9

CIRCUMFERENTIAL CORRIDORS

DESCRIPTION OF THE CIRCUMFERENTIAL CORRIDORS

This chapter will focus on Interstate 495 and Route 128 (which for portions of its path through the Boston region runs together with Interstates 95 and 93) and issues regarding passenger vehicle and freight mobility and safety issues along these roadways. Most attention will be paid to the use of these roadways, which provide connections around the Central Area or around the outskirts of the region. To a lesser degree, the chapter will also look at travel patterns between the municipalities within the corridors defined by these express highways.

The Needs Assessment for the radial corridors included information on these express highways as well, but this chapter will pull the information together, so they can be seen as a whole. The details for highways regarding information on bridges, centerline and lane miles were included in the previous chapters and will not be repeated here. Land use will be described as it relates to the express highways that provide circumferential travel in the region.

The circumferential corridors are built around two important highway facilities that provide critical circumferential connections in the region: Interstate 495 and Route 128. Interstate 495 travels through 12 municipalities in the Boston Region MPO area along the MPO's western border. The municipalities include Littleton, Boxborough, Bolton, Hudson, Marlborough, Southborough, Hopkinton, Milford, Bellingham, Franklin, Wrentham, and Foxborough. Several other nearby municipalities are included in the I-495 Corridor.

Route 128 forms another circumferential corridor closer to the Central Area. Route 128 runs from Rockport in the north through Gloucester, Manchester, Wenham, Beverly, Danvers, Peabody, Lynnfield, Wakefield, Reading, Woburn, Burlington, Lexington, Waltham, Weston, Newton, Wellesley, Needham, Dedham, Westwood,

Canton, Milton, Randolph, Quincy, and terminating in Braintree on the south side of the Corridor. Interstate 95 runs together with Route 128 from Canton in the south to Peabody in the north. At the southern end of the corridor, Route 128 continues east along the same path as Interstate 93 from Canton to Braintree, where it completes its semicircle around the Central Area. Several other communities served by Route 128, but not directly in its path, are included in the Route 128 Corridor.

For transit, since most of the transit system in the Boston Region MPO area is radial in nature, the majority of information on the transit system has been described in the previous chapters. This chapter will focus on the circumferential services and issues that relate to circumferential transit in the region. It will detail the MBTA, regional transit authorities, and transportation management associations that provide circumferential services in the region.

EXISTING TRANSPORTATION FACILITIES

The major transportation facilities and services in the Circumferential Corridors, broken down by mode, are described here.

Highway

As discussed above, the major roadways that will be presented in this chapter are Route 128 and Interstate 495 (see Figure 9-1).

Transit

Most of the transit in the region is radially-oriented; circumferential service is limited to a few MBTA bus routes. There are, however, some MBTA bus routes with segments that offer opportunities for circumferential travel prior to feeding rapid transit stations or heading express to Boston. Some TMA services provide connections between radial transit services and suburban employment destinations. Additionally, there are some MBTA bus routes that connect activity centers within circumferential corridors. A description of the transit services in the Circumferential Corridors is provided below.

MBTA Bus Routes

MBTA Circumferential Bus Routes

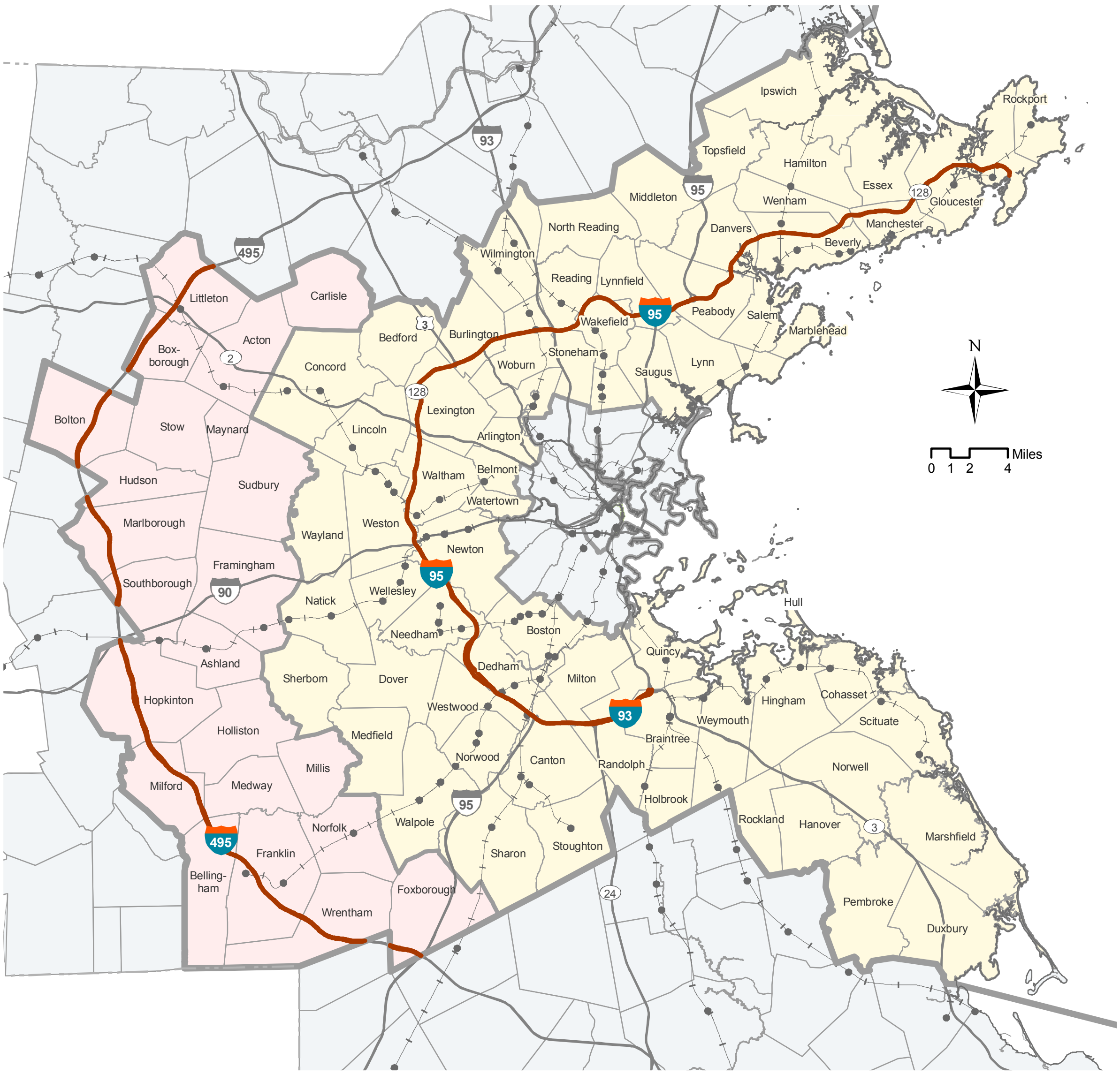
- Route 52 - connects Watertown Square in the Northwest Corridor with Newton Corner and Newton Centre in the West Corridor, and subsequently with the Dedham Mall in the Southwest Corridor; it provides service across West Roxbury and Newton
- Route 59 - connects Needham Junction in the West Corridor with Watertown Square in the Northwest Corridor and provides crosstown service to Needham and Newton

MBTA Bus Routes with Circumferential Segments

- Route 70A - provides service across Waltham before heading to Watertown Square and Central Square, Cambridge

FIGURE 9-1

Existing Highway Transportation Facilities
Circumferential Corridors



Circumferential Corridors

- I-495 and I-93/I-95/Route 128
- Route 128 Corridor
- I-495 Corridor

- Route 354 - connects the Burlington Mall with Woburn Square and provides service across Woburn
- There are six MBTA bus routes that provide service between Waltham and Newton before heading into Boston: Route 553, 554, and 170 - connect Waltham Center in the Northwest Corridor with West Newton in the West Corridor; Route 558 - connects Riverside Station in the West Corridor with Waltham in the Northwest Corridor; Route 505 - connects West Newton in the West Corridor with Waltham Center in the Northwest Corridor; and Route 556 - connects Newtonville in the West Corridor with Waltham Center in the Northwest Corridor

MBTA Bus Routes Connecting Activity Centers in Circumferential Corridors

- Route 51 - connects Reservoir Station in the West Corridor with Roslindale Square in the Southwest Corridor
- Route 134 - connects Woburn Square and Winchester Center
- Routes 136 and 137 - connect Wakefield Square with Franklin Square
- Route 217 - connects Quincy Center and Wollaston Beach with East Milton Square and Ashmont, and provides service across Quincy and Milton
- Route 225 - connects Quincy Center with Weymouth Landing and the Greenbush commuter rail line
- Route 245 - connects Quincy Center with East Milton Square and Mattapan, and provides service across Quincy and Milton
- Route 429 - connects Lynn with Saugus Plaza and Square One Mall in Saugus
- Routes 435 and 436 - connect the North Shore Mall in Peabody with Central Square in Lynn
- Routes 455 and 456 - connect Central Square in Lynn with Salem Center
- Route 465 - connects the North Shore Mall in Peabody with Salem Center

Regional Transit Authorities

- MetroWest Regional Transit Authority provides bus service along eleven different routes, connecting the MetroWest communities of Ashland, Natick, Framingham, Holliston, Hopkinton, Marlborough, Milford, Newton, Southborough, and Wellesley. MWRTA Route 1 connects with the MBTA's Green Line at Woodland Station.
- Cape Ann Transportation Authority (CATA) provides bus service to the Cape Ann area with additional service to the Danvers and Peabody Malls and in Ipswich, Essex, and Beverly. CATA connects with the MBTA's Rockport commuter rail line at Rockport, West Rockport, and Gloucester Stations.

Municipal Bus Services

- The B Line, a local bus service with five loop routes, operates in the town of Burlington. The B-Line connects with service of the MBTA, Lexpress, Bedford Transit, and the Lowell Regional Transit Authority.
- The Dedham Bus, a local bus service with one route, operates in the town of Dedham and connects with MBTA bus and commuter rail service.
- Lexpress, which consists of six different loop routes that converge in Lexington Center, operates in the town of Lexington and offers connections with the Burlington B-line, Lowell Regional Transit Authority, and MBTA bus services. Lexington's Lexpress Route 5 connects Depot Square in Lexington to the Burlington Mall.
- The Beverly local bus consists of one fixed route that serves the City of Beverly and connects with MBTA bus and commuter rail service.

Transportation Management Associations

- The Route 128 Business Council provides shuttle bus service for its members from Alewife Station to employment locations in Waltham and Lexington; from Central Square, Waltham to employment locations in Waltham; and from Newton Highlands Station to the Needham Business Center area.
- The Neponset Valley Transportation Management Association provides service between Quincy Center and Ashmont Stations or the Route 128 Station and businesses along Royall Street in Canton.

Intermodal Facilities (Passenger)

The Anderson Regional Transportation Center is located in Woburn adjacent to Interstate 93 at Exit 37C and to Route 128 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.

The Route 128 Station is located just off Route 128 in Westwood. The station serves MBTA commuter rail and Amtrak trains. It has frequent service to Providence, Rhode Island and points south. Amtrak shares parking with MBTA commuter rail.

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. The Interstate 495 and Route 128 corridors were identified in the MassDOT Freight Plan as major routes for freight moving to, from, and through Massachusetts.

The Interstate 495 Corridor, north of Interstate 90 in Hopkinton, is an important freight route connecting northern New England and the Boston region to the Mid-Atlantic region of the United States. Truck volumes along this segment of Interstate 495 are the highest reported by MassDOT classification counts of major highways in the Boston region. The counts for this stretch of Interstate 495 show locations with more than 20,000 large trucks per day (vehicles with six wheels or more). South of Interstate 90 the volume of large trucks is slightly lower, but still high relative to other interstate highways in the Boston region. Portions of Interstate 495 south of Interstate 90 have large truck volumes as high as 17,000 per day. Additionally, Interstate 495 is unique relative to other interstate highways and state numbered routes in the Boston region because the ratio of multi-unit (tractor trailers and tandem trailer trucks) to single unit trucks is as high as four-to-one. Typically the ratio is closer to one-to-one.

The Route 128 Corridor is also an important freight route connecting northern New England and the Boston region to the Mid-Atlantic region of the United States. MassDOT counts show more than15,000 large trucks per day at some locations in this corridor between the junction of Interstate 95 and Route 128 in Peabody and the junction of Interstate 95/Route 128 and Interstate 93 in Canton. The ratio of multi-unit to single-unit trucks is approximately one-to-one.

Rail Freight

There are few circumferential freight rail connections within the Boston Region MPO area. CSX Transportation is connected to the South Coast region of Massachusetts through a branch line that connects with its main line in Framingham. CSX also connects from Boston to industrial areas in Everett and Chelsea through the Grand Junction Line, which provides a circumferential connection within the Central Area. In Central Massachusetts, just outside of the Interstate 495 Corridor, CSX and Pan Am Railways connect through a line between Worcester and Ayer.

Marine Freight

The Ports of Salem and Gloucester are close to Route 128, although neither port has a direct connection to the highway or rail system.

The Port of Quincy is also close to Interstate 93, but lacks a direct connection to it. The Port of Quincy is for the exclusive use of its owner, the Massachusetts Water Resources Authority (MWRA). Twin Rivers Technology, which is located near the port, and it and the MWRA are served directly by the Fore River Railroad.

Air Freight

Hanscom Airport, which handles some light cargo, is located along Route 128 in the towns of Bedford, Concord, Lexington, and Lincoln.

Air

There are no major commercial airports in the Circumferential Corridors. Hanscom Airport is owned and operated by Massport and is the busiest regional, general aviation airport in New England, handling business, charter, private, and air taxi flights. Information on smaller general aviation airports in the region can be found in the radial corridor chapters.

Bicycle

Bicycle Paths

Currently, there are no major bicycle paths that provide circumferential travel routes between radial corridors.

LAND USE AND DEMOGRAPHICS

Route 128 Corridor Demographics

Population

According to U.S. census data (updated annually at the town level), the corridor's 2009 population was 1,634,030. In the Metropolitan Area Planning Council's (MAPC's) MetroFuture forecasts, the corridor's population increases by 9%, to 1,779,470 by 2035 (MetroFuture is described briefly below). The municipalities projected to have the largest absolute growth are Weymouth, Lynn, Natick, Peabody, and Hingham.

Within the Route 128 Corridor, residential densities are highest in the communities of Arlington, Watertown, Quincy, Lynn, Salem, and Peabody. There is a clear pattern of residential densities lowering as one distances themselves from the Boston core. Communities such as Arlington and Watertown which ring the Boston core have pockets of high density which spills over from the core. Crossing the boundary of Route 128, the overall density and character of communities shifts from urban to much more suburban, often bordering on rural in some areas. This change in both population and employment density makes it more difficult to provide alternative transportation service systems limiting mode choice and favoring automotive travel.

Land Use, Housing, Sustainable Transportation

Route 128 is a key transportation link among municipalities that have seen significant growth in both population and employment densities. It is one of the most heavily traveled roadways in our region and connects communities from the North Shore to the Inner Core to the South Shore. A number of existing and planned employment generators are located along Route 128 in communities such as Burlington, Waltham, Newton, and Quincy which add large volumes of commuter traffic to the regional and local roadways each day during peak hours.

As of the year 2000, there were 620,000 households in the Route 128 Corridor. Quincy, Lynn and Newton comprised 17% of all households in the year 2000. From 2000 – 2009, the Route 128 Corridor municipalities issued building permits for 42,560 new housing units (according to the US Census Bureau), representing housing unit growth of 6.9%. Quincy and Peabody issued the highest number of permits with over 6,700 housing units permitted, about 16% of the total.

In 2007 and again in 2010, MAPC surveyed municipalities about recent and anticipated development. Many of the largest housing developments completed or underway in the Route 128 Corridor were located in North and South Shore communities like Hingham, Peabody and Danvers. The recently completed Brooksby Village development in Peabody added 1,750 residential units to the Route 128 Corridor while the Linden Ponds development in Hingham which is currently under construction is estimated to add another 1,559 units. There are six other developments under construction or recently completed in Danvers, Burlington, North Reading, and Melrose which add around 400 units per project. Much of the future population growth in the Route 128 Corridor is anticipated to occur in the Weymouth/Hingham area on the South Shore and in the Lynn/Danvers/Peabody area on the North Shore.

Some of the largest employment developments in the Route 128 Corridor which recently completed construction are Oracle in Burlington, Blue Cross/Blue Shield in Hingham, the NStar Headquarters in Westwood, and properties at the intersection of Route 20 and Route 28 in Weston. These four developments added approximately 4,600 jobs to the Route 128 Corridor. Some of the largest employment generating projects in the planning stages is Southfield in Weymouth, Westwood Station in Westwood, Quincy Center in Quincy, and Waterfront in Lynn. These four developments are projected to add 10,159 jobs within the Route128 Corridor by the year 2035.

Corridor-wide, auto ownership and average household mileage are higher than the regional averages, at 1.7 autos per household and 53 miles per household per day. The regional averages are 1.5 autos per household and 47 miles driven per household per day.

Employment

According to the Executive Office of Labor and Workforce Development, the Route 128 Corridor's 2009 employment was 819,000. Waltham, Newton and Quincy make up approximately 18% of the Corridor's employment. Employment densities are highest in the communities of Waltham, Newton, Burlington, Woburn, and Quincy. Employees who work in the Corridor commute an average of 16 miles round trip, with 7.8% accomplished by non-auto modes of travel. As commuters get further outside the regional hub of Boston and the Inner Core, transit service becomes more infrequent and pedestrian and bicycle infrastructure is not as widespread. Connectivity for modes other than the automobile becomes worse making it more attractive to drive to work.

MAPC's MetroFuture forecasts show employment increasing by 3% to 865,110 by 2035, with some municipalities experiencing modest growth in absolute terms. The largest gains are expected in Weymouth, Quincy, Westwood, and Woburn.

The regional hubs in the Route 128 Corridor also create the best prospects for developing new transit services outside of the metropolitan core. MetroFuture recommends expanding the current transit network to better facilitate work and personal trips. Where transit expansion does occur, economic development should follow linking jobs and housing to sustainable transportation choices. New housing and employment developments should be located in areas with strong transit access and within walking distance to common household destinations.

In locations more distant from transit, MetroFuture recommends land use, design, and transportation demand strategies that facilitate transit and bicycle or pedestrian access.

Interstate 495 Corridor Demographics

Population

According to U.S. census data (updated annually at the town level), the Corridor's 2009 population was 388,350. In the Metropolitan Area Planning Council's (MAPC's) MetroFuture forecasts, the corridor's population increases by 9%, to 422,670 by 2035. The municipalities projected to have the largest absolute growth are Framingham, Milford, and Ashland.

Within the Interstate 495 Corridor, residential densities are highest in the communities of Framingham, Marlborough, Milford, Hudson, Franklin, and portions of Maynard. Pockets of population density are typically found in communities that are in close proximity to Interstate 495 or in communities that have built up density in their downtowns. In the case of Framingham, dense areas are populated along both Interstate 90 and Route 9. Although there are pockets of higher density within some Interstate 495 Corridor communities, compared to other areas in the region the densities are fairly low. It is these low densities and development patterns that make it difficult to connect communities and trip generators to alternative modes of travel.

Land Use, Housing, Sustainable Transportation

The Interstate 495 Corridor makes up the outer ring of the region and is comprised of mostly low-density suburban to rural communities with pockets of high density. Population growth, in terms of percentage growth, has been significant. When comparing the Interstate 495 Corridor to other communities in the region, in terms of absolute growth, the numbers are much smaller. The development patterns in many communities within the Interstate 495 Corridor have created large travel distances between where people live, work and shop. This development pattern has led to high auto ownership and longer commute distances and times making auto ownership a necessity in most communities. Some large employers have located in the Interstate 495 Corridor, which has created an interest in reverse commuting and suburban mobility options. However, current development densities and the lack of connected pedestrian and bicycle facilities make linking trip generators difficult in some communities.

As of the year 2000, there were 138,500 households in the Interstate 495 Corridor. Framingham, Marlborough, Milford, and Franklin comprised 44% of all households in the year 2000. From 2000 – 2009, Interstate 495 Corridor municipalities issued building permits for 11,900 new housing units (according to the US Census Bureau), representing housing unit growth of 8.6%. Franklin and Marlborough issued the highest number of permits with over 2,760 housing units permitted, about 23% of the total.

In 2007 and again in 2010, MAPC surveyed municipalities about recent and anticipated development. Many of the largest housing developments completed or under construction in the Interstate 495 Corridor were located in Ashland, Acton, Milford, and Hudson. The Woodlands at Laurel Hill in Acton, Simrah Gardens, Village at Quail Run and The Esplanade in Hudson added 744 new housing units through 2010. There are two other large residential projects under construction; Village of the Americas in Ashland and Waldenwoods in Milford. These two developments are anticipated to add another 693 units.

There are a number of large residential projects planned for the Interstate 495 Corridor in the communities of Hopkinton, Ashland and Framingham. The Weston Nurseries/ Legacy Farms project in Hopkinton and Jefferson at Ashland in Ashland are projected to add another 845 units through the year 2035 within the Corridor. Much of the future population growth in the Interstate 495 Corridor is anticipated to occur in the communities of Ashland, Holliston, Hopkinton, and Milford.

Some of the largest employment developments in the Interstate 495 Corridor which recently completed construction are Cisco in Boxborough, the 55 Ayer Road property in Littleton, the Benjamin Moore Building in Milford, and Southborough Place in Southborough. These four employment centers brought an additional 3,440 jobs to the Interstate 495 Corridor. Some of the largest employment generating projects in the planning stages are Framingham Biologics Center in Framingham, Genzyme in Framingham and Highland Commons in Hudson. These three projects are expected to add an additional 1,300 jobs in the near term. Finally, there is a number of major employment generating developments in the planning stages throughout the Interstate 495 Corridor including: EMC Corp. in Southborough, Crossroads Corporate Center in Framingham and Hopping Brook Business park in Holliston. These three developments are projected to add 3,980 jobs within the Interstate 495 Corridor by the year 2035.

Corridor-wide, auto ownership and average household mileage are much higher than the regional averages, at two autos per household and 71 miles per household per day. The regional averages are 1.5 autos per household and 47 miles driven per household per day.

Employment

According to the Executive Office of Labor and Workforce Development, the Interstate 495 Corridor's 2009 employment was 204,000. The communities of Framingham and Marlborough make up approximately 36% of the Interstate 495 Corridor's employment. Employment densities are highest in the Interstate 495 Corridor communities of Framingham, Marlborough, and Franklin. Employees in the Interstate 495 Corridor commute an average of 19 miles round trip, with 6.4% accomplished by non-auto modes of travel. Commuters in most communities within the Interstate 495 Corridor have little choice when it comes to commuting to and

from work. Commuter rail service is available to a handful of communities in the Corridor, as well as some suburban bus service. Connections for pedestrians and cyclists are not as good as is found in the Central Corridor, or even in the Route 128 Corridor. This lack of connectivity creates a necessity for many to own an automobile.

MAPC's MetroFuture forecasts show employment increasing by 4% to 217,700 by 2035, with some municipalities experiencing modest growth in absolute terms. The largest gains are expected in Framingham, Franklin, and Foxborough.

The MetroFuture land use vision for the Interstate 495 Corridor envisions a mix of key regional hubs and suburban centers where both a rebirth of industrial cities and downtowns and maximizing the potential of town centers is the focus of future investment. The Interstate 495 Corridor should have a focused growth in major suburban economic centers such as Framingham, Marlborough, Southborough, and Milford while still emphasizing the importance of smaller suburban centers like those in Hudson, Maynard and Hopkinton. It is a combination of these larger economic growth areas and smaller downtown development sites that will increase both population and employment density in specific areas better facilitating mobility and opening up options for other modes of travel. Future growth should also incorporate principles of mixed-use development and connections to transit, pedestrian and bicycle facilities.

In locations more distant from transit, MetroFuture recommends land use, design, and transportation demand strategies that facilitate transit and bicycle or pedestrian access.

TRAVEL CHARACTERISTICS

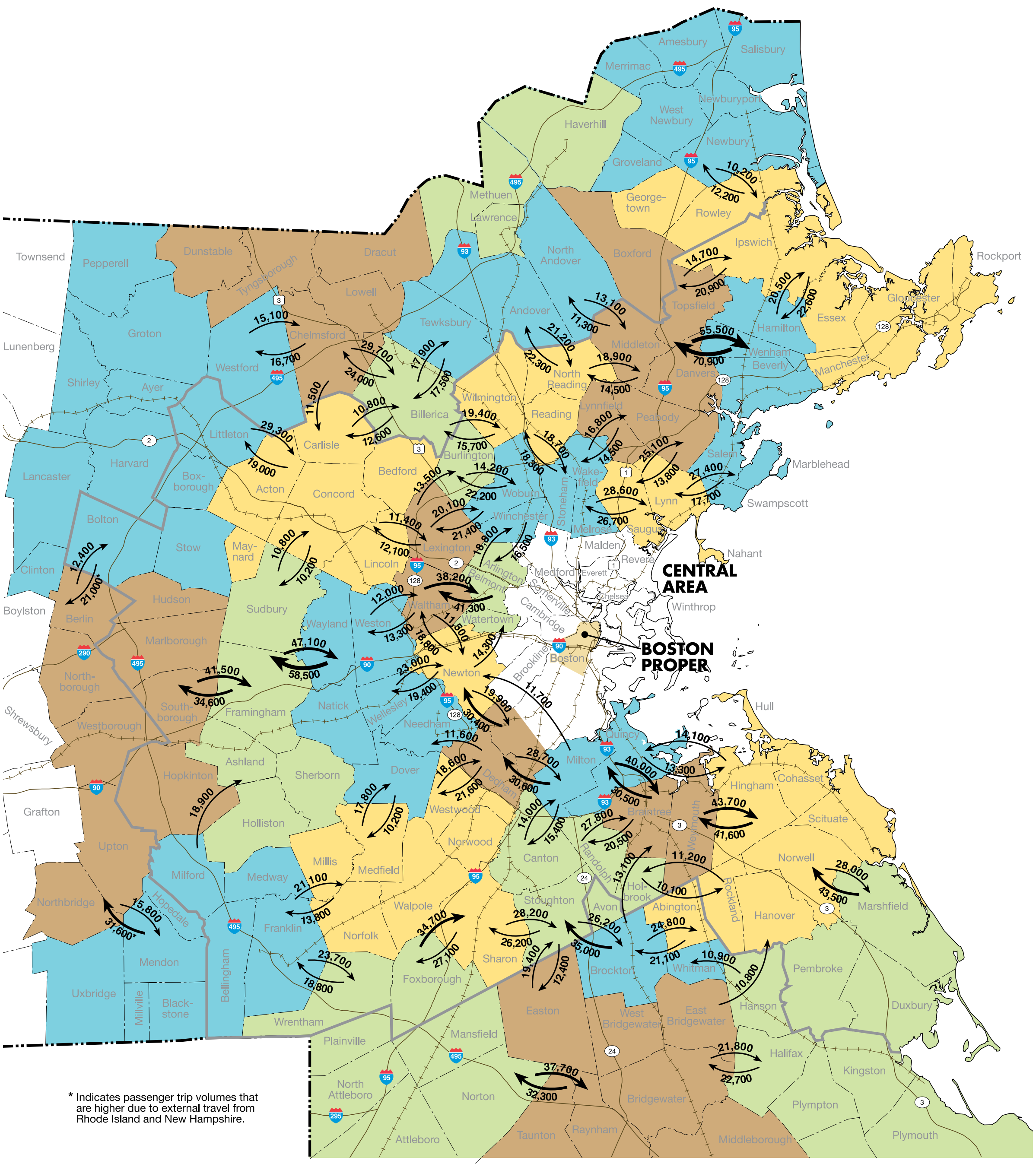
Circumferential Travel Patterns

The Boston Region MPO area and the additional 63 municipalities on its periphery (the 164 municipalities included in the region's transportation demand model), were broken into 40 districts in order to study the suburb-to-suburb travel patterns in the region. The results presented in Figure 9-2 show typical weekday travel between the suburban districts – those outside of the Central Area. The travel is described in terms of person-trips (highway and transit trips). Figure 9-2 shows only travel between districts exceeding 10,000 person-trips per day.

One clear trend from the patterns depicted in this figure is that most travel occurs between adjacent districts. Also, although it is not depicted in the figure, travel within districts far exceeds the travel between districts as 36% of persons-trips both originate

FIGURE 9-2

Travel Patterns in Circumferential Corridors



* Indicates passenger trip volumes that are higher due to external travel from Rhode Island and New Hampshire.

and terminate in the same district. This is not surprising considering that over 60% of trips in the region are less than 5 miles. While the top intra-district flows in the region easily exceed 300,000 person-trips per day, the highest trip flow between adjacent districts is only 70,900 trips per day. Meanwhile, typical weekday travel between non-adjacent districts seldom exceeds 10,000 trips.

The five highest suburban district-to-district trip flows include:

- 70,900 person trips per day: Swampscott, Salem, Marblehead, Beverly, Wenham, and Hamilton **to** Lynnfield, Peabody, Danvers, Middleton, Topsfield, and Boxford
- 58,500 person trips per day: Sudbury, Framingham, Ashland, Sherborn, and Holliston **to** Wayland, Weston, Natick, Wellesley, Needham, and Dover
- 55,500 person trips per day: Lynnfield, Peabody, Danvers, Middleton, Topsfield, and Boxford **to** Swampscott, Salem, Marblehead, Beverly, Wenham, and Hamilton
- 47,100 person trips per day: Wayland, Weston, Natick, Wellesley, Needham, and Dover **to** Sudbury, Framingham, Ashland, Sherborn, and Holliston
- 43,700 person trips per day: Braintree and Weymouth **to** Hingham, Hull, Cohasset, Abington, Rockland, Hanover, Norwell, and Scituate

IDENTIFIED TRANSPORTATION ISSUES SPECIFIC TO THE CIRCUMFERENTIAL TRAVEL

Mobility

Highway Bottlenecks: Method for Identifying Them

A highway bottleneck is defined as a location where a constraint impedes the flow of traffic on various types of roadways. 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 have been identified on Route 128 (which includes portions of Interstates 95 and 93) and Interstate 495. In the tables below, the specific locations are noted as Interstate 95, Interstate 93, Interstate 495, or Route 128. This information was presented for these two roadways in the radial corridor in which they passed through. This information has been consolidated in this chapter so that the full length of the roadways can be examined. The bottlenecks were identified using two methods:

- Travel speed index during peak periods (existing conditions)
- Volume-to-capacity ratio during peak periods (existing and future conditions)

Based on that information, the worst bottlenecks on Route 128 and Interstate 495 were identified and shown below.

Travel Speed Index (from the CMP)

Congestion thresholds have been established for express highways using existing travel speed index data and are used in this identification of bottlenecks. The speed index is the ratio of observed speed to the posted speed limit. The locations on Route 128 that have the worst speed indexes are shown in Table 9-1 for the AM peak period, and Table 9-2 for the PM peak period, and also in Figure 9-3. No locations have been identified for Interstate 495. The AM peak period is from 6:00 AM to 10:00 AM, and the PM peak period is from 3:00 PM to 7:00 PM. The travel speed index information is provided for existing conditions only

TABLE 9-1

Travel Speed Index (from the CMP): Worst Locations* on Route 128 in AM Peak Period

EXPRESS HIGHWAYS	SPEED INDEX
I-95 southbound from Rte. 3 to Winter St. (Burlington, Lexington, Waltham)	0.69 to 0.87
I-93/128 northbound from Rte. 24 to the Ponkapoag exit (Randolph, Milton)	0.74 to 0.83
I-95 southbound between Rte. 129 & Rte. 38 (Reading, Wakefield, Woburn)	0.75 to 0.89
I-95 northbound from I-95/I-93 interchange to Rte. 109 (Dedham, Canton, Westwood)	0.77 to 0.84
I-95 at Rte. 9 (Wellesley)	0.79
I-95 northbound from Recreation Rd. to I-90 (Weston)	0.85 to 0.89
I-93 southbound from the Rte. 3 1-mile sign to Rte. 37 (Randolph)	0.87
I-95 northbound from Highland Ave/Needham St. to Rte. 9 next right sign (Needham)	0.9

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

TABLE 9-2

Travel Speed Index (from the CMP): Worst Locations* on Route 128 in PM Peak Period

EXPRESS HIGHWAYS	SPEED INDEX
I-95 southbound from Great Plain Ave. To I-95/I-93 south interchange (Dedham, Westwood, Canton)	0.52 To 0.89
I-93 northbound from I-95/I-93 interchange to Rte. 24 (Canton, Randolph)	0.57 To 0.62
I-93/rte. 1 southbound from Rte. 138 to the I-93/Southeast Expressway/Rte. 3 split (Canton, Milton, Randolph, Braintree, Quincy)	0.57 To 0.87
I-95 northbound from Rte. 2 To Rte. 3 (Lexington, Waltham)	0.67 To 0.85
I-95 southbound between Rte.30 and Highland Ave./Needham St. (Needham, Wellesley, Newton, Weston)	0.67 To 0.89
I-95 southbound between Rte. 3a and Rte. 3 (Burlington)	0.78 To 0.80
I-95 northbound between Rte. 38 & Rte. 28 (Woburn, Reading)	0.80 To 0.86
I-95 southbound between Rte. 28 & I-93 (Reading)	0.88
I-95 southbound from Trapelo Rd. to Rte. 20 (Waltham)	0.89 To 0.90

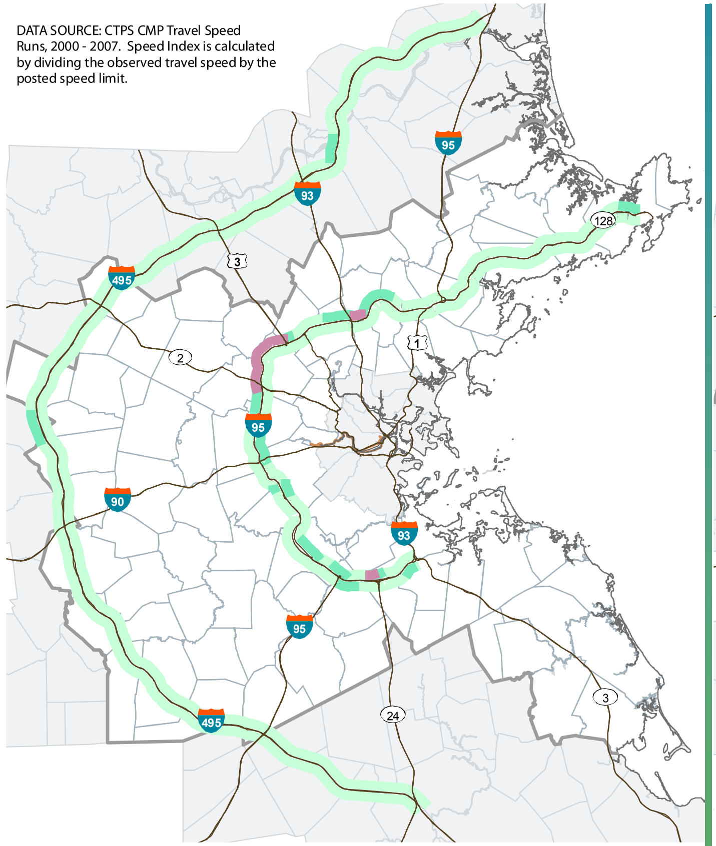
*Where multiple communities are listed for a roadway, they are in descending order of severity.

Volume-to-Capacity Ratio

The existing volume-to-capacity ratios (V/Cs) for Route 128 and Interstate 495 were

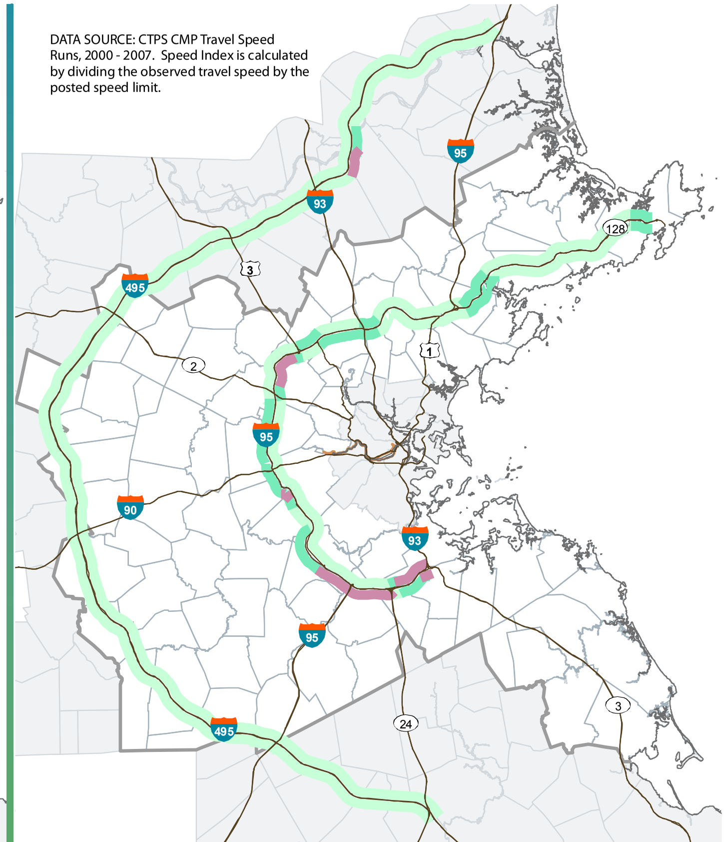
FIGURE 9-3

Express Highway Travel Speed Index (Existing Conditions)
AM and PM: Circumferential Corridors



Travel Speed as Percentage of Posted Speed Limit
AM Peak Period (6 - 10 AM)

- Less than 50 percent
- 50+ to 75 percent
- 75+ to 90 percent
- Greater than 90 percent



Travel Speed as Percentage of Posted Speed Limit
PM Peak Period (3 - 7 PM)

- Less than 50 percent
- 50+ to 75 percent
- 75+ to 90 percent
- Greater than 90 percent

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 9-3 and Figure 9-4 present the segments of these roadways with the highest V/Cs during the AM peak period, listed in descending order of severity. Table 9-4 and Figure 9-4 present the same information for the PM peak period. No bottlenecks were identified for Interstate 495 for existing conditions. Order of severity was determined based on all data points and is therefore not always reflected in the ranges shown in the tables. In these tables and figures, the AM peak period is from 6:00 AM to 9:00 AM ,and the PM peak period is from 3:00 PM to 6:00 PM.

TABLE 9-3

Volume-to-Capacity Ratio (V/C): Worst Locations on Route 128 in AM Peak Period, 2008

EXPRESS HIGHWAYS	V/C
I-93 southbound from the Rte. 138 interchange to I-95 (Canton)	0.96 to greater than 1
I-93 northbound at Rte. 37 just before the Braintree split (Braintree)	0.95
I-93 southbound from the Rte. 24 interchange to the Rte. 138 interchange (Randolph, Milton, Canton)	0.94 to greater than 1
I-95 northbound from the I-95 interchange to the Rte. 135 interchange (Canton, Dedham)	0.86 to greater than 1
I-95 northbound from Rte. 135 interchange in Dedham to Rte. 16 interchange in Newton	0.84 to greater than 1
I-95 southbound between North Ave. & I-93 (Wakefield, Reading)	0.7 to greater than 1

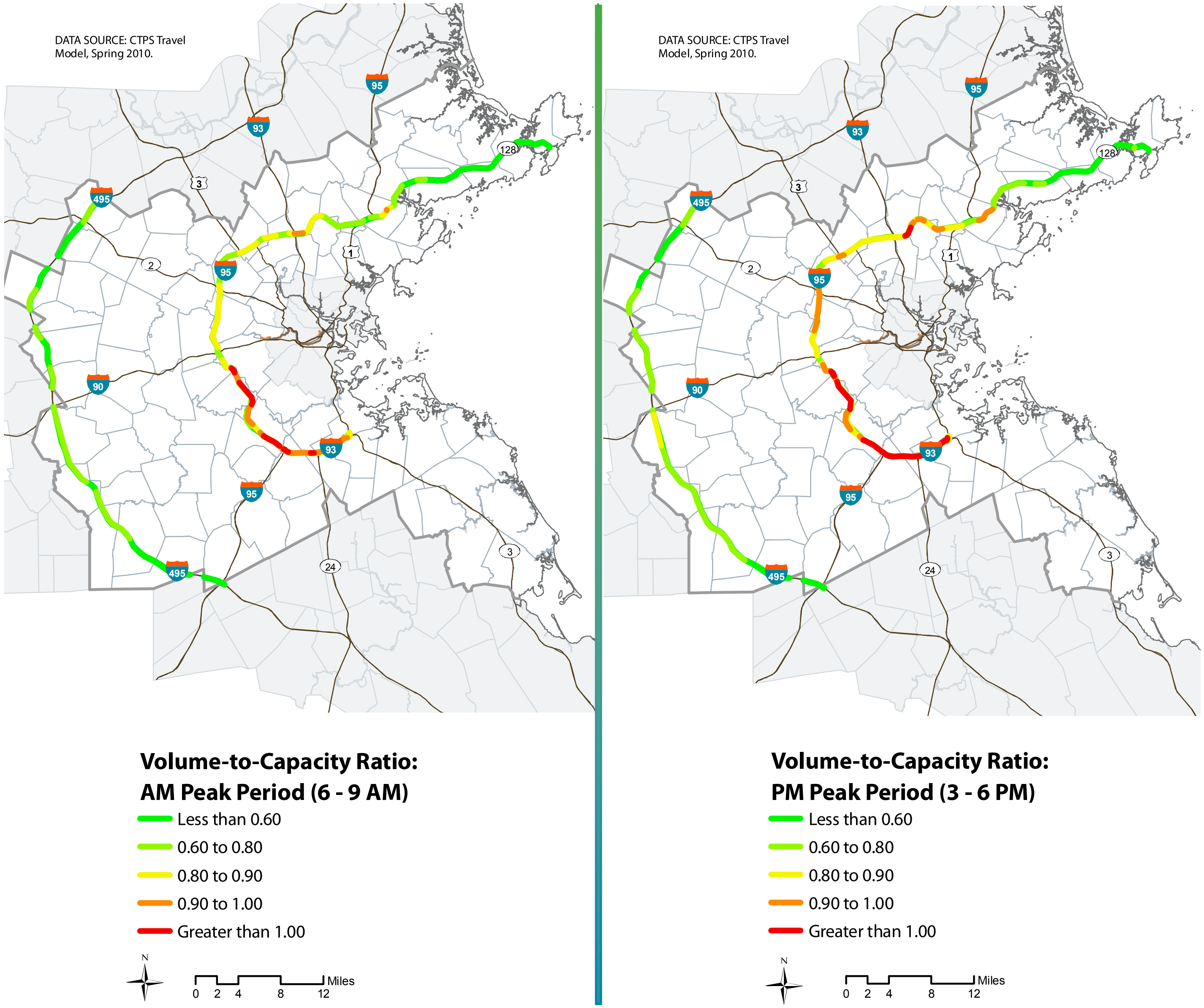
TABLE 9-4

Volume-to-Capacity Ratio (V/C): Worst Locations on Route 128 in PM Peak Period, 2008

EXPRESS HIGHWAYS	V/C
I-95 northbound to the Rte. 9 interchange (Wellesley)	Greater than 1
I-93 northbound from the I-95 split to the Rte. 138 interchange (Canton)	0.94 to greater than 1
I-95 southbound from Rte. 2 interchange to the Totten Pond Rd. interchange (Lexington, Waltham)	0.98 to 0.92
I-95 southbound from the Rte. 16 interchange to Great Plain Ace. Interchange (Newton and Needham)	0.91 to greater than 1
I-95 northbound between Rte. 28 & Rte. 129 (Reading, Wakefield)	0.9 to greater than 1
I-95 southbound from the Rte. 135 interchange to the I-95 interchange (Dedham, Canton)	0.90 to greater than 1
I-95 northbound from the I-95 interchange to the East St. Rotary (Canton, Dedham)	0.90 to greater than 1
I-93 southbound at the Rte. 37 interchange to south of Rte. 24 (Braintree, Randolph)	0.88 to greater than 1
I-95 northbound from Lexington/Burlington town line to Rte.3A (Burlington)	0.9
I-95 southbound to the I-90 interchange (Weston)	0.88 to 0.89
I-95 northbound from the Rte. 20 interchange to the Rte. 2 interchange (Waltham, Lexington)	0.87 to 0.95
I-95 northbound in Wakefield and Lynnfield	0.84 to 0.93

FIGURE 9-4

Express Highway Volume-to-Capacity Ratio
2008 AM and PM: Circumferential Corridors



In addition, the Boston Region MPO's travel demand model was used to determine V/C for these roadways under 2030 No-Build conditions. Table 9-5 and Figures 9-5 present the segments of Route 128 with the highest AM peak period V/Cs under the 2030 No-Build, again listing them in descending order of severity. Table 9-6 and Figure 9-5 present the same information for the PM peak period. Table 9-7 and Figure 9-5 presents the AM and PM peak period V/C information for Interstate 495. Order of severity was determined based on all data points and is therefore not always reflected in the ranges shown in the tables.

TABLE 9-5

Volume-to-Capacity Ratio (V/C): Worst Locations on Route 128 in AM Peak Period, 2030 No-Build

EXPRESS HIGHWAYS	V/C
I-93 southbound from the Rte. 138 interchange to the I-95 interchange (Canton)	0.91 to greater than 1
I-95 northbound from the I-95 interchange to the Rte. 135 interchange (Canton, Dedham)	0.90 to greater than 1
I-93/Rte. 1 northbound at Rte. 37 just before the Braintree split (Braintree)	0.97
I-95 northbound from the Rte. 135 (West St.) interchange to the Rte. 16 (Washington St.) interchange (Dedham, Needham, Wellesley, and Newton)	0.88 to greater than 1
I-95 southbound between North Ave. & I-93 (Wakefield, Reading)	0.8 to greater than 1
I-95 southbound from the Rte. 20 interchange to the Rte. 30 interchange (Waltham and Weston)	0.87 to 0.90
I-95 from Rte. 2 to Totten Pond Rd. (Waltham)	0.85 to 0.94

TABLE 9-6

Volume-to-Capacity Ratio (V/C): Worst Locations on Route 128 in PM Peak Period, 2030 No-Build

EXPRESS HIGHWAYS	V/C
I-95 southbound from the Rte. 16 interchange to Great Plain Ave. interchange (Newton, Wellesley, and Needham)	Greater than 1
I-95 northbound at the Rte. 9 interchange (Wellesley)	0.99 to greater than 1
I-93 southbound at the Rte. 37 interchange to south of Rte. 24 (Braintree, Randolph)	0.94 to greater than 1
I-93 northbound from the I-95 split to the Rte. 138 interchange (Canton)	0.93 to greater than 1
I-95 southbound from the Rte. 135 interchange to the I-95 interchange (Dedham, Canton)	0.90 to greater than 1
I-95 northbound from the Rte. 20 interchange to the Rte. 2 interchange (Waltham, Lexington)	0.94 to 0.96
I-95 southbound from Rte. 2 interchange to the Totten Pond Rd. interchange (Lexington, Waltham)	0.93 to 0.97
I-95 southbound between Rte. 3A & Rte. 3 (Burlington)	0.9
I-95 northbound between I-93 & Lynnfield town line (Reading, Wakefield)	0.8 to 1
I-95 northbound in Wakefield and Lynnfield	0.74 to 0.93

FIGURE 9-5

Express Highway Volume-to-Capacity Ratio
2030 No-Build, AM and PM: Circumferential Corridors

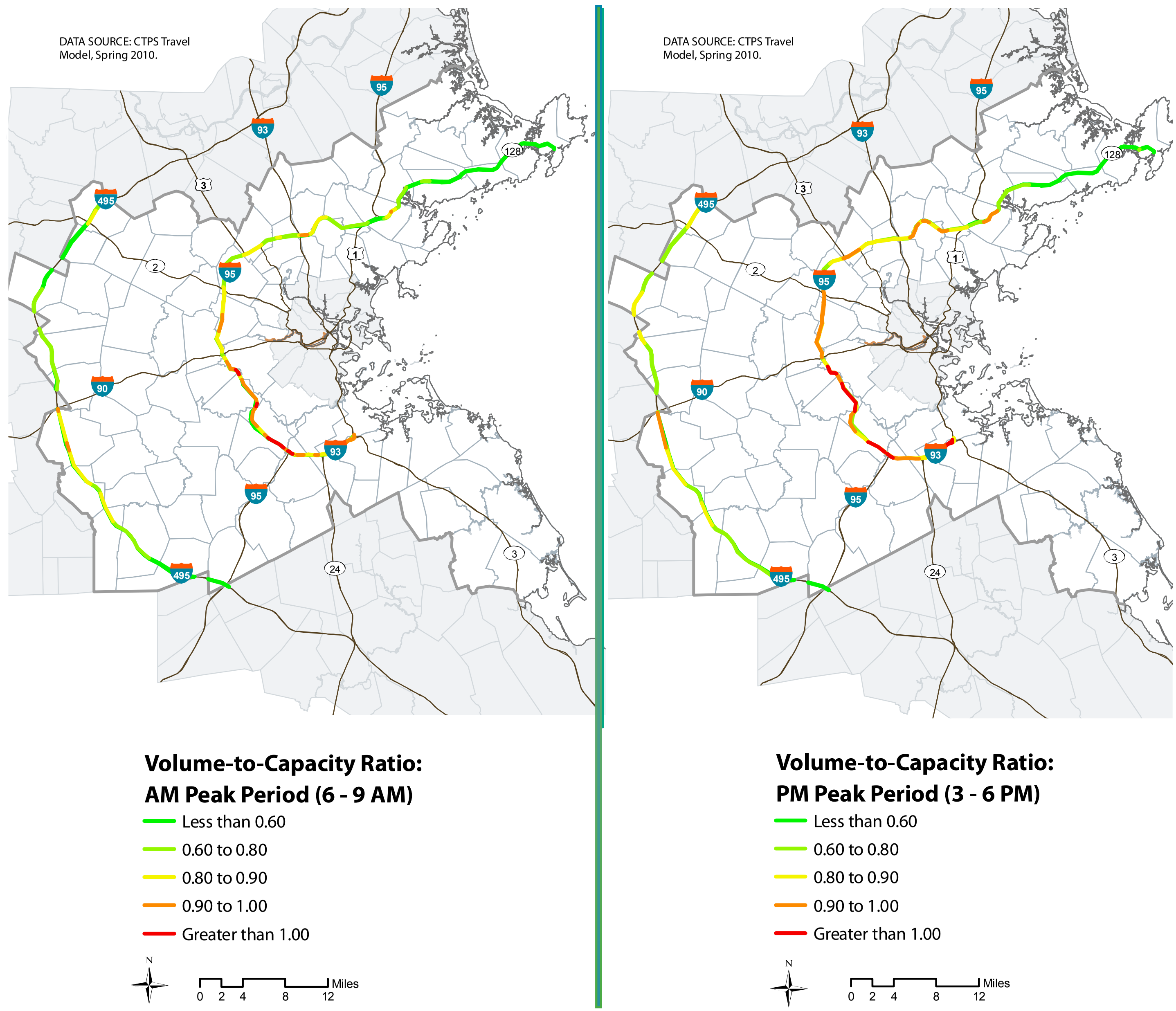


TABLE 9-7

VOLUME-TO-CAPACITY RATIO (V/C):
WORST LOCATIONS ON INTERSTATE 495 IN THE AM AND PM PEAK PERIODS, 2030 NO-BUILD

EXPRESS HIGHWAYS AM PEAK PERIOD	V/C
I-495 northbound from the W. Main St. interchange to I-90 interchange (Hopkinton)	0.88 to 0.95
EXPRESS HIGHWAYS PM PEAK PERIOD	**V/C**
I-495 from the W. Main St. interchange to I-90 interchange (Hopkinton)	0.8 to 0.95

Worst Highway Bottlenecks in the Circumferential Corridors

As shown in Figures 9-3 through 9-5, the majority of Route 128 is congested. The worst bottleneck locations along this express highway are the following:

Route 128/Interstate 93

- Northbound from Interstate 95 to the Braintree Split (Canton, Milton, Randolph, and Braintree)
- Southbound from the Braintree Split to Route 24 (Braintree and Randolph)

Route 128/Interstate 95

- Northbound from Interstate 93 to Route 109 (Dedham, Canton, Westwood)
- Northbound from Lexington/Burlington town line to Route 3A (Burlington)
- At the Route 9 interchange (Wellesley)
- Southbound between North Avenue & Interstate 93 (Wakefield, Reading)
- Southbound from Route. 2 to Totten Pond Road (Lexington, Waltham)
- Southbound from Route 16 to Highland Avenue (Newton and Needham)
- Southbound from Route 135 to Interstate 95 (Dedham, Canton)

There are no locations on Interstate 495 in the Boston Region MPO area where both the travel speed index and volume-to-capacity ratio warrant inclusion on the list above.

Transit Mobility Needs Identified by the MBTA for the Circumferential Corridor

Various factors affect transit mobility, including capacity issues related to vehicle loads, service reliability, infrastructure and/or vehicle condition, and parking availability. Also affecting mobility is connectivity among modes and with other RTAs, private-carrier services, and TMA shuttles.

Vehicle Load and Service Reliability Issues

The ratio of passenger to seats on a vehicle is an indication of whether or not additional capacity is needed on a rail line or bus route. The MBTA's *Service Delivery Policy* defines acceptable vehicle loads by mode and by time period. The maximum allowable ratio of riders to seats on buses is 140% during peak travel periods and 100% during the off-peak.

Of MBTA bus routes that provide some type of circumferential service in this corridor, the buses with the highest ridership are:

- Route 225 (Quincy Center Station - Weymouth Landing) - 2,560 average daily boardings
- Route 134 (North Woburn - Wellington Station) - 2,160 average daily boardings
- Route 70A (Cedarwood - University Park., Cambridge) - 2,030 average daily boardings
- Route 51 (Cleveland Circle - Forest Hills Station) - 1,900 average daily boardings

Table 9-8 presents data on the performance of the Circumferential Corridor bus routes. As shown by the routes' maximum load ratios (based on recent MBTA bus ridership counts) some of the routes in the Circumferential Corridor fail the load standard, Routes 134 and 137. A more recent point check did not show continued load problems on the Route 137.[1] Table 9-8 also shows the number of trips and percent of trips on each bus route serving the Circumferential Corridor that were operated during the month of October 2010. These columns give an indication of which routes operate with a high frequency of service and the degree to which scheduled trips are not run.

In addition, Table 9-8 lists the percent of time points on each route (for all trips operated during October) at which the buses were on time, and gives an indication of whether or not the route might pass the schedule adherence standard. In the *Service Delivery Policy*, the schedule adherence standard establishes a two-step process. First, the standard measures whether or not the bus is on time at various time points along the route. The definition of "on time" at any given time point on a routes varies by time period and by the frequency of service and depends on whether the time point is at the beginning of the route, mid-route, or at the end of the route. Second, a requirement that 75% of trips be "on time" is applied to individual time periods, and a route fails the standard if it fails during any time period during the day.

In Table 9-8, the 75% threshold has been applied to all time points on all trips operated during the month of October 2010, and so the result is not an official schedule adherence designation. It does, however, give an idea of how well individual routes are performing and provides a comparative indication of which routes have the worst problems and are most in need of operational improvements. The MBTA now employs various types of monitoring systems, including real-time vehicle locators and electronic passenger counters, to generate data that can be used to improve service reliability. MBTA Service Planning is currently using automatic vehicle locator (AVL) data to refine bus schedules to better represent actual running times. This should improve on-time performance.

1 A point check is an observation of the vehicle load made at the maximum load point of a route during the period of heaviest use. This differs from a full passenger count, which involves counting the number of riders who board and alight a route at all stops on all trips operated throughout the service day

Table 9-8

Performance of Bus Routes

TYPE	ROUTE	ROUTE NAME	VEHICLE LOAD STANDARD	MAXIMUM LOAD RATIO	BASED ON ALL TRIPS OPERATED DURING OCTOBER 2010: % TIME-POINTS ON TIME	SCHEDULE ADHERENCE STANDARD	% OF SCHEDULED TRIPS OPERATED	# TRIPS OPERATED
Local	51	Cleveland Circle - Forest Hills Station		102%	65%	Fail	99.8%	608
Local	52	Dedham Mall - Watertown Sq.		98%	59%	Fail	99.8%	440
Local	59	Needham Junction - Watertown Sq.		73%	55%	Fail	99.6%	525
Local	70/70A	Cedarwood - University Pk., Cambridge		134%	59%	Fail	99.3%	1,572
Local	134	North Woburn - Wellington Station	Fail	142%	58%	Fail	99.9%	798
Local	136	Reading Depot - Oak Grove Station		123%	63%	Fail	99.7%	387
Local	137	Reading Depot - Malden Center Station	Fail	150%	63%	Fail	99.7%	366
Express	170	Oak Park - Dudley Station		30%	63%	Fail	ND	ND
Local	217	Wollaston Beach - Ashmont Station		73%	59%	Fail	100.0%	200
Local	225	Quincy Ctr. Sta. - Weymouth Landing		136%	61%	Fail	100.0%	1,258
Local	245	Quincy Ctr. Sta. - Mattapan Station		63%	67%	Fail	100.0%	336
Express	354	Woburn Line - State Street		95%	59%	Fail	99.9%	462
Local	429	Northgate Shopping Ctr. - Lynn Central Sq.		111%	51%	Fail	99.8%	451
Local	435	Liberty Tree Mall - Lynn Central Sq.		90%	50%	Fail	100.0%	357
Local	436	Liberty Tree Mall - Lynn Central Sq.		109%	60%	Fail	100.0%	347
Express	455*	Salem - Haymarket via Lynn Central Sq.		93%	42%	Fail	99.6%	459
Local	456	Salem Depot - Lynn Central Sq.		43%	68%	Fail	100.0%	147
Local	465	Liberty Tree Mall - Salem Depot		40%	49%	Fail	99.8%	218
Express	505	Waltham Ctr. - Federal & Franklin Sts.		91%	51%	Fail	99.8%	638
Express	553	Roberts - Federal & Franklin Sts.		102%	45%	Fail	99.5%	313
Express	554	Waverley Sq. - Federal & Franklin Sts.		117%	57%	Fail	100.0%	294
Express	556	Waltham Highlands - Federal & Franklin Sts.		100%	52%	Fail	99.8%	315
Express	558	Riverside - Federal & Franklin via Auburndale		102%	46%	Fail	100.0%	221

Bus schedule adherence can be affected by various factors, most notably the level of traffic on the roadway. However, the size and condition of the fleet also affect service reliability and capacity. A sufficient number of vehicles must be available to operate the regular service with spare vehicles to cover breakdowns and other unusual events. The generally accepted industry standard for spare vehicles is 20% of the active bus fleet. Currently, the spare ratio for buses systemwide meet this spare ratio standard. The current bus fleet is fairly new and in good condition, as is indicated by the measure of mean miles between vehicle failures. The MBTA's November 2010 ScoreCard (which reports on performance during the months of June through October 2010) shows the mean miles between failures for the bus fleet to be 12,437 in October. This greatly exceeded the goal of 6,000.

Mobility Issues Identified in the Program for Mass Transportation (PMT)

In addition, the MBTA's PMT, approved in December 2009, identified the following specific transit capacity needs and other issues regarding mobility in the Circumferential Corridor:

- There are opportunities to establish additional circumferential routes to provide quicker and more direct connections for circumferential travel.
- There are strong activity centers in adjacent radial corridors that are not currently connected by transit.

Inner Suburban Mobility Issues

CTPS conducted a study of the potential for circumferential transit in the inner-suburban area. This study found current gaps in service with relatively high levels of existing and projected demand. The study identified opportunities for fixed-route or flexible transit service between:

- Malden, Medford, Arlington, Belmont, Watertown, and Waltham
- Waltham, Lexington, Burlington, and Woburn
- Wakefield, Stoneham, Reading, and Woburn
- Lynn, Saugus, Melrose, Stoneham, and Woburn
- Quincy, Braintree, Randolph, and Canton
- Dedham, Needham, and Wellesley
- Waltham, Newton, and Wellesley

Freight Mobility Issues

Transport of Hazardous Materials by Trucks

There is a long-standing prohibition against trucks carrying hazardous cargoes traveling in tunnels. The expressway segments impacted by this prohibition include Interstate 90 from the Prudential Center to Logan Airport, Interstate 93 through the Tip O'Neill Tunnel, including the Zakim Bridge, and Route 1 passing under City Square in Charlestown and over the Tobin Bridge. The process of establishing alternate routes involves federal, state, and municipal regulations, and the alternate route system is undergoing review as of this writing. The route designation that emerges from this process can have a material impact on the costs and efficiencies of regional fuel transportation. Restrictions have an effect on regional trucking patterns.

Highway Freight Bottlenecks

The MassDOT Freight Plan identified 12 highway freight bottlenecks in Massachusetts. Seven of the 12 were located in the Circumferential Corridors.

- Interstate 93 southbound at Route 3 and Route 128 (the Braintree Split)
- Route 24 at Interstate 93/Route 128, and the Interstate 93 lane drop in Randolph
- Route 128/Interstate 95 lane drop at Route 9 in Wellesley
- Route 3 at Route 128/Interstate 95 in Burlington
- Interstate 93 at Route 128/Interstate 95 Interchange in Woburn, Stoneham, and Reading
- Interstate 90 at Route 128/Interstate 95 interchange
- Interstate 290 and Interstate 495 (exit 8A)

South Coast Freight Connections

Freight rail connections between Framingham and the South Coast of Massachusetts must cross the Northeast Rail Corridor, which limits freight rail operations due to the high frequency of passenger operations on the Northeast Rail Corridor

Safety Issues

Highway

MassDOT identifies "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 values are 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 in selecting locations for safety-based studies and in the LRTP and TIP project selection process.

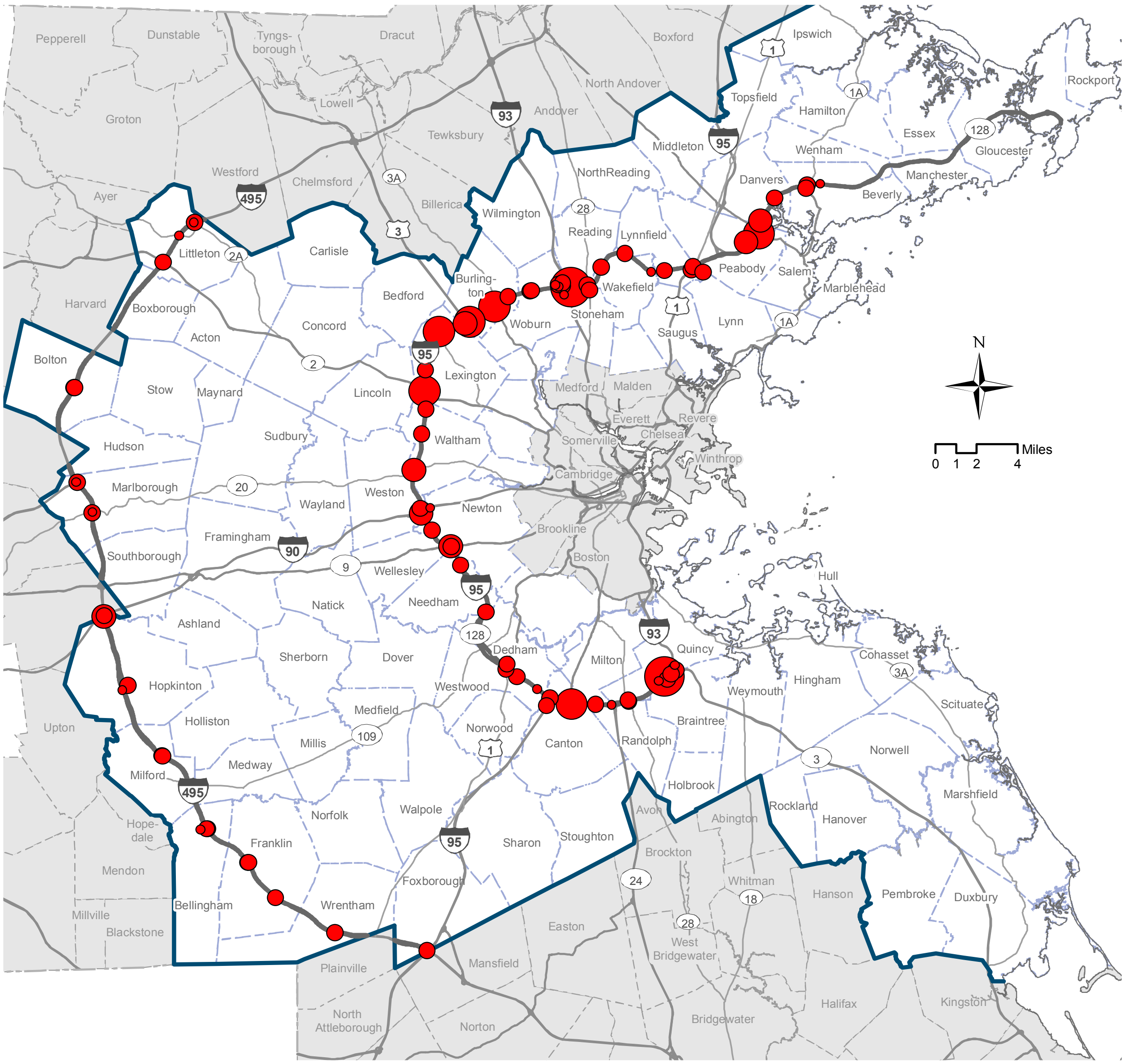
Figure 9-6 identifies the top crash cluster locations in the Circumferential Corridor.

The locations with the highest EPDO values (shown in parentheses below) on the Route 128 Corridor are:

- Route 128/Interstate 93 (northbound) at Granite Street (northbound), Braintree (795)
- Route 128/Interstate 95(northbound) at Interstate 93 (northbound), Reading (755)
- Route 128/Interstate 95 (northbound) at Route 3 (northbound), Burlington (418)
- Route 128 (northbound) at Route 114 (eastbound), Peabody (404)

FIGURE 9-6

Top Five Percent of Crash Cluster Locations Circumferential Corridor



Top 5 Percent Crash Cluster Locations (EPDO Values)

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

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 a 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.

- Route 128/Interstate 95 (northbound) at Route 4 (northbound), Lexington (364)

The locations with the highest EPDO values (shown in parentheses below) on the Interstate 495 Corridor are:

- Interstate 90 (eastbound) at Interstate 495 (southbound), Hopkinton and Westborough (220)
- Interstate 90 (eastbound) at Interstate 495 (northbound), Hopkinton and Westborough (195)
- Interstate 495 (northbound) ramp to Interstate 290 (westbound), Marlborough (182)
- Route 2 (eastbound) at Interstate 495 (northbound), Littleton (171)
- South Street, Route 1A (northbound) ramp to Interstate 495 (southbound), Wrentham (170)

Freight

Truck Rollover Crashes

Trucks are frequently involved in roll over crashes at two locations in the Circumferential Corridors:

- The interchange of Interstate 93 and Interstate 95/Route 128 in Woburn
- The Interstate 495/Interstate 290/Route 85 interchange in Marlborough

Truck Stop Gap

The portion of Interstate 495 in the Boston Region MPO area is part of a gap in the rest stop network in Massachusetts, as identified in the Massachusetts Freight Plan. There is a lack of rest stops along Interstate 495 from approximately the MPO border at Westford to Interstate 90, and continuing along Interstate 90 outside of the MPO area to Sturbridge. This segment of the highway system has high truck volumes and is an important connection between northern New England and the Boston region, and the Mid-Atlantic region of the United States.

SUMMARY OF CIRCUMFERENTIAL CORRIDOR NEEDS

The preceding sections have laid out the corridor's existing transportation infrastructure, land use conditions, travel characteristics and patterns, and transportation-related needs. This section summarizes the corridor's needs that are the most pressing as assessed in light of the MPO's visions established for *Paths to a Sustainable Region* and the available information on the needs. Several needs identified in the preceding sections stand out. In addition to passenger transportation needs by mode, this summary includes issues related to freight transportation, land use, and transportation equity.

Paths to a Sustainable Region envisions a system that is well maintained, has less congestion and fewer accidents on its roadways, offers attractive alternatives to driving, produces very little of the emissions that cause climate change and health problems, offers easy connections between nonmotorized modes and transit, efficiently moves freight, and supports development in areas where it already exists as a strategy to encourage alternatives to driving and to preserve open space.

Highway

Paths to a Sustainable Region envisions a highway system that is well maintained and has less congestion and fewer severe crashes. The needs assessment of the Circumferential Corridors identifies bridge and roadway maintenance needs and significant bottleneck and crash locations. The identified needs and problems listed below will promote the realization of the vision:

Highway bottlenecks cause congestion and accidents and result in higher emissions of pollutants. The bottleneck locations on the Route 128 Corridor are listed below. There are no locations on Interstate 495 in the Boston Region MPO area where both the travel speed index and volume-to-capacity ratio warrant inclusion in this list.

Route 128/Interstate 93

- Northbound from Interstate 95 to the Braintree Split (Canton, Milton, Randolph, and Braintree)
- Southbound from the Braintree Split to Route 24 (Braintree and Randolph)

Route 128/ Interstate 95

- Northbound from Interstate 93 to Rte. 109 (Dedham, Canton, Westwood)
- Northbound from Lexington/Burlington town line to Route 3A (Burlington)
- At the Route 9 interchange (Wellesley)
- Southbound between North Ave. & Interstate 93 (Wakefield, Reading)
- Southbound from Rte. 2 to Totten Pond Road (Lexington, Waltham)
- Southbound from Route 16 to Highland Avenue (Newton and Needham)
- Southbound from Rte. 135 to Interstate 95 (Dedham, Canton)
- The top crash locations for the Route 128 Corridor and the Interstate 495 Corridor were identified by the weighted Equivalent Property Damage Only (EPDO) index, which takes into consideration fatalities, injuries, and property damage.

The locations with the highest EPDO values (shown in parentheses below) on the Route 128 Corridor are:

- Route 128/Interstate 93 (northbound) at Granite Street (northbound), Braintree (795)
- Route 128/Interstate 95(northbound) at Interstate 93 (northbound), Reading (755)

- Route 128/Interstate 95 (northbound) at Route 3 (northbound), Burlington (418)
- Route 128 (northbound) at Route 114 (eastbound), Peabody (404)
- Route 128/Interstate 95 (northbound) at Route 4 (northbound), Lexington (364)

The locations with the highest EPDO values (shown in parentheses below) on the Interstate 495 Corridor are:

- Interstate 90 (eastbound) at Interstate 495 (southbound), Hopkinton and Westborough (220)
- Interstate 90 (eastbound) at Interstate 495 (northbound), Hopkinton and Westborough (195)
- Interstate 495 (northbound) ramp to Interstate 290 (westbound), Marlborough (182)
- Route 2 (eastbound) at Interstate 495 (northbound), Littleton (171)
- South Street, Route 1A (northbound) ramp to Interstate 495 (southbound), Wrentham (170)

Transit

Paths to a Sustainable Region envisions a transit system that, like the envisioned highway system, is safe and maintained in a state of good repair. However, unlike the vision for the highway system the vision for transit calls for more use in order to reduce auto dependency and emissions causing climate change. In addition to projects that will bring the system into a state of good repair, addressing the needs and problems identified below will promote the realization of the vision:

- Transit reliability throughout the Circumferential Corridor is poor. All of the 22 bus routes fail the MBTA's schedule adherence standard.
- There are strong activity centers in adjacent radial corridors that are not currently connected by transit.

Issues to watch:

- Higher transit demand resulting from the implementation of the MetroFuture land use plan will require investments to increase capacity.
- A study of the potential for circumferential transit in the inner-suburban area identified the following opportunities for fixed-route or flexible transit service between:
    - Malden, Medford, Arlington, Belmont, Watertown, and Waltham
    - Waltham, Lexington, Burlington, and Woburn
    - Wakefield, Stoneham, Reading, and Woburn
    - Lynn, Saugus, Melrose, Stoneham, and Woburn

- Quincy, Braintree, Randolph, and Canton
- Dedham, Needham, and Wellesley
- Waltham, Newton, and Wellesley

Freight

Paths to a Sustainable Region envisions a transportation system in which all freight modes operate efficiently. Addressing the needs and problems identified below will promote the realization of this vision:

- The interchange of Interstates 93 and 95 in Woburn, and the interchange of Interstates 290 and 495 in Marlborough, need to be improved in order to reduce the number of truck rollover crashes.
- Seven of the 12 worst highway freight bottlenecks in Massachusetts are located along the Interstate 495 or Interstate 95/Route 128 Corridors.
- There are no truck rest stops along the important freight corridor along Interstate 495 from the MPO border at Westford to Interstate 90, and continuing along Interstate 90 to Sturbridge.
- Freight moving from the CSX Boston Line to the South Coast must cross the Northeast Rail Corridor, which limits the movement of freight.

Issue to watch:

- As demand for rail freight increases, tracks carrying that freight in the Circumferential Corridors may need to be upgraded to accommodate the industry standard of 286,000 pounds per train car. Currently the capacity is 263,000 pounds. This restriction increases costs for shippers.

Bicycle/Pedestrian

Paths to a Sustainable Region calls for linking bicycle, pedestrian, and transit facilities in a network; increasing the use of sustainable modes; and improving transportation options and accessibility for all modes of transportation. Addressing the needs and problems identified below will promote the realization of this vision:

- Currently, there are no major bicycle paths that provide circumferential travel routes.

Land Use

Paths to a Sustainable Region shares the MetroFuture vision of a region in which new development is focused in developed areas already well served by infrastructure. As the work toward realization of this vision proceeds, issues to watch include:

Route 128 Corridor

- Much of the future population growth in the 128 Corridor is anticipated to occur in the Weymouth/Hingham area on the South Shore and in the Lynn/Danvers/Peabody area on the North Shore.

- Some of the largest employment generating projects in the planning stages is Southfield in Weymouth, Westwood Station in Westwood, Quincy Center in Quincy, and Waterfront in Lynn. These four developments are projected to add 10,159 jobs within the Route128 Corridor by the year 2035
- 7.8% of commuting trips in the Route 128 Corridor are accomplished by non-auto modes of travel.
- Auto ownership and average household mileage are higher than the regional averages, at 1.7 autos per household and 53 miles per household per day in the Route 128 Corridor.

I-495 Corridor

- Large residential projects planned in the corridor include the Weston Nurseries/ Legacy Farms project in Hopkinton and Jefferson at Ashland in Ashland, which are projected to add 845 units through the year 2035.
- Much of the future population growth in the Interstate 495 Corridor is anticipated to occur in the communities of Ashland, Holliston, Hopkinton, and Milford.
- Among the largest employment generating projects planned for the corridor are the Framingham Biologics Center in Framingham, Genzyme in Framingham, and Highland Commons in Hudson. These three projects are expected to add an additional 1,300 jobs in the near term. Additionally, projects such as EMC Corp. in Southborough, Crossroads Corporate Center in Framingham, and Hopping Brook Business park in Holliston are projected to add 3,980 jobs within corridor by 2035.
- 6.4% of commuting trips in the Interstate 495 Corridor are accomplished by non-auto modes of travel.
- Corridor-wide, auto ownership and average household mileage are much higher than the regional averages, at 2.0 autos per household and 71 miles per household per day.