



NORTH CORRIDOR NEEDS ASSESSMENT

DESCRIPTION OF THE CORRIDOR

The North Corridor extends from the Charles River in Boston to the New Hampshire border. The corridor is anchored in the south by the Boston neighborhood of Charlestown and the densely populated cities of Everett, Malden, and Medford. Those municipalities are among 13 in the corridor that are located within the Boston Region MPO area; the others are (proceeding north) Melrose, Stoneham, Winchester, Woburn, Wakefield, Burlington, Reading, North Reading, and Wilmington.

This needs assessment addresses only the needs of the municipalities in the Boston Region MPO portion of the corridor. In doing so, however, it must take into consideration conditions and travel activity in other portions of the corridor. This is reflected in the discussion. The portions of the corridor outside of the Boston Region MPO area are not shown in most of the maps.

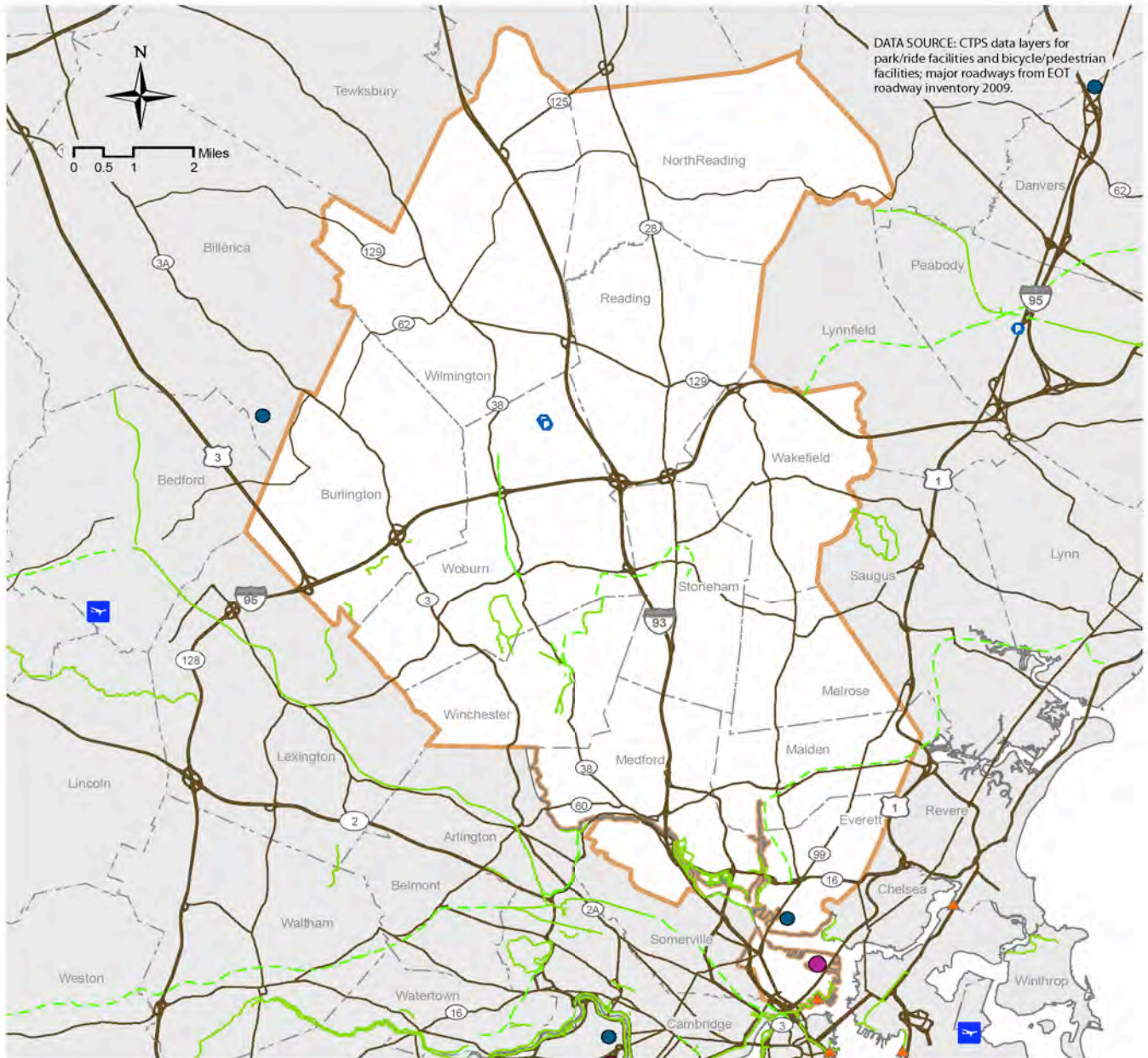
In the northern part of this corridor there are 12 municipalities that are located outside of the Boston Region MPO area: Andover, North Andover, Lawrence, Methuen, and Haverhill, which are in the Merrimack Valley MPO area, and Billerica, Tewksbury, Chelmsford, Lowell, Dracut, Tyngsborough, and Dunstable, which are in the Northern Middlesex MPO area.

EXISTING TRANSPORTATION FACILITIES

The major transportation facilities and services in the North Corridor, broken down by mode, are described here. Although this assessment considers the needs of the Boston Region MPO only, existing transportation facilities outside of the Boston MPO but within the North Corridor are included in this section for informational purposes.

FIGURE 3-1

EXISTING HIGHWAY TRANSPORTATION FACILITIES - NORTH



DATA SOURCE: CTPS data layers for park/ride facilities and bicycle/pedestrian facilities; major roadways from EOT roadway inventory 2009.

- Major highways
 - Carpool-bus park/ride lots
 - ▲ Port facilities/docks
 - ✈ Airports
 - Dedicated bicycle: existing
 - - - Dedicated bicycle: in planning/design
- Intermodal Truck Trip Generators**
- Internal Intermodal Transfer Point
 - Distribution Center
 - External Intermodal Transfer Point

Highway

The major roadways in this corridor are (see Figure 3-1):

- North–south travel: Interstate 93, Route 3, Route 38, and Route 28
- East–west travel: Interstate 95/Route 128, Route 16, Route 60, Route 62, Route 129, Interstate 495, and Route 113

There are 1,250 centerline miles in the corridor:

- State-owned – 94 miles (8%)
- Locally owned – 1,008 miles (80%)
- Privately owned – 148 miles (12%)

There are 253 bridges in the corridor:

- State-owned – 217 (86%)
- Locally owned – 34 (13%)
- Other – 2 (1%)

Of the 253 bridges, 88 (35%) accommodate pedestrians as well as motorists, 13 (5%) are for bicyclists and pedestrians only, 36 (14%) are railroad bridges over highways or water, and 9 (4%) are closed.

Park-and-ride facilities that are not connected with a public transit station are located in Andover, Methuen, Haverhill, and Tyngsborough (all outside of the Boston Region MPO area). They are operated by MassDOT.

Transit

Transit in the corridor includes a variety of modes: commuter rail, intercity rail, rail rapid transit, and bus; see Figure 3-2. A description of the transit services is provided below.

Commuter Rail and Intercity Rail

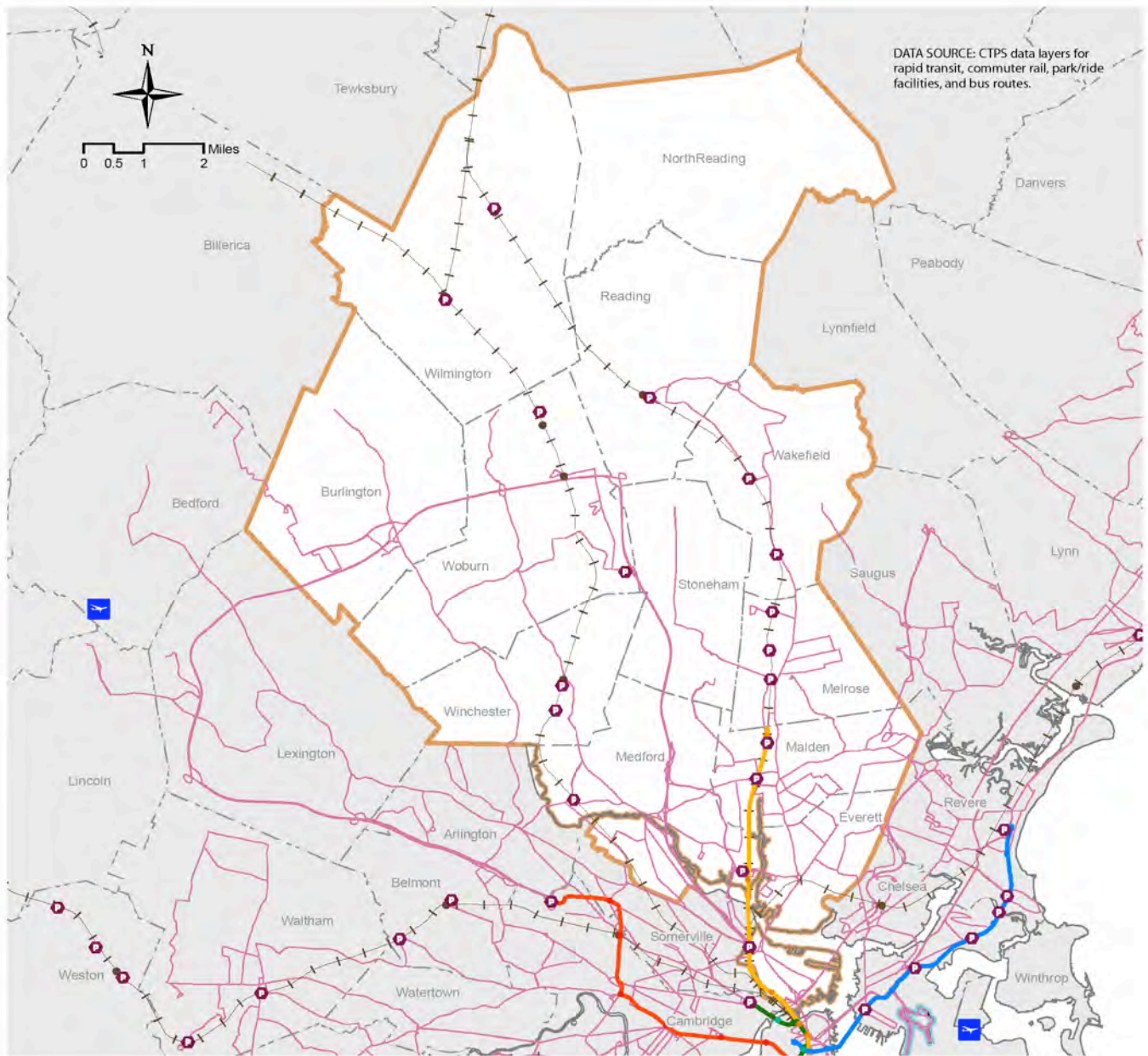
Two MBTA commuter rail lines run through the corridor and provide service into North Station in Boston:

- Haverhill Line, with 13 stations. The stations on the line, along with their numbers of park-and-ride spaces and average utilization rates, and other selected information as applicable, are:
 - Malden – 188 spaces (100% utilization rate); Orange Line station; major bus hub
 - Wyoming Hill (Melrose) – 33 spaces (57% utilization rate)
 - Melrose/Cedar Park – 71 spaces (70% utilization rate)
 - Melrose Highlands – 110 spaces (85% utilization rate); bike parking also
 - Greenwood (Wakefield) – 82 spaces (49% utilization rate); bike parking also



FIGURE 3-2

EXISTING TRANSIT TRANSPORTATION FACILITIES - NORTH



DATA SOURCE: CTPS data layers for rapid transit, commuter rail, park/ride facilities, and bus routes.

- Blue Line
- Green Line
- Orange Line
- Red Line
- Silver Line
- MBTA commuter rail
- MBTA bus routes
- Transit-boat park/ride lots
- Airports

- Wakefield – 159 spaces (60% utilization rate); bike parking also
- Reading – 426 spaces (49% utilization rate); bike parking also
- North Wilmington – 80 spaces (93% utilization rate)
- Ballardvale – 120 spaces (50% utilization rate)
- Andover – 206 spaces (49 % utilization rate)
- Lawrence – 709 spaces (73% utilization rate)
- Bradford – 303 spaces (19% utilization rate)
- Haverhill – 173 spaces (42% utilization rate)
- Lowell Line, with eight stations. The stations on the line, along with their numbers of park-and-ride spaces and average utilization rates, and other selected information as applicable, are:
 - West Medford – 61 spaces (97% utilization rate)
 - Wedgemere (Winchester) – 170 spaces (100% utilization rate)
 - Winchester Center – 152 spaces (91% utilization rate); bike parking also
 - Mishawum (Woburn) – limited daily trips; parking facility is closed
 - Anderson/Woburn – 1,540 spaces (60% utilization rate); bike parking also; part of Anderson Regional Transportation Center (see Intermodal Facilities [Passenger], below)
 - Wilmington – 191 spaces (80% utilization rate)
 - North Billerica – 541 spaces (77% utilization rate)
 - Lowell – 870 spaces (75% utilization rate)

Amtrak operates its Downeaster service on sections of the Haverhill and Lowell commuter rail lines and on Pan Am Railway lines. It departs from North Station in Boston and provides service through New Hampshire up to Portland, Maine.

MBTA Rail Rapid Transit

The northern arm of the MBTA's Orange Line provides direct or indirect access to the MBTA rapid transit system and the entire transit network for many municipalities in the corridor. Service can be directly accessed at five stations:

- Community College (Charlestown) – no park-and-ride spaces; majority of access is walk access or drop-off
- Sullivan Square (Charlestown) – 600 park-and-ride spaces; major bus hub (100% utilization rate)
- Wellington (Medford) – 2,450 park-and-ride spaces; major bus hub (99% utilization rate)



- Malden – 204 park-and-ride spaces; commuter rail station; major bus hub (100% utilization rate)
- Oak Grove (Malden) – 788 park-and-ride spaces (100% utilization rate)

Bus

Numerous public bus services operate in or through the corridor:

- MBTA express buses – (7 routes) These serve Woburn, Burlington, and parts of Medford and terminate at points in Boston Proper.
- MBTA local buses (26 routes) – Some of the local bus routes anchored at the Orange Line stations offer circumferential connections to destinations in the Northeast or Northwest Corridor. In addition, some local bus routes in the North Corridor link the municipalities of Winchester, Melrose, Stoneham, Wakefield, and Reading to Boston.
- Lowell Regional Transit Authority buses (18 routes) – These radiate from Lowell Station in the northern part of corridor, largely outside of the Boston Region MPO area. One provides service to the Burlington Mall with a connection to MBTA service.
- Merrimack Valley Regional Transit Authority buses (23 routes) – These operate in the northern part of corridor, outside of the Boston Region MPO area.
- Private bus carriers – Private bus carriers providing service outside of the Boston Region MPO travel through the corridor but do not provide service to it.



Intermodal Facilities (Passenger)

The Anderson Regional Transportation Center is located in Woburn adjacent to Interstate 93 at Exit 37C and to Route 128/ Interstate 95 near the Washington Street exit. The transportation services at this location are Amtrak service to Portland, Maine, MBTA commuter rail (Lowell Line) service to North Station, Logan Express bus service to Logan Airport, shuttle service to Manchester-Boston Regional Airport, park-and-ride spaces, and bicycle parking.

Connections to MBTA Service from Other Regional Transit Authorities' Services

The two regional transit authorities (RTAs) that serve the corridor provide connections to MBTA services. However, the RTAs provide local service on even headways

that do not always coincide with MBTA service. The Lowell Regional Transit Authority (LRTA) operates from the terminal of the MBTA's Lowell commuter rail line and provides a connection to that line. The Merrimack Valley Regional Transit Authority (MVRTA) provides very few opportunities to make transfers between the bus routes and commuter rail.

Transportation Management Associations

The following transportation management associations (TMAs) provide service in the corridor:

- Route 128 Business Council – provides shuttle bus service for members of the business council in the Route 128/West corridor from Woburn to Needham; the shuttle serves the municipalities of Woburn, Burlington, Lexington, Waltham, Weston, Newton, Wellesley and Needham.
- The Junction Transportation Management Organization – provides commuter services to its members in the Ballardvale Street/Lowell Junction area of Andover and Wilmington and nearby areas.

Freight

Truck Freight

Trucks are the dominant freight mode in the Boston Region MPO area. They operate on all roadways in the region to transport goods and make deliveries. In this analysis, trucks include three categories of vehicle: tankers, tractor-trailer trucks, and business pick-up trucks and vans. The following is a list of the highways in the corridor with the highest current volumes of daily truck traffic:

- Interstate 95 from Interstate 93 west to Route 3, with volumes ranging from 11,000 to 15,000 trucks per day
- Interstate 95 from Interstate 93 east to Route 1, with volumes ranging from 5,000 to 11,000 trucks per day
- Interstate 93 from Interstate 95 north to the Boston Region MPO border, with volumes ranging from 5,000 to 11,000 trucks per day
- Interstate 93 from Interstate 95 south to Route 60, with volumes ranging from 9,000 to 11,000 trucks per day
- Route 3 from Interstate 95 north to the Boston Region MPO border, with volumes ranging from 5,000 to 9,000 trucks per day

Rail Freight

Pan Am Railways operates in the corridor as an important rail link for the paper and lumber industry in northern New England. It also carries intermodal and merchandise traffic to Pan Am's intermodal facility at the Devens Commerce Center in Ayer, Massachusetts.

Pan Am operates a train carrying sand to Boston Sand and Gravel and has rights



to the tracks into Massport's Moran Terminal (part of the Boston Autoport) in Charlestown along the Mystic Wharf Branch. Massport purchased this rail line from Pan Am in 2002 to preserve rail access to the port. However, in 2005 it was granted a Discontinuation of Service Exemption to discontinue service over this line. This branch should be considered "inactive" rather than "abandoned."

Pan Am operates on rail owned by MassDOT in northern Massachusetts. MassDOT owns the Lowell and Haverhill commuter rail lines in the North Corridor, but the lines are operated as shared-use facilities with Pan Am Railways. Pan Am dispatches commuter rail operations for both of these MBTA lines on the outer ends of the lines.

Marine Freight

Marine facilities in the corridor include the Moran Terminal and Mystic Pier One, located in Charlestown (see Figure 3-1). In 1998, the two facilities were converted and leased to the Boston Autoport. The Boston Autoport is used for importing and processing automobiles. Currently the automobiles are transported by truck-carriers that access the terminal via Medford Street to Sullivan Square or via Medford Street to Chelsea Street to City Square. As discussed above, this facility has the potential for rail service along the Mystic Wharf Branch.

Two additional facilities are located along the waterfront in Charlestown. Mystic Piers, located just east of the Tobin Bridge, is used to import, store, and distribute salt. The Medford Street Terminal was bought by Massport to ensure that the area would remain available for marine-cargo use.

Air Freight

There are no freight airport facilities in the corridor.

Intermodal Freight Facilities

The facilities located in the Boston Region MPO portion of the corridor are shown in Figure 3-1 and listed below:

- Boston Autoport, Charlestown
- ITZ-Ohlson Transport (Distribution Center), Everett

The facilities located in the corridor outside of the Boston Region MPO area are:

- R&C Distribution Center, Billerica
- New Balance Distribution Center, Lawrence

Air

There are no airports in the corridor.

Bicycle

Bicycle Paths

The corridor has one bicycle path, the Mystic River Reservation Bike Path, located in Somerville and Everett. Currently, there are four bicycle paths proposed – the

Tri-Community Bikeway in Winchester, Woburn, and Stoneham; the Northern Strand Community Trail (formerly Bike to the Sea) in Everett and Malden; the Woburn Loop Bikeway in Woburn; and the Minuteman Bikeway Extension located in Billerica. These are shown in Figure 3-1.

On-Road Bicycle Accommodations

Table 3-1 shows the percentage of centerline miles in each of the Boston Region MPO municipalities in the corridor that have on-road bicycle accommodations, classified as roadways with bicycle lane(s) or shoulder(s) of four feet or greater. Charlestown is not included in this table but is included in Chapter __ Central Area.

TABLE 3-1

PERCENTAGE OF ROADWAYS WITH BICYCLE ACCOMMODATIONS

MUNICIPALITY	TOTAL NON-INTERSTATE CENTERLINE MILES	CENTERLINE MILES WITH BICYCLE LANE(S)	CENTERLINE MILES WITH FOUR-FOOT SHOULDER(S)	PERCENTAGE OF CENTERLINE MILES WITH BICYCLE ACCOMMODATIONS
Burlington	113	0.00	0.33	0.29%
Everett	61	0.37	0.43	1.17%
Malden	109	0.58	1.29	1.72%
Medford	133	0.00	0.30	0.23%
Melrose	87	0.00	0.77	0.94%
North Reading	117	0.00	1.57	1.32%
Reading	98	0.00	3.14	3.20%
Stoneham	79	0.00	0.25	0.32%
Wakefield	103	0.00	0.00	0.00%
Wilmington	119	0.00	0.00	0.00%
Winchester	92	0.00	0.00	0.00%
Woburn	147	0.00	0.00	0.00%
TOTAL	1,226	0.90	7.83	0.7%

Bicycle Parking

The MBTA has provided bicycle parking at various commuter rail and rapid transit stations in the corridor (see lists of rail stations, above). Also, the MBTA has secured funding for bike racks on all MBTA buses; therefore, the riders in this corridor will be able to take their bicycles on the bus. Municipalities in the corridor that recently installed bike racks funded by the Boston Region MPO are:

- Medford
- Reading



- Wilmington
- Winchester

Municipalities planning bike rack installations are:

- Everett
- Malden
- Melrose
- Stoneham
- Woburn

Pedestrian

Table 3-2 shows the percentage of roadways in each of the Boston Region MPO municipalities in the corridor that have sidewalks on at least one side. Charlestown is not included in this table but is included in Chapter __ Central Area.

TABLE 3-2

PERCENTAGE OF ROADWAYS WITH SIDEWALKS

MUNICIPALITY	TOTAL CENTERLINE MILES	CENTERLINE MILES WITH SIDEWALKS ON AT LEAST ONE SIDE	PERCENTAGE OF CENTERLINE MILES WITH SIDEWALKS
Burlington	113	24	22%
Everett	64	56	88%
Malden	109	88	81%
Medford	133	105	79%
Melrose	82	57	70%
North Reading	87	38	43%
Reading	98	48	49%
Stoneham	79	46	58%
Wakefield	103	66	64%
Wilmington	119	31	26%
Winchester	92	49	53%
Woburn	147	67	46%
TOTAL	1,226	675	55%

The sidewalk coverage in the North Corridor varies widely from 22% coverage in Burlington to 88% in Everett. Overall, the North Corridor ranks above the regional average.

LAND USE AND DEMOGRAPHICS

Demographics

Population

The largest densely populated areas in the North Corridor are within Charlestown,

Everett, Medford, and Malden. The areas that are projected to become more densely populated between 2009 and 2035 include already developed areas along the Orange Line and commuter rail. In general, population is projected to remain relatively stable, with most municipalities experiencing moderate gains or losses (see Figure 3-3).

According to U.S. census data (updated annually at the town level), the corridor's 2009 population was 366,350. In the Metropolitan Area Planning Council's (MAPC's) MetroFuture forecasts, the corridor's population increases by __%, to ___ by 2035 (MetroFuture is described briefly below). The municipalities projected to have the largest absolute growth are _____ (municipalities).

Figure 3-4 shows, by community for 2009, total elderly (age 70 or higher) population and the percentage of elderly residents. This information can be used to assess the types of transportation services needed now and in the future. As shown in Figure 3-4, Wakefield, Stoneham, Melrose, Medford, and Winchester currently have the highest percentages of elderly residents.

Land Use, Housing, Sustainable Transportation

As of the year 2000, there were 142,000 housing units in the North Corridor. One quarter of these units (35,000) were within ½ mile of Orange Line or commuter rail service, with the highest population densities around the Malden Center Station (approximately 21,000 people per square mile.)

From 2000 – 2009, North Corridor municipalities issued building permits for 7,481 new housing units (according to the US Census Bureau), a 5.3% increase. Leading the way were North Reading and Burlington, with more than 1,200 units each.

In 2007 and again in 2010, MAPC surveyed municipalities about recent and anticipated development. Much of the recent development is oriented around the Orange Line Stations in Medford, Malden, and Melrose, with more than 1,110 units near Station Landing, 400 in Malden Center, and 550 new units near Oak Grove. There are currently at least 600 additional units planned near the Malden Center and Oak Grove Stations.

Auto ownership and household vehicle miles travelled are slightly above the regional average, at 1.6 autos per household and 48.0 miles per household per day for passenger vehicles. These rates vary widely, however, with North Reading, Wilmington, and Burlington both exceeding 2.0 vehicles per household and 64 miles per household per day. Everett, Malden, Medford, and Melrose are all at or below the regional average of 1.5 vehicles per household and 47 miles per household per day.

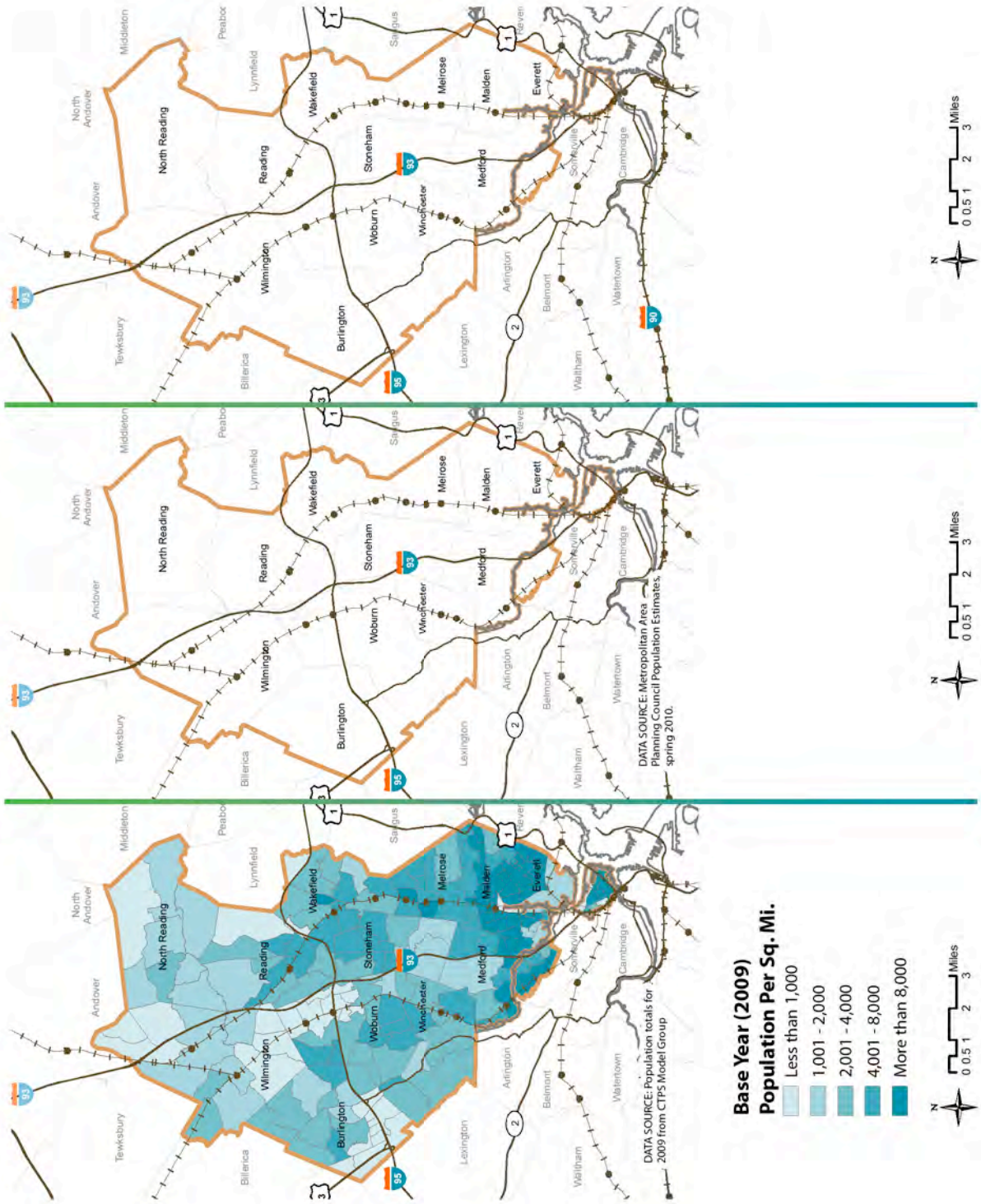
Employment

The areas with the highest numbers of jobs are concentrated in the municipalities of Woburn, Burlington, and Wilmington, in the municipalities closest to Boston, along Interstates 93 and 95 and commuter rail lines, and in older downtowns (Figure 3-5). According to the Executive Office of Labor and Workforce Development, the North Corridor's 2009 employment was 186,339, down from nearly 203,000



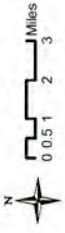
FIGURE 3-3

POPULATION DENSITY BY TRANSPORTATION ANALYSIS ZONE



Base Year (2009)
Population Per Sq. Mi.

- Less than 1,000
- 1,001 - 2,000
- 2,001 - 4,000
- 4,001 - 8,000
- More than 8,000



DATA SOURCE: Metropolitan Area
Planning Council Population Estimates,
spring 2010.

DATA SOURCE: Population totals for
2009 from CTPS Model Group

FIGURE 3-4

ELDERLY POPULATION BY TOWN - 2008

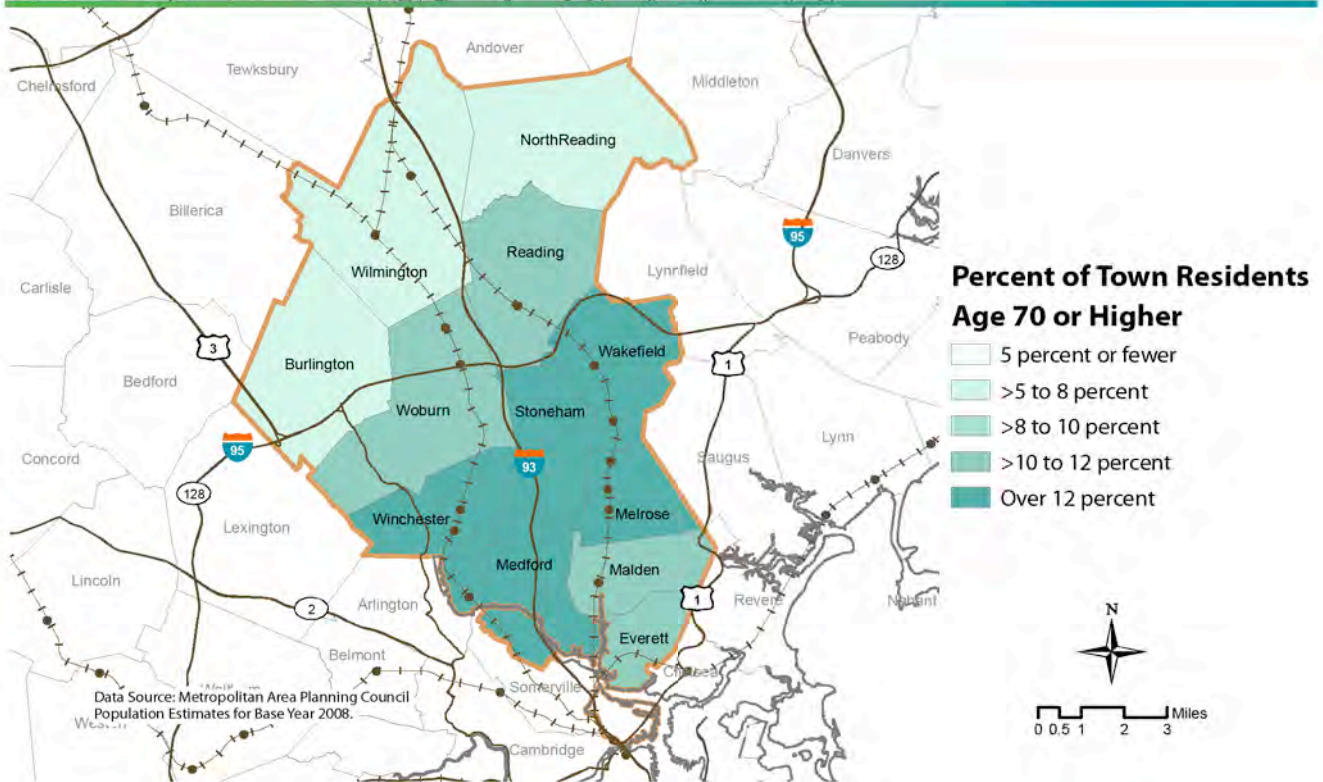
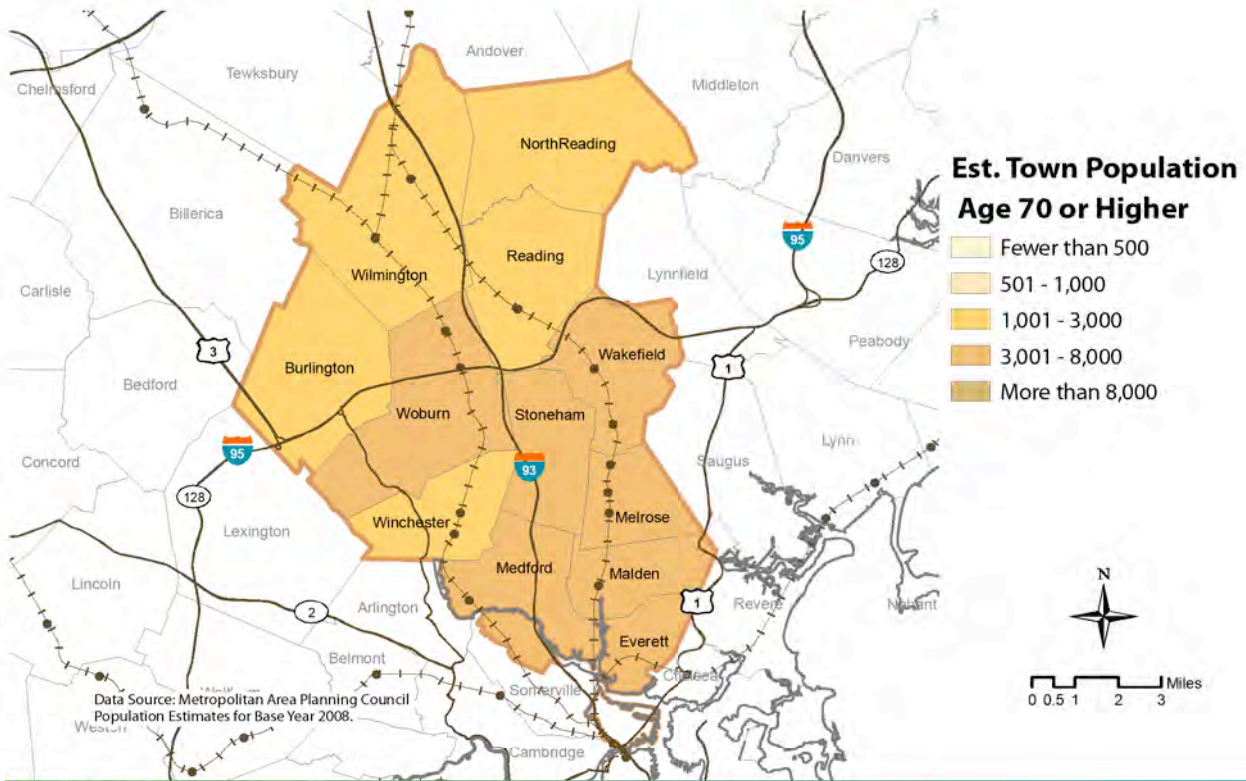
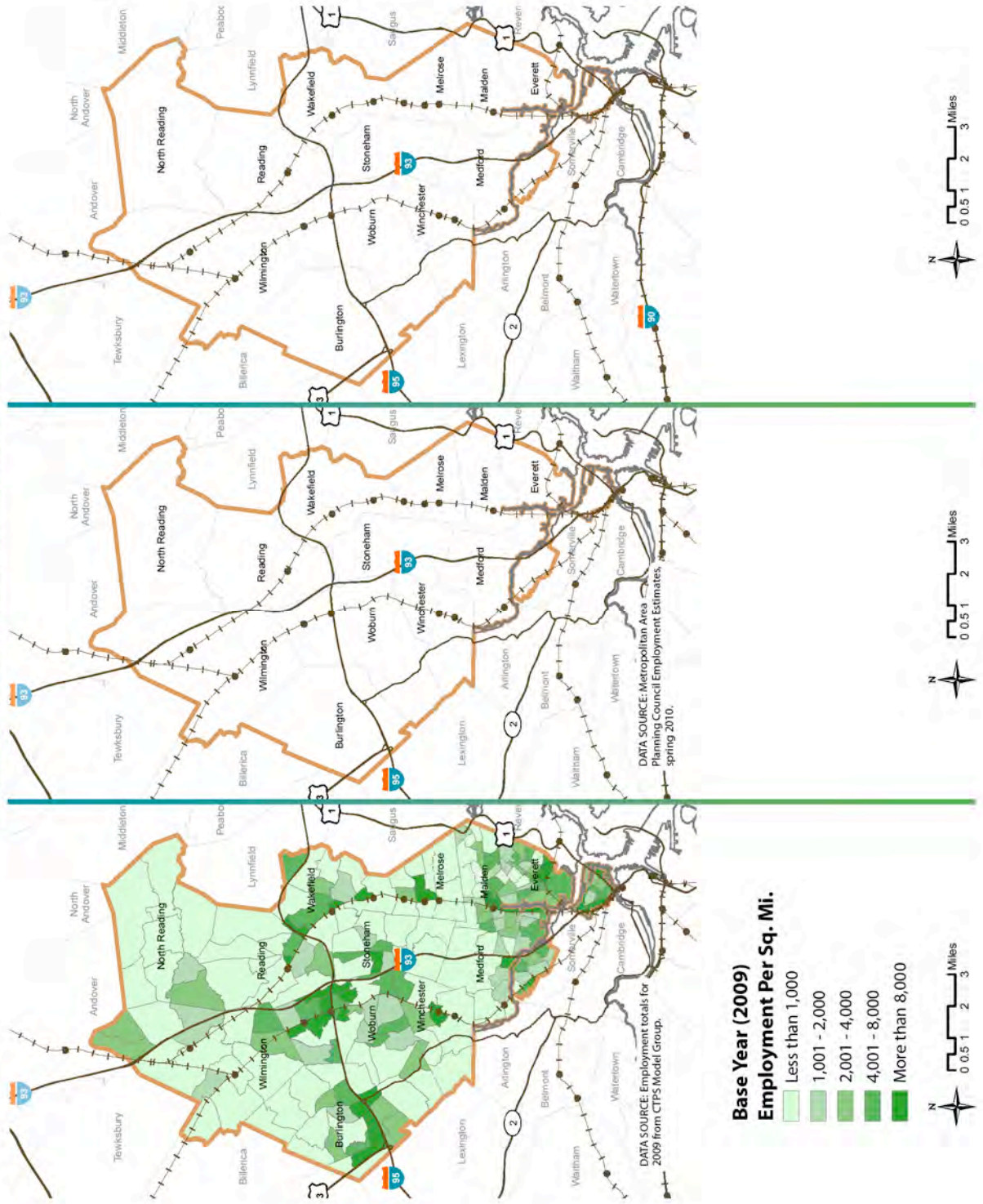


FIGURE 3-5

EMPLOYMENT DENSITY BY TRANSPORTATION ANALYSIS ZONE



in 2001. Approximately half of this employment is in Woburn, Burlington, and Wilmington. These are also the areas with the highest commuting VMT per worker; in both Burlington and Wilmington, the average worker drives more than 17 miles to and from work each day. Only 6% of commuting miles to those municipalities are traveled by a mode other than transit. In Malden, Medford, Melrose, and Everett, more than 17% of commuting miles are traveled by transit, biking or walking. As a result, these communities generate just 6 round trip auto miles per commuter.

MAPC's MetroFuture forecasts show employment increasing by __%, to _____ by 2035, with most municipalities experiencing modest growth in absolute terms. Increases in employment density between 2009 and 2035 are projected to occur through redevelopment of underutilized industrial land along the Orange Line and Commuter Rail corridors (such as the Station Landing and Rivers Edge developments in Medford), as well as through expansion and densification of existing employment centers along Route 128 and I-93 (such as the recent expansion of the Lahey Clinic in Burlington.)

The Lowell Junction development proposed for Wilmington, Andover, and Tewksbury is projected to have approximately 3 million square feet of commercial and industrial space. The Wilmington census tract included in that development has among the highest auto VMT per commuter in the Corridor (22 auto miles per commuter per day.) At average occupancy rates of 2.5 employees per 1,000 square feet, this development could generate over 160,000 auto commuting miles per day.

MetroFuture Plan

MetroFuture is a long-range plan for land use, housing, economic development, and environmental preservation in the Boston Region, comprising both a vision for the region's future and a set of strategies to achieve that future. The MetroFuture land use plan and associated socioeconomic projections are used in the MPO's travel demand model. MetroFuture seeks to create a more sustainable future for the region by focusing growth in areas where it already exists, in order to make better use of existing infrastructure and reduce the need for new highways, interchanges, and other infrastructure. MetroFuture classified municipalities into four distinct community types based on existing conditions and potential for sustainable development. The North Corridor includes three Inner Core communities (Malden, Medford, Melrose), and one Regional Urban Center (Woburn.) The remaining towns are Maturing Suburbs.

The MetroFuture land use vision for the North Corridor is built around redevelopment of commercial and industrial land along the Orange Line Corridor and at commuter rail stations. In these locations, new households will have the greatest access to transit and the highest proximity to common household destinations. The recent and planned developments along the Orange Line demonstrate a demand for this type of development, which can be satisfied through additional redevelopment of underutilized commercial and industrial land.

Economic development along the Orange Line and commuter rail stations will also create more options for commuters, especially if transit service is structured to serve reverse commutes from the Inner Core to suburban job locations near transit. In

locations more distant from transit, MetroFuture recommends land use, design, and transportation demand strategies that facilitate transit and bicycle or pedestrian access. For example, the Northwest Park redevelopment in Burlington has the potential to increase employment density while also dramatically shifting commute trips to alternative modes through parking strategies, pedestrian oriented design, and increased transit service to nearby population centers and transit hubs.

Municipal Planning

Municipalities in the corridor have adopted or opted in to contemporary planning initiatives and other planning activities that promote economic development, smart growth, healthy transportation, and greenhouse gas emission reductions. The programs and participating municipalities are shown in Table 3-3. A description of these programs was provided in Chapter 1.

The MPO does not have direct control over land use decisions; land use is controlled by local municipalities through zoning. However, the MPO can use this information in its decision-making when choosing projects to fund in its LRTP and Transportation Improvement Program. Projects can be ranked based on how well the community is implementing the smart growth and healthy transportation initiatives in addition to whether a project reduces GHG emissions.

TABLE 3-3

MUNICIPAL PLANNING COMMUNITY CHECKLIST

MUNICIPALITY	ECONOMIC DEVELOPMENT			SMART GROWTH							LAND USE			PUBLIC HEALTH			CLIMATE CHANGE		
	PWED	Approved 40R District	TMA	TOD & Housing Support	Approved 43D Site	Regional Hub	Suburban Center	Urban Center	Maturing Suburb	Growth Districts Initiative	District Local Tech. Asst.	TOD District	Mixed Use Zoning District	Comm. Preservation Act	Mass In Motion	Safe Routes to School	WCW	ICLEI Member	Green Community
Burlington			•		•	•			•	•	•		•						
Everett			•								•				•				
Malden									•	•		•	•			•	•		
Medford											•		•		•			•	•
Melrose						•					•		•		•				•
North Reading		•			•				•				•						
Reading		•					•		•				•		•			•	
Stoneham									•				•		•		•		
Wakefield									•		•		•		•				
Wilmington			•		•	•	•		•				•						
Winchester									•				•					•	
Woburn			•			•	•						•		•				

TRAVEL CHARACTERISTICS

Travel into Boston Proper from the North Corridor (Highway and Transit)

The most recent traffic-count information for travel into Boston Proper from the North Corridor is shown in Table 3-4. Also included, is the same information from the travel demand model showing projected future 2030 No-Build conditions. Boston Proper is the area with the following boundaries:

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

TABLE 3-4

AVERAGE DAILY HIGHWAY AND TRANSIT PERSON-TRIPS INTO BOSTON PROPER FROM THE NORTH CORRIDOR (2008 AND 2030 NO-BUILD)

	2008 PERSON-TRIPS	2030 NO-BUILD PERSON-TRIPS
Highway	131,300	136,290
Transit	56,670	58,070
Total	187,970	194,360
Highway percentage	70%	70%
Transit percentage	30%	30%
Corridor's share of total person trips into Boston	19%	19%

Table 3-5 gives the modal breakdown of the transit trips.

TABLE 3-5

AVERAGE DAILY TRANSIT PERSON-TRIPS BY MODE INTO BOSTON PROPER FROM THE NORTH CORRIDOR (2008 AND 2030 NO-BUILD)

	2008 PERSON-TRIPS	2030 NO-BUILD PERSON-TRIPS
Bus	2,490	2,620
Rapid transit	45,700	47,490
Commuter rail	8,480	7,960
Contracted bus service	0	0
Ferry	0	0
TOTAL	56,670	58,070
Corridor's share of total transit trips into Boston	16%	15%

Inbound congestion levels on each of the three major modes of transit entering Boston Proper from the North Corridor were calculated via two methods: by comparing the peak ridership loads to the seating capacity and to the planning capacity (planning capacity is the seating capacity plus standing capacity). The 2008 congestion levels for each mode are shown in Table 3-6.

TABLE 3-6

PEAK CONGESTION LEVELS ON TRANSIT MODES WITH SERVICE INTO BOSTON PROPER FROM THE NORTH CORRIDOR (2008)

MODE	BY SEATING CAPACITY	BY PLANNING CAPACITY
Rail	126%	90%
Rapid transit	78%	34%
Commuter rail	64%	53%

Travel within the Inner North Corridor and Travel between It and Other Corridors (Highway and Transit Combined)

Figure 3-6 presents data, for both the base year 2008 and the proposed 2030 No-Build scenario, on the person-trips (highway and transit combined) that originate in and are destined to the North Corridor. The 2030 No-Build assumes the realization of the projected MetroFuture population and employment with the existing transportation network.

As shown, 52% of person-trips in the 2008 base year and 53% of person-trips in the 2030 No-Build scenario remain in the inner North Corridor (municipalities within the Boston Region MPO). Other travel to and from the inner North Corridor includes the outer North (municipalities in the North Corridor but not in the Boston Region MPO), Northwest and Northeast corridors and the Central Area. In total, travel within the North and adjacent corridors accounts for 96% of all person-trips associated with the North Corridor. The Central Area is the region's most prominent population and employment area within the region, and it includes the North Corridor municipalities of Everett, Malden, Everett, and Charlestown. The remaining 4% of the person-trips travel to the remaining corridors. In comparing 2008 base and the 2030 No-Build travel, the latter includes slightly more travel within the inner North Corridor and slightly less to or from the surrounding corridors. The only increase in travel in the future is projected to be in travel destined to the North Corridor from the Northwest Corridor.

Truck Travel

Daily truck trip-ends per square mile are shown in Figure 3-7 along with the locations of freight intermodal facilities. This figure shows that the highest concentrations of 2008 daily truck activity occur around the Boston Autoport intermodal facility in Charlestown, around the ITZ-Ohlson Transport Distribution Center and the fuel distribution facility in Everett, and along Interstate 95 at the intersection of Interstate 93 in Woburn and between Routes 3 and 3A in Burlington. Other areas

FIGURE 3-6

TRAVEL ASSOCIATED WITH THE NORTH CORRIDOR
(2008 AND 2030 PERSON TRIPS)

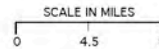
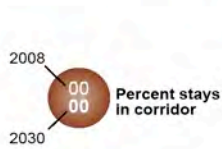
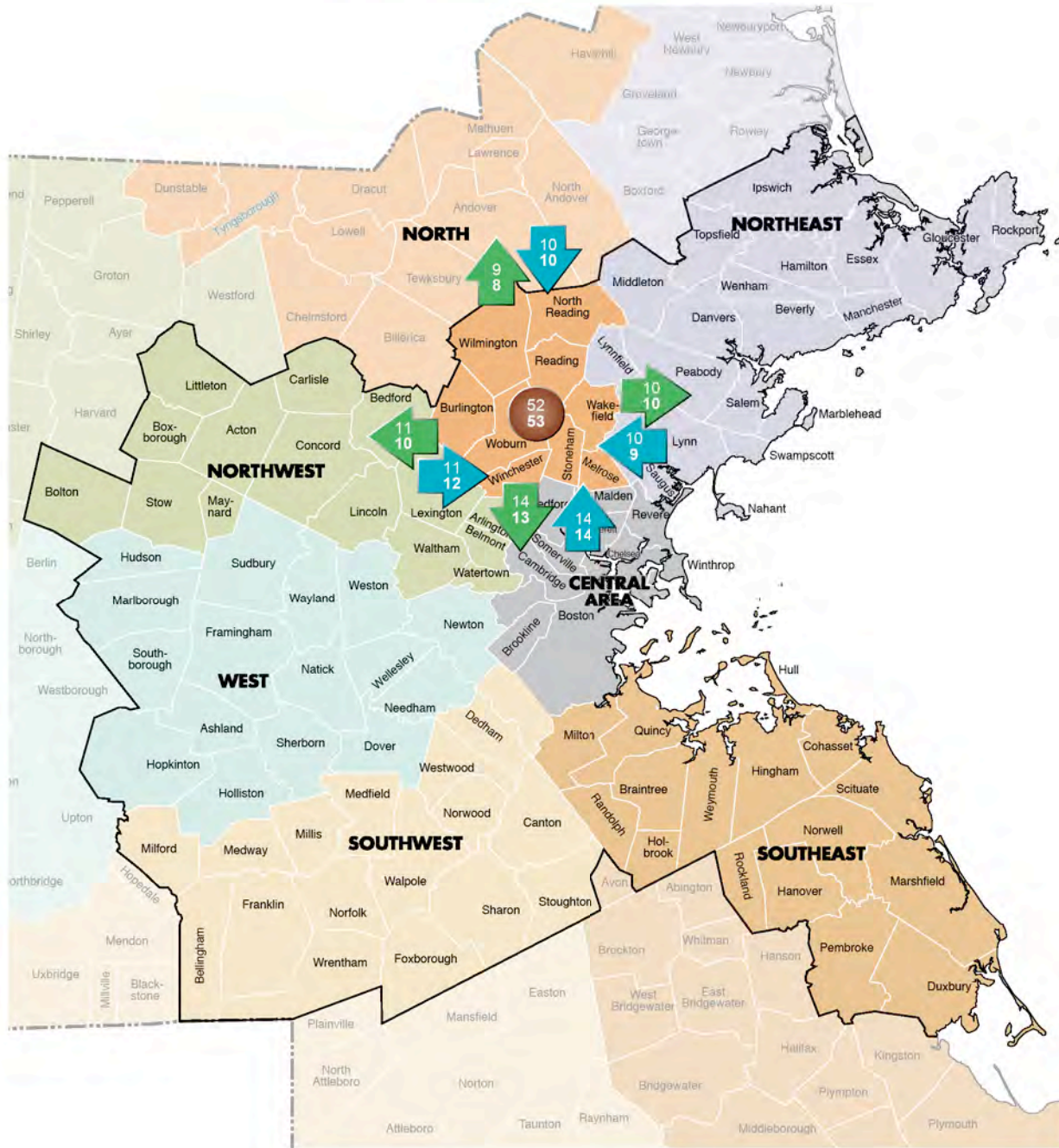
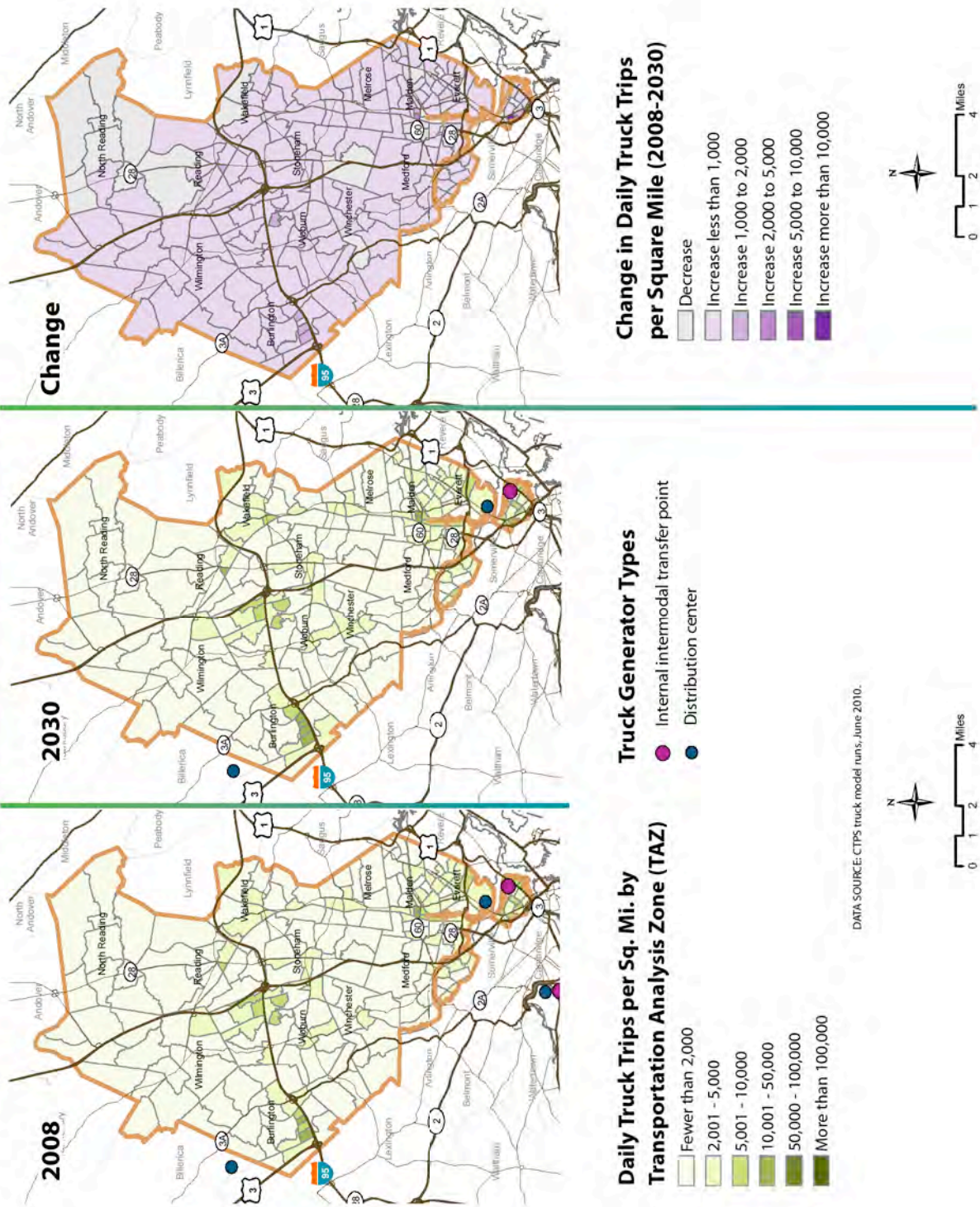


FIGURE 3-7

DAILY TRUCK TRIPS BY TRANSPORTATION ANALYSIS ZONE



with high levels of truck travel include Route 28 in Wakefield, Melrose, and Malden and Route 38 in Woburn and Winchester.

Bicycle and Pedestrian Travel

Bicycle counts are not available for any of the off-road or on-road facilities in the North Corridor, and pedestrian counts are not available for any off-road facilities or other locations.

IDENTIFIED TRANSPORTATION ISSUES

System Preservation and Modernization

Highway

Roadways

The Boston Region MPO is the most densely populated MPO in the state. The conditions of its roadways are under constant pressure from high traffic volumes and harsh weather conditions. Because of this and the advanced age of much of its infrastructure, the roadways require significant preservation activities. Pavement needs were not calculated at a corridor level but have been calculated for the MPO region as a whole. That information is provided in Chapter __.

Bridges

Condition: In Massachusetts, bridge conditions are determined through a nationally adopted rating system based on a number of standards, including structural adequacy, safety, serviceability, traffic, and public use. The system classifies bridges according to three conditions: 1) meeting standards, 2) functionally obsolete, and 3) structurally deficient. Functionally obsolete means that the bridge fails to meet current traffic demands or highway standards such as bridge width, traffic volume, or condition of approach roadways. Inclusion in this category does not necessarily mean there is an imminent safety concern. Structurally deficient means that deterioration has reduced the load-carrying capacity of the bridge and is an indication that reconstruction may be necessary. Of the 253 bridges in the North Corridor, 56 (22%) are classified as functionally obsolete, and 10 (4%) are classified as structurally deficient.

Vertical Clearance: The desired vertical clearance for trucks on highways as outlined in the *2006 Massachusetts Highway Department Project Development and Design Guide* is sixteen feet and six inches. This allows for the larger truckloads that are becoming more prevalent. There are 114 bridges in the corridor that should meet this vertical clearance for trucks. Of these bridges, 86 (75%) do not meet this standard.

Highway Bridge Weight Restrictions: Closed bridges and weight-restricted bridges cost truckers time and money due to increased fuel consumption, longer delivery times, and other inefficiencies. There are 13 (5%) weight-restricted bridges in the North Corridor.



Transit: Universe of Transit Preservation and Modernization Needs and Methods Proposed to Meet Them Identified in the MBTA's Program for Mass Transportation for the North Corridor

The MBTA's Program for Mass Transportation approved in December 2009 provides information on current and proposed transit needs. Specific transit needs or issues regarding system preservation and modernization in the North Corridor are as follows:



State-of-Good Repair Projects

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.

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.

Infrastructure Enhancements

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. This includes facilities, power, track/right-of-way, and signals projects for the Lowell Line and Haverhill commuter rail.

ADA Accessibility

Some gaps remain in providing ADA Accessibility. The following stations are not accessible:

- Lowell Line (Wedgemere, West Medford, and Winchester)
- Haverhill Line (Greenwood, Melrose Cedar Park, North Wilmington, Wakefield, and Wyoming Hill)

Freight

Weight Restricted Tracks

The tracks in the North Corridor are restricted to 263,000 pounds per train car. The industry standard has become 286,000 pounds. This increases costs to Massachusetts shippers who need more cars to move their freight than those in other areas with access to 286,000 pound tracks.

Truck Rollover Crashes

A high percentage of the lane-departure crashes in the MPO region are truck rollovers occurring at the Interstate 93/Interstate 95 interchange in Woburn.

Dredging

The channel into the Port of Boston, which provides access into the Charlestown terminals, is currently dredged to a depth of 40 feet but needs to be at least 45 feet deep in order to accommodate ships of deeper draft.

Mobility

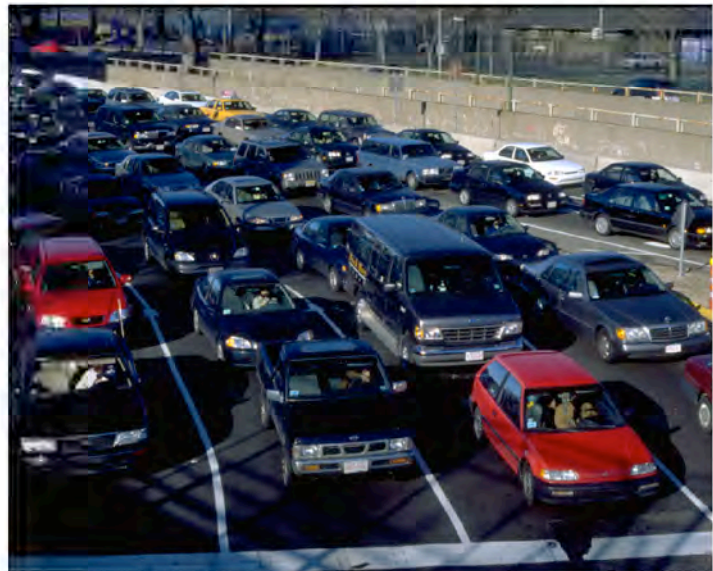
Highway Bottlenecks: Method for Identifying Them

A highway bottleneck is defined as a location where a constraint impedes the flow of traffic. The constraint at a bottleneck can be caused by, among other things, close spacing of intersections operating near or at capacity, a lane drop, or the confluence of large volumes of traffic at an interchange connecting two major highways.

Bottlenecks can be identified using a number of methods. For identifying those in the North Corridor, three types of data that the Boston Region MPO collects or produces for freeways and arterials have been used:

- Travel speed index during peak periods (existing)
- Volume-to-capacity ratio during peak periods (existing and future)
- Intersections given priority by the Congestion Management Process (CMP) for improvement

Information of each type for the North Corridor is presented in the following three subsections. Based on that information, the worst bottlenecks in the corridor were identified; these are listed in the subsequent section.



Travel Speed Index (from the CMP)

Congestion thresholds have been established for freeways and arterials using existing travel speed index data and are used in this determination of bottlenecks. The speed index is the ratio of observed speed to the posted speed limit. The locations on freeways and Class I and II arterials that have the worst speed indexes are shown in Table 3-7 for the AM peak period and Table 3-8 for the PM peak period. Freeways are multilane, divided highways with fully controlled limited access. Class I and II arterials are defined as higher-speed arterials (those with some degree of limited access) and partially limited-access highways (on the remainder of the arterial roadway network, classified as Urban Street Class III, bottlenecks have been identified by way of the CMP's assessment of intersections; see CMP Priority Intersections, below). This information is provided for existing conditions only.

TABLE 3-7

**TRAVEL SPEED INDEXES (FROM THE CMP):
WORST LOCATIONS* IN AM PEAK PERIOD**

FREWAYS	SPEED INDEX
I-93 southbound between Menivale Ave. & Everett Connector (Medford, Boston, Stoneham)	0.52 to 0.74
Rte.3 southbound @ I-95 (Burlington)	0.52
Rte. 4 northbound @ I-95 (Burlington)	0.69
I-95 southbound between Rte. 28 & Rte. 3 (Reading, Burlington, Wakefield, Woburn)	0.75 to 0.89
CLASS I & II ARTERIALS	SPEED INDEX
Rte. 28 between Rte. 60 & Rte. 16 (Medford)	0.44 to 0.62

*Where multiple communities are listed for a roadway, they are in descending order of severity.

TABLE 3-8

**TRAVEL SPEED INDEX (FROM THE CMP):
WORST LOCATIONS* IN PM PEAK PERIOD**

FREWAYS	SPEED INDEX
I-93 northbound between Rte. 1 & I-95 (Stoneham, Medford, Boston, Reading)	0.50 to 0.69
Rte. 3 northbound & southbound @ I-95 (Burlington)	0.69 to 0.73
I-95 southbound between Rte.3A and Rte. 3 (Burlington)	0.78 to 0.80
I-95 northbound between Rte. 38 & Rte. 28 (Woburn and Reading)	0.80 to 0.86
I-95 southbound between Rte. 38 & I-93 (Reading)	0.88
CLASS I & II ARTERIALS	SPEED INDEX
Rte. 28 between Rte. 16 & Rte. 60 (Medford)	0.39 to 0.58

*Where multiple communities are listed for a roadway, they are in descending order of severity.

Volume-to-Capacity Ratio

The existing volume-to-capacity ratios (V/Cs) of freeway and arterial segments in the North Corridor were calculated using the roadways' existing traffic volumes and capacities. The V/C is an indication of the operational quality of a roadway segment. A roadway is reaching capacity as the V/C begins to approach 1. Table 3-9 presents the segments of roadways in the North Corridor with the highest V/Cs during the AM peak period, listed in descending order of severity. Table 3-10 presents the same information for the PM peak period. Order of severity was determined based on all data points and is therefore not always reflected in the ranges shown in the tables.

TABLE 3-9

**VOLUME-TO-CAPACITY RATIO (V/C):
WORST LOCATIONS* IN AM PEAK PERIOD, 2008**

FREEWAYS	V/C
Rte. 3 @ I-95 (Burlington)	Greater than 1
I-93 southbound between Rte. 1 & Roosevelt Circle (Boston, Somerville, Medford)	0.8 to greater than 1
I-95 southbound between North Ave. & I-93 (Wakefield, Reading)	0.7 to greater than 1
I-95 southbound between Cambridge St. & Rte. 3 (Burlington)	0.8
I-93 southbound between Rte. 129 & Atlantic Avenue (Wilmington, Woburn)	0.8
ARTERIALS	V/C
Rte. 99 between Revere Beach Pkwy. & the Malden Bridge (Everett)	0.9 to greater than 1
Rte. 1 (Tobin Bridge) (Chelsea to Boston)	Greater than 1
Rte. 3A between Billerica town line & Woburn town line (Burlington)	0.7 to greater than 1
Mystic Valley Pkwy. (Winthrop St. to Main St. (Medford)	0.8 to greater than 1

*Where multiple communities are listed for a roadway, they are in descending order of severity.

TABLE 3-10

**VOLUME-TO-CAPACITY RATIO (V/C):
WORST LOCATIONS* IN PM PEAK PERIOD, 2008**

FREEWAYS	V/C
I-93 southbound between Broadway & Rte. 1 (Boston, Somerville)	Greater than 1
I-95 northbound between Rte. 28 & Rte. 129 (Reading, Wakefield)	0.9 to greater than 1
I-93 northbound from Medford/Somerville town line to Rte. 28 (Medford)	0.9 to 1.0
I-95 northbound from Lexington/Burlington town line to Rte. 3A (Burlington)	0.9
I-93 northbound (Charlestown)	0.9
ARTERIALS	V/C
Rte. 99 (Everett)	Greater than 1
Mystic Valley Pkwy. from Auburn St. to Main St. (Medford)	Greater than 1
Rte. 3A/3 between Church Lane & Lexington St. (Burlington, Woburn)	Greater than 1
Rte. 129 between Water St. & Rte. 28 (Wakefield, Reading)	0.9 to greater than 1
Rte. 38 between Tewksbury & Woburn (Wilmington)	0.9 to greater than 1

*Where multiple communities are listed for a roadway, they are in descending order of severity.

In addition, the Boston Region MPO's travel demand model was used to determine V/C for roadways under 2030 No-Build conditions. Table 3-11 presents the segments of roadways in the North Corridor with the highest AM peak period V/Cs under the 2030 No-Build, again listing them in descending order of severity. Table 3-12 presents the same information for the PM peak period. Order of severity was determined based on all data points and is therefore not always reflected in the ranges shown in the tables. In the V/C analysis, arterials are not broken down by classification.

TABLE 3-11

**VOLUME-TO-CAPACITY RATIO (V/C):
WORST LOCATIONS* IN AM PEAK PERIOD, 2030 No-BUILD**

FREEWAYS	V/C
I-93 southbound between Rte. 1 & Roosevelt Circle (Boston, Somerville, Medford)	0.8 to greater than 1
I-95 southbound between North Ave. & I-93 (Wakefield, Reading)	0.8 to greater than 1
I-93 southbound between Tewksbury town line & Industrial Way (Wilmington, Woburn)	0.8
ARTERIALS	V/C
Rte. 38 (Wilmington to Winchester)	0.4 to greater than 1
Rte. 3A from Billerica town line to Bedford St. (Burlington)	0.8 to greater than 1
Rte. 3 between I-95 & Lexington St. (Burlington to Woburn)	0.9 to greater than 1
Mystic Valley Pkwy. (Route 16) from Mystic Valley Connector to Auburn St. (Medford)	0.7 to greater than 1
Rte. 129 between Water St. & Rte. 28 (Wakefield, Reading)	0.6 to 1.0

*Where multiple communities are listed for a roadway, they are in descending order of severity.

TABLE 3-12

**VOLUME-TO-CAPACITY RATIO (V/C):
WORST LOCATIONS* IN PM PEAK PERIOD, 2030 No-BUILD**

FREEWAYS	V/C
I-93 southbound between Broadway & Rte. 1 (Boston, Somerville)	Greater than 1
I-95 northbound between I-93 & Lynnfield town line (Reading, Wakefield)	Greater than 1
I-93 northbound @ I-95 (Reading)	Greater than 1
I-95 southbound between Rte. 3A & Rte. 3 (Burlington)	0.9
I-93 northbound between Rte. 62 & Rte. 125 (Wilmington)	0.8
ARTERIALS	V/C
Rte. 38 (Wilmington, Winchester)	0.7 to greater than 1
Rte. 3 between I-95 & Lexington St. (Burlington to Woburn)	Greater than 1
Rte. 60 between Pleasant St. & Eastern Ave. (Malden)	0.7 to greater than 1
Rte. 3A from Billerica town line to Bedford St. (Burlington)	Greater than 1

*Where multiple communities are listed for a roadway, they are in descending order of severity.

CMP Priority Intersections

The CMP identifies the intersections in the region that, on the basis of certain criteria, should be given priority for receiving improvements. An intersection is categorized as a priority if it meets at least one of the following criteria: it has a high incidence of crashes, the average delay on its major approaches is greater than 80 seconds per vehicle as monitored by the CMP (all state-numbered routes are monitored), or it has been identified in an MPO study as needing improvement.

The North Corridor intersections that have been given priority by the CMP are shown in Figure 3-8. The roadways in the corridor that have clusters of priority intersections are (in roughly geographical order):

- Route 16 in Everett
- Route 99 in Everett
- Main Street through Everett, Malden, and Melrose
- Route 60 in Medford and Malden
- Route 28 in Stoneham, Reading , and North Reading
- Route 38 in Woburn
- Route 3A in Burlington
- Middlesex Turnpike in Burlington

Many of the clusters of priority intersections are on Class III arterials with the worst travel speed indexes (as determined by the CMP).

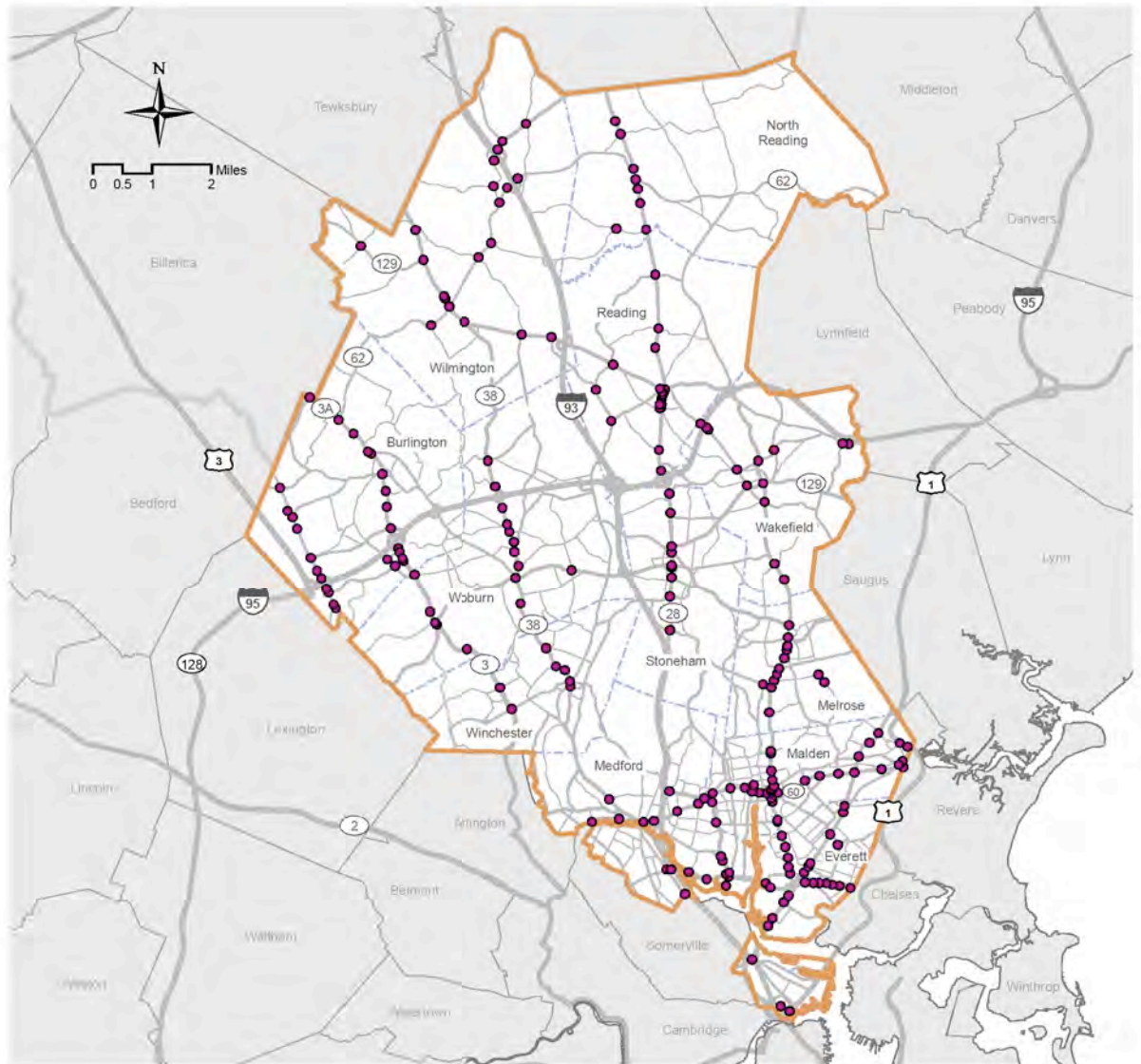
Worst Highway Bottlenecks in the North Corridor

Based on the three types of information presented above, Table 3-13 shows the locations that have been identified as the worst bottlenecks in the North Corridor:



FIGURE 3-8

CMP PRIORITY INTERSECTIONS, NORTH CORRIDOR



DATA SOURCE: Boston Region MPO
Congestion Management Program (CMP)

An intersection has been categorized as a "priority intersection" if it meets at least one of the following criteria:
(a) high accident location.
(b) high levels of approach delay greater than 80 seconds per vehicle as monitored through the CMP (all state numbered routes).
(c) identified as such in an MPO study.

● Priority Intersections

TABLE 3-13

WORST BOTTLENECK LOCATIONS IN THE NORTH CORRIDOR

FREEWAYS	SPEED INDEX	VOLUME TO CAPACITY	PRIORITY INTERSECTIONS
Interstate 93 between the Leverett Connector and Interstate 95 (Charlestown, Medford, Reading, and Stoneham) and between Route 129 and Atlantic Avenue (Wilmington and Woburn)	•	•	
Interstate 95 between Route 28 and Route 3 (Wakefield, Reading, Woburn, and Burlington)	•	•	
Route 3 @ Interstate 95 (Burlington)	•	•	
ARTERIALS			
Main Street through Everett, Malden, and Melrose			•
Middlesex Turnpike in Burlington			•
Mystic Valley Parkway in Medford		•	
Route 1 Tobin Bridge in Charlestown		•	
Route 3A in Burlington and Woburn		•	•
Route 16 in Everett			•
Route 28 in Medford, Stoneham, Reading, and North Reading	•		•
Route 38 in Woburn and Wilmington		•	•
Route 60 in Medford and Malden		•	•
Route 99 in Everett		•	•
Route 129 in Wakefield and Reading		•	

Transit: Universe of Transit Mobility Needs and Methods Proposed to Meet Them Identified in the MBTA’s Program for Mass Transportation for the North Corridor

The MBTA’s Program for Mass Transportation approved in December 2009 provides information on current and proposed transit needs. Specific transit needs or issues regarding mobility in the North Corridor are as follows:

Capacity Issues

- Based on projections in the PMT, investments will be needed to ensure sufficient capacity is available to serve current and projected travel demand. Malden, in particular, currently has the fifth-highest number of intracity trips and is projected to have the fifth-largest increase in trips within a single municipality in the future. However, its mode share is comparatively low.
- Modeling projections suggest that Bus Route 132 will experience crowding levels that will trigger the need for additional service.
- Medford currently displays high trip volumes to Somerville and Boston; however these trips are not served by rapid transit.

- Very densely populated areas in Everett, which currently generate significant trips into the urban core do not have access to rapid transit service.
- The Haverhill Line layover facility creates noise pollution and localized air pollution in a densely developed residential neighborhood.
- Proposed projects adjacent to the Haverhill Line that promote smart growth and economic development should be supported.

Transit Station Parking Issues

- The current park and ride inventory shows that the following stations are utilized at 85% of capacity or greater:
 1. Haverhill Line (North Wilmington, Melrose Highland, and Malden)
 2. Lowell Line (Winchester Center, Wedgemere, and West Medford)
 3. Orange Line (Oak Grove, Malden, Wellington, and Sullivan Square)
 4. Express Bus (Woburn)
- For some customers, access to rail services is constrained by the lack of bicycle parking.

Connections with Other Regional Transit Authorities

Both the Merrimack Valley Regional Transit Authority (MVRTA) and the Lowell Regional Transit Authority (LRTA) serve the North Corridor; however, 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 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.

Freight

Transport of Hazardous Materials by Trucks

The Massachusetts Motor Transportation Association is working with the Massachusetts Department of Transportation, the City of Boston, and others to determine a new hazardous material truck route in Boston. Recent attempts to change the truck route have affected truck traffic accessing the fuel farm in Everett.

Vertical Clearance of Railroad Bridges

The desired vertical clearance for bridges over rail lines is twenty feet eight inches. This allows for double-stack trains to operate on the tracks. Of the 55 bridges over rail lines in the corridor, 37 (67%) do not meet this desired height.

MassPort Feasibility Study

MassPort has a strong interest in improving existing access and preserving future access to Moran Terminal for both rail and truck. They recently completed a feasibility study for rail access and a truck haul road along the Mystic Wharf Branch corridor in Charlestown. If MassPort were to move forward with a haul road/rail corridor concept, a number of additional steps would be required before a preferred alternative could be selected and designed. It would also have to coordinate with potential plans for highway improvements for Rutherford Avenue and Sullivan Square.

Bicycle and Pedestrian

The North Corridor has limited bicycle accommodations. There is neither a bicycle corridor to Boston nor any major east-west connectors. There are currently many gaps in the North Corridor's bicycle network that prevent users from safely connecting to trails in adjacent corridors or to transit and commuter rail stations.

Municipalities in the North Corridor that have requested funding for bicycle and pedestrian projects have stated the need for additional facilities to provide non-motorized access to facilities in the region including access to commuter rail, schools, recreation, and commercial areas. They have cited the need for a safe alternative mode that will help in reducing congestion and improving air quality.

The Boston Region MPO has done a number of bicycle and pedestrian plans including the *Regional Bicycle Plan*, the *Boston Region's Pedestrian Plan*, and the *Improving Pedestrian and Bicycle Access to Selected Transit Stations*.

The bicycle accommodations in the North Corridor are limited. Less than one percent of the non-interstate centerline miles in the corridor provide on-road bicycle accommodations (on-road bike lanes or shoulders of at least four feet).

Some of the Boston Region's Pedestrian Plan key findings are that two-thirds of pedestrian fatalities took place on urban roads and that older individuals (over 64) are more likely to become pedestrian fatalities. The sidewalk inventory of the North Corridor indicates that 5 of the 12 municipalities have no sidewalks on more than 50% of their roadways.

Malden Center was included as one of the locations in the *Improving Pedestrian and Bicycle Access to Selected Transit Stations* study. Some of the issues limiting pedestrian and bicycle access at this station are associated with bicycle parking, crosswalks and sidewalks and station signage.

Safety

MassDOT produces the crash clusters based on crash reports provided by its Registry of Motor Vehicles. The clusters are ranked based on the sum of the Equivalent Property Damage Only (EPDO) values of the crashes within the clusters. EPDO is calculated by giving a crash a 10 if it involves a fatality, a 5 if a personal injury is involved, and a 1 if the crash results in property damage only. MassDOT applies a



spatial algorithm to generate the clusters. EPDO values are used by the MPO to select areas of safety-based studies and in the LRTP and TIP project selection process.

Figure 3-9 identifies the top crash cluster locations in the North Corridor. It shows that the locations in this corridor with the highest EPDO values are located on Interstates 95 and 93, the Middlesex Turnpike, and Routes 16 and 129. Specifically, the locations with the highest EPDO values (shown in parentheses below) are:

- Interstate 95 and Interstate 93 interchange, Reading (755)
- Interstate 93 at Montvale Avenue, Woburn (533)
- Interstate 95 at Route 3, Burlington (418)
- Middlesex Turnpike at Interstate 95, Burlington (359)
- Interstate 93 at Route 129 (Lowell Street), Wilmington (319)

Environment

Figures 3-10 through 3-12 provide an overview of environmental constraints in the North Corridor. They include:

- Department of Environmental Protection Designated Wetlands
- FEMA Flood Zones
- Public Water Supply
- Surface Water Protection Areas
- Natural Heritage and Endangered Species Program Priority Habitats
- Protected Open Space

The North Corridor has one Area of Critical Environmental Concern (ACEC), Golden Hills that is located in Melrose, Saugus, and Wakefield. Golden Hills has 500 acres and was designated in 1987.

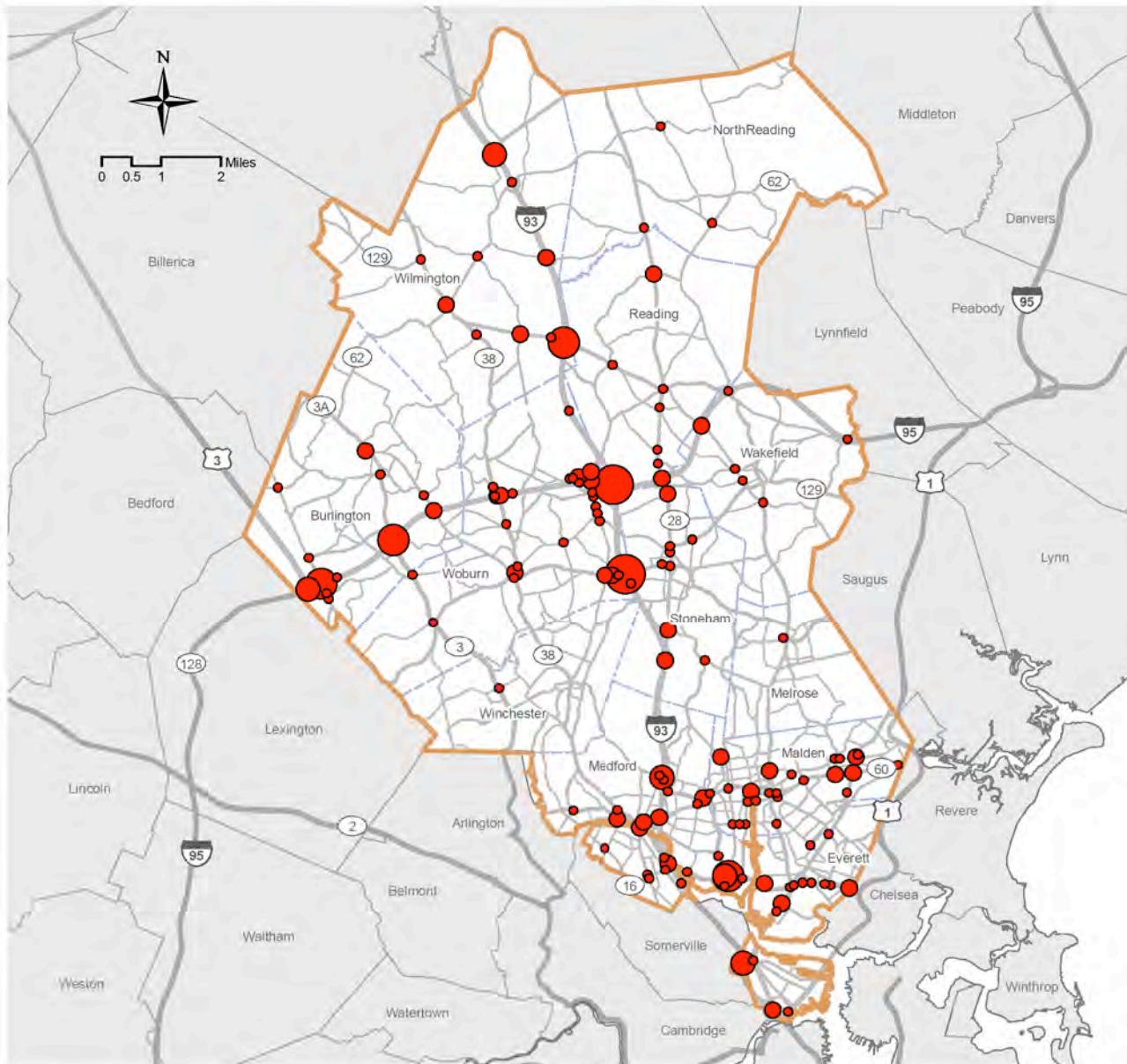
Projects being considered for inclusion in the LRTP are overlaid on these environmental constraint maps. This information is then used during the project selection decision-making process. These environmental constraints are further addressed during project design and mitigation.

Regional Equity

Environmental justice areas in the Boston Region MPO are defined as areas with a population over 50% minority persons or persons with an income below 60% of the region's median income (\$33,480). The environmental justice areas located in the North Corridor within the Boston MPO include Charlestown, Everett, Malden, and Medford. MPO staff meets with social service and community contacts and conducts surveys to identify needs within these environmental justice areas. Table 3-14 outlines issues and needs identified by contacts in the environmental justice areas in the North Corridor, along with suggested responses.

FIGURE 3-9

TOP 5 PERCENT CRASH CLUSTER LOCATIONS



DATA SOURCE: MassDOT Crash Clusters
The top 5% crash cluster locations were selected based on their Equivalent Property Damage Only (EPDO) values. EPDO is used to determine the severity of each crash cluster location. EPDO is calculated for each cluster by assigning a value of 10 if a crash involves a fatality, a 5 if a crash involves an injury, and a 1 if a crash results in property damage only. The centroid point for each of the clusters was determined and is used to display the EPDO data on this map.

Top 5 Percent Crash Cluster Locations (EPDO Values)

- 100 or less
- 101 to 200
- 201 to 300
- 301 to 500
- Greater than 500

TABLE 3-14

IDENTIFIED ENVIRONMENTAL JUSTICE ISSUES

COMMUNITY	ISSUES/NEEDS	SUGGESTED RESPONSES
Everett	Service industry workers need transportation past the hours of public transportation.	Late evening/early morning service to meet the needs of service industry workers.
Everett	Public transportation has limited ability to meet the needs of elderly and handicapped who have limited mobility.	Service to accommodate the needs of the elderly, particularly for shopping and medical appointments.
Everett	MBTA maintenance facility is a burden. It occupies a large parcel of land, which the city could use for development.	
Everett	Bus routes cover all major roadways, but service hours are limited.	Longer service hours.
Everett	Many bus stops do not have shelters. This is a burden, particularly in foul weather.	Shelters at bus stops.
Everett	Commuter rail passes through Everett and does not stop.	Commuter rail stop (at Gateway Center).
Everett	Absence of map and schedule displays at bus stops limits ridership, particularly those with limited English proficiency.	Map and schedule displays at stops.
Everett	Transit to employment destinations other than Boston is limited and cumbersome.	Urban Ring, Service to Kenmore Square and Longwood Medical Area.
Everett	Increased traffic over Alford Street bridge and through Everett since Tobin toll increase and truck traffic on Route 99.	Assess traffic impacts of toll increase and conduct reconnaissance of traffic in the area.
Malden	A new family health center may warrant a change in existing bus routes.	Identify route changes to serve the new health center.
Malden	Seniors find downtown crossings dangerous and have difficulty accessing the bus stops.	Improve the safety of crossings. Review the locations of downtown bus stops.
Malden	Senior transportation is limited.	
Malden, Medford, Everett	Travel between cities and towns on public transit requires going into Boston first and then traveling out again.	Provide circumferential transit to connect cities and towns.
Malden, Medford, Everett	Long off-peak headways on buses during the day and evening make it difficult for people who work non-traditional hours to commute to work.	Increase bus frequency on routes that provide access to jobs with non-traditional work hours.
Malden, Medford, Everett	The change in bus routes to go around instead of through Malden Square is a burden to elderly people, people with disabilities, and shoppers.	Return to the old route.
Malden, Medford, Everett	The pedestrian phase of the signal at Main and Salem Streets conflicts with turning traffic.	Change the signal phasing.
Malden, Medford, Everett	Everett and Medford are interested in Walkable Communities.	The MPO is available to coordinate it's Walkable Communities Workshops program with Everett and Medford.
Malden, Medford, Everett	People placed in the Townline Inn on Broadway (Route 99) by the Department of Transitional Assistance have to walk where there are no sidewalks.	
Medford	Residents of West Medford will be burdened by the construction of the Green Line extension and consequent development that will disrupt the (low-income and/or minority) community and displace some of it's residents (due to both the construction and gentrification).	Consider the impact of the Green Line extension on West Medford residents, and try to mitigate negative impacts.
Malden, Medford, Everett	Some members of the community have difficulty reading and understanding the bus schedules.	Provide schedules in alternative languages and formats.

FIGURE 3-10

DEP WETLANDS/FEMA FLOOD ZONES - NORTH

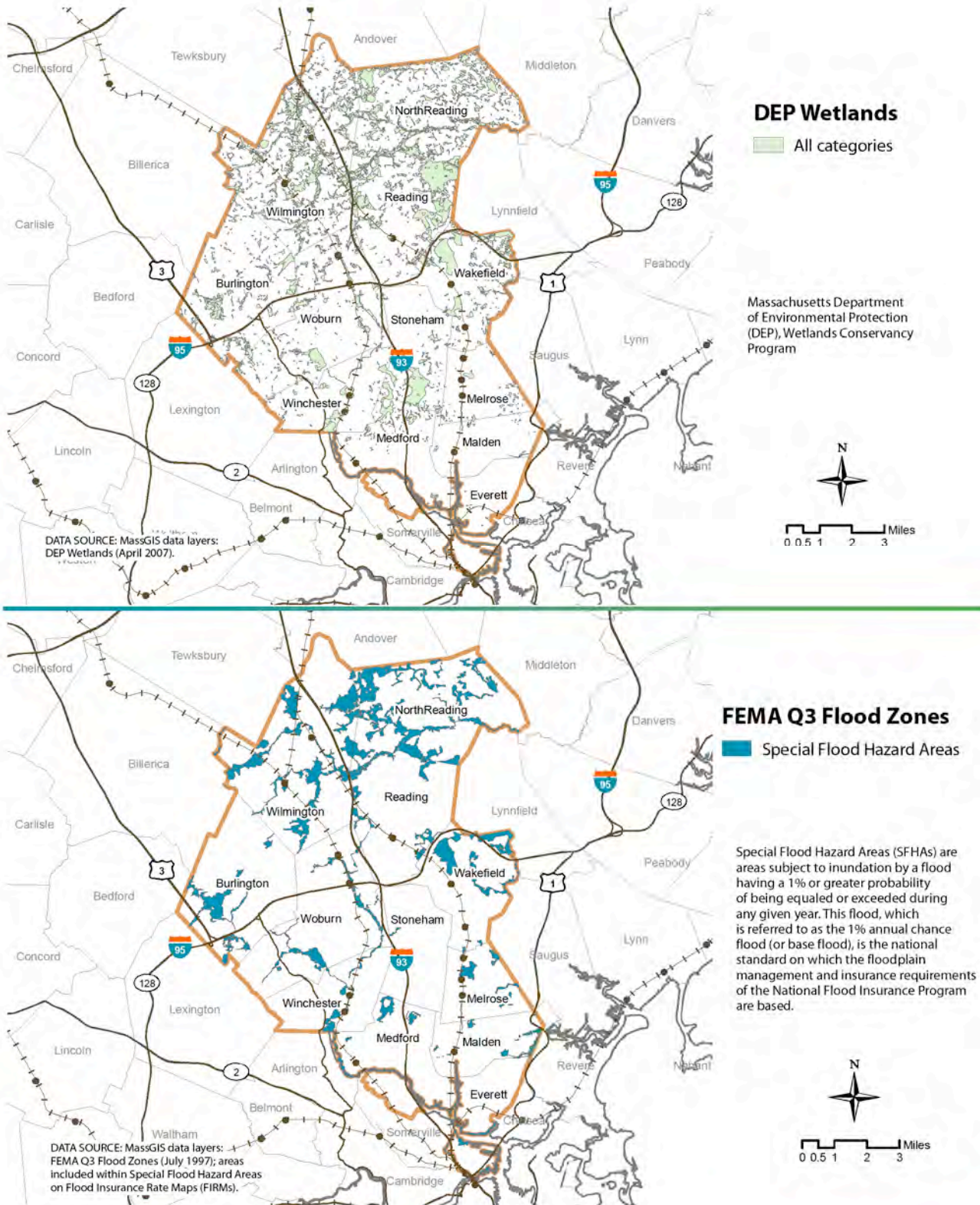


FIGURE 3-11

PUBLIC WATER SUPPLY/SURFACE WATER PROTECTION AREAS - NORTH

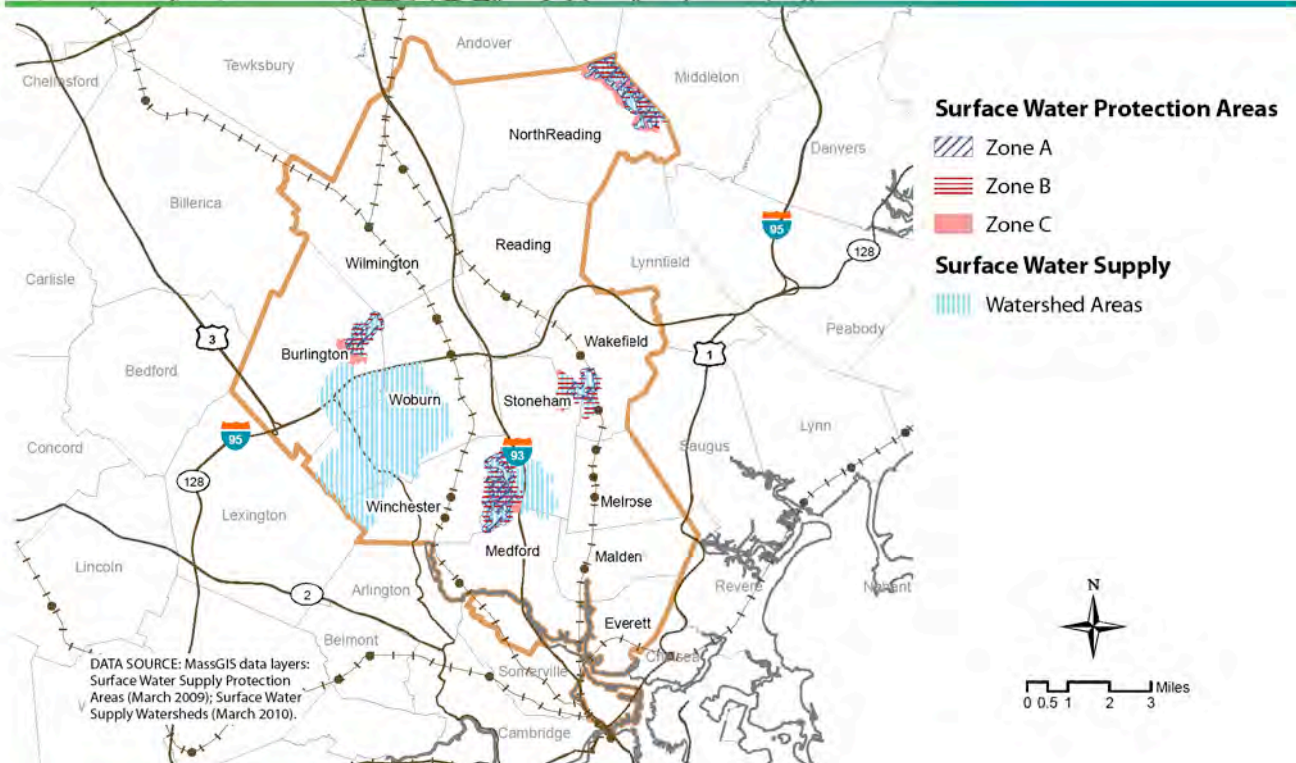
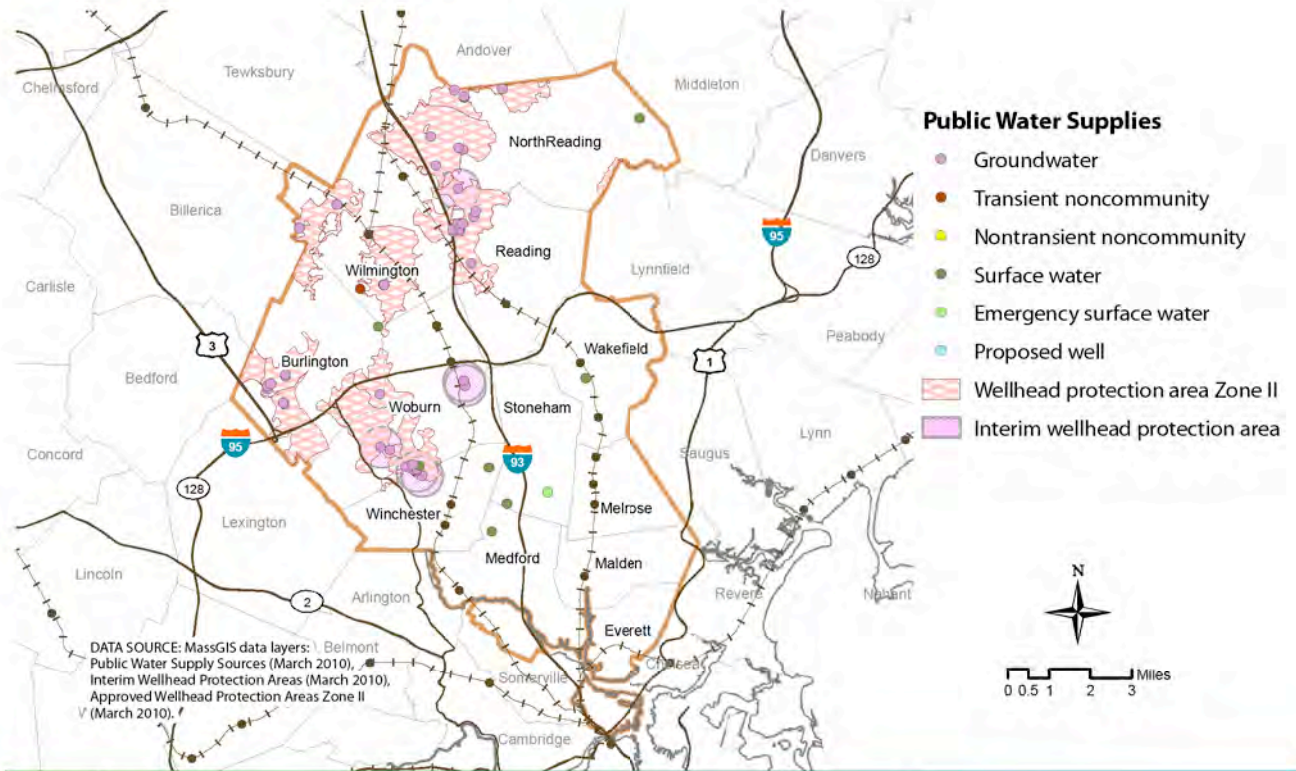
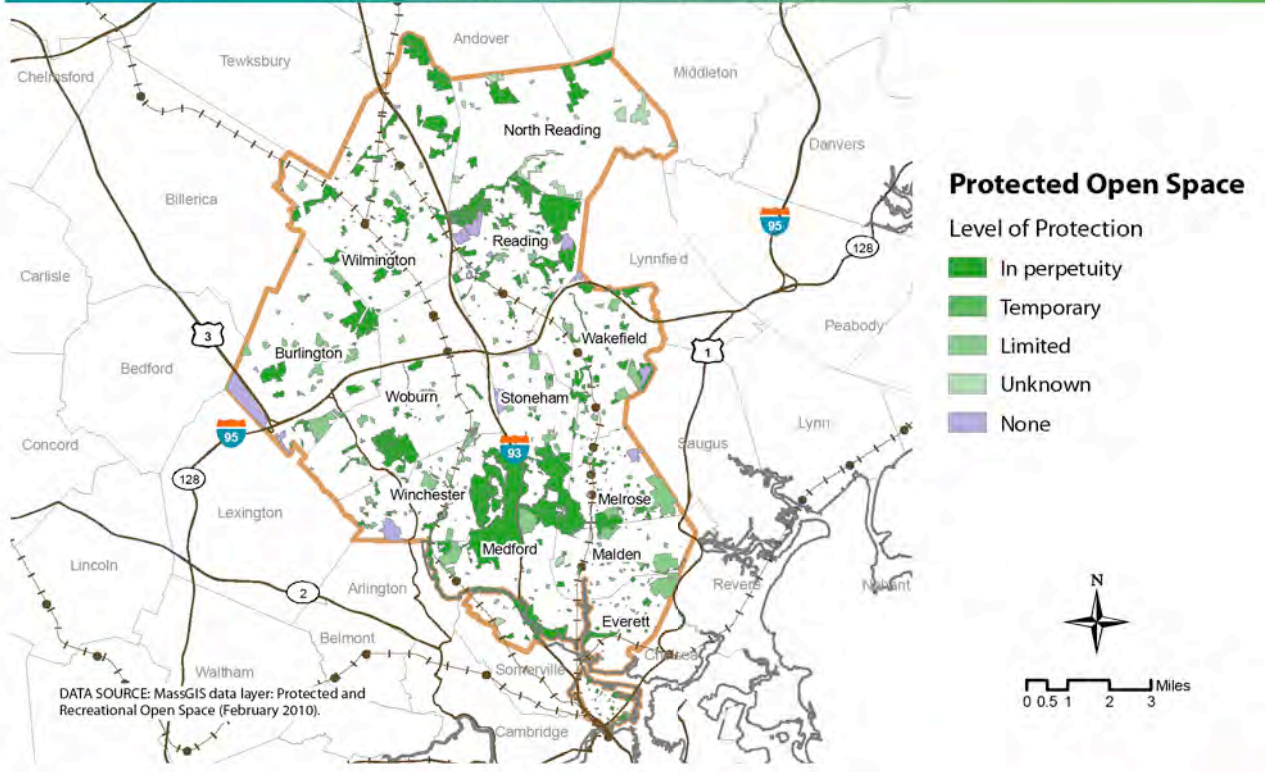
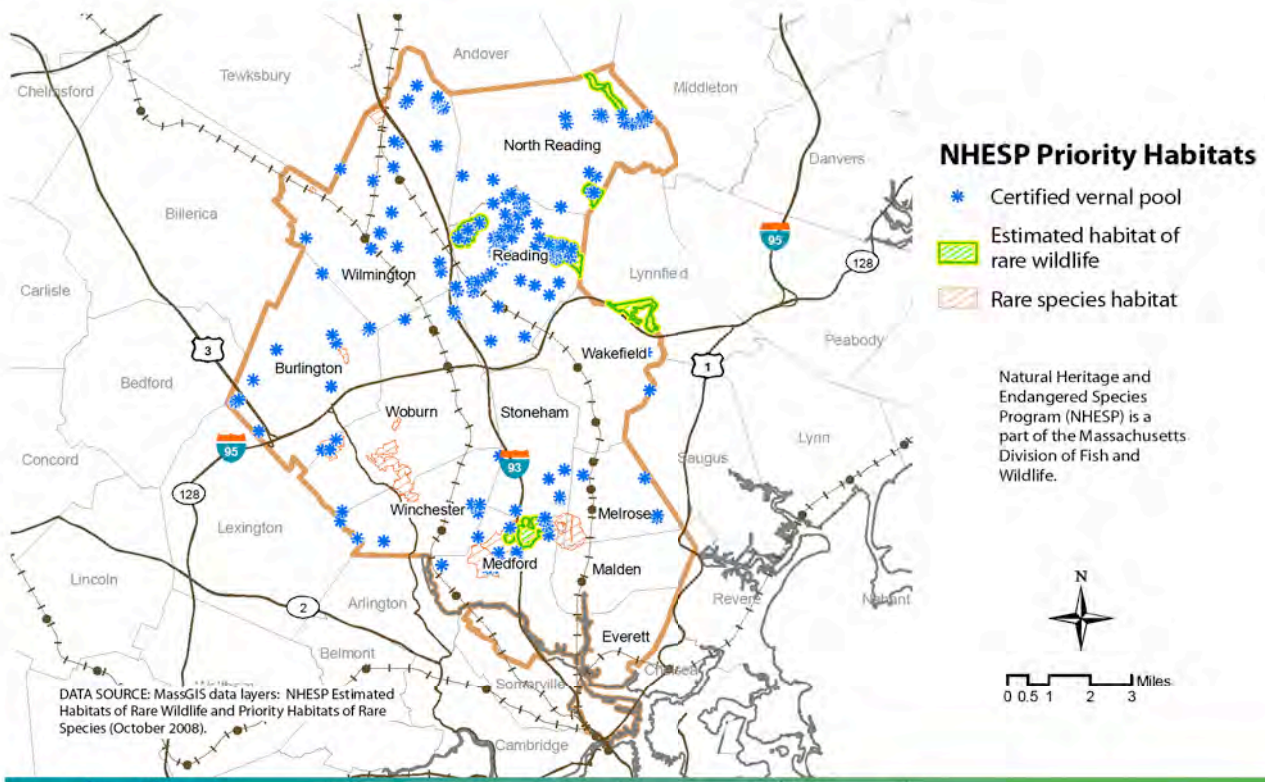


FIGURE 3-12

NHESP HABITATS/PROTECTED OPEN SPACE - NORTH



IDENTIFIED PROJECTS FOR THE NORTH CORRIDOR

The following projects for the North Corridor, which are at various stages in the planning or implementation process, have been identified.

Highway

CTPS Corridor Studies and Recommendations

CTPS has performed studies identified by the MPO regarding mobility in the region. The following studies were performed for corridors located in the North Corridor:

- Route 3 and 3A Corridor Study – 1995 (Burlington, Woburn, Winchester)
 1. Intersection improvements along Cambridge Street
- Route 60 Mobility Study – 2009 (Malden and Medford)
 1. Improvements for pedestrians
 2. Improvements for transit
 3. Intersection traffic operations and safety improvements

Highway Projects Under MassDOT Environmental Review

MassDOT's Highway Division Environmental Department initiates early project coordination with affected municipalities and environmental agencies to assess the impacts of a project to surrounding municipalities and the natural environment. The following are projects in the North Corridor that are in that environmental process.



Funded Major Highway Projects in Progress

- I-95/I-93 Interchange (Woburn, Reading, Stoneham, and Wakefield)
- Route 1 Relocation and Add-a-lane (Malden, Saugus, and Revere)
- Tri Town I-93/Lowell Junction Interchange (Andover, Tewksbury, and Wilmington)

Major Highway Projects in Permitting 25 to 100% Design

- Middlesex Turnpike Phase III (Bedford, Billerica, and Burlington)

Major Highway Projects Pending, On Hold & Inactive

- I-93/Route 129 Interchange Improvements (Wilmington and Reading)
- I-93/Route 125/Ballardvale Road (Wilmington)

The Boston Region MPO's Universe of Highway Projects

As part of the development of the Boston Region MPO' Long-Range Transportation Plan (LRTP) and Transportation Improvement Program (TIP), the MPO asks each community to identify the highway projects it would like the MPO to consider in the development process of these documents. The following is a list of projects received during the development of past LRTPs and TIPs. Projects that add capacity to the transportation system and/or cost over \$10 million are required to be included in the LRTP before being funded. Those that do not add capacity and cost under \$10 million can be included in the Transportation Improvement Program without first being included in the LRTP.

MPO Universe of Projects for Highways (Adds Capacity and/or Costs Over \$10 Million)

- Middlesex Turnpike Phase III (Bedford, Billerica, and Burlington)
- Route 1 Improvements (Malden, Saugus, and Revere)
- I-95/I-93 Interchange (Woburn, Reading, Stoneham, and Wakefield)
- Route 128 Capacity Improvements (Lynnfield to Reading)
- New Boston Street Bridge (Woburn)
- Montvale Avenue (Woburn)
- Telecom City Boulevard (Everett, Malden, and Revere)
- Route 16 (Revere Beach Parkway) (Everett, Medford, and Revere)
- I-93/Ballardvale Street Interchange (Wilmington)
- I-93/Route 129 Interchange (Wilmington and Reading)
- Route 128 HOV (Wellesley to Woburn)
- Route 3A (Burlington)
- Lowell Junction (Andover, Tewksbury, and Wilmington)
- Route 16/I-93 Connection (Medford)



MPO Universe of Projects for Highways (Does Not Add Capacity and Costs Under \$10 Million)

- Air Force Road Rehabilitation, Everett
- Beacham Street Reconstruction, Everett
- Pleasant Street, Malden

- Lebanon Street, Melrose
- Main Street Intersections at Emerson, Essex, Foster and Grove Streets, Melrose
- West Street, Reading
- Streetscape Improvements High and Haven Streets, Reading
- Wildwood Intersections, Wilmington
- Signal Upgrade at 4 Intersections, Winchester

Highway Projects Programmed in the Boston Region MPO's Current LRTP and TIP

The Boston Region MPO has prioritized the following projects in the current LRTP – JOURNEY TO 2030 and Fiscal Year 2011–2014 TIP along with the year in which it is programmed.

Highway Projects in the 2011-2014 TIP

- Pleasant Street, Malden – 2014 (includes an earmark)

Highway Projects in the Recommended LRTP – JOURNEY TO 2030

- Middlesex Turnpike Phase III (Bedford, Billerica, and Burlington) – 2016 to 2020
- Route 1 Relocation and Add-a-lane (Malden, Saugus, and Revere) – 2025 to 2030
- I-93/Route 129 Interchange (Wilmington and Reading) – 2021 to 2025
- Montvale Avenue (Woburn) – 2016 to 2020
- New Boston Street Bridge (Woburn) – 2016 to 2020

Transit

Transit Projects in the MBTA's Program for Mass Transportation (PMT)



The PMT outlined a list of projects that were proposed for implementation over the next 25 years in the North Corridor. With the creation of MassDOT, planning for transit projects will be performed by MassDOT's Office of Transportation Planning. The transit projects in the PMT are:

Enhancement Projects

- Improved Bus Amenities & System Identity for Bus Routes Centered on Malden

Expansion Projects

- Lowell Commuter Rail Line Extension (Nashua/Manchester)*

- Haverhill Commuter Rail Line Extension and Related Improvements (Plaistow)*

Projects listed with an asterisk (*) were included in the PMT Illustrative Scenario Analysis.

Transit Projects in the MBTA's Capital Investment Program

State of Good Repair Projects

- Merrimack River Bridge rehabilitation
- Rehabilitation of three Shawsheen River bridges
- Orange Line car reinvestment, rebuilding, and procurement
- Wellington maintenance facility improvements
- Rapid transit station midlife rehabilitation upgrades
- Orange Line station platform improvements
- Winchester Station renovations

Enhancement Projects

- Haverhill Line double tracking
- Wedgemere Station accessibility
- Orange Line north signal system upgrade
- Orange Line power infrastructure improvements
- Station elevator and escalator replacement and modernization program
- AFC, Phase II, CharlieCard implementation on commuter rail

Expansion Projects

- Green Line Extension from College Avenue to Mystic Valley Parkway, Somerville and Medford
- Bradford layover facility on the Haverhill Line



Transit Projects Recommended From Congestion Management Program

The MBTA can continue to expand bicycle parking; however the MBTA does not currently have a standard for determining the appropriate number of spaces for each station. This standard should be adopted. The following improvements are recommended for stations at which bike racks were not used:

- Orange Line (Oak Grove) – provide shelter for existing racks

- Haverhill Line (Bradford) – install signs directing bicyclists to racks
- Haverhill Line (Andover) – relocated racks to existing sheltered area
- Lowell Line (Lowell) – Install additional racks in sheltered area
- Lowell Line (Winchester Center) – relocate one rack to location visible from street

Transit Projects in the Recommended Plan – JOURNEY to 2030

- Green Line Extension From College Avenue to Mystic Valley Parkway, Somerville and Medford
- Compact Communities: Urban Ring Phase 2 (illustrative project – not part of the financially-constrained plan)

Bicycle and Pedestrian

CTPS Studies and Recommendations

CTPS has performed studies identified by the MPO regarding bicycle and pedestrian needs in the region. The following studies were performed for corridors located in the North Corridor:

- Bike-to-the-Sea Feasibility Study (1996)
 1. Obtain agreement from local municipalities
 2. Construct rail trail
- Stoneham Bikeway Preliminary Study (1999)
 1. Ensure the ROW is secure
 2. Construct rail trail
- Improving Bicycle and Pedestrian Access to Selected Transit Stations (2005)
 1. Improve bicycle and pedestrian accommodations in the vicinity of Malden Center Station on the Orange Line

The Boston Region MPO's Universe of Bicycle/Pedestrian Projects

As part of the development of the Boston Region MPO's LRTP and TIP, the MPO asks each community to identify the bike/pedestrian projects it would like the MPO to consider in the development process of these documents. The following is a list of bicycle and pedestrian projects received during the development of past LRTPs and TIPs.

- Northern Strand Community (formally Bike to the Sea) Trail, Everett
- Northern Strand Community (formally Bike to the Sea) Trail, Malden
- Tri-Community Bikeway, Winchester
- Woburn Loop Bikeway Project, Woburn
- Minuteman Bikeway Extension, Billerica

MassDOT Capital Investment Plan (CIP) High Priority Paths

The MassDOT CIP identified 100 miles of new high priority trails to be completed within the next ten years. There is one shared-use path that is included in the North Corridor – the Northern Strand Community Trail.

Bicycle and Pedestrian Projects Programmed in the Boston Region MPO's Current LRTP and TIP

There are no bicycle projects from the North Corridor currently programmed in the Boston Region MPO's current LRTP – JOURNEY TO 2030 and Fiscal Year 2011–2014 TIP.

Projects in Other MPOs

In the JOURNEY TO 2030 LRTP, the Boston Region MPO included projects that are funded in other MPO areas that affect travel within the Boston Region MPO. One project is included in the North Corridor – the Lowell Junction Interchange project located in Wilmington, Tewksbury, and Andover. This project is funded in the Merrimack Valley MPO's LRTP.

