

Chapter 7—Transportation Equity

7.1 THE TRANSPORTATION EQUITY PROGRAM

The purpose of the MPO's transportation equity program (TE) 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).

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 all protected populations.

7.2 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 (section 2.6.2) 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 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.

7.3 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.

7.4 TRANSPORTATION EQUITY ANALYSES

7.4.1 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.

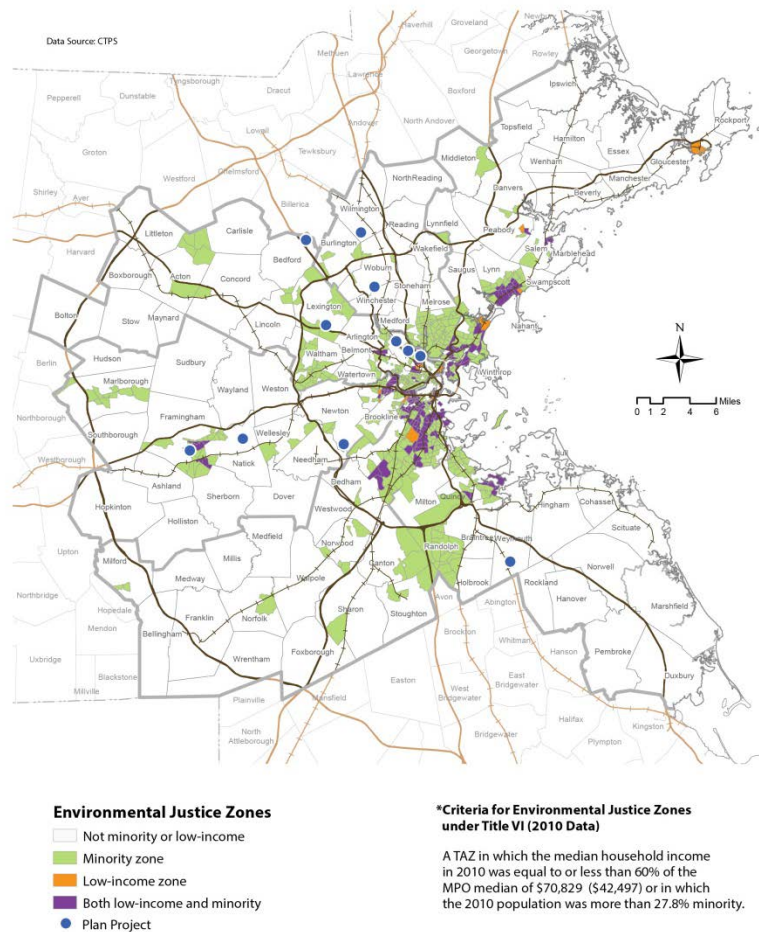
According to the 2010 census, the median MPO household income was \$70,829. Therefore, using the MPO's definition, a low-income TAZ is one in which the average median household income is less than or equal to \$42,497.

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.

**FIGURE 7.1
Equity Analysis Zones**



For the purposes of analyzing the transportation system in 2040, the MPO assumed that the distributions of equity analysis zones would remain unchanged, and that the population growth rate for these zones 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.

7.4.2 Measuring Impacts

To determine whether the benefits and burdens of projects, programs, and service 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 recipient's 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 the recipient to evaluate alternatives and mitigate burdens where practicable

The 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 are projected to sustain more than 20 percent additional burden than do nonminority TAZs. Therefore, a projected burden would be found if the analysis results for minority TAZs were >1.2 times the projected burden for nonminority TAZs.
- A disproportionate burden would exist if low-income TAZs are projected to sustain more than 20 percent additional burden than do non-low-income TAZs. Therefore, a projected burden would be found if the analysis results for low-income TAZs were >1.2 times the projected burden for non-low-income TAZs.
- A disparate benefit would exist if minority TAZs are 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 >0.80 times the projected burden for nonminority TAZs.
- A disproportionate benefit would exist if low-income TAZs are 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 >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.

7.4.3 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 Build 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 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 was 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 per square mile of dry land within a TAZ
- Congested vehicle-miles traveled (VMT) – congested vehicle-miles traveled: 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 time¹ – average door-to-door travel time for all transit trips produced in the TAZ
- 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

¹ Productions and attractions are used in transportation modeling to identify types of trip ends and are loosely related to origins and destinations.

7.5 TRANSPORTATION EQUITY ANALYSIS RESULTS

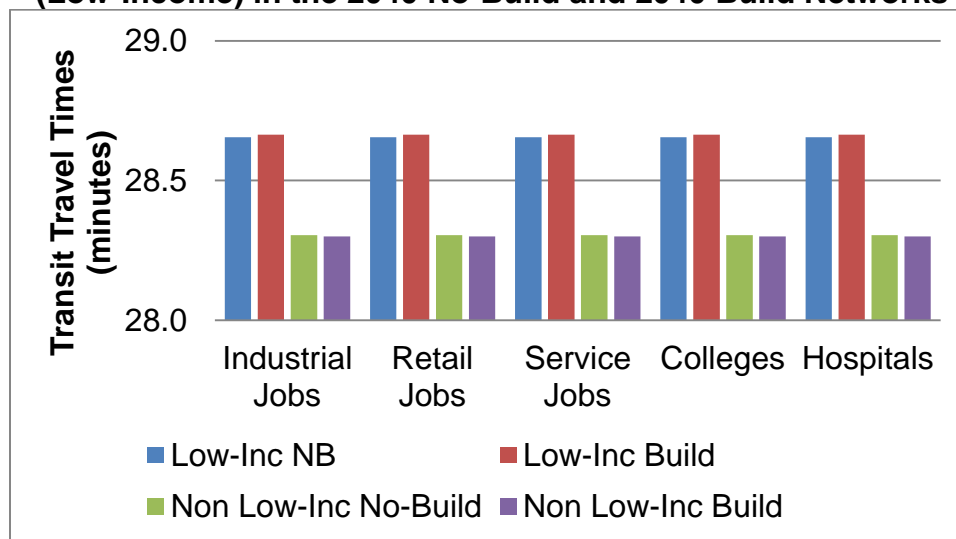
7.5.1 Accessibility Results

The results from the accessibility analysis show the following for trips from equity analysis zones to nearby employment, hospitals, and colleges:

- Average transit and highway travel times to destinations are the same for equity analysis zones in the 2040 Build network as they are for the 2040 No-Build network
- The transportation model indicates access to slightly less employment within a 40-minute transit ride for all area types in the 2040 Build network than in the 2040 No-Build network. However, because most of the differences are within the model’s margin of error, there is no real change.

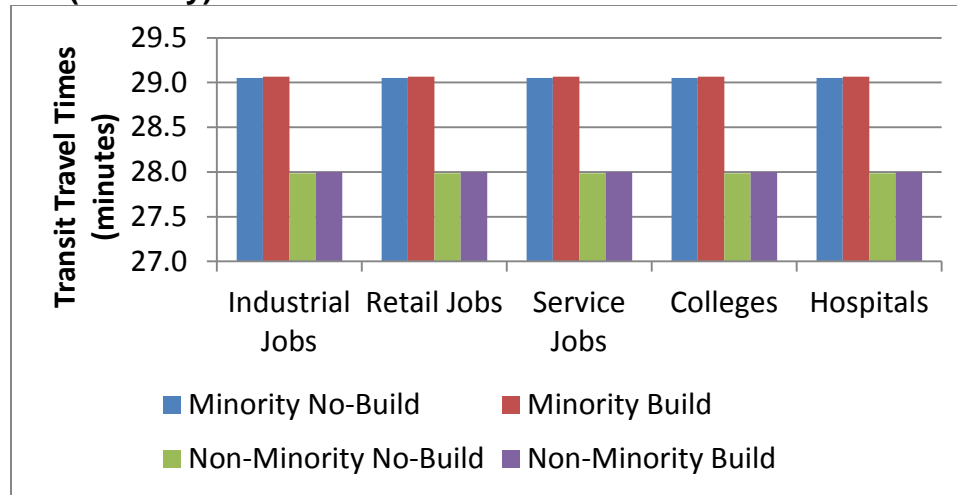
Figures 7.2 and 7.3 show that average transit travel times to destinations are lower for non-low-income and non-minority zones.

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.

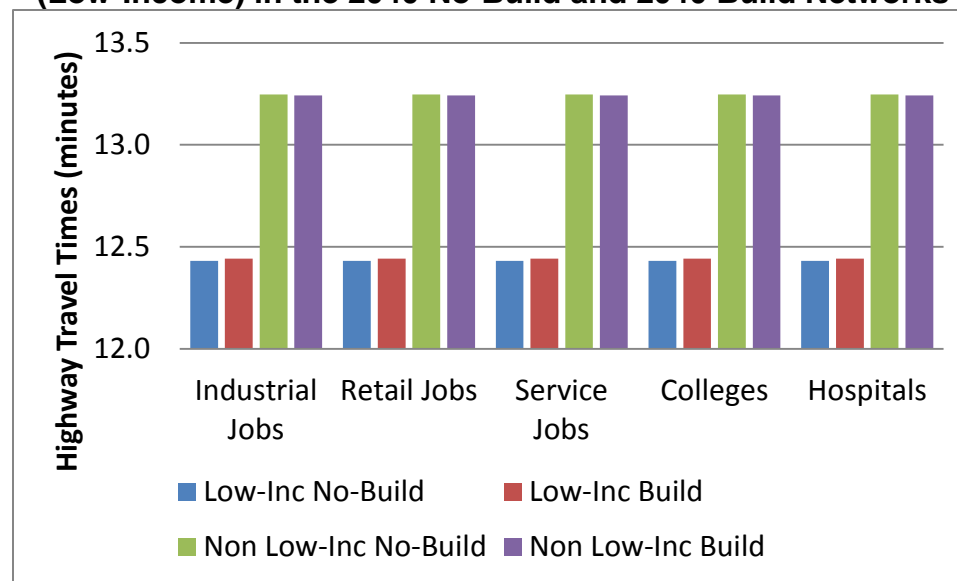
FIGURE 7.3
Average Transit Travel Times to Destinations for Equity Analysis Zones (Minority) in the 2040 No-Build and 2040 Build Networks



Source: Central Transportation Planning Agency.

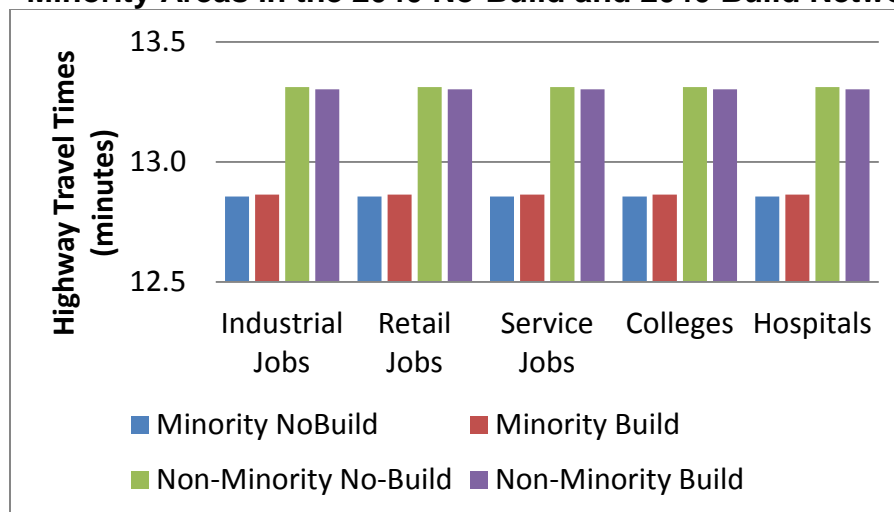
Figures 7.4 and 7.5 show that average highway travel times to destinations are slightly lower for equity analysis zones in both the 2040 No-Build and Build networks than they are in non-equity analysis zones.

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 Minority and Non-Minority Areas 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 disparate impacts nor disproportionate burdens in average transit and highway travel times to destinations, as all differences fall within the MPO’s threshold.

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

	No-Build	Build	Pct. Travel-Time Increase	No-Build	Build	Pct. Travel-Time Increase	No-Build	Build	Pct. Travel-Time Increase
	Industrial			Retail			Service		
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									

Source: Central Transportation Planning Agency.

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

	No- Build			Pct. Travel- Time			Pct. Travel- Time		
	Industrial	Build	Increase	Industrial	Build	Increase	Service	Build	Increase
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									

Source: Central Transportation Planning Agency.

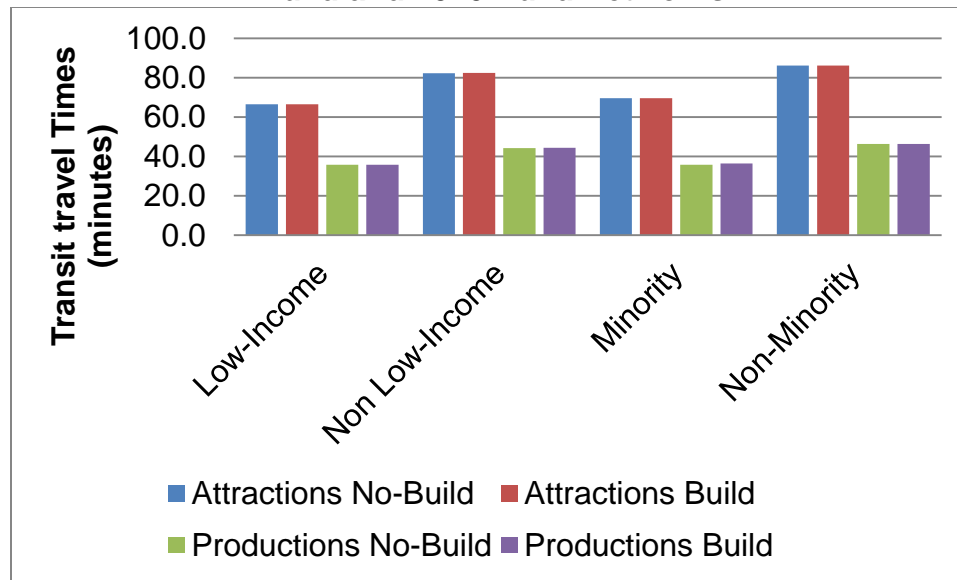
7.5.2 Mobility and Congestion Results

Results from the mobility and congestion analyses show the following: Congested VMT are higher for all areas in the 2040 Build network than in the 2040 No-Build network with percentage increases slightly higher for low-income zones.

VMT per square mile is higher for equity analysis zones in the 2040 build network than in the 2040 No-Build network and lower for non-equity analysis zones. All percentage changes are slight and within the model's margin of error.

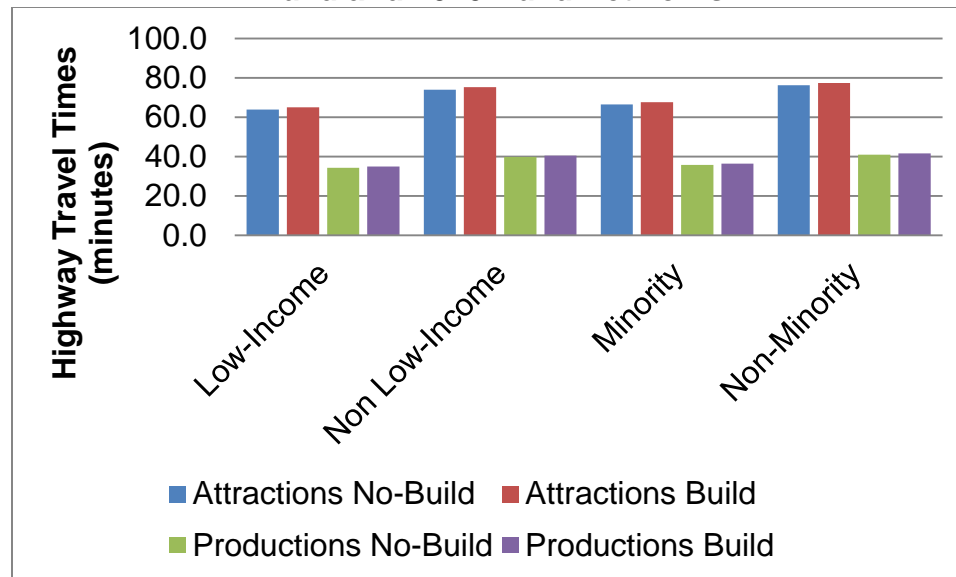
Figures 7.6 and 7.7 show that average transit and highway travel times for attractions and productions (destinations) are shorter for equity analysis zones in both the 2040 No-Build and Build networks.

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 no disproportionate burdens or impacts in average transit and highway times.

TABLE 7.3
Benefits and Burdens Analysis for Average Transit Travel Time

	No- Build	Build	No- Build	Build	Percentage Travel-Time Increase
	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					

Source: Central Transportation Planning Agency.

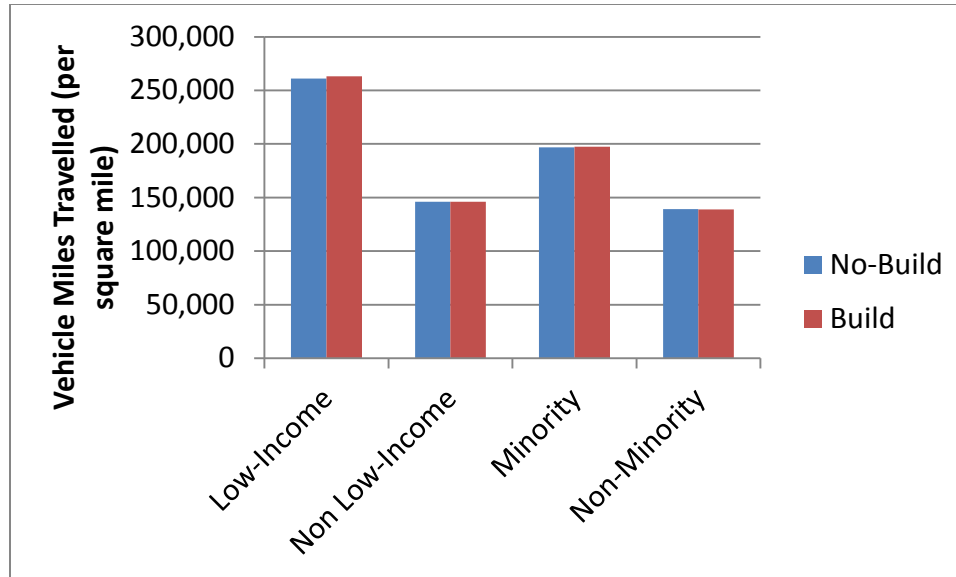
TABLE 7.4
Benefits and Burdens Analysis for Average Highway Travel Time

	No-Build	Build	Percentage Travel-Time Increase	No-Build	Build	Percentage Travel-Time Increase
	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						>1.2%
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						

Source: Central Transportation Planning Agency.

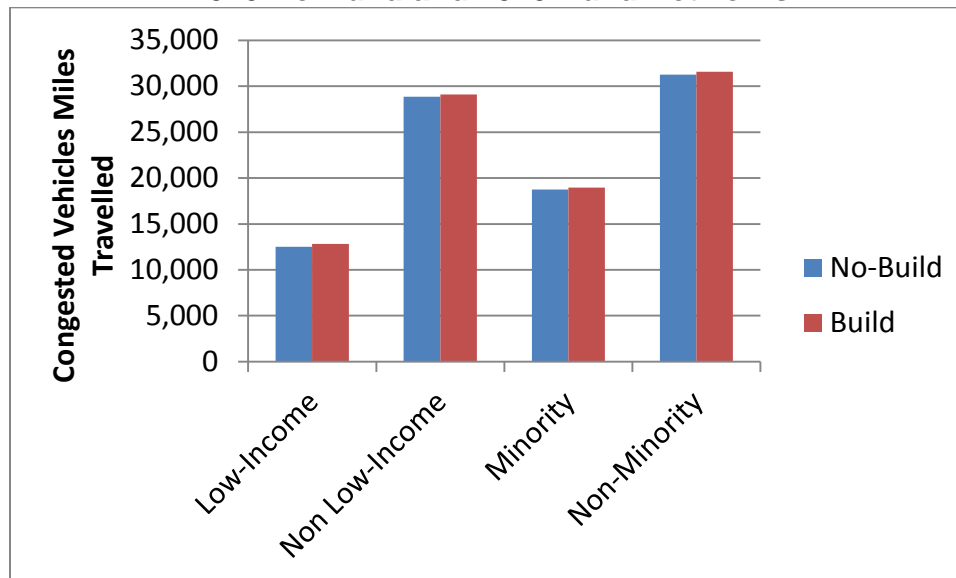
Figures 7.8 and 7.9 show that average VMT per square mile is greater for equity analysis zones than for non-equity analysis zones and that average congested VMT is less for equity analysis zones.

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 disproportionate impacts for average VMT, and a disproportionate impact for congested VMT. These impacts and burdens will be addressed at the program level.

TABLE 7.5
Average Vehicle Miles Traveled

	No-Build	Build	Percentage Increase
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			
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			

Source: Central Transportation Planning Agency.

TABLE 7.6
Benefits and Burdens Analysis for Congested Vehicle Miles Travelled

	No-Build	Build	Percentage Increase
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			
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			

Source: Central Transportation Planning Agency.

7.5.3 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.

7.6 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 MPO plans to fund a study in the FFY 2016 UPWP that will 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.