A. INTRODUCTION

On February 11, 1994, President Clinton issued Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." This Executive Order is designed to ensure that each federal agency "shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."

Executive Order 12898 also requires federal agencies to work to ensure greater public participation in the decision-making process. To this end, the Second Avenue Subway project has a public participation and community outreach program, described in Chapter 4 ("Public Outreach and Review Process") of this FEIS.

This chapter analyzes the Second Avenue Subway's potential impacts in terms of their effects on minority and low-income populations, to determine whether it has any disproportionately high and adverse impacts on those populations. More detailed information on the methodology used for this assessment is provided in Appendix N. Overall, the new subway would have a positive effect on the communities where it operates, including those with low-income and minority populations. The potential adverse impacts evaluated in this chapter are the temporary but significant impacts associated with the project's construction activities.

B. PUBLIC OUTREACH

The project has included an extensive public outreach program, initiated during preparation of the Manhattan East Side Transit Alternatives (MESA) Study and continuing through the SDEIS and FEIS phases. This effort is ongoing and will continue through the project's design and construction. It has included dozens of meetings with community boards, the public, local and regional organizations, the project's Technical Advisory Committee (TAC) and Public Advisory Committee (PAC), and interested governmental agencies. Meetings have been held with all affected community boards along the alignment, including those with predominantly minority and/or low-income populations. This program is described in more detail in Chapter 4 of this FEIS.

C. METHODOLOGY

The environmental justice analysis for the Second Avenue Subway project follows the guidance and methodologies recommended in the federal Council on Environmental Quality's *Environmental Justice Guidance under the National Environmental Protection Act*, December 1997, and the U.S. Department of Transportation's *Final Order on Environmental Justice*, April 1997. These are summarized below, with more information provided in Appendix N, "Environmental Justice."

CEQ GUIDANCE

The federal Council on Environmental Quality (CEQ), which has oversight of the federal government's compliance with Executive Order 12898 and the National Environmental Policy Act (NEPA), developed its guidance to assist federal agencies with their NEPA procedures so that environmental justice concerns are effectively identified and addressed. Federal agencies are permitted to supplement this guidance with more specific procedures tailored to their particular programs or activities, as the U.S. Department of Transportation (USDOT) has done.

The CEQ's document provides guidance on consideration of Environmental Justice in each phase of NEPA (i.e., scoping, analysis of impacts, issuance of a Record of Decision). The steps to be followed during the NEPA evaluation of impacts are set forth in Appendix N. In brief, the CEQ methodology involves collecting demographic information on the area where the project may cause high and adverse effects; identifying low-income and minority populations in that area using census data; and identifying whether the project's high and adverse effects are disproportionately high and adverse on the low-income and minority populations, in comparison to those on other populations. Any disproportionately high and adverse effects on minority and/or low-income populations should then be one of the factors the federal agency considers in making its finding on the project and issuing a Record of Decision.

USDOT'S FINAL ORDER ON ENVIRONMENTAL JUSTICE

- The environmental justice assessments for the Second Avenue Subway also followed USDOT's Final Order on Environmental Justice, which establishes the procedures for the USDOT to use in complying with Executive Order 12898. The order applies to all of USDOT's operating administrations, including the Federal Transit Administration (FTA). As set forth in the order, FTA must take several steps (defined in Appendix N) to determine whether the project would have disproportionately high and adverse effects on minority and low-income populations. "Disproportionately high and adverse effects" are defined as adverse effects that are predominantly borne by a minority population and/or low-income population or will be suffered by the minority and/or low-income population and are appreciably more severe or greater in magnitude than the adverse effects that will be suffered by the non-minority or non-low-income population.
- In making determinations regarding disproportionately high and adverse effects on minority and low-income populations, mitigation and enhancement measures that will be taken and all offsetting benefits to the affected minority and low-income populations may be taken into account, as well as the design, comparative impacts, and relevant number of similar existing system elements in non-minority and non-low-income areas.

FTA must ensure that any programs, policies, or activities that will have a disproportionately high and adverse effect on minority populations or low-income populations will only be carried out if: 1) Further mitigation measures or alternatives that would avoid or reduce the disproportionately high and adverse effect are not practicable; and 2) A substantial need for the program, policy, or activity exists, based on the overall public interest, and alternatives that would have less adverse effects on protected populations that would still satisfy that need would either have other adverse social, economic, environmental, or human health impacts that are more severe, or would involve increased costs of extraordinary magnitude.

D. PRELIMINARY ASSESSMENT PROCESS

The process used to assess environmental justice for the Second Avenue Subway was based on the guidance documents described above. It consisted of four steps, as summarized below and as described in further detail in Appendix N:

1) Identify Study Areas;
2) Compile Population Characteristics and Identify Locations with Populations of Concern for Environmental Justice;
3) Identify Adverse Effects on Populations of Concern; and
4) Evaluate Project's Overall Effects.

Using this assessment process, a determination is then made of whether the impacts identified in Step 3 are disproportionately high and adverse.

1. IDENTIFY STUDY AREAS

Study areas were determined based on the analyses conducted for the other impact assessments included in this FEIS. The study areas represent areas in which project impacts may occur. This includes the adverse impacts associated with construction as well as the benefits upon project completion. Based on the conclusions of the impacts analyses completed for this FEIS in Chapter 5 through 17, three basic study areas were established: a Project Corridor Study Area, a Shafts/Staging Sites/Study Area, and a Storage Tracks Study Area. These study areas are illustrated in Figures 18-1, 18-2, and 18-3.

No study area for environmental justice was considered for the project's new Broadway Line, since this new service would not result in significant adverse impacts. The Second Avenue Subway project would bring new service to the existing Broadway Line, but this would not require any new construction other than creation of a new entrance to the existing 63rd Street-Lexington Avenue subway station. Thus, this service change would be beneficial, resulting in greater train frequency on the existing Broadway Line in Manhattan and allowing simpler connections between East Harlem/the Upper East Side and West Midtown/the West Side.

Similarly, evaluations of environmental justice were not performed for the potential yard or maintenance facilities under consideration for project use at the 36th-38th Street Yard in Brooklyn, at the Concourse Yard in the Bronx, or at the 207th Street Yard in Upper Manhattan, since the analyses conducted for this FEIS and presented in Chapters 5 through 17 and 19 concluded that the project would not result in any significant adverse impacts on transportation, land use or social conditions, neighborhood character, economic conditions, the visual environment or resources, historic resources, air quality, or noise and vibration at any of these sites.[1] A summary of the conclusions made for each of those possible yards or maintenance facilities follows:

- If new storage tracks are created at 36th-38th Street Yard, these tracks would be located within an existing, active subway storage and maintenance yard. The new storage space would require reconfiguration of some existing activities within the yard, but would not change the yard's relationship with the surrounding area. No noise impacts would occur from this change in the yard's use.

[1] As described elsewhere in this FEIS, expansion of the Coney Island Yard is no longer under consideration.

- If new maintenance facilities are created at Concourse Yard in the Bronx or at the 207th Street Yard in Upper Manhattan, these facilities would be created within existing subway storage yard and maintenance facility complexes. Both Concourse Yard and 207th Street Yard are separated from surrounding land uses: Concourse Yard is sunken below the grade of the surrounding area, while 207th Street Yard is buffered by the wall formed by the existing maintenance shop buildings. In both facilities, the new maintenance operations would not be perceptible from outside the yard and no significant adverse environmental impacts would occur.

The three study areas analyzed—the Project Corridor Study Area, the Shafts/Staging Sites/ Study Area, and the Storage Tracks Study Area—are described below.

PROJECT CORRIDOR STUDY AREA

The Project Corridor Study Area is defined as the area within ½ mile of all stations along the alignment. As described throughout this FEIS, 16 new stations are proposed as part of the Second Avenue Subway project. On average, stations would each be placed approximately 10 blocks apart, from 125th Street in East Harlem south to Hanover Square in Lower Manhattan.

Because surface construction would be required in order to construct each station, temporary significant adverse impacts would occur at all station locations during construction. Tunnel construction would also occur along the same area, also necessitating some surface construction in various locations. This study area was defined to account for the impacts associated with construction of the project's stations and tunnels, as well as the benefits that would accrue on completion of the project.

As described in more detail in Chapter 3, "Description of Construction Methods and Activities," the extent of surface construction required for the stations and tunnels would vary depending on geological conditions at each point along the alignment. Based on existing information, geological and other conditions would permit below-ground tunneling along a portion of 125th Street, at the curve from 125th Street to Second Avenue, between 91st Street and approximately 4th Street, and from Houston Street to the project's southern terminus in Lower Manhattan. This would limit the amount of surface disruption needed along much of the route.

Tunnels would be constructed using cut-and-cover excavation in some limited locations where the alignment is relatively shallow and in soil. This includes several blocks along Second Avenue in East Harlem where connections would be created between tunnel segments that already exist and to create access for portions of mined tunnel, as well as short segments in other areas that are adjacent to stations that must be excavated using cut-and-cover techniques. Some stations could be constructed using a combination of underground mining and cut-and-cover excavation, while others must be excavated entirely using cut-and-cover techniques, depending on geological and other conditions. Each station would have shafts from which soil and rock would be removed.

Generally, areas where tunnels and stations could be constructed underground, using boring and mining techniques, would experience less surface construction than areas where surface excavation is required. The ½-mile Project Corridor Study Area is the area in which impacts from construction of mined tunnels, cut-and-cover tunnels, and stations could occur. It includes

portions of East Harlem, the Upper East Side, East Midtown, Gramercy Park/Union Square, East Village/ Lower East Side/Chinatown, and Lower Manhattan.[1]

SHAFTS/STAGING SITES/STUDY AREA

The Shafts/Staging Sites/Study Area is defined as the area within ½ mile of sites that may be used as staging areas, shafts, and spoils removal locations for tunnel construction; these would be discontinued and restored to their original uses following subway construction. These sites would be centers of concentrated construction activity associated with construction of mined tunnels. Based on the factors identified in Chapter 3 regarding construction needs and environmental priorities, the locations identified as best able to meet all of the construction and environmental requirements for staging areas and spoils removal sites were as follows:

- 96th Street vicinity staging area; 91st Street shaft site and spoils removal area (collectively referred to as the 90s staging and shaft site area);
- 66th Street shaft site and spoils removal area;
- 36th Street vicinity and 33rd Street vicinity shaft site and staging area (collectively referred to as the 30s staging and shaft site area);
- Houston Street vicinity shaft site and staging area; and/or
- Water Street and Pier 6 shaft site and staging area.

The construction activities associated with each of these sites would result in temporary significant adverse impacts on the surrounding community; therefore, a study area of ½ mile around of each of these areas was analyzed. These study areas are within the larger Project Corridor Study Area defined above, and represent areas in which additional construction activities would occur beyond those required for the tunnel and stations. Construction activities at these locations would also generally be of longer duration than construction required for the tunnels and stations. As shown in Figure 18-2, the 90s study area (including both the 96th Street staging area and 91st Street shaft site and spoils removal area) falls in both East Harlem and the Upper East Side, the 66th Street study area is on the Upper East Side, the 30s staging and shaft site area is in both East Midtown and Gramercy Park/Union Square, the Houston Street study area is predominantly in the East Village/Lower East Side/Chinatown, but also falls in Gramercy Park/Union Square, and the Water Street study area is in Lower Manhattan. In addition to the individual construction sites study areas, the analysis in this chapter also considers the overall study area formed by the combination of the five construction site study areas.[2]

At all but the 66th Street shaft site, the construction activities would be located at sites where stations would also be constructed in any case, so that the impacts associated with the activities described in the shafts/staging sites construction areas would occur in addition to the impacts

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[1] The six neighborhood zones roughly correspond to the neighborhood zones presented in Chapter 6, "Social and Economic Conditions." A few minor adjustments to study area boundaries were made to avoid splitting census tracts between neighborhood zones; these are defined in Appendix N.

[2] A shaft would also be required on 125th Street at Third Avenue, adjacent to the new 125th Street Station, to remove spoils associated with a short tunnel segment that would curve to Second Avenue. Given the short length of this curved tunnel, the activities at this shaft site would be similar to those already occurring at the 125th Street station. They would not be of the same intensity or duration as the other five shaft areas listed above, and do not warrant a separate study area in this chapter.

that would occur at all of the station areas, described above. The use of these sites as shaft and staging sites and then for stations would limit the locations where disruptions would occur, but would lengthen the disruption at those locations. In most cases, shaft sites for launching mechanized boring machines are proposed in areas near where stations would also be located, and that would consequently require cut-and-cover construction under any case. Therefore, while the duration of the disturbances would be longer at these shaft sites, the actual construction activities would be comparable to those at station areas along the entire alignment. In contrast, at the 66th Street shaft, the activities would be entirely separate from any construction required to build a station.

STORAGE TRACKS STUDY AREA

In addition to the project's permanent stations and tunnels, permanent underground storage tracks are also under consideration at four locations adjacent to the Second Avenue Subway Line. As described in Chapter 2, these locations are as follows: beneath Second Avenue from 129th to approximately 125th Street in East Harlem; along 125th Street west of Park Avenue to 525 feet west of Fifth Avenue ("125th Street tail tracks"); in parallel tunnels between approximately 21st and 9th Streets ("Midline storage tracks"); and on Water Street south of the Hanover Square Station ("Hanover Square tail tracks"). The final storage track locations will be selected from among these four locations (as well as the 36th-38th Street Yard in Brooklyn).

The Storage Tracks Study Area was developed to consider any impacts associated with construction and operation of the new storage tracks at the four possible Manhattan locations. As described in Chapter 3 of this FEIS, the 125th Street tail tracks and Hanover tail tracks would be constructed using a Tunnel Boring Machine, with surface disturbance limited to a shaft for insertion or removal of the machine. The midline storage tracks would also be constructed via the TBM, although limited areas of drilling and blasting would be needed to connect to the project's main tunnels. The 129th Street storage tracks would be constructed via cut-and-cover construction extending approximately from 122nd Street to 129th Street within the streetbed of Second Avenue.

2. COMPILE POPULATION CHARACTERISTICS FOR STUDY AREAS AND IDENTIFY POPULATIONS OF CONCERN FOR ENVIRONMENTAL JUSTICE

This step first involved using data from the U.S. Census of Population and Housing to determine the population and income characteristics for each of the three study areas defined above. This step was required to identify populations of concern for environmental justice.

For each of the three study areas, population characteristics were compiled from the 2000 *U.S. Census of Population and Housing* using the detailed methodologies provided in Appendix N and the same definitions of population characteristics as those of the U.S. Census Bureau. The following information was collected for each census tract in the study areas, and then aggregated for the two study areas as well:

- *Data on racial and ethnic characteristics:* The population in each census tract in the Second Avenue study area was characterized using the following racial categories provided in the 2000 Census: White, Black, Asian, and "Other." In addition to racial characteristics, the 2000 Census also includes information on Hispanic origin, which is considered to be an ethnic rather than racial characteristic. People of this ethnic category can be any race.

- *Total percentage of minority population:* Because Hispanic residents may be of any race, people who characterized themselves as White, Black, Asian, and Other in the 2000 Census may be non-Hispanic or Hispanic. To determine the total number of minority residents in each census tract, therefore, the number of Black, Asian, Other, and Hispanic Whites were tallied. As set forth in the CEQ guidance, any area where more than 50 percent of its population is minority was considered to be a minority community. In addition, census tracts where the percentage of the population of a particular racial or ethnic group was "meaningfully greater" than in Manhattan as a whole were noted.
- *Low-income population:* The percent of households living below poverty level was used to determine the low-income population in a given census tract. For households, the U.S. Census Bureau defines a household as all people who occupy one housing unit. Accordingly, a household may include both related family members and any unrelated people who share a housing unit. As another measure of low-income status, the median household income was also gathered for census tract and estimates were made of the median income for each neighborhood zone in the Project Corridor Study Area and for each construction site area in the Shafts/Staging Sites/Study Area and the Storage Tracks Study Area.[1] Because the CEQ guidance does not suggest a threshold to be used in identifying low-income populations, areas with a proportion of low-income households that is meaningfully greater than in Manhattan overall were considered to be low-income. In Manhattan, approximately 17 percent of the households live below the federal poverty threshold, so any area with more than 20 percent of its households in poverty was considered to be a low-income area.

PROJECT CORRIDOR STUDY AREA

Total Study Area

In 2000, an estimated 652,500 people lived in the Project Corridor Study Area (i.e., within ½ mile of a proposed station), which is about 43 percent of Manhattan's entire population. This population includes a total minority population of 43 percent, compared with Manhattan's 54 percent. As shown in Table 18-1, the study area included slightly fewer Black (11 percent) and Hispanic (16 percent) residents than Manhattan as a whole (17 percent and 27 percent, respectively), but a slightly higher percentage of Asian residents (15 percent, compared with 9 percent in Manhattan overall). The percentage of households living below the poverty level in 1999 (14 percent) was slightly lower than in Manhattan or New York City as a whole, where 17 and 20 percent of the households, respectively, were below the poverty threshold in 1999. The corridor study area includes 335,000 households, or 45 percent of all households in Manhattan.

The characteristics of the six neighborhood zones in the Project Corridor Study Area are described below and summarized in Table 18-1. Figure 18-4 shows the census tracts where minority populations and/or low-income populations are located. As shown in the graphic, the East Harlem and East Village/Lower East Side/ Chinatown areas are minority and low-income neighborhoods; in addition, three census tracts east of First Avenue in Gramercy Park/Union Square and one in Lower Manhattan are also home to minority and/or low-income populations.

[1] To aggregate these income data for each neighborhood zone level or study area, the weighted average of each census tract's median household income was calculated. Those numbers were used to represent as closely as possible the median household income for the neighborhood zone or study area.

Table 18-1
Population and Economic Characteristics for Environmental Justice Study Areas

Study Area	Population							Economic Profile		
		Race and Ethnicity (%)								
	Total	White[1]	Black[1]	Asian[1]	Other[1,2]	Hispanic[3]	Total Minority[4]	Number of House-holds	Median Household Income ($1999)[5]	House-holds in Poverty (%)[6]
Corridor Study Area										
East Harlem	121,949	24.4	41.9	2.8	29.8	50.1	***91.8***	45,255	$22,255	***35.6***
Upper East Side	207,069	88.2	2.4	6.2	3.3	5.6	15.6	120,978	$81,379	6.3
East Midtown	66,062	83.8	2.0	11.1	3.1	5.1	20.1	42,896	$78,264	6.1
Gramercy/Union Sq.	109,034	76.5	5.9	10.9	6.7	9.8	28.7	61,850	$62,558	10.1
East Village/ Chinatown/ Lower East Side	133,185	40.8	5.1	44.5	9.7	13.5	***64.8***	56,597	$39,703	***21.9***
Lower Manhattan	15,175	71.3	5.4	16.6	6.7	6.6	32.4	7,378	$75,191	9.3
Total, Corridor Study Area	*652,473*	*63.8*	*10.9*	*14.9*	*10.2*	*16.2*	*42.9*	*334,953*	*$62,338*	*13.6*
Shaft/Staging Sites Study Area										
90s Site (E. Harlem and Upper East Side)	114,288	70.5	11.7	6.0	11.8	20.8	38.9[7]	58,126	$67,546	12.6[7]
66th St Site (Upper E. Side)	72,579	89.2	1.4	6.9	2.6	4.8	14.5	44,672	$80,314	5.5
30s Site (E. Midtown, Gramercy/Union Sq.)	74,166	77.2	5.4	12.0	5.4	8.3	27.7	45,253	$65,869	9.1
Houston St Site (Gramer-cy/Union Sq. & E. Village/ Lower E. Side/ Chinatown)	73,604	62.8	4.8	22.3	10.1	13.9	42.4[7]	37,495	$48,527	16.4[7]
Water St/Pier 6 (Lower Manhattan)	10,761	71.7	5.1	16.3	7.0	6.5	32.0	5,155	$78,943	8.9
Total, Construction Sites Study Area	*345,399*	*74.3*	*6.5*	*11.3*	*8.0*	*12.8*	*31.9*	*190,700*	*$66,707*	*10.8*
Storage Tracks Study Area										
129th Street Storage Tracks (E. Harlem)	44,176	21.8	43.7	1.0	33.6	55.7	***96.5***	15,582	$15,051	***42.9***
125th Street Tail Tracks (E. Harlem)	62,136	10.7	69.4	0.8	19.1	29.6	***97.7***	38,539	$18,878	***41.4***
Midline Storage Trks (Gramercy/ Union Sq.)	133,536	76.1	5.7	11.2	7.0	9.7	28.9	75,115	$59,864	11.1
Hanover Tail Tracks	9,286	72.9	4.6	15.5	7.0	6.2	30.7	4,421	$88,548	7.8
Total, Storage Tracks Study Area	*249,133*	*50.1*	*28.3*	*6.9*	*14.7*	*22.7*	***58.1***	*133,657*	*$43,770*	***23.4***
Manhattan	*1,537,195*	*54.4*	*17.4*	*9.4*	*18.9*	*27.2*	***54.2***	*739,167*	*$47,030*	*16.6*
New York City	*8,008,278*	*44.7*	*26.6*	*9.8*	*19.0*	*27.0*	***65.0***	*3,022,477*	*$38,293*	*19.7*

Notes:

1 White, Black, Asian, and Other population may be Hispanic and non Hispanic (see note 3).

2 "Other" includes residents of American Indian, Alaska Native, Native Hawaiian and Other Pacific Islander descent, as well as those respondents who did not identify with any listed racial groups (White, Black, Asian), or who indicated that they are of more than one race defined in the Census.

3 The Hispanic category consists of those respondents who classified themselves in one of the several Hispanic Origin categories in the Census questionnaire. People of this ethnic group may be any race and are listed again in the racial groups (see Note 1).

4 The total minority population includes all Blacks, Asians, Other, and Hispanic Whites.

5 The median income was calculated by taking a weighted average of the median incomes of all census tracts in a study area.

6 Percent of households with incomes below established poverty level. The U.S. Census Bureau using its established income thresholds for poverty levels defines poverty levels.

7 Although this study area does not have an overall population that is minority or low-income (as defined below), it does have a concentration of census tracts with minority and low-income populations, as shown in Figure 18-5.

Bold italic text denotes minority population (more than 50 percent of the residents are minority residents) or low-income population (more than 20 percent of the households are living below poverty).

This table was revised for the FEIS to reflect minor alterations to study areas because of refinements to project elements.

Source: U.S. Department of Commerce, Bureau of Census, *U.S. Census of Population and Housing*, 2000, SF1 for total population, race, and ethnicity; SF 3 for median income, households, and poverty.

East Harlem

In 2000, approximately 122,000 people lived in the East Harlem neighborhood zone, according to the 2000 Census. As shown in Table 18-1 and illustrated in Figure 18-4, the population of East Harlem is overwhelmingly minority (92 percent). Almost half the population of East Harlem is Hispanic, and some 42 percent of the residents of East Harlem are African-American. (As noted earlier, Hispanic residents can be any race, so some of the African-American residents in East Harlem are also Hispanic.) The percentage of people who consider themselves "other" is also relatively high (30 percent). East Harlem is also a low-income community, with 36 percent of its households living in poverty. As shown in Figure 18-4, all but two of the census tracts in the East Harlem neighborhood zone have minority and low-income populations. Consequently, all of the census tracts in the East Harlem zone, and the zone as a whole, are considered populations of concern for purposes of analyzing environmental justice.

East Harlem is an area where residents have higher rates of asthma hospitalizations than elsewhere in New York City—approximately 3,000 hospitalizations per 100,000 persons. The reasons for local disparities in asthma are not known, but may be due to differences in economic status and ethnicity; exposure to different asthma triggers; or access to medical care.

Upper East Side

The Upper East Side neighborhood zone contains an estimated 207,100 people. As indicated in Table 18-1, this neighborhood is not a minority or low-income area, with 16 percent of the neighborhood constituting minority residents and 6 percent of households living in poverty. None of the individual census tracts on the Upper East Side are minority or low-income areas.

East Midtown

The East Midtown neighborhood zone is not a minority or low-income area as illustrated in Table 18-1, and none of the individual census tracts in neighborhood zone are minority or low-income areas. In 2000, 20 percent of this area's estimated 66,000 residents were members of minority groups, and a very small percentage (6 percent) lived below the poverty threshold.

Gramercy Park/Union Square

The Gramercy Park/Union Square neighborhood zone is home to an estimated 109,000 residents, based on the 2000 Census. The population of this neighborhood zone overall is neither minority nor low-income, as shown in Table 18-1. However, as shown in Figure 18-3, three census tracts in this neighborhood zone have low-income and/or minority populations. Tract 28 (between 14th and 9th Streets east of Avenue B) has a population that is 73 percent minority, with almost one-third of the households living in poverty. Tract 34 (just to the east, between First Avenue and Avenue B) is low-income, with some 21 percent of its households living in poverty. Tract 62 (east of First Avenue between 34th and 23rd Streets, and consisting of the Bellevue-NYU Medical Center hospital complex) has a population that is 54 percent minority. The great majority of the population reported in the census for this tract were people living in group quarters (e.g., dormitories, homeless shelters) rather than households. Overall, Tracts 28, 34, and 62 are considered areas with populations of concern for the evaluation of environmental justice.

East Village/Lower East Side/Chinatown

The East Village/Lower East Side/Chinatown neighborhood zone is both a minority and a low-income community. As shown in Table 18-1, approximately 65 percent of this area's 133,200 residents are minority population. The great majority of the residents in this neighborhood (45

percent) are Asian, and another 14 percent are Hispanic. Approximately 22 percent of the households in this neighborhood zone are living in poverty. As shown in Figure 18-3, when considered individually, many of the census tracts in the East Village/Lower East Side/ Chinatown are minority and low-income areas. Almost all of the tracts south of Houston Street and east of Avenue B are minority and low-income areas. Most of these areas have a predominantly Asian population, while others have large numbers of Hispanic residents as well. In two tracts, Tracts 43 and 45, the population is not more than 50 percent minority, but the proportion of Asian residents (31 and 23 percent, respectively) is much higher than the Manhattan level of 9 percent. Most of the same census tracts also have high proportions of low-income residents, as shown in Figure 18-3. Overall, almost all of the census tracts in this neighborhood have populations of concern for environmental justice.

Lower Manhattan

Lower Manhattan's small but growing residential population (which increased by 80 percent between 1990 and 2000) is not a minority or low-income population. As shown in Table 18-1, approximately 32 percent of the 15,175 residents in this neighborhood are minority population and some 9 percent of the households are below the poverty level. As shown in the graphics, only one of the individual census tracts in Lower Manhattan is minority or low-income areas: Tract 319, with a total of 332 residents, has some 23.5 percent of its households living in poverty. Tract 319 consists of Battery Park City and the area along the East River waterfront, so this population most likely consists of transients. In addition, although not minority tracts, two tracts, Tracts 7 and 15.01, do have substantially higher proportions of Asian residents (23 and 21 percent, respectively) than the Manhattan level of 9 percent.

SHAFTS/STAGING SITES/STUDY AREA

The study area for the additional sites needed to construct or operate the project but that would not provide passenger services is shown in Figure 18-2. As shown in Table 18-1, overall, the combined construction study area (i.e., the total of each of the ½-mile zones defined for each of the construction sites) has an estimated 345,400 residents, with a total minority population of 32 percent. Approximately 11 percent of the households in the combined study area are living in poverty. The characteristics of the population in the study areas for each of the five proposed shaft/staging construction locations are described below. Figure 18-5 shows the census tracts where minority populations and/or low-income populations are located.

90s Construction Zone (East Harlem and Upper East Side)

The ½-mile study area for the construction zones for the 96th Street staging area and 91st Street shaft site is located half in East Harlem and half in the Upper East Side neighborhood zone. As shown in Table 18-1, this study area overall encompasses an estimated 114,300 residents. When considered as a whole, this study area is not a minority or low-income area. Approximately 39 percent of the area's residents are minority population and 13 percent are living in poverty. However, as illustrated in Figure 18-5, all but two of the census tracts north of 96th Street are minority and low-income areas. Consequently, approximately half of the 96th Street study area consists of populations of concern for environmental justice.

66th Street Shaft Site and Staging Area (Upper East Side)

The 66th Street shaft site and staging area, located on East 66th Street between Second and Third Avenues, is in the Upper East Side neighborhood. As shown in the table and graphics, the

½-mile study area around this site is not a minority or low-income area and does not include any individual tracts that are minority or low-income areas.

30s Vicinity Shaft Site and Staging Area (East Midtown and Gramercy Park/Union Square)

As shown in Table 18-1, the ½-mile study area around the 30s construction site is not a minority or low-income area. The study area includes one census tract that is a minority area, Tract 62, which encompasses the institutional housing (dormitories and homeless shelter) at Bellevue Hospital and NYU Medical Center.

Houston Street Vicinity Shaft Site and Staging Area (Gramercy Park/Union Square and East Village/Lower East Side/Chinatown)

The ½-mile study area around the East Houston Street vicinity shaft site does not constitute a minority or low-income area. As shown in Table 18-1, 42 percent of these residents are members of minority groups and 16 percent of the households in this area are living in poverty. As shown in Figure 18-5, the southeastern portion of the study area consists of census tracts with minority and low-income populations. These tracts are located predominantly south of Houston Street and east of Avenue B.

Water Street/Pier 6 Shaft Site and Staging Area (Lower Manhattan)

The ½-mile study area for the construction activities at the southern terminus of the project alignment includes most of the Lower Manhattan neighborhood zone and is home to some 10,800 residents. As discussed above, earlier in this chapter, this is not a minority or low-income area. When considered individually, one of the census tracts in the Water Street study area (Tract 319) has a low-income population. In addition, two of the tracts, although not minority tracts, have larger proportions of Asian residents than does Manhattan as a whole.

STORAGE TRACKS STUDY AREA

129th Street Storage Tracks (East Harlem)

The study area for the 129th Street underground storage tracks is located entirely in the East Harlem neighborhood. As shown in Table 18-1, this study area has an estimated population of 44,176 residents, and is a minority and low-income neighborhood. This study area has a minority population of 97 percent, and 43 percent of the households are living in poverty. As shown in Figure 18-6, the ½-mile study area for the 129th Street underground train storage tracks encompasses 12 census tracts, all of which are minority and low-income in character.

125th Street Tail Tracks (East Harlem)

The study area for the underground storage tracks beneath 125th Street is located entirely in the East Harlem neighborhood. It is similar to the study area affected by the 125th Street Station, except that it extends farther to the west, because the tail tracks would be west of the station. As shown in Table 18-1, this study area has an estimated population of 62,100 residents, and is entirely minority and low-income in character.

Midline Storage Tracks Study Area (Gramercy Park/Union Square)

As shown in Table 18-1, the ½-mile study area around the proposed underground storage tracks between approximately 21st and 9th Streets is not a minority or low-income area. This study area encompasses six individual tracts with minority and/or low-income populations. These

include Tracts 28, 34, and 63, described earlier in the description of the Gramercy Park/Union Square neighborhood in the Project Corridor Study Area discussion; and Tracts 30.02, 36.01, and 36.02, located immediately south of Houston Street at the edge of the midtown storage tracks study area. Two of these tracts have low-income populations and the population of the third is both low-income and minority (Asian and Hispanic).

Hanover Square Tail Tracks (Lower Manhattan)

The ½-mile study area for the construction activities associated with the underground storage tracks in this area is the same as that for the Water Street/Pier 6 activities described above.

PUBLIC OUTREACH TO COMMUNITIES OF CONCERN

Executive Order 12898 requires federal agencies to involve the public on project issues related to human health and the environment, and the USDOT's Final Order on Environmental Justice indicates that project sponsors should elicit public involvement opportunities, including soliciting input from affected minority and low-income populations in considering alternatives. As described in Chapter 4 of this FEIS, the Second Avenue Subway project has included a public outreach program in all community boards along the alignment, including those with predominantly low-income and minority populations. For the minority and low-income communities in East Harlem (Community Board 11) and the East Village/Lower East Side/ Chinatown (Community Board 3) that were identified in the project's environmental justice study areas (see above), the following meetings have been held:

- July 31, 2001 with Community Board 11 to discuss 116th Street Station options.
- September 4, 2001 with Community Board 11's Transportation Committee to discuss 116th Street Station options.
- November 7, 2001 with Community Board 3's Transportation Committee to discuss the alignment around Sara D. Roosevelt Park.
- November 15, 2001 with Community Board 3 to discuss the alignment around Sara D. Roosevelt Park.
- February 6, 2002 with Community Board 3's Second Avenue Task Force to discuss constructability issues.
- June 19, 2002 with Community Board 3's Second Avenue Task Force to discuss alignment options between Houston and Canal Streets and construction impacts.
- September 3, 2002 with Community Board 11's Transportation Committee to discuss construction impacts.
- May 20, 2003 with Community Board 3's Transportation Committee to discuss proposed station entrances, including property impacts.
- June 3, 2003 with Community Board 11's Transportation Committee to discuss proposed station entrances, including property impacts.
- June 17, 2003 with Community Board 3's Transportation Committee to discuss proposed ancillary facilities and noise mitigation.
- June 18, 2003 with Franklin Plaza Apartments to discuss 106th Street Station entrances.
- June 26, 2003 with the Regional Plan Association's East Harlem Community Link Initiative/East Harlem Second Avenue Corridor Working Group to discuss future development near Second Avenue Subway stations.

- September 2, 2003 with Community Board 11's Transportation Committee to discuss proposed ancillary facilities and noise mitigation.

3. IDENTIFY ADVERSE EFFECTS ON POPULATIONS OF CONCERN

Once the portions of the three study areas with low-income and minority populations were identified, the project's significant adverse impacts to those areas were considered. As noted above, census tracts with low-income and minority populations are concentrated in East Harlem and the East Village/Lower East Side/Chinatown neighborhood zones in the Project Corridor Study Area, with three additional individual census tracts in Gramercy Park/Union Square and another in Lower Manhattan. For the Shafts/Staging Sites/Study Area, portions of the study areas for the 90s site and the East Houston Street site have low-income and minority populations, although the overall study areas for those two sites do not. For the Storage Tracks Study Area, both the 129th Street storage tracks and the 125th Street tail tracks have study areas that are entirely low-income and minority.

The analysis below takes into account the proposed phasing plan for the project. As described in Chapter 3, since issuing the SDEIS, NYCT has identified a phasing plan for the project that would allow the new Second Avenue Subway to be built and operated incrementally, in four phases, as follows:

- Phase 1: 105th Street to 62nd Street, including the tunnel connection to the 63rd Street/Broadway Line;
- Phase 2: 125th Street to 105th Street;
- Phase 3: 62nd Street to Houston Street, including the 63rd Street tunnel connection to Queens for non-passenger services; and
- Phase 4: Houston Street to Hanover Square tail tracks.

The plan permits portions of the project to operate prior to completion of the entire line, with some service provided within each of the areas upon completion of that construction phase.

In general, the temporary adverse impacts during construction of new stations and the benefits that would result from operation of the project would be distributed evenly throughout the 8.5-mile-long corridor study area, an area that includes populations of concern for environmental justice as well as populations that are not of concern. The significant adverse impacts that would occur to low-income and minority populations are summarized below. These impacts would occur during construction of a particular phase, and the benefits of the project would occur upon completion of that phase.

PROJECT CORRIDOR STUDY AREA

As is described throughout this FEIS (see Chapters 5 through 17), introduction of new subway service and new stations would bring substantial benefits to the East Side, including East Harlem and the East Village/Lower East Side/Chinatown. This benefit would occur as a result of the introduction of new transit service in neighborhoods that currently are not well-served, which particularly includes East Harlem and the East Village/Lower East Side/Chinatown. The benefit would include supporting land uses in the developing retail districts in East Harlem and the Lower East Side.

As detailed in Chapter 12, "Noise and Vibration," the analysis conducted for this FEIS concluded that the new operating subway would result in some significant adverse vibration

impacts where crossovers are planned as well as potential ground-borne noise impacts at other locations. A small number of these locations are in tracts with populations of concern for environmental justice. Standard design features, such as special track fasteners or resiliently supported railroad ties, will be incorporated into the project to minimize vibration or ground-borne noise impacts.

Although the new subway would result in great benefits, the construction activities required for the subway's stations and tunnels would result in temporary significant adverse impacts. As described later in this chapter (see the discussion under item 4, below), these impacts would be associated with the unavoidable disruptions from cut-and-cover construction activities and underground tunneling operations. The impacts that would specifically affect East Harlem and the East Village/Lower East Side/Chinatown, as well as the four other census tracts of concern, are as follows:

- Significant disruption associated with cut-and-cover construction for tunnels and stations. This could occur at all new stations, in the short portions of new tunnels to be built adjacent to the existing tunnel segments along Second Avenue, which extend from 120th to 110th Streets, and 105th to 99th Streets, and at either end of the curved tunnel that connects 125th Street to Second Avenue. A small area of cut-and-cover excavation would also be required within Sara D. Roosevelt Park in the East Village/Lower East Side/Chinatown neighborhood. The most extensive cut-and-cover construction at stations would be at those located in soft soil rather than rock. As described later in this chapter, the construction technique to be used depends on the geological conditions and depth of the tunnel alignment; in East Harlem, the tunnel would be shallow and located in soft soil, requiring use of cut-and-cover to connect to existing tunnel segments and to construct the tunnels on either side of those segments.

- Significant disruption associated with ground improvement or underpinning. This could occur at any location along the alignment. Locations that appear likely to be underpinned near low-income and minority communities include entrance and egress points for each station; alongside any station constructed by cut-and-cover construction; the Metro-North Railroad viaduct at Park Avenue and 125th Street; the alignment along 125th Street, the curve connecting 125th Street with Second Avenue; and locations near existing transit structures, particularly in the Chrystie/Grand Streets area.[1]

- Potential for temporary displacement of residents and businesses at certain locations along the alignment where underpinning requires temporary evacuation of buildings. The greatest such disruption would occur where the tunnel would curve beneath private property between Second Avenue and 125th Street, where residents and businesses could be displaced for up to 12 months. Other serious disruption could occur along Chrystie Street near the Grand Street Station, where construction work would impede vehicle access to businesses for up to four weeks at a time, several times during the construction period.

- Significant disruption near Grand Street, including work in Sara D. Roosevelt Park to allow construction at the existing Grand Street Station on the Ⓑ Ⓓ lines and major work that would affect the Grand Street Station.

[1] As described elsewhere in the FEIS, the Shallow Chrystie and Forsyth Street Options for construction south of Houston Street are no longer under consideration.

- Possible permanent displacement and acquisition of private property to allow creation of off-street entrances to the new subway station and above-ground ancillary equipment. This would occur at all of the 16 station locations.
- Temporary disruptions to service on existing subway lines on nights and weekends to accommodate construction. These disruptions would be timed to minimize disruptions, but some inconvenience would be unavoidable.

SHAFTS/STAGING AREAS STUDY AREA

In addition to the significant disruption that would occur along the alignment and particularly at station locations during the project's construction, five areas would experience additional temporary construction-related disruption associated with surface activities required to support tunnel construction. Four of these sites are at station locations, to take advantage of the excavation activities that would already be occurring there and therefore minimize the total amount of disturbance. In these areas, the same population affected by station construction would also be affected by the additional construction activities proposed. The other site—the 66th Street shaft site—is not located near a station site.

Construction disruption at the various staging/shaft sites/spoils removal locations would be similar in nature to that at the station sites, but would be longer and at times more intense. Significant adverse impacts to land use and neighborhood character, economic conditions, and the visual environment could result from the construction activities at all proposed shaft site/staging area/spoils removal locations.

The significant adverse impacts that would occur at the shafts/staging areas sites that have low-income and minority populations in their study areas are as follows. Please note that the significant adverse impacts to low-income and minority populations that were described in the SDEIS for a possible staging and barge site at 129th Street and the Harlem River have been eliminated, since this site is no longer under consideration for that use.

- 90s Construction Zone (Phase 1). The area between 99th and 91st Streets would be a major center of activity for tunnel construction to the south during Phase 1. Under all cases, a station would be constructed here between 97th and 93rd Streets, and the tunnel boring machine (TBM) would be installed and launched in this vicinity (because the 91st Street vicinity is the northernmost location along the Second Avenue alignment where the rock is at an appropriate elevation to permit TBM tunneling). Spoils would need to be removed from a shaft site in this location as the TBM tunnel work proceeded southward from approximately 91st Street. To support the TBM effort, land for staging of materials, spoils removal activities, and worker access would be required; because of the absence of alternatives, a portion of Playground 96, a public park, is proposed as a staging area to support the construction activities. This site could be used for up to 8 years (this represents a 2-year reduction from the maximum time for such use described in the SDEIS). The use of this park for this extended period would constitute a significant temporary open space impact on the community. Construction activities between 99th Street and 91st Street would affect populations of concern as well as others, as it is located on the boundary between two distinct neighborhoods.
- Houston Street Vicinity Site (Phase 3). Near the Houston Street Station, the rock that starts at approximately 91st Street transitions to soil, necessitating the use of a different type of mechanized TBM. This machine would either be installed or removed in the shaft that would

be created between 4th Street and Houston Street, within the station construction area. Neighborhood character, noise, and visual impacts would result from the increased traffic, noise, congestion, dirt, and construction activities. A gas station at 1st Street and Second Avenue could potentially be displaced during construction, to create a staging area to support the extensive cut-and-cover area required in this area and work associated with the tunnel construction. Because the Houston Street area is highly congested with traffic, the additional traffic generated by shaft site activities could also be problematic. Access to a private school, which would be adjacent to the construction activities on the east side of Second Avenue between 3rd and 2nd Streets, would have to be maintained, and a noise mitigation plan developed to alleviate impacts. The Houston Street site would affect an area that overall does not have a low-income and minority population. As described earlier, many of the census tracts south of Houston Street are populations of concern for environmental justice, but those to the north are not.

STORAGE TRACKS STUDY AREA

Finally, construction of the Second Avenue Subway would also involve disruptive activities required to create new underground storage tracks at certain locations adjacent to the project route. Once these tracks are completed and the subway is in operation, no significant adverse impacts would result from the use of underground storage tracks.

Three of the potential storage yard locations—the 125th Street tail tracks, midline storage tracks, and Hanover tail tracks—would be constructed by underground mining activities and would involve very little surface disruption. The fourth location, roughly between 125th and 129th Streets, would be constructed by cut-and-cover construction in the streetbed of Second Avenue. The activities at 129th Street and 125th Street, which would affect a low-income and minority neighborhood, are as follows.

- 129th Street Storage Tracks (Phase 2). To construct these storage tracks, cut-and-cover construction techniques would be required from 129th Street to approximately 122nd Street, requiring excavation from the surface before a new roof could be installed and the area restored to its existing condition. The construction work would occur within the Second Avenue streetbed. This would result in the kinds of construction impacts typical of cut-and-cover activities needed for station construction. These include disruption to neighborhood character, noise and dust at the nearby Crack is Wack Playground and Harlem River Park, and traffic disruptions in an area between the Harlem River Drive and Triborough Bridge. Please note that the project has been refined as a result of ongoing engineering since issuance of the SDEIS, and Crack is Wack Playground would no longer be directly used by the project's construction.
- 125th Street Tail Tracks (Phase 2). Construction of these new tail tracks would be accomplished using a TBM. A shaft would be created within 125th Street, west of Fifth Avenue, to remove the machinery, and spoils would be removed from the area of the 125th Street Station. At the surface, construction activities associated with the tail tracks would be limited to removal of spoils and delivery of materials for the tunnel, in effect lengthening the spoils removal phase of the 125th Street Station construction.

Other construction activities nearby, including cut-and-cover work, ground improvement, and other protective measures that could be required on 125th Street in association with the new station, could result in relatively extensive disruption in this portion of East Harlem for a number

of years. The potential for cumulative impacts from the combination of the Second Avenue Subway and other projects is discussed in Chapter 19.

4. EVALUATE THE PROJECT'S OVERALL EFFECTS

The project's significant adverse impacts on low-income and minority populations, identified in Step 3, were then compared with the significant adverse impacts that would occur to the general population using the analyses presented in Chapters 5 through 17 of this FEIS. This allowed a determination of whether the significant adverse impacts that would affect low-income and minority populations would be disproportionate (see section E, below).

PROJECT CORRIDOR STUDY AREA

As noted above, the Second Avenue Subway would bring benefits to low-income and minority communities, but its construction would result in significant adverse impacts. These same benefits and impacts would accrue to the entire population of the Project Corridor Study Area. In general, the benefits that would result from operation of the project and the adverse impacts during construction would be distributed evenly throughout the 8.5-mile-long corridor study area, an area that includes populations of concern as well as populations that are not of concern. These benefits and impacts are as follows.

The Second Avenue Subway would result in significant overall benefits to transportation service in the project corridor and on the East Side of Manhattan. It would also support the land use and economic conditions present in the study area by making access more convenient throughout the area. New stations would be created in every neighborhood, providing access to substantial new service for all. The greatest benefit to local land use patterns would be likely in the less densely developed neighborhoods in the Project Corridor Study Area—East Harlem and East Village/ Lower East Side/Chinatown. Except at one area on the Upper East Side and one in East Midtown, stations would generally be distributed evenly, with a distance of up to 11 blocks between station entrances. In addition to the analysis in Chapters 5 through 17 of this FEIS, Chapter 19, "Indirect and Cumulative Impacts," describes the potential for cumulative impacts from the combination of the Second Avenue Subway and other projects.

Once operational, the new subway would incorporate mitigation measures to avoid some significant adverse vibration impacts where crossovers are planned as well as potential ground-borne noise impacts predicted from the operating subway (these are described in more detail in Chapter 12). Operation of the new subway has the potential for vibration and ground-borne noise at levels exceeding FTA's impact criteria at locations throughout the project alignment, but standard design solutions to mitigate these impacts would be incorporated into the project at all locations where significant vibration and ground-borne noise impacts are predicted. The ground-borne noise impacts are concentrated in the areas where the alignment would travel through rock, as opposed to soil. NYCT will be evaluating a range of mitigation options that could ameliorate this adverse impact.

As described in detail in Chapters 5 through 17 of this FEIS, while the new subway would provide a substantial benefit once it is operational, its construction would result in a number of temporary significant adverse impacts. These are as follows:

- Significant disruption associated with cut-and cover construction for stations. Construction activities would result in unavoidable increases in traffic, truck movements, dust and other particulate matter, and noise and vibration in the areas nearby. The associated disruptions to

access and travel patterns, as well as the visual effects from barriers, construction equipment (including nighttime lighting), and activities, would adversely affect the neighborhood character and visual environment of the surrounding areas and could affect business activities during construction. As noted above in the discussion of Step 3, this disruption would occur in low-income and minority neighborhoods. It would also occur throughout the alignment, at all 16 station locations along the alignment, which are evenly distributed throughout every neighborhood and all types of populations. Overall, the impacts that would be created along the entire Second Avenue Subway corridor would be comparable at all locations where stations are proposed, and comparable mitigation would be employed in each case to minimize adverse effects.

While traffic delays and diversions would occur throughout the East Side where construction is occurring, these impacts would be greatest on the Upper East Side and in East Midtown. The worst location would be 34th Street and Second Avenue, where impacts may not be fully mitigatable because of construction constraints. This is not a neighborhood of concern for environmental justice. In addition to affecting regular traffic flows in the areas near station sites, the project's construction activities would also result in trucks traveling to and from those sites delivering materials and hauling away debris. Those trucks would most likely use the most direct route between the station site and the nearest entrance/exit from Manhattan. On the Upper East Side and in East Harlem, trucks would likely use the Triborough and Queensboro Bridges; in East Midtown and Gramercy Park/Union Square, they would travel to and from the Queens-Midtown Tunnel; farther south, they might use the Williamsburg and Manhattan Bridges. A smaller number would travel across town to a Hudson River crossing. If a barge site is established near Water Street in Lower Manhattan, many trucks from operations south of Houston Street would instead travel to that site.

- Significant disruption associated with construction of tunnels. In addition to the impacts associated with station construction, the creation of the new tunnel between stations would also result in some disruption. This would be more noticeable in the locations along the alignment where cut-and-cover construction would be required: predominantly in locations in East Harlem where the tunnel would be connected to the existing tunnel sections, which were built in soil too shallow to allow the use of a boring machine for the connections (for more information, see Chapter 3, "Description of Construction Methods and Activities"). Boring machines would be used throughout the alignment wherever possible, but several other small areas of cut-and-cover tunnel construction would nonetheless be required adjacent to stations that would be constructed using that method. Cut-and-cover construction would result in the same type of disruption as described above for station locations.

- Significant disruption associated with ground improvement or underpinning. The purpose of underpinning and other ground improvement techniques is to protect structures adjacent to construction areas from settlement or lateral movement. This could occur at locations anywhere along the project alignment. General areas where protective measures may be required include the following:

  - Entrance, egress, and ventilation points for each station;
  - Alongside any area constructed by cut-and-cover construction;
  - Locations where the Second Avenue Subway would be constructed near existing transit structures, particularly in the Lexington Avenue 125th Street Station and the Chrystie/ Grand Streets area;
  - The Metro-North Railroad viaduct at Park Avenue and 125th Street;

- Portions of the alignment along 125th Street between Fifth and Second Avenues;
- The curve connecting 125th Street with Second Avenue and between Hester and Canal Streets, where the alignment would be partially beneath existing buildings;
- The 63rd Street curved connection tunnels near the existing bellmouths;
- Portions of the alignment between Fulton and Wall Streets; and
- Potentially beneath utilities at all cut-and-cover construction areas (alternatively, utilities could be relocated).

- Potential for temporary displacement of residents and businesses at certain locations along the alignment for safety purposes or where underpinning requires temporary evacuation of buildings (see Chapter 8, "Displacement and Relocation"). As noted earlier, long-term (up to 12 months) displacement of this nature would occur at 125th Street and Second Avenue, where the alignment would curve beneath private property. Displacement for shorter periods (up to several weeks) might also be required in other locations, although it would be avoided to the extent possible. MTA and NYCT would adhere to established laws and procedures governing relocation.

- Significant disruption of the area between Delancey and Hester Streets in the area of the Grand Street Station. This construction would require use of part of Sara D. Roosevelt Park, with loss of a number of large trees that line the park, as well as some interior trees.

- Possible permanent displacement and acquisition of private property to allow creation of off-street entrances to the new subway station and above-ground ancillary equipment. This would occur at all 16 station locations. Thus, this impact would be distributed evenly along the alignment, in all different neighborhoods.

- Temporary disruptions to service on existing subway lines and Metro-North Railroad on nights and weekends to accommodate construction. These disruptions would be timed to minimize disruptions, but some inconvenience would be unavoidable. Disruptions to subway service would occur to the Lexington Avenue Line trains originating at 125th Street for up to 2 years; the B D, F V, J M Z, and Q W trains near Houston Street for 2 to 3 years; and the A C routes under Fulton Street for up to 2 years).

- Cumulative construction impacts. These would depend on the duration of the construction period and the extent of overlap of construction activities within each phase and between construction phases. If many areas to be constructed during a construction phase were under excavation at the same time (for example the 96th, 86th, and 72nd Street Stations during Phase 1) or if a nearby section of a subsequent phase commences prior to completion of the prior phase, there is greater potential for a cumulative neighborhood-wide or areawide deterioration of conditions (i.e., access, congestion, truck travel, noise, vibration, and visual effects). Thus, impacts would occur throughout the neighborhood zone and/or adjacent neighborhood zones at the same time. Upon completion of each phase the construction within each neighborhood zone would end and construction impacts in that area would cease, minimizing the cumulative impacts that would occur along the project corridor. With a slower construction period and less construction overlap, fewer locations would be affected at any one time, so the land use and neighborhood character impacts would be more geographically limited. However, slowing construction could elongate the overall construction disruption to the East Side and delay the ultimate benefit of having a new full-length subway in place.

SHAFT SITES/STAGING AREAS STUDY AREA

Disruptive construction activities would also be required to stage and manage the construction of the project's below-ground tunnels. These staging and shaft sites would be developed at key locations along the project alignment, such as at locations where the depth of bedrock requires a transition in tunneling techniques from soft soil to rock or vice versa, at locations where easy access to exits from the island for trucks is available, as well as a location along Lower Manhattan's waterfront where barging may be employed to limit the amount of truck traffic required during construction. Several of these staging and shaft sites would be in use for up to 8 years (this represents a 2-year reduction from the maximum time for such use described in the SDEIS).

An investigation was undertaken to identify potential shaft sites and staging areas that might be used for the subway's construction. This investigation is described in detail in the "Final Section 4(f) Evaluation and Section 6(f) Evaluation" included at the end of the main volume of this FEIS. Overall, given the potential for adverse environmental and community impacts at shaft sites and staging areas, identifying sites removed from residences, businesses, and community facilities was a key initial priority. However, despite extensive research, given Manhattan's overall density, finding sites that would not create any environmental impacts or neighborhood disturbance proved to be impossible. Consequently, the investigation team instead focused on finding sites that would create the least disruptive environmental impacts and then explored construction methodologies that would take advantage of the various sites. Generally, the process for identifying potential sites involved listing those sites that appeared potentially viable (i.e., underdeveloped) and then considering a variety of screening factors to choose the best sites.

Construction disruption at the various staging/shaft sites/spoils removal locations would be similar in nature to that at the station sites, but would be longer and at times more intense. Temporary significant adverse impacts to land use and neighborhood character, economic conditions, and the visual environment could result from the construction activities at all proposed shaft site/staging area/spoils removal locations.

Impacts associated with use of the 90s site and Houston Street site (which both have low-income and minority populations in portions of their study areas) are described earlier in this chapter. In addition to those two sites, three additional shaft/staging sites are also being considered, as follows.

- 66th Street Site (Phase 1). While disruptive, spoils removal activities on 66th Street between Second and Third Avenues would be less intense than at the other sites under consideration, because of the shorter duration (approximately up to 4 years)[1] and fewer trucks that would be required to construct the curves connecting to the 63rd Street Line in this area.
- 30s Vicinity Site (Phase 3). Two potential shaft site and staging areas have been identified in the vicinity of the 34th Street Station, where cut-and-cover construction would be required under any circumstance. A shaft site would also be needed in this area because the soil condition is such that the tunnel elevation needs to be shallow to avoid the existing Amtrak tunnels, resulting in a required cut-and-cover excavation at this location in any case. Further, placing a shaft site in this area reduces the amount of truck traffic on Manhattan streets,

[1] As a result of project refinements made during continuing engineering, the length of time for using the shaft site would increase from the two years described in the SDEIS.

since trucks from this activity site could easily access the Queens-Midtown Tunnel without affecting local streets.

The proposed activities would occupy both the western portion of St. Vartan Park and the service road in front of Kips Bay Plaza between 33rd and 32nd Streets for up to 8 years (a reduction of up to 2 years from what was described in the SDEIS.) Part of the sidewalk adjacent to Kips Bay Plaza, as well as part of the 33rd Street roadbed, could be used. Both shaft site operations and the proposed station construction would result in temporary neighborhood character impacts in the surrounding residential area, because the activities would not be compatible with the existing largely residential neighborhood. The 34th Street area already has very high traffic volumes because of the Queens-Midtown Tunnel; therefore, the introduction of more vehicles in this area during station construction would exacerbate existing congestion problems, creating significant adverse impacts that may not be fully mitigatable. However, as noted above, by using the Queens-Midtown Tunnel to remove spoils, traffic volumes on local streets could be minimized.

- Water Street Site (Phase 4). At Water Street and Coenties Slip (near Wall Street) in Lower Manhattan, a TBM could be launched heading north, and a spoils removal site or sites could also be located within this study area. Depending on the shaft site used, spoils could either be trucked to Pier 6 or conveyed to a shaft site on Water Street near Coenties Slip. Once at this shaft site, spoils would be loaded onto trucks or a conveyor and transported to Pier 6 down Gouverneur Lane or Old Slip, or trucked directly to the Brooklyn-Battery Tunnel. Additional cut-and-cover construction could occur along Gouverneur Lane or Old Slip if an underground conveyor is used to transport spoils to Pier 6. The barging facility proposed in the vicinity of Pier 6 would be used to transfer spoils.

STORAGE TRACKS STUDY AREA

Construction of three of the potential underground train storage facilities would involve minimal disruption in the surrounding neighborhood. The 125th Street tail tracks and Hanover Square tail tracks would be constructed via TBM, with excavated material being removed from the nearest station excavation site. The midline storage tracks would require small areas of blasting and otherwise would be built via TBM. This construction would require careful coordination with the nearby New York Eye and Ear Infirmary, to avoid significant adverse vibration impacts to activities within the hospital. The fourth storage tracks area—the 129th Street storage tracks in East Harlem—would require disruptive cut-and-cover activities in a low-income and minority neighborhood. The disruption would be similar to that for other cut-and-cover tunnel segments along the alignment, which include many station locations as well as short tunnel segments.

E. DETERMINATION REGARDING WHETHER ADVERSE EFFECTS WOULD DISPROPORTIONATELY AFFECT POPULATIONS OF CONCERN

As noted earlier in the discussion of methodology, the analysis of environmental justice requires an assessment of whether the project would result in any high and adverse (i.e., significant and adverse) environmental or health impacts on low-income and minority populations, and if so, a judgment of whether those impacts would disproportionately fall on those populations of concern. Following the USDOT's Final Order on Environmental Justice, effects would be disproportionate if they are significant and have an effect on minority and low-income

populations that would be appreciably more severe or greater in magnitude than the adverse effects on the general population or other appropriate comparison group. This analysis should consider the cumulative effects of multiple hazards to the affected group.

Using the conclusions made in Steps 1 through 4 defined in Section D, a determination was made regarding whether or not the project's impacts on populations of concern would be disproportionate. This involved comparing the adverse impacts of the project throughout the study area, to determine the characteristics of the population affected by each impact. Consistent with the USDOT's guidelines for evaluating environmental justice, the evaluation included consideration of cumulative effects on populations of concern of multiple adverse effects; mitigation and enhancement measures and offsetting benefits to the affected minority and low-income populations; and the design, comparative impacts, and relevant number of similar system elements in non-minority and non-low-income neighborhoods. The conclusions of this evaluation are described below. For any disproportionate effects identified, Section F below describes possible measures to mitigate or avoid these adverse effects on low-income and minority populations.

PROJECT CORRIDOR STUDY AREA

Overall, the adverse effects and benefits along the corridor study area associated with construction and then operation of the new subway stations and alignment would affect a wide variety of people, with no disproportionate adverse effect to low-income or minority populations. The transportation benefits would accrue to all residents of the East Side, as would the associated benefits to land use and economic conditions.

As described earlier, the construction technique to be used depends on the geological conditions and depth of the tunnel alignment, but the 8.5-mile-long project alignment includes a variety of geological conditions as well as a mix of population groups in the surrounding study area. Construction impacts would be distributed evenly throughout the corridor, and would not disproportionately affect low-income or minority populations. Cut-and-cover construction activities for the new tunnel would occur predominantly in East Harlem, a low-income and minority community, because of the presence of and need to connect existing tunnels in that area. All neighborhoods would experience cut-and-cover construction activities for new stations, with greater impact occurring in areas where rock is too deep to allow mined stations (generally north of 91st Street and from 4th Street to the Brooklyn Bridge). At all locations where new stations would be created—for which there is a need, and which would eventually result in a substantial benefit—impacts would occur during construction. These unavoidable impacts would generally not be disproportionate, since they would occur over the entire alignment.

SHAFTS/STAGING AREAS STUDY AREA

Excavation of spoils at shaft sites and other activities at staging areas along the alignment has potential for high and adverse impacts, but these impacts would not fall disproportionately on low-income or minority populations. Some of the potential shaft sites/staging areas being analyzed are located in areas with populations of concern, and others are not. As described above, only shaft/staging area evaluated in the SDEIS that was located in an entirely low-income and minority neighborhood (the 129th Street staging/barge site) has been eliminated from consideration. Two sites have study areas with a mix of both minority and low-income areas and areas that are not, and the other three shafts/staging areas have study areas that have no populations of concern for environmental justice. Different shaft sites would be used during each

construction phase, both to reduce the burden on any one neighborhood and to enable operation of portions of the line after completion of each phase. The two sites where the adverse effects would be of the longest duration (up to 8 years) would be the site in the 90s (which is located partially in a population of concern and partially not) and the site in the 30s (not located in a population of concern). The activities that would occur at each of these sites would be similar, including the use of parkland for construction staging. For all of these reasons, the impacts associated with shafts/staging areas study area would not fall disproportionately on any populations of concern. Furthermore, as each staging area would be in use during only one construction phase, with subway service being provided to that area at the conclusion of that phase, impacts would occur to the area that would immediately benefit.

STORAGE TRACKS STUDY AREA

At three of the four locations being considered for new underground storage tracks in Manhattan, construction of new storage tracks would generally not result in significant adverse impacts during construction. Construction activities at only one of the yard sites—the 129th Street storage tracks—would result in significant adverse impacts, since cut-and-cover construction would be required for this facility. This is the only location for storage tracks that would result in significant surface disruption and the only such location that is in a low-income and minority neighborhood, so the impacts of this segment of the project may be considered disproportionate, relative to the impacts of developing the other three storage tracks locations being evaluated. However, in the context of the entire project, where cut-and-cover activities would be located in a wide variety of neighborhoods, such impacts would not be disproportionate. Moreover, since the SDEIS, the overall project has been modified to reduce the amount of disruptive construction in East Harlem, including a reduction to the area affected by the 129th Street storage tracks, including no direct use of Crack is Wack Playground, elimination of the 129th Street barge site, and reduction in the areas where cut-and-cover would occur along 125th Street.

ASSESSMENT OF CUMULATIVE IMPACTS

The guidance documents for environmental justice issued by CEQ and USDOT both indicate that when determining whether disproportionate impacts would occur to low-income or minority populations, cumulative effects must also be considered.

Chapter 19 of this FEIS ("Indirect and Cumulative Effects") describes the cumulative effects that could occur during construction of the Second Avenue Subway. As described there, other construction projects are proposed along the Second Avenue route that could be under construction at the same time as the subway. In portions of the study area that were identified as low-income and/or minority areas for purposes of assessing environmental justice, these include several construction projects proposed by the New York City Department of Transportation (NYCDOT) in East Harlem that could overlap in timing with work on the Second Avenue Subway. As noted in Chapter 19, NYCT would work with NYCDOT to coordinate the different construction projects in this area as well as in other areas. Once construction is complete, the new subway would improve access throughout the East Side, including to the neighborhoods with populations of concern for environmental justice. In addition to providing better access to Midtown and Lower Manhattan, the new subway's connection to Metro-North's Harlem-125th Street Station would also provide improved access to Westchester County and other areas north of the city.

F. MITIGATION OR AVOIDANCE FOR DISPROPORTIONATE EFFECTS

As described in the discussion of methodology at the beginning of this chapter, the USDOT's Final Order on Environmental Justice requires FTA to ensure that any of its actions that would have a disproportionately high and adverse effect on minority or low-income populations only be carried out if 1) further mitigation measures or alternatives that would avoid or reduce the disproportionately high and adverse effect are not practicable; and 2) a substantial need for the action exists and other alternatives that would have less adverse effects on the protected population and would still satisfy the need would either have other adverse effects that are more severe or would involve increased costs of extraordinary magnitude.

During early planning for the project, several potential construction options were evaluated for the area near the Grand Street Station. One of those options, known as the "Shallow Chrystie Option," would have resulted in a potential disproportionately high and adverse effect on low-income and minority populations. Consistent with the USDOT's Final Order on Environmental Justice, the Shallow Chrystie Option was removed from consideration, thereby avoiding a potential disproportionately high and adverse impacts on low-income and minority communities.

As noted above, only one of the four potential storage track options being considered—the 129th Street storage tracks—would result in significant adverse impacts associated with construction activities. Although that option is located in a low-income and minority community, the impacts of this cut-and-cover activity would not be considered disproportionate in the context of all the construction activities required for the full alignment, which include cut-and-cover in a variety of different neighborhoods. Moreover, if this storage yard option is selected, mitigation measures would be employed to alleviate adverse impacts to the extent practicable. These would include use of barriers to block construction noise at nearby parks, and use of traffic management plans to limit the disruption to traffic patterns in this corner of East Harlem.

Mitigation measures to be used throughout all project areas are described throughout Chapters 5 through 17 of this FEIS. These include measures to limit disturbance during construction through the use of barriers, dust suppression, traffic management plans, and community outreach programs. Businesses and residents who must be displaced for the project would be compensated as required by state and federal law. Plans would be developed for identifying suitable replacement facilities for park facilities that must be closed during construction, and all park spaces would be fully restored and trees replanted once the project is complete.

As described in Chapter 1 of this FEIS ("Project Purpose and Need"), there is a substantial need for the Second Avenue Subway. The new subway would significantly improve mobility on the East Side of Manhattan, by reducing overcrowding on the existing Lexington Avenue Line and improving accessibility along the East Side. However, as noted in other chapters of this FEIS, construction of the subway would result in impacts that cannot be avoided, although they can be partially mitigated. ✷