



APPENDIX F

LONG-RANGE TRANSPORTATION PLAN DISPARATE IMPACT/ DISPROPORTIONATE BURDEN ANALYSIS



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Amendment 1

TO THE LONG-RANGE TRANSPORTATION PLAN OF THE BOSTON REGION METROPOLITAN PLANNING ORGANIZATION

AUGUST 2016

The Boston Region Metropolitan Planning Organization (MPO) is composed of:

Massachusetts Department of Transportation

City of Everett

Metropolitan Area Planning Council

City of Newton

Massachusetts Bay Transportation Authority

City of Somerville

Massachusetts Bay Transportation Authority Advisory Board

City of Woburn

Massachusetts Port Authority

Town of Arlington

Regional Transportation Advisory Council

Town of Bedford

Federal Highway Administration (nonvoting)

Town of Framingham

Federal Transit Administration (nonvoting)

Town of Lexington

City of Beverly

Town of Medway

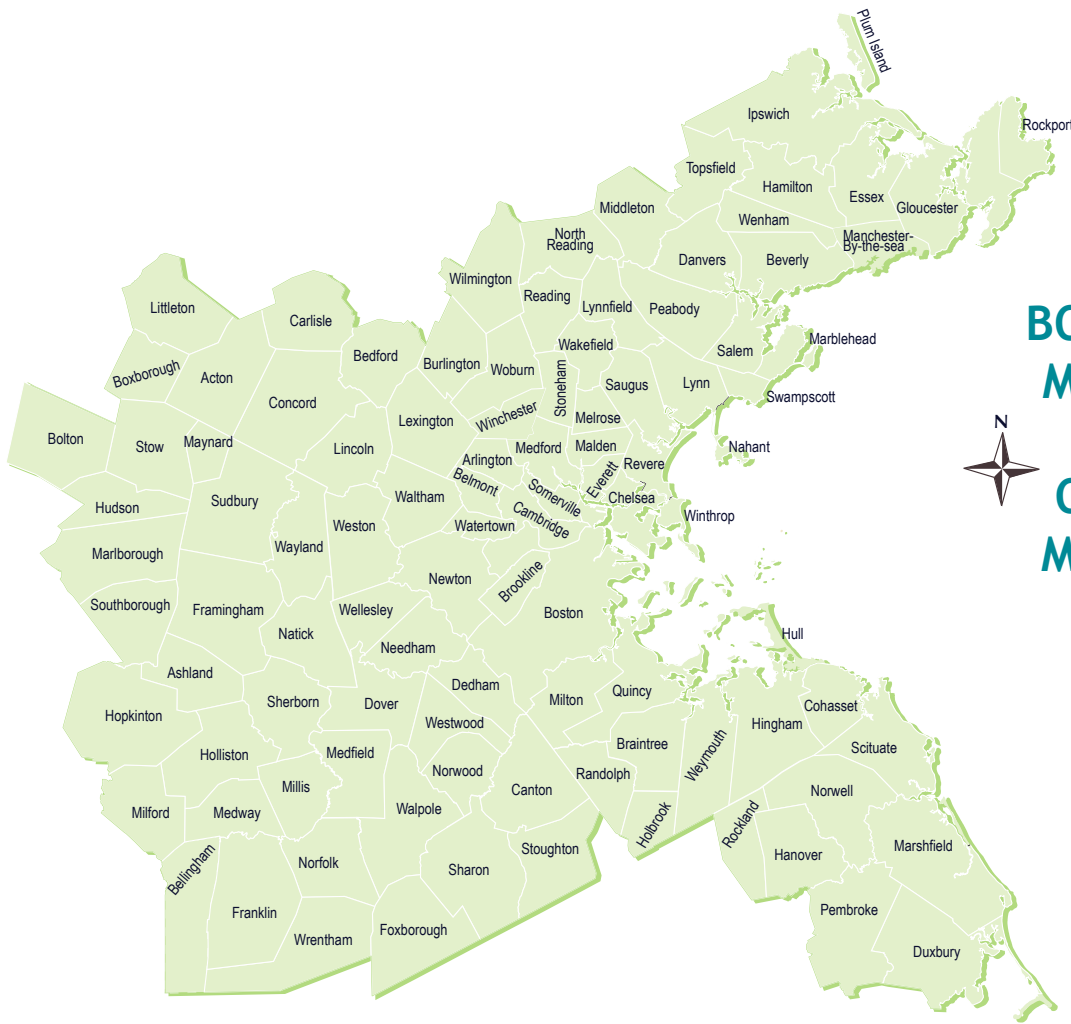
City of Boston

Town of Norwood

Town of Braintree

Prepared by the MPO's Central Transportation Planning Staff

This document was funded in part through grants from the Federal Highway Administration and Federal Transit Administration of the U.S. Department of Transportation. Its contents do not necessarily reflect the official views or policies of the U.S. DOT.



BOSTON REGION METROPOLITAN PLANNING ORGANIZATION MUNICIPALITIES



For additional copies of this document or to request it in accessible formats, contact us:

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 Certification Activities Group
 10 Park Plaza , Suite 2150
 Boston, MA 02116

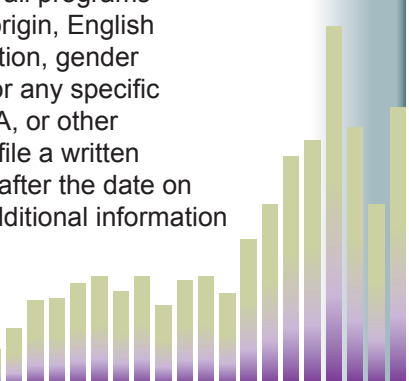
By telephone (857) 702-3690 (voice)
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This document can be downloaded from our Web site:
www.bostonmpo.org

The MPO complies with Title VI of the Civil Rights Act of 1964, the Americans with Disabilities Act (ADA) and other federal and state nondiscrimination statutes and regulations in all programs and activities. The MPO does not discriminate on the basis of race, color, national origin, English proficiency, income, religious creed, ancestry, disability, age, gender, sexual orientation, gender identity or expression, or military service. Any person who believes herself/himself or any specific class of persons to have been subjected to discrimination prohibited by Title VI, ADA, or other nondiscrimination statute or regulation may, herself/himself or via a representative, file a written complaint with the MPO. A complaint must be filed no later than 180 calendar days after the date on which the person believes that the discrimination occurred. A complaint form and additional information can be obtained by contacting the MPO (see above) or at www.bostonmpo.org.





Certification of the Boston Region MPO Transportation Planning Process

The Boston Region Metropolitan Planning Organization certifies that its conduct of the metropolitan transportation planning process complies with all applicable requirements, which are listed below, and that this process includes activities to support the development and implementation of the Regional Long-Range Transportation Plan and Air Quality Conformity Determination, the Transportation Improvement Program and Air Quality Conformity Determination, and the Unified Planning Work Program.

1. 23 USC 134, 49 USC 5303, and this subpart.
2. Sections 174 and 176 (c) and (d) of the Clean Air Act, as amended (42 USC 7504, 7506 (c) and (d) and 40 CFR Part 93.
3. Title VI of the Civil Rights Act of 1964, as amended (42 USC 2000d-1) and 49 CFR Part 21.
4. 49 USC 5332, prohibiting discrimination on the basis of race, color, creed, national origin, sex, or age in employment or business opportunity.
5. Section 1101(b) of the SAFETEA-LU (Pub. L. 109-59) and 49 CFR Part 26 regarding the involvement of disadvantaged business enterprises in U.S. DOT-funded projects.
6. The provisions of the Americans with Disabilities Act of 1990 (42 USC 12101 et seq.) and 49 CFR Parts 27, 37, and 38.
7. The Older Americans Act, as amended (42 USC 6101), prohibiting discrimination on the basis of age in programs or activities receiving federal financial assistance.
8. Section 324 of Title 23 USC regarding the prohibition of discrimination based on gender.
9. Section 504 of the Rehabilitation Act of 1973 (29 USC 794) and 49 CFR Part 27 regarding discrimination against individuals with disabilities.
10. Anti-lobbying restrictions found in 49 USC Part 20. No appropriated funds may be expended by a recipient to influence or attempt to influence an officer or employee of any agency, or a member of Congress, in connection with the awarding of any federal contract.

July 30, 2015

A handwritten signature in blue ink, appearing to read "Stephanie Pollack", is written over a horizontal line.

Stephanie Pollack, Secretary and Chief Executive Officer
Massachusetts Department of Transportation
Chair, Boston Region MPO

The signatures of the other MPO members may be found on page 2

John R. Romano
Massachusetts Department of Transportation
Highway Division

Maurice D.
Metropolitan Area Planning Council

Quince Ramsay
Massachusetts Bay Transportation Authority

Mike Young
Regional Transportation Advisory Council

James E. Dillio
City of Boston for Mayor Martin Walsh

D. Moses (for Mayor Worcester)
At-Large - City of Newton

Richard Quinn
At-Large - Town of Lexington

J. Ma
MetroWest Regional Collaborative -
Town of Framingham

Denise A. D'Amico
North Shore Task Force - Town of Beverly
City

South Shore Coalition - Town of Braintree

John
Three Rivers Interlocal Council - Town of
Norwood

Bill
Massachusetts Department of Transportation

Paul Regan
Advisory Board to the MBTA

Massachusetts Port Authority

Thomas Kadzis (for Mayor Walsh)
City of Boston

Jan Maff (For Mayor DeMaria)
At-Large - City of Everett

Laura W. River, for Kevin Greeley, Chair
At-Large - Town of Arlington of Selection

Bob P. 34
Inner Core - City of Somerville

Joe E. San
Minuteman Advisory Group on Interlocal
Coordination - Town of Bedford

John D'Amico
North Suburban Planning Council - City of
Woburn

South West Advisory Planning Committee -
Town of Medway



Certification of the Boston Region MPO Transportation Planning Process

310 CMR 60.05: Global Warming Solutions Act Requirements for the Transportation Sector and the Massachusetts Department of Transportation

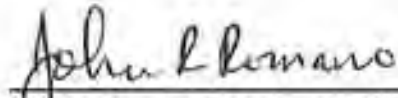
This will certify that the Regional Long-Range Transportation Plan and Air Quality Conformity Determination for the Boston Region Metropolitan Planning Organization (MPO) is in compliance with all applicable requirements in the State Regulation 310 CMR 60.05: Global Warming Solutions Act Requirements for the Transportation Sector and the Massachusetts Department of Transportation. The regulation requires MPO to:

1. 310 CMR 60.05, 3(b)(1)(a): Evaluate and track the GHG emissions and impacts of RTPs and TIPs;
2. 310 CMR 60.05, 3(b)(1)(b): In consultation with MassDOT, develop and utilize procedures to prioritize and select projects in RTPs, TIPs, and STIPs based on factors that include GHG emissions and impacts;
3. 310 CMR 60.05, 3(b)(1)(c): Quantify net GHG emissions and impacts resulting from the projects in RTPs and TIPs and have made efforts to minimize GHG emissions and impacts;
4. 310 CMR 60.05, 3(b)(1)(d): Determine in consultation with the RPA that the appropriate planning assumptions used for GHG emissions modeling are consistent with local land use policies, or that local authorities have made documented and credible commitments to establishing such consistency;
5. 310 CMR 60.05, 4(a)(2)(a): Develop RTPs and TIPs;
6. 310 CMR 60.05, 4(a)(2)(b): Ensure that RPAs are using appropriate planning assumptions;
7. 310 CMR 60.05, 4(a)(2)(c): Perform regional GHG emissions analysis of RTPs and TIPs;
8. 310 CMR 60.05, 4(a)(2)(d): Calculate GHG emissions for RTPs and TIPs;
9. 310 CMR 60.05, 4(a)(2)(e): Develop public consultation procedures for GHG reporting and related GWSA requirements consistent with current and approved regional public participation plans;
10. 310 CMR 60.05, 4(c): Prior to making final endorsements on the RTPs, TIPs, STIPs, and projects included in these plans, MassDOT and the MPOs shall include the GHG Assessment and information on related GWSA activities in RTPs, TIPs, and STIPs and provide an opportunity for public review and comment on the RTPs, TIPs, and STIPs.
11. 310 CMR 60.05, 6(a): After a final GHG assessment has been made by MassDOT and the MPOs, MassDOT and the MPOs shall submit MPO-endorsed RTPs, TIPs or projects within 30 days of endorsement to the Department for review of the GHG assessment.

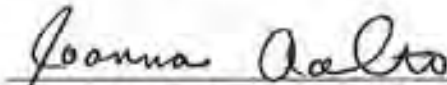
August 18, 2016

Stephanie Pollack, Secretary and Chief Executive Officer
Massachusetts Department of Transportation
Chair, Boston Region MPO

The signatures of the other MPO members may be found on page 2.



Massachusetts Department of Transportation
Highway Division

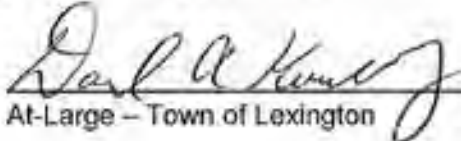
Metropolitan Area Planning Council


Massachusetts Bay Transportation Authority


Regional Transportation Advisory Council


City of Boston

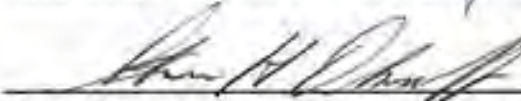

At-Large - City of Newton


At-Large - Town of Lexington

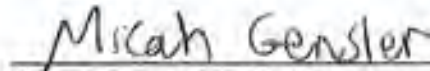
MetroWest Regional Collaborative -
Town of Framingham

North Shore Task Force - City of Beverly


South Shore Coalition - Town of Braintree


Three Rivers Interlocal Council - Town of
Norwood


Massachusetts Department of Transportation



Advisory Board to the MBTA

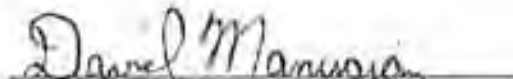

Massachusetts Port Authority


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Inner Core - City of Somerville


Minuteman Advisory Group on Interlocal
Coordination - Town of Bedford

North Suburban Planning Council - City of
Woburn

SouthWest Advisory Planning Committee -
Town of Medway

A1

AMENDMENT ONE TO CHARTING PROGRESS TO 2040

OVERVIEW

The Boston Region Metropolitan Planning Organization (MPO) is proposing an amendment to its current Long-Range Transportation Plan (LRTP), *Charting Progress to 2040*, which was endorsed by the MPO in July 2015. This document explains the proposed amendment, whose primary purpose is to provide consistency between the MPO's LRTP and the Federal Fiscal Years (FFYs) 2016–20 Transportation Improvement Program (TIP) and its amendments, the proposed FFYs 2017–21 TIP, and the Massachusetts Capital Investment Program (CIP).

The LRTP amendment includes additional projects, or a change in funding of five major infrastructure projects (defined as projects that add capacity to the transportation system and/or that cost more than \$20 million). These include:

- 1. Green Line Extension (GLX) Project:** The FFYs 2016–20 TIP Amendment Four includes transfer of funding programmed for the Green Line Extension (GLX) from College Avenue to Route 16 in Medford (GLX Phase 2) to the first phase of the GLX project from Lechmere Station in Cambridge to College Avenue in Medford (GLX Phase 1). This action was carried forward into the draft FFYs 2017–21 TIP, which currently is out for public review. This action requires that the transfer of funding to GLX Phase 1 project be included in the LRTP, along with removal of funding for GLX Phase 2. In addition, the completion schedule for GLX Phase 1 has been pushed back from its original date of 2020. (MPO target funds)
- 2. Ramp Construction on Interstate 95 Northbound and Improvements to Canton Street and Dedham Street:** This project was included in the previous LRTP, *Paths to a Sustainable Region*, endorsed by the MPO in 2011. The value of this project changed because of increases in construction materials. Additional statewide funding of \$16.8 million has been added for this project. (Statewide federal aid and non-federal aid funds)
- 3. Melnea Cass Boulevard:** Reconstruction of Melnea Cass Boulevard was funded in the draft FFYs 2017–21 TIP. Because this project costs more than \$20 million, it must be included in the LRTP. (MPO target and federal earmark funds)

4. **State Funded Projects:** Two regionally significant projects located in the Boston Region MPO area are included in the Massachusetts CIP and must be listed in the Boston Region MPO LRTP. The projects include **reconstruction of Interstate 90 and Interstate 495 interchange in Hopkinton and Westborough** (Statewide federal aid and non-federal aid funds) and **a new connection from Burgin Parkway over the MBTA in Quincy**. (State economic development funds)

The Melnea Cass Boulevard project in Boston and the two CIP projects are new major infrastructure projects to the LRTP and are described below. A description of the GLX Phase 1 project is included in Charting Progress to 2040 (http://www.ctps.org/data/pdf/plans/lrtp/charting/2040_LRTP_Chapter5_final.pdf). A description of the Ramp Construction on Interstate 95 Northbound and Improvements to Canton Street and Dedham Street are included in the previous LRTP, Paths to a Sustainable Region (http://www.ctps.org/data/pdf/plans/LRTP/paths/2035_LRTP_Chapter8.pdf).

Table A.1 shows the total amount of funding dedicated to major infrastructure projects and Operation and Maintenance (O&M) programs in the LRTP. O&M projects are those that do not need to be listed in the LRTP (non-major infrastructure projects) before they are programmed in the Transportation Improvement Program and include Complete Streets projects, intersection improvement projects, bicycle and pedestrian projects, and community transportation/parking/clean air and mobility projects. Table A.2 lists the highway projects funded under the major infrastructure program, as well as other investment programs established for O&M projects, their costs, and the period in which they are projected to be programmed. The list also includes additional funding for the GLX Phase 1 transit project, which is using highway funds flexed to transit, and other cost changes to projects and programs currently programmed in the LRTP.

TABLE A.1
Funding Dedicated to Programs in the LRTP

Program	Dedicated Funding
MPO Discretionary Capital Program: Major Infrastructure Projects	\$629,402,200
MPO Discretionary Capital Program: Highway Funds Flexed to Transit	\$190,000,000
MPO Discretionary Capital Program: Complete Street Program	\$904,709,400
MPO Discretionary Capital Program: Intersection Improvement Program	\$436,756,300
MPO Discretionary Capital Program: Bicycle/Pedestrian Program	\$155,984,400
MPO Discretionary Capital Program: Community Transportation/ Parking/Clean Air and Mobility Program	\$62,393,700
MPO Discretionary Capital Program: Unassigned Funds	\$474,547,500
Total MPO Highway Funding	\$2,853,793,500
Highway Expansion Projects Funded in the Boston Region MPO by the Commonwealth	\$296,137,500
Other Highway Funding	\$296,137,500
Transit Expansion Projects Funded in the Boston Region MPO by the Commonwealth	\$1,555,250,000
Transit Funding	\$1,555,250,000

**TABLE A.2
Major Infrastructure Projects Programmed with Highway Funding in the Recommended Plan with Costs**

Project Name	Current Cost	Investment Category	FFY 2016–2020	FFY 2021–2025	FFY 2026–2030	FFY 2031–2035	FFY 2036–2040	MPO Funding	Non-MPO Funding
Route 128 Additional Lanes (Needham & Wellesley)	\$50,725,206	MI	\$50,725,206					\$50,725,206	
Ramp Construction on I-95 (NB) and Improvements on Canton St/Dedham St (Canton, Norwood, Westwood)	\$68,864,034	MI	\$16,837,538						\$16,837,538
Middlesex Turnpike Improvements from Crosby Dr North to Manning Rd, Phase III (Bedford & Billerica)	\$36,735,100	MI	\$28,296,348					\$28,296,348	\$8,438,700
Reconstruction of Melnea Cass Boulevard (Boston)	\$25,297,838	MI	\$7,853,499					\$7,853,499	\$17,444,339
Reconstruction of Rutherford Ave, from City Sq to Sullivan Sq (Boston)	\$109,967,000	MI	\$7,000,000	\$113,066,906				\$120,066,906	\$8,578,930
Intersection Improvements at Rte 126 & Rte 135/MBTA & CSX Railroad (Framingham)	\$115,000,000	MI			\$184,118,700			\$184,118,700	
Reconstruction of I-90 and I-495 Interchange (Hopkinton & Westborough)	\$270,000,000	MI		\$270,000,000					\$270,000,000
Route 4/225 (Bedford St) and Hartwell Ave (Lexington)	\$23,221,000	MI		\$30,557,000				\$30,557,000	
Bridge Replacement, Rte 27 (North Main St) over Rte 9 (Worcester St) and Interchange Improvements (Natick)	\$25,793,370	MI		\$33,942,300				\$33,942,300	
Reconstruction of Highland Ave, Needham St & Charles River Bridge, from Webster St to Rte 9 (Newton & Needham)	\$14,297,606	MI	\$15,464,292					\$15,464,292	

TABLE A.2 (Cont.)
Major Infrastructure Projects Programmed with Highway Funding in the Recommended Plan with Costs

Project Name	Current Cost	Investment Category	FFY 2016–2020	FFY 2021–2025	FFY 2026–2030	FFY 2031–2035	FFY 2036–2040	MPO Funding	Non-MPO Funding
Construction of New Connection from Burgin Parkway over the MBTA (Quincy)	\$9,300,000	MI		\$9,300,000					\$9,300,000
McGrath Boulevard Project (Somerville)	\$56,563,000	MI			\$90,559,000			\$90,559,000	
Green Line Extension Project (Phase 1), Lechmere Station to College Ave/ Union Sq (Somerville & Cambridge)	\$190,000,000	MI	\$158,000,000	\$32,000,000				\$190,000,000*	
Green Line Extension Project (Phase 2), College Ave to Mystic Valley Parkway/Rte 16 (Somerville to Medford)	\$190,000,000	MI	\$158,000,000	\$32,000,000				\$190,000,000	
Reconstruction & Widening on Rte 18 (Main St) from Highland Pl to Rte 139 (Weymouth & Abington)	\$81,812,268	MI	\$45,281,758					\$45,281,758	\$36,530,510
Reconstruction of Montvale Ave. from I-93 Interchange to Central St (Woburn)	\$4,225,256	MI	\$4,752,838					\$4,752,838	
Bridge Replacement, New Boston St over MBTA (Woburn)	\$17,784,392	MI		\$17,784,392				\$17,784,392	
Complete Street Program (Regionwide)		CS		\$137,760,390	\$177,609,859	\$321,301,910	\$268,037,266	\$904,709,425	
Bicycle/Pedestrian Program (Regionwide)		B/P		\$23,751,791	\$30,622,389	\$55,396,881	\$46,213,322	\$155,984,384	
Intersection Improvement Program (Regionwide)		INT		\$66,505,016	\$85,742,690	\$155,111,267	\$129,397,301	\$436,756,274	
Community Transportation/ Parking/Clean Air Mobility Program (Regionwide)		CT/ PK/ CA		\$9,500,717	\$12,248,956	\$22,158,752	\$18,485,329	\$62,393,753	

TABLE A.2 (Cont.)
Major Infrastructure Projects Programmed with Highway Funding in the Recommended Plan with Costs

Project Name	Investment Category	Current Cost	FFY 2016–	FFY 2021–	FFY 2026–	FFY 2031–	FFY 2036–	MPO	Non-MPO
			2020	2025	2030	2035	2040	Funding	Funding
Total Available Regional Highway Target Funds			\$441,648,114	\$464,868,512	\$580,901,594	\$657,770,110	\$708,605,218	\$2,853,793,548	\$367,130,017
Total Programmed Regional Highway Target Funds			\$317,373,941	\$464,868,512	\$580,901,594	\$553,968,810	\$462,133,218	\$2,379,246,075	
Regional Highway Target Funds Available			\$124,274,173**	\$0	\$0	\$103,801,300	\$246,472,000	\$474,547,473	
Percentage of Funding Allocated			72%	100%	100%	84%	65%	83%	
Major Infrastructure			\$317,373,941	\$227,350,598	\$274,677,700	\$0	\$0	\$819,402,239	
Complete Street			\$0	\$137,760,390	\$177,609,859	\$321,301,910	\$268,037,266	\$904,709,425	
Bicycle and Pedestrian			\$0	\$23,751,791	\$30,622,389	\$55,396,881	\$46,213,322	\$155,984,384	
Intersection Improvement Program			\$0	\$66,505,016	\$85,742,690	\$155,111,267	\$129,397,301	\$436,756,274	
Community Transportation			\$0	\$9,500,717	\$12,248,956	\$22,158,752	\$18,485,329	\$62,393,753	
Unallocated Funds			\$124,274,173**	\$0	\$0	\$103,801,300	\$246,472,000	\$474,547,473	
Total			\$441,648,114	\$464,868,512	\$580,901,594	\$657,770,110	\$708,605,218	\$2,853,793,548	
% Major Infrastructure			72%	49%	47%	0%	0%	29%	
% Complete Street			0%	30%	31%	49%	38%	32%	
% Bicycle and Pedestrian			0%	5%	5%	8%	6%	5%	
% Intersection Improvement Program			0%	14%	15%	24%	18%	15%	
% Community Transportation			0%	2%	2%	3%	3%	2%	
% Unallocated Funds			28%**	0%	0%	16%	35%	17%	
% Total			100%	100%	100%	100%	100%	100%	

Added Project	Project name	MI	\$1,000
Deleted Project	Project name	MI	\$1,000
Change in Cost	Project name	MI	\$1,001

MI - Major Infrastructure Program
CS - Complete Streets Program
B/P - Bicycle/Pedestrian Program - Assabet River Rail Trail will be funded under this program
INT - Intersection Improvement Program
CT/PK/CA - Community Transportation/Parking/Clean Air and Mobility Program

* Flexing \$152 million federal portion to FTA, match provided by local contribution
** Funding in the 2016-2020 time band is allocated for non-major infrastructure projects through the TIP process.

NEW PROJECT DESCRIPTIONS

Boston: Melnea Cass Boulevard (\$25,297,838)

PROJECT DESCRIPTION

The Melnea Cass Boulevard project would reconstruct the street in order to serve not only drivers but also pedestrians, cyclists, and transit riders more equitably, and to improve safety for all roadway users. The project specifically aims to strengthen neighborhood connections for pedestrians and cyclists. The proposed improvements would better integrate future developments and land use, on both sides of the street, with the roadway design. Preliminary design plans are expected to be completed in April 2017.

The corridor is approximately 0.9 miles long and extends from Massachusetts Avenue to Columbus Avenue in the South End of Boston. The existing corridor provides two lanes in each direction with additional left turn lanes at Tremont Street, Washington Street, Harrison Avenue, Hampden Street, and Massachusetts Avenue. The corridor serves almost 40,000 vehicles daily and numerous bus routes, including Routes #8, #19, #47, and CT3.

PROJECT CONTEXT AND POSSIBLE IMPACTS BY MPO GOAL

Capacity Management / Mobility

Roadways:

The proposed design includes maintaining two travel lanes in each direction with additional turning lanes where necessary; however, there will no longer be a continuous concrete center median separating the directions of travel between Tremont Street and Hampden Street.

Transit:

New traffic signal equipment will be installed at each of the nine intersections along the corridor. Improvements to signal timing and phasing will be made to all study area intersections to improve operations, which would benefit the numerous bus routes operating within the corridor.

Pedestrians/Bicycles:

The proposed design provides two-way cycle tracks and sidewalks along both sides of Melnea Cass Boulevard. The proposed cycle tracks, part of the Boston Bike 5-Year and 30-Year Action Plans, will provide an important link within the planned bicycle network, which includes expanding accommodations to Massachusetts Avenue, Shawmut Avenue, Malcolm X Boulevard, Albany Street, and Hampden Street. The two-way cycle tracks will be 10 feet wide. The minimum width of the sidewalks will be seven feet, although in some locations they will be wider. The sidewalks generally will be buffered from the cycle tracks by landscaping that will vary in width throughout most of the length of the project area. Two-way marked bicycle crossings will be provided across all crossroads intersecting Melnea Cass Boulevard to provide additional safety. Also, the majority of pedestrian crossings across Melnea Cass Boulevard will be shortened as a result of the proposed design.

Safety

There is no Highway Safety Improvement Program crash cluster in the project area.

System Preservation

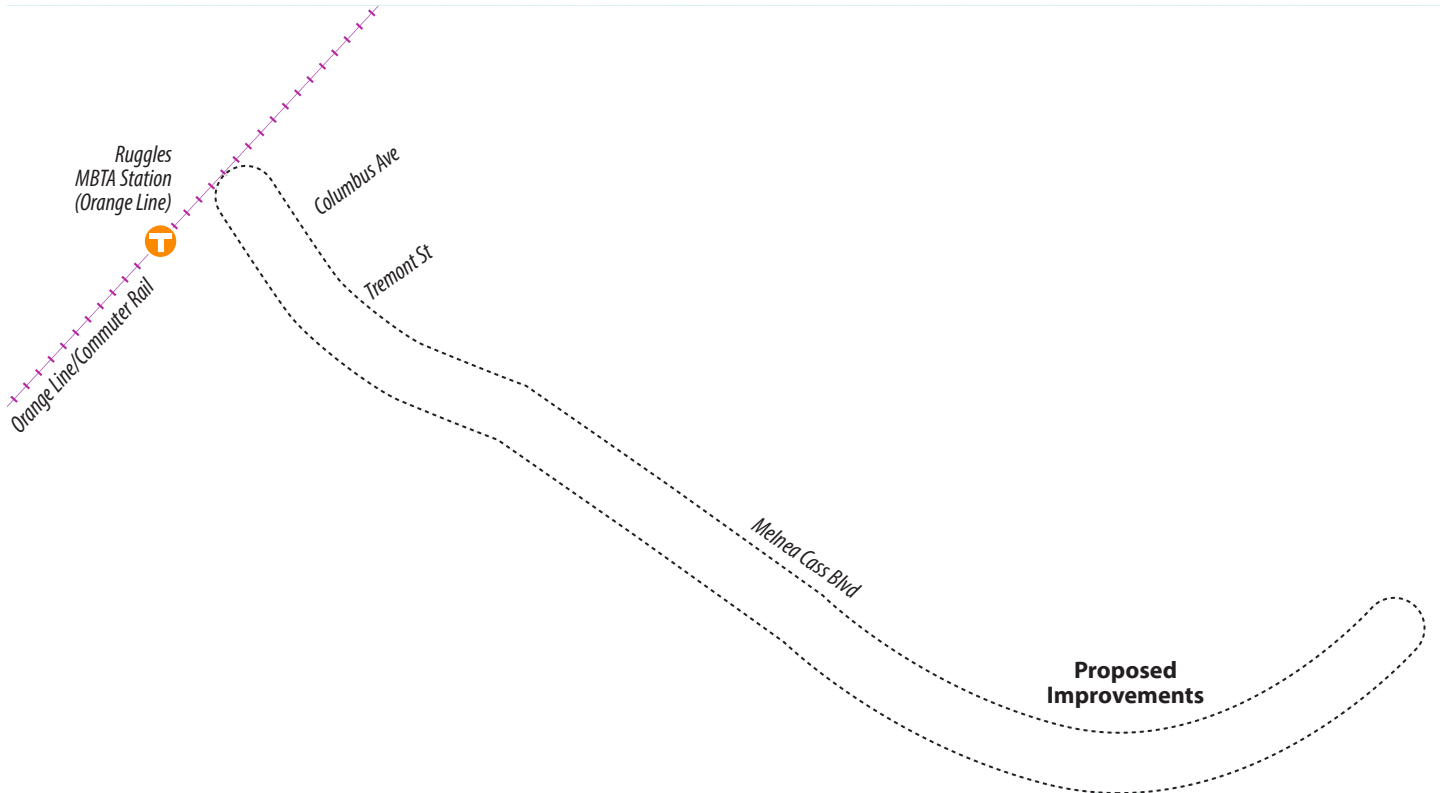
Nearly four lane-miles of substandard pavement will be improved as part of this project.

Economic Vitality

This new vision of Melnea Cass Boulevard is consistent with the goals expressed in the Roxbury Master Plan; it will provide the improvements and accommodations that the planned developments require in order to be successful.

Transportation Equity

This project site is located entirely within in an environmental justice area.



Hopkinton and Westborough: Reconstruction of Interstate 90 and Interstate 495 (\$270,000,000)

PROJECT DESCRIPTION

This project proposes to improve the interchange of Interstate 90 and Interstate 495. A number of alternatives are being developed and evaluated in the current feasibility study. Modifications to the existing ramp alignments, widening, and bridge improvements, as well as construction of new ramps and associated bridges, are under consideration. This interchange has been identified both in a joint study by the Boston Region and Central Massachusetts Metropolitan Planning Organizations (MPOs) and by elected officials in central Massachusetts as a critical linkage in need of redesign and reconstruction. The Massachusetts Department of Transportation (MassDOT) performed a planning study in 2012 and 2013 and a feasibility study in 2014. An environmental notification form was filed on March 2, 2015.

PROJECT CONTEXT AND POSSIBLE IMPACTS BY MPO GOAL

Capacity Management/Mobility

Roadways:

In 2015, MassDOT traffic counts found average weekday traffic on Interstate 495 north of Interstate 90 to be approximately 101,100 vehicles, and 99,700 vehicles south of Interstate 90. Ramp volumes ranged from 13,100 to 18,100 vehicles depending on direction. Historically, congestion at this interchange has been associated with the toll plazas. The implementation of the All Electronic Toll System is slated for July 2016; however, the removal of the toll plazas is not expected to eliminate the congestion and safety issues. Several of the ramps currently operate at level of service “D” or worse, and will be significantly improved with the proposed changes. This is a limited-access interchange, so no pedestrian or bicycle use is allowed.

Safety

This location has been identified in the MassDOT Highway Safety Improvement Program as a hazardous road location and includes a crash cluster that ranks within the top five percent of the MPO. Sharp curves on both ramps have led to numerous accidents, including rollovers of large trucks. The project will also eliminate conflicts as a result of weaving movements.

System Preservation

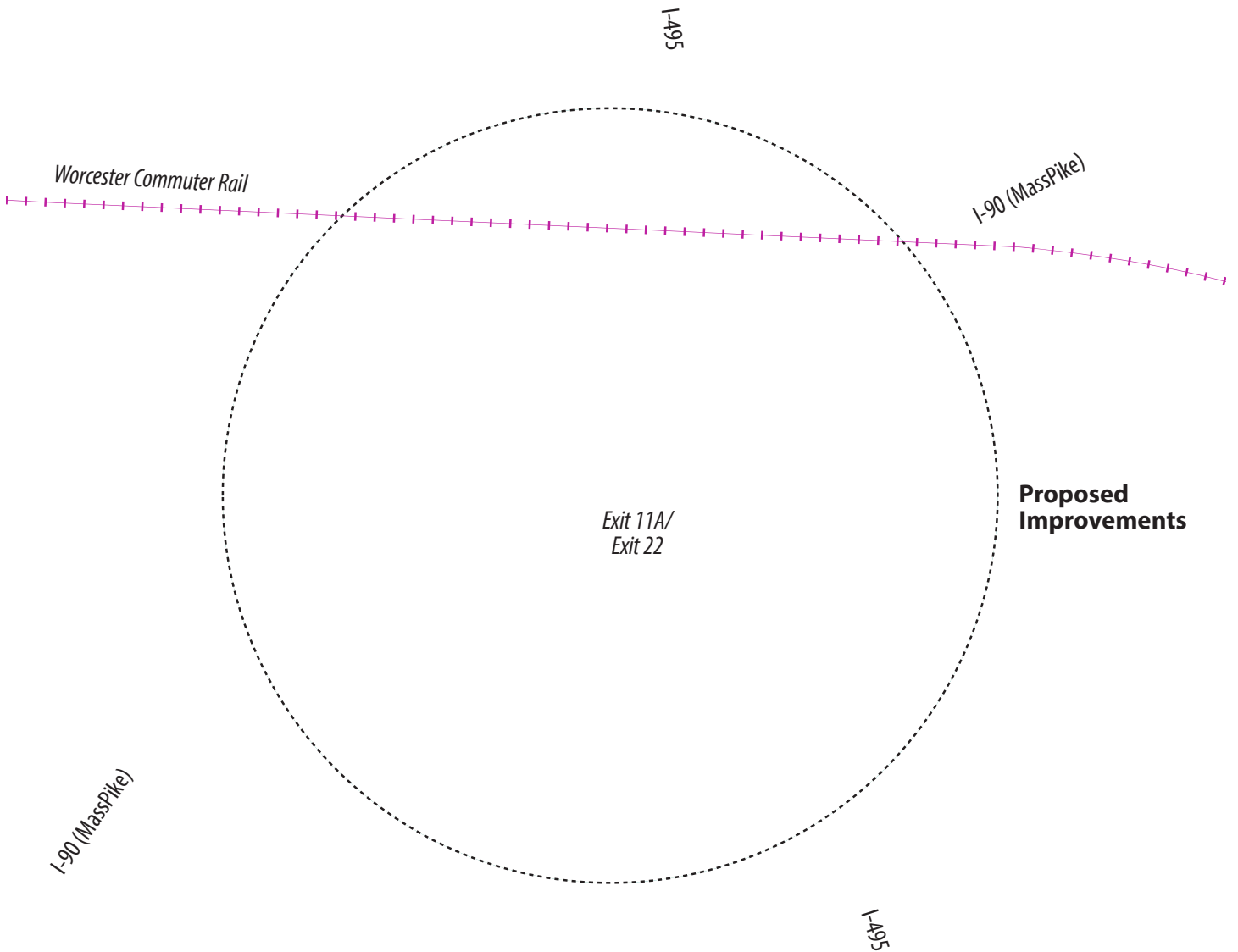
The current interchange geometry is substandard, and the geometric modifications will be a substantial improvement. In addition, there will be improvements to the existing bridges, including bridge deck replacement, rehabilitation, and bridge replacement, as well as significant reconstruction.

Economic Vitality

This project will provide substantial opportunities for economic development in the region. In a planning document sponsored by the Executive Office of Housing and Economic Development, the region surrounding the interchange was identified as a Priority Development Area.

Transportation Equity

This project is not within an Environmental Justice area.



Quincy:

Construction of a New Connection from Burgin Parkway over the MBTA (\$9,300,000)

PROJECT DESCRIPTION

This project will construct a new bridge, referred to as the Burgin Parkway Access Bridge, over the Massachusetts Bay Transportation Authority (MBTA) railroad alignment in order to connect a proposed street on the east side and Burgin Parkway on the west side. The bridge location is approximately midway between Concourse Street and Granite Street. The proposed roadway will include two 11-foot-wide travel lanes, one in each direction, with 5-foot-wide shoulders and 5- to 6-foot-wide sidewalks on each side. This project is currently at the pre-25 percent design stage.

Reconstruction of Burgin Parkway is required to accommodate a raised profile to obtain vertical clearance for the bridge. Burgin Parkway reconstruction will include:

- New sidewalks on Burgin Parkway on both sides of the roadway; the sidewalk on the east side to the north of the new bridge will tie into existing sidewalks
- Bicycle shoulders
- Raised median

PROJECT CONTEXT AND POSSIBLE IMPACTS BY MPO GOAL

Capacity Management/Mobility

Roadways:

No traffic studies have been performed to date; however, building this bridge will provide another means of access to the Quincy Center redevelopment area. The roadway has been designed for 6,000 vehicles per day.

Transit:

The bridge will be built over the MBTA railroad alignment but it will not provide access to an existing station. The new connection is located between the Quincy Center and Quincy Adams Red Line stations. No information is available regarding potential bus usage on this new roadway connection.

Pedestrians/Bicycles:

New sidewalks will be constructed on the new roadway and continue on both sides of the bridge on Burgin Parkway. The sidewalk will tie into existing sidewalks on Burgin Parkway to the north and taper down to match the existing cross-section with no sidewalks to the south. An alternative has been included to construct a sidewalk along Burgin Parkway to the south to comply with Massachusetts Department of Transportation's (MassDOT's) Healthy Transportation Directive. In addition, the new roadway will include 5-foot-wide shoulders that will allow for bicycle travel. Bicycle shoulders will be provided on Burgin Parkway.

Safety

There is no recent crash history at the project location. Safety benefits may be realized at other locations adjacent to the project area that have less traffic. The raised median on Burgin Parkway will provide for safer conditions in that area.

System Preservation

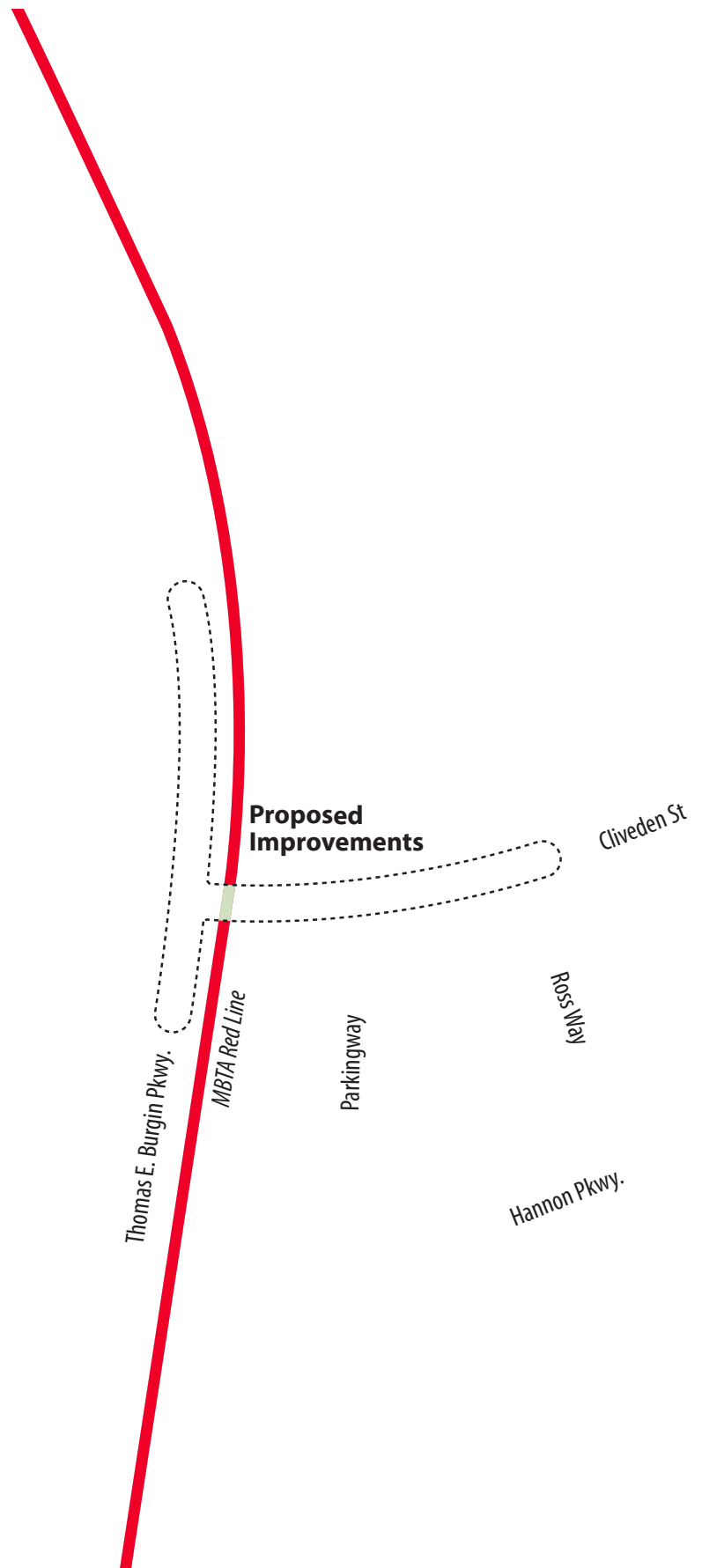
This is a new connection to the transportation system.

Economic Vitality

This project is part of the Quincy Center Redevelopment Project, which involves a multiphase, multiuse rejuvenation of a major portion of Quincy Center. The development includes new office, retail, residential, and parking facilities that will be constructed in phases over several years. The project will provide a new connection to the transportation system and improve traffic flow in the redevelopment area.

Transportation Equity

This project is not within an Environmental Justice area.



AIR QUALITY CONFORMITY DETERMINATION

Background

The Commonwealth of Massachusetts is classified as “unclassifiable/attainment” for the ozone standard with the exception of Dukes County. Therefore, the Boston Region MPO does not have to perform a conformity determination for ozone for its LRTP or TIP.

In addition, on April 1, 1996, the cities of Boston, Cambridge, Chelsea, Everett, Malden, Medford, Quincy, Revere, and Somerville were classified as “attainment” for carbon monoxide (CO) emissions. As part of past LRTPs, an air-quality conformity analysis was required for these communities, as they had a carbon monoxide maintenance plan approved as part of the Massachusetts State Implementation Plan (SIP). As of April 1, 2016, the 20-year maintenance period for this CO maintenance area expired and transportation conformity is no longer required for CO in these municipalities. This is documented in a letter from the United States Environmental Protection Agency dated May 12, 2016.

As of April 22, 2002, the community of Waltham was re-designated as being in attainment for CO, with an EPA-approved limited-maintenance plan. In areas that have approved limited-maintenance plans, federal actions requiring conformity determinations under the transportation conformity rule are considered to satisfy the “budget test” (as budgets are not treated as being 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.

Therefore, the MPO is not required to perform modeling analyses for a conformity determination for ozone or CO; it is only required to provide the statement in the paragraph above regarding the Waltham attainment area. However, it still is required to provide a status report on the timely implementation of transportation control measures included as part of the SIP. This status report is provided below.

Timely Implementation of Transportation Control Measures

Transportation control measures (TCMs) were required in SIP revisions submitted to the EPA in 1979 and 1982, and in those submitted as part of the Central Artery/Tunnel (CA/T) project. The TCMs included in the 1979 and 1982 submissions were accomplished through construction or implementation of ongoing programs.

The TCMs submitted as part of the CA/T project mitigation have been included in the LRTP as recommended or completed projects, except for the following three projects:

- Completion of a final design of the Red Line-Blue Line Connector from the Blue Line at Government Center to the Red Line at Charles Station

- Fairmount Line Improvements
- Enhanced Green Line extended beyond Lechmere Station to Medford Hillside and Union Square

MassDOT worked with the Massachusetts Department of Environmental Protection (DEP) to address these projects, and continues to keep the Boston Region MPO informed of their status through monthly reports at the MPO's regularly scheduled meetings. The Boston Region MPO will continue to include these projects in the LRTP and TIP until the TCMs described above have been completed, assuming that any interim projects or programs would provide equal or better emissions benefits. When the process has been completed, the MPO will amend the LRTP and future TIPs and their conformity determinations to include any changes (including any interim projects or programs).

Status Report of the Uncompleted SIP Projects

The status of the SIP projects has been updated using the *SIP Transit Commitments Status Report*, submitted by MassDOT to DEP in May 2016. Highlights of the report are presented below. For a detailed description of these projects' status, please visit the MassDOT website at:

<https://www.massdot.state.ma.us/planning/Main/PlanningProcess/StateImplementationPlan/SIPTransitCommitmentSubmissions.aspx>

RED LINE-BLUE LINE CONNECTOR - FINAL DESIGN - SIP REQUIRED COMPLETION BY DECEMBER 2011

Project Status

MassDOT initiated a process to amend the SIP to permanently and completely remove the obligation to perform a final design of the Red Line-Blue Line Connector. To that end, MassDOT officially sought approval from DEP to support a SIP amendment process. MassDOT did not propose 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 that project (final design only). Correspondence from MassDOT to DEP to initiate the amendment process formally was submitted on July 27, 2011, and is posted on the MassDOT website.

On September 13, 2012, DEP held two hearings to take public comment on MassDOT's proposed amendments to 310 CMR 7.36, "Transit System Improvements," including eliminating the requirement to complete the final design of the Red Line-Blue Line Connector. Between the two hearings, there were 16 attendees, 10 of whom gave oral testimony. All who spoke at the hearings were not in favor of DEP removing the commitment. DEP accepted written testimony until September 24, 2012.

On August 23, 2013, EPA sent a letter to the Federal Highway Administration (FHWA) to provide an update on Massachusetts Air Quality Conformity. In that letter, EPA noted that the Red Line-Blue Line Connector Design project had not met its completion date of December 2011, but that MassDOT was not obligated to implement interim emission-reduction projects because no emission reductions are associated with the design of the project.

On October 8, 2013, the DEP approved a request made by MassDOT in July 2011 to revise 310 CMR 7.36 to remove the requirement that MassDOT complete the design of the Red Line-Blue Line Connector. The Commonwealth of Massachusetts submitted the revision on November 6, 2013 for approval by EPA. The text of the revision is available on the MassDOT website at:

<http://www.massdot.state.ma.us/Portals/17/docs/sip/October13UpdatedSIPReg.pdf>.

On December 8, 2015, the EPA published a final rule in the Federal Register that approved the SIP revision and removed the commitment to design the Red Line-Blue Line Connector project.

Funding Source

This commitment has been nullified.

FAIRMOUNT LINE IMPROVEMENTS PROJECT - SIP REQUIRED COMPLETION BY DECEMBER 2011

Project Status

The Four Corners and Newmarket Stations opened for service on July 1, 2013. All change orders have been paid and the project is officially closed out. The Talbot Avenue Station opened in November 2012.

A station at Blue Hill Avenue has been the subject of significant community controversy during the past seven years. Redesign of the station reached 100 percent, with plans submitted in March 2016. While the community still has concerns, the project team is now advancing with the understanding that continued coordination with the community is paramount. Construction is scheduled to begin in winter 2016, and the station is to open in summer 2018.

MassDOT and the MBTA prepared a Petition to Delay and an Interim Emission Offset Plan to be implemented for the duration of the delay of the Fairmount Line Improvements project. MassDOT estimated the reduced emissions that are expected to be generated by implementing the new Fairmount Line station and, with input from Fairmount Line stakeholders, proposed offset measures. MassDOT estimated that the potential offset measures would meet emissions-reduction targets. The measures include shuttle bus

service from Andrew Square to Boston Medical Center and increased service on bus Route 31, which serves Dorchester and Mattapan. These measures were implemented on January 2, 2012, and currently are in place.

Funding Source

The Commonwealth

GREEN LINE EXTENSION TO SOMERVILLE AND MEDFORD PROJECT – SIP REQUIRED COMPLETION BY DECEMBER 2014

Project Status

State-level environmental review (Massachusetts Environmental Policy Act (MEPA)) was completed in July 2010. Federal-level environmental review (National Environmental Policy Act (NEPA)) documents were submitted to the Federal Transit Administration in September 2011, and a public hearing was held on October 20, 2011. A Finding of No Significant Impact (FONSI) was issued by the Federal Transit Administration (FTA) on July 9, 2012.

On January 5, 2015, the US Secretary of Transportation and the MBTA signed the Full Funding Grant Agreement (FFGA) for the Green Line Extension project (GLX), approving \$996,121,000 of FTA New Starts funding to support design and construction of the project. Execution of the FFGA was the result of many years of planning, design and pre-construction efforts by MassDOT and the MBTA, in collaboration with the FTA and its Project Management Oversight Consultant. Federal funding is scheduled to be paid between federal fiscal years (FFYs) 2015 and 2022. As noted in the MassDOT Capital Investment Plan (CIP) for fiscal year 2016, MassDOT and the MBTA will use Commonwealth funds in addition to federal funding to support design and construction activities.

As the project proceeded, it was later found that the project scope as defined in the Full Funding Grant Agreement could not be built for the \$1.992 billion project cost established in January 2015. It was projected that the total project cost could range between \$2.7 billion and \$3.0 billion. The Commonwealth's share of overall project costs would then be between \$1.7 billion and \$2.0 billion, rather than the currently budgeted \$996 million.

With the federal contribution capped at \$996 million and the Commonwealth responsible for all project cost increases, MassDOT and the MBTA had no choice but to re-evaluate the GLX project in order to recommend to the Commonwealth if and how the project should proceed.

MassDOT and the MBTA are now working to identify opportunities to value engineering elements of the project in order to bring costs of the overall project closer to the original anticipated costs.

The MBTA Fiscal and Management Control Board and the MassDOT Board were briefed on August 24, 2015 and September 9, 2015, respectively, about these developments.

Before seeking additional state funding, MassDOT and the MBTA considered:

- All available options to reduce costs
- All available options to identify additional funding from sources other than the Commonwealth
- Whether or not to proceed with the Green Line Extension project

MassDOT and the MBTA actively sought stakeholder and public input on, as well as staff analysis of, options including the following:

Option 1 - Reduce the Project Scope and Project Costs

Downsize, delay, or eliminate planned vehicle maintenance and storage facility

Option 2 - Find Additional Sources of Funds, Other than State Bonds

This could include:

- Reallocate \$158 million programmed by the Boston Region MPO for a future Route 16 extension to the core GLX project (the MPO endorsed this action in Amendment Four of the 2016–20 TIP)
- Work with municipal partners (Cambridge and Somerville committed \$75 million towards the project)
- Obtain institutional and private contributions
- Seek any additional federal funding in cooperation with the Congressional delegation

Option 3 - Change Procurement Method

Halt Construction Manager/General Contractor process and rebid project—in smaller contract packages—using a more traditional procurement method

Option 4 - Mothball or Cancel the Project

On May 9, 2016, the MBTA Fiscal and Management Control Board and the MassDOT Board voted to advance a scaled-down version of the project by submitting the redesign to federal regulators and continuing with plans for financing the project.

MassDOT will provide an update to DEP and the public as soon as it has determined the impact of this delay on the overall project schedule.

Prior to the cost increase, the project had been moving forward, with MassDOT and MBTA implementing a four-phased project-delivery plan.

Phase 1 used the traditional design-bid-build approach to deliver the contract for widening the Harvard Street and Medford Street railroad bridges and demolishing the 21 Water Street building. The MBTA also added some retaining wall construction to the Phase 1 contract that had previously been programmed for Phase 4 in that area. This contract is completed.

Phase 2/2A will extend service from the (new) Lechmere Station to the Washington Street and Union Square Stations and relocate the bus facility and vehicle storage at Lechmere Station.

Phase 3 will construct the vehicle-maintenance facility and storage facility.

Phase 4 will provide service from Washington Street Station (completed as part of Phase 2, above) to College Avenue Station.

New Green Line Vehicles: The MBTA Vehicle Procurement contract to purchase 24 Type 9 Vehicles was awarded to CAF USA Inc. in an amount not to exceed \$118,159,822 at the MassDOT Board Meeting held on May 14, 2014. The NTP for this contract was issued on September 4, 2014.

CAF is in the process of developing drawing packages for the Preliminary Design; and the MBTA Project Team and CAF continue to hold technical working sessions and project meetings. In addition, weekly project management meetings are held between MBTA and CAF to discuss project status, short-term schedules and priorities; and monthly project status meetings are held to review and discuss all project issues, including schedules, deliverables, and milestones.

The first vehicle is to be delivered no later than 36 months from the notice to proceed. The pilot car delivery is scheduled for September 2017. The pilot car will receive comprehensive testing for six months followed by delivery of the remaining 22 vehicles, with the last car to be delivered by July 2018. All vehicles are expected to be in service in early 2019.

Somerville Community Path: Originally the Green Line Extension project included just the design of the extension of the Somerville Community Path from south of Lowell Street to the Inner Belt area of Somerville. In May 2014, MassDOT and the City of Somerville announced an agreement to add construction of the Community Path, including a connection to the Cambridge/Northpoint area, to the scope of the program. The Path Extension is not part of the SIP commitment and is currently being re-evaluated by the MBTA Fiscal and Management Control Board and the MassDOT Board.

SIP Requirement Status

By filing an Expanded Environmental Notification Form, procuring multiple design consultants, and publishing Draft and Final Environmental Impact Reports, MassDOT met the first four interim milestones associated with the Green Line Extension project. 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.

In the 2011 SIP Status Report, MassDOT reported that the Green Line Extension project would not meet the legal deadline of December 31, 2014.

Although the goal of the phased project delivery approach is to complete components in an incremental way, the timeline for overall project completion listed above represents a substantial delay beyond the current SIP deadline of December 31, 2014; this triggered 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 calculated the reductions of non-methane hydrocarbon, carbon monoxide, and nitrogen oxide—reductions equal to or greater than those projected for the Green Line Extension itself, as specified in the SIP regulation—that will be required for the period of the delay.

In June 2012, MassDOT released a list of potential mitigation ideas received from the public that could be used as offset measures. In the summer and fall of 2012, MassDOT solicited public comments on these potential measures. The MBTA created an internal working group to determine a final portfolio of interim mitigation measures to implement by December 31, 2014, the legal deadline for implementation of the Green Line Extension.

This work resulted in a recommendation to implement the following three interim mitigation measures, which collectively would meet the emissions-reduction target for the project:

- Additional off-peak service along existing routes serving the GLX corridor, including the Green Line, and bus routes 80, 88, 91, 94, and 96
- Purchase of 142 new hybrid electric vehicles for THE RIDE
- Additional park-and-ride spaces at the Salem and Beverly intermodal facilities

The Petition to Delay, submitted to DEP on July 22, 2014, which expands further on the analysis and determination of the interim offset measures, is available on MassDOT's website. These measures went into effect at the beginning of 2015.

Funding Source

The Commonwealth

RUSSIA WHARF FERRY TERMINAL

Project Status

Former MassDOT Secretary Richard Davey approved construction of the permitted ferry facility and a \$460,000 ferry-service startup subsidy in October 2012. The 2005 facility plans and specifications were revised to meet the latest MassDOT Highway Division standards. The bid package was issued in fall 2013. A contractor was selected and the Notice to Proceed was issued in April 2014. Pre-construction activities progressed, but contractual issues associated with the project design led MassDOT to decide to rebid the contract. There is no regularly scheduled passenger water transportation service in this area, nor are there any plans to provide such service.

The City of Boston, however, is undertaking design and engineering work to address the Old Northern Avenue Bridge, which will allow for ferry vessel-clearance. The city received a grant in 2012 to purchase two ferry vessels for Inner Harbor use, which could include this ferry terminal as a destination. The Massachusetts Convention Center Authority has agreed to take over that grant and will purchase the vessels. Procurement could occur in calendar year 2016.

Funding Source

The Commonwealth

Changes in Project Design and Construction Schedule since the Last Conformity Determination Analysis

The Commonwealth requires that any changes in the mix of projects, project designs, or construction schedules from the previous conformity determination for the region be identified. The last conformity determination was performed for the Boston Region MPO's current LRTP, *Charting Progress to 2040*, in July 2015. The mix of projects included in the conformity determination for this LRTP remains the same, except for the following:

- Completion of the GLX Phase 1 project to College Avenue and Union Square has been delayed; the project was scheduled to be completed after 2020, and now is included in the 2040 analyses only
- The GLX Phase 2 project from College Avenue to Mystic Valley Parkway/Route 16 has been removed
- Two regionally significant projects that are included in the MassDOT CIP and funded with state funding have been listed in this LRTP Amendment
 - Reconstruction of Interstate 90 and Interstate 495 in Hopkinton and Westborough

- Construction of a new connection from Burgin Parkway over the MBTA in Quincy
- Reconstruction of Melnea Cass Boulevard has been listed in this LRTP Amendment
- Status of uncompleted SIP projects has been updated

GLOBAL WARMING SOLUTIONS ACT TRANSPORTATION STATUS: FUTURE CARBON DIOXIDE EMISSIONS REDUCTIONS

Background

The Global Warming Solutions Act of 2008 (GWSA) requires statewide reductions in greenhouse gas (GHG) emissions of 25 percent below 1990 levels by the year 2020, and 80 percent below 1990 levels by 2050. As part of the GWSA, the Executive Office of Energy and Environmental Affairs developed the Massachusetts Clean Energy and Climate Plan (CECP), which outlines programs to attain the 25 percent reduction by 2020—including a 7.6 percent reduction from the transportation sector.

The Commonwealth's 13 metropolitan planning organizations (MPOs) are integrally involved in helping to achieve greenhouse gas reductions mandated under the GWSA. The MPOs work closely with MassDOT and other involved agencies to develop common transportation goals, policies, and projects that would help to reduce GHG emission levels statewide, and meet the specific requirements of the GWSA regulation – *Global Warming Solutions Act Requirements for the Transportation Sector and the Massachusetts Department of Transportation (310 CMR 60.05)*. The purpose of this regulation is to assist the Commonwealth in achieving its adopted GHG emission-reduction goals by requiring:

- MassDOT to demonstrate that its GHG reduction commitments and targets are being achieved
- Each MPO to evaluate and track the GHG emissions and impacts of both its LRTP and TIP
- Each MPO, in consultation with MassDOT, to develop and utilize procedures to prioritize and select projects in its LRTP and TIP based on factors that include GHG emissions and impacts

The Commonwealth's MPOs are meeting the requirements of this regulation through the transportation goals and policies contained in their 2016 LRTPs, the major projects planned in the LRTPs, and the mix of new transportation projects that are programmed and implemented through the TIP.

The GHG tracking and evaluation processes enable the MPOs and MassDOT to identify the anticipated GHG impacts of the planned and programmed projects, and to use GHG impacts as criteria to prioritize transportation projects. This approach is consistent with the greenhouse-gas reduction policies of promoting healthy transportation modes through prioritizing and programming an appropriate balance of roadway, transit, bicycle and pedestrian investments; as well as supporting smart-growth development patterns by creating a balanced multi-modal transportation system. All of the Commonwealth's MPOs and MassDOT are working toward reducing greenhouse gases with "sustainable" transportation plans, actions, and strategies that include, but are not limited to:

- Reducing emissions from construction and operations
- Using more fuel-efficient fleets
- Implementing and expanding travel demand management programs
- Encouraging eco-driving
- Providing mitigation for development projects
- Improving pedestrian, bicycle, and public transit infrastructure and operations (healthy transportation)
- Investing in higher-density, mixed-use, and transit-oriented developments (smart growth)

Regional Tracking and Evaluation in Long Range Transportation Plans

MassDOT coordinated with the Boston Region MPO and regional planning agencies to implement GHG tracking and evaluation in developing all MPOs' 2012 LRTPs, which were adopted in September 2011. This collaboration continued for the MPOs' 2016 LRTPs, 2016–19 TIPs, and 2017–21 TIPs. This information is now being updated and included in the Boston Region MPO's Amendment One to the 2016 LRTP, *Charting Progress to 2040*. Working together, MassDOT and the MPOs have attained the following milestones:

- As a supplement to the 2016 LRTPs and the Boston Region MPO Amendment One to *Charting Progress to 2040*, the MPOs have completed modeling and long-range statewide projections for GHG emissions resulting from the transportation sector. Using the Boston Region MPO's travel demand model and the statewide travel demand model for the remainder of the state, the MPOs have projected GHG emissions for 2020 no-build (base) and build (action) conditions, and for 2040 no-build (base) and build (action) conditions.

- All of the MPOs have addressed GHG emissions-reduction projections in their LRTPs, discussed climate change, and included a statement of MPO support to reduce GHG emissions as a regional goal.

MassDOT’s statewide estimates of CO₂ emissions resulting from the collective list of all recommended projects in all the Massachusetts LRTPs and Amendments combined are presented below. Emissions shown in Table A.3 have been estimated using the new (2014) MOVES model, and incorporate the latest planning assumptions including updated socio-economic projections for the Commonwealth.

TABLE A.3
Massachusetts Statewide CO₂ Emissions Estimates
(all emissions in tons per summer day)

Year	CO ₂ Action Emissions	CO ₂ Base Emissions	Difference (Action – Base)
2020	136,567.8	136,597.1	-29.3
2040	69,646.8	69,673.6	-26.8

This analysis measures only projects that are included in the travel demand models. Many other types of projects that cannot be accounted for in the model (such as bicycle and pedestrian facilities, shuttle services, intersection improvements, etc.), are covered in the regional TIPs with either “qualitative” assessments of likely CO₂ change, or actual quantitative estimates listed for each project.

Tables A.4 and A.5 list the regionally significant projects that are included in the travel demand greenhouse gas analysis for the Boston Region MPO’s Amendment One to *Charting Progress to 2040*.

As shown above, collectively, all projects in the LRTPs in the 2020 Action scenario provide a statewide reduction of more than 29 tons of CO₂ per day compared to the base case. The 2040 Action scenario estimates a reduction of nearly 27 tons of CO₂ emissions compared to the base case.

These results demonstrate that the transportation sector is expected to make positive progress in meeting GHG reduction targets and complying with the requirements of the GWSA. MassDOT and the MPOs will continue to advocate for steps needed to accomplish the Commonwealth’s long-term goals for greenhouse gas reductions.

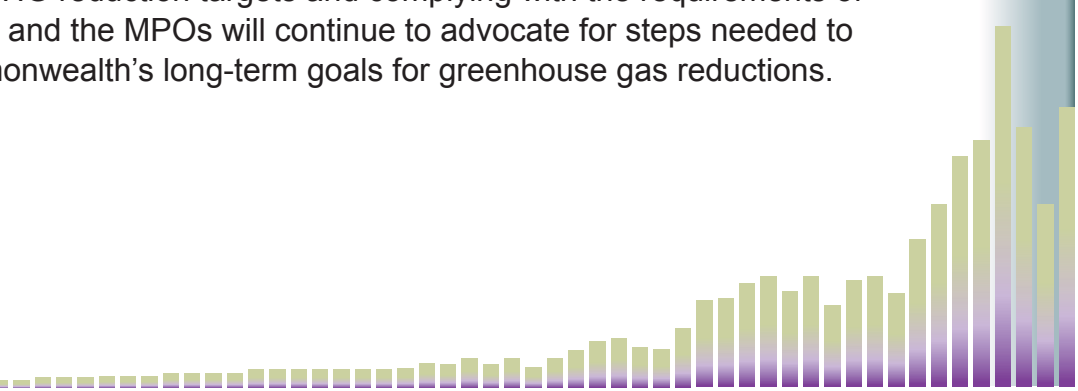


TABLE A.4
Regionally Significant Projects Included in the Regional Transportation Models for the Boston Region MPO Recommended LRTP Projects: Projects under Construction

Analysis Year	Municipality	Project Name
2020	Needham and Wellesley	Rehabilitation/Replacement of 6 Bridges on I-95/ Rte 128 (Add-a-Lane – Contract V)
2020	Canton, Norwood, and Westwood	Ramp Construction on I-95 Northbound and Improvements on Canton St and Dedham St
2040	Somerville and Cambridge	Green Line Extension Project (Phase 1), Lechmere Station to College Ave/Union Sq

TABLE A.5
Regionally Significant Projects Included in the Regional Transportation Models for the Boston Region MPO Recommended LRTP Projects: Recommended Projects

Analysis Year	Municipality	Project Name
2020	Boston	Reconstruction of Melnea Cass Blvd
2020	Bedford and Billerica	Middlesex Tpk Improvements, from Crosby Dr North to Manning Rd, Phase III
2020	Newton and Needham	Reconstruction of Highland Ave, Needham Str and Charles River Bridge, from Webster St to Rte 9
2020	Weymouth and Abington	Reconstruction and Widening on Rte 18 (Main St) from Highland Pl to Rte 139
2020	Woburn	Reconstruction of Montvale Ave, from I-93 Interchange to Central St
2040	Boston	Reconstruction of Rutherford Ave, from City Sq to Sullivan Sq
2040	Framingham	Intersection Improvements at Rte 126 and Rte 135/MBTA and CSX Railroad
2040	Lexington	Rte 4/225 (Bedford St) and Hartwell Ave
2040	Hopkinton and Westborough	Reconstruction of I-90 and I-495 Interchange
2040	Natick	Bridge Replacement, Rte 27 (North Main St) over Rte 9 (Worcester St) and Interchange Improvements
2040	Quincy	Construction of a New Connection from Burgin Pkwy over the MBTA
2040	Somerville	McGrath Blvd Project
2040	Woburn	Bridge Replacement, New Boston St over MBTA

TRANSPORTATION EQUITY ANALYSES RESULTS

MPO staff used the travel demand model to perform two types of equity analyses (discussed below) to determine whether this LRTP Amendment would have a disproportionately high adverse effect on minority and low-income populations. Both types of equity analyses calculated differences between the 2040 No-Build and 2040 Build alternatives for “equity analysis zones” (minority transportation analysis zones (TAZs) and low-income TAZs), and for non-equity analysis zones (nonminority TAZs and non-low-income TAZs). For each analysis, the ratio of change from No-Build to Build alternatives was compared for minority versus nonminority TAZs to determine whether there was a disparate impact, and for low- versus non-low-income TAZs to determine whether there was a disproportionate burden.

Thresholds in the MPO’s draft Disparate Impact Policy were used to measure whether this Amendment resulted in disparate impacts or disproportionate burdens. Staff first used this policy to analyze equity in the LRTP in 2015, and it has not been finalized. Because the requirement to analyze disparate impacts is relatively new, MPO staff will continue to examine the draft policy before bringing it to the MPO for approval.

Results of this analysis show that there are no disparate impacts or disproportionate burdens on minority and low-income populations, except for a disparate impact for congested vehicle-miles of travel (VMT), which also was found in the current LRTP, Charting Progress to 2040. However, the change in this measure does show a decrease from the No-Build to Build conditions for both low-income and non-low-income populations, suggesting that the projects will improve congestion for everyone.

Accessibility Analysis Results

For the purpose of this analysis, accessibility was defined as ‘the ability to reach desired destinations and the ease of doing so.’ This analysis investigated the number of employment opportunities, health-care facilities, and higher-education facilities that people could reach from equity analysis zones and non-equity analysis zones, along with average transit and highway travel times to these destinations. Analysis of transit travel times included destinations within a 40-minute transit trip, while analysis of highway travel times included destinations within a 20-minute auto trip.

The accessibility analysis first compared the change in transit and highway travel times to various types of employment from the 2040 No-Build to Build alternatives for low-income, non-low-income, minority, and nonminority TAZs, respectively.

The second part of the accessibility analysis compared the ratio of change from the 2040 No-Build to Build alternative for low-income versus non-low-income TAZs to determine whether there was a disproportionate burden, and for minority versus nonminority TAZs to determine whether there was a disparate impact for each type of employment evaluated.

Mobility, Congestion, and Air Quality Analysis Results

MOBILITY AND CONGESTION RESULTS

For the purpose of this analysis, mobility is defined as ‘the ability to move from place to place,’ and congestion is defined as ‘the level at which transportation system performance becomes unacceptable because of traffic congestion.’ The MPO’s mobility and congestion analysis focused on the average door-to-door travel time and average VMT under congested conditions.

The mobility and congestion analyses first compared the change in average door-to-door travel time, congested VMT, and VMT per square mile for all transit and highway trips produced in, or attracted to, equity analysis zones from the 2040 No-Build to Build alternatives for low-income, non-low-income, minority, and nonminority TAZs, respectively.

The second part of the mobility and congestion analysis compared the ratio of change from the 2040 No-Build to Build alternatives for low- versus non-low-income TAZs to determine whether there was a disproportionate burden, and for minority versus nonminority TAZs to determine whether there was a disparate impact for each of the factors evaluated.

AIR QUALITY ANALYSIS RESULTS

The air quality-analysis focused on carbon monoxide, a pollutant that results primarily from incomplete combustion of fossil fuels and accumulates in localized areas, creating hot spots that negatively affect human health.

Carbon monoxide emissions show essentially no change from the 2040 No-Build to Build alternatives for all zones.

Equity Analysis Conclusions

The MPO is continuing to monitor transportation equity burdens and impacts in the region, and is taking steps to address them through the TIP process. The MPO is programming 14 new projects through 2021 under the Complete Streets, intersection improvement, and multi-use path programs in transportation equity areas in Ashland, Boston, Brookline, Everett, Gloucester, Lynn, Marlborough, Salem, and Somerville. These projects will improve safety and provide benefits to those who walk and bike that are not captured in this analysis.

In addition, MPO staff will continue to work on finalizing its equity analysis process and draft Disparate Impact Policy. For example, how do we capture improvements to

safety and non-motorized mobility, and how do we ensure that our policy thresholds reflect meaningful changes? Some of this work will be completed through a project funded in the FFY 2016 UPWP: Systemwide Title VI/Environmental Justice Assessment of TIP Projects. The purpose of this project is to develop best practices for the Boston Region MPO's systemwide analysis of the benefits and burdens of TIP investments for environmental justice/Title VI populations. Although this project is focused on the TIP, the methodologies that staff develop will be applicable to the LRTP as well. Continued refinement of the draft Disparate Impact Policy will occur under the MPO's ongoing Transportation Equity Program.



Appendix A

PUBLIC COMMENTS

COMMENTS RECEIVED DURING THE PUBLIC REVIEW PERIOD

The following table summarizes the comments received by the Boston Region MPO during the 30-day public review period for Amendment One to *Charting Progress to 2040*. The public review period began on July 12, 2016, and closed on August 10, 2016. The MPO's response to each comment is also included in the table.

**Table A-A.1
Response to Public Comments on Draft Amendment One to the Long-Range Transportation Plan**

Projects(s)/ Issue(s)	Affiliation	Name	Request/ Support/ Oppose	Comment	MPO Response	Change or Revision to LRTP
Reconstruction of I-90/I-495 Interchange (Hopkinton)	495/MetroWest Partnership	Paul Matthews, Executive Director; Jessica Strunkin, Deputy Director	Support	Support inclusion of the Reconstruction of I-90/I-495 Interchange in Amendment One of the LRTP. State that the project will address congestion, safety, air quality, and sustainable development.	Thank you for your comments on the LRTP. The Reconstruction of I-90/I-495 Interchange is included in the list of recommended projects in Amendment One to <i>Charting Progress to 2040</i> in the 2021 to 2025 time band.	No
Reconstruction of I-90/I-495 Interchange (Hopkinton)		Senator James B. Eldridge	Support	Supports inclusion of the Reconstruction of I-90/I-495 Interchange in Amendment One of the LRTP. States the project will address congestion, safety, air quality, and sustainable development. States the project will greatly impact the long-term economic, environmental, and safety interests of the region. The safety and congestion concerns of the interchange are of immediate concern due to the imminent implementation of All Electronic Tolling. Adds that the traffic and environmental impacts of the interchange's current configuration have made it a regional transportation priority for the past several years.	Thank you for your comments on the LRTP. The Reconstruction of I-90/I-495 Interchange is included in the list of recommended projects in Amendment One to <i>Charting Progress to 2040</i> in the 2021 to 2025 time band.	No

Table A-A.1 (cont.)
Response to Public Comments on Draft Amendment One to the Long-Range Transportation Plan

Projects(s)/ Issue(s)	Affiliation	Name	Request/ Support/ Oppose	Comment	MPO Response	Change or Revision to LRTP
Reconstruction of I-90/I-495 Interchange (Hopkinton)		Representative Carolyn C. Dykema	Support	Supports inclusion of the Reconstruction of I-90/I-495 Interchange in Amendment One of the LRTP. States the project will address congestion, safety, air quality, and sustainable development. States the project will greatly impact the long-term economic, environmental, and safety interests of the region. The safety and congestion concerns of the interchange are of immediate concern due to the imminent implementation of All Electronic Tolling. Adds that the traffic and environmental impacts of the interchange's current configuration have made it a regional transportation priority for the past several years.	Thank you for your comments on the LRTP. The Reconstruction of I-90/I-495 Interchange is included in the list of recommended projects in Amendment One to <i>Charting Progress to 2040</i> in the 2021 to 2025 time band.	No

**Table A-A.1 (cont.)
Response to Public Comments on Draft Amendment One to the Long-Range Transportation Plan**

Projects(s)/ Issue(s)	Affiliation	Name	Request/ Support/ Oppose	Comment	MPO Response	Change or Revision to LRTP
Reconstruction of I-90/I-495 Interchange (Hopkinton)		Senator Michael O. Moore	Support	Supports inclusion of the Reconstruction of I-90/I-495 Interchange in Amendment One of the LRTP. States the project will address congestion, safety, air quality, and sustainable development. States the project will greatly impact the long-term economic, environmental, and safety interests of the region. The safety and congestion concerns of the interchange are of immediate concern due to the imminent implementation of All Electronic Tolling. Adds that the traffic and environmental impacts of the interchange's current configuration have made it a regional transportation priority for the past several years.	Thank you for your comments on the LRTP. The Reconstruction of I-90/I-495 Interchange is included in the list of recommended projects in Amendment One to <i>Charting Progress to 2040</i> in the 2021 to 2025 time band.	No

Table A-A.1 (cont.)
Response to Public Comments on Draft Amendment One to the Long-Range Transportation Plan

Projects(s)/ Issue(s)	Affiliation	Name	Request/ Support/ Oppose	Comment	MPO Response	Change or Revision to LRTP
Reconstruction of I-90/I-495 Interchange (Hopkinton)		Representative James J. O'Day	Support	Supports inclusion of the Reconstruction of I-90/I-495 Interchange in Amendment One of the LRTP. States the project will address congestion, safety, air quality, and sustainable development. States the project will greatly impact the long-term economic, environmental, and safety interests of the region. The safety and congestion concerns of the interchange are of immediate concern due to the imminent implementation of All Electronic Tolling. Adds that the traffic and environmental impacts of the interchange's current configuration have made it a regional transportation priority for the past several years.	Thank you for your comments on the LRTP. The Reconstruction of I-90/I-495 Interchange is included in the list of recommended projects in Amendment One to <i>Charting Progress</i> to 2040 in the 2021 to 2025 time band.	No

**Table A-A.1 (cont.)
Response to Public Comments on Draft Amendment One to the Long-Range Transportation Plan**

Projects(s)/ Issue(s)	Affiliation	Name	Request/ Support/ Oppose	Comment	MPO Response	Change or Revision to LRTP
Reconstruction of I-90/I-495 Interchange (Hopkinton)		Representative Hannah E. Kane	Support	Supports inclusion of the Reconstruction of I-90/I-495 Interchange in Amendment One of the LRTP. States the project will address congestion, safety, air quality, and sustainable development. States the project will greatly impact the long-term economic, environmental, and safety interests of the region. The safety and congestion concerns of the interchange are of immediate concern due to the imminent implementation of All Electronic Tolling. Adds that the traffic and environmental impacts of the interchange's current configuration have made it a regional transportation priority for the past several years.	Thank you for your comments on the LRTP. The Reconstruction of I-90/I-495 Interchange is included in the list of recommended projects in Amendment One to <i>Charting Progress to 2040</i> in the 2021 to 2025 time band.	No
Reconstruction of I-90/I-495 Interchange (Hopkinton)	Executive Director, CrossTown Connect	Scott Zadakis	Support	Generally supports a more efficient transportation system in the broader region and voices support for the Reconstruction of the I-90/I-495 Interchange project. This project will help with congestion.	Thank you for your comments on the LRTP. The Reconstruction of I-90/I-495 Interchange is included in the list of recommended projects in Amendment One to <i>Charting Progress to 2040</i> in the 2021 to 2025 time band.	No
Intersection Improvements at Route 126/135/MBTA & CSX Railroad (Framingham)	495/MetroWest Partnership	Paul Matthews, Executive Director; Jessica Strunkin, Deputy Director	Support	Support continued inclusion of the Intersection Improvements at Route 126/135/MBTA & CSX Railroad in the LRTP.	Thank you for your comments on the LRTP. The Intersection Improvements at Route 126/135/MBTA & CSX Railroad project continues to be included in the list of recommended projects in Amendment One to <i>Charting Progress to 2040</i> in the 2026 to 2030 time band.	No

Table A-A.1 (cont.)
Response to Public Comments on Draft Amendment One to the Long-Range Transportation Plan

Projects(s)/ Issue(s)	Affiliation	Name	Request/ Support/ Oppose	Comment	MPO Response	Change or Revision to LRTP
Bridge Replacement, Route 27 over Route 9 (Natick)	495/MetroWest Partnership	Paul Matthews, Executive Director; Jessica Strunkin, Deputy Director	Support	Support continued inclusion of the Route 27 over Route 9 Bridge Replacement in the LRTP.	Thank you for your comments on the LRTP. The Route 27 over Route 9 Bridge Replacement project continues to be included in the list of recommended projects in Amendment One to <i>Charting Progress to 2040</i> in the 2021 to 2025 time band.	No
Green Line Extension (Phase 2)		Senator Patricia D. Jehlen	Request	Requests an additional amendment to the LRTP that would program funding for Phase 2 of the Green Line Extension. States a Route 16 terminus will provide numerous opportunities for sustainable development in the region, as well as improve air quality and mobility. Notes that the site serves a number of environmental justice communities, and the project directly advances a number of the MPO's stated goals for the LRTP.	Thank you for your comments on the LRTP. The MPO voted to transfer the funding programmed in its LRTP, <i>Charting Progress to 2040</i> , and its 2016–2020 TIP for the Green Line Extension from College Avenue to Route 16 to the first phase of the Green Line project as part of Amendment Four of its 2016–2020 TIP. In doing so, the MPO recognized and incorporated into its record the commitment by the Secretary of MassDOT to file an Environmental Notification Form under the Massachusetts Environmental Protection Act for Phase 2 of the Green Line Extension by December 31, 2016, and after such filing to carry forward the MEPA review process to its conclusion, so long as Phase 1 of the Green Line Extension continues to go forward. The MPO will continue to monitor the progress of the Green Line Phase 1 project and the MEPA review process for Phase 2, and discuss the inclusion of Phase 2 as part of the next LRTP development.	No

**Table A-A.1 (cont.)
Response to Public Comments on Draft Amendment One to the Long-Range Transportation Plan**

Projects(s)/ Issue(s)	Affiliation	Name	Request/ Support/ Oppose	Comment	MPO Response	Change or Revision to LRTP
Green Line Extension (Phase 2)		Representative Christine P. Barber	Request	Requests an additional amendment to the LRTP that would program funding for Phase 2 of the Green Line Extension. States a Route 16 terminus will provide numerous opportunities for sustainable development in the region, as well as improve air quality and mobility. Notes that the site serves a number of environmental justice communities, and the project directly advances a number of the MPO's stated goals for the LRTP.	Thank you for your comments on the LRTP. The MPO voted to transfer the funding programmed in its LRTP, <i>Charting Progress to 2040</i> , and its 2016–2020 TIP for the Green Line Extension from College Avenue to Route 16 to the first phase of the Green Line project as part of Amendment Four of its 2016–2020 TIP. In doing so, the MPO recognized and incorporated into its record the commitment by the Secretary of MassDOT to file an Environmental Notification Form under the Massachusetts Environmental Protection Act for Phase 2 of the Green Line Extension by December 31, 2016, and after such filing to carry forward the MEPA review process to its conclusion, so long as Phase 1 of the Green Line Extension continues to go forward. The MPO will continue to monitor the progress of the Green Line Phase 1 project and the MEPA review process for Phase 2, and discuss the inclusion of Phase 2 as part of the next LRTP development.	No

**Table A-A.1 (cont.)
Response to Public Comments on Draft Amendment One to the Long-Range Transportation Plan**

Projects(s)/ Issue(s)	Affiliation	Name	Request/ Support/ Oppose	Comment	MPO Response	Change or Revision to LRTP
Green Line Extension (Phase 2)		Representative Sean Garballey	Request	Requests an additional amendment to the LRTP that would program funding for Phase 2 of the Green Line Extension. States a Route 16 terminus will provide numerous opportunities for sustainable development in the region, as well as improve air quality and mobility. Notes that the site serves a number of environmental justice communities, and the project directly advances a number of the MPO's stated goals for the LRTP.	Thank you for your comments on the LRTP. The MPO voted to transfer the funding programmed in its LRTP, <i>Charting Progress to 2040</i> , and its 2016–2020 TIP for the Green Line Extension from College Avenue to Route 16 to the first phase of the Green Line project as part of Amendment Four of its 2016–2020 TIP. In doing so, the MPO recognized and incorporated into its record the commitment by the Secretary of MassDOT to file an Environmental Notification Form under the Massachusetts Environmental Protection Act for Phase 2 of the Green Line Extension by December 31, 2016, and after such filing to carry forward the MEPA review process to its conclusion, so long as Phase 1 of the Green Line Extension continues to go forward. The MPO will continue to monitor the progress of the Green Line Phase 1 project and the MEPA review process for Phase 2, and discuss the inclusion of Phase 2 as part of the next LRTP development.	No

**Table A-A.1 (cont.)
Response to Public Comments on Draft Amendment One to the Long-Range Transportation Plan**

Projects(s)/ Issue(s)	Affiliation	Name	Request/ Support/ Oppose	Comment	MPO Response	Change or Revision to LRTP
Green Line Extension (Phase 2)		Representative Denise Provost	Request	Requests an additional amendment to the LRTP that would program funding for Phase 2 of the Green Line Extension. States a Route 16 terminus will provide numerous opportunities for sustainable development in the region, as well as improve air quality and mobility. Notes that the site serves a number of environmental justice communities, and the project directly advances a number of the MPO's stated goals for the LRTP.	Thank you for your comments on the LRTP. The MPO voted to transfer the funding programmed in its LRTP, <i>Charting Progress to 2040</i> , and its 2016–2020 TIP for the Green Line Extension from College Avenue to Route 16 to the first phase of the Green Line project as part of Amendment Four of its 2016–2020 TIP. In doing so, the MPO recognized and incorporated into its record the commitment by the Secretary of MassDOT to file an Environmental Notification Form under the Massachusetts Environmental Protection Act for Phase 2 of the Green Line Extension by December 31, 2016, and after such filing to carry forward the MEPA review process to its conclusion, so long as Phase 1 of the Green Line Extension continues to go forward. The MPO will continue to monitor the progress of the Green Line Phase 1 project and the MEPA review process for Phase 2, and discuss the inclusion of Phase 2 as part of the next LRTP development.	No

Table A-A.1 (cont.)
Response to Public Comments on Draft Amendment One to the Long-Range Transportation Plan

Projects(s)/ Issue(s)	Affiliation	Name	Request/ Support/ Oppose	Comment	MPO Response	Change or Revision to LRTP
Green Line Extension (Phase 2)		Representative Timothy J. Toomey	Request	Requests an additional amendment to the LRTP that would program funding for Phase 2 of the Green Line Extension. States a Route 16 terminus will provide numerous opportunities for sustainable development in the region, as well as improve air quality and mobility. Notes that the site serves a number of environmental justice communities, and the project directly advances a number of the MPO's stated goals for the LRTP.	Thank you for your comments on the LRTP. The MPO voted to transfer the funding programmed in its LRTP, <i>Charting Progress to 2040</i> , and its 2016–2020 TIP for the Green Line Extension from College Avenue to Route 16 to the first phase of the Green Line project as part of Amendment Four of its 2016–2020 TIP. In doing so, the MPO recognized and incorporated into its record the commitment by the Secretary of MassDOT to file an Environmental Notification Form under the Massachusetts Environmental Protection Act for Phase 2 of the Green Line Extension by December 31, 2016, and after such filing to carry forward the MEPA review process to its conclusion, so long as Phase 1 of the Green Line Extension continues to go forward. The MPO will continue to monitor the progress of the Green Line Phase 1 project and the MEPA review process for Phase 2, and discuss the inclusion of Phase 2 as part of the next LRTP development.	No

**Table A-A.1 (cont.)
Response to Public Comments on Draft Amendment One to the Long-Range Transportation Plan**

Projects(s)/ Issue(s)	Affiliation	Name	Request/ Support/ Oppose	Comment	MPO Response	Change or Revision to LRTP
Green Line Extension (Phase 2)	Resident, City of Somerville	Chris McCarthy	Oppose	Opposes reprogramming funding from Phase 2 of the Green Line Extension to Phase 1. States the Route 16 station is a critical part of GLX and will serve residents in the vicinity of Arlington, Medford, and Somerville. The area is currently poorly served by transit, and Phase 2 will mitigate vehicle traffic on Route 16 and improve air quality.	Thank you for your comments on the LRTP. The MPO voted to transfer the funding programmed in its LRTP, <i>Charting Progress to 2040</i> , and its 2016–2020 TIP for the Green Line Extension from College Avenue to Route 16 to the first phase of the Green Line project as part of Amendment Four of its 2016–2020 TIP. In doing so, the MPO recognized and incorporated into its record the commitment by the Secretary of MassDOT to file an Environmental Notification Form under the Massachusetts Environmental Protection Act for Phase 2 of the Green Line Extension by December 31, 2016, and after such filing to carry forward the MEPA review process to its conclusion, so long as Phase 1 of the Green Line Extension continues to go forward. The MPO will continue to monitor the progress of the Green Line Phase 1 project and the MEPA review process for Phase 2, and discuss the inclusion of Phase 2 as part of the next LRTP development.	No

Table A-A.1 (cont.)
Response to Public Comments on Draft Amendment One to the Long-Range Transportation Plan

Projects(s)/ Issue(s)	Affiliation	Name	Request/ Support/ Oppose	Comment	MPO Response	Change or Revision to LRTP
Green Line Extension (Phase 2)	Resident, City of Medford	John Roland Elliot	Oppose	Opposes reprogramming funding from Phase 2 of the Green Line Extension to the general Green Line Extension budget. States reprogramming funds will have an adverse impact on the prospect of fulfilling the Commonwealth's obligations to provide Green Line service to Medford Hillside. Adds that funding for transportation could be funded by the Legislature. The Route 16 terminus is the only practical conclusion to the Green Line Extension that will permit the project to achieve goals of boosting transit ridership, improving mobility and air quality, distributing transit services equitably, and promoting and facilitating sustainable development.	Thank you for your comments on the LRTP. The MPO voted to transfer the funding programmed in its LRTP, <i>Charting Progress to 2040</i> , and its 2016–2020 TIP for the Green Line Extension from College Avenue to Route 16 to the first phase of the Green Line project as part of Amendment Four of its 2016–2020 TIP. In doing so, the MPO recognized and incorporated into its record the commitment by the Secretary of MassDOT to file an Environmental Notification Form under the Massachusetts Environmental Protection Act for Phase 2 of the Green Line Extension by December 31, 2016, and after such filing to carry forward the MEPA review process to its conclusion, so long as Phase 1 of the Green Line Extension continues to go forward. The MPO will continue to monitor the progress of the Green Line Phase 1 project and the MEPA review process for Phase 2, and discuss the inclusion of Phase 2 as part of the next LRTP development.	No

**Table A-A.1 (cont.)
Response to Public Comments on Draft Amendment One to the Long-Range Transportation Plan**

Projects(s)/ Issue(s)	Affiliation	Name	Request/ Support/ Oppose	Comment	MPO Response	Change or Revision to LRTP
Green Line Extension (Phase 2)	Resident, City of Medford	Elisabeth Bayle	Oppose	Opposes reprogramming funding from Phase 2 of the Green Line Extension to Phase 1. Notes many years of advocacy for the project and that delaying the project further will affect thousands of residents. States that in addition to helping fulfill the Commonwealth's legal commitment to bring the Green Line Extension to Medford Hillside, Phase 2 will provide improvements in air quality, transit-oriented development, mobility, and health.	Thank you for your comments on the LRTP. The MPO voted to transfer the funding programmed in its LRTP, <i>Charting Progress to 2040</i> , and its 2016–2020 TIP for the Green Line Extension from College Avenue to Route 16 to the first phase of the Green Line project as part of Amendment Four of its 2016–2020 TIP. In doing so, the MPO recognized and incorporated into its record the commitment by the Secretary of MassDOT to file an Environmental Notification Form under the Massachusetts Environmental Protection Act for Phase 2 of the Green Line Extension by December 31, 2016, and after such filing to carry forward the MEPA review process to its conclusion, so long as Phase 1 of the Green Line Extension continues to go forward. The MPO will continue to monitor the progress of the Green Line Phase 1 project and the MEPA review process for Phase 2, and discuss the inclusion of Phase 2 as part of the next LRTP development.	No

**Table A-A.1 (cont.)
Response to Public Comments on Draft Amendment One to the Long-Range Transportation Plan**

Projects(s)/ Issue(s)	Affiliation	Name	Request/ Support/ Oppose	Comment	MPO Response	Change or Revision to LRTP
Ramp Construction on I-95 Northbound and Improvements on Canton Street/Dedham Street	Neponset Valley TMA	Karen Dumaine, Executive Director	Support	Supports updating the cost for ramp construction on I-95 Northbound and progressing with improvements to Canton Street and Dedham Street in Canton, Norwood, and Westwood. States the I-95/I-93 Interchange in Canton is a pivotal project for keeping the Neponset Valley region competitive and reducing traffic congestion. The project is also critical to achieving the full economic development potential of the University Station project. Adds that the project will address long-held safety concerns.	Thank you for your comments on the LRTP. The increased funding for the Ramp Construction on I-95 Northbound and Improvements on Canton Street/Dedham Street is included in the list of recommended projects in Amendment One to <i>Charting Progress to 2040</i> . The increased funding appears in the 2016 to 2020 time band.	No
Newburyport/ Rockport Commuter Rail Line	Resident, Town of Hamilton	Sarah Lauderdale	Request	Requests an additional inbound train between 5:01 pm and 7:23 pm on weekdays on the Newburyport/Rockport Commuter Rail Line.	Thank you for your comments on the LRTP. Through the development of its vision, goals, and objectives, the MPO emphasized that transit is an important element to mobility in the MPO region. This comment will be submitted to the MBTA Service Planning Department for their evaluation in adding service during this time period.	No

Table A-A.1(cont.)
Response to Public Comments on Draft Amendment One to the Long-Range Transportation Plan

Projects(s)/ Issue(s)	Affiliation	Name	Request/ Support/ Oppose	Comment	MPO Response	Change or Revision to LRTP
Public Transit	Resident, City of Boston (South Boston)	Louise Baxter	Request	Requests a focus on public transit in the LRTP, noting increasing population and the cost of vehicular travel.	Thank you for your comments on the LRTP. Through the development of its vision, goals, and objectives, the MPO emphasized that transit is an important element to mobility in the MPO region. MassDOT is in the process of developing Focus40, the MBTA’s long-range capital planning document defining a 25-year vision for public transportation. This information was not available for the MPO to use in the development of this LRTP Amendment. The MPO acknowledges that Focus40 will be an important input in programming future transit dollars, and chose to leave 50% of its target funds unallocated in the 2030 to 2040 time bands while awaiting input on Focus40 and other long-range transportation planning documents. The MPO will consider your comments in the development of future LRTPs. Your comment will also be submitted to MassDOT and the MBTA for their consideration.	No

**Table A-A.1 (cont.)
Response to Public Comments on Draft Amendment One to the Long-Range Transportation Plan**

Projects(s)/ Issue(s)	Affiliation	Name	Request/ Support/ Oppose	Comment	MPO Response	Change or Revision to LRTP
Public Transit	Executive Director, CrossTown Connect	Scott Zadakis	Support	Supports modernization and increasing the reliability and capacity of the public transportation system.	Thank you for your comments on the LRTP. Through the development of its vision, goals, and objectives, the MPO emphasized that transit is an important element to mobility in the MPO region. MassDOT is in the process of developing Focus40, the MBTA's long-range capital planning document defining a 25-year vision for public transportation. This information was not available for the MPO to use in the development of this LRTP Amendment. The MPO acknowledges that Focus40 will be an important input in programming future transit dollars, and chose to leave 50% of its target funds unallocated in the 2030 to 2040 time bands while awaiting input on the Focus40 and other long-range transportation planning documents. The MPO will consider your comments in the development of future LRTPs. Your comment will also be submitted to MassDOT and the MBTA for their consideration.	No

Table A-A.1 (cont.)
Response to Public Comments on Draft Amendment One to the Long-Range Transportation Plan

Projects(s)/ Issue(s)	Affiliation	Name	Request/ Support/ Oppose	Comment	MPO Response	Change or Revision to LRTP
Operations & Management Funding	Executive Director, CrossTown Connect	Scott Zadakis	Support/ Request	<p>Would like to applaud the MPO for the change in tack to reprioritize and fund operations and management projects that support bicycle and pedestrian travel on a more equitable level with large highway projects. Also happy to see increased funding for Complete Street projects.</p> <p>Considering this, they are troubled that the Amendment cuts several million dollars from the Bicycle and Pedestrian program. Would also like to see an increase in funding for the Community Transportation/Parking/Clean Air and Mobility program.</p> <p>Programming only 2% of spending on this program shows a lack of emphasis on these types of projects.</p>	<p>Thank you for your comment on the LRTP. In developing the LRTP in 2015, the MPO chose to emphasize capacity management through low-cost investments such as bicycle and pedestrian projects, and chose to initiate a new program including Community Transportation combined with Parking and Clean Air and Mobility. At that time, knowing that projects had been programmed through 2020, the MPO chose to begin to implement these programs beginning in the 2021 to 2025 time band. The assumptions in the outer time bands are that no more than 50% of funding would go to major infrastructure projects, with the remaining divided between the operations and management projects and programs. Beginning in 2021, it was assumed that of the remaining unprogrammed funding, 58% would be programmed to Complete Streets, 28% to intersection improvements, 10% to bicycle and pedestrian projects, and 4% to the new Community Transportation/Parking/Clean Air and Mobility program. This is an estimate for future funding that allows the municipalities to plan for the future, knowing that the MPO has a commitment to these types of projects. As projects are submitted for funding in the TIP, each project will be evaluated using the goals and objectives set in the LRTP.</p>	No

Table A-A.1 (cont.)
Response to Public Comments on Draft Amendment One to the Long-Range Transportation Plan

Projects(s)/ Issue(s)	Affiliation	Name	Request/ Support/ Oppose	Comment	MPO Response	Change or Revision to LRTP
Needs Assessment		Senator Joan B. Lovely	Support/ Request	<p>Supports identification of future areas of need in the 2nd Essex District in the existing Needs Assessment, including:</p> <ul style="list-style-type: none"> - HSIP crash clusters in downtown areas of Salem and Peabody - HSIP bicycle clusters in Beverly and Salem - Noting that Peabody, Beverly, and Salem have “transit capacity needs” - Route 128 at Lowell Street, Exit 26, in Peabody identified as a “priority congested location” - Route 128 at Route 114 identified as one of the “top 25 highway crash clusters” - Washington Street in Salem identified as having “multiple safety needs” <p>Requests the MPO prioritize these areas and provide financial support to advance these improvements.</p>	<p>Thank you for your comments on the LRTP. The information in the Needs Assessment is used in the development of the MPO’s Unified Planning Work Program to identify studies to be conducted each year. For project and program funding, this information is used in evaluating and prioritizing projects that are submitted by the municipalities as part of the TIP and LRTP. The MPO will continue to evaluate projects, programs, and study ideas as they are submitted by the municipalities requesting funding.</p>	No

Table A-A.1(cont.)
Response to Public Comments on Draft Amendment One to the Long-Range Transportation Plan

Projects(s)/ Issue(s)	Affiliation	Name	Request/ Support/ Oppose	Comment	MPO Response	Change or Revision to LRTP
Project Identification		Senator Joan B. Lovely	Request	Requests that the MPO be aware of potential projects in the communities of Beverly, Danvers, Peabody, Salem, and Topsfield. States that infrastructure needs in these communities are far greater than the resources available to address them. Potential projects include: - Improvements to Boston Street (Salem) - Improvements to Bridge Street (Beverly) Notes significant activity in the communities of Peabody, Danvers, and Topsfield.	Thank you for your comments on the LRTP. The MPO evaluates projects that are submitted by the municipalities using its evaluation criteria based on its adopted goals and objectives. The projects are then prioritized for funding through the LRTP and the TIP. The Boston Street and Bridge Street projects are included in the TIP's Universe of Projects.	No
Project Clarification	Planning Director, Town of Wellesley	Michael Zehner	Request	Requests that the Route 9 Corridor Enhancements project referenced in Appendix B of the LRTP be revised to read the Route 9 Corridor Reconstruction project, which is MassDOT project 607340.	MPO staff revised the project name of the Wellesley project 607340 in the Universe of Projects list in Appendix B of the LRTP from "Route 9 Corridor Enhancements" to "Route 9 Corridor Reconstruction."	Yes

GLX = Green Line Extension
 HSIP = Highway Safety Improvement Program
 LRTP = Long-Range Transportation Plan
 MassDOT = Massachusetts Department of Transportation
 MBTA = Massachusetts Bay Transportation Authority
 MEPA = Massachusetts Environmental Policy Act
 MPO = Metropolitan Planning Organization
 TIP = Transportation Improvement Program
 TMA = Transportation Management Association



7

TRANSPORTATION EQUITY

THE TRANSPORTATION EQUITY PROGRAM

The purpose of the MPO's transportation equity (TE) program is to ensure that populations protected under various federal and state civil rights statutes, executive orders, and regulations (TE populations) are provided equal opportunity to participate fully in the MPO's transportation planning and decision-making process. The program also ensures that TE populations share equitably in the benefits and burdens of past, present, and planned future transportation projects, programs, and service. The TE program includes three types of activities: 1) outreach to TE populations; 2) systematic consideration of equity in the planning and programming process; and 3) analyses to identify TE populations and their transportation needs, and to estimate the equity impacts of MPO funding decisions.

Environmental Justice (EJ) Executive Order 12898 of February 11, 1994 laid the groundwork for the MPO's TE program. This executive order required each federal agency to achieve environmental justice by identifying and addressing any disproportionately high adverse human health or environmental effects—including interrelated social and economic effects—of its programs, policies, and activities on minority or low-income populations. The EJ executive order was intended not to create new mandates, but to encourage implementation of existing statutes, such as Title VI of the Civil Rights Act of 1964, which states that, "No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance." Executive Order 13166 of August 11, 2000 extended Title VI national origin protections to individuals with limited English proficiency (LEP). As recipients of federal funding, MPOs are subject to EJ and Title VI requirements.

Because the MPO's TE program grew out of EJ requirements, initially it was designed to serve minority and low-income populations (EJ populations). More recently, in response to Federal Transit Administration (FTA) and Federal Highway Administration (FHWA) LEP requirements and the extension of protections based on age, sex, and disability through the FHWA Title VI/Nondiscrimination program, the MPO is assessing how to expand its TE program to consider systematically the needs of additional protected populations.

TRANSPORTATION EQUITY OUTREACH FOR THE LRTP

TE outreach is an integral part of the MPO's overall public participation program designed specifically to communicate with low-income and minority residents, the elderly, persons with disabilities, and persons with LEP. The purpose of TE outreach is to identify transportation needs of specific populations served by the TE program and promote their involvement in the planning process. Through this outreach, the MPO hopes to develop relationships that will heighten awareness and sow seeds of mutual understanding, appreciation, and trust to encourage broader participation of TE populations.

Outreach targets both individuals and organizations representing the interests of TE populations, such as social-service organizations, community-development corporations, regional employment boards, civic groups, business and labor organizations, transportation advocates, environmental groups, EJ and civil-rights groups, and the state's regional coordinating councils (RCCs)—recently formed through the Statewide Mobility Management Program to coordinate human-service transportation services.

The MPO maintains an email list of TE contacts to provide them general information about the MPO and its planning processes, and give them information about topics and events of specific interest to the communities served by the TE program. During the past year and a half, staff has worked to increase significantly the number of valid contacts on this list.

Initial TE outreach for the LRTP began in fall 2014 with a series of public meetings to solicit comments on the MPO's revised Public Participation Plan (P3) and inform members of the public about the MPO's TE program. These meetings were held in areas with high concentrations of minority, low-income, and LEP residents, including Framingham, Lynn, Quincy, and the Fields Corner neighborhood of Dorchester in Boston. The focus of these meetings was to provide information about and solicit input on the P3, which describes the public involvement process for the LRTP and other major MPO documents and activities. These meetings set the stage for specific LRTP public engagement, as the P3 provides information about the LRTP development schedule and the types and timing of opportunities for participation. Subsequent email notifications to the TE contacts kept them apprised of all public meetings for the LRTP and MPO-sponsored meetings at which the LRTP was discussed. Chapter 2 (Public Participation - Public Outreach Methods section) discusses the public meetings and other outreach opportunities specifically for this LRTP.

Notices for all MPO-sponsored public meetings are routinely translated into the three languages, other than English, that are most frequently spoken in the MPO area: Spanish, Portuguese, and Chinese. P3 public meeting notices also were translated into Vietnamese because the Fields Corner meeting was held at the VietAID Center as part of the MPO's effort to forge closer ties with specific organizations as a way of facilitating communication with their constituent populations. Although the TE email list is good for reaching many groups quickly, MPO staff sees personal contact as a more effective way to foster meaningful engagement in the future.

TRANSPORTATION EQUITY AND THE PLANNING PROCESS

The MPO systematically integrates equity concerns into the transportation planning process in a number of ways. At the highest level, equity is part of the MPO's central vision statement, and therefore is reflected in the MPO's goals and objectives. Equity concerns are also integrated by considering feedback from all outreach activities, including TE outreach, and the ongoing public involvement that routinely occurs during development of the LRTP, TIP, UPWP, and other MPO studies.

In addition, equity is one of the factors the MPO considers when selecting studies for the UPWP, and it is integrated into the project selection criteria for the LRTP and TIP. Finally, as discussed below, staff performs equity analyses on the recommended projects in the draft LRTP to evaluate the effects on access, mobility, congestion, and air quality for TE populations, and determine whether the recommendations should be changed before a final LRTP is adopted.

TRANSPORTATION EQUITY ANALYSES

Demographic Analyses

The MPO analyzes demographic data to identify the geographic locations and concentration of protected populations. This is done to understand their transportation needs relative to existing and planned infrastructure, and to pinpoint areas where public outreach could be most beneficial and fruitful. For this LRTP, the analysis of benefits and burdens (equity analysis) was based on minority and low-income populations, as defined using federal guidance, census data, and geography.

GEOGRAPHIC LEVEL OF ANALYSIS

The MPO region is divided into 1,943 Transportation Analysis Zones (TAZs) for the purposes of forecasting travel behavior using the MPO's regional travel demand model set. A TAZ is a unit of geography that is defined based on demographic information—population, employment, and housing—and the numbers of trips generated in, and attracted to, it. The full geographic area covered by the MPO's travel demand model set, which also includes municipalities adjacent to the MPO's 101 cities and towns, comprises 2,727 TAZs.

Using TAZ geography and thresholds established through federal guidance, the MPO has developed demographic profiles that identify areas with concentrations of minority and low-income populations for analyzing benefits and burdens. The MPO has also developed demographic profiles for areas with concentrations of LEP residents, the elderly, and people with disabilities. However, the MPO has yet to develop thresholds for these populations to identify specific areas for the purposes of performing an equity analysis.

MINORITY AND LOW-INCOME THRESHOLDS

Minority Populations

The MPO uses the US Census Bureau's racial and ethnic minority group definitions to determine minority status in the region. The census defines non-minority as persons who identify as white and not Hispanic or Latino. Minorities include:

- American Indian/Alaskan Native
- Asian/Native Hawaiian/Other Pacific Islander
- Black/African American
- Another race or multiple races
- Hispanic/Latino of any race

The FTA Title VI circular (FTA C 4702.1B) defines a predominantly minority area as one where the proportion of minority persons residing in that area exceeds the average proportion of minority persons in the MPO region. Using this definition, a minority TAZ is one in which the minority population is greater than 27.8 percent.

Low-Income Populations

The FTA Title VI circular suggests that a low-income person be defined as one whose median household income is at or below the Department of Health and Human Services' poverty guidelines. However, the circular allows MPOs to develop their own definitions of low-income, as long as their thresholds meet or exceed the federal definition of low-income. The Boston Region MPO defines a low-income person as an individual living in a household with a median income that is less than or equal to 60 percent of the median household income in the MPO region. The MPO chose this threshold, which is higher than federal poverty guidelines, because the cost of living in the MPO region is higher than the national average.

According to the 2010 census, the median MPO household income was \$70,829. Therefore, using the MPO's definition, a low-income TAZ is one in which the average median household income is less than or equal to \$42,497.

Equity Analysis Zones

The MPO uses the above definitions to identify equity analysis zones—TAZs that meet the threshold for minority and/or low-income—as the basis for its analysis of the benefits and burdens of transportation programs and projects. Figure 7.1 shows the MPO's equity analysis zones, of which 11 percent are low-income TAZs, 33 percent are minority, and 10 percent are both low-income and minority. Also included are the locations of major infrastructure projects recommended in this LRTP. Investments like grounding McGrath

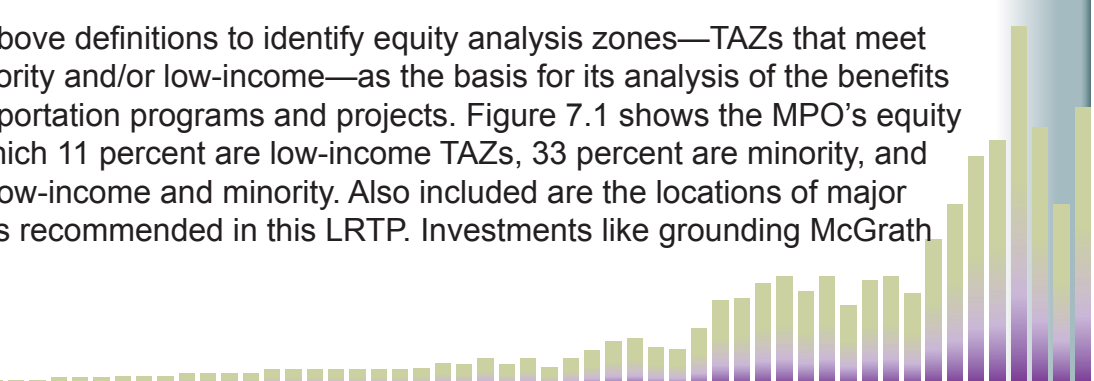
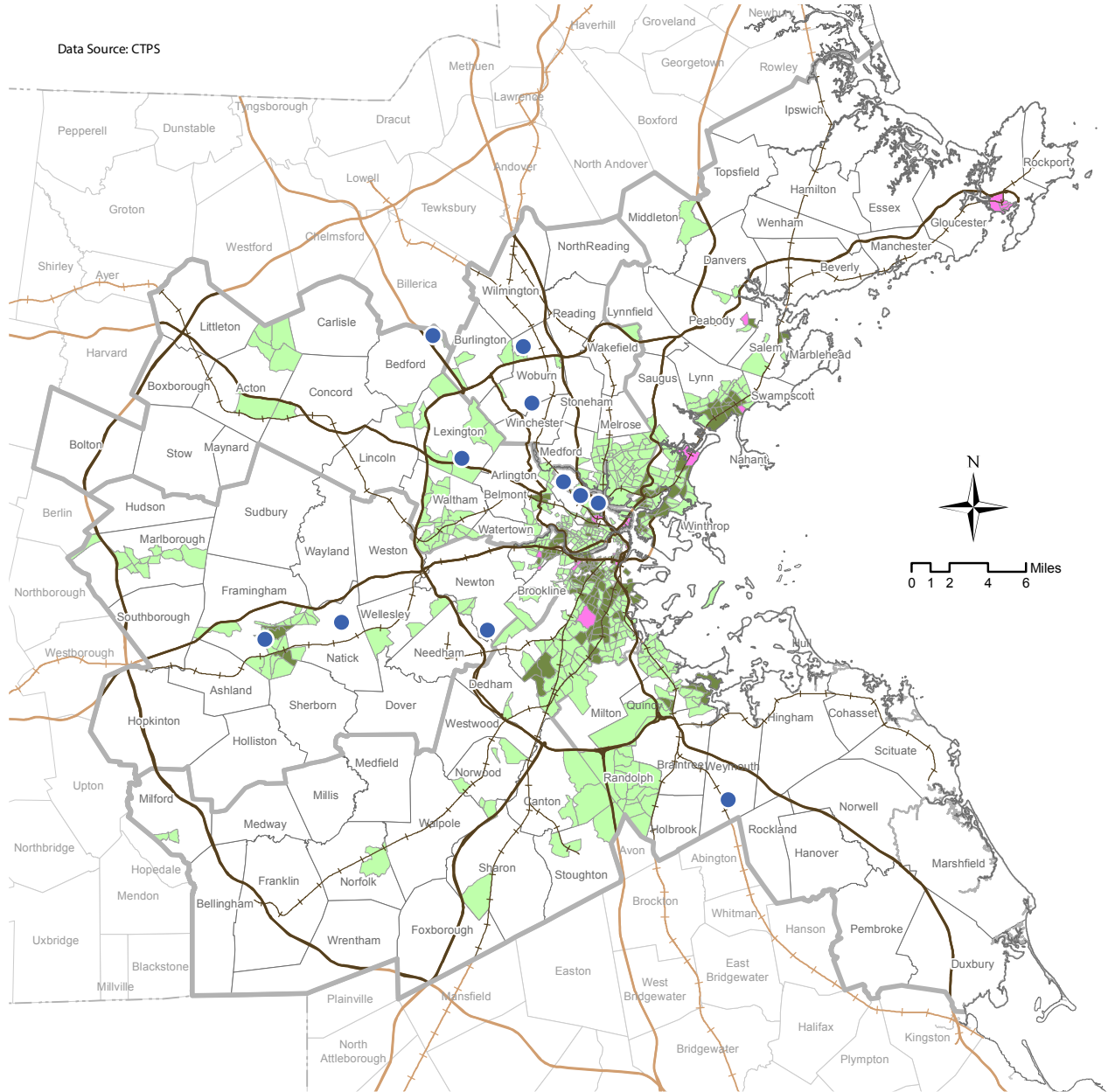


FIGURE 7.1
Equity Analysis Zones



Transportation Analysis Zones (TAZs) That Meet Equity Analysis Zone Criteria*

- Not minority or low-income
- Minority zone
- Low-income zone
- Both low-income and minority
- Plan Project

***Criteria for Equity Analysis Zones under Title VI (2010 Data)**

A TAZ in which the median household income in 2010 was equal to or less than 60% of the MPO median of \$70,829 (\$42,497) or in which the 2010 population was more than 27.8% minority.

Highway in Somerville, reconstructing Rutherford Avenue in Boston, and improving Route 126 and Route 135 in Framingham will address MPO-identified transportation issues for equity populations. Grounding McGrath will help reconnect two transportation equity areas. Reconstructing Rutherford Avenue will improve community access to the Orange Line and bus terminal and will enhance bus operations. Improving Downtown Framingham will enhance MetroWest Regional Transit Authority service for many low-income and minority riders.

For the purposes of analyzing the transportation system in 2040, the MPO assumed that the distributions of equity analyses would remain unchanged, and that the population growth rate for these areas would be the same as that forecast by MAPC for the overall population of the region. Based on these demographic projections, staff used the regional travel demand model set to forecast the unique distributions of trip flows for the differing transportation networks in the 2040 No-Build and Build alternatives.

Measuring Impacts

To determine whether the benefits and burdens of projects, programs, and services are equitably distributed, the MPO has proposed a policy to measure the following types of disparities, in keeping with federal requirements:

- Disparate impact: a facially neutral policy or practice that disproportionately affects members of a group identified by race, color, or national origin, where the policy or practice lacks a substantial legitimate justification and where there exists one or more alternatives that would serve the same legitimate objectives, but with less disproportionate effects on the basis, of race, color, or national origin.
- Disproportionate burden: a neutral policy or practice that disproportionately affects low-income populations more than non-low income populations. A finding of disproportionate burden requires evaluation of alternatives and mitigation of burdens where practicable.

The MPO's proposed policy sets thresholds to distinguish an acceptable level of impact from a level of impact that has a meaningful effect for the factors analyzed. For LRTP equity analyses that are completed using the regional travel demand model set, the MPO has proposed the following thresholds:

- A disparate burden would exist if minority TAZs were projected to sustain more than 20 percent additional burden than nonminority TAZs. Therefore, a projected burden would be found if the analysis results for minority TAZs were more than 1.2 times the projected burden for nonminority TAZs.
- A disproportionate burden would exist if low-income TAZs were projected to sustain more than 20 percent additional burden than non-low-income TAZs. Therefore, a projected burden would be found if the analysis results for low-income TAZs were more than 1.2 times the projected burden for non-low-income TAZs.

- A disparate benefit would exist if minority TAZs were projected to receive less than 80 percent of the benefit that nonminority TAZs receive. Therefore, a projected benefit would be found if the analysis results for minority TAZs were more than 0.80 times the projected burden for nonminority TAZs.
- A disproportionate benefit would exist if low-income TAZs were projected to receive less than 80 percent of the benefits that non-low-income TAZs receive. Therefore, a projected benefit would be found if the analysis results for low-income TAZs were less than 0.80 times the projected burden for nonminority TAZs.

Staff proposed a 20 percent threshold based on the belief that a 10 percent differential would be meaningful, plus the model's 10 percent margin of error. The full disparate impact/disproportionate burden policy will undergo public review and comment before it is adopted by the MPO.

Equity Analysis Methods

MPO staff used the travel demand model to perform two types of equity analyses (discussed below) each of which calculated differences between the No-Build and Build¹ alternatives for equity analysis zones (minority TAZs and low-income TAZs) and the difference for non-equity analysis zones (nonminority TAZs and non-low-income TAZs). For each analysis, the rate of change from the No-Build to the Build alternatives was compared for minority versus nonminority TAZs to determine whether there was a disparate impact and for low- versus non-low-income TAZs to determine whether there was a disproportionate burden.

For the 2040 Build alternative, only major infrastructure projects (those on the recommended list of projects discussed in Chapter 5 and shown in Figure 7.1) were modeled. Specific projects in the O&M-type investment programs are not identified in the LRTP, as they will be selected through the TIP programming process. Because most bike and pedestrian improvements will be part of the O&M-type investment programs, they were not captured in the LRTP equity analysis. However, the TIP project-selection process seeks to minimize burdens and maximize benefits for protected populations, and many projects in the TIP go through the National Environmental Policy Act (NEPA) process, which includes an EJ evaluation.

ACCESSIBILITY ANALYSIS

For the purposes of this analysis, accessibility was based on both the ability to reach desired destinations and the ease of doing so. This analysis investigated the number of employment opportunities, health care facilities, and higher education facilities that could be reached from equity analysis zones and non-equity analysis zones along with average

¹ The No-Build alternative includes projects that are currently under construction, advertised for construction, or programmed in the first year of the 2015-2018 TIP. The Build alternative includes the projects that are recommended in this LRTP.

transit and highway travel times to these destinations. Analysis of transit travel times included destinations within a 40-minute transit trip, while analysis of highway travel times included destinations within a 20-minute auto trip.

Staff used the following factors to examine differences in accessibility between the 2040 No-Build network and the 2040 Build network:

- Average travel time to industrial, retail, and service jobs within a 40-minute transit trip and a 20-minute auto trip
- Number of industrial, retail, and service jobs within a 40-minute transit trip and a 20-minute auto trip
- Average travel time to hospitals, weighted by number of beds, within a 40-minute transit trip and a 20-minute auto trip
- Number of hospitals, weighted by number of beds, within a 40-minute transit trip and a 20-minute auto trip
- Average travel time to two- and four-year institutions of higher education, weighted by enrollment, within a 40-minute transit trip and a 20-minute auto trip
- Number of two- and four-year institutions of higher education, weighted by enrollment, within a 40-minute transit trip and a 20-minute auto trip

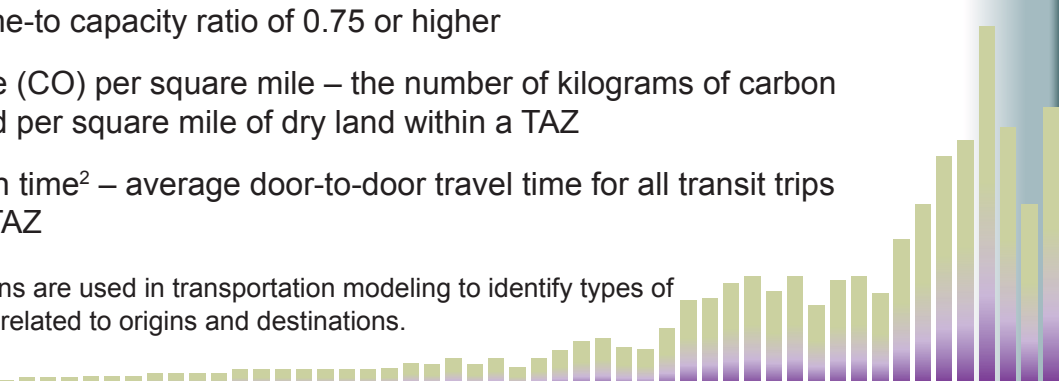
MOBILITY, CONGESTION, AND AIR-QUALITY ANALYSIS

For the purposes of this analysis, mobility is defined as the ability to move from place to place, and congestion is defined as the level at which transportation system performance becomes unacceptable because of traffic congestion. The MPO's mobility and congestion analysis focused on the average door-to-door travel time and average vehicle-miles traveled (VMT) under congested conditions. The air quality-analysis focused on carbon monoxide, a pollutant that results primarily from incomplete combustion of fossil fuels and accumulates in localized areas creating hot spots that negatively affect human health.

Staff used the following mobility, congestion, and air-quality factors in the equity analysis:

- VMT per square mile – number of vehicle-miles traveled (VMT) per square mile of dry land within a TAZ
- Congested VMT – the volume of vehicle-miles traveled within a TAZ on highway links with a volume-to capacity ratio of 0.75 or higher
- Carbon monoxide (CO) per square mile – the number of kilograms of carbon monoxide emitted per square mile of dry land within a TAZ
- Transit production time² – average door-to-door travel time for all transit trips produced in the TAZ

² Productions and attractions are used in transportation modeling to identify types of trip ends and are loosely related to origins and destinations.



- Highway production time – average door-to-door travel time for all highway trips produced in the TAZ
- Transit attraction time – average door-to-door travel time for all transit trips attracted to the TAZ
- Highway attraction time – average door-to-door travel time for all highway trips attracted to the TAZ

TRANSPORTATION EQUITY ANALYSIS RESULTS

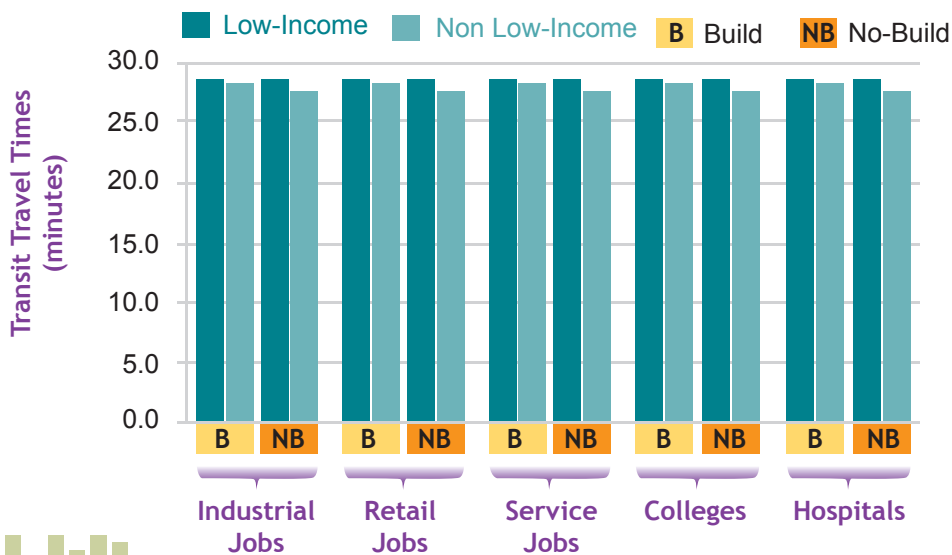
Accessibility Results

The accessibility analysis first compared the change in transit and highway travel times to various types of employment between the 2040 No-Build and Build alternatives for low-income, non-low-income, minority, and nonminority TAZs, respectively.

The second part of the accessibility analysis compared the ratio of the change from the 2040 No-Build to the Build alternative for low-income versus non-low-income TAZs to determine whether there was a disproportionate burden, and for minority versus nonminority TAZs to determine whether there was a disparate impact for each type of employment evaluated. The results of the accessibility analyses are illustrated in the following figures and tables.

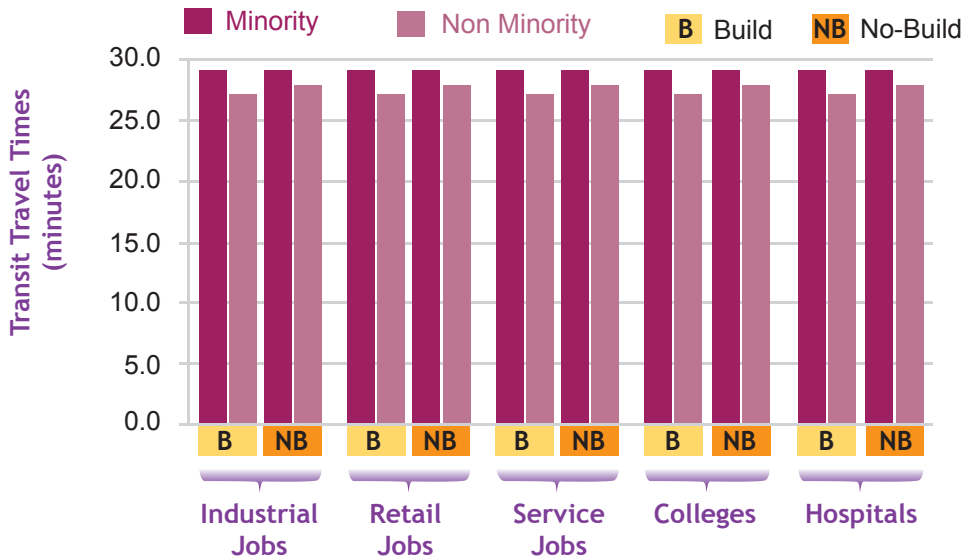
Figures 7.2 and 7.3 show that average transit travel times to employment destinations are lower for non-low-income and non-minority TAZs than for low-income and minority TAZs, respectively; but the changes for each type of equity analysis \varnothing ne between the 2040 No-Build and Build alternatives are not statistically significant.

FIGURE 7.2
Average Transit Travel Times to Destinations for Equity Analysis Zones (Low-Income) in the 2040 No-Build and 2040 Build Networks



Source: Central Transportation Planning Agency.

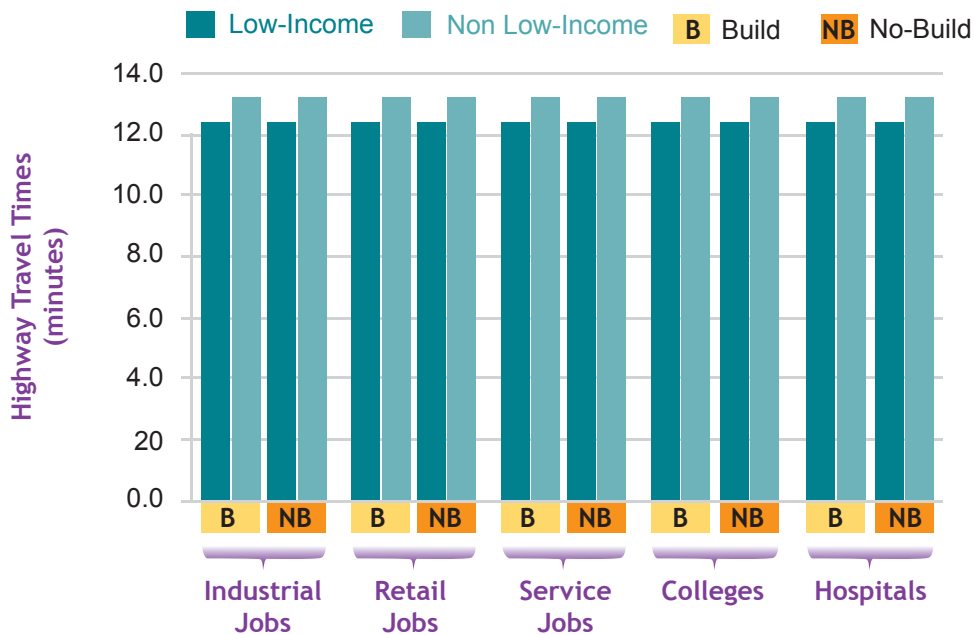
FIGURE 7.3
Average Transit Travel Times to Destinations for Equity Analysis Zones (Minority) in the 2040 No-Build and 2040 Build Networks



Source: Central Transportation Planning Agency.

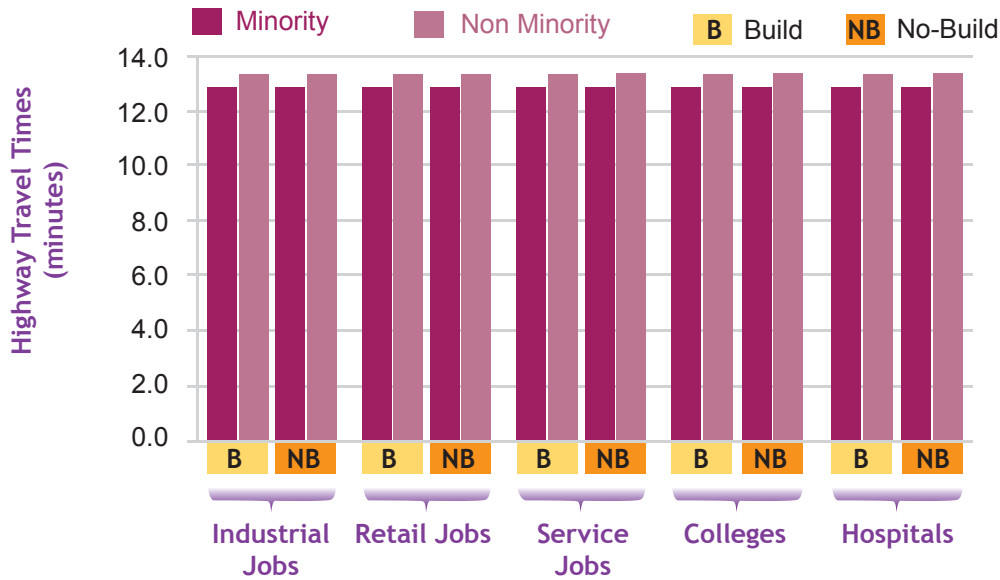
Figures 7.4 and 7.5 show that average highway travel times to employment destinations are slightly lower for low-income and minority TAZs than for non-low-income and non-minority TAZs, respectively, but the changes for each type of equity analysis zone between the 2040 No-Build and Build alternatives are not statistically significant.

FIGURE 7.4
Average Highway Travel Times to Destinations for Equity Analysis Zones (Low-Income) in the 2040 No-Build and 2040 Build Networks



Source: Central Transportation Planning Agency.

FIGURE 7.5
Average Highway Travel Times to Destinations for Equity Analysis Zones (Minority) in the 2040 No-Build and 2040 Build Networks



Source: Central Transportation Planning Agency.

Tables 7.1 and 7.2 show that there are neither disproportionate burdens nor disparate impacts in average transit and highway travel times to employment destinations, as all differences fall within the MPO’s disproportionate burden/disparate impact threshold.

TABLE 7.1
Benefits and Burdens Analysis for Average Transit Travel Times to Employment Destination Types

	Industrial			Retail			Service		
	No-Build	Build	Pct. Travel-Time Increase	No-Build	Build	Pct. Travel-Time Increase	No-Build	Build	Pct. Travel-Time Increase ^a
Population									
Low-Income	28.7	28.7	0.0%	28.7	28.7	0.0%	28.7	28.7	0.0%
Non Low-Income	28.3	28.3	0.0%	28.3	28.3	0.0%	28.3	28.3	0.0%
Ratio	--	--	0.00	--	--	0.00	--	--	0.00
Burden Threshold	--	--	--	--	--	--	--	--	>1.20
Result: No Disproportionate Burden									
Population									
Minority	29.1	29.1	0.0%	29.1	29.1	0.0%	29.1	29.1	0.0%
Non-Minority	28.0	28.0	0.0%	28.0	28.0	0.0%	28.0	28.0	0.0%
Ratio	--	--	0.00	--	--	0.00	--	--	0.00
Burden Threshold	--	--	--	--	--	--	--	--	>1.20
Result: No Disparate Impact									

^aAll changes are within the model’s margin of error.

Source: Central Transportation Planning Agency.

TABLE 7.2
Benefits and Burdens Analysis for Average Highway Travel Times to
Employment Destination Types

	Pct. Travel-Time Increase			Pct. Travel-Time Increase			Pct. Travel-Time Increase ^a		
	No-Build	Build		No-Build	Build		No-Build	Build	
	Industrial			Retail			Service		
Population									
Low-Income	12.4	12.4	0.0%	12.4	12.4	0.0%	12.4	12.4	0.0%
Non Low-Income	13.2	13.2	0.0%	13.2	13.2	0.0%	13.2	13.2	0.0%
Ratio	--	--	0.00	--	--	0.00	--	--	0.00
Burden Threshold	--	--	--	--	--	--	--	--	>1.20
Result: No Disproportionate Burden									
Population									
Minority	12.9	12.9	0.0%	12.9	12.9	0.0%	12.9	12.9	0.0%
Non-Minority	13.3	13.3	0.0%	13.3	13.3	0.0%	13.3	13.3	0.0%
Ratio	--	--	0.00	--	--	0.00	--	--	0.00
Burden Threshold	--	--	--	--	--	--	--	--	>1.20
Result: No Disparate Impact									

^aAll changes are within the model's margin of error
Source: Central Transportation Planning Agency.

Mobility and Congestion Results

The mobility and congestion analyses first compared the change in average door-to-door travel time, congested VMT, and VMT per square mile for all transit and highway trips produced in, or attracted to, equity analysis zones between the 2040 No-Build and Build alternatives for low-income, non-low-income, minority, and nonminority TAZs, respectively.

The second part of the mobility and congestion analysis compared the ratio of the change from the 2040 No-Build to the Build alternatives for low- versus non-low-income TAZs to determine whether there was a disproportionate burden, and for minority versus nonminority TAZs to determine whether there was a disparate impact for each of the factors evaluated. The results of the mobility and congestion analyses are illustrated in the following figures and tables.

Figures 7.6 and 7.7 show that average transit and highway travel times for attractions and productions are shorter for low-income and minority TAZs than for non-low-income and non-minority TAZs, respectively, in both alternatives; but the changes for each type of equity analysis zone between the 2040 No-Build and Build alternatives are not statistically significant.

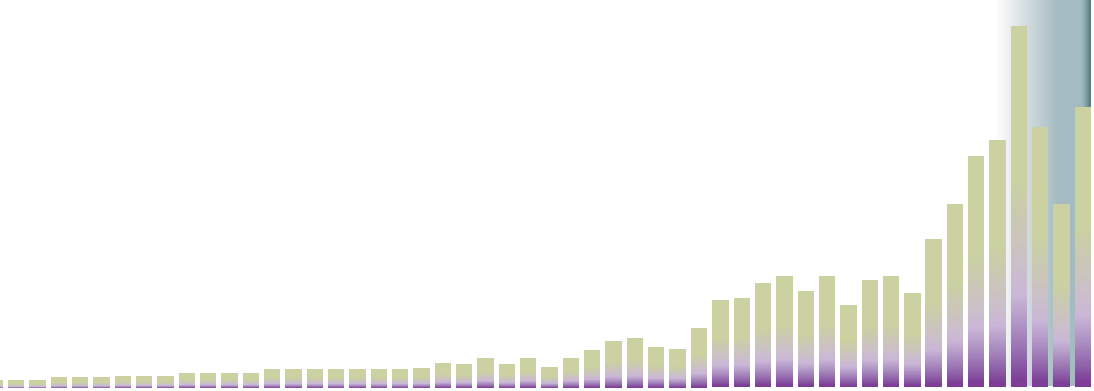
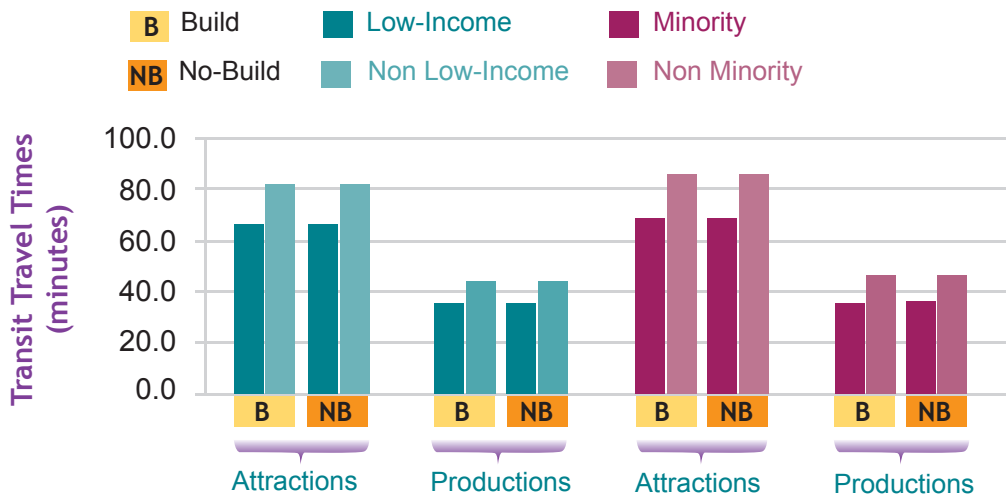
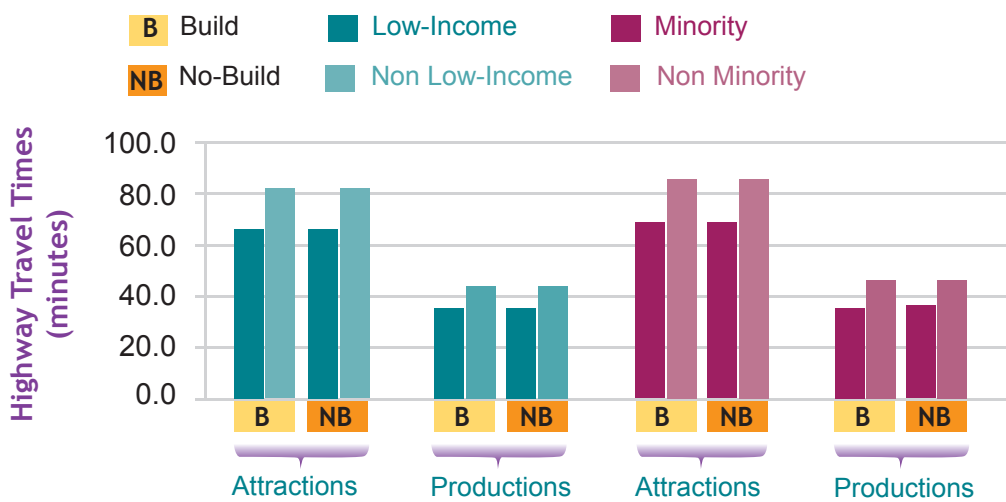


FIGURE 7.6
Average Transit Travel Times for Equity Analysis Zones in the 2040 No-Build and 2040 Build Networks



Source: Central Transportation Planning Agency.

FIGURE 7.7
Average Highway Travel Times for Equity Analysis Zones in the 2040 No-Build and 2040 Build Networks



Source: Central Transportation Planning Agency.

Tables 7.3 and 7.4 show that there are neither disproportionate burdens nor disparate impacts in average transit and highway travel times.

TABLE 7.3
Benefits and Burdens Analysis for Average Transit Travel Time

	No-Build	Build	No-Build	Build	Percentage Travel-Time Increase ^a
	Attractions		Productions		
Population					
Low-Income	63.8	65.0	34.3	35.0	1.8%
Non Low-Income	74.0	75.2	39.8	40.5	1.6%
Ratio					1.14
Burden Threshold					>1.20
Result: No Disproportionate Burden					
Population					
Minority	66.4	67.6	35.8	36.4	1.8%
Non-Minority	76.1	77.3	41.0	41.6	1.6%
Ratio					1.15
Burden Threshold					>1.20
Result: No Disparate Impact					

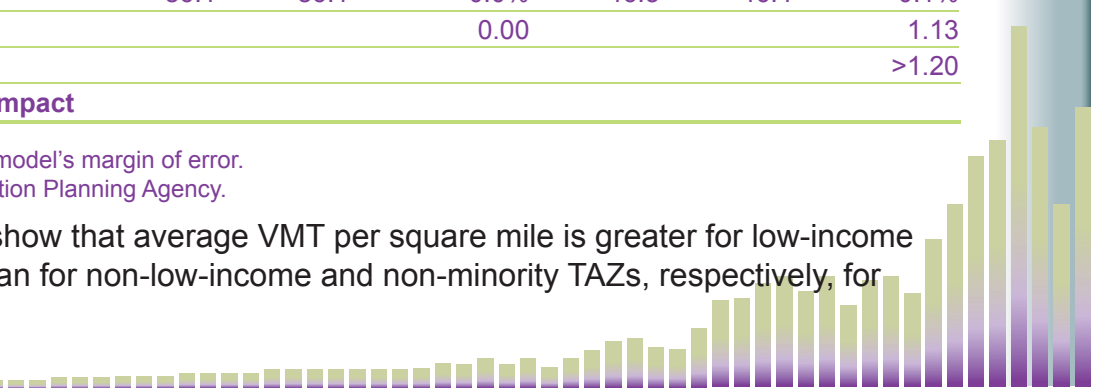
^aAll changes are within the model's margin of error.
Source: Central Transportation Planning Agency.

TABLE 7.4
Benefits and Burdens Analysis for Average Highway Travel Time

	No-Build	Build	Percentage Travel-Time Increase	No-Build	Build	Percentage Travel-Time Increase ^a
	Attractions			Productions		
Population						
Low-Income	66.4	66.5	0.0%	35.7	35.8	0.0%
Non Low-Income	82.2	82.3	0.1%	44.2	44.3	0.1%
Ratio			0.35			0.35
Burden Threshold						>1.20
Result: No Disproportionate Burden						
Population						
Minority	69.5	69.5	0.0%	35.8	36.4	1.8%
Non-Minority	86.1	86.1	0.0%	46.3	46.4	0.1%
Ratio			0.00			1.13
Burden Threshold						>1.20
Result: No Disparate Impact						

^aAll changes are within the model's margin of error.
Source: Central Transportation Planning Agency.

Figures 7.8 and 7.9 show that average VMT per square mile is greater for low-income and minority TAZs than for non-low-income and non-minority TAZs, respectively, for



both alternatives, and that average congested VMT is less for low-income and minority TAZs than for non-low-income and non-minority TAZs, respectively, for both alternatives. However, the changes for each type of equity analysis zone between the 2040 No-Build and Build alternatives are not statistically significant.

FIGURE 7.8
Average VMT for Equity Analysis Zones in the 2040 No-Build and 2040 Build Networks



Source: Central Transportation Planning Agency.

FIGURE 7.9
Average Congested Vehicle Miles Traveled for Equity Analysis Zones in the 2040 No-Build and 2040 Build Networks



Source: Central Transportation Planning Agency.

Tables 7.5 and 7.6 show disproportionate burdens and disparate impacts for average VMT, and a disproportionate burden for congested VMT. However, because the changes between the 2040 No-Build and Build alternatives for each type of equity/non-equity analysis \neq the comparison are within the margin of error of the model, it is unlikely that the ratio of the changes is meaningful.

The MPO will carefully monitor these possible burdens and impacts over time and, if necessary, address them at the program level through the TIP project selection process and equity analyses.

TABLE 7.5
Average Vehicle Miles Traveled

	No-Build	Build	Percentage Increase ^a
Population			
Low-Income	261,156	263,048	0.72%
Non Low-Income	146,043	145,905	-0.09%
Ratio			-7.66
Burden Threshold			>1.20
Result: Disproportionate Burden^b			
Population			
Minority	196,710	197,452	0.38%
Non-Minority	139,224	138,973	-0.18%
Ratio			-2.09
Burden Threshold			>1.20
Result: Disparate Impact^b			

^aAll changes are within the model's margin of error.

^bBecause the changes themselves are within the margin of error of the model, this comparison probably does not show a meaningful difference.

Source: Central Transportation Planning Agency.

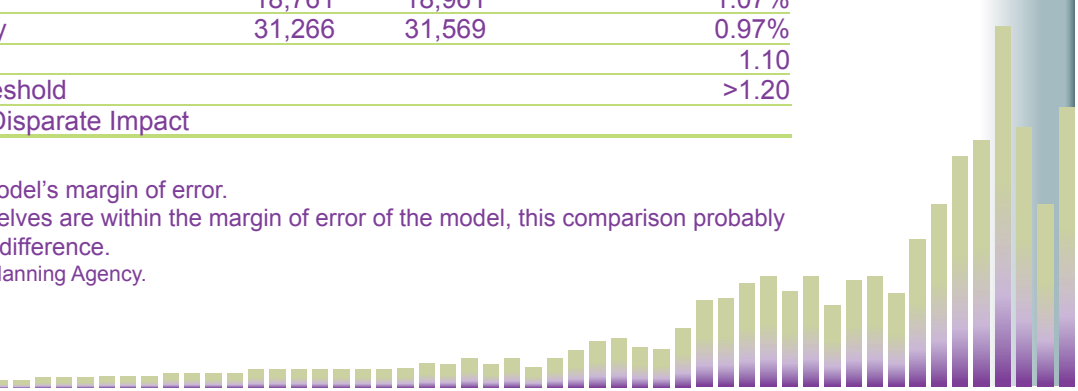
TABLE 7.6
Benefits and Burdens Analysis for Congested Vehicle Miles Travelled

	No-Build	Build	Percentage Increase ^a
Population			
Low-Income	12,493	12,832	2.72%
Non Low-Income	28,843	29,103	0.90%
Ratio			3.01
Burden Threshold			>1.20
Result: Disproportionate Burden^b			
Population			
Minority	18,761	18,961	1.07%
Non-Minority	31,266	31,569	0.97%
Ratio			1.10
Burden Threshold			>1.20
Result: No Disparate Impact			

^aAll changes are within the model's margin of error.

^bBecause the changes themselves are within the margin of error of the model, this comparison probably does not show a meaningful difference.

Source: Central Transportation Planning Agency.



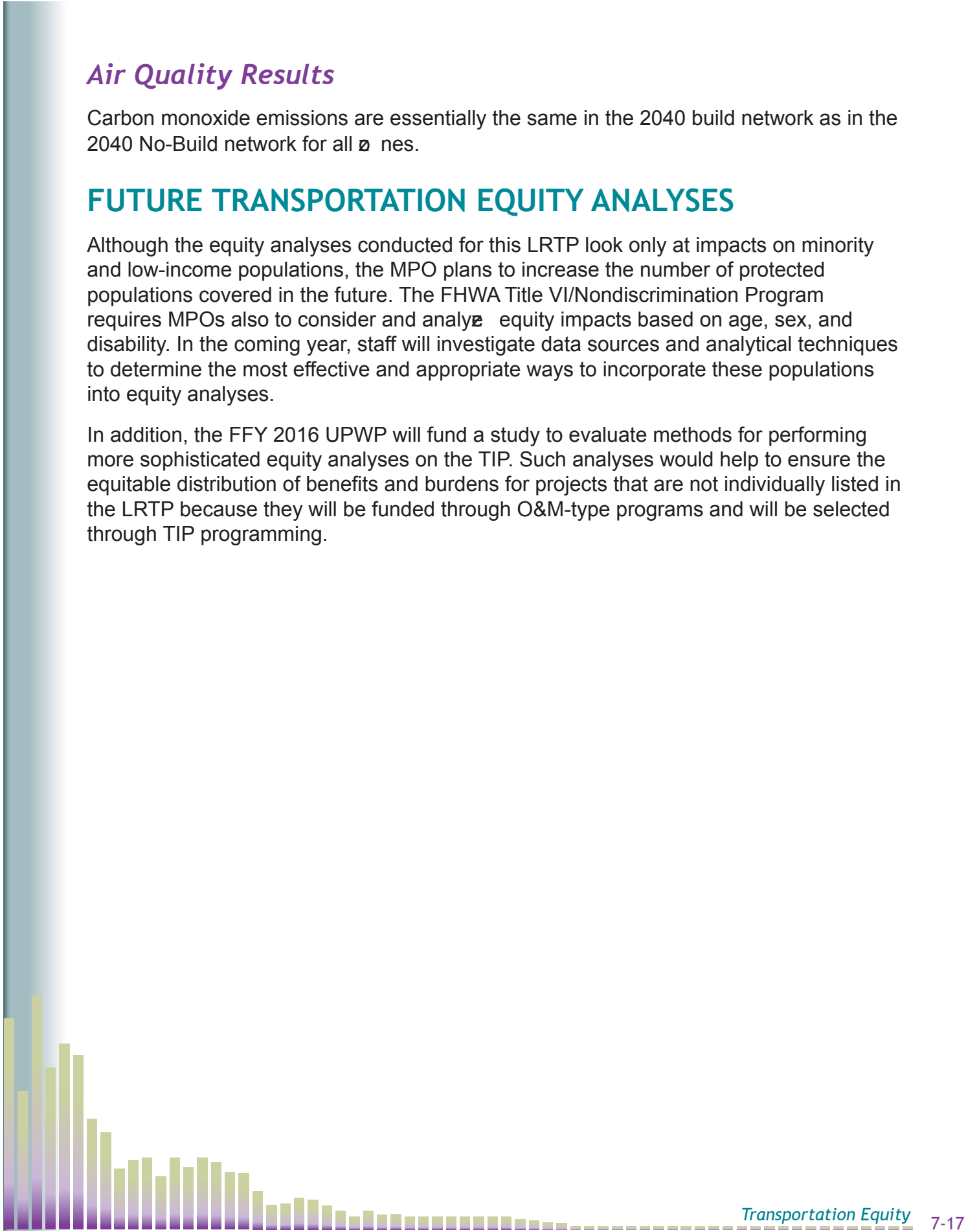
Air Quality Results

Carbon monoxide emissions are essentially the same in the 2040 build network as in the 2040 No-Build network for all zones.

FUTURE TRANSPORTATION EQUITY ANALYSES

Although the equity analyses conducted for this LRTP look only at impacts on minority and low-income populations, the MPO plans to increase the number of protected populations covered in the future. The FHWA Title VI/Nondiscrimination Program requires MPOs also to consider and analyze equity impacts based on age, sex, and disability. In the coming year, staff will investigate data sources and analytical techniques to determine the most effective and appropriate ways to incorporate these populations into equity analyses.

In addition, the FFY 2016 UPWP will fund a study to evaluate methods for performing more sophisticated equity analyses on the TIP. Such analyses would help to ensure the equitable distribution of benefits and burdens for projects that are not individually listed in the LRTP because they will be funded through O&M-type programs and will be selected through TIP programming.





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