



## ENVIRONMENTAL JUSTICE ASSESSMENT

As part of its regional equity program (discussed in Chapter 9), the MPO 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 performance measures, of this Plan's recommended set of projects through 2030 (see Chapter 13 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 Plan that does not burden environmental justice areas when compared to a network that includes no projects other than those already underway. MPO members used the results of a preliminary environmental justice analysis to inform their decisions when selecting the projects that are included in this Plan. 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 2030 does not burden environmental justice areas and environmental justice population zones more than the 2030 No-Build network.

### **ENVIRONMENTAL JUSTICE AREAS AND ENVIRONMENTAL JUSTICE POPULATION ZONES**

#### **Environmental Justice Areas**

As discussed in Chapter 9, 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 regional 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). The TAZ's total minority population must be at least 200.

There are environmental justice areas in each of the following (see Figures 9-1 and 9-2):

*The municipalities of:*

- Cambridge
- Chelsea
- Everett
- Framingham
- Lynn
- Malden
- Medford
- Milford
- Peabody
- Quincy
- Randolph
- Revere
- Salem
- Somerville
- Waltham

*The Boston neighborhoods of:*

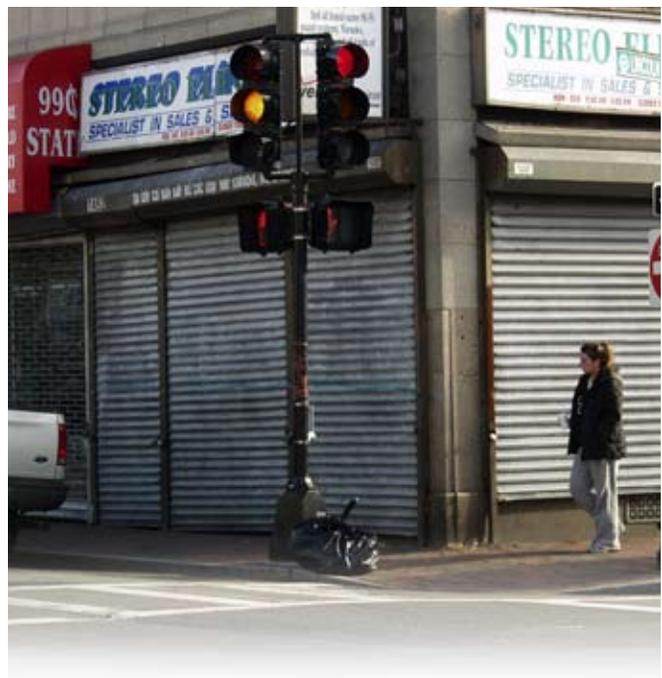
- Allston-Brighton
- Charlestown
- Chinatown
- Dorchester
- East Boston

- Fenway
- Hyde Park
- Jamaica Plain
- Mattapan
- Roslindale
- Roxbury
- South Boston
- South End

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

## Environmental Justice Population Zones

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 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 14-1 and 14-2, respectively.

The 2030 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 2030 Build and 2030 No-Build networks used the same demographic forecasts.

## PERFORMANCE MEASURES

The MPO used performance measures as indicators of benefits and burdens for environmental justice and non-environmental justice areas and for environmental justice population and non-environmental justice population zones populations. These measures fall into three categories:

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

The first measure 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.

## 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.

Staff examined differences between the 2000 Base Year network, 2030 No-Build network, and 2030 Build network for environmental justice and non-environmental justice areas. The accessibility performance measures 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

FIGURE 14-1  
ENVIRONMENTAL JUSTICE POPULATION ZONES

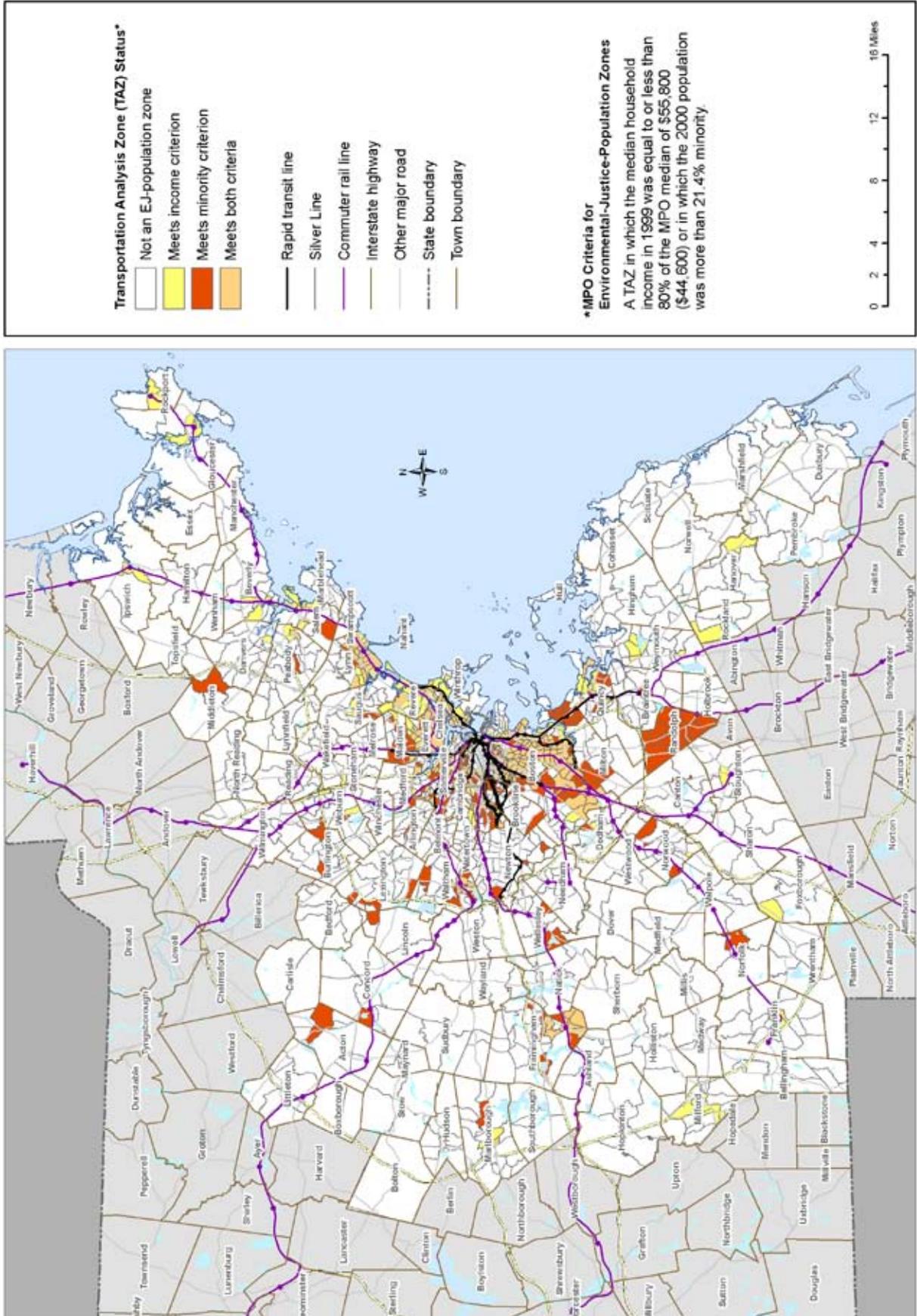
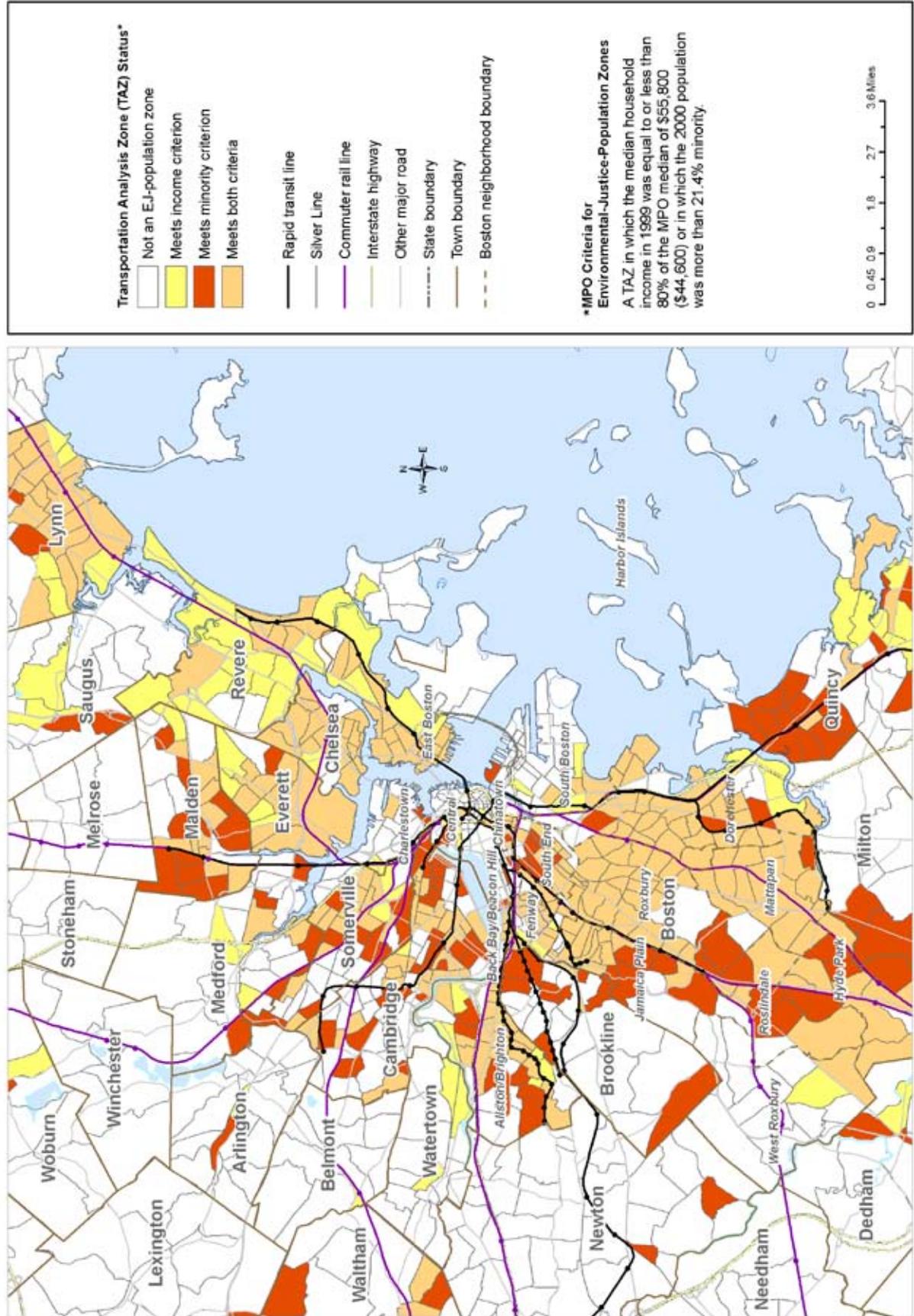


FIGURE 14-2  
ENVIRONMENTAL JUSTICE POPULATION ZONES IN THE URBAN CORE



## Mobility, Congestion, and Environmental Analysis

MPO staff analyzed mobility, congestion, and the environmental impacts by comparing performance measures for environmental justice population zones to those for non-environmental justice zones. Staff examined differences between the average levels of these performance measures within the two types of zone for the 2000 Base Year network, 2030 No-Build network, and 2030 Build network.

The mobility, congestion, and environmental performance measures 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-PLAN RESULTS

The environmental justice analysis determined that while the 2030 recommended plan Build network improves accessibility, mobility, congestion, and environmental conditions relative to the 2030 No-Build network for both environmental justice and non-environmental justice areas and for both environmental justice population zones and non-environmental justice population zones,

TABLE 14-1

### ACCESSIBILITY ANALYSIS RESULTS FOR TRANSIT TRIPS IN THE 2030 NO-BUILD AND 2030 BUILD NETWORKS

	2030 NO-BUILD		2030 BUILD		NO-BUILD VS. BUILD	
	EJ	NON-EJ	EJ	NON-EJ	EJ	NON-EJ
TRAVEL TIME TO INDUSTRIAL JOBS*	31.6	31.0	31.7	31.0	0.3%	0.0%
TRAVEL TIME TO RETAIL JOBS*	31.9	32.0	31.9	32.0	0.0%	0.0%
TRAVEL TIME TO SERVICE JOBS*	31.6	31.6	31.6	31.6	0.0%	0.0%
TRAVEL TIME TO COLLEGES*	31.9	33.4	31.8	33.4	-0.3%	0.0%
TRAVEL TIME TO HOSPITALS*	32.6	33.7	32.6	33.7	0.0%	0.0%
NUMBER OF INDUSTRIAL JOBS	46,731	26,547	47,815	27,170	2.3%	2.3%
NUMBER OF RETAIL JOBS	41,076	22,772	41,925	23,435	2.1%	2.9%
NUMBER OF SERVICE JOBS	311,061	144,968	315,313	149,108	1.4%	2.9%
NUMBER OF COLLEGES (ENROLLMENT)	44,986	29,556	46,023	30,218	2.3%	2.2%
NUMBER OF HOSPITAL BEDS	3,056	1,993	3,130	2,077	2.4%	4.2%

\* Travel time is measured in minutes

**TABLE 14-2**

**ACCESSIBILITY ANALYSIS RESULTS FOR HIGHWAY TRIPS IN THE 2030 NO-BUILD AND 2030 BUILD NETWORKS**

	2030 NO-BUILD		2030 BUILD		NO-BUILD VS. BUILD	
	EJ	NON-EJ	EJ	NON-EJ	EJ	NON-EJ
TRAVEL TIME TO INDUSTRIAL JOBS*	13.6	13.6	13.6	13.6	0.0%	0.0%
TRAVEL TIME TO RETAIL JOBS*	13.4	13.3	13.4	13.3	0.0%	0.0%
TRAVEL TIME TO SERVICE JOBS*	13.2	13.4	13.2	13.4	0.0%	0.0%
TRAVEL TIME TO COLLEGES*	13.4	13.5	13.5	13.6	0.7%	0.7%
TRAVEL TIME TO HOSPITALS*	12.8	13.2	12.8	13.2	0.0%	0.0%
NUMBER OF INDUSTRIAL JOBS	102,212	81,472	102,815	82,486	0.6%	1.2%
NUMBER OF RETAIL JOBS	85,945	62,543	86,361	63,102	0.5%	2.9%
NUMBER OF SERVICE JOBS	508,553	300,305	509,725	302,303	0.2%	0.7%
NUMBER OF COLLEGES (ENROLLMENT)	73,367	39,252	73,718	39,425	0.5%	0.4%
NUMBER OF HOSPITAL BEDS	6,738	3,896	6,746	3,926	0.1%	0.8%

\* Travel time is measured in minutes

it benefits environmental justice areas and environmental justice population zones slightly more. Results are aggregated for each type of area and zone 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 (Table 14-1 for transit trips and Table 14-2 for highway trips):

- Travel times to area destinations are less or the same for environmental justice areas in the 2030 Build network when compared to those in the 2030 No-Build network.
- People in environmental justice areas will be able to access more area destinations within a 20-minute drive or 40-minute transit ride in the 2030 Build network than in the 2030 No-Build network.

- The increase in the number of area destinations accessed in the 2030 Build network are more pronounced for transit trips than for highway trips.

**Mobility, Congestion, and Environmental Analysis Results**

Results from the mobility, congestion, and environmental analysis show the following for trips within environmental justice-population zones (Table 14-3):

- Congested VMT is less for environmental justice population zones in the 2030 Build network than in the 2030 No-Build network.
- VMT per square mile is less for environmental justice population zones in the 2030 Build network compared to the 2030 No-Build network.
- The 2030 Build network yields less CO emissions per square mile for environmental justice population zones when compared to the 2030 No-Build network.

**TABLE 14-3**

**MOBILITY, CONGESTION, AND ENVIRONMENTAL ANALYSIS RESULTS IN THE  
2030 NO-BUILD AND 2030 BUILD NETWORKS**

	2030 NO-BUILD		2030 BUILD		NO-BUILD VS. BUILD	
	EJ	NON-EJ	EJ	NON-EJ	EJ	NON-EJ
CONGESTED VMT	3,227	8,056	2,839	6,984	-12.0%	-13.3%
VMT PER SQUARE MILE	175,564	141,725	173,646	141,365	-1.1%	-0.3%
CO PER SQUARE MILE	1,554	1,253	1,534	1,249	-1.3%	-0.3%
TRANSIT ATTRACTION TRAVEL TIME*	38.7	38.7	38.7	38.7	0.0%	0.0%
TRANSIT PRODUCTION TRAVEL TIME*	41.2	50.3	41.1	50.2	-0.2%	-0.2%
HIGHWAY ATTRACTION TRAVEL TIME*	14.3	14.2	14.2	14.1	-0.7%	-0.7%
HIGHWAY PRODUCTION TRAVEL TIME*	12.3	12.9	12.2	12.8	-0.8%	-0.8%

\* Travel time is measured in minutes

**Selected Projects That Will Benefit Environmental Justice Areas and Environmental Justice Population Zones**

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

- Somerville: Construct Orange Line Station at Assembly Square – Provides better access to rapid transit stations, employment, and retail opportunities.
- Somerville: Extend Green Line from Lechmere to Mystic Valley Parkway and Union Square Spur – Provides better access to rapid transit stations, employment, and retail opportunities.
- Boston: Fairmont Line – Provides faster access to high demand locations.

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

- Boston: East Boston Haul Road/Chelsea Truck Route – Reduces traffic on local and neighborhood streets through the dedicated freight-haul road and provides a pedestrian connection to the proposed East Boston Greenway.
- 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.

**More Detailed Results from the Accessibility Analysis and the Mobility, Congestion, and Environmental Analysis**

MPO staff compared model results for the 2030 No-Build network and 2030 Build network to current, or 2000 Base Year, conditions to see how conditions are estimated to change for environmental justice areas and populations by the year 2030. The results of these comparisons are summarized below.

## Other Accessibility Analysis Results

Figure 14-3 shows that while average transit travel times to area jobs, colleges, and hospitals are at least 30 minutes, they are notably less for environmental justice areas than for non-environmental justice areas.

Figure 14-4 shows that while average highway travel times to colleges and hospitals are at least 10 minutes, they 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 14-3 and 14-4 show that differences in average travel times between environmental justice areas and non-environmental-justice areas are more pronounced for transit trips than for highway trips.

Figures 14-5 to 14-7 show that the average environmental justice area has transit and highway

access to notably more jobs than the average non-environmental justice area. These figures also show that people are estimated to have access to more jobs with the 2030 Build network than with the 2000 Base Year network.

Figure 14-8 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 are estimated to have access to more two- and four-year colleges with the 2030 Build network than with the 2000 Base Year network.

Figure 14-9 shows that the average environmental justice area has transit and highway access to notably more hospital beds than the average non-environmental justice area. It also shows that people will have access to more hospitals with the 2030 Build network than with the 2000 Base Year network.

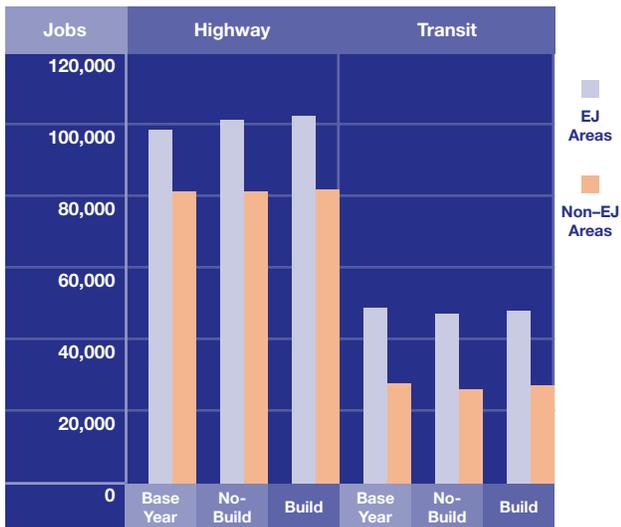
**FIGURE 14-3**  
**AVERAGE TRANSIT TRAVEL TIMES TO AREA DESTINATIONS FOR ENVIRONMENTAL JUSTICE AND NON-ENVIRONMENTAL JUSTICE AREAS IN THE 2000 BASE YEAR, 2030 NO-BUILD, AND 2030 BUILD NETWORKS**



**FIGURE 14-4**  
**AVERAGE HIGHWAY TRAVEL TIMES TO AREA DESTINATIONS FOR ENVIRONMENTAL JUSTICE AND**  
**NON-ENVIRONMENTAL JUSTICE AREAS IN THE 2000 BASE YEAR,**  
**2030 NO-BUILD, AND 2030 BUILD NETWORKS**



**FIGURE 14-5**  
**AVERAGE NUMBER OF BASIC INDUSTRY JOBS TO**  
**WHICH THERE IS ACCESS FOR ENVIRONMENTAL**  
**JUSTICE AND NON-ENVIRONMENTAL JUSTICE AREAS**  
**IN THE 2000 BASE YEAR, 2030 NO-BUILD, AND**  
**2030 BUILD NETWORKS**



**FIGURE 14-6**  
**AVERAGE NUMBER OF RETAIL INDUSTRY JOBS TO**  
**WHICH THERE IS ACCESS FOR ENVIRONMENTAL**  
**JUSTICE AND NON-ENVIRONMENTAL JUSTICE AREAS**  
**IN THE 2000 BASE YEAR, 2030 NO-BUILD, AND**  
**2030 BUILD NETWORKS**



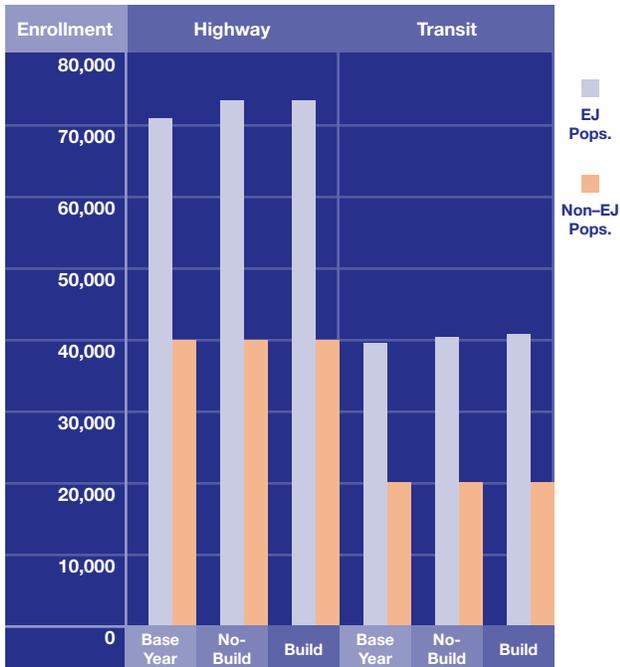
**FIGURE 14-7**

**AVERAGE NUMBER OF SERVICE INDUSTRY JOBS TO WHICH THERE IS ACCESS FOR ENVIRONMENTAL JUSTICE AND NON-ENVIRONMENTAL JUSTICE AREAS IN THE 2000 BASE YEAR, 2030 NO-BUILD, AND 2030 BUILD NETWORKS**



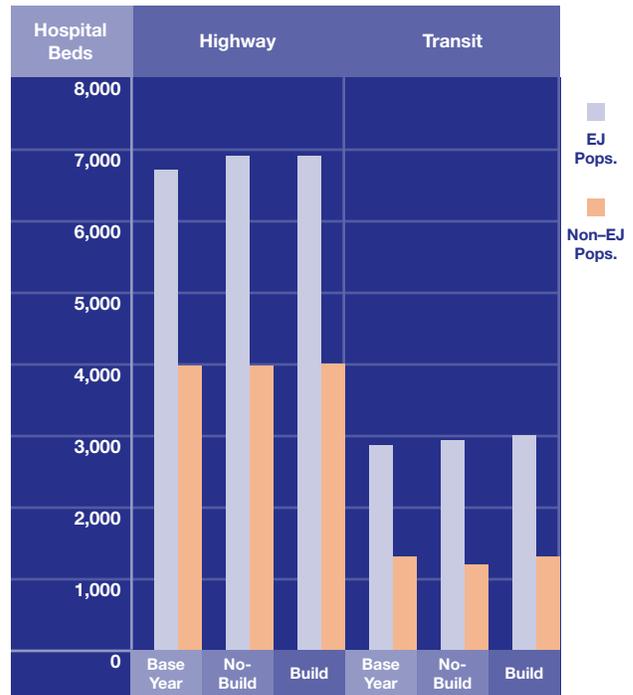
**FIGURE 14-8**

**AVERAGE NUMBER OF COLLEGES (IN TERMS OF ENROLLMENT) TO WHICH THERE IS ACCESS FOR ENVIRONMENTAL JUSTICE AND NON-ENVIRONMENTAL JUSTICE AREAS IN THE 2000 BASE YEAR, 2030 NO-BUILD, AND 2030 BUILD NETWORKS**



**FIGURE 14-9**

**AVERAGE NUMBER OF HOSPITALS (IN TERMS OF BEDS) TO WHICH THERE IS ACCESS FOR ENVIRONMENTAL JUSTICE AND NON-ENVIRONMENTAL JUSTICE AREAS IN THE 2000 BASE YEAR, 2030 NO-BUILD, AND 2030 BUILD NETWORKS**



### Other Mobility, Congestion, and Environmental Analysis Results

Figure 14-10 shows that average transit travel times for attractions and productions are shorter for environmental justice population zones than for non-environmental justice population zones, with generally slight differences between the 2030 networks and the 2000 Base Year network.

Figure 14-11 shows that average highway attraction travel times are longer for environmental justice population zones; however, they are only approximately 30 seconds longer. Average highway production travel times are shorter for environmental justice population zones.

Figures 14-10 and 14-11 show that average travel times are usually longer for the 2000 Base Year network and are usually shorter for the 2030 Build network. 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 14-10**  
**AVERAGE TRANSIT TRAVEL TIMES FOR ENVIRONMENTAL JUSTICE POPULATION ZONES AND NON-ENVIRONMENTAL JUSTICE POPULATION ZONES IN THE 2000 BASE YEAR, 2030 NO-BUILD, AND 2030 BUILD NETWORKS**

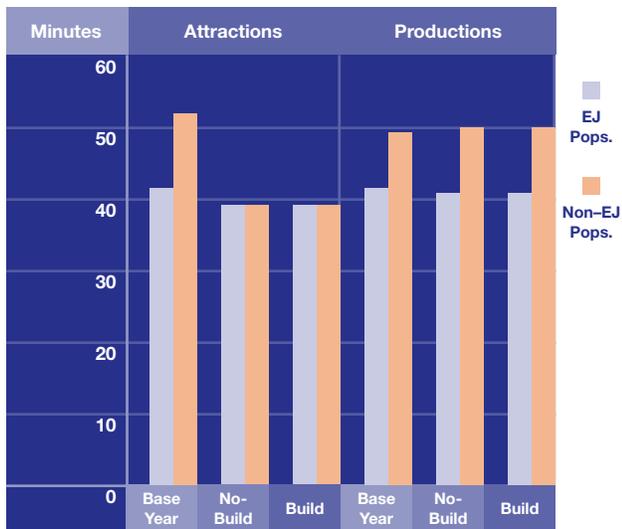
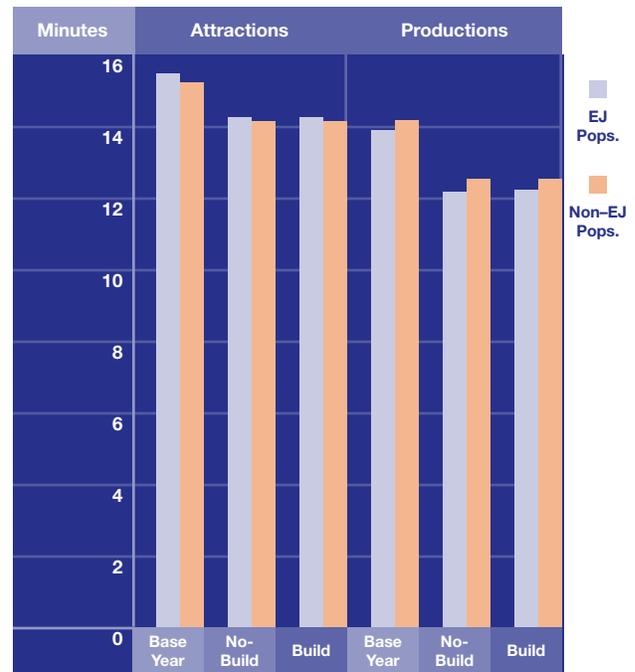


Figure 14-12 shows that average congested VMT is less for environmental justice population zones than for non-environmental justice population zones. It also shows that both of the 2030 networks are estimated to improve conditions over the 2000 Base Year network.

Figure 14-13 shows that average VMT per square mile is greater for environmental justice population zones than for non-environmental justice population zones. However, the difference is less with the 2030 Build network than the 2000 Base Year network, meaning that the disparity decreases with the recommended plan.

Figure 14-14 shows that average CO emissions are greater for environmental justice population zones than for non-environmental justice population zones. However, both of the 2030 networks improve conditions over the 2000 Base Year network, and the difference in average CO emissions between environmental justice population

**FIGURE 14-11**  
**AVERAGE HIGHWAY TRAVEL TIMES FOR ENVIRONMENTAL JUSTICE POPULATION ZONES AND NON-ENVIRONMENTAL JUSTICE POPULATION ZONES IN THE 2000 BASE YEAR, 2030 NO-BUILD, AND 2030 BUILD NETWORKS**

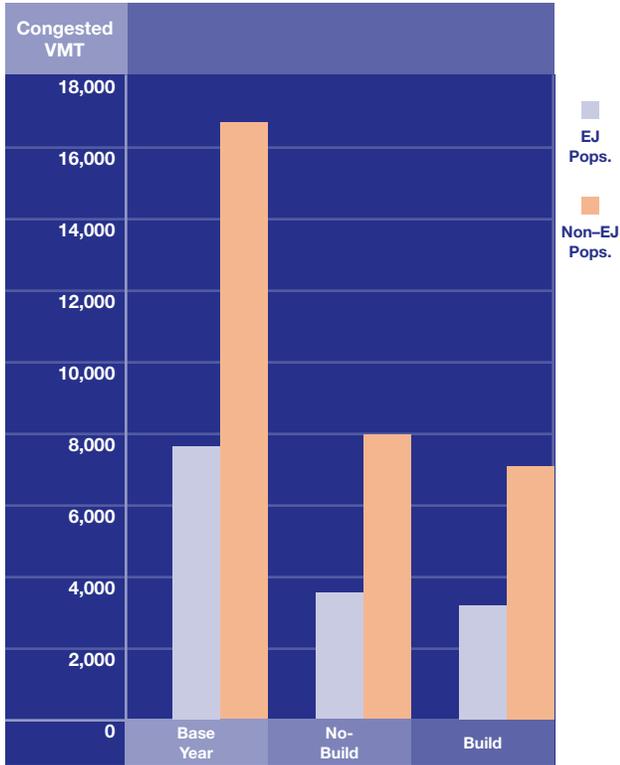


zones and non-environmental justice population zones is less for the 2030 Build network than for the 2000 Base Year network, meaning that the disparity decreases with the recommended-plan.

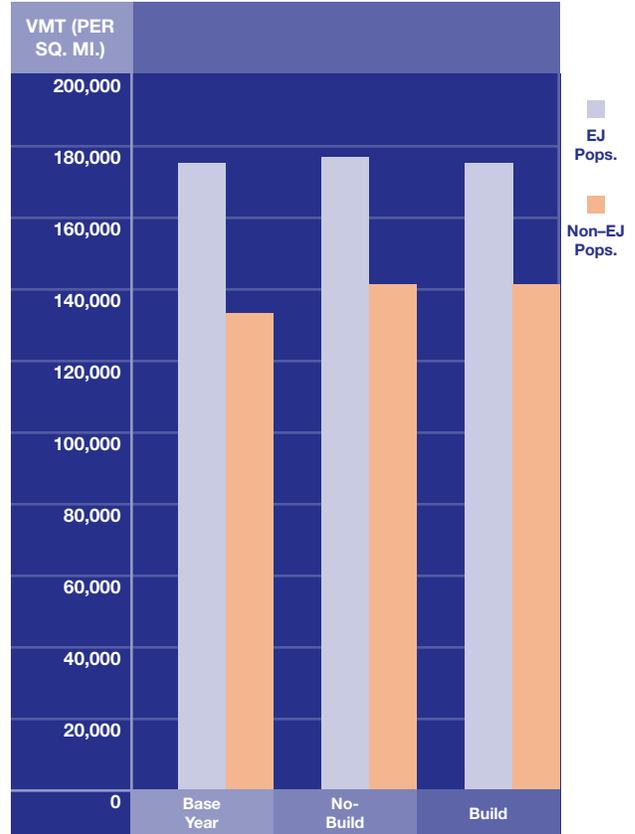
## CONCLUSION

The environmental justice analysis indicates that while the 2030 recommended plan Build network improves accessibility, mobility, congestion, and environmental conditions relative to the 2030 No-Build network for both environmental justice and non-environmental justice areas and both environmental justice-population zones and non-environmental justice-population zones, it benefits environmental justice areas and environmental-justice population zones slightly more. The accessibility portion of the analysis found that the decrease in travel times and the increase in the number of area destinations accessed with the 2030 Build network is more pronounced for transit trips than for highway trips.

**FIGURE 14-12**  
**AVERAGE CONGESTED VMT FOR ENVIRONMENTAL JUSTICE POPULATION ZONES AND NON-ENVIRONMENTAL JUSTICE POPULATION ZONES IN THE 2000 BASE YEAR, 2030 NO-BUILD, AND 2030 BUILD NETWORKS**



**FIGURE 14-13**  
**AVERAGE VMT PER SQUARE MILE FOR ENVIRONMENTAL JUSTICE POPULATION ZONES AND NON-ENVIRONMENTAL JUSTICE POPULATION ZONES IN THE 2000 BASE YEAR, 2030 NO-BUILD, AND 2030 BUILD NETWORKS**



**FIGURE 14-14**  
**AVERAGE CO EMISSIONS PER SQUARE MILE FOR ENVIRONMENTAL JUSTICE POPULATION ZONES AND NON-ENVIRONMENTAL JUSTICE POPULATION ZONES IN THE 2000 BASE YEAR, 2030 NO-BUILD, AND 2030 BUILD NETWORKS**

