

DRAFT  
AMENDMENT TO *PATHS TO A SUSTAINABLE REGION*,  
THE BOSTON REGION METROPOLITAN PLANNING ORGANIZATION'S  
LONG-RANGE TRANSPORTATION PLAN  
MAY 24, 2012

## OVERVIEW

The Boston Region Metropolitan Planning Organization (MPO) is proposing an amendment to its current Long-Range Transportation Plan (LRTP), *Paths to a Sustainable Region*. *Paths to a Sustainable Region* was adopted by the MPO in September 2011. The amendment is spelled out and explained in the present document. The primary reason it is being proposed is to make the information on one of the projects in the LRTP consistent with the information on it in the Draft Federal Fiscal Years (FFYs) 2013–16 Transportation Improvement Program (TIP) that was released for public review beginning May 2, 2012.

In the Draft TIP, the Route 53 widening project in Hanover was proposed for programming in FFY 2014. This project had been programmed in the *Paths to a Sustainable Region* LRTP in the FFYs 2016–20 funding time band; the LRTP amendment moves it to FFY 2014 to be consistent with information presented in the TIP. The Hanover project is regionally significant and therefore must be included in the region's air quality conformity determination in the correct time band. The MPO performed a full conformity determination on the Draft TIP because of this change. A new conformity determination has also been performed on the LRTP, as amended.

This amendment, in addition to changing the time band for the Hanover project, updates the LRTP with the latest planning assumptions and information, and changes the funding time bands for two projects that are outside of the Draft TIP's time frame. The full content of the amendment is listed below and then further described.

- The funding time band for the Route 53 widening project in Hanover is changed from FFYs 2016–20 to FFY 2014. This change affects the air quality conformity determination.
- The funding time bands for the New Boston Street Bridge project in Woburn and the Montvale Avenue project in Woburn are changed from FFYs 2021–25 to FFYs 2016–20. These changes affect the air quality conformity determination.
- Financial information for the years 2013–16 is updated for consistency with the FFYs 2013–16 TIP.
- Projects that were included in the FFYs 2013–16 TIP that cost over \$10 million and were not already in the LRTP are added, with project descriptions, to the list of projects in the Recommended Plan. These projects do not affect the air quality conformity determination.
- The latest designs of the Longfellow Bridge (Boston, Cambridge) and the Casey Overpass (Boston) are incorporated into the travel-demand model used in determining air quality conformity.

- A new air quality conformity determination has been conducted that incorporates all relevant changes included in the amendment.

#### CHANGES IN FUNDING TIME BANDS

This amendment changes the funding time bands for three projects. The funding time band for the Route 53 widening project in Hanover is changed from FFYs 2016–20 to FFY 2014. The New Boston Street Bridge project and the Montvale Avenue project, both located in Woburn, are moved forward from the 2021–25 funding time band to the 2016–20 time band. These three changes are reflected in the new air quality conformity determination.

#### UPDATED FINANCIAL INFORMATION

The financial assumptions in the LRTP for the years 2013–16 are updated to be consistent with the FFYs 2013–16 TIP. The LRTP is a fiscally constrained document that includes information on costs and revenues to demonstrate the MPO’s ability to fund the improvements recommended in the document. Since the adoption of the LRTP in September 2011, the MPO has received federal funding estimates for 2013–16 and has used them in the Draft TIP. This LRTP amendment applies them to the affected LRTP time bands, 2012–15 and 2016–20. Table 1 shows the result and incorporates it into a presentation of the projected federal funds available in all of this LRTP’s time bands for capital projects on the MPO area’s highway system. The projected federal funding for the transit system has not changed since the LRTP was adopted.

TABLE 1  
 Amended *Paths to a Sustainable Region* LRTP  
 Projected Federal Funds for Capital Projects  
 on the Boston Region MPO Area’s Highway System  
 2012 to 2035  
 (in millions)

<b>Capital Program</b>	<b>FFYs 2012– 2015</b>	<b>FFYs 2016– 2020</b>	<b>FFYs 2021– 2025</b>	<b>FFYs 2026– 2030</b>	<b>FFYs 2031– 2035</b>	<b>Total</b>
Boston share of Discretionary Capital Program	\$259.56	\$468.55	\$673.62	\$844.95	\$979.53	\$3,226.21
Estimated Boston share of regional Major Infrastructure Projects	\$26.59	\$93.47	\$141.99	\$173.49	\$201.12	\$636.66
<b>Total</b>	<b>\$286.15</b>	<b>\$562.02</b>	<b>\$815.61</b>	<b>\$1,018.44</b>	<b>\$1,180.65</b>	<b>\$3,862.87</b>

## TIP PROJECTS THAT COST OVER \$10 MILLION

Three projects were included in the FFYs 2013–16 TIP that will cost over \$10 million, were not included in the LRTP as adopted, and are added to the LRTP as amended. The Federal Highway Administration has requested that the MPO include all projects over \$10 million in the LRTP's list of recommended projects and show the availability of funding for these projects. The three added projects are listed below and are included (highlighted in light blue) in Table 2, which presents, with their costs, all of the major infrastructure and expansion projects programmed with highway funding in the Recommended Plan of the amended LRTP. A description and map for each of the three added projects are attached. Also listed below is a project, costing over \$10 million, for which, in the LRTP amendment, funding for one project phase is moved to a different time band; this change is also reflected in Table 2.

- Beverly: Rantoul Street – Added (2012-2015 time band)
- Boston: Commonwealth Avenue – Added (2012-2015 time band)
- Medway: Route 109 – Added (2016-2020 time band)
- Acton, Carlisle, and Westford: Bruce Freeman Rail Trail Phases 2A and 2C – Funding for Phase 2A of this project is moved to FFY 2014. Funding for Phase 2C remains in the 2021-2025 time band.

These changes do not affect the air quality conformity determination for the LRTP. Cost adjustments were also made in Table 2 (bold dark blue numbers) to be consistent with the TIP. These include adjustments to the Clean Air and Mobility Program and funding for the Green Line Extension – College Avenue to Route 16. Adjustments to project totals, available revenue, and percentage of program funding at the end of the table are shown in yellow.

## UPDATED BRIDGE DESIGNS

Preferred designs have been chosen for the Longfellow Bridge in Boston and Cambridge and the Casey Overpass in Boston since the adoption of the current LRTP. The Longfellow Bridge project includes the removal of one travel lane, and the Casey Overpass will be constructed at-grade with new connections to surface roadways. Both projects are projected to be open by the end of 2016. These changes are reflected in the travel-demand model used in the air quality conformity determination.

**TABLE 2**  
**Major Infrastructure and Expansion Projects Programmed with Highway Funding**  
**in the Amended Recommended Plan, with Costs**

	CURRENT COST (2012)	2012–2015	2016–2020	2021–2025	2026–2030	2031–2035	MPO FUNDING	NON-MPO FUNDING*
<b>ONGOING NO-BUILD HIGHWAY PROJECTS</b>								
Route 128 Additional Lanes (Randolph to Wellesley)**	\$134,326,250	\$103,326,450	\$31,000,000				\$134,326,250	\$10,500,000
Crosby's Corner (Concord & Lincoln)**	\$38,668,424	\$38,668,424					\$38,668,424	
Trapelo Rd. (Belmont)	\$15,257,435	\$15,257,435					\$15,257,435	
<b>RECOMMENDED HIGHWAY PROJECTS</b>								
Middlesex Turnpike Improvements, Phase III (Bedford, Burlington, & Billerica)	\$21,147,447		\$20,147,447				\$20,147,447	\$1,000,000
<b>Rantoul St. (Beverly)</b>	\$15,748,820	\$15,748,820					\$15,748,820	
Sullivan Sq./ Rutherford Ave.. (Boston)	\$94,000,000		\$103,562,290				\$103,562,290	\$15,377,710
<b>Commonwealth Ave. (Boston)</b>	\$12,446,850	\$12,446,850					\$12,446,850	
I-93/Route 3 Interchange – Braintree Split (Braintree)	\$36,000,000					\$85,320,000	\$85,320,000	
I-93/I-95 Interchange (Canton)	\$235,500,000			\$377,040,000			\$377,040,000	
I-95 Northbound/ Dedham St. Ramp/ Dedham St. Corridor (Canton)	\$35,000,000			\$56,040,000			\$56,040,000	
Bruce Freeman Rail Trail (Concord to Westford)	\$18,700,000	\$8,788,000		\$15,259,000			\$24,047,000	
Route 126/Route 135 Grade Separation (Framingham)	\$58,500,000				\$113,950,000		\$113,950,000	
Route 53 Final Phase (Hanover)	\$1,000,000	\$1,144,000					\$1,144,000	

Highlighted blue – added projects

Dark blue numbers – cost adjustments to individual projects

Yellow numbers – cost adjustments to totals

**TABLE 2 (continued)**  
**Major Infrastructure and Expansion Projects Programmed with Highway Funding**  
**in the Amended Recommended Plan, with Costs**

	CURRENT COST (2012)	2012-2015	2016-2020	2021-2025	2026-2030	2031-2035	MPO FUNDING	NON-MPO FUNDING*
<b>RECOMMENDED HIGHWAY PROJECTS (CONTINUED)</b>								
Assabet River Rail Trail (Hudson to Acton)	\$18,100,000		\$23,820,000				\$23,820,000	
Route 1 Improvements (Malden, Revere, Saugus)	\$175,196,000					\$415,200,000	\$415,200,000	
<b>Route 109 (Medway)</b>	<b>\$11,234,840</b>		<b>\$11,234,840</b>				<b>\$11,234,840</b>	
Needham St./ Highland Ave./ Winchester St. (Newton & Needham)	\$18,400,000			\$29,460,000			\$29,460,000	
I-93/I-95 Interchange (Reading, Stoneham, Wakefield, & Woburn)	\$276,000,000				\$537,621,000		\$537,621,000	
Bridge St. (Salem)	\$11,223,250		\$14,769,000				\$14,769,000	
Route 18 Capacity Improvements (Weymouth)*	<b>\$38,340,000</b>	<b>\$23,568,240</b>					<b>\$23,568,240</b>	\$14,771,760
Montvale Ave. (Woburn)	<b>\$3,403,540</b>		<b>\$4,307,000</b>				<b>\$4,307,000</b>	
New Boston St. Bridge (Woburn)	<b>\$7,896,853</b>		<b>\$9,992,000</b>				<b>\$9,992,000</b>	
Conley Haul Rd. (Boston)	\$25,000,000						\$0	\$25,000,000
<b>RECOMMENDED HIGHWAY PROGRAM</b>								
Clean Air and Mobility Program (Regionwide)	\$2,000,000 per yr	<b>\$823,010</b>	\$10,937,000	\$12,680,000	\$14,700,000	\$17,039,000	\$58,528,000	
<b>RECOMMENDED TRANSIT PROJECT USING HIGHWAY FUNDING</b>								
Green Line Extension from Medford Hillside (College Ave.) to Mystic Valley Pkwy. (Rte. 16)	\$140,608,000		<b>\$186,900,000</b>	<b>\$3,200,000</b>			<b>\$190,100,000</b>	
<b>PROJECT TOTAL</b>		<b>\$219,771,029</b>	<b>\$416,669,577</b>	<b>\$493,679,000</b>	\$666,271,000	\$517,559,000	<b>\$2,313,949,606</b>	<b>\$66,649,470</b>
<b>AVAILABLE REVENUE</b>		<b>\$286,150,000</b>	<b>\$562,020,000</b>	<b>\$815,610,000</b>	\$1,018,440,000	\$1,180,650,000	<b>\$3,862,870,000</b>	
<b>PERCENTAGE OF PROGRAM FUNDING</b>		<b>77%</b>	<b>74%</b>	<b>61%</b>	65%	44%	<b>60%</b>	

\* Non-MPO Funding includes earmarks, with the exception of the Conley Haul Road (Boston). This project will be paid for by the Massachusetts Port Authority.  
\*\*Current cost is the remaining cost to complete project.



ADDITIONAL PROJECTS  
TO THE  
RECOMMENDED PLAN

## **Beverly: Reconstruction and Signal Improvements on Rantoul Street (Route 1A), from Cabot Street (South) to Cabot Street (North) (\$15,143,094)**

### **Description**

This project involves improvements to a 1.1-mile-long segment of Rantoul Street (Route 1A) in Beverly. Rantoul Street, along with Cabot Street, forms the core of Beverly's central business district. It is adjacent to the Beverly Depot stop on the Newburyport/Rockport Line of the MBTA's commuter rail system. The project will support transit-oriented redevelopment in a regional urban center.

Approximately 5,750 feet of pavement will be rehabilitated on Rantoul Street to improve safety, traffic flow, and roadway drainage. The width of the roadway will remain approximately the same. Turning lanes will be added at the Elliot Street intersection, and the existing traffic signals at School Street, Federal Street, and Elliot Street will be upgraded to meet current standards. The 11-foot sidewalks and granite curbing will be refurbished throughout the project area and will include wheelchair access ramps at all crossing points. The project also includes bicycle lanes.

### **Project's Context/Possible Impacts, by MPO Policy Area**

#### **Land Use**

The project area is the core of Beverly's central business district, with much of the land in commercial and mixed use. The project will support new transit-oriented development and redevelopment near the commuter rail station.

#### **Safety**

There were 124 crashes at the seven intersections in the project corridor during the three years of 2004 through 2006. Injuries were reported in 20 to 30 percent of the crashes at each location, but no fatalities were reported.

#### **Mobility**

Motorists encounter long delays at many of the intersection in the project area. 2008 traffic counts for Rantoul Street near Railroad Avenue found nearly 1,000 vehicles per hour during the AM peak and nearly 1,100 vehicles per hour during the PM peak. The average daily traffic volume was approximately 13,500 vehicles. The project includes a new traffic signal at Railroad Avenue, which will allow vehicles and pedestrians to have easier and safer access to a new MBTA parking garage.

#### **Livability**

The project will reconstruct the sidewalks, add bicycle lanes, and generally improve the streetscape in Beverly's downtown area. It will also support higher-density, mixed-use redevelopment projects proposed for the area near the commuter rail station. Zoning along Rantoul Street near the train station allows for up to 43 units per acre and buildings as tall as 75 feet. The roadway improvements will help accommodate additional development.

**MAP 1 Beverly: Reconstruction and Signal Improvements on Rantoul Street (Route 1A), from Cabot Street (South) to Cabot Street (North)**



***Environmental Justice***

The project is located within a low-income environmental justice population zone.





## **Boston, Brookline: Improvements to Commonwealth Avenue, from Amory Street to Alcorn Street (\$11,507,814)**

### **Description**

This project will improve approximately 0.5 miles of Commonwealth Avenue in Boston and Brookline between Amory Street on the east and Alcorn Street on the west. This street is an important gateway boulevard into the city of Boston.

The project will upgrade the pavement and drainage conditions and four signalized intersections, improve and add pedestrian and bicycle facilities, and improve the streetscape design. It will also widen the MBTA reservation for the Green Line trolleys operating on the B Branch. The improvements will be consistent with Boston's Commonwealth Avenue Phase I project, which improved the avenue east of this phase from Alcorn Street to Kenmore Square. These improvements are intended to create a "complete street" that will accommodate all users of the corridor.

### **Project's Context/Possible Impacts, by MPO Policy Area**

#### ***Land Use***

Land uses in the project area mainly consist of commercial, residential, and institutional buildings. The north side of the project area includes properties owned by Boston University, including Agganis Arena. The area is zoned for compact, mixed-use development.

#### ***Safety***

There were 71 crashes in the project corridor during the three years of 2006 through 2008. Of these crashes, 18 involved a personal injury and none involved a fatality. There were three reported crashes involving pedestrians and two involving bicyclists. The corridor crash rate is higher than the statewide average.

#### ***Mobility***

The average daily traffic volume in 2009 was 27,800 vehicles on Commonwealth Avenue west of Babcock Street (in the western portion of the project area) and 34,600 vehicles east of Amory Street (just east of the project area). More than 1,000 pedestrians and 200 bicyclists per hour were counted during the morning and evening peak periods at certain intersections.

In the morning and afternoon peak periods there are long queues and delays at the intersections of Commonwealth Avenue at Babcock Street and Commonwealth Avenue at St. Paul and Buick Streets. Heavy traffic volumes and high traffic speeds also create discomfort for people walking and biking in the corridor.

#### ***Environmental Justice***

Commonwealth Avenue is a key travel corridor for environmental justice communities in the Allston-Brighton and Fenway neighborhoods of Boston and other nearby neighborhoods. Outreach to environmental justice communities throughout the region has indicated that high traffic speeds and poor accommodations for pedestrians and

## MAP 2 Boston, Brookline: Improvements to Commonwealth Avenue, from Amory Street to Alcorn Street



bicyclists are problems. This project will improve accommodations for people using transit or walking and bicycling in the corridor.

### **Livability**

This project enhances livability by making it easier and safer to walk, ride a bicycle, and use public transportation in the corridor. Streetscape improvements will also make the area more pleasant.



## Medway: Reconstruction of Route 109 (Main Street) from Holliston Street to Highland Street (\$9,987,731)

### Description

This project involves roadway improvements in Medway's business district. Route 109 is a principal arterial roadway running primarily east and west and providing connections to Milford and Millis. The improvements are planned for a 1.53-mile stretch of Route 109 between Holliston Street and Milford Street. The project involves resurfacing and reconstruction of the roadway and the consolidation of curb cuts. Additional elements of the project include reconstructed and additional sidewalks, three new traffic signals, and improved signage, drainage, lighting, and aesthetics. Signal upgrades and capacity improvements will be implemented at the intersections of Main Street with Franklin, Milford, and Highland Streets, including widening for turn lanes in the southbound and westbound approaches. Work also includes adjusting the grade on Main Street west of Winthrop Street for approximately 700 feet.

### Project's Context/Possible Impacts by MPO Policy Area

#### Land Use

Land along the corridor is used for commercial and residential purposes. A shopping center is located between Pond Street and Holliston Street; there are numerous curb cuts along this stretch. The western end of the project area includes the Rabbit Hill Historic District, which contains significant buildings and architecture. There are also five wetland areas within 100 feet of the project right-of-way.

#### Safety

During the three years of 2006 through 2008, there were 120 crashes within the project area. Of these crashes, 23 involved an injury and none involved a fatality. The crash rate in the project area was 2.61 crashes per million vehicle miles traveled, which is approximately equal to the statewide average for similar facilities.

#### Mobility

Average daily traffic volumes on Route 109 in the project area range from about 20,500 to 21,300. Motorists encounter long delays during the morning and afternoon peak periods at several intersections along the corridor. Improvements to these intersections are a key component of the project.

#### Livability

Sidewalks will be reconstructed and added in places throughout the corridor. The project also includes elements to improve the aesthetics and lighting of the area.

**MAP 3 Medway: Reconstruction of Route 109 (Main Street), Holliston Street to Highland Street**





## Introduction

The 1990 Clean Air Act Amendments (CAAA) require metropolitan planning organizations within nonattainment areas to perform air quality conformity determinations prior to the approval of Long-Range Transportation Plans (LRTPs) and Transportation Improvement Programs (TIPs), and at such other times as required by regulation. A nonattainment area is one that the United States Environmental Protection Agency (EPA) has designated as not meeting certain air quality standards. A conformity determination is a demonstration that plans, programs, and projects are consistent with the State Implementation Plan (SIP) for attaining the air quality standards. The CAAA requirement to perform a conformity determination ensures that federal approval and funding go to transportation activities that are consistent with air quality goals. This chapter presents information and analyses for the air quality conformity determination for the projects in an amended Paths to a Sustainable Region LRTP, as required by federal regulations (40 CFR Part 93) and the Massachusetts Conformity Regulations (310 CMR 60.03). It also includes the regulatory framework, conformity requirements, planning assumptions, mobile-source emission budgets, and conformity consultation procedures related to the determination.

## Legislative Background

The 1970 Clean Air Act defined a one-hour national ambient air quality standard (NAAQS) for ground-level ozone. The one-hour ozone standard is 0.12 parts per million, averaged at each monitor over one hour and not to be exceeded more than once per year. Hourly values are determined by readings recorded at air quality monitors located throughout the state. The 1990 CAAA further classified degrees of nonattainment of the one-hour standard based on the severity of the monitored levels of the pollutant. The entire commonwealth of Massachusetts was classified as being in serious nonattainment for the one-hour ozone standard, with a required attainment date of 1999. The attainment date was later extended, first to 2003 and a second time to 2007.

In 1997, the EPA proposed a new, eight-hour ozone standard that replaced the one-hour standard, effective June 15, 2005. Scientific information had shown that ozone could affect human health at lower levels, and over longer exposure times than one hour. The new standard was challenged in court, and after a lengthy legal battle, the courts upheld it. It was finalized in June 2004. The eight-hour standard is 0.08 parts per million, averaged over eight hours and not to be exceeded more than once per year. Nonattainment areas were again further classified based on the severity of the eight-hour values. Massachusetts as a whole was classified as being in moderate nonattainment for the eight-hour standard, but it was separated into two nonattainment areas—Eastern Massachusetts and Western Massachusetts.



The Eastern Massachusetts Ozone Nonattainment Area includes all of Barnstable, Bristol, Dukes, Essex, Middlesex, Nantucket, Norfolk, Suffolk, and Worcester counties. With this nonattainment classification, the CAAA requires the Commonwealth to reduce its emissions of volatile organic compounds (VOCs) and nitrogen oxides (NO<sub>x</sub>), the two major precursors to ozone formation, to achieve attainment of the eight-hour ozone standard by 2009.

In addition, on April 1, 1996, the cities of Boston, Cambridge, Chelsea, Everett, Malden, Medford, Quincy, Revere, and Somerville were classified as being in attainment for carbon monoxide (CO). As part of the LRTP, an air quality conformity analysis must still be completed for these communities, as they have a carbon monoxide maintenance plan

approved as part of the SIP. The 2010 CO motor vehicle emission budget established for the Boston CO attainment area with a maintenance plan is 228.33 tons of CO per winter day.

As of April 22, 2002, the community of Waltham was redesignated as being in attainment for CO, with an EPA-approved limited-maintenance plan. In areas with approved limited-maintenance plans, federal actions requiring conformity determinations under the transportation conformity rule are considered to satisfy the “budget test” (as budgets are treated as not constraining in these areas for the length of the initial maintenance period). Any requirements for future “project-level” conformity determinations for projects located within this community will continue to use a “hot-spot” analysis to ensure that any new transportation projects in this CO attainment area do not cause or contribute to CO nonattainment.

On January 31, 2008, the Massachusetts Department of Environmental Protection (DEP) submitted to the EPA a revision of the Massachusetts SIP that included a revised eight-hour ozone attainment demonstration for Eastern Massachusetts. This SIP revision included a 2009 mobile-source emission budget for VOC and NO<sub>x</sub> emissions in the

Eastern Massachusetts Ozone Nonattainment Area. The EPA found the eight-hour budget adequate for conformity purposes on March 18, 2008. The Boston Region MPO must show conformity with this eight-hour budget.

## Conformity Regulations

Designated MPOs are required to perform conformity determinations by ozone nonattainment area for their LRTPs and TIPs. Section 176 of the CAAA defines conformity to a State Implementation Plan to mean conformity to the plan's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of the standards. The Boston Region MPO must certify with regard to the activities outlined in the LRTP and TIP that:

- None will cause or contribute to any new violation of any standard in any area.
- None will increase the frequency or severity of any existing violation of any standard in any area.
- None will delay the timely attainment of any standard or any required interim emission reductions or other milestones in any area.

The EPA issued final conformity regulations in the November 24, 1993, Federal Register, and DEP issued conformity regulations effective December 30, 1994. They set forth requirements for determining conformity of LRTPs, TIPs, and individual projects. The federal conformity regulations were amended several times through August 2010. The components of the required conformity analysis are listed below and are explained in detail subsequently.

## Conformity Criteria

- Horizon years
- Latest planning assumptions
- Latest emission model used
- Timely implementation of transportation control measures (TCMs)
- Conformity in accordance with the consultation procedures and SIP revisions
- Public participation procedures
- Financially constrained document

## Procedures for Determining Regional Transportation Emissions

### The Conformity Test

- Consistent with emission budgets set forth in SIP
- Contributes to reductions in CO nonattainment areas

This conformity determination will show the consistency of the amended LRTP with the 2009 mobile-source emission budget for VOCs and NO<sub>x</sub> in the Eastern Massachusetts Ozone Nonattainment Area and with the CO emission budget for the Boston, Cambridge, Chelsea, Everett, Malden, Medford, Quincy, Revere, and Somerville maintenance area.





## Conformity Determination Criteria

This conformity determination has been prepared in accordance with 40 CFR Part 93, Transportation Conformity Rule Amendments: Flexibility and Streamlining: Final Rule. It shows that the LRTP has been prepared following all the guidelines and requirements of the Rule.

### Horizon Year Requirements

The horizon years for regional model analysis have been established following 40 CFR 93.106(a) of the Federal Conformity Regulations. The years for which emissions are calculated are shown below.

- 2010 – Milestone Year: This year is currently being used as the base year for calculating emission reductions of VOCs and NOx.
- 2016 – Milestone Year and Analysis Year: This year is used to show conformity with the CO budget in the Boston nonattainment area and the 2009 ozone budget in Eastern Massachusetts.
- 2020 – Analysis Year
- 2025 – Analysis Year
- 2035 – Horizon Year: Last forecast year of the LRTP

### Latest Planning Assumptions

Section 93.110 of the Federal Conformity Regulations outlines the requirements for the most recent planning assumptions that must be in place at the time of the conformity determination. Assumptions must be derived from current estimates and future projections of population, household, employment, travel, and congestion data developed by the MPO. Analysis for the amended LRTP is based on U.S. census data and information obtained from the Metropolitan Area Planning Council (MAPC), the Massachusetts Department of Transportation (MassDOT), and other sources. The following is a list of the sources of data used for model calibration in this analysis:

- Population, households, and household size: Year 2009 data at a community level received from the U.S. Census Bureau. Community to TAZ-level (transportation analysis zone) distribution based on Census 2000 allocation.
- Employment: The Central Transportation Planning Staff's Eastern Massachusetts Site-Level Employment Database for 2009, finalized in 2010.
- Household income, resident workers, and vehicle ownership: The data from



Summary File 3 data for Massachusetts from the 2000 U.S. Census of Population and Housing were interpolated to produce year 2009 data.

- Household workers: The year 2009 data were arrived at by interpolating Census Transportation Planning Package Part I for Massachusetts from the 2000 U.S. Census of Population and Housing.
- Traffic volumes: MassDOT 2008–09 Traffic Volumes for the Commonwealth of Massachusetts. Traffic counts taken for external stations and screen lines were used.
- Population, household, and employment forecasts: The forecasts of population, households, and employment for the 101 cities and towns within the Boston Region MPO area were developed by the Metropolitan Area Planning Council (MAPC) using what is called the “MetroFuture” scenario. This scenario was developed by altering a number of assumptions from their previous Extended Growth scenario. The MetroFuture scenario seeks to channel regional growth and development by targeting the majority of growth to denser areas with already available water, sewer, and transit infrastructure. In this scenario, it is assumed that a greater percentage of residents will be living within walking distance of transit and of major activity centers. The forecasts of population, households, and employment for the 63 cities and towns outside of the Boston Region MPO that are in the MPO’s modeled area were developed by MassDOT and the neighboring regional planning agencies (RPAs).
- Project-level data: Obtained from the responsible implementing agency.

## Transit Service Policy Assumptions

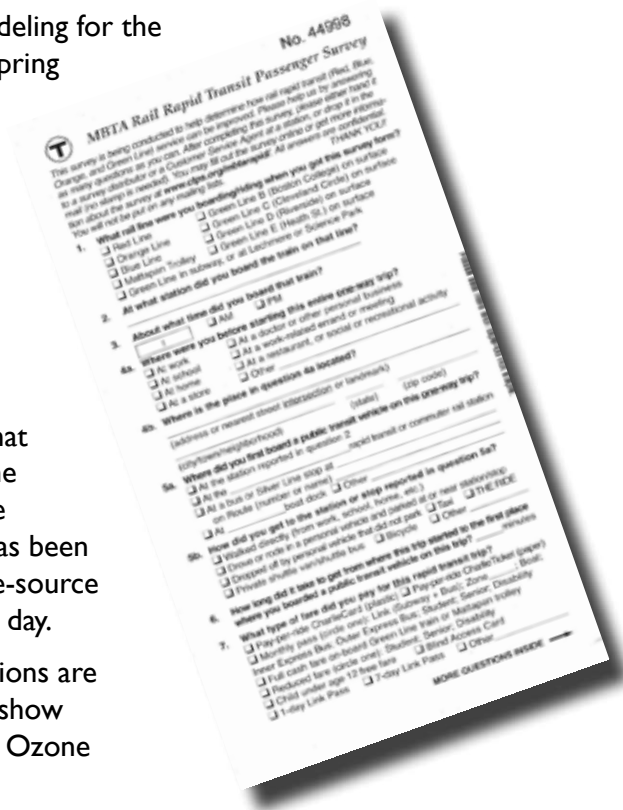
The transit service assumptions used in ridership modeling for the amended LRTP were based on MBTA service in the spring of 2009. The model calibration was performed using the following:

- *Ridership and Service Statistics*, 8th edition, MBTA Blue Book, 2009
- Transit On-Board Survey (2008-2009)

## Emission Inventory Assumptions

For the amended LRTP, conformity is determined in relation to the SIP mobile-source emission budgets that were approved in March 2008 for VOCs and NO<sub>x</sub>. The VOC mobile-source emission budget for 2009 for the Eastern Massachusetts Ozone Nonattainment Area has been set at 63.5 tons per summer day, and the 2009 mobile-source emission budget for NO<sub>x</sub> is 174.96 tons per summer day.

The Boston Region MPO area’s VOC and NO<sub>x</sub> emissions are included with those in the following MPO regions to show conformity with the SIP in the Eastern Massachusetts Ozone Nonattainment Area:



- Cape Cod MPO
- Central Massachusetts MPO
- Merrimack Valley MPO
- Montachusett Region MPO
- Northern Middlesex MPO
- Old Colony MPO
- Southeastern Region MPO
- Martha's Vineyard Commission (considered an MPO for planning purposes)
- Nantucket Planning and Economic Development Commission (considered an MPO for planning purposes)



CO emission projections have been set for the nine cities in the Boston area that are classified as being in attainment for CO. An emission attainment inventory for CO of 501.53 tons per winter day was established for all sources of CO emissions (mobile, industrial, and all other sources) for the redesignation year 1993. Of the 501.53 tons, 305.43 tons per winter day was allocated for mobile sources. In addition to the attainment year inventory, the EPA required that emission projections for every five years through 2010 be developed for all sources to ensure that the combination of all CO emissions would not exceed the 501.53 tons

per winter day maximum allowance in the future. The mobile-source emission projection of 228.33 tons per winter day was set for 2010. Emissions from the nine towns in the Boston area may not exceed the amount in the last year of the maintenance plan (2010).

MassDOT's Office of Transportation Planning estimated the results for all of the MPOs in the Eastern Massachusetts Ozone Nonattainment Area using a statewide travel demand model (the Boston Region MPO's regional travel demand model set results were included as the latest planning assumptions for the conformity analysis). The air quality analysis has been finalized for all of the MPOs, and MassDOT has made the final conformity determination for this ozone nonattainment area.

### **Latest Emission Model**

Emission factors used for calculating emission changes were determined using MOBILE 6.2, the model used by DEP in determining the mobile-source emission budget. Emission factors for motor vehicles are specific to each model year, pollutant type, temperature, and travel speed. MOBILE 6.2 requires a wide range of input parameters, including inspection and maintenance program information and other data, such as hot/cold start mix, emission failure rates, vehicle fleet mix, and fleet age distribution.

The input variables used in this conformity determination were received from DEP. The inputs used for the 2009 Base Year were the same as those used in determining the latest emissions inventory for the Commonwealth of Massachusetts. The inputs used for the years 2009 through 2030 were also received from DEP, and include information on programs that were submitted to the EPA as the strategy for the Commonwealth to attain ambient air quality standards.

## Timely Implementation of Transportation Control Measures

Transportation control measures (TCMs) were required in the SIP in revisions submitted to the EPA in 1979 and 1982 and in those submitted as part of the Central Artery/Tunnel project. The TCMs included in the 1979 and 1982 submissions were accomplished through construction or through implementation of ongoing programs. The only exceptions are the bus immersion-heater program, the Newton Rider bus service, the private bus insurance discount concept, and the pedestrian malls in Lynn, Cambridge, and Needham. Other services have been substituted for these TCMs. These projects were all included in past Boston Region MPO LRTPs and TIPs.

TCMs were also submitted as a SIP commitment as part of the Central Artery/Tunnel project mitigation. The status of these projects has been updated using the Administrative Consent Order (ACO) signed by the Executive Office of Transportation and the Executive Office of Environmental Affairs (EOEA) in September 2000 and January 2005, and the SIP – Transit Commitments Status Report, which was submitted by MassDOT to DEP in April 2012. All of the projects are included in the amended LRTP as recommended or completed projects. They include:

- Southeast Expressway High-Occupancy-Vehicle (HOV) Lane
- HOV Lane on I-93 to Mystic Avenue
- 20,000 New Park-and-Ride Spaces
- Ipswich Commuter Rail Extension to Newburyport
- Old Colony Commuter Rail Extension
- Framingham Commuter Rail Extension to Worcester
- South Boston Piers Transitway

### Reevaluation Process of SIP TCMs

MassDOT and DEP went through an extensive process for reevaluating TCMs that had been included in the original Central Artery SIP that had not been completed on schedule – the Green Line Arborway Restoration, the Red Line–Blue Line Connector, and the Green Line Extension to Ball Square/Tufts University. This process began in 2004 and was completed in 2008. The outcome included DEP’s agreeing to the following alternative commitments:



- Fairmount Line Improvements.
- 1,000 New Parking Spaces in the Boston Region.
- Complete a final design of the Red Line–Blue Line Connector from the Blue Line at Government Center to the Red Line at Charles Station.
- Enhanced Green Line extended beyond Lechmere to Medford Hillside and Union Square.

MassDOT announced through its State Implementation Plan – Transit Commitments 2011 Status Report submitted to DEP on July 27, 2011, that they are proposing delays or changes to these projects. In that submission, MassDOT included a Petition to Delay for the Fairmount Line Improvements project and the 1,000 New Parking Spaces. They also made a formal request to remove the Red Line–Blue Line project and informed DEP that the Green Line Extension to College Avenue will be delayed. MassDOT worked with DEP to set up a process for addressing these changes and continues to keep the Boston Region MPO informed of this process through its monthly reports at their regularly scheduled meetings. The Boston Region MPO will continue to include these projects in the LRTP and TIP until the process has been completed, assuming that any interim projects or programs will provide equal or better emission benefits. When the process has been completed, the MPO will amend the LRTP and its conformity determination to include any changes (including any interim projects or programs). A status of each of these projects as reported in the status report is provided below.

### *A Status Report of the Uncompleted SIP Projects*

A more detailed description of the status of these projects can be found at <http://www.eot.state.ma.us/default.asp?pgid=content/transitCommitment&sid=about>.

#### *Fairmount Line Improvement Project – SIP Requires Completion by December 2011*

##### *Project Status*

MassDOT and the MBTA anticipate that the Four Corners, Talbot Avenue, and Newmarket stations will be incrementally completed in 2013. A station at Blue Hill Avenue, which had provoked controversy among abutters, is now moving forward. The station is tentatively scheduled for construction advertisement in December 2012, with anticipated construction to start in early 2013. MassDOT and the MBTA began the formal Petition to Delay process for the Fairmount Line Improvements project and prepared a list of potential interim reduction offset measures. The proposed measures were developed with the input and assistance of Fairmount Line stakeholders, and MassDOT believes that the potential offset measures meet the standard of being within the transit ridership area required in the SIP. The measures include shuttle bus service from Andrew Square to Boston Medical Center and increased bus service on bus Route 31 serving Dorchester and Mattapan. These measures are currently in place.

**Funding Source:** the Commonwealth

#### *1,000 New Park-and-Ride Spaces – SIP Requires Completion by December 2011*

##### *Project Status*

MassDOT and the MBTA did not meet the SIP deadline for this project because construction of the Wonderland garage, which will provide 612 of the required spaces,

fell behind schedule. MassDOT and the MBTA currently anticipate that the Wonderland project will be completed in June 2012. MassDOT and the MBTA do not believe that there will be a measurable loss of air quality improvement; nonetheless, they have proposed increased Saturday bus service on Route 111, the highest-ridership route serving the communities to the northeast of Boston, as interim mitigation. The remaining 388 required spaces are being provided through other, smaller parking projects throughout the MBTA system and are open for use.

**Funding Source:** the Commonwealth

#### Red Line/Blue Line Connector – Final Design – SIP Requires Completion by December 2011

##### **Project Status**

MassDOT and the MBTA have proposed to nullify the commitment to perform final design of the Red Line–Blue Line Connector due to the unaffordability of the eventual construction of the project. MassDOT has initiated a process to amend the SIP to permanently and completely remove the obligation to perform final design of the Red Line–Blue Line Connector. To this end, MassDOT will work with DEP and with the general public on the amendment process. MassDOT is not proposing to substitute any new projects in place of the Red Line–Blue Line Connector commitment, given the absence of any air quality benefits associated with the current Red Line–Blue Line commitment (final design only). Correspondence from MassDOT to DEP formally initiating the amendment process was submitted on July 27, 2011, and is posted on the MassDOT website. This is the beginning of a process that includes a formal public comment period and public meeting. This process could take up to two years based on past experience.

**Funding Source:** MassDOT is proposing to nullify this commitment

#### Green Line Extension Project – SIP Requires Completion by December 2014

##### **Project Status**

MassDOT and the MBTA have performed an in-depth risk assessment for the project, which is now trending for completion in 2018–2020. MassDOT and the MBTA are beginning the process of formally petitioning DEP on the delay and they will be developing a list of potential interim reduction offset measures, to be informed by public input.

MassDOT, which has committed substantial resources to the Green Line Extension project, a top transportation priority of the Commonwealth and the largest expansion of the MBTA rapid transit system in decades, has transitioned the project from the planning and environmental review phases to design, engineering, and eventual construction, coupled with the tasks associated with applying for New Starts funding. As part of this transition, the MBTA assumed the lead project management responsibility for the ongoing development of the Green Line Extension project, with MassDOT continuing to support the MBTA on an as-needed basis. This transition to design, engineering, and construction represents the achievement of a crucial and exciting milestone for the Green Line Extension project, which has now progressed farther and closer to implementation, with the support and advocacy of elected leaders, municipal officials, organized advocates, and hundreds of individual members of the public, than at any time in the past.

Together, MassDOT and the MBTA have also managed an extensive community and public participation effort for the Green Line Extension project, which enjoys widespread support from local officials and the public in general. This community participation effort, while time-consuming, has made the project better and more responsive to public concerns, and is appropriate for a project of this magnitude and importance to the surrounding community and to the region as a whole.

The Green Line Extension is an enormously complex capital project, with many tasks and subtasks that must be completed, some in sequence and some in parallel, in order for the first rider to travel from a relocated Lechmere Station toward Union Square and College Avenue. In the 2010 SIP Status Report, MassDOT indicated that the Green Line Extension project was tracking for completion at the end of October 2015, 10 months past the legal deadline of December 31, 2014. Then the Green Line Extension project team performed a cost/schedule/risk analysis. As a result, the 2010 schedule projections for the Green Line Extension project were refined. MassDOT and the MBTA now have a much deeper and more nuanced understanding of the constraints and limitations that must be managed in order to implement the Green Line Extension project.

Based upon those continuing analyses, MassDOT is now projecting a time frame, rather than a specific month or day, for the introduction of revenue service on the Green Line Extension. The points within the time frame are associated with different probabilities, as shown below:

- 10% Probability of Completing – fall of 2018
- 90% Probability of Completing – summer of 2020

This risk-based schedule was developed by recognizing lessons learned on the Greenbush Commuter Rail project, in which the MBTA did not take ownership of needed properties until after the design/build process began, which cost the MBTA both time and money.

MassDOT and the MBTA continue to seek ways to accelerate the project time line where possible, and have met with legislative and municipal leaders to evaluate strategies to incrementally construct and open portions of the project. Detailed design work is continuing on a Phase 1 Early Bridge/Demolition package, which includes the widening of two railroad bridges to accommodate the additional Green Line tracks and the demolition of the MBTA tire storage building at 21 Water Street in the Lechmere area to provide parking and a staging area for the Phase 2/2A work. Survey, property issues, drainage design, and retaining wall design are all being worked on and advanced, along with coordination with the Cities and the abutters. A public meeting to review the scope of that contract was held on January 25, 2012. It is still expected that the bidding for the work will occur during the spring and summer of 2012 after receipt of the FONSI (Finding of No Significant Impact), and construction would begin in fall of 2012. A potential change in the program delivery methodology is still being evaluated, and legislative language requesting authorization to use a delivery method called Construction Manager/General Contractor to deliver the Green Line program has been developed. With a Request for Qualifications for the completion of the advanced Preliminary Engineering and Final Design now advertised and available, staff are working

on the more detailed scope of services to accompany the Request for Proposals to be issued to the most qualified firms. An informational forum for designers and contractors was held on February 27, with attendance of over 100 interested parties.

The time line listed above represents a substantial delay beyond the current SIP deadline of December 31, 2014, triggering the need to provide interim emission reduction offset projects and measures for the period of the delay (beginning January 1, 2015). Working with the Central Transportation Planning Staff, MassDOT and the MBTA are currently initiating the process of calculating the reductions of NMHC, CO, and NO<sub>x</sub> – reductions equal to or greater than the reductions projected for the Green Line Extension itself, as specified in the SIP regulation – that will be required for the period of the delay. Once that process is complete, MassDOT and the MBTA will develop a portfolio of interim projects and/or measures that can meet the requirement, and will seek input from both DEP and the general public on the portfolio.

MassDOT and the MBTA are aware of the strong public interest in potential interim emission reduction offsets, having already received many suggestions and recommendations; they will strive to make use of ideas presented to them by the public whenever possible. However, MassDOT and the MBTA are acutely aware of the need for any selected interim emission reduction offsets to quantitatively and demonstrably meet the emission reduction threshold established in the SIP regulation, and will be subjecting potential interim emission reduction offsets to necessary rigorous analysis by the Central Transportation Planning Staff. MassDOT and the MBTA are also sensitive to the constrained fiscal environment in which all of the Massachusetts transportation agencies currently operate, and will weigh fiscal concerns when selecting appropriate interim emission reduction offsets.

**Funding Source:** the Commonwealth

### Russia Wharf Ferry Terminal

#### **Project Status**

Building of the Russia Wharf Ferry Terminal was the responsibility of the Central Artery/Tunnel (CA/T) Project. Actual ferry service to the wharf was not included in the SIP requirement, and the CA/T Project is not responsible for providing that service. In May 2006, the CA/T Project requested a deferral of the construction of the facility from DEP and the Boston Conservation Commission (BCC) pending the availability of ferry service and resolution of the status of the Old Northern Avenue Bridge, which is too low to provide clearance to vessels of a size or configuration suited to regularly scheduled passenger service. In June 2008, the Boston Conservation Commission approved an extension of this facility's Order of Conditions to June 2011. The Massachusetts Turnpike Authority completed a marketing demand study in October 2009 to determine the potential demand for service in this area, the type of service that could be provided, and the physical, operational, and financial constraints of this project. In February 2010, this information was forwarded to the Massachusetts Department of Transportation as part of the ongoing evaluation of this facility. This study will be sent to the Department of Environmental Protection Waterways Program and BCC in the second half of 2011. The only water transportation service currently available at this location is on-call water taxi. There is no regularly scheduled passenger water transportation service, and



there is no party with a plan or proposal to provide such service. The City of Boston is moving forward to evaluate design/engineering alternatives to the Old Northern Avenue Bridge that would address the vessel clearance issue, which currently makes operation of regularly scheduled ferry service difficult and inefficient.

**Funding Source:** the Commonwealth

## Consultation Procedures

The conformity regulations require the MPO to make a conformity determination according to consultation procedures set out in the state and federal regulations and to follow public involvement procedures established by the MPO under federal metropolitan transportation-planning regulations.

Both the state and federal regulations require that the Boston Region MPO, MassDOT, DEP, EPA, and the Federal Highway Administration consult on the following issues:

- Selection of regional emissions analysis models, including model development and assessment of project design factors for modeling
- Selection of inputs to the most recent EPA-approved emissions factor model
- Selection of CO hot-spot modeling procedures, as necessary
- Identification of regionally significant projects to be included in the regional emissions analysis
- Identification of projects that have changed in design and scope
- Identification of exempt projects
- Identification of exempt projects that should be treated as nonexempt because of adverse air quality impacts
- Identification of the latest planning assumptions and determination of consistency with SIP assumptions

These issues have all been addressed through consultation among the agencies listed above.

## Public Participation Procedures

Title 23 CFR Sections 450.324 and 40 CFR 90.105(e) require that the development of the LRTP, TIP, and related certification documents provide an adequate opportunity for public review and comment.

Section 450.316(b) establishes the outline for MPO public participation programs. The Boston Region MPO's public participation program was adopted in June 2007 and amended in April 2010. The development and adoption of this program conform to these requirements. The program guarantees public access to the LRTP and TIP and all supporting documentation, provides for public notification of the availability of the LRTP and TIP and the public's right to review the draft documents and comment on them, and provides a public review and comment period prior to the adoption of the LRTP and TIP and related certification documents by the MPO.



On May 20, 2012, a public notice was placed in the Boston Globe informing the public of its right to comment on this draft document. On \_\_\_\_\_, the Boston Region MPO voted to approve the LRTP Amendment and its Air Quality Conformity Determination. This allowed ample opportunity for public comment and MPO review of the draft document. These procedures comply with the associated federal requirements.

## Financial Consistency

Title 23 CFR Section 450.324 and 40 CFR 93.108 require the LRTP to “be financially constrained by year and include a financial plan that demonstrates which projects can be implemented using current revenue sources and which projects are to be implemented using proposed revenue sources.”

This Boston Region MPO’s amended LRTP is financially constrained to projections of federal and state resources reasonably expected to be available during the appropriate time frame. Projections of federal resources are based upon the estimated apportionment of the federal authorizations contained in SAFETEA-LU, the six-year transportation reauthorization bill, as allocated to the region by the state or as allocated among the various Massachusetts MPOs according to federal formulas or MPO agreement. Projections of state resources are based upon the allocations contained in the current state Transportation Bond Bill and historic trends. Therefore, this amended LRTP complies with federal requirements relating to financial planning.

## Procedures For Determining Regional Transportation Emissions

The federal conformity regulations set forth specific requirements for determining transportation emissions. The requirements and the procedures used for the LRTP are summarized below.

### Demographics, Employment, and Transportation Demand

Specific sources of population, household, employment, and traffic information used in the amended LRTP have been listed above under the Latest Planning Assumptions section. Chapter 8 of the Boston Region MPO’s amended *Paths to a Sustainable Region* LRTP outlines recommendations for specific projects for the time period ending in 2035.

Only regionally significant projects are required to be included in the travel-demand modeling efforts. The federal conformity regulations define regionally significant as follows:

A transportation project (other than an exempt project) that is on a facility which serves regional transportation needs (such as access to and from the area outside of the region, major activity centers in the region, major planned developments such as new retail malls, sport complexes, etc., or transportation terminals as well as most terminals themselves) and would be included in the modeling of a metropolitan area’s transportation network, including at a minimum all principal arterial highways and all fixed guideway transit facilities that offer an alternative to regional highway travel.

In addition, specific projects have been exempt from regional modeling emissions analysis. The categories of exempt projects include:

- Intersection channelization projects
- Intersection signalization projects at individual intersections
- Interchange reconfiguration projects
- Changes in vertical and horizontal alignment
- Truck size and weight inspection stations
- Bus terminals and transfer points

The Recommended LRTP Network in this conformity determination is composed of projects proposed in the approved TIPs and LRTP, and projects in the MBTA capital budget. A list of the projects that meet these criteria and are included in the Recommended LRTP Network and this conformity determination is provided in Table 10-1. The list includes all regionally significant projects in the Eastern Massachusetts Ozone Nonattainment Area.

In addition to emissions calculated using the MPO's regional travel demand model set (which includes emissions from cars, trucks, and motorcycles), a separate analysis was performed off-model to determine emissions from commuter rail, commuter boat, and the MBTA bus program. These calculations are shown in Table 10-2.

**TABLE 10-1**

**Regionally Significant Projects Included in the Regional Transportation Models for the Eastern Massachusetts Ozone Nonattainment Area**

ANALYSIS YEAR	COMMUNITY	DESCRIPTION OF PROJECTS
<b>UNDER CONSTRUCTION – BOSTON REGION MPO</b>		
2016	Bedford, Burlington	Middlesex Turnpike Improvements, Phases 1 and 2
2016	Bellingham	Pulaski Boulevard
2016	Boston	Fairmount Line Improvements, including new stations
2016	Boston	East Boston Haul Road/Chelsea Truck Route (new grade separated roadway)
2016	Concord, Lincoln	Route 2/Crosby's Corner (grade separation)
2016	Danvers	Route 128/Route 35 and Route 62
2016	Hudson	Route 85 (capacity improvements from Marlborough TL to Route 62)
2016	Marshfield	Route 139 Widening (to 4 lanes between School St. and Furnace St.)
2016	Quincy	Quincy Center Concourse, Phase 2 (new roadway: Parking Way to Hancock St.)
2016	Randolph to Wellesley	Route 128 Additional Lanes
2016	Somerville	Assembly Square Orange Line Station
2016	Somerville	Assembly Square Roadways (new and reconfigured)
2016	Weymouth, Hingham, Rockland	South Weymouth Naval Air Station Access Improvements
2016	Regionwide	1000 Additional Park-and-Ride Spaces

**TABLE 10-1**

**Regionally Significant Projects Included in the Regional Transportation Models for the Eastern Massachusetts Ozone Nonattainment Area (cont.)**

ANALYSIS YEAR	COMMUNITY	DESCRIPTION OF PROJECTS
<b>RECOMMENDED PLAN PROJECTS – BOSTON REGION MPO</b>		
2016	Beverly	Beverly Station Commuter Rail Parking Garage
2016	Boston	Conley Haul Road
2016	Hanover	Route 53, Final Phase (widening to 4 lanes between Route 3 and Route 123)
2016	Salem	Salem Station Commuter Rail Parking Garage Expansion
2016	Somerville, Cambridge, Medford	Green Line Extension to Medford Hillside (College Avenue)/Union Sq.
2016	Weymouth	Route 18 Capacity Improvements
2020	Bedford, Burlington, Billerica	Middlesex Turnpike Improvements, Phase 3 – widening Plank St. to Manning Rd.
2020	Boston	Sullivan Square/Rutherford Avenue Improvements
2020	Salem	Bridge Street (widening to 4 lanes between Flint and Washington St.)
2020	Somerville, Medford	Green Line Extension from Medford Hillside (College Avenue) to Mystic Valley Parkway (Route 16)
2025	Woburn	Montvale Avenue (widening from Central St. to east of Washington St.)
2025	Woburn	New Boston Street Bridge (reestablish connection over MBTA Lowell line)
2025	Canton	I-95 (NB)/Dedham Street Ramp/Dedham Street Corridor (new ramp with widening on Dedham St. from I-95 to University Ave.)
2025	Canton	Interstate 95/Interstate 93 Interchange (new direct connect ramps)
2025	Newton, Needham	Needham Street/Highland Avenue (includes widening Charles River Bridge)
2035	Braintree	Braintree Split - I-93/Route 3 Interchange
2035	Framingham	Route 126/135 Grade Separation
2035	Reading, Woburn, Stoneham	I-93/I-95 Interchange (new direct connect ramps)
2035	Revere, Malden, Saugus	Route 1 (widening from 4 to 6 lanes between Copeland Circle and Route 99)
2035	Wilmington	Tri-Town Interchange (new “Lowell Junction” interchange on I-93 between Route 125 and Dascomb Rd.)
<b>CAPE COD REGION</b>		
2020	Barnstable	Yarmouth Rd. /Route 28 (widening to 4 lanes) with Hyannis Access Improvements
2025	Bourne	Route 6 Exit 1 WB on-ramp changes and interchange improvements
2035	Bourne	Route 25 Access Ramp widening, Belmont Circle two-way travel
2035	Capewide	Daily Passenger Rail Service: Hyannis to Buzzard’s Bay, Middleborough
2035	Mashpee	Mashpee Rotary Ring Roads (connectors, Great Neck Rd., Routes 28 and 151)
<b>CENTRAL MASSACHUSETTS REGION</b>		
2016	Northborough	Route 20, Church St. to South St., signal coordination in corridor
2016	Shrewsbury/Worcester	Route 9 Bridge over Lake Quinsigamond: widening, additional lane each direction
2016	Auburn	Route 12/20 to Auburn TL capacity improvements and raised median
2016	Worcester	Lincoln/Highland/Pleasant Streets intersection corridor improvements, minor widening, select signal coordination

(CONT.)

**TABLE 10-1**

**Regionally Significant Projects Included in the Regional Transportation Models for the Eastern Massachusetts Ozone Nonattainment Area (cont.)**

ANALYSIS YEAR	COMMUNITY	DESCRIPTION OF PROJECTS
<b>CENTRAL MASSACHUSETTS REGION (CONTINUED)</b>		
2016	Worcester	Route 20 Widening to a consistent 4 lanes
2020	Charlton, Oxford	Route 20 Widening to a consistent 4 lanes
2025	Westborough, Hopkinton	I-90/I-495 and I-495/Route 9 Interchange Improvements (CD or frontage roads)
2035	Worcester	Route 122/122A Madison St./Chandler St. Kelley Square to Pleasant St.: various improvements and signal coordination
2035	Worcester	I-290 Hope Ave. (to full interchange and roundabout at Webster St. and Hope Ave.)
2035	Millbury, Sutton	Route 146 Improvements: Route 122A to Central Turnpike
<b>MARTHA'S VINEYARD REGION</b>		
n/a	n/a	None
<b>MERRIMACK VALLEY REGION</b>		
2016	Amesbury	Route 110 from I-495 to I-95 (widen from 2 lanes to 4)
2020	Newburyport, Amesbury	I-95 over Merrimack River (Whittier Bridge widening from 6 to 8 lanes)
2020	Methuen	Route 110/113 (Methuen Rotary – new interchange ramps at I-93)
2025	Lawrence, North Andover	Route 114 (widening from I-495 to Waverly Road)
2035	Andover	Tri-Town Interchange (new "Lowell Junction" interchange on I-93 between Route 125 and Dascomb Rd.) and I-93 widening to 4 lanes in each direction from new interchange/current "lane drop" area to I-495
<b>MONTACHUSETT REGION</b>		
2016	Fitchburg/Westminster	New Wachusett Commuter Rail Station
2016	Ayer to South Acton	Fitchburg Line Commuter Rail Improvements (double track)
2020	Leominster	Route 13 Hawes St. to Prospect St. (some widening, new signals, etc.)
2025	Athol	New Interchange on Route 2 at South Athol Road
<b>NANTUCKET REGION</b>		
n/a	n/a	None
<b>NORTHERN MIDDLESEX REGION</b>		
2016	Westford	Route 110 Minot's Corner to Nixon Rd., widen to 4 lanes
2020	Billerica	Middlesex Turnpike Improvements, Phase 3 – widening Plank St. to Manning Rd.
2035	Tewksbury	Tri-Town Interchange (new "Lowell Junction" interchange on I-93 between Route 125 and Dascomb Rd.) and I-93 widening to 4 lanes in each direction from new interchange/current "lane drop" area to I-495.
2035	Westford	I-495 at Boston Road (Exit 32) widening of on- and off-ramps
2035	Lowell, Tewksbury, Chelmsford, and Westford	I-495 Additional travel lane each direction between Exits 32 and 35 and between Exits 37 and 40
2035	Lowell	Wood Street, Rourke Bridge: new bridge, widening and corridor improvements
<b>OLD COLONY REGION</b>		
2016	Abington	Route 18 –Widening to 4 Lanes from Route 139 to Highland Rd.
2020	Brockton	Route 123 –Widen from Route 24 to Angus Beaton Drive

(CONT.)

**TABLE 10-1**

**Regionally Significant Projects Included in the Regional Transportation Models for the Eastern Massachusetts Ozone Nonattainment Area (cont.)**

ANALYSIS YEAR	COMMUNITY	DESCRIPTION OF PROJECTS
<b>OLD COLONY REGION (CONTINUED)</b>		
2020	Bridgewater	Route 24 –Add Northbound Slip Ramp from Route 104 WB to Route 24 NB Northbound
2020	Plymouth	Route 3 –Add Northbound on-Ramp at Long Pond Road (Exit 5)
2020	Plymouth	Long Pond Road Bridge widening (Exit 5)
2025	Brockton	Main Street, Warren Avenue, Spring Street, West Elm Street, Belmont Street - Reestablish Two-Way Circulation
2025	West Bridgewater	Route 106 –Widening from 2 to 4 Lanes between Route 24 and Route 28
2035	Plymouth	Route 3 – Add NB Off-ramp to Plimouth Plantation Hwy (Exit 4)
2035	Plymouth	Route 25 –Add New Interchange Before Exit 1 and connect to Bourne Road
2035	West Bridgewater	Route 28, Route 106, Central Square Signal and intersection coordination
<b>SOUTHEASTERN MASSACHUSETTS REGION</b>		
2016	Fall River, Somerset	New Brightman Street Bridge –capacity improvements to 4 lane divided facility
2016	Fall River	Route 79/Davol Street (interchange improvements and new traffic circulation)
2016	Freetown	Route 24 – New Interchange (Exit 8 ½)
2016	Mansfield	Route 140/I-495 New Southbound On-Ramp
2020	Dartmouth	Route 6 (Fauce Corner Rd)/I-195 Interchange –Bridge Widening to 5 Lanes
2035	Taunton	Route 24/140 –Interchange Reconstruction

**TABLE 10-2**

**Emissions from Off-Model Sources of VMT in Eastern Massachusetts**

	MODE	2010		2016		2020		2025		2035	
		GRAMS	TONS	GRAMS	TONS	GRAMS	TONS	GRAMS	TONS	GRAMS	TONS
<b>VOC EMISSIONS</b>	Buses	30,400	0.034	30,400	0.034	30,400	0.034	30,400	0.034	30,400	0.034
	Commuter Rail	123,400	0.136	70,500	0.078	70,500	0.078	27,100	0.030	9,500	0.010
	Commuter Boat	285,800	0.315	285,800	0.315	285,800	0.315	285,800	0.315	285,800	0.315
	<b>TOTAL</b>	<b>439,600</b>	<b>0.485</b>	<b>386,700</b>	<b>0.426</b>	<b>386,700</b>	<b>0.426</b>	<b>343,300</b>	<b>0.378</b>	<b>325,700</b>	<b>0.359</b>
<b>NOx EMISSIONS</b>	Buses	1,288,100	1.420	1,288,100	1.420	1,288,100	1.420	1,288,100	1.420	1,288,100	1.420
	Commuter Rail	2,711,400	2.989	1,613,300	1.778	1,613,300	1.778	921,900	1.016	447,400	0.493
	Commuter Boat	539,800	0.595	539,800	0.595	539,800	0.595	539,800	0.595	539,800	0.595
	<b>TOTAL</b>	<b>4,539,300</b>	<b>5.004</b>	<b>3,441,200</b>	<b>3.793</b>	<b>3,441,200</b>	<b>3.793</b>	<b>2,749,800</b>	<b>3.031</b>	<b>2,275,300</b>	<b>2.508</b>

## Changes In Project Design and Construction Schedule Since the Last Conformity Determination Analysis

The Commonwealth requires that any changes in mix of projects, project design, or construction schedule from the previous conformity determination for the region be identified. The last conformity determination was performed for the Boston Region MPO's federal fiscal years (FFYs) 2013–16 Transportation Improvement Program (TIP) in May 2012. The mix of projects included in the conformity determination for this amended LRTP is the same as the mix for that preceding conformity determination. However, for three the construction schedule has changed and for two the project design has changed:

- Hanover: Route 53 was moved from the 2016–20 time band to the 2012–15 time band for consistency with the FFYs 2013–16 TIP.
- Two Woburn projects, New Boston Street Bridge and Montvale Avenue, were moved from the 2021–25 time band to the 2016–20 time band.
- The latest designs of the Longfellow Bridge (Boston, Cambridge) and the Casey Overpass (Boston) were incorporated into the travel-demand model

## Model-Specific Information

40 CFR Part 93.111 outlines requirements pertaining to the network-based transportation demand models. These requirements include modeling methods and functional relationships that are to be used in accordance with accepted professional practice and are to be reasonable for purposes of estimating emissions. The Boston Region MPO has used the methods described in the conformity regulations for the analysis in this amended LRTP Amendment.

## Highway Performance Monitoring System Adjustments

As stated in EPA guidance, all areas of serious ozone and carbon monoxide nonattainment must use the Federal Highway Administration's (FHWA's) Highway Performance Monitoring System (HPMS) to track daily vehicle-miles of travel (VMT) prior to attainment to ensure that the state is in line with commitments made in reaching attainment of the ambient air quality standards by the required attainment dates. MassDOT provided HPMS information to DEP. DEP used this information in setting mobile-source budgets for VOCs, NO<sub>x</sub>, and CO in all SIP revisions prior to 1997. DEP has since revised its VOC and NO<sub>x</sub> budgets using transportation-demand model runs. However, the models must still be compared to HPMS data, since HPMS is currently the accepted tracking procedure as outlined in the regulations.

The conformity regulations require that all model-based VMT be compared with the HPMS VMT to ensure that the region is in line with VMT and emission projections made by DEP. An adjustment factor that compares the 2010 HPMS VMT to the 2010 transportation model VMT has been developed. This adjustment factor is then applied to all modeled VOC and NO<sub>x</sub> emissions for the years 2010 through 2035 to ensure consistency with EPA-accepted procedures.

$$\frac{2010 \text{ HPMS VMT}}{2010 \text{ Modeled VMT}} = \text{Adjustment factor for VOC and NOx}$$

HPMS adjustment factors, calculated on a regional basis, are applied to the model output of future scenarios, and they occasionally change as base-year models are updated or improved. The latest HPMS factors for the Eastern Massachusetts Ozone Nonattainment Area are shown in Table 10-3.

**TABLE 10-3**

**HPMS Adjustment Factors**

MPO REGION	2010 HPMS VMT (MILES)	TRAVEL DEMAND MODEL VMT (MILES)	HPMS/MODEL CONVERSION FACTOR
Cape Cod	6,869,000	4,456,118	1.541
Central Massachusetts	14,564,000	11,924,422	1.221
Martha's Vineyard	266,000	224,944	1.183
Merrimack Valley	9,353,000	9,143,834	1.023
Boston	60,751,000	71,225,035	0.853
Montachusett	5,015,000	4,392,193	1.142
Nantucket	153,000	71,899	2.128
Northern Middlesex	6,523,000	6,735,326	0.968
Old Colony	6,883,000	6,549,927	1.051
Southeastern Massachusetts	14,710,000	13,745,040	1.070
<b>TOTAL EASTERN MASS.</b>	<b>125,087,000</b>	<b>128,468,738</b>	<b>0.974</b>

Since the CO emission budget for the Boston CO attainment area was determined using the HPMS method rather than the transportation model, a different adjustment factor is applied to the CO emissions for the nine cities and towns in that area. This was done by comparing the 1990 CO emissions from the nine cities and towns resulting from the 1990 base-year model run to the 1990 HPMS-generated CO emissions data submitted as part of the SIP. The HPMS data were divided by the model data to determine the CO adjustment factor to be applied to all modeled CO emissions for future years. The CO HPMS adjustment factor is 0.71.

## The Conformity Test

### Consistency with Emission Budgets Set Forth in the SIP

The Boston Region MPO has conducted an air quality analysis for the Boston Region MPO's amended Paths to a Sustainable Region. The purpose of the analysis was to evaluate the air quality impacts on the SIP of the projects included in the amended LRTP. The analysis evaluated the change in ozone-precursor (VOCs and NOx) emissions and CO emissions due to implementation of the LRTP. The modeling procedures and assumptions used in this air quality analysis follow the EPA's final conformity regulations.

They are also consistent with procedures used by DEP to develop Massachusetts’s “1990 Base-Year Emission Inventory,” “1996 Reasonable Further Progress Plan,” “Post-1996 Reasonable Further Progress Plan,” “1996 Rate of Progress Report,” and “Ozone Attainment Demonstration” for the SIP. All consultation procedures were followed to ensure that a complete analysis of the amended LRTP was performed and was consistent with the SIP.

The primary test for showing conformity with the SIP is to demonstrate that the air quality conformity of this amended LRTP is consistent with the emission budgets set forth in the SIP. The Massachusetts Reasonable Further Progress Plan (RFP) was deemed complete by the EPA on June 5, 1997. The EPA determined that the 15% RFP SIP submittal contained an adequate mobile source emission budget to conduct conformity determinations using the conformity criteria. In addition, the 2009 mobile-source emission budget for Eastern Massachusetts was found adequate for conformity purposes by the EPA in March 2008.

The MPO staff estimated VOC and NO<sub>x</sub> emissions for the Boston Region MPO region. MassDOT included the Boston Region MPO emissions estimates in the final emission totals for all areas and all MPOs in Massachusetts. The VOC mobile-source emission budget for 2009 for the Eastern Massachusetts Ozone Nonattainment Area has been set at 63.5 tons per summer day, and the 2009 mobile-source budget for NO<sub>x</sub> is 174.96 tons per summer day. As shown in Tables 10-4 and 10-5, the results of the air quality analysis demonstrate that the VOC and NO<sub>x</sub> emissions from all build scenarios are less than the VOC and NO<sub>x</sub> emission budgets for the Eastern Massachusetts Ozone Nonattainment Area.

The CO mobile-source attainment inventory for 1993 for the nine cities in the Boston area recently reclassified as being in attainment is 305.43 tons per winter day. The projection of mobile sources for the Boston maintenance area is 228.33 tons per winter day for 2010. Estimates of CO emissions for the nine cities in the Boston maintenance area for various years are shown in Table 10-6. The CO emissions are less than the CO emission budget.

**TABLE 10-4**

**VOC Emissions Estimates for the Eastern Massachusetts Ozone Nonattainment Area (in tons per summer day)**

YEAR	BOSTON REGION MPO ACTION EMISSIONS	EASTERN MA ACTION EMISSIONS	EMISSION BUDGET	DIFFERENCE (ACTION MINUS BUDGET)
2010	n/a	64.974	n/a	n/a
2016	17.664	36.232	63.50	-27.268
2020	15.645	32.386	63.50	-31.114
2025	15.316	30.988	63.50	-32.512
2035	14.657	31.063	63.50	-32.437



**TABLE 10-5**

**NOx Emissions Estimates for the Eastern Massachusetts Ozone Nonattainment Area (in tons per summer day)**

YEAR	BOSTON REGION MPO ACTION EMISSIONS	EASTERN MA ACTION EMISSIONS	EMISSION BUDGET	DIFFERENCE (ACTION MINUS BUDGET)
2010	n/a	178.925	n/a	n/a
2016	30.307	66.219	174.96	-108.741
2020	19.531	45.188	174.96	-129.772
2025	17.092	36.521	174.96	-138.439
2035	12.214	29.038	174.96	-145.922

**TABLE 10-6**

**Winter CO Emissions Estimates for the CO Maintenance Area for the Nine Cities in the Boston Area (all emissions in tons per winter day)**

YEAR	BOSTON REGION MPO ACTION EMISSIONS	EMISSION BUDGET	DIFFERENCE (ACTION MINUS BUDGET)
2010	180.57	228.33	-47.76
2016	112.64	228.33	-115.69
2020	107.98	228.33	-120.35
2025	107.54	228.33	-120.79
2035	106.67	228.33	-121.66

## Conclusion

The Clean Air Act Amendments of 1990 established air quality conformity requirements for transportation plans, programs, and projects. The EPA published a final rule in the November 24, 1993, Federal Register, with several amendments through January 2008, providing procedures to be followed by the U.S. Department of Transportation in determining conformity of transportation plans, programs, and projects with the SIP for meeting air quality standards. Eastern Massachusetts has been designated a “moderate” ozone nonattainment area for the eight-hour ozone standard. Federal conformity regulations require that the impact of transportation plans, programs, and projects on nonattainment areas be evaluated.

The Boston Region MPO has conducted an air quality analysis for projects in the amended LRTP. The purpose of the analysis was to evaluate the air quality impacts of the amended LRTP on the SIP. The analysis evaluates the change in ozone precursor emissions (VOCs and NOx) and CO emissions due to the implementation of the amended LRTP Amendment. The modeling procedures and assumptions used in this air

quality analysis follow the EPA's and the Commonwealth's guidelines and are consistent with all present and past procedures used by the Massachusetts DEP to develop and amend the SIP.

MassDOT has found the emission levels from all areas and all MPO regions in Eastern Massachusetts, including emissions resulting from implementation of the amended LRTP, to be in conformance with the SIP according to state and federal conformity criteria. Specifically, the following conditions are met:

- The VOC emissions for the build scenarios are less than the 2009 VOC mobile-source emission budget for analysis years 2016 through 2035.
- The NO<sub>x</sub> emissions for the build scenarios are less than the 2009 NO<sub>x</sub> mobile-source emission budget for analysis years 2016 through 2035.
- The CO emissions for the build scenarios are less than projections for analysis years 2016 through 2035 for the nine cities in the Boston CO maintenance area.

In accordance with Section 176(c)(4) of the Clean Air Act as Amended in 1990, the Boston Region MPO has completed this review and hereby certifies that the amended *Paths to a Sustainable Region*, and its latest conformity determination, conditionally conforms with 40 CFR Part 93 and 310 CMR 60.03 and is consistent with the air quality goals in the Massachusetts State Implementation Plan.