APPENDIX D.2

TRANSPORTATION

A. SURFACE TRANSIT

EXISTING LOCAL BUS SERVICE

This section of the Appendix provides detailed information on existing bus service through the study area. Other information on surface transit, including a description of impacts is provided in Chapter 5C. Table D.2-1 highlights the major corridors through Manhattan's East Side and the key bus routes that operate along them. Over 600 buses operate in the study area during peak hours and, as presented in Table D.2-2, the East Midtown area has the highest volume of peak hour local buses.

Table D.2-1
Overview of Major Bus Corridors and Routes on Manhattan's East Side

Corridor	Key Routes
Fifth and Madison Avenues	M1, M2, M3, M4, M5 (only on Fifth Avenue), and, to a lesser degree, Q32
Lexington and Third Avenues	M98, M101, M102, and M103
First and Second Avenues	M15
York Avenue	M31
Avenues A, B, C, and D	M9, M14, and M21
East Broadway and Madison Street (Lower East Side)	M9 and M22
Allen Street (Lower East Side) and Water Street (Lower Manhattan)	M15

Table D.2-2
Scheduled Local Buses in the Peak Hours

Study Area Zone	AM No. of Buses	PM No. of Buses
East Harlem (M1, M2, M3, M4, M15, M60, M96, M98, M100, M101, M102, M103, M106, M116, and BX15)	183	155
Upper East Side (M1, M2, M3, M4, M15, M30, M31, M66, M72, M79, M86, M96, M98, M101, M102, M103, M106, Q32, Q60, and Q101)	267	214
East Midtown (M1, M2, M3, M4, M5, M15, M16, M21, M27, M30, M31, M34, M42, M50, M57, M98, M101, M102, M103, M104, Q32, Q60, and Q101)	360	265
Gramercy Park / Union Square (M1, M2, M3, M4, M5, M6, M7, M9, M14, M15, M16, M21, M23, M34, M98, M101, M102, M103, and Q32)	255	216
Lower East Side (M1, M2, M3, M5, M6, M7, M8, M9, M14, M15, M21, M22, M101, M102, M103, and B39)	191	156
Lower Manhattan (M1, M6, M9, M15, M20, M21, M22, M103, and B51)	91	78
Source: 2000 Bus Route Profiles		

Frequency of bus service is generally high, with scheduled headways (the time between buses) on some routes as low as 1.5 minutes during the peak periods (e.g., on the M15 in the AM peak). The M15 bus route has one of the highest bus frequencies since it is the only bus route that operates locally on First and Second Avenues. Crosstown bus service frequency is highest among the East Midtown and Upper East Side bus routes, generally ranging between 2 and 10 minute headway. One exception is the M14 route that operates along 14th Street at 1.5 minute headways during the AM peak period. One reason for this high service frequency is that it incorporates all of the M14 bus routes that serve Avenues A, C, and D through the Lower East Side. Tables D.2-3 and D.2-4 provide a summary of bus headways for key north-south and east-west routes in the study area.

Table D.2-3
NYCT Local Bus Routes: Bus Headways for Key North-South Routes

Routes	Weekday Service				Saturday
	AM (min)	Midday (min)	PM (min)	Evening (min)	Midday (min)
North-South Routes					
M1: Fifth/Madison Avenues	4.5	8	3.5	9.5	9.5
M2: Fifth/Madison Avenues/Powell Blvd.	6	8.5	6	9	9.5
M3: Fifth/Madison Avenue/St. Nicholas Avenue.	8.5	8.5	7.5	9	9.5
M4: Fifth/Madison Avenues/Broadway	3	7.5	3.5	9.5	7.5
M5: Fifth Ave./Ave. of Americas/Riverside Drive	5.5	10	8.5	10	9
M6: Seventh Ave./Broadway/Ave. of Americas	15	9	8.5	15	9
M9: Avenue B/East Broadway	8.5	15	12	30	20
M15: First/Second Avenues	1.5	3	2.5	5	3.5
M31: 57th Street/York Avenue	2	8	4	8.5	10
M98: Washington Heights – Third/Lexington Aves.	6	—	7.5	20	—
M101: Third/Lexington/Amsterdam Aves.	4	6	5	7.5	10
M102: Third/Lexington Avenues/Malcolm X Blvd.	10	10	10	10	12
M103: Third/Lexington Aves.	10	12	10	10	10
B51: Brooklyn Fulton Mall – Lower Manhattan	15	30	12	30	—

Note: "—" Indicates that there is no service.
Source: 2000 NYCT Bus Route Profiles

NYCT EXPRESS BUS SERVICE

In addition to the local bus service described above, New York City Transit (NYCT) operates two express bus routes within the East Side of Manhattan—X25 and X90,—on weekdays only. The X90 provides bus service from the residential sections of the Upper East Side to the Financial District. All express bus routes operate southbound in the AM peak period and northbound in the PM peak period, generally at 10- to 20-minute headways. NYCT also operates five express bus routes from Brooklyn into Manhattan, four routes from Queens, and 24 routes from Staten Island. These buses generally operate at headways ranging from 5 to 30 minutes and travel to the Lower Manhattan and/or Midtown Manhattan commercial districts.

Table D.2-4
NYCT Local Bus Routes: Bus Headways for Key East-West Routes

Routes	Weekday Service				Saturday
	AM (min)	Midday (min)	PM (min)	Evening (min)	Midday (min)
East-West Routes					
M8: 8th/9th Streets	10	10	10	20	20
M14AD: 14th Street/Avenues A, C, and D	1.5	3	2.5	4	3.5
M16/M34: 34th Street	4	5.5	4	9	6.5
M21: Houston Street/Avenue C	15	20	15	30	20
M22: Madison/Chambers Streets	7.5	15	12	15	12
M23: 23rd Street	4.5	6.5	5.5	9	8
M30: 57th/72nd Streets	6	—	12	12	—
M42: 42nd Street	1.5	5	3.5	11	9.5
M50/M27: 49th/50th Streets	2	6	4.5	7.5	10
M57: 57th Street	8.5	10	8.5	10.5	10.5
M60: 125th Street	12	15	12	12	12
M66: 66th/67th Streets	5	8.5	5	8	9.5
M72: 72nd Street	12	12	12	15	11
M79: 79th Street	3.5	6.5	5	8	7.5
M86: 86th Street	3	5	4	6	6.5
M96: 96th Street	3	6	4	8.5	8.5
M100: 125th Street	10	10	10	12	10
M104: Broadway/42nd Street	3.5	5	3	5.5	4.5
M106: 96th/106th Streets	30	30	30	30	30
M116: 116th Street	4.5	15	5	20	15
BX15: 125th Street	6.5	8.5	8.5	11.5	8.5
B39: Delancey Street	15	15	12	20	12
Q32: Penn Station – Jackson Heights	6.5	10	6	8.5	8.5

Note: "-" indicates that there is no service.
Source: 2000 NYCT Bus Route Profiles

PRIVATE EXPRESS BUS SERVICE

New York City Department of Transportation (NYCDOT) has granted express bus franchises to various private companies to provide express bus service from parts of the Bronx, Brooklyn, Queens, and Staten Island into the Manhattan CBD. Service is provided either to Midtown or to the Wall Street area, although some bus routes provide service to both destinations. Non-franchised commuter service from Staten Island generally travels through New Jersey to Manhattan via the Holland Tunnel. Express bus service is also provided into Manhattan from several areas outside of New York City, including Westchester County and Suffolk County.

BUS TRAVEL TIMES AND SPEEDS

Bus speeds are negatively impacted by street congestion and the frequency of bus stops. Table D.2-5 presents average bus speeds by route, for both weekdays and Saturdays at noon. Bus speeds are generally 10 to 20 percent lower than speeds for other vehicles. Buses providing regular service generally operate at speeds in the 5 to 7 mile per hour (mph) range, while limited-stop buses, which provide service to selected bus stops spaced about every eight to 10 blocks, operate in the 7 to 10 mph range. Only the dual bus lanes on Madison Avenue appear to

have successfully improved overall bus speeds compared to regular bus lanes. Immediately after the lanes were implemented, speeds during the PM increased 80 percent.

A common condition affecting bus operations is "bus bunching," where after a long period when no buses arrive at a specific bus stop, several buses arrive within minutes or even a few seconds of each other. Several factors contribute to bus bunching, including the high frequency of service, high passenger volumes using the buses which can cause long delays at individual bus stops, overall traffic congestion on the avenues which decreases bus speeds, and illegal parking.

BUS SCHEDULE GUIDELINES

NYCT "Local Bus Schedule Guidelines" are designed to ensure that there are enough buses on a given route to accommodate riders during a particular time period. Guidelines have been developed for both "feeder" routes (i.e., routes on which most of the passengers have a common origin or destination) and "grid" routes (which are characterized by a series of significant on/off activities). Most of the local bus routes in the study area are grid routes. The grid route schedule guidelines indicate that buses are expected to accommodate up to a maximum of 60 people (approximately 1.5 times seated capacity) on standard 40-foot buses and 85 people on articulated buses during the peak periods.

Consistent with these guidelines, three levels of loading standards have been developed for NYCT buses: seated (less than 40 passengers on a bus); standing (between 41 and 60 passengers per bus, or up to the service guideline of a maximum of 60 passengers per bus, as indicated earlier); and overcrowded (more than 60 passengers per bus).

Ridership data obtained from the 2000 NYCT Route Profiles and limited observations of bus crowding conditions indicate that the major north-south routes—which are the primary focus of this study because they transport passengers in the same general directions that Second Avenue Subway service would offer—are characterized by high frequency of service and high ridership levels.

The M15 bus route provides local service on First and Second Avenues. As the M15 has the highest number of passengers of any route, more trips are scheduled on the M15 bus (39 trips) during the AM peak hour than on any other bus route in the study area. With an average per-trip load guideline of 60 passengers (the maximum allowable), the capacity rating for the M15 bus is 82 percent. The service capacity rating in the PM peak hour is 76 percent.

The M101, M102, and M103 routes have the next highest number of riders in the AM peak hour, with over 1,200 passengers. The M101, M102, and M103 buses have a capacity rating of 84 percent in the AM peak hour and a rating of 92 percent during the PM peak hour.

B. VEHICULAR TRAFFIC

Following is supporting information for the Existing Conditions and Construction Impact sections of the Vehicular Traffic chapter (Chapter 5D). The Existing Conditions portion discusses the street and roadway network for the five study zones, provides an overview of traffic trends, specifies truck routes, and summarizes major street traffic volumes and travel speeds. The Construction Impacts section provides level of service summary tables for each study zone during the construction phase.

Appendix Table D.2-5
NYCT Local Bus Routes Average Bus Speeds for Key Routes

Routes	Midday	
	Weekday	Saturday
North-South Routes		
M1: Fifth/Madison Avenues	5.7	9.2
M2: Fifth/Madison Avenues/Powell Boulevard	6.5	6.6
M3: Fifth/Madison/St. Nicholas Avenues	5.8	6.7
M4: Fifth/Madison Avenues/Broadway	5.6	6.9
M5: Fifth Avenue/Avenue of the Americas/Riverside Drive	6.7	7.0
M6: Seventh Avenue/Broadway/Avenue of the Americas	4.7	6.1
M9: Avenue B/East Broadway	5.5	6.6
M15: First/Second Avenues	5.3	6.4
M31: 57th Street/York Avenue	5.8	6.3
M98: Washington Heights/Lexington Avenue	12.2	NA
M101: Third/Lexington Avenues	5.4	6.7
M102: Third/Lexington Avenues	5.9	6.5
M103: Third/Lexington Avenues	5.4	6.6
M104: Broadway	5.4	5.6
East-West Routes		
M8: 8th/9th Streets	6.0	6.2
M14AD: 14th Street/Avenues A, C, and D	5.0	5.4
M16/M34: 34th Street	4.6	6.4
M21: Houston Street/Avenue C	6.1	7.7
M22: Madison/Chambers Streets	4.6	4.8
M23: 23rd Street	4.7	5.5
M30: 57th/72nd Streets	4.4	NA
M42: 42nd Street	5.0	6.5
M50/M27: 49th/50th Streets	4.9	5.5
M57: 57th Street	5.3	5.8
M60: 125th Street	10.9	11.8
M66: 66th/67th Streets	4.9	5.9
M72: 72nd Street	4.9	6.8
M79: 79th Street	5.2	6.2
M86: 86th Street	4.8	6.6
M96: 96th Street	4.3	4.9
M100: 125th Street/Amsterdam Avenue	5.1	6.8
M106: 106th Street	6.1	6.8
M116: 116th Street	6.5	6.8

Notes:
Bus speeds measured at noon.
All speeds indicated in miles per hour.
Source: 2000 NYCT Bus Route Profiles

EXISTING CONDITIONS

STREET AND ROADWAY NETWORK

The following is a general overview of the character of the street and roadway network in each of the five zones.

East Harlem

East Harlem is mostly residential, and traffic moves through the area to employment points located farther south in Manhattan. The key roadway is the 125th Street corridor, lined with Harlem's largest concentration of commercial stores, and connected to points east via the Triborough Bridge at Second Avenue. Travel along 125th Street is slowed due to frequent shopper-related double parking, which often reduces street capacity to a single moving lane. Metro-North's 125th Street Station is situated at Park Avenue.

Upper East Side

The Upper East Side is bounded on the north by 96th Street and on the south by 60th Street. Major avenues connect traffic to and from the East Midtown core just south of 60th Street. Trucks making deliveries to the many retail and commercial establishments lining the avenues typically slow north-south traffic flows. Central Park transverses at 86th, 79th, and 65th/66th Streets serve east-west travel and are also heavily used by NYCT bus routes. Significant land uses of note in the area that generate the bulk of traffic trips are high-density residential uses and the Museum Mile on Fifth Avenue.

East Midtown

East Midtown contains the core of the eastern portion of Manhattan's CBD. It carries the highest traffic volumes in the study area, and has several distinguishing geometric features. Each of the area's north-south avenues has slightly different functions in processing vehicular traffic. Fifth and Madison Avenues act as a one-way pair for a significant amount of commuter and local bus traffic traveling directly into Manhattan's center. Park Avenue carries a significant amount of taxicabs destined to and from Grand Central Terminal (GCT) at 42nd Street. Lexington and Third Avenues are used as a north-south pair for a number of NYCT buses, and First and Second Avenues, situated to the east and out of the densest commercial areas, process a significant volume of through traffic, including the heavily utilized M15 bus route. Also of note are a number of key east-west arterials (e.g. 57th, 42nd, 34th Streets) that carry vehicles across the borough. Travel along 42nd and 34th Streets is slowed by difficult traffic signal progressions, but are generally considered better for through traffic than the narrower one-way crosstown streets.

Major traffic generators in East Midtown include: the Queensboro Bridge ramp system that intersects with a number of avenues and cross streets, the United Nations along First Avenue, Grand Central Terminal at 42nd Street, and the entrance and exit to the Queens-Midtown Tunnel. The Queensboro Bridge has a number of ramps in Manhattan that process traffic, although currently only those that access the upper level via 58th and 57th Streets are reversible. The Queens-Midtown Tunnel operates with four lanes (two in each direction), one of which is a reversible lane during peak periods, processing westbound traffic into Manhattan during the AM and the reverse in the PM. Along the entrance routes to both the Queensboro Bridge and Queens-Midtown Tunnel, vehicles queue, often requiring traffic enforcement agents to prevent gridlock.

Gramercy Park/Union Square

Traffic volumes in the Gramercy Park/Union Square area are lower than in the East Midtown area since the neighborhoods in this study zone (e.g. Stuyvesant Town, Peter Cooper Village, and Gramercy Park) are more residential in nature. The major traffic generators in this area, which is bordered by 34th Street to the north and 10th Street to the south, are hospitals, such as

Bellevue Hospital, NYU Medical Center, and the Veterans Administration Hospital along First Avenue between 23rd and 34th Streets. Between 23rd and 14th Streets are Beth Israel Medical Center, Cabrini Medical Center, and the Hospital for Joint Diseases.

Lower East Side

A regular street grid north of Houston Street characterizes the primarily residential Lower East Side zone. However, the area to the south is marked by irregular and odd-angled intersections that are difficult to travel through. This part of the study area processes large amounts of through traffic between the East River crossings and commercial areas north and south. Key travel corridors include: First and Second Avenues, which act as a one-way street pair through the area; Broadway, Manhattan's central southbound spine; Allen Street; the Williamsburg Bridge; and the FDR Drive.

Lower Manhattan

Lower Manhattan is characterized by an irregular grid pattern south of Canal Street. Except for a few major arterials, most streets within the area are narrow with usually just one moving lane. Travel is time-consuming and slow along them. Pedestrian traffic often overflows into the street, further impeding vehicular traffic flow. Water Street and Broadway are the two key north-south streets in this area, and each carries two or more effective travel lanes; yet they are often difficult to negotiate due to frequent double-parked truck traffic. The FDR Drive begins its path to the northern tip of Manhattan along the East River at the Battery.

The Wall Street/Financial District commercial hub, City Hall, and the Staten Island Ferry at Manhattan's southern tip are the most significant activity generators affecting traffic flow in Lower Manhattan. The “superblock” configuration of City Hall cuts off east-west through flow on Warren Street, Murray Street, and Park Place, and renders travel through this area difficult. During the morning rush hours, the Staten Island Ferry unloads from 4,000 to 6,000 pedestrians into the immediate area, causing vehicular traffic to come to a standstill for minutes at a time.

OVERVIEW OF TRAFFIC TRENDS

Traffic volumes entering Manhattan have increased from the late 1940s to 2000. The 10-year traffic growth rate for the past decade on the study area crossings is 1.3 percent per year, a higher rate than the previous two decades. This was due, in part, to the recovery of the city’s economy in the 1990s since its low point during the 1970s. Currently, there are more than 1.9 million Manhattan vehicle crossings per day.

These traffic volume increases are occurring during periods just before and after the normal commuter peak periods when the roadways have additional reserve capacity. Many of the approach roads to and from the river crossings operate at or near capacity during the AM and PM peak commuter hours and cannot accommodate a significant increase in traffic. Figure D.2-1 illustrates the total historical volumes at Manhattan bridges and tunnels in the study area between 1948 and 2000.

Traffic enters and exits the study area either from the West Side, from the various bridge and tunnel crossings along the eastern edge of Manhattan, or from the north end of Manhattan. A review of the most recent 2000 “New York City Bridge Traffic Volumes” crossing data indicates that, overall, about 955,000 vehicles used the East River/Harlem River crossings each day. Within the peak hour, between 30,000 and 35,000 vehicles enter and exit the nine bridges and tunnels in the study area in the peak direction. (The Willis and Third Avenue Bridges are

considered as one paired bridge.) No single crossing carries more than 19 percent of the study area's river crossing traffic, and, except for the lightly used Madison Avenue Bridge (5 percent), all other crossings carry between 7 and 15 percent of the total crossing volume. The most heavily used crossing is the Queensboro Bridge, which processes approximately 91,500 vehicles per day per direction (19 percent of the total crossings in the study area). The second-highest crossing is the Brooklyn Bridge, which processes about 73,800 vehicles per day in each direction (15 percent of the total crossing volume). The Williamsburg Bridge and the Triborough Bridge each process some 95,000 to 105,000 vehicles per day, each accounting for 11 percent of the East River/Harlem River crossing traffic. The Third Avenue, Willis Avenue, and Manhattan Bridges and the Queens-Midtown Tunnel process about 73,100 to 80,900 vehicles per day, each accounting for 8 percent of the East River/Harlem River crossings.

The portion of the study area south of 60th Street, including East Midtown, the Lower East Side, and Lower Manhattan, is part of the Central Business District (CBD), which is one of the most densely concentrated commercial and office areas in the world. Hundreds of thousands of vehicles enter and leave the area each day, with almost half the vehicles entering the CBD at the 60th Street screenline.

Within the CBD, the 8-9 AM peak hour, most travel is into Manhattan. This traffic is mainly composed of motorists driving to work, buses providing mass transit access, and commercial vehicles making deliveries, with a small amount of traffic traveling completely through the area. Figure D.2-2 shows the traffic volumes entering and leaving the CBD in the AM peak hour for 1998. As expected, most of the traffic is entering the area, although traffic volumes in the Holland Tunnel are close to a 50/50 directional split. The entry portal with the highest total volume is the 60th Street “screenline” (also known as a cordon line, it is a “line” across which traffic volumes are counted). Over 40 percent of the traffic entering the CBD area crosses 60th Street.

In the 5-6 PM peak hour, most vehicles are leaving the CBD. Figure D.2-3 depicts the traffic volumes entering and leaving the CBD in the PM peak hour. Approximately 55,000 vehicles leave the CBD during this hour, and over 44,000 vehicles enter the area. The traffic flows at both the Brooklyn Bridge and the Holland Tunnel are at approximately a 50/50 split with slightly more vehicles entering than leaving at the Holland Tunnel.

Twenty-four hour volumes entering and leaving the CBD are presented in Figure D.2-4.

Traffic volumes crossing a screenline at 60th Street are shown for the AM, PM, and 24-hour periods in Figure D.2-5. The FDR Drive, a three-lane per direction limited-access roadway, carries more traffic than any other road in the study area during all three time periods. Second Avenue is the busiest of the avenues entering the CBD area in the AM peak hour, while First Avenue carries the highest volume of traffic for an avenue leaving the area in the PM peak hour. Both avenues carry traffic, particularly truck traffic, which generally travels around the edge of the CBD’s core.

MAJOR STREET TRAFFIC VOLUMES

Traffic volumes vary widely along the major north-south routes in the study area, from up to 3,000 to 4,000 vehicles per hour (vph) in some high-density sections to only several hundred per hour in other less dense areas. Volumes are at their peak in the East Midtown area.

Volumes are highest during the AM and PM peak commuter periods. The upper graph on Figure D.2-6 shows volumes crossing the 60th Street screenline for the years 1986 and 1998. The data

show that traffic volumes *before* the AM peak period and *after* the PM peak period are higher in 1998 versus 1996, indicating that the duration of the peak period is becoming longer to accommodate the increased vehicular demand. Vehicle flows build in the early morning periods before 6 AM, increase dramatically in the 6-9 AM period, and drop off slightly in the mid-morning hours. There is a minor increase during midday caused by delivery traffic that continues to build to the late afternoon commuter peak, usually 5-7 PM, before gradually decreasing to low levels in the overnight periods. It is important to note that peak volume levels are maintained fairly consistently over many hours of the day, from close to 7 AM until and through much of the nighttime hours. The lower graphs on Figure D.2-6 show vehicle volumes and transit ridership data on a percent basis. As expected, transit has sharp peak usage that varies greatly from automobile usage.

Specific descriptions of the major avenue traffic flows and unique transportation features follow.

Fifth Avenue

Fifth Avenue is a one-way southbound street from 138th Street in East Harlem to Washington Square Park. North of 60th Street, Fifth Avenue has four travel lanes; south of 60th Street, an additional travel lane is available. As Fifth Avenue provides a central corridor through the CBD, it carries a substantial volume of bus traffic (160-170 buses per hour) during the morning inbound peak period. Fifth Avenue is also intensely used during the evening peak period.

During the AM peak period, traffic volumes increase steadily from 600 to 700 vph in East Harlem to 1,200-1,500 vph on the Upper East Side, to their maximum of 2,100 vph between 42nd and 57th Streets. South of 42nd Street, volumes begin to steadily decrease from 1,500 vph near 34th Street to less than 700 vph south of Madison Square Park (23rd Street). During the midday periods, traffic flows along Fifth Avenue peak in Midtown at 1,400-1,600 vph and this level is maintained below 23rd Street as the avenue is used as a key delivery route. During the PM peak period, traffic volumes follow a pattern similar to that occurring earlier in the day, although the intensity of traffic volumes is slightly less than in the AM peak period.

Madison Avenue

Madison Avenue extends from 23rd Street to the 135th Street Bridge into the Bronx as a one-way northbound street. It forms a street pair with Fifth Avenue. South of 42nd Street, Madison Avenue provides four lanes for traffic (usually three lanes are moving lanes). North of 42nd Street, the avenue widens to a total of five lanes. Of note in this section are the dual bus lanes between 42nd and 59th Streets, which operate during the afternoon peak period to accommodate heavy northbound bus volumes. During this period, all lanes are maintained as moving travel lanes (with no parking lanes) to maximize capacity.

During the morning and midday peak periods, Madison Avenue carries modest traffic volumes compared with neighboring avenues, with volumes building to a Midtown peak of about 1,600-1,800 vph in the East 50s. The avenue is also used as a "deadhead" route for empty express buses returning to their depots, with some 300 empty buses recorded during the weekday 7-9 AM period. In the Upper East Side and East Harlem, volumes of 1,000-1,200 vph are consistently maintained in the AM and midday peaks. During the PM peak period in East Midtown, traffic volumes are in the 1,100-1,350 vph range, with an additional 160-170 buses per hour carried in the dual bus lanes.

Park Avenue

Park Avenue is one of the few two-way avenues in Manhattan. It has two sections separated by GCT. North of GCT, it has three moving traffic lanes in each direction for most of its length into East Harlem. No buses travel along the section of Park Avenue north of GCT. South of GCT, Park Avenue/Park Avenue South narrows, usually with only two moving lanes available in each direction. A few bus routes use it as part of their run. A raised two-lane elevated roadway that wraps around GCT and touches down at 46th and 40th Streets connects the two sections. Commercial traffic is prohibited from using Park Avenue as a through route.

Southbound traffic volumes in the northern section of Park Avenue are higher during the morning, ranging from about 700 vph in East Harlem to 1,800-2,000 vph near GCT. South of GCT, southbound traffic volumes initially decrease to about 600 vph between 40th and 30th Streets, and then increase to about 1,000 vph in the Union Square area. Midday traffic volumes are balanced in both directions of Park Avenue south of 60th Street, ranging from a 1,600 vph peak above GCT to 1,000 vph or less south of GCT. During the PM peak period, Park Avenue carries some 1,500-2,000 vph northward of East Midtown. South of GCT, traffic volumes are similar to those during midday periods.

Lexington Avenue

Lexington Avenue is a southbound street with five traffic lanes, with three to four moving lanes in most sections in Midtown. The avenue is bounded on the north by the Harlem River in East Harlem and on the south by Gramercy Park near 23rd Street. During the AM peak period, inbound commuter traffic to Midtown is at its highest. Local truck deliveries are permitted along Lexington Avenue.

During the AM peak period, volumes in East Harlem are in the 500-700 vph range, and build to between 1,500 and 2,000 vph near 60th Street. South of GCT, volumes decrease to 500 vph toward Lexington Avenue's southern terminus. The midday periods show a similar pattern. During the PM peak period, traffic builds again into East Midtown (about 1,500 vph near GCT), but then drops off only slightly to some 1,000 vph or so as it proceeds farther south.

Third Avenue

Third Avenue runs northbound through most of Manhattan and the Bronx (via the Third Avenue Bridge). It carries five northbound travel lanes with an additional curbside parking lane on each side north of 24th Street, and two-way traffic south of 24th Street. North of 24th Street, it forms a street pair with Lexington Avenue. South of 24th Street, the avenue narrows to three lanes in each direction (usually two moving lanes are maintained). South of 7th Street, Third Avenue merges into the Bowery. Local truck trips are permitted along Third Avenue.

A review of existing traffic volumes along Third Avenue throughout the day indicates that it is heavily used as a connection to the Queensboro Bridge at 59th Street. South of 23rd Street, volumes range from between 500 and 700 vph to a high of 1,000 vph per direction (near the Bowery). From 23rd Street to the Queensboro Bridge, traffic volumes average about 2,500 vph in the daily peak periods; north of the bridge, volumes decrease to just less than 2,000 vph throughout the day. In the East 50s, volumes are within the 2,300 to 2,700 vph range during each daily peak period, with higher volumes noted for the later outbound commutes.

Second Avenue

Second Avenue is a southbound one-way street that forms a street pair with First Avenue. The avenue begins just off the Harlem River Drive at 128th Street and ends on the Lower East Side at Houston Street, where it merges into Chrystie Street. It has seven travel lanes, usually with five lanes available for moving traffic. The right lane is reserved for bus-only operations between 96th and 14th Streets from 7 to 10 AM. Between Houston and Canal Streets, First and Second Avenues continue their one-way pair function along Allen Street, a corridor with three travel lanes in each direction and a wide median. Vehicles with destinations south of Canal Street must pass through Chinatown's eastern streets to access Water Street, which connects to the Battery area. Local truck trips are allowed to travel along Second Avenue for access to and from delivery destinations.

During the AM peak period, traffic volumes typically increase when traveling south along the avenue, from about 1,700 vph in the Upper East Side to a maximum of just over 3,500 vph near the Queensboro Bridge. Volumes decrease to 2,000 vph toward 14th Street. During the midday periods, traffic volumes exhibit a similar pattern, although the intensity of the level of traffic is about 20 percent lower than the AM peak. Traffic volume patterns during the PM peak period are nearly identical to those in the AM peak, which indicates that the avenue serves a number of travel functions that, when considered together throughout the day, result in a fairly uniform daily use. Traffic volumes are significantly lower on Allen and Water Streets, with levels ranging between 500 and 900 vph during each of the weekday peak periods.

First Avenue

First Avenue runs northbound between Houston Street and 126th Street with seven traffic lanes (usually five moving lanes). Allen Street is the extension of First Avenue below Houston Street, and operates as a two-way street with three traffic lanes in each direction. During the 4-7 PM peak period, the right curb lane of First Avenue between 34th and 96th Streets is reserved for bus-only operations. Local truck trips are allowed to travel along First Avenue.

During the AM peak period, volumes south of 14th Street average less than 1,800 vph. There are a number of off-street parking garages in the immediate vicinity of the Bellevue Hospital and NYU Medical Center hospital area, causing block-to-block traffic fluctuations. North of the medical complex, volumes exceed 2,000 vph, reach their morning peak just above 60th Street with about 2,700 vph as vehicles near the Queensboro Bridge, and then decrease to the 1,000-1,800 vph range farther north. During the midday periods, volumes are in the range of 1,500-2,000 vph, with the higher volumes at the East Midtown approach to the Queensboro Bridge. Traffic volumes peak during the late afternoon as outbound flows intensify. North of 14th Street, traffic volumes range from 2,300-2,700 vph, and increase to greater than 3,000 vph near the Queensboro Bridge. Volumes decrease slightly on the Upper East Side to the 2,000-2,300 vph range, decreasing further above 96th Street to below 1,500 vph.

First and Second Avenues are the primary roadways for the M15 bus route, which runs the entire length of Manhattan. A few local bus routes originating on the Lower East Side use short sections of each avenue toward the Midtown core. Two express bus lines (X90 and X92) from the Upper East Side make use of the avenues for closed-door operation (i.e., no passenger pickups) before entering the FDR Drive at 23rd Street. Express buses originating from Queens also use these two corridors between the Queens-Midtown Tunnel and the Queensboro Bridge. Finally, First Avenue was observed to be a deadhead route for buses traveling north after their morning inbound run.

FDR Drive

The FDR Drive is a six-lane highway that borders Manhattan's eastern edge and funnels traffic around Midtown and off Manhattan. As a limited-access facility, the FDR Drive has several on- and off-ramps situated along its length. The highway does not permit commercial truck traffic, although some buses (such as the NYCT express X25, X90, and X92 routes and Brooklyn and Staten Island buses) do travel along it between 23rd and South Streets where weight restrictions allow their usage. The FDR Drive is most intensely used north of the Brooklyn Bridge, with recorded volumes approaching 4,000 to 4,500 vph (in the peak direction) in sections of the Upper East Side.

Other North-South Avenues Within the Study Area

Other north-south avenues within the study area include Water Street/Pearl Street on Lower Manhattan, which carries 300-700 vph throughout the day and connects with the Bowery and Allen Street above Chinatown; Fourth Avenue, which connects the Bowery with Park Avenue and carries volumes of 800 vph or less throughout the day; and York Avenue, a two-way street that extends between 92nd and 57th Streets on the Upper East Side and carries modest volumes of between 500 (near New York Hospital) and 1,000 (near the Queensboro Bridge) vph during peak periods.

Taxis

Taxis represent a major component of the traffic stream throughout Manhattan, primarily in the Upper East Side and East Midtown sections of the study area. On Park Avenue, taxis account for as much as 70 to 80 percent of the total traffic volumes. Half the traffic along Fifth and Madison Avenues is composed of taxis. Along Third and Lexington Avenues, taxis account for between 40 and 50 percent of the total traffic volume.

A unique taxi-ridesharing program is in place on the Upper East Side along the east side of York Avenue between 79th and 78th Streets. Each taxicab carries up to four passengers for a flat fare per person, and travels directly to Wall Street via the FDR Drive. While there is no signage indicating the presence of a special taxi loading zone or stand, it is clear that area residents use this service. Taxi drivers begin queuing after 6 AM, and continue loading there until about 10 AM. A 1995 count between 7:30 and 9:30 AM indicated that close to 400 people traveled in some 120 taxis.

Taxi volumes are less pronounced in East Harlem, where private livery vehicles provide a similar service to area residents.

TRUCKS

Truck traffic makes up a significant percentage of East Side traffic, ranging, in general, from 10 to 20 percent of the overall traffic stream, except for Park Avenue, where through truck traffic is prohibited. Although they perform a vital function, trucks can have a significant impact on the street network, contributing to low travel speeds, congestion, and, at times, blockages of curbside bus stops and the “second lane” away from the curb. The New York City Department of Transportation (NYCDOT) has developed a series of regulations to balance the need for truck operations while at the same time moving traffic as smoothly and efficiently as possible. The influence of NYCDOT truck regulations is described below.

There are five east-west streets and three north-south streets in the study area designated as "through truck routes," which can be used by truck drivers who do not have an origin or destination within Manhattan. These streets are shown below in Table D.2-6:

Several avenues function as local truck routes. Drivers making a pick-up or delivery within Manhattan may use the "local truck routes" for access to their destination. Within the study area, all or part of First, Second, Third, and Lexington Avenues are local truck routes. Portions of Madison and Fifth Avenues are also local truck routes, but generally only in the vicinity of the crossings through Central Park. Trucks are not permitted on either Park Avenue or York Avenue except for local deliveries. Many of the major crosstown streets are also local truck routes.

Table D.2-6
Designated Truck Routes Within Study Area

Street	Limits
Allen Street	Delancey Street to Houston Street
Canal Street	Manhattan Bridge to West Street
Chrystie Street	Delancey Street to Houston Street
Delancey Street	Williamsburg Bridge to Bowery
Houston Street	Allen Street to Varick Street
Kenmare Street	Bowery to Lafayette Street
Lafayette Street	Kenmare Street to Canal Street
34th Street[1]	Queens-Midtown Tunnel to Twelfth Avenue

Note:
1 All through trucks are prohibited from 34th Street between the Queens-Midtown Tunnel and Dyer Avenue between the hours of 11 AM and 6 PM.

There are three "limited truck zones" within the study area: the Lower East Side, Chinatown, and Little Italy. Drivers cannot enter streets in these areas except to make deliveries. Wagner Place, St. James Place/East Broadway, Montgomery Street, and South Street bound the Lower East Side limited truck zone. Worth Street, Baxter/Centre/Lafayette Streets, Houston Street, and the Bowery bound the Chinatown and Little Italy limited truck zones.

There are also length restrictions on vehicles in two areas: the Financial District and the Midtown core. Unless the driver has a special permit, no vehicle longer than 33 feet can enter these areas during certain periods of the day, although a vehicle already in the restricted areas can remain and complete its deliveries. For the Financial District, the restrictions are in place between 11 AM and 2 PM on weekdays. Whitehall Street, Broadway/Park Row, Frankfort Street, and Pearl/Water Streets bound the Financial District restricted area. In the Midtown core, the restrictions are most severe; they are in effect from 12 noon until 6 PM on weekdays. The boundaries of the Midtown core restricted area are Seventh Avenue, 59th Street, Third Avenue, and 42nd Street.

TRAVEL SPEEDS

NYCDOT records travel speeds along north-south avenues within the 7 AM-7 PM period in Midtown between 30th and 59th Streets. Table D.2-7 presents travel speeds collected by NYCDOT in 1993. Compared to sample speed runs conducted on north/south avenues through

East Midtown in recent years, travel speeds have remained similar. Overall, travel speeds along the avenues range from about 5 to 13 miles per hour (mph).

Of all the East Side avenues, First and Second Avenues consistently show the highest travel speeds, ranging between 11 and 13 mph throughout the 7 AM-7 PM period. Fifth Avenue travel speeds are highest, at about 12 mph, inbound during the AM peak period, which indicates that there are few side interferences to overall travel along the corridor at that time. The slowest speeds, less than 6 mph, were recorded along Madison Avenue and southbound on Park Avenue during the 10 AM-1 PM period. In fact, Madison Avenue tends to have the slowest travel speeds of all East Side north-south corridors, with a 12-hour average speed of just over 6 mph.

Table D.2-7
Automobile Travel Speeds (mph) by Avenue (Between 30th and 59th Streets)

Avenue	7-10 AM	10 AM-1 PM	1-4 PM	4-7 PM	7 AM-7 PM
First Avenue	13.1	12.1	11.4	9.4	11.3
Second Avenue	11.4	12.3	11.9	13.7	12.2
Third Avenue	9.4	10.4	9.0	5.6	8.2
Lexington Avenue	8.6	9.6	9.3	10.5	9.5
Park Avenue (NB)	8.7	7.5	6.8	5.6	7.0
Park Avenue (SB)	9.1	5.8	7.7	9.9	7.8
Madison Avenue	8.6	5.1	5.8	6.9	6.3
Fifth Avenue	11.7	7.1	6.7	8.9	8.2

Source: NYCDOT Bureau of Traffic Operations

As noted in the preceding section on surface transit, buses travel at even slower speeds than general traffic, because buses need to stop for passenger boarding and alighting and also have to contend with all of the impedances that affect general traffic. Slow general traffic speeds on the avenues coupled with bus stoppages for boarding and alighting contribute significantly to buses "bunching" in traffic, i.e., arriving in groups of two or more followed by significant gaps of time until the next bus arrives.

Travel speed delays are even more pronounced where traffic encounters major capacity bottlenecks—for example, at locations where East Side bridge and tunnel crossings touch down onto the street network. When gridlock conditions occur, travel times become highly unreliable, affecting all modes of travel.

CAPACITIES AND LEVELS OF SERVICE

Analysis Methodology

The capacity of urban streets is defined as the maximum number of vehicles that can pass through their intersections with other streets. Capacities are typically calculated on an hourly basis and expressed in passenger car equivalents per hour (pcph).

To document overall existing traffic conditions in the study area, Environmental Impact Statements (EISs) completed for development projects within the study area over the past six years were reviewed. Because of the atypical traffic conditions in much of Manhattan since September 11, 2001, this approach is conservative because it accounts for higher traffic volumes than if counts had been conducted after this date. The level of service criteria for these studies

was based upon the *1994 Highway Capacity Manual*[1]. According to this methodology, the capacities of signalized intersections are based on three sets of inputs: (1) geometric conditions, including number of lanes, area type (CBD or other), and the existence of parking; (2) traffic conditions, including volumes by movement, vehicle classification, the number of parking maneuvers, and pedestrian conflicts; and (3) signalization conditions, including signal cycle length, phasing, and green-time ratios.

Level of service (LOS) for signalized intersections is defined in terms of delay, with the conditions that the driver is likely to encounter at each LOS as follows:

- LOS A describes operations with very low delay, i.e., less than 5.0 seconds per vehicle. This occurs when signal progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all.
- LOS B describes operations with delay in the range of 5.1 to 15.0 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. Again, most vehicles do not stop at the intersection.
- LOS C describes operations with delay in the range of 15.1 to 25.0 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
- LOS D describes operations with delay in the range of 25.1 to 40.0 seconds per vehicle. At LOS D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume-to-capacity (v/c) ratios. Many vehicles stop, and the proportion of vehicles not stopping declines.
- LOS E describes operations with delay in the range of 40.1 to 60.0 seconds per vehicle. This is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high volume-to-capacity ratios.
- LOS F describes operations with delay in excess of 60.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with over saturation, i.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios with cycle failures. Poor progression and long cycle lengths may also be contributing to such delays.

According to generally accepted practice, LOS A, B, and C reflect the existence of delays within an acceptable-to-tolerable range, and LOS D and E suggest delays increasing into often unacceptable or breakdown conditions (LOS F).

As of January 2002, the 2000 *Highway Capacity Manual (HCM)* methodology is NYCDOT's approved procedure for intersection capacity analyses; accordingly, this methodology has been used for the Second Avenue Subway construction phase traffic analysis. For the Second Avenue Subway's Major Investment Study (MIS)/Draft Environmental Impact Statement (DEIS), an

[1] The *1994 Highway Capacity Manual* procedures were the approved methodology by the New York City Department of Transportation through the end of 2001, and were used in the EISs reviewed. As of January 1, 2002, the *2000 Highway Capacity Manual* is being used to assess traffic conditions and future impacts.

earlier 1994 methodology was used to conduct the analysis. The most significant difference between the new 2000 methodology and the previous 1994 methodology relates to the level of service (LOS) criteria. The 1994 LOS was based on the average stopped delay per vehicle and the 2000 LOS is based on the average control delay, which includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The conditions that the driver is likely to encounter at each LOS have not changed between methodologies, but the delay range for each operating condition has been modified as shown in Table D.2-8 to account for the difference between average stopped delay and average control delay.

Table D.2-8
Comparison of Highway Capacity Manual Methodologies

Level of Service	1994 HCM Delay Criteria	2000 HCM Delay Criteria
A	Less than 5.0 seconds	Less than 10.0 seconds
B	5.1 to 15.0 seconds	10.1 to 20.0 seconds
C	15.1 to 25.0 seconds	20.1 to 35.0 seconds
D	25.1 to 40.0 seconds	35.1 to 55.0 seconds
E	40.1 to 60.0 seconds	55.1 to 80.0 seconds
F	Greater than 60.0 seconds	Greater than 80.0 seconds

CONSTRUCTION IMPACTS OF THE SECOND AVENUE SUBWAY

SECOND AVENUE SUBWAY

The following summary Tables D.2-9 through D.2-15 have been included to support the text in Chapter 5D and to provide more detailed level of service information. The tables compare No Build and construction phase traffic conditions for the six study areas, identify significant impacts, and highlight required mitigation.

C. PARKING

EXISTING CONDITIONS

Following is a detailed description of existing parking conditions in the study areas.

EAST HARLEM

East Harlem generally does not have a large amount of off-street parking (estimated to be fewer than 3,000 spaces). Off-street lots are generally makeshift—cleared vacant parcels used by shoppers and residents to park as many vehicles as can fit. Other paved lots are reserved for private businesses or institutions, such as religious institutions or NYCT 126th Street bus depot. On-street parking is restricted by alternate side regulations and was observed to be less than fully utilized.

UPPER EAST SIDE

The Upper East Side has more than 30,000 off-street parking spaces, the largest amount in the study area. Most spaces are in large garages in the primarily residential area east of Third Avenue. Garages are used for long-term residents' parking and for hospital and related service activity centers. One cluster of off-street parking includes the large housing complex areas just

north of 90th Street. Midday utilization rates in this area range from 65 to 75 percent. In the area directly surrounding New York Hospital-Cornell Medical Center (80th to 60th Streets, Second to York Avenues), there are about 9,500 spaces, with a high midday utilization of almost 85 percent. Many small garages, typically within large residential buildings scattered between Fifth and Third Avenues, are at capacity at midday. On-street parking restrictions generally allow curb parking during the day (either early morning or late afternoon) to accommodate residential demands.

Table D.2-9
Overall Intersection Level of Service:
Second Avenue Subway Construction Phase vs. No Build Alternative
East Harlem/125th Street Station Area

Signalized Intersection	AM Peak Hour		PM Peak Hour		Significant Impact[1] (Time Period)	Mitigation Required
	No Build	Build[3]	No Build	Build[3]		
First Avenue at 125th Street	B	B	B	B	—	—
Second Avenue at 127th Street	D	B	D	C	—	—
Second Avenue at 126th Street	C	E	D	D	Yes (AM/PM)	Standard mitigation [2]
Second Avenue at 125th Street	D	F	D	F	Yes (AM/PM)	Provide four SB lanes & standard mitigation
Second Avenue at 124th Street	B	D	C	C	Yes (AM/PM)	Standard mitigation [2]
Third Avenue at 124th Street	B	B	B	B	—	—
Third Avenue at 125th Street	C	F	B	C	Yes (AM/PM)	Standard mitigation [2]
Third Avenue at 126th Street	B	B	A	B	—	—
Third Avenue at 127th Street	A	A	A	A	—	—
Lexington Avenue at 129th Street	E	F	C	C	Yes (AM)	Standard mitigation [2]
Lexington Avenue at 128th Street	E	F	B	C	Yes (AM)	Standard mitigation [2]
Lexington Avenue at 127th Street	D	F	B	B	Yes (AM)	Standard mitigation [2]
Lexington Avenue at 126th Street	B	C	B	B	—	—
Lexington Avenue at 125th Street	D	F	C	F	Yes (AM/PM)	Standard mitigation [2]
Lexington Avenue at 124th Street	B	C	B	B	—	—
Park Avenue at 124th Street	D	F	B	B	Yes (AM)	Standard mitigation [2]
Park Avenue at 125th Street	D	E	C	C	Yes (AM)	Standard mitigation [2]
Park Avenue at 126th Street	C	E	B	B	Yes (AM)	Standard mitigation [2]
Madison Avenue at 125th Street	C	E	C	E	Yes (AM/PM)	Standard mitigation [2]

Notes:
1 Significant impact on any lane group or approach.
2 Requires standard traffic engineering mitigation improvements such as signal timing changes, lane restriping, or parking prohibitions.
3 Build condition level of service does not include mitigation.

Table D.2-10
Overall Intersection Level of Service:
Second Avenue Subway Construction Phase vs. No Build Alternative
Upper East Side/96th Street Station Area

Intersection	AM Peak Hour		PM Peak Hour		Significant Impact[1] (Time Period)	Mitigation Required
	No Build	Build[3]	No Build	Build[3]		
First Avenue at 86th Street	B	B	B	B	Yes (AM)	Standard mitigation [2]
First Avenue at 96th Street	C	C	C	C	Yes (PM)	Standard mitigation [2]
First Avenue at 97th Street	B	B	B	B	—	—
Second Avenue at 97th Street	D	E	D	F	Yes (AM/PM)	Standard mitigation [2]
Second Avenue at 96th Street	E	F	E	F	Yes (AM/PM)	Standard mitigation [2]
Second Avenue at 95th Street	B	D	B	C	—	—
Second Avenue at 94th Street	C	C	B	C	—	—
Second Avenue at 93rd Street	D	F	B	D	Yes (AM)	Standard mitigation [2]
Second Avenue at 92nd Street	C	D	B	C	—	—
Second Avenue at 86th Street	D	E	D	E	Yes (AM/PM)	Standard mitigation [2]
Third Avenue at 86th Street	B	B	B	B	—	—
Third Avenue at 96th Street	C	C	C	C	—	—
Third Avenue at 97th Street	B	B	B	B	—	—
Lexington Avenue at 96th Street	C	D	C	C	—	—

Notes:
1 Significant impact on any lane group or approach.
2 Requires standard traffic engineering mitigation improvements such as signal timing changes, lane restriping, or parking prohibitions.
3 Build condition level of service does not include mitigation.

Table D.2-11
Overall Intersection Level of Service:
Second Avenue Subway Construction Phase vs. No Build Alternative
East Side/55th Street Station Area

Intersection	AM Peak Hour		PM Peak Hour		Significant Impact[1] (Time Period)	Mitigation Required
	No Build	Build [3]	No Build	Build [3]		
Sutton Place at 57th Street	C	B	B	B	—	—
First Avenue at 57th Street	E	E	F	F	—	—
First Avenue at 59th Street	E	E	C	C	—	—
Second Avenue at 59th Street	F	E	F	E	—	—
Second Avenue at 58th Street	F	C	D	D	—	—
Second Avenue at 57th Street	F	F	D	F	Yes (AM/PM)	Provide four SB lanes & standard mitigation
Second Avenue at 56th Street	F	F	C	D	Yes (AM)	Standard mitigation [2]
Second Avenue at 55th Street	F	F	B	E	Yes (AM/PM)	Standard mitigation [2]
Second Avenue at 54th Street	F	F	B	E	Yes (AM/PM)	Standard mitigation [2]
Second Avenue at 53rd Street	F	F	B	D	Yes (AM)	Standard mitigation [2]
Third Avenue at 57th Street	C	C	E	E	—	—
Third Avenue at 59th Street	D	D	D	D	—	—
Lexington Avenue at 59th Street	E	F	C	C	Yes (AM)	Standard mitigation [2]
Lexington Avenue at 57th Street	C	C	C	C	—	—

Notes:
1 Significant impact on any lane group or approach.
2 Requires standard traffic engineering mitigation improvements such as signal timing changes, lane restriping, or parking prohibitions.
3 Build condition level of service does not include mitigation.

Table D.2-12
Overall Intersection Level of Service:
Second Avenue Subway Construction Phase vs. No Build Alternative
Upper East Side/66th Street Shaft Area

Signalized Intersection	AM Peak Hour		PM Peak Hour		Significant Impact[1] (Time Period)	Mitigation Required
	No Build	Build[3]	No Build	Build[3]		
York Avenue at 66th Street	D	E	B	F	Yes (AM/PM)	Standard mitigation [2]
York Avenue at 64th Street	C	C	D	D	—	—
York Avenue at 59th Street	B	B	C	C	—	—
First Avenue at 66th Street	D	E	F	F	—	—
First Avenue at 59th Street	D	D	B	B	—	—
Second Avenue at 68th Street	B	C	B	B	—	—
Second Avenue at 67th Street	F	C	C	B	—	—
Second Avenue at 66th Street	C	C	F	F	Yes (PM)	Provide 4 10-ft SB lanes & standard mitigation [2]
Second Avenue at 65th Street	B	B	C	C	—	—
Second Avenue at 64th Street	C	E	F	E	Yes (AM)	Standard mitigation [2]
Second Avenue at 59th Street	F	F	F	F	Yes (AM/PM)	Provide 5 10-ft SB lanes & standard mitigation [2]
Third Avenue at 67th Street	B	B	C	C	—	—
Third Avenue at 66th Street	D	D	E	E	Yes (AM/PM)	Standard mitigation [2]
Third Avenue at 65th Street	B	B	B	B	—	—
Third Avenue at 64th Street	C	C	C	C	—	—
Third Avenue at 59th Street	C	C	D	D	—	—
Lexington Avenue at 67th Street	D	D	D	D	—	—
Lexington Avenue at 66th Street	C	C	B	B	—	—
Lexington Avenue at 65th Street	C	C	B	B	—	—
Lexington Avenue at 64th Street	C	C	B	B	—	—
Lexington Avenue at 59th Street	B	B	B	B	—	—
Park Avenue at 67th Street	C	C	C	C	—	—
Park Avenue at 66th Street	C	C	D	D	—	—
Park Avenue at 65th Street	C	C	B	B	—	—
Park Avenue at 64th Street	D	D	C	C	Yes (AM)	Standard mitigation [2]

Notes:
1 Significant impact on any lane group or approach.
2 Requires standard traffic engineering mitigation improvements such as signal timing changes, lane restriping, or parking prohibitions.
3 Build condition level of service does not include mitigation.
This table is new for the FEIS.

Table D.2-13
Overall Intersection Level of Service:
Second Avenue Subway Construction Phase vs. No Build Alternative
East Midtown/34th Street Station Area

Intersection	AM Peak Hour		PM Peak Hour		Significant Impact[1] (Time Period)	Mitigation Required
	No Build	Build	No Build	Build		
First Avenue at 30th Street	C	C	C	C	—	—
First Avenue at 34th Street	E	E	D	D	—	—
First Avenue at 37th Street	B	B	A	A	—	—
Tunnel Approach Street at 35th Street	B	C	F	F[3]	—	—
Second Avenue at 37th Street	C	B	B	A	—	—
Second Avenue at 36th Street	F	F	C	D	Yes (AM)	Provide four SB lanes & standard mitigation[2]
Second Avenue at 35th Street	D	F	B	B	Yes (AM)	Provide four SB lanes & standard mitigation[2]
Second Avenue at 34th Street	E	F	C	F	Yes (AM/PM)	Provide four SB lanes & standard mitigation[2]
Second Avenue at 33rd Street	B	F	A	B	Yes (AM)	Provide four SB lanes & standard mitigation[2]
Second Avenue at 32nd Street	B	F	A	B	Yes (AM)	Provide four SB lanes & standard mitigation[2]
Second Avenue at 31st Street	B	F	A	D	Yes (AM)	Provide four SB lanes & standard mitigation[2]
Second Avenue at 30th Street	B	B	B	B	—	—
Third Avenue at 31st Street	B	B	B	B	—	—
Third Avenue at 36th Street	B	B	D	D	—	—
Lexington Avenue at 34th Street	C	D	C	C	—	—

Notes:
1 Significant impact on any lane group or approach.
2 This intersection would require a fourth southbound lane as well as standard mitigation improvements such as signal timing changes, lane restriping, or parking prohibitions.
3 This intersection would continue to operate at a poor level of service F condition, but would not be considered a significant impact since vehicular delays would not increase by more than ten seconds from No Build conditions for any traffic movement.
4 Build condition level of service does not include mitigation.

Table D.2-14
Overall Intersection Level of Service:
Second Avenue Subway Construction Phase
Second Avenue Construction Phase vs. No Build Alternative
Lower East Side/Houston Street Station Area

Intersection	AM Peak Hour		PM Peak Hour		Significant Impact[1] (Time Period)	Mitigation Required
	No Build	Build[3]	No Build	Build[3]		
Second Avenue at 4th Street	B	B	B	B	—	—
Second Avenue at 3rd Street	C	B	C	B	—	—
Second Avenue at 2nd Street	C	C	C	B	—	—
Second Avenue at 1st Street	C	C	C	C	—	—
Second Avenue/Chrystie Street at Houston Street	D	E	E	F	Yes (AM/PM)	AM Standard mitigation [2] /PM provide four SB lanes of traffic
Chrystie Street at Delancey Street	C	C	C	C	—	—
Bowery at Houston Street	D	D	E	E	Yes (PM)	Standard mitigation [2]
Forsyth Street at Houston Street	C	C	E	E	—	—
Allen Street at Delancey Street	C	D	C	C	—	—
Allen Street/First Avenue at Houston Street	D	D	D	D	—	—

Notes:
1 Significant impact on any lane group or approach.
2 Requires standard traffic engineering mitigation improvements such as signal timing changes, lane restriping, or parking prohibitions.
3 Build Condition Level of Service does not include mitigation

Table D.2-15
Overall Intersection Level of Service:
Second Avenue Subway Construction Phase vs. No Build Alternative
Lower Manhattan/Hanover Square Station Area

Intersection	AM Peak Hour		PM Peak Hour		Significant Impact[1] (Time Period)	Mitigation Required
	No Build	Build [3]	No Build	Build [3]		
South Street at Wall Street	B	B	B	B	—	—
South Street at Gouverneur Lane	B	B	B	B	—	—
South Street at Old Slip	C	C	C	C	—	—
Water Street at Maiden Lane	C	E	B	C	Yes (AM/PM)	Standard mitigation [2]
Water Street at Pine Street	B	F	A	C	Yes (AM)	Standard mitigation [2]
Water Street at Wall Street	C	F	B	D	Yes (AM/PM)	Standard mitigation [2]
Water Street at Old Slip	B	F	B	B	Yes (AM)	Standard mitigation [2]
Water Street at Broad Street	D	F	C	E	Yes (AM/PM)	Standard mitigation [2]
Water Street at Whitehall Street	C	D	C	C	Yes (AM/PM)	Standard mitigation [2]
Pearl Street at Maiden Lane	D	D	C	C	—	—
Pearl Street at Pine Street	A	A	A	A	—	—
Pearl Street at Wall Street	B	B	B	B	—	—

Notes:
1 Significant impact on any lane group or approach.
2 Requires standard traffic engineering mitigation improvements such as signal timing changes, lane restriping, or parking prohibitions.
3 Build condition level of service does not include mitigation.

EAST MIDTOWN

The East Midtown area contains a substantial amount of off-street parking spaces. About 17,000 off-street parking spaces were reported in a 2000 Parking Guide to New York City prepared by the New York City Department of City Planning (NYCDCP), with about 75 percent of the garages and lots located between Park and First Avenues. Other major parking space clusters are just south of the Queensboro Bridge ramps, near the perimeter of the United Nations area, and in the East 30s near the Queens-Midtown Tunnel entrance area.

Midday parking utilization rates vary widely throughout East Midtown, with higher rates reported for facilities north of 42nd Street. Some garages near 34th Street had average midday occupancy rates of about 60 to 70 percent. Farther north near 42nd Street, midday garage occupancy rates appeared to be consistently in the 75 to 85 percent range.

There are very few curb parking spaces available at any time in East Midtown. Between 60th and 34th Streets, any allowances for extended on-street parking are limited to some isolated blocks east of First Avenue north of the United Nations and within the Tudor City residential complex along 41st Street.

GRAMERCY PARK / UNION SQUARE

In the mostly residential area east of Lexington Avenue between 34th and 14th Streets, curb parking is allowed to a larger extent after early morning street sweeping periods. The 2000 Parking Guide indicated that there are approximately 12,000 off-street parking spaces in the Gramercy Park/Union Square area. Parking space clusters were located near Third Avenue in the Gramercy Park neighborhood and in the areas near Union Square. There are also 2,200 private spaces in the Stuyvesant Town residential complex that are not available to the general public. Some parking lots south of 23rd Street reported usage rates as low as 45 percent, while others in the same area have usage rates near 90 percent.

LOWER EAST SIDE

The Lower East Side has approximately 2,600 off-street garage and lot spaces. Most spaces are close to commercial sections between Broadway and Second Avenue, where the demand for such parking is high. Midday parking utilizations for the Cooper Square area were reported to be within the 65 to 75 percent range, and less than 60 percent on Saturday evenings. In addition, there are some very large isolated public parking facilities (300-plus spaces) farther east near the foot of the Williamsburg Bridge. Most blocks in this area allow curb parking after (and even during) the morning peak periods.

LOWER MANHATTAN

Lower Manhattan has approximately 5,700 off-street parking spaces. The largest number of off-street spaces (about 2,300 spaces) is in the area between the South Street Seaport and Beekman Downtown Hospital near the foot of the Brooklyn Bridge. About 1,400 spaces exist between the Lower Manhattan Financial District and South Ferry. About 1,230 spaces are scattered in small lots throughout southern Chinatown. An additional 780 spaces are tightly spaced between the support columns under the elevated FDR Drive. EISs reviewed for this area report midday utilization rates of 70 to 80 percent, although selected garages had higher than 90 percent usage figures. On-street parking regulations in the Financial District are very restrictive, as the streets

are narrow and generally only delivery vehicles are permitted to park along the curb for short durations. In some of the residential areas to the east, curb parking is allowed to a larger degree.

CONSTRUCTION IMPACTS OF THE SECOND AVENUE SUBWAY

Construction impacts on parking are summarized in Chapter 5E. Following is a detailed description of parking conditions during the construction phase within each of the study areas.

125TH STREET STATION

During construction of the 125th Street Station, parking along 125th Street would need to be prohibited to minimize traffic impacts during the construction phase. Currently, curbside parking is generally permitted along 125th Street except during street cleaning hours, at bus stops, or at locations designated for authorized vehicles, such as ambulances or fire department vehicles. If construction activities were to extend from Third Avenue to Fifth Avenue, a total of about 100 parking spaces could be eliminated. Alternative parking locations along 126th and 124th Streets are not viable alternatives since both of the streets are currently signed for "No Parking" and also "No Standing" during the peak traffic periods. During the construction phase, traffic might divert to 126th and 124th Streets from 125th Street. As a result, the full roadway width would continue to be needed for traffic and new curbside parking could not be provided. Furthermore, if parking were prohibited along portions of Third, Lexington, or Madison Avenues near 125th Street during construction to provide truck loading and unloading space for the 125th Street businesses, another 30 to 40 parking spaces could be eliminated.

Parking impacts during the cut-and-cover construction of the storage tracks beneath Second Avenue between 128th and 124th Streets would be less severe. North of 126th Street, curbside parking and standing are prohibited along Second Avenue, and, consequently, no legal parking spaces would be lost during construction. Approximately 15 parking spaces would be lost on Second Avenue between 126th and 124th Streets.

To mitigate traffic impacts along Second Avenue in this area, southbound traffic might need to divert to Park and Lexington Avenues. To accommodate this additional traffic, parking restrictions could be required on these alternative southbound routes during peak periods, especially during the AM peak hours.

Within one-quarter mile of the station construction area, there is limited on-street parking available and only one off-street garage that has a capacity of 45 spaces. A parking alternative for this area may include formalizing the space under the Metro-North Railroad tracks as a public parking area to minimize the effects of parking loss at the construction zone.

96TH STREET STATION

The 96th Street Station construction, spoils removal, and tunnel boring machine (TBM) insertion area could extend from 98th Street to 91st Street and would eliminate approximately 80 to 90 parking spaces along Second Avenue during the construction phase. Some available parking spaces might be found on the cross streets to accommodate the parking reduction on Second Avenue, but an alternative truck loading and unloading location might be needed for Second Avenue businesses, which could eliminate about 10 to 20 cross-street parking spaces for these deliveries. For example, a Key Food supermarket is located on Second Avenue between 93rd and 92nd Streets and might require truck loading/unloading parking space on 93rd or 92nd Streets if deliveries are prohibited on Second Avenue during the construction phase.

Deliveries to the Metropolitan Hospital Center that occur on Second Avenue might be restricted if the construction zone should extend north of 97th Street. Alternative delivery locations would need to be provided on-site or on the First Avenue side of the hospital to accommodate this essential use.

On the east side of Second Avenue between 95th and 94th Streets is a 180-car parking garage that would be impacted by the open excavation of Second Avenue in this area for station construction and spoils removal. Because the garage has only one driveway, it would be inaccessible when construction operations occur on the east side of Second Avenue. Within a quarter-mile of the parking garage are eight other garages with a total capacity of over 1,700 spaces that could accommodate some of the parking eliminations.

55TH STREET STATION

In East Midtown, the predominant parking regulation along Second Avenue and the adjacent cross streets within the 55th Street Station construction area is "No Standing Anytime Except Trucks Loading and Unloading" during off-peak traffic hours (i.e., 10 AM to 4 PM). Therefore, no parking spaces would be lost, but approximately 50 curb spaces for deliveries would be eliminated within the construction zone, which could extend from 57th Street to 53rd Street. These deliveries cannot be easily shifted to the cross streets since these curbs are mostly occupied with delivery vehicles as well. Due to a lack of delivery space that would be available during the daytime hours, one option would be to require and provide parking space for late-evening and nighttime deliveries (after 7 PM) for these areas. Within one-quarter mile of the construction zone, there are ten garages with a total parking capacity of nearly 1,400 spaces, which could help accommodate visitors who drive to the area, but these spaces would not alleviate the shortfall of delivery curb space.

Similar to the 125th Street construction zone, southbound traffic on Second Avenue may need to be diverted to Lexington and Park Avenues to mitigate traffic impacts, which could result in peak period parking restrictions on these alternate southbound routes to accommodate the extra traffic.

34TH STREET STATION

The 34th Street Station and TBM insertion construction zone could extend from 36th Street to 32nd Street along Second Avenue. From 35th to 32nd Streets, curbside metered parking and truck loading activities are permitted on both sides, but are prohibited on the west side during peak traffic hours (i.e., 7-10 AM and 4-7 PM). On-street parking spaces in East Midtown are limited, and the construction zone parking restrictions would eliminate approximately 50 parking spaces. Furthermore, additional on-street parking spaces on an adjacent cross street might need to be eliminated if a truck loading and unloading area is required for the affected Second Avenue businesses during the construction phase. Within one-quarter mile of the construction zone are 10 parking garages that have a total capacity of over 1,000 spaces, which could alleviate on-street parking reductions. It should be noted that St. Vartan Cathedral is located on the northeast corner of Second Avenue and 34th Street, but curbside access to this land use could be provided from 34th Street.

To mitigate traffic impacts on Second Avenue, southbound traffic would need to be diverted to alternate southbound routes. This diversion could require peak period parking restrictions on the alternate routes, such as Lexington Avenue, to accommodate this additional traffic demand.

HOUSTON STREET STATION

Parking impacts during the construction phase of the Houston Street Station were analyzed for the Lower East Side area. The Houston Street Station construction zone could extend from Houston Street north to 6th Street. The eastern and western curbs of Second Avenue between 6th and 1st Streets are primarily signed for 1-hour parking regulations. Between First Street and Houston Street, no parking is allowed between 8 AM and 6 PM on the western curb, but parking is allowed on the eastern curb toward First Avenue.

The curb faces along Second Avenue average between five and eight metered spaces per block, totaling about 70 spaces. Those vehicles parked on Second Avenue today would need to find other parking locations during the construction phase. Some available parking may be found on the adjacent cross streets, but this might not be sufficient to accommodate the parking demand. Within one-quarter mile of the construction site are four parking garages with a total capacity of over 350 vehicles that could accommodate on-street parking losses.

On Second Avenue between 3rd and 2nd Streets is the Church of the Nativity, which might need curbside access during the construction phase. Across the street from the church is a funeral home, which may also require certain curbside parking needs.

To mitigate the anticipated traffic impacts that would occur on Second Avenue at Houston Street during station construction, additional southbound traffic may need to be diverted to the Bowery. To accommodate this traffic, parking may need to be prohibited during the peak hours.

HANOVER SQUARE STATION

In the Lower Manhattan study area, the Water Street construction zone could extend from Maiden Lane to approximately Old Slip. Parking within this area would be prohibited during the construction phase to minimize traffic impacts. The parking regulations north of Hanover Square are predominantly "No Standing Anytime" to provide curb space for local and express bus stops. In this area, the construction phase would not eliminate any legal parking spaces but would require the relocation of several bus stops to curbs north of the construction zone.

South of Hanover Square, truck loading and unloading is permitted at the curb and along the western curb; some parking is allowed for authorized Taxi and Limousine Commission "for-hire" vehicles. The approximately 40 parking spaces on Water Street south of Hanover Square would be eliminated during construction of the Hanover Square Station. Some of these vehicles might be accommodated by available parking spaces on Old Slip, Pearl Street, or South Street. The remaining vehicles could probably be accommodated within the six parking garages that are within one-quarter mile of the construction site that have a total capacity of over 900 spaces.

During construction of the Seaport Station, access to the surface parking lots on the east side of Pearl Street would be restricted from Pearl Street but could still be accessed from driveways on Peck Slip and Water Street. Parking in the 310-car garage on Pearl Street would be eliminated when construction activities at this station occur on Pearl Street. There are six other parking garages with a total capacity of 690 cars within one-quarter mile of this garage and another 14 garages within one-half mile that could help accommodate parking needs.

OTHER STATION LOCATIONS

Although parking impacts at the other station locations were not analyzed in detail, it is possible to extrapolate the findings from the representative stations analyzed above. The length of a

typical station construction zone is about four to five blocks. During the construction phase, parking would be prohibited on both sides of Second Avenue through the construction zone to minimize traffic impacts. Assuming the average blockface accommodates seven to eight parking spaces, approximately 50 to 80 curbside parking spaces might be lost per zone. An additional 10 to 20 parking spaces per zone might need to be eliminated on the cross streets to provide locations for truck deliveries to businesses on Second Avenue that might lose parking in front of their establishments. These numbers reflect the best parking reduction estimates for the construction phase at this time. The engineering team will develop detailed maintenance and protection of traffic plans for the entire construction effort, and this will detail the number and specific location of parking spaces to be eliminated.

As in other locations, any parking garages or lots located adjacent to construction areas would be adversely affected unless alternative entrances/egresses to the garages are available from the construction areas. Also, as with the areas assessed in detail, any associated shortfalls in parking that would occur as a result of temporary closures to such garages or lots would be reduced if additional parking garages were located within a one-quarter mile radius.

PERMANENT IMPACTS OF THE SECOND AVENUE SUBWAY

As described in Chapter 5E, while a parking garage at 89 Chrystie Street with a capacity for 140 vehicles and portions of several parking lots may be acquired for necessary ancillary facilities, and curb spaces immediately adjacent to new stations access locations could be lost, no significant parking impacts would occur once the Second Avenue Subway is operational.

D. PEDESTRIANS

EXISTING CONDITIONS

The following discussion provides more detailed information on pedestrian analysis procedures and operating characteristics in support of Chapter 5F.

According to the *Highway Capacity Manual*, six different levels of service (LOS), A through F, are used to detail the quality of pedestrian flows based on available effective walk or maneuver space per person, the presence of pedestrian platoons (i.e., a grouping or bunching of pedestrians walking into the crosswalk when the light turns green) and, in the case of crosswalks and corners, the presence of controlling traffic signals and intersecting pedestrian flows. Levels of service are therefore based not only on volumes, but also on sidewalk or crosswalk area. A low volume on a wide sidewalk would operate well, while the same volume on a narrow sidewalk may not. The levels of service are calculated for the peak 15-minute interval within the peak hour. LOS A describes pedestrian flows that are considered to be "open" flows, with unrestricted walking speeds and no maneuvering needed to pass or avoid conflicts. In LOS B, pedestrian flows are provided with sufficient space and are virtually unimpeded. LOS C pedestrian flows are somewhat restricted, with minor conflicts noticeable in opposing flows. In LOS D, pedestrian flows and walking speeds are restricted with conflicts present. At capacity LOS E conditions, virtually all walking speeds are restricted and there is insufficient space for passing slower pedestrians. Stoppages and interruptions of flow are due to limited walkway capacity. LOS F conditions are characterized by severely restricted walk speeds, and forward progress is limited to shuffling. LOS A, B, C, and D are considered acceptable in an urban area; LOS E and F are considered unacceptable, although these conditions are often prevalent in intensely developed urban locations.

An overview of existing on-street pedestrian conditions in each study area neighborhood zone is presented below. Pedestrian volume data collected from Environmental Impacts Statements completed since 1990 are summarized as follows.

EAST HARLEM

The East Harlem area is dominated by 125th Street, a major commercial and activity corridor that runs east-west between the Triborough Bridge to the east and the Henry Hudson Parkway to the west. Pedestrian volumes are highest in the weekday evening and Saturday midday periods, which are the peak shopping times. At the Adam Clayton Powell Boulevard intersection (slightly west of the study area), the peak crosswalk volumes were noted to be generally within the 1,000-1,500 persons per hour range, with a maximum of about 2,400 pedestrians per hour during these periods. One block east at Lenox Avenue, pedestrian volumes are below 1,000 persons per hour, with a peak of about 1,500 persons per hour. Levels of service are within the acceptable range. Away from the 125th Street commercial corridor, sidewalk activity dwindles and LOS A conditions generally prevail.

UPPER EAST SIDE

The Upper East Side is dominated by concentrated pedestrian flows near the major hospitals and commercial developments fronting along First and Second Avenues and along the key east-west streets, such as 86th Street. Other important generators include Hunter College, Lenox Hill and Mount Sinai Hospitals, and local public schools. A few blocks from these significant land uses, pedestrian volumes diminish to a point at which congestion does not occur.

Volumes along the sidewalks of 86th Street near Lexington Avenue range between 2,500 and 3,000 pedestrians per hour. Near Hunter College along Lexington Avenue and at the 68th Street subway station, pedestrian crosswalk volumes range between 1,600 and 2,500 persons in the AM peak hour, and between 2,500 and 3,500 in the midday and PM peak hours. Closer to New York Hospital-Cornell Medical Center along York Avenue and farther from subway transit, pedestrian volumes are somewhat lower, generally within a 1,000 to 2,000 person per hour range. In almost every case, levels of service associated with these pedestrian volumes are LOS C or better, indicating acceptable sidewalk and crosswalk conditions.

EAST MIDTOWN

East Midtown contains the most intense pedestrian volumes in Manhattan. East Midtown is also the nation's largest Central Business District (CBD), contains several major intermodal transportation facilities, and has numerous tourist attractions. Each of these land uses generates significant pedestrian activity, and when situated near each other (such as at the United Nations and Grand Central Terminal), they combine to cause extreme crowding at key pedestrian processing areas. In the Grand Central Terminal area, the morning and evening periods are dominated by commuter flows coming from or bound for Metro-North trains or the subways. The midday period is less intense and characterized by local trips typical of office workers during their lunch hour.

Near East Midtown's northern boundary at 60th Street, hourly volumes along Third Avenue consist of a mix of commuter walkers and shoppers, and range from 4,000 to 6,000 persons per hour. There are some isolated sidewalks, however, that carry volumes approaching 8,000 persons per hour during the lunch time period. Although the sidewalks appear to have adequate capacity to process such volumes, the corner reservoir areas where pedestrians often mix or wait

for the walk signal operate at LOS D or worse during various peak travel periods. Pedestrian volumes along 42nd Street show peak period volumes as high as 5,000-6,000 per hour near Grand Central Terminal, although reported levels of service are still in the acceptable LOS C or better range. Corner reservoir areas and crosswalks operate under some congestion, with levels of service ranging from D to E during various time periods. Hourly volumes noted along Fifth Avenue near the Midtown branch of the New York Public Library range from 2,500 to 3,000 persons in all daily peak hours. Levels of service for mid-block sidewalk and corner reservoir and crosswalk areas are acceptable. Hourly pedestrian volumes at mid-block points along side streets range from 300 to 1,000 persons per hour (LOS A or B), although at selected areas near Rockefeller Center (a major tourist attraction), hourly pedestrian volumes expectedly intensify and tend to exceed 1,000 persons in the midday period.

GRAMERCY PARK / UNION SQUARE

On-street pedestrian volumes are lower in the Gramercy Park/Union Square area than in East Midtown. Most sidewalks operate at an acceptable LOS C or better and most of the pedestrian activity occurs along the two major cross streets, namely 23rd and 14th Street. At Second Avenue and 14th Street, peak pedestrian crosswalk volumes range from 400 to 500 people per hour during the AM and PM peak periods and operate at LOS B conditions.

LOWER EAST SIDE

On the Lower East Side, intense pedestrian activities tend to be closer to commercial spines, such as Broadway and Canal Street, which are lined with retail businesses attracting shoppers and tourists. At the eastern edge of Chinatown, the Canal Street crosswalks near the Bowery process between 600 and 1,800 people per hour in the weekday peak periods. Similar volumes are noted near Canal Street's intersection with Broadway. Although level of service data was not available for this area, volume levels appear to reflect conditions within the LOS C to LOS D range. Just north of Canal Street along the Bowery, hourly pedestrian volumes are within the 700-900 people per hour range. Hourly pedestrian volumes are lower with increased distance from major commercial areas, within the 200 to 400 people per hour range (LOS B or better), which appear to reflect the internal conditions away from the major travel roadways.

LOWER MANHATTAN

In Lower Manhattan, much of the pedestrian traffic is generated by office buildings but is concentrated around transportation facilities, such as the Staten Island Ferry at the southernmost tip of the island and subway stations in the area. Ferry and subway commuters frequently complete their trip on foot, as either their work destinations are within acceptable walking distances or connecting transit is not convenient for their use. The South Street Seaport, on the extreme east side of Lower Manhattan near Fulton Street, generates weekday lunchtime pedestrian traffic. Other tourist attractions within the area include the Statue of Liberty, Wall Street, and various government buildings. There are a number of full-time and part-time pedestrian-only areas in Lower Manhattan, including Fulton Street east of Water Street (full-time) and Nassau Street (part-time).

Pedestrian volumes are highest in the Wall Street part of Lower Manhattan, as this is the focal point of the Financial District's employment center. While pedestrian volumes are high, the levels of service on record have been presented as acceptable. In some cases, AM and PM peak pedestrian volumes were recorded as exceeding 300-350 persons per 15 minutes (over 1,200 per

hour) on a particular mid-block sidewalk. Closer to the borough's municipal center, near Chambers Street and Broadway, mid-block pedestrian volumes of between 1,000 and 1,500 per hour have been recorded, indicative of acceptable levels of service.

CONSTRUCTION IMPACTS OF THE SECOND AVENUE SUBWAY

Please see Chapter 5F for the assessment of construction impacts.

PERMANENT IMPACTS OF THE SECOND AVENUE SUBWAY

SECOND AVENUE SUBWAY

While the locations of subway entrances have not been finalized, the most current information available on subway station entrance locations is included in Chapter 5F.

The on-street assignment of these pedestrians was based on NYCT's Critical Link Analysis of the Transit Demand Forecast (TDF) model. This procedure identifies the origin and destination zones of the riders on trains entering or leaving a station. This origin and destination information was the basis for developing street-level pedestrian flow distributions as pedestrians were assigned to the station entrances closest to their origin or destination zone. Pedestrians from zones more than two avenues away were assumed to use the crosstown bus and assigned to the sidewalk network as they transferred between the bus stop and the subway station entrance.

The PM peak hour subway-generated pedestrian flows were based upon MetroCard and turnstile count data and are estimated to be about 15 percent lower than the comparable AM peak periods in the business district station areas and about 35 percent lower at stations in residential areas. The lower station pedestrian flows in the residential areas reflect the travel behavior of workers not immediately returning home during the PM peak hour.

The *Highway Capacity Manual* methodology was used as the procedural basis for all pedestrian level of service analyses on corners, crosswalks, and walkways. For walkways, the "platoon" level of service, which usually occurs when transit vehicles release a large group of pedestrians in a short period of time, is measured as the pedestrian flow rate per foot of width per minute. Street corners and crosswalks are analyzed for the "maximum surge" condition (i.e., the point at which the maximum number of pedestrians are in the crosswalk) and are measured in square feet of space per pedestrian.

To determine whether the new Second Avenue Subway pedestrian flows would create significant on-street impacts, level of service criteria cited in the *New York City Environmental Quality Review Technical Manual (NYC CEQR)*, were used as follows:

- For corners and crosswalks, significant impacts may occur in the Manhattan CBD if the No Build condition has an average pedestrian area of less than 15 square feet per pedestrian, and the project decreases the available area by 1 square foot per person or more. Outside the CBD, significant impacts may occur if the No Build condition has an average pedestrian area of less than 20 square feet per pedestrian and the project decreases the available area by 1 square foot or more.
- For sidewalks, a significant impact may occur in the Manhattan CBD if the No Build conditions are characterized by a flow rate of greater than 15 pedestrians per foot per minute (pfm) and the project would increase that rate by 2 or more pedestrians per foot per minute. Outside the CBD, a significant impact would occur if the No Build conditions have flow

rates of more than 13 pfm and the project would increase that rate by 2 or more pedestrians per foot per minute.

On-street pedestrian elements at 11 representative station locations were selected for detailed analysis -- the 125th, 96th, 86th, 72nd, 42nd, 14th, Seaport and Hanover Square Stations on the Second Avenue Subway, the 42nd Street/Times Square and 34th Street/Herald Square Stations on the express service on the Broadway Line, and Grand Central Station on the Lexington Avenue Line. Tables D.2-16 and D.2-17 summarize pedestrian levels of service at key crosswalks and corners for the No Build and Build conditions. These tables support the findings described in the Pedestrian chapter of the FEIS for the critical street corner and crosswalk elements at each study location. More information is available in Appendix D.3.

Table D.2-16
Second Avenue Subway (Year 2025) Pedestrian Crosswalk Levels of Service

Location	Crosswalk	AM Peak Period			PM Peak Period		
		No Build	Build	Mitigated	No Build	Build	Mitigated
Park Avenue at 125th Street	North	C	E	C	C	E	C
	South	D	E	D	C	C	—
Second Avenue at 94th Street	East	B	E*	E#	B	E*	E#
	West	B	C	—	B	B	—
Second Avenue at 86th Street	North	D	E*	D	C	D	—
	South	C	C	—	C	D	—
Second Avenue at 44th Street	East	C	D	—	D	D	—
	West	C	E*	D	C	E*	D
Lexington Avenue at 42nd Street	North	E	E	—	E	E	—
	West	E	D	—	E	D	—
Seventh Avenue at 40th Street	South	D	D	—	D	D	—
	East	E	E	—	E	E*	D
Sixth Avenue at 32nd Street	North	D	D	—	E	E	—
	East	D	C	—	D	C	—
Water Street at Fulton/Pearl St	North	A	B	—	B	B	—
	South	B	B	—	C	C	—
	West	A	D	—	A	B	—
Water Street at Wall Street	East	B	C	—	C	C	—
	West	B	D	—	B	D	—

Notes:
* Denotes a significant pedestrian impact.
# Denotes an unmitigated significant pedestrian impact, because measure identified would create property impacts that would outweigh the benefits (see Chapter 5F).
1 The number of station entrances will be determined through Preliminary Engineering. Additional significant adverse impacts could be expected if fewer entrances are constructed than the numbers that were assumed for these analyses.
2 A crosswalk may deteriorate to or within LOS E and not be considered a significant impact if the pedestrian area occupancies remain within *NYC CEQR* guidelines.

Table D.2-17

Second Avenue Subway (Year 2025) Pedestrian Corner Reservoir Levels of Service

Location	Corner	AM Peak Period			PM Peak Period		
		No Build	Build	Mitigated	No Build	Build	Mitigated
Park Avenue at 125th Street	Northwest	B	B	—	B	B	—
	Southwest	A	B	—	B	B	—
Lexington Avenue at 125th Street	Northeast	A	A	—	A	A	—
	Northwest	B	B	—	B	B	—
	Southeast	B	B	—	C	C	—
	Southwest	B	B	—	B	B	—
Second Avenue at 94th Street	Southeast	A	E*	E#	A	D*	D#
	Northwest	A	C	—	A	D	—
Second Avenue at 86th Street	Northwest	B	C	—	B	C	—
	Southeast	B	C	—	B	D	—
Second Avenue at 72nd Street	Northeast	A	B	—	A	B	—
	Northwest	A	C	—	A	B	—
	Southeast	A	B	—	A	B	—
	Southwest	A	B	—	A	B	—
Second Avenue at 44th Street	Southeast	B	B	—	B	B	—
	Southwest	B	D	—	B	C	—
Second Avenue at 42nd Street	Northeast	C	C	—	C	D	—
	Northwest	C	D	—	C	C	—
	Southeast	B	B	—	B	B	—
	Southwest	D	C	—	C	B	—
Lexington Avenue at 42nd Street	Northeast	D	C	—	E	D	—
	Northwest	E	D	—	D	D	—
Seventh Avenue at 40th Street	Southeast	D	D	—	C	C	—
Sixth Avenue at 32nd Street	Northeast	D	D	—	E	E	—
Second Avenue at 14th Street	Northwest	A	A	—	A	A	—
	Southeast	A	B	—	A	B	—
Water Street at Fulton/Pearl St	Northeast	A	A	—	A	B	—
	Southeast	A	B	—	B	B	—
Water Street at Wall Street	Southeast	C	B	—	C	B	—
	Southwest	B	B	—	B	B	—
Water Street at Hanover Square	Northeast	A	B	—	A	B	—
	Northwest	B	B	—	B	B	—
	Southeast	A	B	—	B	B	—
	Southwest	A	C	—	A	B	—

Notes:

* Denotes a significant pedestrian impact.

# Denotes an unmitigated significant pedestrian impact, because measure identified would create property impacts that would outweigh the benefits (see Chapter 5F).

1 The number of station entrances will be determined through Preliminary Engineering. Additional significant adverse impacts could be expected if fewer entrances are constructed than the numbers that were assumed for these analyses.

2 A crosswalk may deteriorate to or within LOS E and not be considered a significant impact if the pedestrian area occupancies remain within *NYC CEQR* guidelines.

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