CHAPTER 9
ENVIRONMENTAL JUSTICE ASSESSMENT

BACKGROUND

In addition to its transportation equity program (discussed in Chapter 6), the MPO has performed a detailed, system-level analysis of transportation equity in the region, examining the distribution of the transportation system's benefits and burdens among environmental justice and non–environmental justice areas and among environmental justice and non–environmental justice population zones. (These types of areas and zones are defined in the section below.) The analysis also examined the impacts, in terms of various analysis factors, of this LRTP's recommended set of projects through 2035 (see Chapter 8 for the list of projects) on those types of areas and zones. Measures focus on mobility, accessibility, and environmental impact concerns.

As interpreted from federal guidance, the MPO should recommend a regional set of transportation projects in its LRTP that does not burden environmental justice areas when compared to a network that includes no projects other than those already underway. The results of the final analysis, summarized in this chapter, showed that the MPO's recommended set of transportation projects, or the "Build" network, in the year 2035 does not burden environmental justice areas and environmental justice population zones more than the 2035 No-Build network and in several cases, benefits them.

ENVIRONMENTAL JUSTICE AREAS AND ENVIRONMENTAL JUSTICE POPULATION ZONES

Geography for Outreach and Accessibility Analysis

As discussed in Chapter 6, environmental justice areas are based on the demographics of the people living in a transportation analysis zone (TAZ). TAZs are an aggregation of census geography based on population and numbers of trips. According to the definition used for the MPO's transportation equity program, "A TAZ will be considered an Environmental Justice Area if it is over 50 percent minority or has a median household income at or below 60 percent of the region's median" (60 percent of the region's median

household income of $55,800 is $33,480).[1]

Environmental justice areas are presented in Figures 6-1 and 6-2.

In addition to being the focus of the transportation equity program, environmental justice areas are used in the accessibility portion of the MPO's environmental justice analysis, as described in this chapter.

Geography for Mobility, Congestion, and Environmental Analysis

In the mobility, congestion, and environmental portions of the analysis, environmental justice population zones are used. To locate environmental justice populations, the MPO selected broader criteria for lower-income and minority TAZs than those used for locating environmental justice areas. Though not required, this greater inclusion of TAZs is in line with—and slightly more inclusive than—the Massachusetts Executive Office of Environmental Affairs (EOEA) definition of environmental justice populations. The broader criteria avoid masking data for isolated TAZs and are more inclusive of environmental justice populations. The MPO's thresholds for these environmental justice populations are as follows:

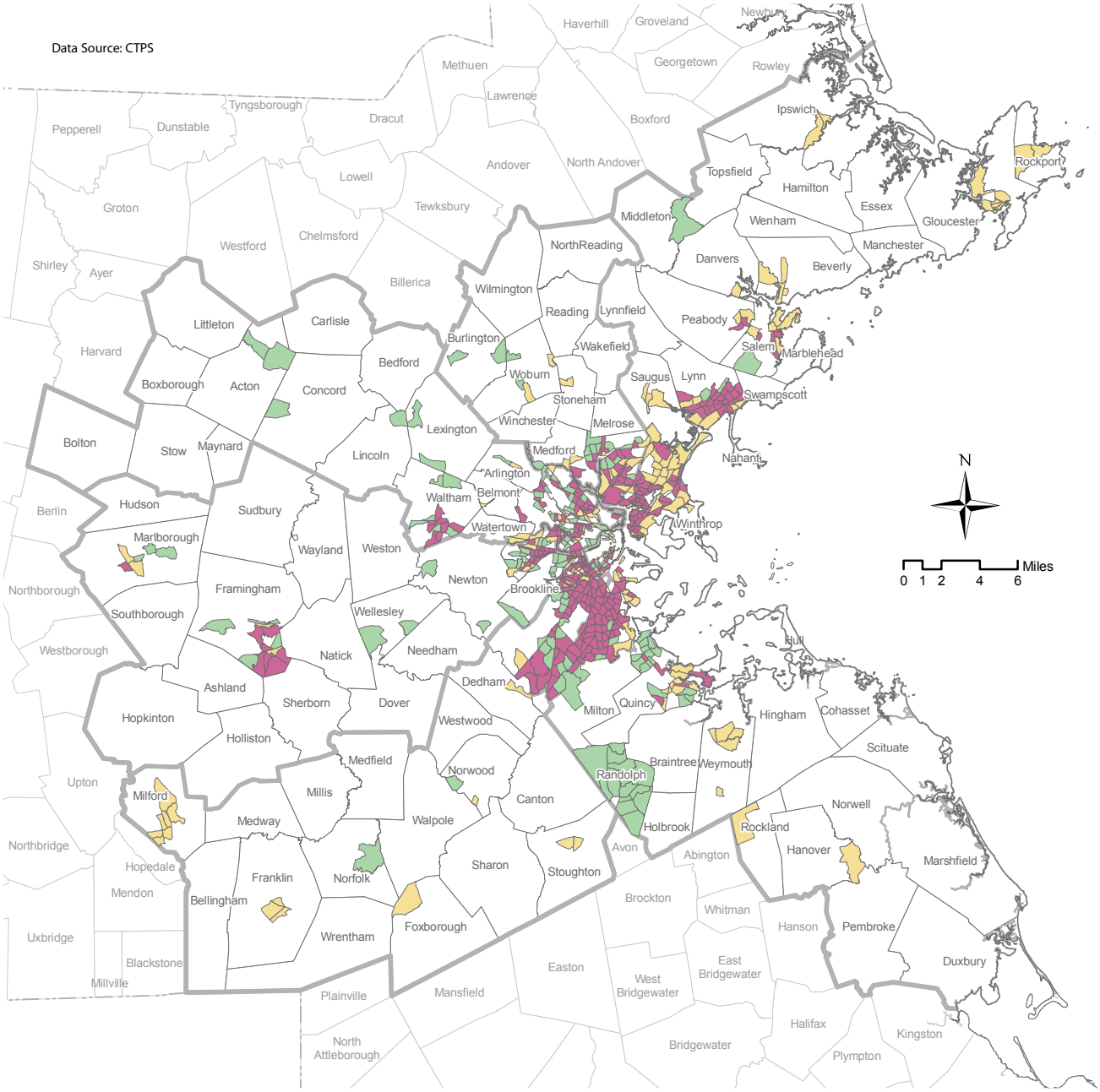
- Low income – The MPO median household income in 2000 was approximately $55,800. A low-income TAZ was defined as having a median household income at or below 80 percent of this level ($44,640).
- Minority – 21.4 percent of the MPO population in 2000 was composed of minorities (nonwhite and Hispanic). A minority TAZ was defined as having a percentage of minority population greater than 21.4 percent.

The environmental justice population zones in the Boston Region MPO area and in the urban core are shown in Figures 9-1 and 9-2, respectively.

The 2035 demographic forecasts assumed the same distributions of the environmental justice areas and environmental justice population zones as were observed in the 2000 census and that the environmental justice population's growth rate will be the same as the rate that the Metropolitan Area Planning Council has forecast for the overall population of the given area. The 2035 Build

[1] The MPO used the 2000 U.S. census to define environmental justice areas. Though the 2010 census minority population data at the tract level was released on March 22, 2011, the household income data have yet to be released at the tract level. MPO staff has determined that the 2005–2009 American Community Survey (ACS) sample data have high margins of error at the tract level for minority population and did not want to use it as the source. Environmental justice areas will be redefined when complete new data are available.

FIGURE 9-1
Environmental Justice Population Zones - Regionwide



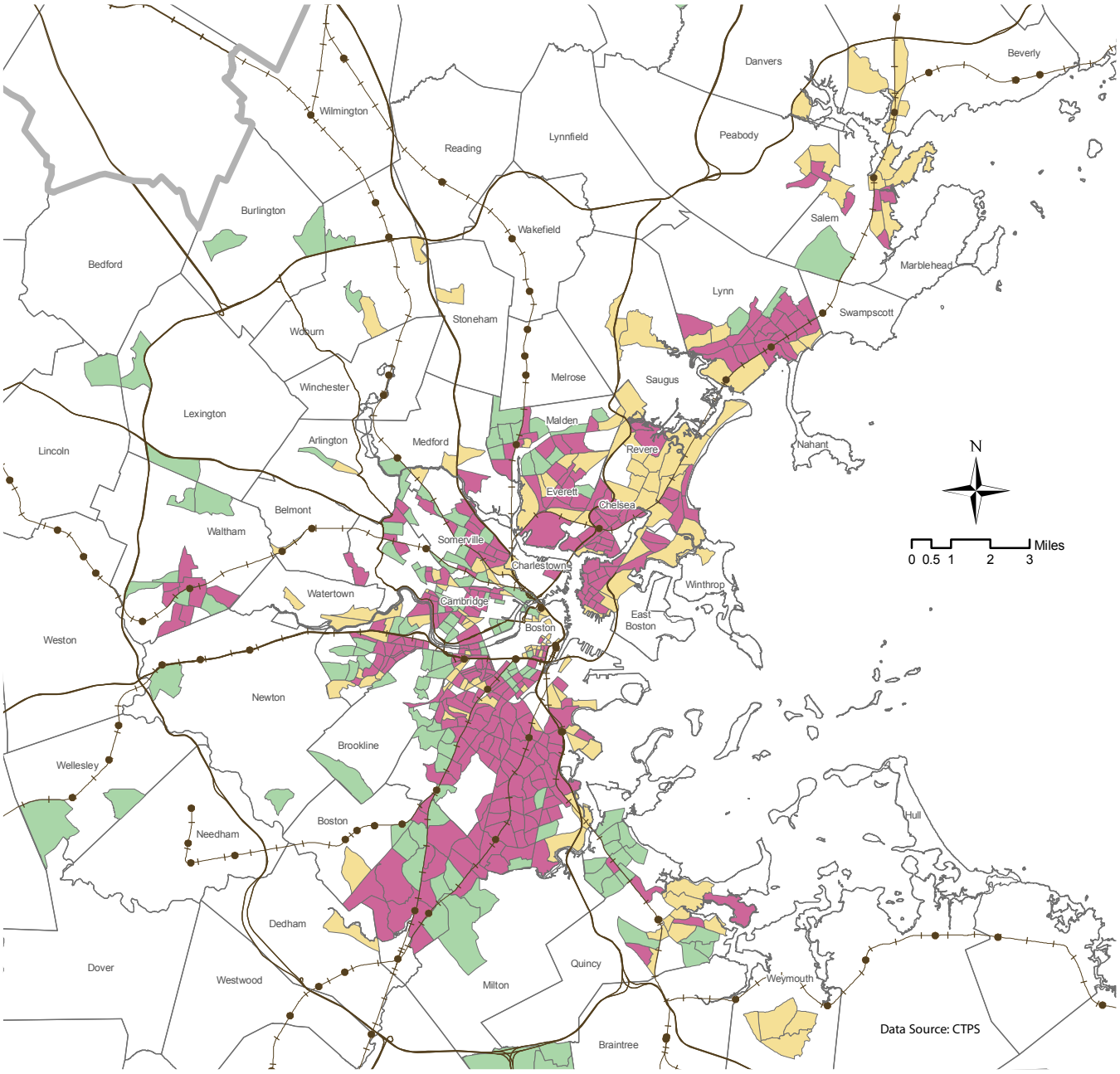
Transportation Analysis Zones (TAZs) That Meet Environmental Justice Population Zone Criteria*

- Meets income criterion
- Meets minority criterion
- Meets both criteria

***Criteria for Environmental Justice Population Zones**

A TAZ in which the median household income in 1999 was equal to or less than 80% of the MPO median of $55,800 ($44,600) or in which the 2000 population was more than 21.4% minority.

FIGURE 9-2
Environmental Justice Population Zones - CENTRAL AREA



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***Criteria for Environmental Justice Population Zones**

A TAZ in which the median household income in 1999 was equal to or less than 80% of the MPO median of $55,800 ($44,600) or in which the 2000 population was more than 21.4% minority.

and 2035 No-Build networks used the same demographic forecasts but developed unique distributions of trip flows based on the transportation network for the No-Build and Build scenarios.

ANALYSIS FACTORS

The MPO used several factors as indicators of benefits and burdens for environmental justice and non–environmental justice areas. These factors fall into three categories:

- Accessibility to needed services and jobs
- Mobility and congestion
- Environment

The first factor was applied to environmental justice and non–environmental justice areas, the second and third to environmental-justice-population zones and non–environmental justice population zones.

To avoid confusion, environmental justice areas and environmental justice zones will both be referred to as environmental justice areas in the remainder of this chapter.

Accessibility Analysis

MPO staff analyzed access to needed services and jobs in terms of average transit and highway travel times from environmental justice areas to industrial, retail, and service employment opportunities; health care; and institutions of higher education. The analysis of transit travel times included destinations within a 40-minute transit trip, and the analysis of highway travel times included destinations within a 20-minute auto trip. The accessibility analysis also included an examination of the number of destinations within a 40-minute transit trip and a 20-minute auto trip. The 40-minute transit trip and the 20-minute highway trip thresholds represent average commute times in the region based on 2000 census journey-to-work data.

Staff examined differences between the 2035 No-Build network and the 2035 Build network for environmental justice and non–environmental justice areas. The accessibility analysis factors were:

- The average travel time to industrial, retail, and service jobs within a 40-minute transit trip and a 20-minute auto trip
- The average number of industrial, retail, and service jobs within a 40-minute

transit trip and a 20-minute auto trip

- The average travel time to hospitals, weighted by the number of beds, within a 40-minute transit trip and a 20-minute auto trip
- The average number of hospitals, weighted by the number of beds, within a 40-minute transit trip and a 20-minute auto trip
- The average travel time to facilities of two- and four-year institutions of higher education, weighted by enrollment, within a 40-minute transit trip and a 20-minute auto trip
- The average number of facilities 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 Environmental Analysis

MPO staff analyzed mobility, congestion, and the environmental impacts by comparing analysis factors for environmental justice areas to those for non–environmental justice areas. Staff examined differences between the average levels of these analysis factors within the two types of areas for the 2035 No-Build network and the 2035 Build network.

The mobility, congestion, and environmental analysis factors were:

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

SUMMARY OF RECOMMENDED-LRTP RESULTS

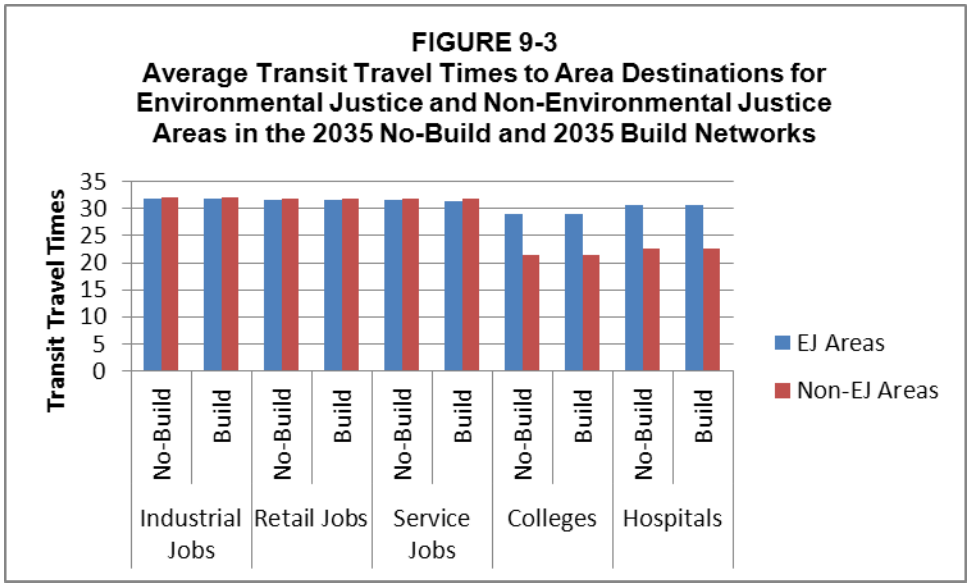
The environmental justice analysis determined that while the 2035 recommended LRTP Build network improves accessibility, mobility, and congestion conditions relative to the 2035 No-Build network for both environmental justice and non–environmental justice areas, it benefits environmental justice areas slightly more. CO emissions are higher in environmental justice areas than in non-environmental justice areas in both the No-Build and the Build networks. CO emissions increase for both populations in the Build network over the No-Build. Results are aggregated for each type of area and are averaged by the number of environmental justice and non–environmental justice TAZs, respectively.

Accessibility Analysis Results

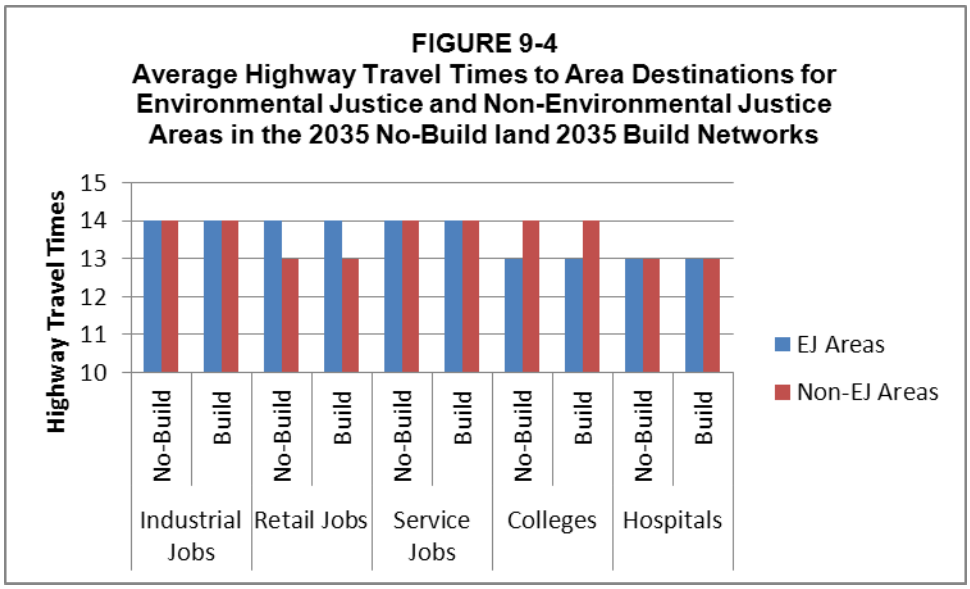
Results from the accessibility analysis show the following for trips from environmental justice areas to nearby jobs, colleges, and hospitals:

- Travel times to area destinations are less or the same for environmental justice areas in the 2035 Build network when compared to those in the 2035 No-Build network.
- People in environmental justice areas will be able to access more area destinations within a 40-minute transit ride in the 2035 Build network than in the 2035 No-Build network, and even though the transportation model indicates 20-minute highway access to slightly fewer jobs and hospital beds in the Build network, the difference is not statistically significant as it is within the model's margin of error.
- The 2035 Build network increases the number of area destinations accessible by transit for environmental justice areas.

Figure 9-3 shows that average transit travel times to area jobs are approximately 30 minutes, with those for environmental justice areas slightly less than for non–environmental justice areas. Travel times to hospitals and colleges are higher for environmental justice areas in both the No-Build and Build networks.



While Figure 9-4 shows that average highway travel times to colleges and hospitals are slightly less for environmental justice areas than for non–environmental justice areas, the differences in average highway travel time to jobs are statistically insignificant.



Figures 9-5 to 9-7 show that the average environmental justice area has transit and highway access to notably more jobs than the average non–environmental justice area. In addition, environmental justice populations can access more jobs by transit in the Build network than in the No-Build network.

FIGURE 9-5
Average Number of Industrial Jobs to Which There is Access for Environmental Justice and Non-Environmental Justice Areas in the 2035 No-Build and 2035 Build Networks

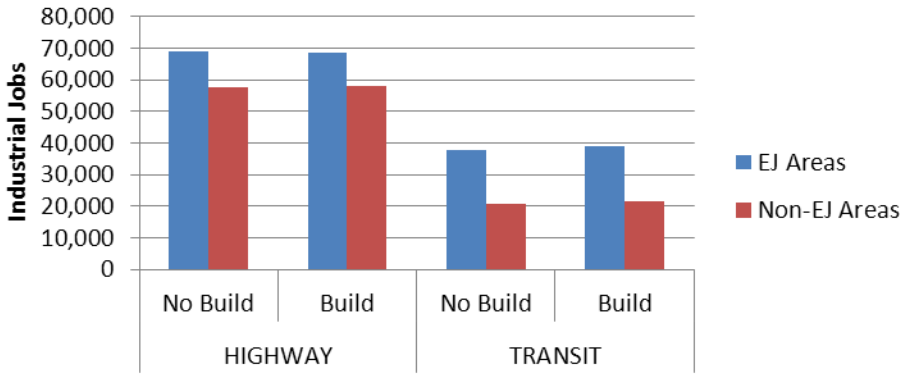
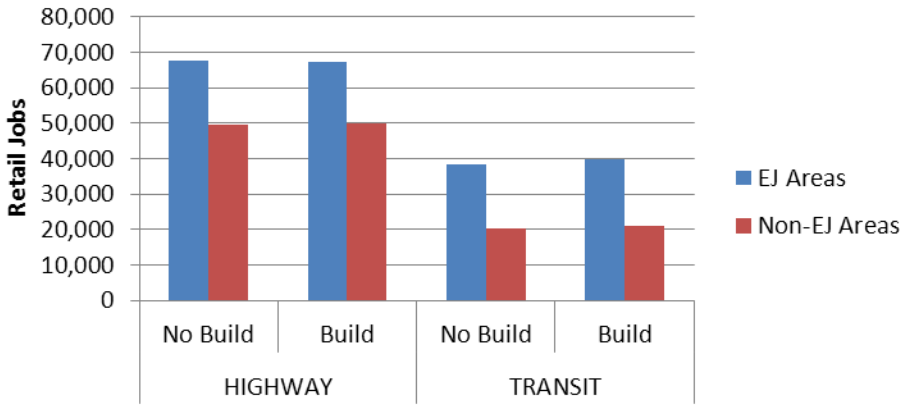


FIGURE 9-6
Average Number of Retail Jobs to Which There is Access for Environmental Justice and Non-Environmental Justice Areas in the 2035 No-Build and 2035 Build Networks



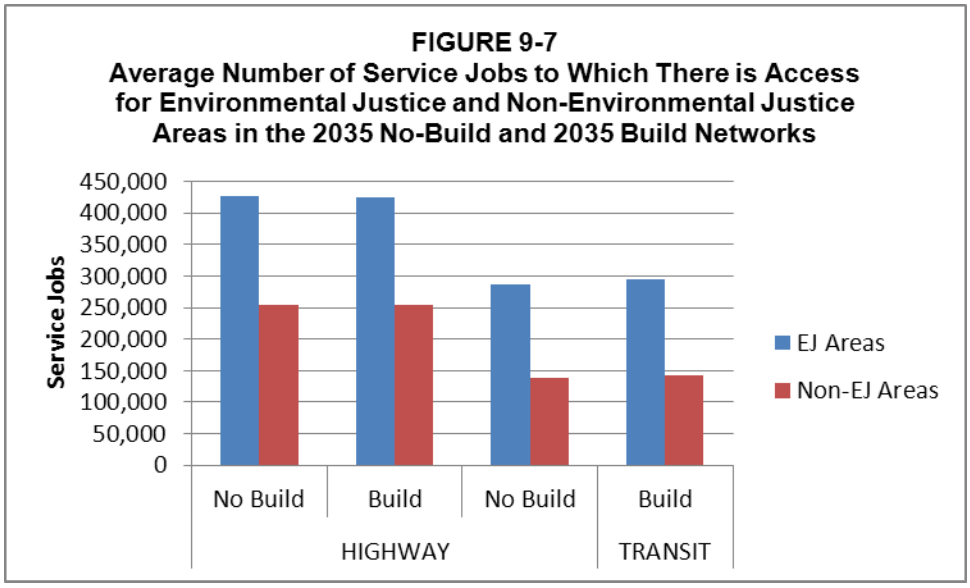


Figure 9-8 shows that the average environmental justice area has transit and highway access to notably more two- and four-year colleges than the average non–environmental justice area. The figure also shows that people in environmental justice areas are estimated to have access to more colleges in the Build network than in the No-Build network.

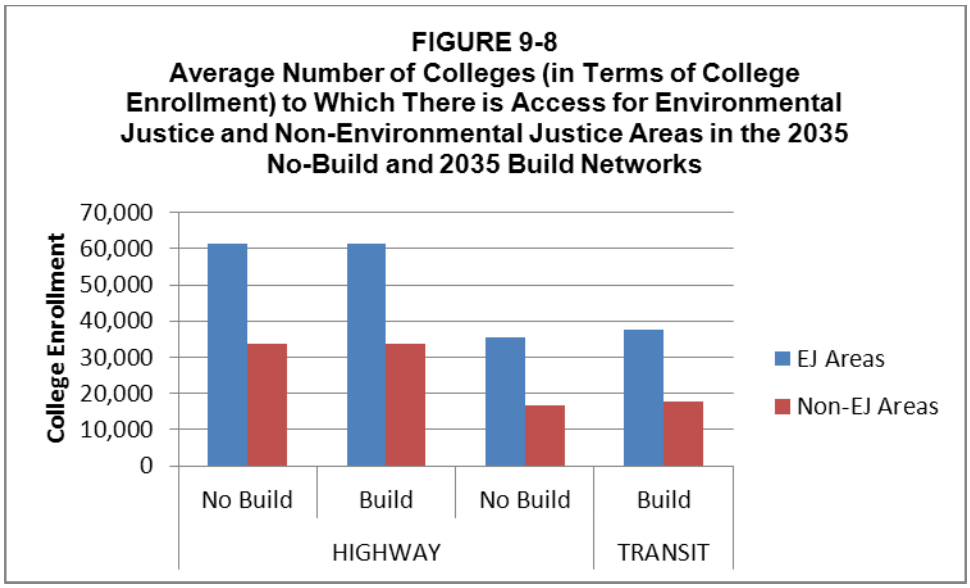
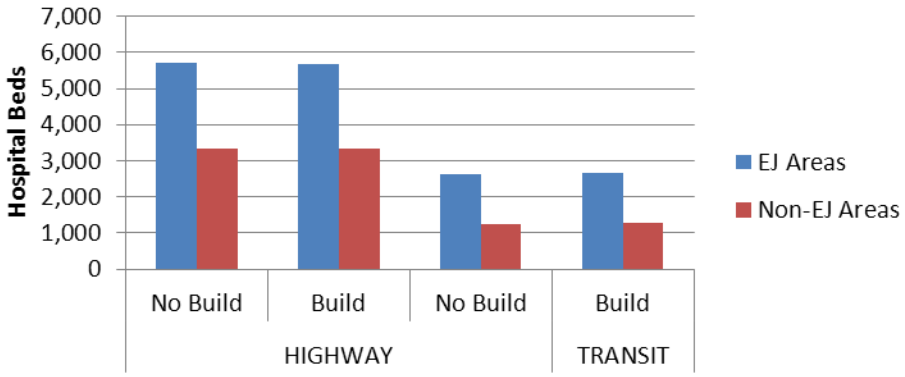


Figure 9-9 shows that the average environmental justice area has transit and highway access to more hospital beds than the average non–environmental justice area.

FIGURE 9-9
Average Number of Hospital Beds to Which There is Access for Environmental Justice and Non-Environomeontal Justice Areas in the 2035 No-Build and 2035 Build Networks



Mobility, Congestion, and Environmental Analysis Results

Results from the mobility, congestion, and environmental analysis show the following for trips within environmental justice areas:

- Congested VMT is slightly less for environmental justice areas in the 2035 Build network than in the 2035 No-Build network.
- VMT per square mile is less for environmental justice areas in the 2035 Build network compared to the 2035 No-Build network indicating a diversion from highway to transit.
- The 2035 Build network yields slightly more CO emissions per square mile for both environmental justice and non-environmental justice areas when compared to the 2035 No-Build network; however the increase is smaller for environmental justice population zones.

Figure 9-10 shows that average transit travel times for attractions and productions are shorter for environmental justice areas than for non–environmental justice areas.

FIGURE 9-10
Average Transit Travel Times for Environmental Justice and Non-Environmental Justice Population Zones in the 2035 No-Build and 2035 Build Networks

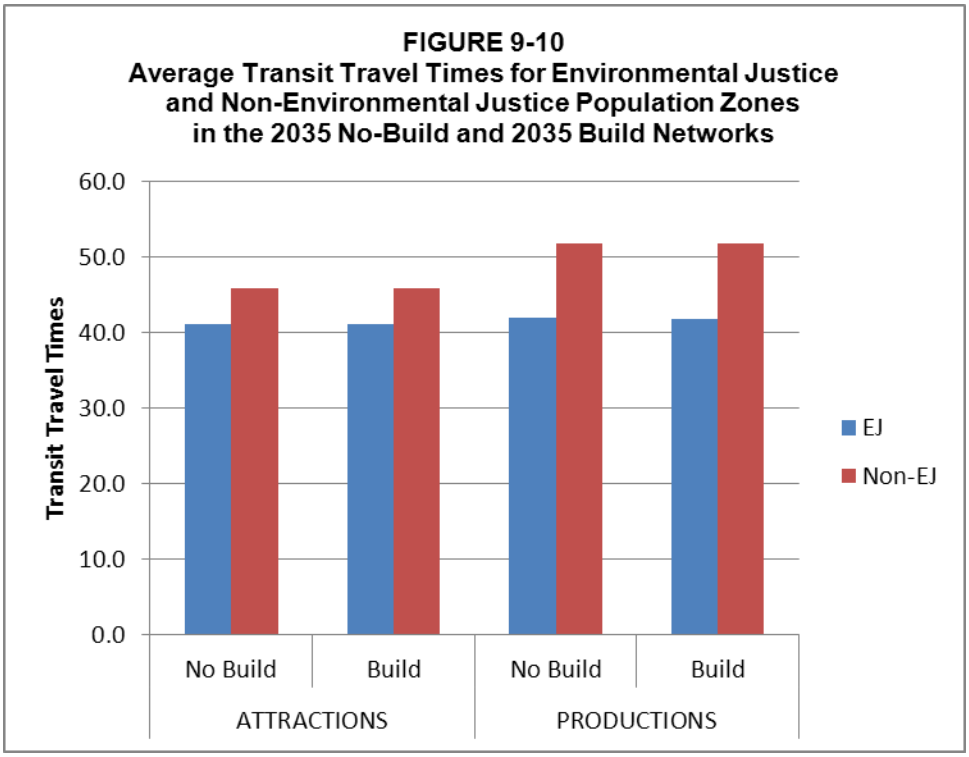
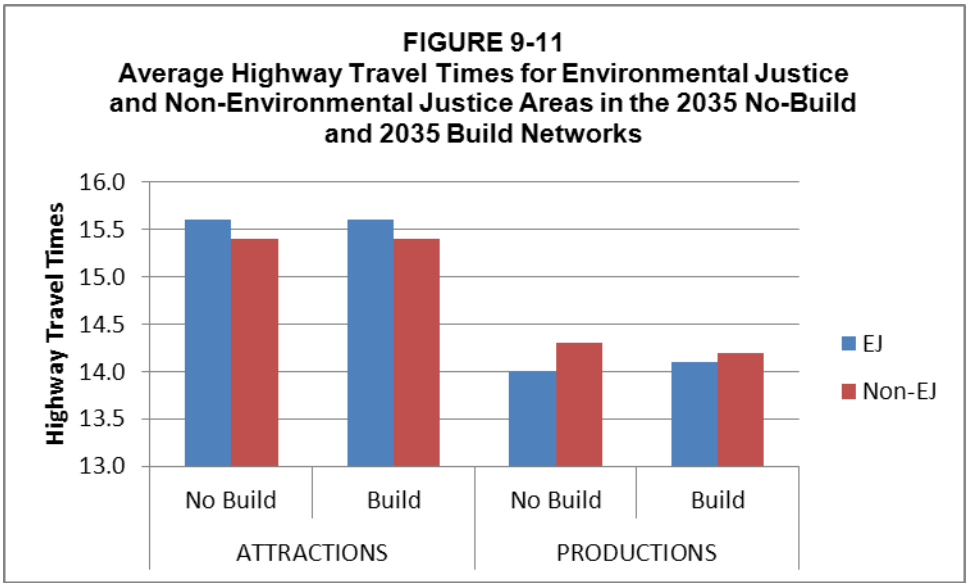


Figure 9-11 shows that there is no statistical difference in average highway attraction and production travel times for environmental justice areas and non-environmental justice areas.

FIGURE 9-11
Average Highway Travel Times for Environmental Justice and Non-Environmental Justice Areas in the 2035 No-Build and 2035 Build Networks



Both figures show that differences in average travel time between environmental justice population zones and non–environmental justice population zones are more pronounced for transit than for highway trips.

Figure 9-12 shows that average congested VMT is less for environmental justice areas than for non–environmental justice areas.

FIGURE 9-12
Average Congested VMT for Environmental Justice and Non-Environmental Justice Areas in the 2035 No-Build and 2035 Build Networks

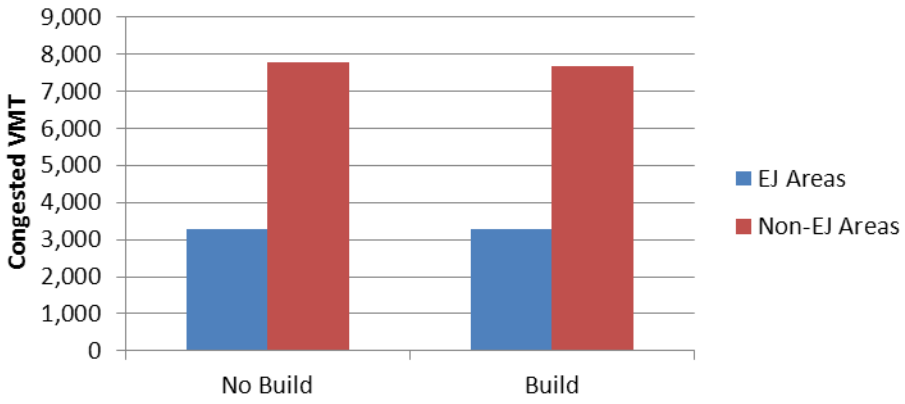


Figure 9-13 shows that average VMT per square mile is greater for environmental justice areas than for non–environmental justice areas in both the No-Build and Build networks.

FIGURE 9-13
Average VMT for Environmental Justice and Non-Environmental Justice Areas in the 2035 No-Build and 2035 Build Networks

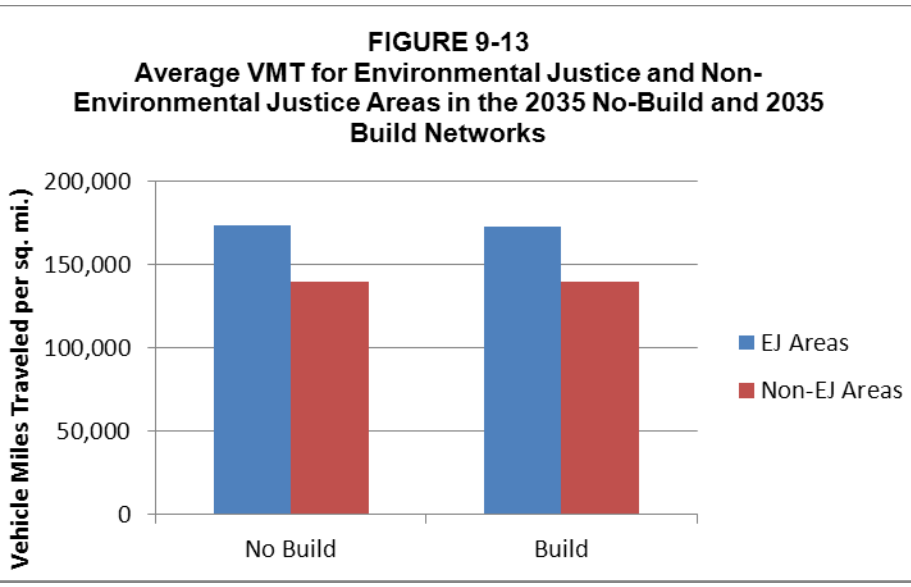
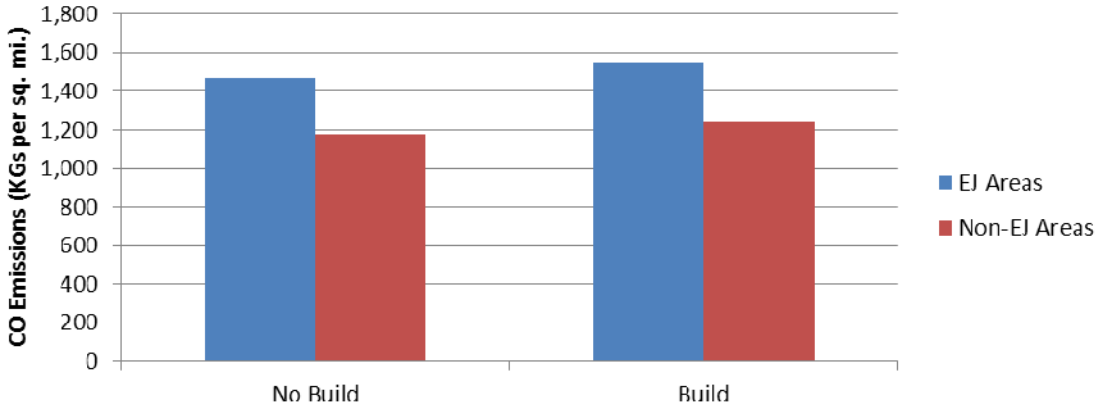


Figure 9-14 shows that average CO emissions are greater for environmental justice areas than for non–environmental justice areas in both the No-Build and Build networks.

FIGURE 9-14
Average CO Emissions per Square Mile for Environmental and Non-Environmental Areas in the 2035 No-Build and 2035 Build Networks



SELECTED PROJECTS THAT WILL BENEFIT ENVIRONMENTAL JUSTICE AREAS

The following transit projects in the LRTP will improve air quality and provide more transportation options for environmental justice populations:

- Somerville: Extend Green Line from Lechmere to College Avenue – Provides better access to rapid transit stations, employment, and retail opportunities.

These highway projects will benefit people living in nearby and adjacent environmental justice areas in the following ways:

- Framingham: Route 126/Route135 Grade Separation – Improves air quality in the area by allowing traffic to flow more freely. Improves connectivity for people accessing downtown destinations.