Project Site

Traffic Analysis Location

Traffic Analysis Locations
Figure 11-4

Table 11-8
Traffic Level 2 Screening Analysis Results—Analysis Locations

Intersection	Incremental Vehicle Trips (Weekday)			Analysis Locations
	AM	Midday	PM	
Fulton Street and DeKalb Avenue	0	0	0	
Livingston Street and Bond Street	4	1	4	
Schermerhorn Street and Bond Street	35	9	23	
Flatbush Avenue and DeKalb Avenue	57	14	57	✓
Flatbush Avenue and Fulton Street	72	19	92	✓
Flatbush Avenue and Nevins Street	37	9	52	
Livingston Street and Nevins Street	30	6	32	
Schermerhorn Street and Nevins Street	61	13	51	✓
State Street and Nevins Street	51	8	49	✓
Atlantic Avenue and Nevins Street	32	7	36	
Pacific Street and Nevins Street	10	0	7	
DeKalb Avenue and Hudson Avenue	6	0	1	
Hudson Avenue and Fulton Street	35	13	58	
Flatbush Avenue and Livingston Street	32	8	42	
Flatbush Avenue and Lafayette Avenue	73	12	70	✓
Schermerhorn Street and 3rd Avenue	43	9	36	✓
State Street and 3rd Avenue	84	13	72	✓
Atlantic Avenue and 3rd Avenue	65	12	59	✓
Pacific Street and 3rd Avenue	0	1	1	
DeKalb Avenue and Rockwell Place	6	0	1	
Fulton Street and Rockwell Place	35	13	58	
Lafayette Avenue and Rockwell Place	45	7	31	✓
Flatbush Avenue and Schermerhorn Street	32	3	33	
Flatbush Avenue and State Street	80	9	75	✓
Flatbush Avenue and 4th Avenue	80	9	75	✓
4th Avenue and Atlantic Avenue	74	12	66	✓
4th Avenue and Pacific Street	10	1	8	
Flatbush Avenue and Atlantic Avenue	49	7	47	✓
DeKalb Avenue and Ashland Place	1	1	5	
Fulton Street and Ashland Place	50	16	81	✓
Ashland Place and Lafayette Avenue	81	20	96	✓
DeKalb Avenue and St Felix Street	1	0	2	
St Felix Street and Fulton Street	19	5	26	
St Felix Street and Lafayette Avenue	15	4	19	
St Felix Street and Hanson Place	55	16	66	
DeKalb Avenue and Fort Green Place	1	0	2	
Fort Greene Place and Fulton Street	19	5	26	
Fort Greene Place and Lafayette Avenue	15	4	19	
Fort Greene Place and Hanson Place	85	22	85	✓
Lafayette Avenue and Fulton Street	18	5	25	
DeKalb Avenue and S Elliot Place	1	0	2	
S Elliot Place and Lafayette Avenue	-1	0	-1	
S Elliot Place and Fulton Street	19	5	26	
S Elliot Place and Hanson Place	28	2	11	
DeKalb Avenue and S Portland Avenue	5	1	2	
S Portland Avenue and Lafayette Avenue	3	1	-1	
S Portland Avenue and Fulton Street	43	6	37	
S Portland Avenue and Hanson Place	28	2	11	
DeKalb Avenue and S Oxford Street	5	1	2	
S Oxford Street and Lafayette Avenue	3	1	-1	
S Oxford Street and Fulton Street	43	6	37	
State Street and Bond Street	7	1	7	
Atlantic Avenue and Bond Street	21	7	30	
Pacific Street and Bond Street	0	0	0	
Fulton Street and Hanover Place	0	0	0	
Livingston Street and Hanover Place	1	0	2	
Pacific Street and Flatbush Avenue	28	2	28	
Atlantic Avenue and Fort Greene Place	27	9	27	
S Elliot Place and S Portland Avenue	0	0	0	
Atlantic Avenue and S Portland Avenue	7	5	7	
Fulton Street and Hanson Place	43	6	37	

Notes: ✓ denotes intersections selected for the detailed traffic analysis.

PEDESTRIANS

As shown in **Table 11-6**, the projected peak-hour incremental pedestrian trips would exceed the CEQR analysis threshold of 200 pedestrians during all peak hours. Level 2 pedestrian trip assignments were individually developed for all the proposed uses, as shown in **Figures 11-5 through 11-7** and discussed below.

- Auto Trips—All of the student auto pick-up and drop-off trips were assigned to the State Street, Schermerhorn Street, and Flatbush Avenue curbsides for the proposed school facilities. Motorists would seek parking at off-street parking facilities in the study area. Motorists parking at off-site facilities would walk to and from these off-street parking facilities.
- Taxi Trips—Taxi patrons would get dropped off and picked up along State Street, Schermerhorn Street, 3rd Avenue, and Flatbush Avenue.
- City Bus Trips—City bus riders would take buses stopping on 3rd Avenue, Fulton Street, Flatbush Avenue, and Atlantic Avenue.
- Subway Trips—Subway riders were assigned to the Atlantic Avenue–Barclays Center station (B, D, N, Q, R, and No. 2, 3, 4, 5 trains), Hoyt Schermerhorn station (A, C, and G trains), Nevins Street station (No. 2, 3, 4, and 5), and the Lafayette Avenue station (G train).
- Walk-Only Trips—Pedestrian walk-only trips were developed by distributing project-generated person trips to area pedestrian facilities (i.e., sidewalks, corner reservoirs, and crosswalks) based on population data as well as the land use characteristics of the surrounding neighborhood.

CHANGES TO THE STUDY AREA STREET NETWORK

DOT has proposed but not yet obtained final approval for a neighborhood pedestrian safety project that would include curb extensions, larger plazas, and shorter crossings for pedestrians, and a bus lane project on Fulton Street that would modify lane widths at Fulton Street and Flatbush Avenue. From the pedestrian safety improvements project, there would be modifications that would affect the traffic and pedestrian study areas. The proposal to close Schermerhorn Street to vehicular traffic between 3rd and Flatbush Avenues would divert eastbound Schermerhorn Street right turn traffic onto the eastbound Lafayette Avenue approach or to other intersections. This improvement would obviate the need to analyze the Schermerhorn Street and Flatbush Avenue intersection for the traffic study. The proposal to install a signalized crosswalk crossing Flatbush Avenue at the north leg of State Street would require the pedestrian analysis of that new crosswalk, the northwest and southwest corners of State Street and Flatbush Avenue, and the crosswalk across State Street at Flatbush Avenue. The area east of Flatbush Avenue is a plaza and would not need to be analyzed in the pedestrian study. Although the closure of Schermerhorn Street to vehicular traffic between 3rd Avenue and Flatbush Avenue and the signalization of State Street at Flatbush Avenue is not being proposed by the co-applicants, this chapter will evaluate transportation conditions with and without the DOT-proposed projects in the No Action condition to cover the worst-case condition, which was determined to be the condition with the diversion of traffic volumes onto State Street and Atlantic Avenue, after accounting for traffic circulation patterns and the proposed changes to intersection geometries.

Based on the detailed assignment of pedestrian trips and in consultation with DOT considering the above described proposed pedestrian safety improvements, 8 sidewalks, 9 corner reservoirs, and 10 crosswalks were recommended for detailed analysis of weekday peak hour conditions, as summarized in **Table 11-9** and **Figure 11-8**.

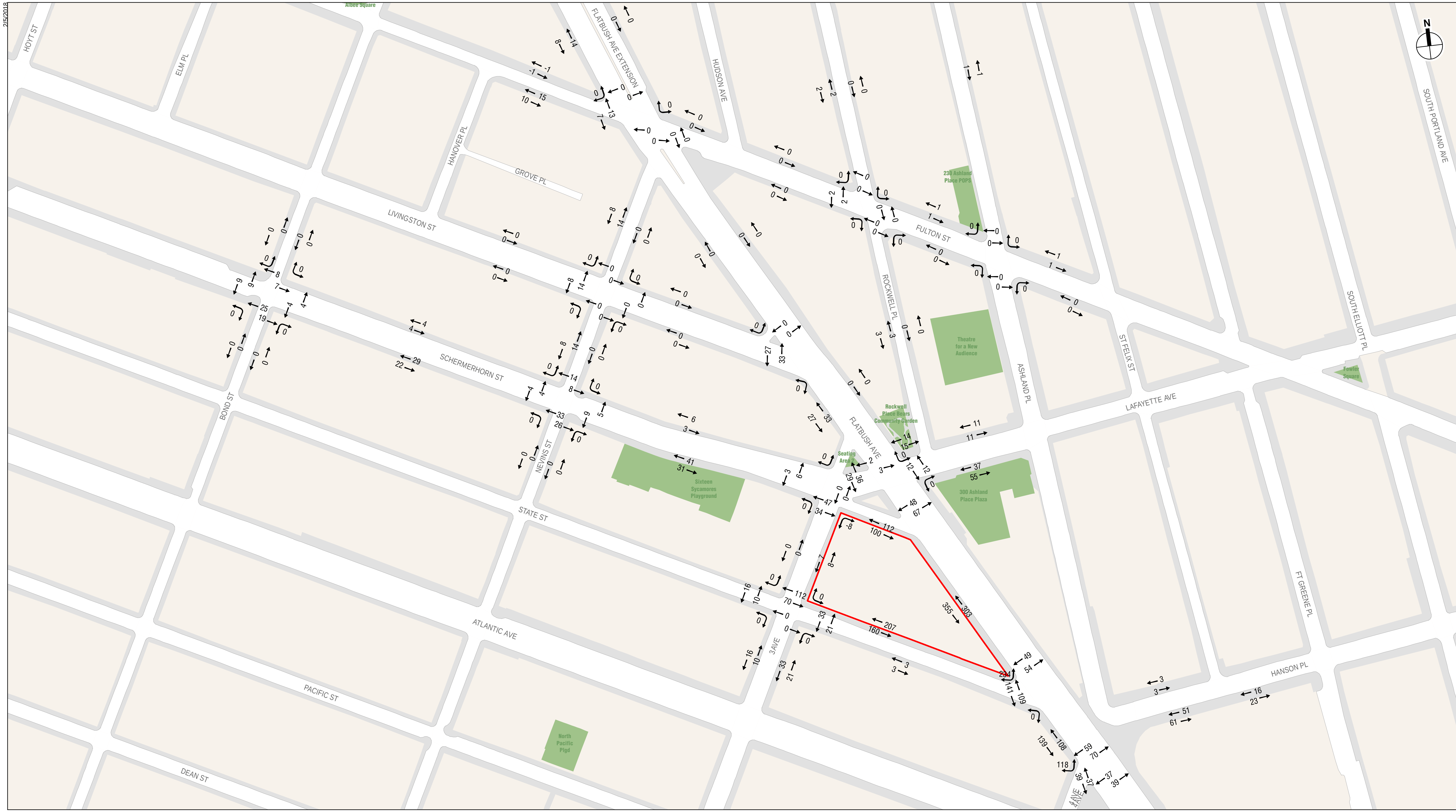
Project Site

0 400 FEET

2025 Proposed Project Incremental Pedestrian Trips
Weekday AM Peak Hour

ECF 80 FLATBUSH AVENUE

Figure 11-5



Project Site

0 400 FEET

2025 Proposed Project Incremental Pedestrian Trips
Weekday Midday Peak Hour

ECF 80 FLATBUSH AVENUE

Figure 11-6

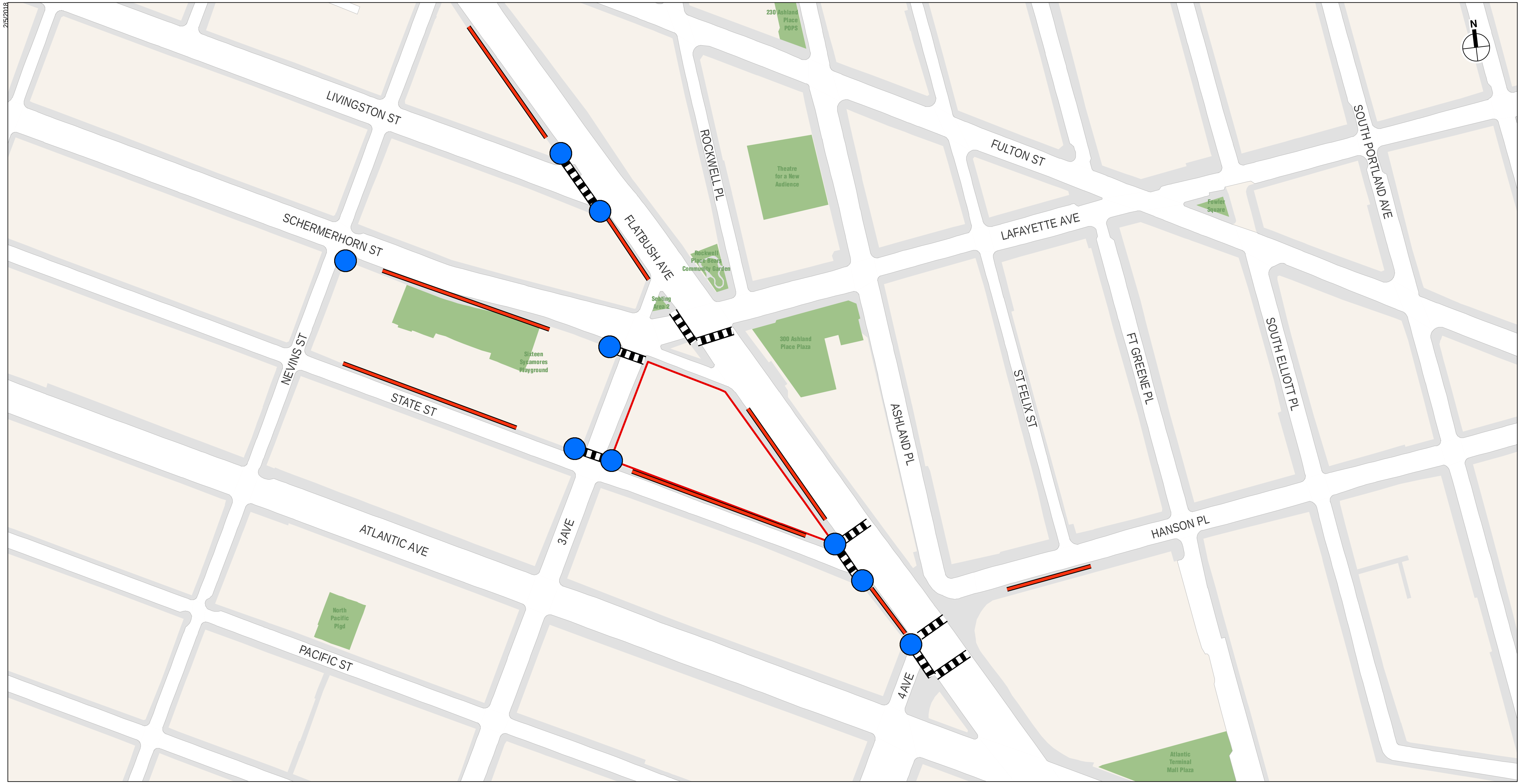
Project Site

0 400 FEET

2025 Proposed Project Incremental Pedestrian Trips
Weekday PM Peak Hour

ECF 80 FLATBUSH AVENUE

Figure 11-7



Project Site

Pedestrian Analysis Locations

Corner

Crosswalk

Sidewalk

0 400 FEET

ECF 80 FLATBUSH AVENUE

Pedestrian Analysis Locations

Figure 11-8

Table 11-9
Pedestrian Level 2 Screening Analysis Results–Analysis Locations

Pedestrian Elements	Weekday AM	Weekday Midday	Weekday PM	Selected Analysis Location
Flatbush Avenue and Fulton Street				
Northeast Corner	0	0	0	
Southeast Corner	0	0	0	
Northwest Corner	158	20	161	
Southwest Corner	158	20	161	
North Crosswalk	0	0	0	
South Crosswalk	0	0	0	
East Crosswalk	0	0	0	
West Crosswalk	158	20	161	
Flatbush Avenue and Livingston Street				
West Sidewalk along Flatbush Avenue between Livingston Street and Nevins Street	232	60	248	✓
West Sidewalk along Flatbush Avenue between Livingston Street and Lafayette Avenue	232	60	248	✓
Northwest Corner	232	60	248	✓
Southwest Corner	232	60	248	✓
North Crosswalk	0	0	0	
West Crosswalk	232	60	248	✓
Flatbush Avenue and Lafayette Avenue				
North Sidewalk along Lafayette Avenue between Flatbush Avenue and Rockwell Place	99	29	108	
South Sidewalk along Lafayette Avenue between Flatbush Avenue and Ashland Place	131	92	140	
Northeast Corner	99	29	106	
Southeast Corner (part of a pedestrian plaza)	277	139	302	
Northwest Corner (part of a pedestrian plaza)	284	70	298	
North Crosswalk	26	5	25	
South Crosswalk	204	115	221	✓
East Crosswalk	73	24	81	
West Crosswalk	258	65	273	✓
Flatbush Avenue and Schermerhorn Street				
West Sidewalk along Flatbush Avenue between Schermerhorn Street and State Street	445	658	488	✓
South Sidewalk along Schermerhorn Street between Flatbush Avenue and 3rd Avenue*	904	212	959	
Flatbush Avenue and State Street				
North Sidewalk along State Street between Flatbush Avenue and 3rd Avenue	709	367	755	✓
South Sidewalk along State Street between Flatbush Avenue and 3rd Avenue	30	6	31	
West Sidewalk along Flatbush Avenue between State Street and 4th Avenue	497	247	525	✓
South Sidewalk along Hanson Place between Flatbush Avenue and Fort Greene Place–East Segment	98	39	102	
Northwest Corner (proposed by DOT for future pedestrian safety improvement project)	334	112	365	✓
Southwest Corner (proposed by DOT for future pedestrian safety improvement project)	308	103	338	✓
North Crosswalk (proposed by DOT for future pedestrian safety improvement project)	308	103	338	✓
West Crosswalk (proposed by DOT for future pedestrian safety improvement project)	505	250	534	✓
Flatbush Avenue and Hanson Place				
South Sidewalk along Hanson Place between Flatbush Avenue and Fort Greene Place - West Segment	334	112	365	✓
Flatbush Avenue and 4th Avenue				
West Sidewalk along 4th Avenue between Flatbush Avenue and Atlantic Avenue	145	120	146	
North Sidewalk along Atlantic Avenue between 4th Avenue and Flatbush Avenue	45	28	42	
Northeast Corner	45	28	42	
Northwest Corner	384	201	428	✓
Southwest Corner (part of a pedestrian plaza)	484	152	538	
North Crosswalk	347	129	379	✓
South Crosswalk	242	76	269	✓
West Crosswalk	242	76	269	✓
Fulton Street and Lafayette Avenue				
South Sidewalk along Lafayette Avenue between Fulton Street and South Elliott Place	90	38	96	
South Sidewalk along Lafayette Avenue between Fulton Street and Fort Greene Place	90	38	96	
Southeast Corner	90	38	96	
Southwest Corner	90	38	96	
South Crosswalk	90	38	96	

Table 11-9 (cont'd)
Pedestrian Level 2 Screening Analysis Results–Analysis Locations

Pedestrian Elements	Weekday			Selected Analysis Location
	AM	Midday	PM	
Lafayette Avenue and Ashland Place				
East Sidewalk along Ashland Place between Lafayette Avenue and Fulton Street	4	2	5	
West Sidewalk along Ashland Place between Lafayette Avenue and Fulton Street	34	10	39	
South Sidewalk along Lafayette Avenue between Ashland Place and Saint Felix Street	131	92	140	
West Sidewalk along Ashland Place between Lafayette Avenue and Hanson Place	34	10	39	
Southeast Corner	135	91	144	
Northwest Corner	98	34	111	
Southwest Corner (part of a pedestrian plaza)	169	101	183	
North Crosswalk	64	24	72	
South Crosswalk	135	91	144	
East Crosswalk	0	0	0	
West Crosswalk	34	10	39	
Hanson Place and Fort Greene Place				
South Sidewalk along Hanson Place between Fort Greene Place and South Elliott Place	40	26	42	
East Sidewalk along Fort Greene Place between Hanson Place and Atlantic Avenue	95	20	92	
Nevins Street and Livingston Street				
West Sidewalk along Nevins Street between Livingston Street and Flatbush Avenue	109	22	111	
West Sidewalk along Nevins Street between Livingston Street and Schermerhorn Street	109	22	111	
Northwest Corner	109	22	111	
Southwest Corner	109	22	111	
North Crosswalk	0	0	0	
South Crosswalk	0	0	0	
East Crosswalk	0	0	0	
West Crosswalk	109	22	111	
Nevins Street and Schermerhorn Street				
North Sidewalk along Schermerhorn Street between Nevins Street and 3rd Avenue	51	9	52	
South Sidewalk along Schermerhorn Street between Nevins Street and 3rd Avenue	205	72	220	✓
North Sidewalk along Schermerhorn Street between Nevins Street and Bond Street	25	8	27	
South Sidewalk along Schermerhorn Street between Nevins Street and Bond Street	122	51	133	
Northeast Corner	167	36	171	
Southeast Corner	204	73	220	✓
Northwest Corner	134	30	138	
Southwest Corner	171	67	187	
North Crosswalk	109	22	111	
South Crosswalk	146	59	160	
East Crosswalk	58	14	60	
West Crosswalk	25	8	27	
3rd Avenue and Schermerhorn Street				
East Sidewalk along 3rd Avenue between Schermerhorn Street and State Street	173	15	181	
Southeast Corner*	258	73	270	
Northwest Corner	51	9	52	
Southwest Corner	307	90	323	✓
South Crosswalk	256	81	271	✓
West Crosswalk	51	9	52	
3rd Avenue and State Street				
East Sidewalk along 3rd Avenue between State Street and Atlantic Avenue	46	54	48	
West Sidewalk along 3rd Avenue between State Street and Atlantic Avenue	40	26	42	
North Sidewalk along State Street between 3rd Avenue and Nevins Street	207	156	214	✓
Northeast Corner	300	236	310	✓
Southeast Corner	46	54	48	
Northwest Corner	287	208	297	✓
Southwest Corner	40	26	42	
North Crosswalk	247	182	255	✓
East Crosswalk	46	54	48	
West Crosswalk	40	26	42	

Table 11-9 (cont'd)
Pedestrian Level 2 Screening Analysis Results–Analysis Locations

Pedestrian Elements	Weekday AM	Weekday Midday	Weekday PM	Selected Analysis Location
Bond Street and Schermerhorn Street				
North Sidewalk along Schermerhorn Street between Bond Street and Hoyt Street	106	33	118	
South Sidewalk along Schermerhorn Street between Bond Street and Hoyt Street	40	26	42	
Northeast Corner	74	23	82	
Southeast Corner	123	52	132	
Northwest Corner	106	33	119	
Southwest Corner	155	62	169	
North Crosswalk	49	15	55	
South Crosswalk	98	44	105	
East Crosswalk	25	8	27	
West Crosswalk	57	18	64	

Notes:
✓ denotes pedestrian elements selected for detailed analysis.
* part of a pedestrian plaza proposed by DOT for future pedestrian safety improvement project

PARKING

Based on a field study of off-street public parking availability within ¼-mile of the project site, there are 10 facilities with a licensed capacity of 1,484 spaces, as shown in **Table 11-7**. There will be additional parking facilities coming online before the proposed project is built, such as the Willoughby Square garage, and a garage at the Steiner's Hub/333 Schermerhorn Street development; however, since parking availability at those future sites is not known, autos have been assigned to park only at the existing locations with availability. According to **Table 11-7**, there would be approximately 200 to 350 spaces available within ¼-mile of the site at the existing off-street parking facilities. The parking demand for the proposed project will be assessed during the weekday AM, midday, PM, and overnight periods, and compared to available capacity. If the parking demand exceeds available capacity during any of these periods, a field study of off-street public parking availability within ½-mile from the site will be conducted to determine if there would be a parking shortfall.

TRAFFIC OPERATIONS

The operations of all of the signalized intersections in the study area were assessed using methodologies presented in the *2000 Highway Capacity Manual (HCM)* using the *Highway Capacity Software (HCS+ 5.5)*. The *HCM* procedure evaluates the level of service (LOS) for signalized intersections using average stop control delay, in seconds per vehicle (spv), as described below.

SIGNALIZED INTERSECTIONS

The average control delay per vehicle is the basis for LOS determination for individual lane groups (grouping of movements in one or more travel lanes), the approaches, and the overall intersection. LOS is defined in **Table 11-10**.

Table 11-10
LOS Criteria for Signalized Intersections

LOS	Average Control Delay
A	≤ 10.0 seconds
B	>10.0 and ≤ 20.0 seconds
C	>20.0 and ≤ 35.0 seconds
D	>35.0 and ≤ 55.0 seconds
E	>55.0 and ≤ 80.0 seconds
F	>80.0 seconds
Source: Transportation Research Board. *HCM*.	

Although the *HCM* methodology calculates a volume-to-capacity (v/c) ratio, there is no strict relationship between v/c ratios and LOS as defined in the *HCM*. A high v/c ratio indicates substantial traffic passing through an intersection, but a high v/c ratio combined with low average delay actually represents the most efficient condition in terms of traffic engineering standards, where an approach or the whole intersection processes traffic close to its theoretical maximum capacity with minimal delay. However, very high v/c ratios—especially those approaching or greater than 1.0—are often correlated with a deteriorated LOS. Other important variables affecting delay include cycle length, progression, and green time. LOS A and B indicate good operating conditions with minimal delay. At LOS C, the number of vehicles stopping is higher, but congestion is still fairly light. LOS D describes a condition where congestion levels are more noticeable and individual cycle failures (a condition where motorists may have to wait for more than one green phase to clear the intersection) can occur. Conditions at LOS E and F reflect poor service levels, and cycle breakdowns are frequent. The *HCM* methodology also provides for a summary of the total intersection operating conditions. The analysis chooses the two critical movements (the worst case from each roadway) and calculates a summary critical v/c ratio. The overall intersection delay, which determines the intersection's LOS, is based on a weighted average of control delays of the individual lane groups. Within New York City, the midpoint of LOS D (45 seconds of delay) is generally considered as the threshold between acceptable and unacceptable operations.

Significant Impact Criteria

According to the criteria presented in the *CEQR Technical Manual*, impacts are considered significant and require examination of mitigation if they result in an increase in the With Action condition of 5 or more seconds of delay in a lane group over No Action levels beyond mid-LOS D. For No Action LOS E, a 4-second increase in delay is considered significant. For No Action LOS F, a 3-second increase in delay is considered significant. In addition, impacts are considered significant if LOS deteriorate from acceptable A, B, or C in the No Action condition to marginally unacceptable LOS D (a delay in excess of 45 seconds, the midpoint of LOS D), or unacceptable LOS E or F in the With Action condition.

UNSIGNALIZED INTERSECTIONS

For unsignalized intersections, the average control delay is defined as the total elapsed time from which a vehicle stops at the end of the queue until the vehicle departs from the stop line. This includes the time required for the vehicle to travel from the last-in-queue to the first-in-queue position. The average control delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation. The LOS criteria for unsignalized intersections are summarized in **Table 11-11**.

Table 11-11
LOS Criteria for Unsignalized Intersections

LOS	Average Control Delay
A	≤ 10.0 seconds
B	> 10.0 and ≤ 15.0 seconds
C	> 15.0 and ≤ 25.0 seconds
D	> 25.0 and ≤ 35.0 seconds
E	> 35.0 and ≤ 50.0 seconds
F	> 50.0 seconds
Source: Transportation Research Board. *HCM*.	

The LOS thresholds for unsignalized intersections are different from those for signalized intersections. The primary reason is that drivers expect different levels of performance from different types of transportation facilities. The expectation is that a signalized intersection is designed to carry higher traffic volumes than an unsignalized intersection; hence, the corresponding control delays are higher at a signalized intersection than at an unsignalized intersection for the same LOS. In addition, certain driver behavioral considerations combine to make delays at signalized intersections less onerous than at unsignalized intersections. For example, drivers at signalized intersections are able to relax during the red interval, whereas drivers on minor approaches to unsignalized intersections must remain attentive to the task of identifying acceptable gaps and vehicle conflicts. Also, there is often much more variability in the amount of delay experienced by individual drivers at unsignalized intersections. For these reasons, the corresponding delay thresholds for unsignalized intersections are lower than those of signalized intersections. As with signalized intersections, within New York City, the midpoint of LOS D (30 seconds of delay) is generally perceived as the threshold between acceptable and unacceptable operations.

Significant Impact Criteria

The same sliding scale of significant delays described for signalized intersections applies for unsignalized intersections. For the minor street to trigger significant impacts, at least 90 passenger car equivalents (PCE) must be identified in the With Action condition in any peak hour.

TRANSIT OPERATIONS

SUBWAY STATION ELEMENTS

The methodology for assessing station circulation (e.g., stairs, escalators, and passageways) and fare control elements (e.g., regular turnstiles, high entry/exit turnstiles, and high exit turnstiles) compares the user volume with the analyzed element's design capacity, resulting in a v/c ratio. For stairs, the design capacity considers the effective width of a tread, which accounts for railings or other obstructions, the friction or counter-flow between upward and downward pedestrians (up to 10 percent capacity reduction is applied to account for counter-flow friction), surging of entering and exiting pedestrians (up to 25 percent capacity reduction is applied to account for surged flows off of platforms and onto platforms), and the average area required for circulation. For passageways, similar considerations are made. For escalators and turnstiles, capacities are measured by the number and width of an element and the New York City Transit (NYCT) optimum capacity per element, also account for the potential for surging of entering and exiting pedestrians. In the analysis for each of these elements, volumes and capacities are presented for

15-minute intervals. The estimated v/c ratio is compared with NYCT criteria to determine a LOS for the operation of an element, as summarized in **Table 11-12**.

Table 11-12
LOS Criteria for Subway Station Element

LOS	V/C Ratio
A	0.00 to 0.45
B	0.45 to 0.70
C	0.70 to 1.00
D	1.00 to 1.33
E	1.33 to 1.67
F	Above 1.67
Source: New York City Mayor's Office of Environmental Coordination, *CEQR Technical Manual*.	

At LOS A ("free flow") and B ("fluid flow"), there is sufficient area to allow pedestrians to freely select their walking speed and bypass slower pedestrians. When cross and reverse flow movement exists, only minor conflicts may occur. At LOS C ("fluid, somewhat restricted"), movement is fluid although somewhat restricted. While there is sufficient room for standing without personal contact, circulation through queuing areas may require adjustments to walking speed. At LOS D ("crowded, walking speed restricted"), walking speed is restricted and reduced. Reverse and cross flow movement is severely restricted because of congestion and the difficult passage of slower moving pedestrians. At LOS E ("congested, some shuffling and queuing") and F ("severely congested, queued"), walking speed is restricted. There is also insufficient area to bypass others, and opposing movement is difficult. Often, forward progress is achievable only through shuffling, with queues forming.

Significant Impact Criteria

The determination of significant impacts for station elements varies based on their type and use. For stairs and passageways, significant impacts are defined in term of width increment threshold (WIT) based on the minimum amount of additional capacity that would be required either to mitigate the location to its service conditions (LOS) under the No Action levels, or to bring it to a v/c ratio of 1.00 (LOS C/D), whichever is greater. Significant impacts are typically considered to occur once the WITs in **Table 11-13** are reached or exceeded.

Table 11-13
Significant Impact Guidance for Stairs and Passageways

With Action v/c Ratio	WIT for Significant Impact (inches)	
	Stairway	Passageway
1.00 to 1.09	8.0	13.0
1.10 to 1.19	7.0	11.5
1.20 to 1.29	6.0	10.0
1.30 to 1.39	5.0	8.5
1.40 to 1.49	4.0	6.0
1.50 to 1.59	3.0	4.5
1.60 and up	2.0	3.0
Sources: New York City Mayor's Office of Environmental Coordination, *CEQR Technical Manual*.		

For escalators and control area elements, impacts are significant if the proposed project causes a v/c ratio to increase from below 1.00 to 1.00 or greater. Where a facility is already at or above its capacity (a v/c of 1.00 or greater) in the No Action condition, a 0.01 increase in v/c ratio is also significant.

PEDESTRIAN OPERATIONS

The adequacy of the study area's sidewalk, crosswalk, and corner reservoir capacities in relation to the demand imposed on them is evaluated based on the methodologies presented in the *HCM*, pursuant to procedures detailed in the *CEQR Technical Manual*.

The primary performance measure for sidewalks and walkways is pedestrian space, expressed as sf per pedestrian (SFP), which is an indicator of the quality of pedestrian movement and comfort. The calculation of the sidewalk SFP is based on the pedestrian volumes by direction, the effective sidewalk or walkway width, and average walking speed. The SFP forms the basis for a sidewalk LOS analysis. The determination of sidewalk LOS is also dependent on whether the pedestrian flow being analyzed is best described as "non-platoon" or "platoon." Non-platoon flow occurs when pedestrian volume within the peak 15-minute period is relatively uniform, whereas, platoon flow occurs when pedestrian volumes vary significantly with the peak 15-minute period. Such variation typically occurs near bus stops, subway stations, and/or where adjacent crosswalks account for much of the walkway's pedestrian volume.

Crosswalks and street corners are not easily measured in terms of free pedestrian flow, as they are influenced by the effects of traffic signals. Street corners must be able to provide sufficient space for a mix of standing pedestrians (queued to cross a street) and circulating pedestrians (crossing the street or moving around the corner). The *HCM* methodologies apply a measure of time and space availability based on the area of the corner, the timing of the intersection signal, and the estimated space used by circulating pedestrians.

The total "time-space" available for these activities, expressed in sf-second, is calculated by multiplying the net area of the corner (in sf) by the signal's cycle length. The analysis then determines the total circulation time for all pedestrian movements at the corner per signal cycle (expressed as pedestrians per second). The ratio of net time-space divided by the total pedestrian circulation volume per signal cycle provides the LOS measurement of SFP.

Crosswalk LOS is also a function of time and space. Similar to the street corner analysis, crosswalk conditions are first expressed as a measurement of the available area (the crosswalk width multiplied by the width of the street) and the permitted crossing time. This measure is expressed in sf-second. The average time required for a pedestrian to cross the street is calculated based on the width of the street and an assumed walking speed. The ratio of time-space available in the crosswalk to the total crosswalk pedestrian occupancy time is the LOS measurement of available SFP. The LOS analysis also accounts for vehicular turning movements that traverse the crosswalk.

The LOS standards for sidewalks, crosswalks, and corner reservoirs are summarized in **Table 11-14**. The *CEQR Technical Manual* specifies acceptable LOS in Central Business District (CBD) areas is mid-LOS D or better.

Table 11-14
LOS Criteria for Pedestrian Elements

LOS	Sidewalks		Corner Reservoirs
	Non-Platoon Flow	Platoon Flow	
A	> 60 SFP	> 530 SFP	> 60 SFP
B	> 40 and ≤ 60 SFP	> 90 and ≤ 530 SFP	> 40 and ≤ 60 SFP
C	> 24 and ≤ 40 SFP	> 40 and ≤ 90 SFP	> 24 and ≤ 40 SFP
D	> 15 and ≤ 24 SFP	> 23 and ≤ 40 SFP	> 15 and ≤ 24 SFP
E	> 8 and ≤ 15 SFP	> 11 and ≤ 23 SFP	> 8 and ≤ 15 SFP
F	≤ 8 SFP	≤ 11 SFP	≤ 8 SFP

Source: New York City Mayor's Office of Environmental Coordination, *CEQR Technical Manual*.

SIGNIFICANT IMPACT CRITERIA

The determination of significant pedestrian impacts considers the level of predicted decrease in pedestrian space between the No Action and With Action conditions. For different pedestrian elements, flow conditions, and area types, the CEQR procedure for impact determination corresponds with various sliding-scale formulas, as further detailed below.

Sidewalks

There are two sliding-scale formulas for determining significant sidewalk impacts. For non-platoon flow, the determination of significant sidewalk impacts is based on the sliding scale using the following formula: $Y \geq X/9.0 - 0.31$, where Y is the decrease in pedestrian space in SFP and X is the No Action pedestrian space in SFP. For platoon flow, the sliding-scale formula is $Y \geq X/(9.5 - 0.321)$. Since a decrease in pedestrian space within acceptable levels would not constitute a significant impact, these formulas would apply only if the With Action pedestrian space falls short of LOS C in non-CBD areas or mid-LOS D in CBD areas. **Table 11-15** summarizes the sliding scale guidance provided by the *CEQR Technical Manual* for determining potential significant sidewalk impacts.

Corner Reservoirs and Crosswalks

The determination of significant corner and crosswalks impacts is also based on a sliding scale using the following formula: $Y \geq X/9.0 - 0.31$, where Y is the decrease in pedestrian space in SFP and X is the No Action pedestrian space in SFP. Since a decrease in pedestrian space within acceptable levels would not constitute a significant impact, this formula would apply only if the With Action pedestrian space falls short of LOS C in non-CBD areas or mid-LOS D in CBD areas. **Table 11-16** summarizes the sliding scale guidance provided by the *CEQR Technical Manual* for determining potential significant corner reservoir and crosswalk impacts.

Table 11-15
Significant Impact Guidance for Sidewalks

Non-Platoon Flow				Platoon Flow			
Sliding Scale Formula: *Y ≥ X/9.0 – 0.31*				Sliding Scale Formula: *Y ≥ X/(9.5 – 0.321)*			
Non-CBD Areas		CBD Areas		Non-CBD Areas		CBD Areas	
No Action Ped. Space (X, SFP)	With Action Ped. Space Reduc. (Y, SFP)	No Action Ped. Space (X, SFP)	With Action Ped. Space Reduc. (Y, SFP)	No Action Ped. Space (X, SFP)	With Action Ped. Space Reduc. (Y, SFP)	No Action Ped. Space (X, SFP)	With Action Ped. Space Reduc. (Y, SFP)
–	–	–	–	43.5 to 44.3	≥ 4.3	–	–
–	–	–	–	42.5 to 43.4	≥ 4.2	–	–
–	–	–	–	41.6 to 42.4	≥ 4.1	–	–
–	–	–	–	40.6 to 41.5	≥ 4.0	–	–
–	–	–	–	39.7 to 40.5	≥ 3.9	–	–
–	–	–	–	38.7 to 39.6	≥ 3.8	38.7 to 39.2	≥ 3.8
–	–	–	–	37.8 to 38.6	≥ 3.7	37.8 to 38.6	≥ 3.7
–	–	–	–	36.8 to 37.7	≥ 3.6	36.8 to 37.7	≥ 3.6
–	–	–	–	35.9 to 36.7	≥ 3.5	35.9 to 36.7	≥ 3.5
–	–	–	–	34.9 to 35.8	≥ 3.4	34.9 to 35.8	≥ 3.4
–	–	–	–	34.0 to 34.8	≥ 3.3	34.0 to 34.8	≥ 3.3
–	–	–	–	33.0 to 33.9	≥ 3.2	33.0 to 33.9	≥ 3.2
–	–	–	–	32.1 to 32.9	≥ 3.1	32.1 to 32.9	≥ 3.1
–	–	–	–	31.1 to 32.0	≥ 3.0	31.1 to 32.0	≥ 3.0
–	–	–	–	30.2 to 31.0	≥ 2.9	30.2 to 31.0	≥ 2.9
–	–	–	–	29.2 to 30.1	≥ 2.8	29.2 to 30.1	≥ 2.8
25.8 to 26.6	≥ 2.6	–	–	28.3 to 29.1	≥ 2.7	28.3 to 29.1	≥ 2.7
24.9 to 25.7	≥ 2.5	–	–	27.3 to 28.2	≥ 2.6	27.3 to 28.2	≥ 2.6
24.0 to 24.8	≥ 2.4	–	–	26.4 to 27.2	≥ 2.5	26.4 to 27.2	≥ 2.5
23.1 to 23.9	≥ 2.3	–	–	25.4 to 26.3	≥ 2.4	25.4 to 26.3	≥ 2.4
22.2 to 23.0	≥ 2.2	–	–	24.5 to 25.3	≥ 2.3	24.5 to 25.3	≥ 2.3
21.3 to 22.1	≥ 2.1	21.3 to 21.5	≥ 2.1	23.5 to 24.4	≥ 2.2	23.5 to 24.4	≥ 2.2
20.4 to 21.2	≥ 2.0	20.4 to 21.2	≥ 2.0	22.6 to 23.4	≥ 2.1	22.6 to 23.4	≥ 2.1
19.5 to 20.3	≥ 1.9	19.5 to 20.3	≥ 1.9	21.6 to 22.5	≥ 2.0	21.6 to 22.5	≥ 2.0
18.6 to 19.4	≥ 1.8	18.6 to 19.4	≥ 1.8	20.7 to 21.5	≥ 1.9	20.7 to 21.5	≥ 1.9
17.7 to 18.5	≥ 1.7	17.7 to 18.5	≥ 1.7	19.7 to 20.6	≥ 1.8	19.7 to 20.6	≥ 1.8
16.8 to 17.6	≥ 1.6	16.8 to 17.6	≥ 1.6	18.8 to 19.6	≥ 1.7	18.8 to 19.6	≥ 1.7
15.9 to 16.7	≥ 1.5	15.9 to 16.7	≥ 1.5	17.8 to 18.7	≥ 1.6	17.8 to 18.7	≥ 1.6
15.0 to 15.8	≥ 1.4	15.0 to 15.8	≥ 1.4	16.9 to 17.7	≥ 1.5	16.9 to 17.7	≥ 1.5
14.1 to 14.9	≥ 1.3	14.1 to 14.9	≥ 1.3	15.9 to 16.8	≥ 1.4	15.9 to 16.8	≥ 1.4
13.2 to 14.0	≥ 1.2	13.2 to 14.0	≥ 1.2	15.0 to 15.8	≥ 1.3	15.0 to 15.8	≥ 1.3
12.3 to 13.1	≥ 1.1	12.3 to 13.1	≥ 1.1	14.0 to 14.9	≥ 1.2	14.0 to 14.9	≥ 1.2
11.4 to 12.2	≥ 1.0	11.4 to 12.2	≥ 1.0	13.1 to 13.9	≥ 1.1	13.1 to 13.9	≥ 1.1
10.5 to 11.3	≥ 0.9	10.5 to 11.3	≥ 0.9	12.1 to 13.0	≥ 1.0	12.1 to 13.0	≥ 1.0
9.6 to 10.4	≥ 0.8	9.6 to 10.4	≥ 0.8	11.2 to 12.0	≥ 0.9	11.2 to 12.0	≥ 0.9
8.7 to 9.5	≥ 0.7	8.7 to 9.5	≥ 0.7	10.2 to 11.1	≥ 0.8	10.2 to 11.1	≥ 0.8
7.8 to 8.6	≥ 0.6	7.8 to 8.6	≥ 0.6	9.3 to 10.1	≥ 0.7	9.3 to 10.1	≥ 0.7
6.9 to 7.7	≥ 0.5	6.9 to 7.7	≥ 0.5	8.3 to 9.2	≥ 0.6	8.3 to 9.2	≥ 0.6
6.0 to 6.8	≥ 0.4	6.0 to 6.8	≥ 0.4	7.4 to 8.2	≥ 0.5	7.4 to 8.2	≥ 0.5
5.1 to 5.9	≥ 0.3	5.1 to 5.9	≥ 0.3	6.4 to 7.3	≥ 0.4	6.4 to 7.3	≥ 0.4
< 5.1	≥ 0.2	< 5.1	≥ 0.2	< 6.4	≥ 0.3	< 6.4	≥ 0.3

Notes: Y = decrease in pedestrian space in SFP; X = No Action pedestrian space in SFP.
Sources: New York City Mayor's Office of Environmental Coordination, *CEQR Technical Manual*.

Table 11-16
Significant Impact Guidance for Corners and Crosswalks

Sliding Scale Formula: *Y ≥ X/9.0 – 0.31*			
Non-CBD Areas		CBD Areas	
No Action Pedestrian Space (X, SFP)	With Action Pedestrian Space Reduction (Y, SFP)	No Action Pedestrian Space (X, SFP)	With Action Pedestrian Space Reduction (Y, SFP)
25.8 to 26.6	≥ 2.6	–	–
24.9 to 25.7	≥ 2.5	–	–
24.0 to 24.8	≥ 2.4	–	–
23.1 to 23.9	≥ 2.3	–	–
22.2 to 23.0	≥ 2.2	–	–
21.3 to 22.1	≥ 2.1	21.3 to 21.5	≥ 2.1
20.4 to 21.2	≥ 2.0	20.4 to 21.2	≥ 2.0
19.5 to 20.3	≥ 1.9	19.5 to 20.3	≥ 1.9
18.6 to 19.4	≥ 1.8	18.6 to 19.4	≥ 1.8
17.7 to 18.5	≥ 1.7	17.7 to 18.5	≥ 1.7
16.8 to 17.6	≥ 1.6	16.8 to 17.6	≥ 1.6
15.9 to 16.7	≥ 1.5	15.9 to 16.7	≥ 1.5
15.0 to 15.8	≥ 1.4	15.0 to 15.8	≥ 1.4
14.1 to 14.9	≥ 1.3	14.1 to 14.9	≥ 1.3
13.2 to 14.0	≥ 1.2	13.2 to 14.0	≥ 1.2
12.3 to 13.1	≥ 1.1	12.3 to 13.1	≥ 1.1
11.4 to 12.2	≥ 1.0	11.4 to 12.2	≥ 1.0
10.5 to 11.3	≥ 0.9	10.5 to 11.3	≥ 0.9
9.6 to 10.4	≥ 0.8	9.6 to 10.4	≥ 0.8
8.7 to 9.5	≥ 0.7	8.7 to 9.5	≥ 0.7
7.8 to 8.6	≥ 0.6	7.8 to 8.6	≥ 0.6
6.9 to 7.7	≥ 0.5	6.9 to 7.7	≥ 0.5
6.0 to 6.8	≥ 0.4	6.0 to 6.8	≥ 0.4
5.1 to 5.9	≥ 0.3	5.1 to 5.9	≥ 0.3
< 5.1	≥ 0.2	< 5.1	≥ 0.2

Notes: Y = decrease in pedestrian space in SFP; X = No Action pedestrian space in SFP.
Sources: New York City Mayor's Office of Environmental Coordination, *CEQR Technical Manual*.

VEHICULAR AND PEDESTRIAN SAFETY EVALUATION

An evaluation of vehicular and pedestrian safety is necessary for locations within the traffic and pedestrian study areas that have been identified as high crash locations, where 48 or more total reportable and non-reportable crashes or 5 or more pedestrian/bicyclist injury crashes occurred in any consecutive 12 months of the most recent 3-year period for which data are available. For these locations, crash trends are identified to determine whether projected vehicular and pedestrian traffic would further impact safety at these locations. The determination of potential significant safety impacts depends on the type of area where the project site is located, traffic volumes, accident types and severity, and other contributing factors. Where appropriate, measures to improve traffic and pedestrian safety are identified and coordinated with DOT for their approval. Because the proposed project includes two schools, a school safety assessment will be conducted, where project-related school student pedestrian activity is assessed at high crash locations, uncontrolled crossings, non-ADA pedestrian ramps, and narrow sidewalks.

PARKING CONDITIONS ASSESSMENT

The parking analysis identifies the extent to which off-street parking is available and utilized under existing and future conditions. It takes into consideration anticipated changes in area parking supply and provides a comparison of parking needs versus availability to determine if a parking shortfall is likely to result from parking displacement attributable to or additional demand generated by a proposed project. Typically, this analysis encompasses a study area within a ¼-mile of the project site. If the analysis concludes a shortfall in parking within the ¼-mile study area, the study area could sometimes be extended to a ½-mile to identify additional parking supply.

For proposed projects located in Manhattan or other CBD areas, the inability of the proposed project or the surrounding area to accommodate the project's future parking demand is considered a parking shortfall, but is generally not considered significant due to the magnitude of available alternative modes of transportation. For other areas in New York City, a parking shortfall that exceeds more than half the available on-street and off-street parking spaces within a ¼-mile of the project site may be considered significant. Additional factors, such as the availability and extent of transit in the area, proximity of the project to such transit, and patterns of automobile usage by area residents, could be considered to determine the significance of the identified parking shortfall. In some cases, if there is adequate parking supply within ½-mile of the project site, the projected parking shortfall may also not necessarily be considered significant.

C. DETAILED TRAFFIC ANALYSIS

As described above in Section B, "Preliminary Analysis Methodology and Screening Assessment," 14 signalized intersections and 2 unsignalized intersections have been selected for analysis in the weekday AM, midday, and PM peak hours.

2017 EXISTING CONDITIONS

ROADWAY NETWORK AND TRAFFIC STUDY AREA

The key roadways in the study area include Flatbush Avenue, Nevins Street, 3rd Avenue, 4th Avenue, Rockwell Place, Ashland Place, Fort Greene Place, DeKalb Avenue, Fulton Street, Schermerhorn Street, Lafayette Avenue, State Street, Atlantic Avenue, and Hanson Place. The physical and operational characteristics of the study area roadways are described below.

- Flatbush Avenue is a major two-way northbound-southbound roadway with a curb-to-curb width of approximately 70 feet to 90 feet in the study area, and is an access route to the Manhattan Bridge. Flatbush Avenue is a DOT-designated truck route, and the B41, B45, and B67 buses operate northbound and the B45 and B67 buses operate southbound along Flatbush Avenue. Curbside parking is provided along Flatbush Avenue north of Fulton Street in the study area.
- Nevins Street is a local one-way southbound roadway with a curb-to-curb width of approximately 26 feet. While curbside parking is provided only on the west side of Nevins Street, parking was observed to exist on both sides of Nevins Street during the traffic data collection.
- 3rd Avenue is a major two-way northbound-southbound roadway with a curb-to-curb width of approximately 40 feet, except between Atlantic Avenue and Schermerhorn Street, where it operates as one-way northbound. 3rd Avenue is a DOT-designated truck route, and the B37 and B103 buses operate northbound along 3rd Avenue.
- 4th Avenue is a major two-way north-southbound roadway, except between Flatbush Avenue and Atlantic Avenue, where it is one-way southbound. 4th Avenue has a curb-to-curb width of approximately 86 feet, is a DOT-designated truck route, and the B103 bus operates southbound along 4th Avenue. Curbside parking is provided on the west curbside of 4th Avenue south of Atlantic Avenue in the study area.
- Rockwell Place is a local one-way southbound roadway with a curb-to-curb width of approximately 24 feet, ending at Lafayette Avenue. Parking was observed to exist on both sides of Rockwell Place.
- Ashland Place is a local two-way northbound-southbound roadway with a curb-to-curb width of approximately 40 feet. Curbside parking is provided on both sides of Ashland Place.

- Fort Greene Place is a local one-way southbound roadway with a curb-to-curb width of approximately 34 feet. Curbside parking is provided on both sides of Fort Greene Place.
- DeKalb Avenue is local one-way westbound roadway with a curb-to-curb width of approximately 35 to 45 feet, and is a DOT-designated truck route. Curbside parking is provided on the north and south curbsides of DeKalb Avenue.
- Fulton Street is a major two-way westbound-eastbound roadway with a curb-to-curb width of approximately 23 feet west of Flatbush Avenue and 45 feet east of Flatbush Avenue. Fulton Street serves as a 24-hour bus only corridor between Adams Street and Flatbush Avenue. The B25, B26, B38, and B52 buses operate eastbound and the B25, B26, and B52 buses operate westbound on Fulton Street.
- Schermerhorn Street is a local two-way westbound-eastbound roadway with a curb-to-curb width of approximately 47 feet, and is a DOT-designated truck route. Schermerhorn Street becomes one-way eastbound between 3rd Avenue and Flatbush Avenue. Curbside parking is provided on both sides of Schermerhorn Street.
- Lafayette Avenue is a local one-way eastbound roadway with a curb-to-curb width of approximately 35 feet, and is a DOT-designated truck route. Curbside parking is provided on both sides of Lafayette Avenue.
- State Street is a local one-way eastbound roadway with a curb-to-curb width of approximately 30 feet. Curbside parking is provided on both sides of State Street.
- Atlantic Avenue is a major two-way westbound-eastbound roadway with a curb-to-curb width of approximately 70 feet and is a DOT-designated truck route. The B37, B45, B63, and B65 buses operate eastbound and the B63 bus operates westbound on Atlantic Avenue. Curbside parking is provided on both sides of Atlantic Avenue west of 4th Avenue.
- Hanson Place is a local two-way westbound-eastbound roadway with a curb-to-curb width of approximately 40 feet.

TRAFFIC CONDITIONS

Traffic data were collected in June 2017 during the school year for the weekday AM, midday, and PM peak periods via a combination of manual intersection counts and 24-hour Automatic Traffic Recorder (ATR) counts. The 2017 existing peak period traffic volumes were developed based on these counts. The highest peak hour traffic volumes (8:00 AM to 9:00 AM, 1:00 PM to 2:00 PM, and 6:00 PM to 7:00 PM) during the respective peak periods based on the collected data were used. Inventories of roadway geometry, traffic controls, bus stops, and parking regulations/activities were recorded to provide appropriate inputs for the operational analyses. Official signal timings were also obtained from DOT for use in the analysis of the study area signalized intersections. **Figures 11-9 through 11-11** show the 2017 existing traffic volumes for the weekday AM, midday, and PM peak hours, respectively.

LEVELS OF SERVICE

A summary of the 2017 existing conditions traffic analysis results are presented in **Table 11-17**. Details on LOS, v/c ratios, and average delays are presented in **Tables 11-18 and 11-19**. Overall, the capacity analysis indicates that most of the study area's intersection approaches/lane groups operate acceptably—at mid-LOS D or better (delays of 45 seconds or less per vehicle for signalized intersections and 30 seconds or less per vehicle for unsignalized intersections) for the peak hours. Approaches/lane groups operating beyond mid-LOS D and those with v/c ratios of 0.90 or greater are described below.

2/5/2018

Project Site

0 400 FEET

2017 Existing Traffic Volumes
Weekday AM Peak Hour
Figure 11-9

ECF 80 FLATBUSH AVENUE

2/5/2018

Project Site

0 400 FEET

2017 Existing Traffic Volumes
Weekday Midday Peak Hour
Figure 11-10

ECF 80 FLATBUSH AVENUE

Project Site

0 400 FEET

2017 Existing Traffic Volumes
Weekday PM Peak Hour
Figure 11-11

ECF 80 FLATBUSH AVENUE

Table 11-17
Summary of 2017 Existing Traffic Analysis Results

LOS	Analysis Peak Hours: Weekday AM	Weekday Midday	Weekday PM
Signalized Intersections			
Lane Groups at LOS A/B/C	35	34	27
Lane Groups at LOS D	14	18	23
Lane Groups at LOS E	4	3	5
Lane Groups at LOS F	5	3	3
Total	**58**	**58**	**58**
Lane Groups with v/c ≥ 0.90	8	7	8
Unsignalized Intersections			
Lane Groups at LOS A/B/C	1	1	0
Lane Groups at LOS D	1	0	1
Lane Groups at LOS E	0	0	0
Lane Groups at LOS F	0	1	1
Total	**2**	**2**	**2**
Lane Groups with v/c ≥ 0.90	0	1	1

Table 11-18
2017 Existing Conditions LOS Analysis: Signalized Intersections

Intersection	Weekday AM				Weekday Midday				Weekday PM			
	Lane Group	v/c Ratio	Delay (sec)	LOS	Lane Group	v/c Ratio	Delay (sec)	LOS	Lane Group	v/c Ratio	Delay (sec)	LOS
Flatbush Avenue and DeKalb Avenue												
WB	LTR	0.69	39.5	D	LTR	0.75	42.3	D	LTR	0.84	47.8	D
NB	T	0.83	30.1	C	T	0.78	28.2	C	T	0.73	26.0	C
SB	TR	0.73	26.3	C	TR	0.75	27.0	C	TR	0.73	26.0	C
	Intersection		30.2	C	Intersection		30.1	C	Intersection		29.9	C
Flatbush Avenue and Fulton Street												
EB	LTR	0.58	48.3	D	LTR	0.66	54.9	D	LTR	0.69	54.9	D
WB	LT	1.05	117.1	F	LT	1.05	116.2	F	LT	1.05	117.9	F
	R	0.52	26.8	C	R	0.14	16.3	B	R	0.35	19.6	B
NB	T	0.81	37.0	D	T	0.95	52.1	D	T	0.78	38.9	D
SB	L	1.05	128.0	F	L	1.05	118.5	F	L	1.05	117.2	F
	T	0.51	15.7	B	T	0.50	15.5	B	T	0.53	15.9	B
	Intersection		41.0	D	Intersection		49.3	D	Intersection		41.1	D
Nevins Street and Schermerhorn Street												
EB	TR	0.52	16.2	B	TR	0.79	25.8	C	TR	0.84	29.0	C
WB	LT	0.15	10.6	B	LT	0.14	10.7	B	LT	0.07	9.9	A
SB	LTR	0.98	74.2	E	LTR	0.67	35.2	D	LTR	0.82	45.0	D
	Intersection		40.8	D	Intersection		27.0	C	Intersection		33.4	C
Nevins Street and State Street												
EB	TR	0.31	23.4	C	TR	0.37	24.5	C	TR	0.46	26.0	C
SB	LT	0.38	13.5	B	LT	0.35	13.0	B	LT	0.50	15.5	B
	Intersection		17.2	B	Intersection		17.9	B	Intersection		19.8	B
3rd Avenue and Schermerhorn Street												
EB	L	0.37	36.4	D	L	0.36	36.0	D	L	0.39	36.7	D
	LT	0.47	39.3	D	LT	0.86	60.7	E	LT	0.85	58.4	E
NB	LTR	0.67	38.8	D	LTR	0.46	34.1	C	LTR	0.47	34.2	C
	Intersection		38.6	D	Intersection		43.4	D	Intersection		42.4	D
3rd Avenue and State Street												
EB	LT	0.25	31.8	C	LT	0.48	49.5	D	LT	0.71	61.0	E
NB	TR	0.45	14.1	B	TR	0.30	6.3	A	TR	0.27	6.0	A
	Intersection		16.5	B	Intersection		14.3	B	Intersection		20.1	C
3rd Avenue and Atlantic Avenue												
EB	TR	0.61	26.1	C	TR	0.72	25.7	C	TR	0.77	29.4	C
WB	T	1.05	71.6	E	T	0.75	26.6	C	T	0.86	34.1	C
	R	0.69	33.8	C	R	0.46	21.6	C	R	0.38	21.7	C
NB	LTR	0.67	38.5	D	LTR	0.72	45.2	D	LTR	0.85	49.9	D
	Intersection		50.5	D	Intersection		29.3	C	Intersection		35.4	D
Flatbush Avenue and Lafayette Ave												
EB	L	0.56	41.8	D	L	0.49	38.8	D	L	0.48	40.6	D
	LT	0.65	42.2	D	LT	0.55	38.6	D	LT	0.68	44.2	D
NB	TR	1.00	55.7	E	TR	0.98	50.5	D	TR	0.98	53.1	D
SB	L	0.49	48.0	D	L	0.63	53.8	D	L	0.55	44.9	D
	T	0.58	14.0	B	T	0.59	14.6	B	T	0.65	14.2	B
	Intersection		38.9	D	Intersection		35.9	D	Intersection		35.9	D
Flatbush Avenue and 4th Avenue												
NB	T	0.80	31.5	C	T	0.70	28.1	C	T	0.68	27.7	C
SB	TR	0.88	39.1	D	TR	1.05	74.6	E	TR	1.05	72.1	E
	R	0.56	27.6	C	R	0.55	27.1	C	R	0.59	28.1	C
	Intersection		33.8	C	Intersection		48.4	D	Intersection		47.1	D
4th Avenue and Atlantic Avenue												
EB	T	0.56	27.5	C	T	0.81	39.7	D	T	1.00	66.9	E
	R	0.26	27.8	C	R	0.54	41.3	D	R	0.49	42.4	D
WB	T	0.73	30.8	C	T	0.65	32.5	C	T	0.84	41.8	D
NB	L	0.89	64.9	E	L	0.42	42.0	D	L	0.54	45.8	D
	R	0.90	82.2	F	R	0.74	60.0	E	R	0.96	92.3	F
SB	LT	1.05	97.1	F	LT	0.83	52.7	D	LT	0.89	52.8	D
	R	0.36	44.4	D	R	0.39	41.3	D	R	0.15	30.7	C
	Intersection		49.9	D	Intersection		41.2	D	Intersection		54.7	D

Table 11-18 (cont'd)
2017 Existing Conditions LOS Analysis: Signalized Intersections

Intersection	Weekday AM				Weekday Midday				Weekday PM			
	Lane Group	v/c Ratio	Delay (sec)	LOS	Lane Group	v/c Ratio	Delay (sec)	LOS	Lane Group	v/c Ratio	Delay (sec)	LOS
Flatbush Avenue and Atlantic Avenue												
EB	T	0.69	29.3	C	T	0.71	30.2	C	T	0.96	49.0	D
	R	0.33	32.0	C	R	0.46	35.1	D	R	0.52	37.7	D
WB	TR	1.05	80.1	F	TR	0.91	49.8	D	TR	0.87	46.2	D
	R	0.56	39.4	D	R	1.00	93.4	F	R	0.78	55.5	E
NB	T	0.70	27.5	C	T	0.57	24.6	C	T	0.61	25.3	C
SB	T	0.38	21.4	C	T	0.51	23.4	C	T	0.49	23.0	C
	Intersection		43.4	D	Intersection		36.6	D	Intersection		37.6	D
Ashland Place and Fulton Street												
EB	LT	0.58	19.0	B	LT	0.54	17.5	B	LT	0.69	21.8	C
	R	0.04	10.7	B	R	0.06	10.9	B	R	0.07	10.9	B
WB	LT	0.69	21.2	C	LT	0.46	15.7	B	LT	0.50	16.4	B
	R	0.54	19.0	B	R	0.30	13.8	B	R	0.23	13.2	B
NB	LTR	0.71	31.7	C	LTR	0.56	27.3	C	LTR	0.87	48.1	D
SB	L	0.41	27.4	C	L	0.48	27.8	C	L	0.78	47.0	D
	TR	0.09	19.1	B	TR	0.19	20.1	C	TR	0.35	22.7	C
	Intersection		23.1	C	Intersection		19.8	B	Intersection		28.9	C
Ashland Place and Lafayette Avenue												
EB	LTR	0.82	30.8	C	LTR	0.83	21.4	C	LTR	0.90	35.6	D
NB	TR	0.58	35.1	D	TR	0.49	20.7	C	TR	0.55	37.0	D
SB	LT	0.16	25.8	C	LT	0.38	19.1	B	LT	0.54	37.6	D
	Intersection		31.6	C	Intersection		20.9	C	Intersection		36.1	D
Fort Greene Place and Hanson Place												
EB	TR	0.37	14.5	B	TR	0.45	15.6	B	TR	0.67	21.5	C
WB	LT	0.35	14.1	B	LT	0.35	14.2	B	LT	0.48	17.2	B
NB	LR	0.37	14.6	B	LR	0.76	28.0	C	LR	0.89	43.0	D
SB	LTR	0.17	11.7	B	LTR	0.14	11.3	B	LTR	0.24	12.7	B
	Intersection		14.0	B	Intersection		19.8	B	Intersection		26.8	C

Notes: L = Left Turn, T = Through, R = Right Turn, EB = Eastbound, WB = Westbound, NB = Northbound, SB = Southbound.

Table 11-19
2017 Existing Conditions LOS Analysis
Unsignalized Intersections

Intersection	Weekday AM				Weekday Midday				Weekday PM			
	Lane Group	v/c Ratio	Delay (sec)	LOS	Lane Group	v/c Ratio	Delay (sec)	LOS	Lane Group	v/c Ratio	Delay (sec)	LOS
Flatbush Avenue and State Street												
EB	R	0.39	32.9	D	R	1.05	165.0	F	R	1.05	165.0	F
Rockwell Place and Lafayette Avenue												
SB	L	0.14	21.0	C	L	0.23	22.4	C	L	0.20	26.5	D

Notes: L = Left Turn, T = Through, R = Right Turn, LOS = LOS, EB = Eastbound, WB = Westbound, NB = Northbound, SB = Southbound.

Flatbush Avenue

- Northbound approach at the Flatbush Avenue and Fulton Street intersection (LOS D with a v/c ratio of 0.95 and a delay of 52.1 spv during the weekday midday peak hour);
- Southbound left-turn at the Flatbush Avenue and Fulton Street intersection (LOS F with a v/c ratio of 1.05 and a delay of 128.0 spv during the weekday AM peak hour; LOS F with a v/c ratio of 1.05 and a delay of 118.5 spv during the weekday midday peak hour; and LOS F with a v/c ratio of 1.05 and a delay of 117.2 spv during the weekday PM peak hour);
- Northbound approach at the Flatbush Avenue and Lafayette Avenue intersection (LOS E with a v/c ratio of 1.00 and a delay of 55.7 spv in the weekday AM peak hour; LOS D with a v/c ratio of 0.98 and a delay of 50.5 spv in the weekday midday peak hour; and LOS D with a v/c ratio of 0.98 and a delay of 53.1 spv in the weekday PM peak hour);
- Southbound left-turn at the Flatbush Avenue and Lafayette Avenue intersection (LOS D with a v/c ratio of 0.49 and a delay of 48.0 spv in the weekday AM peak hour; and LOS D with a v/c ratio of 0.63 and a delay of 53.8 spv in the weekday midday peak hour);

- Southbound through/right-turn at the Flatbush Avenue and 4th Avenue intersection (LOS E with a v/c ratio of 1.05 and a delay of 74.6 spv in the weekday midday peak hour; and LOS E with a v/c ratio of 1.05 and a delay of 72.1 spv in the weekday PM peak hour);

Nevins Street

- Southbound approach at the Nevins Street and Schermerhorn Street intersection (LOS E with a v/c ratio of 0.98 and a delay of 74.2 spv in the weekday AM peak hour).

4th Avenue

- Northbound left-turn at the 4th Avenue and Atlantic Avenue intersection (LOS E with a v/c ratio of 0.89 and a delay of 64.9 spv in the weekday AM peak hour; and LOS D with a v/c ratio of 0.54 and a delay of 45.8 spv in the weekday PM peak hour);
- Northbound right-turn at the 4th Avenue and Atlantic Avenue intersection (LOS F with a v/c ratio of 0.90 and a delay of 82.2 spv in the weekday AM peak hour; LOS E with a v/c ratio of 0.74 and a delay of 60.0 spv in the weekday midday peak hour; and LOS F with a v/c ratio of 0.96 and a delay of 92.3 spv in the weekday PM peak hour); and
- Southbound left-turn/through at the 4th Avenue and Atlantic Avenue intersection (LOS F with a v/c ratio of 1.05 and a delay of 97.1 spv in the weekday AM peak hour; LOS D with a v/c ratio of 0.83 and a delay of 52.7 spv in the weekday midday peak hour; and LOS D with a v/c ratio of 0.89 and a delay of 52.8 spv in the weekday PM peak hour).

Ashland Place

- Northbound approach at the Ashland Place and Fulton Street intersection (LOS D with a v/c ratio of 0.87 and a delay of 48.1 spv during weekday PM peak hour); and
- Southbound left turn at the Ashland Place and Fulton Street intersection (LOS D with a v/c ratio of 0.78 and a delay of 47.0 spv during the weekday PM peak hour).

DeKalb Avenue

- Westbound approach at the Flatbush Avenue and DeKalb Avenue intersection (LOS D with a v/c ratio of 0.84 and a delay of 47.8 spv during the weekday PM peak hour).

Fulton Street

- Eastbound approach at the Flatbush Avenue and Fulton Street intersection (LOS D with a v/c ratio of 0.58 and a delay of 48.3 spv during the weekday AM peak hour; LOS D with a v/c ratio of 0.66 and a delay of 54.9 spv during the weekday midday peak hour; and LOS D with a v/c ratio of 0.69 and a delay of 54.9 spv during the weekday PM peak hour); and
- Westbound left-turn/through at the Flatbush Avenue and Fulton Street intersection (LOS F with a v/c ratio of 1.05 and a delay of 117.1 spv during the weekday AM peak hour; LOS F with a v/c ratio of 1.05 and a delay of 116.2 spv during the weekday midday peak hour; and LOS F with a v/c ratio of 1.05 and a delay of 117.9 spv during the weekday PM peak hour).

Schermerhorn Street

- Eastbound left-turn/through at the 3rd Avenue and Schermerhorn Street intersection (LOS E with a v/c ratio of 0.86 and a delay of 60.7 spv during the weekday midday peak hour; and LOS E with a v/c ratio of 0.85 and a delay of 58.4 spv during the weekday PM peak hour).

State Street

- Eastbound approach at the 3rd Avenue and State Street intersection (LOS D with a v/c ratio of 0.48 and a delay of 49.5 spv during the weekday midday peak hour; LOS E with a v/c ratio of 0.71 and a delay of 61.0 spv in the weekday PM peak hour); and
- Eastbound approach at the Flatbush Avenue and State Street intersection (LOS F with a v/c ratio of 1.05 and a delay of 165.0 spv during the weekday midday peak hour; and LOS F with a v/c ratio of 1.05 and a delay of 165.0 spv during the weekday PM peak hour).

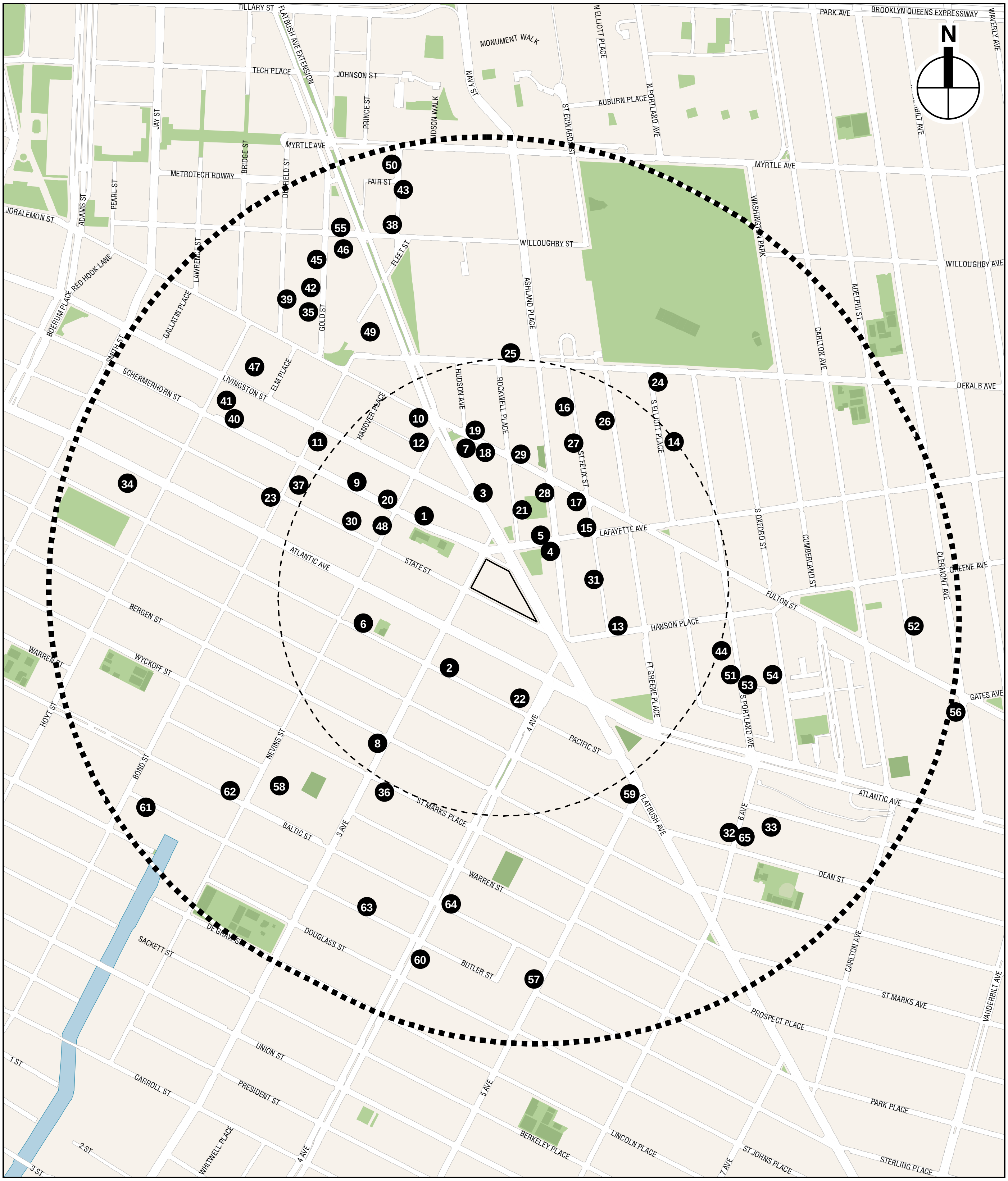
Atlantic Avenue

- Westbound through at the 3rd Avenue and Atlantic Avenue intersection (LOS E with a v/c ratio of 1.05 and a delay of 71.6 spv during the weekday AM peak hour);
- Northbound approach at the 3rd Avenue and Atlantic Avenue intersection (LOS D with a v/c ratio of 0.72 and a delay of 45.2 spv during the weekday midday peak hour; and LOS D with a v/c ratio of 0.85 and a delay of 49.9 spv during the weekday PM peak hour);
- Eastbound through at the 4th Avenue and Atlantic Avenue intersection (LOS E with a v/c ratio of 1.00 and a delay of 66.9 spv during the weekday PM peak hour);
- Eastbound through at the Flatbush Avenue and Atlantic Avenue intersection (LOS D with a v/c ratio of 0.96 and a delay of 49.0 spv during the weekday PM peak hour);
- Westbound through-right at the Flatbush Avenue and Atlantic Avenue intersection (LOS F with a v/c ratio of 1.05 and a delay of 80.1 spv during the weekday AM peak hour; LOS D with a v/c ratio of 0.91 and a delay of 49.8 spv during the weekday midday peak hour; and LOS D with a v/c ratio of 0.87 and a delay of 46.2 spv during the weekday PM peak hour); and
- Westbound right-turn at the Flatbush Avenue and Atlantic Avenue intersection (LOS F with a v/c ratio of 1.00 and a delay of 93.4 spv during the weekday midday peak hour; and LOS E with a v/c ratio of 0.78 and a delay of 55.5 spv during the weekday PM peak hour).

It should be noted that during peak hours, traffic enforcement agents are often present to direct traffic flow at the study area intersections along Atlantic Avenue, such that the actual conditions are likely more favorable than what the analysis results show for these intersections.

FUTURE WITHOUT THE PROPOSED ACTIONS

The No Action condition was developed by increasing existing (2017) traffic levels by the expected growth in overall travel through and within the study area. As per *CEQR Technical Manual* guidelines, an annual background growth rate of 0.25 percent was assumed for the first 5 years (2017–2022) and then 0.125 percent for the remaining years (2022–2025). A total of 65 development projects expected to occur in the No Action condition (No Build projects) were identified as being planned for the ½-mile study area (see **Figure 11-12**). However, some of these planned projects are modest in size and would be very modest traffic generators. After reviewing the development programs for each of the planned projects, it was determined that background growth will address the increase in traffic and pedestrian levels for 32 of the small- to moderate-sized projects in the study area. The remaining 33 No Build projects were clustered together based on their proximity to one another and their locations relative to the roadway network. **Table 11-20** and **Figure 11-12** summarize the projects that were accounted for in this future 2025 No Action condition, including those that were considered as part of the study area background growth.



ECF 80 FLATBUSH AVENUE

No Build Projects
Figure 11-12

Table 11-20
No Build Projects Expected to be Complete by 2025

Map Ref. No.[1]	Project Name/ Address	Development Program[2]	Transportation Assumptions[2]	Status/ Build Year[3]
Development Projects Within ¼ Mile				
1	333 Schermerhorn Street	Mixed commercial/residential: 34,823 gsf community facility, 750 DUs	Transportation assumptions from *CEQR Technical Manual*, *Atlantic Yards Arena and Redevelopment Project FSEIS*, DOT Trip Generation and Mode Choice Survey, *East New York Rezoning FEIS*, *Gateway Estates II FEIS* (2009), and U.S. Census Bureau ACS2011-2015 JTW estimates	2018
2	509 Pacific Street	Mixed commercial/residential: 13,854 gsf retail, 29 DUs	Included in background growth	2018
3	41 Flatbush Avenue	Commercial: 243,000 gsf office, 27,000 gsf retail	Transportation assumptions from *CEQR Technical Manual* and *Atlantic Yards Arena and Redevelopment Project FSEIS*	2018
4	300 Ashland Place	Mixed commercial/community facility/residential: 20,116 gsf community facility, 379 DUs	Transportation assumptions from *CEQR Technical Manual*, *Atlantic Yards Arena and Redevelopment Project FSEIS*, DOT Trip Generation and Mode Choice Survey, *East New York Rezoning FEIS*, *Caton Flats Development EAS*, *Gateway Estates II FEIS*, and U.S. Census Bureau ACS 2011-2015 JTW estimates	2018
5	15 Lafayette Avenue / 280 Ashland Place	Mixed commercial/community facility/residential: 2,622 gsf retail, 16,498 gsf community facility, 123 DUs	Transportation assumptions from *CEQR Technical Manual*, *Atlantic Yards Arena and Redevelopment Project FSEIS*, DOT Trip Generation and Mode Choice Survey, *East New York Rezoning FEIS*, *Caton Flats Development EAS*, and U.S. Census Bureau ACS 2011-2015 JTW estimates	2018
6	465 Pacific Street	Mixed commercial/residential: 15,000 gsf retail, 30 DUs	Included in background growth	2018
7	1 Flatbush Avenue	Mixed commercial/residential: 20,000 gsf retail, 183 DUs	Transportation assumptions from *CEQR Technical Manual*, *Atlantic Yards Arena and Redevelopment Project FSEIS* , DOT Trip Generation and Mode Choice Survey, *East New York Rezoning FEIS*, and U.S. Census Bureau ACS 2011-2015 JTW estimates	2018
8	98 3rd Avenue	Mixed commercial/residential: 3,310 gsf retail, 19 DUs	Included in background growth	2018
9	285 Schermerhorn Street	Mixed commercial/residential: 13,684 gsf retail, 105 DUs	See project site 7, above	2018
10	540 Fulton Street	Commercial: 184,000 gsf office	Transportation assumptions from *CEQR Technical Manual*, *Atlantic Yards Arena and Redevelopment Project FSEIS*, DOT Trip Generation and Mode Choice Survey, *East New York Rezoning FEIS*, and *Gateway Estates II FEIS*	2018
11	33 Bond Street / 300 Livingston Street	Mixed commercial/residential: 29,806 gsf retail, 714 DUs	See project site 7, above	2018
12	8 Nevins Street / 299 Livingston Street	Mixed commercial/residential: 6,657 gsf retail, 147 DUs	See project site 7, above	2018
13	147 Saint Felix Street	Residential: 2 DUs	Included in background growth	2018
14	39 South Elliott Place	Residential: 2 DUs	Included in background growth	2018
15	37 Lafayette Avenue	Mixed commercial/community facility/residential: 6,473 gsf retail, 210 gsf community facility, 6 residential DUs	Included in background growth	2018
16	22 Saint Felix Street	Residential: 1 DU	Included in background growth	2018
17	620 Fulton Street	Mixed commercial/medical office: 20,000 gsf retail, 52,301 gsf office, 60,615 gsf medical office	Transportation assumptions from *CEQR Technical Manual*, *Atlantic Yards Arena and Redevelopment Project FSEIS*, DOT Trip Generation and Mode Choice Survey, and *East New York Rezoning FEIS*	2018
18	570 Fulton Street rezoning	Mixed commercial/residential: 12,433 gsf retail, 89,846 gsf office, 139 DUs	See project site 7, above	2018
19	625 Fulton Street	Commercial: 148,023 gsf retail	See project site 10, above	2018
20	319 Schermerhorn Street	Mixed commercial/residential: 5,100 gsf retail, 74 DUs	Included in background growth	2018
21	93 Rockwell Place	Commercial: 138,563 gsf hotel	See project site 3, above	2018
22	24 4th Avenue	Mixed commercial/residential: 6,657 gsf retail, 72 DUs	Included in background growth	2018
23	386 State Street	Residential: 2 DUs	Included in background growth	2018
24	3 South Elliott Place	Residential: 3 DUs	Included in background growth	2018
25	95-99 DeKalb Avenue	Community facility: 155,000 gsf medical office	Transportation assumptions from *East New York Rezoning FEIS*	2018
26	30 Fort Greene Place	Residential: 3 DUs	Included in background growth	2018
27	52 Saint Felix Street	Residential: 2 DUs	Included in background growth	2018
28	250 Ashland Place	Mixed commercial/residential: 24,000 gsf retail, 584 DUs	Transportation assumptions from *CEQR Technical Manual*, *Atlantic Yards Arena and Redevelopment Project FSEIS*, *East New York Rezoning FEIS*, *Gateway Estates II FEIS*, and U.S. Census Bureau ACS 2011-2015 JTW estimates	2018
29	651 Fulton Street	Community facility: 94,765 gsf	Included in background growth (Interior renovation work only)	2018
30	401-405 State Street	Mixed residential/community facility: 7 DUs, 6,000 gsf community facility	Included in background growth	2018
31	130 Saint Felix Street	Residential: 40 DUs	Included in background growth	2018
Development Projects Within ½ Mile				
32	38 6th Avenue	Mixed commercial/residential/community facility: 5,821 gsf retail, 23,754 gsf medical office, 303 DUs	See project site 7, above	2018
33	670 Pacific Park	Residential: 86 DUs	Included in background growth	2018
34	330 Atlantic Avenue	Mixed commercial/residential: 1,216 gsf retail, 4 DUs	Included in background growth	2018
35	436 Albee Square	Mixed commercial/residential: 23,740 gsf retail, 150 DUs	See project site 7, above	2018
36	8 St. Mark's Place	Mixed commercial/residential: 485 gsf retail, 14 DUs	Included in background growth	2018
37	61 Bond Street	Mixed commercial/hotel: 154,947 gsf retail, 285 hotel rooms	See project site 10, above	2018
38	112 Fleet Place	Residential: 20 DUs	Included in background growth	2018
39	237 Duffield Street	Mixed commercial/residential: 4,773 gsf retail, 110 DUs	See project site 7, above	2018
40	211 Schermerhorn Street	Mixed commercial/residential: 6,308 gsf retail, 68 DUs	Included in background growth	2018
41	45 Hoyt Street / 210 Livingston Street	Mixed commercial/residential: 16,562 gsf retail, 368 DUs	See project site 7, above	2018
42	420 Albee Square	Mixed commercial/school: 14,000 gsf retail, 342,000 gsf office, 472 school seats	Transportation assumptions from *CEQR Technical Manual*, *Atlantic Yards Arena and Redevelopment Project FSEIS*, DOT Trip Generation and Mode Choice Survey, *East New York Rezoning FEIS*, *Gateway Estates II FEIS*, and NYMTC School Paired Journey data	2018

Table 11-20 (cont'd)
No Build Projects Expected to be Complete by 2025

Map Ref. No.[1]	Project Name/ Address	Development Program[2]	Transportation Assumptions[2]	Status/ Build Year[3]
Development Projects Within ½ Mile				
43	101 Fleet Place Rezoning	Mixed commercial/school: 221,056 gsf office, 600 school seats	Transportation assumptions from *CEQR Technical Manual*, *Atlantic Yards Arena and Redevelopment Project FSEIS* , and NYMTC School Paired Journey data	2018
44	142-150 South Portland Rezoning	Mixed residential/community facility: 9,700 gsf community facility, 100 DUs	Transportation assumptions from *CEQR Technical Manual*, *Atlantic Yards Arena and Redevelopment Project FSEIS*, *East New York Rezoning FEIS*, *Gateway Estates II FEIS*, *Caton Flats Development EAS*, and U.S. Census Bureau ACS 2011-2015 JTW estimates	2018
45	408 Albee Square	Commercial: 1,776 gsf retail	Included in background growth	2018
46	138 Willoughby Street	Mixed commercial/residential: 502,460 gsf retail, 458 DUs	See project site 1, above	2018
47	11 Hoyt Street	Mixed commercial/residential: 99,652 gsf retail, 476 DUs	See project site 1, above	2018
48	50 Nevins Street	Mixed commercial/residential: 3,800 gsf retail, 128 DUs	See project site 7, above	2018
49	9 DeKalb Avenue	Mixed commercial/residential: 92,694 gsf retail, 417 DUs	See project site 1, above	2018
50	86 Fleet Place	Mixed commercial/residential: 10,813 gsf retail, 440 DUs	See project site 7, above	2018
51	162 South Portland Avenue	Residential: 5 DUs	Included in background growth	2018
52	399 Adelphi Street	Residential: 4 DUs	Included in background growth	2018
53	171 South Portland Avenue	Residential: 9 DUs	Included in background growth	2018
54	164 South Oxford Street	Residential: 7 DUs	Included in background growth	2018
55	141 Willoughby Street	Residential: 203 DUs, 124,000 gsf retail	Transportation assumptions from *CEQR Technical Manual*, *Atlantic Yards Arena and Redevelopment Project FSEIS*, and U.S. Census Bureau ACS 2011-2015 JTW estimates	2018
56	470 Clermont Avenue	Community facility: 1,870 gsf	Included in background growth	2018
57	120 5th Avenue	Mixed commercial/residential: 93,000 gsf retail, 164 DUs	See project site 1, above	2018
58	Wyckoff Gardens NYCHA	Residential: 650 DUs	See project site 55, above	2018
59	178 Flatbush Avenue	Commercial: 17,882 gsf office	Included in background growth	2018
60	137 4th Avenue	Mixed commercial/residential: 1,599 gsf retail, 11 DUs	Included in background growth	2018
61	188 Butler Street	Commercial: 4,628 gsf office	Included in background growth	2018
62	489 Baltic Street	Mixed commercial/hotel: 9,968 gsf retail, 33 hotel rooms	Included in background growth	2018
63	337 Butler Street	Mixed commercial/hotel: 90,924 gsf retail, 176 hotel rooms	See project site 10, above	2018
64	613 Baltic Street	Mixed commercial/community facility/residential: 3,157 gsf retail, 2,163 gsf community facility, 43 DUs	Included in background growth	2018
65	37 Sixth Avenue	Mixed residential/school: 323 DUs, 69,858 gsf community facility	Transportation assumptions from *CEQR Technical Manual*, *Atlantic Yards Arena and Redevelopment Project FSEIS*, NYMTC School Paired Journey data, and U.S. Census Bureau ACS 2011-2015 JTW estimates	2018

Notes:
NYMTC = New York Metropolitan Transportation Council;
NYCHA = New York City Housing Authority
[1] See **Figure 11-12.**
[2] Development program and transportation assumptions based on No Build list prepared on October 24, 2017. Due to subsequent updates in No Build project assumptions, transportation analyses will be updated between DEIS and FEIS to reflect the development program shown in this table. The changes will reflect the following differences: -252 dwelling units, -689,832 gsf retail, +125,850 gsf office, -544 school seats, +85,153 gsf community facility.
[3] No Build Projects listed in this table are assumed to be complete by the proposed development's Build year of 2025.

CHANGES TO THE STUDY AREA STREET NETWORK

DOT is currently planning several street improvement projects that, if implemented, would result in roadway changes in the study area by 2025. The roadway changes are accounted for in the traffic analyses in the No Action condition. Geometric and traffic circulation changes are anticipated with the following street improvement projects:

Atlantic Avenue Street Improvement Project

- Flatbush Avenue and 4th Avenue: the northbound approach will be reconfigured with four 10-foot through lanes. The southbound approach will be reconfigured with two 11-foot through lanes and one 9-foot right-turn lane.
- Flatbush Avenue and Atlantic Avenue: the eastbound approach will be reconfigured with two 10-foot through lanes and one 12-foot right-turn lane. The westbound approach will be reconfigured with two 10-foot shared through-right lanes and one 10-foot right-turn lane.
- 4th Avenue and Atlantic Avenue: the northbound approach will be reconfigured with one 11-foot left-turn lane, one 11-foot shared left-right lane, and one 12-foot right-turn lane.

Flatbush Avenue Phase 2 Street Improvement Project Reconstruction

The reconstruction of Flatbush Avenue would result in the permanent closure of the segment of Schermerhorn Street, a one-way eastbound roadway, between 3rd Avenue and Flatbush Avenue. Traffic is expected to divert to eastbound State Street and eastbound Atlantic Avenue due to this closure. In addition, geometric and signal timing changes are anticipated at the following intersections:

- 3rd Avenue and Schermerhorn Street: the northbound approach will be reconfigured with two 10.3-foot shared left-through lanes. The eastbound approach will be reconfigured with one 13-foot left-turn lane.
- Flatbush Avenue and Lafayette Avenue: the northbound approach will be reconfigured with three 10-foot shared through-right lanes. The southbound approach will be reconfigured with three 10-foot shared left-through lanes.
- Flatbush Avenue and State Street: the intersection will be converted from a two-way stop-controlled intersection to a signalized intersection with crosswalks striped on the southbound and eastbound approaches.
- Lafayette Avenue and Ashland Place: the eastbound approach will be reconfigured with two 11-foot shared left-through-right lanes.

Fulton Street Bus and Pedestrian Improvements Project

The Fulton Street Bus and Pedestrian Improvements project would consist of a series of pedestrian safety improvements and bus lane extensions along the Fulton Street corridor between Flatbush Avenue and Grand Avenue. Within the study area, the project would only result in slight changes in lane widths at Fulton Street and Flatbush Avenue and Fulton Street and Ashland Place. These geometric changes were accounted for the 2025 No Action condition traffic analyses.

Although these street modifications including the closure of Schermerhorn Street to vehicular traffic between 3rd Avenue and Flatbush Avenue and the signalization of State Street at Flatbush Avenue are not being proposed by the co-applicants, this chapter will evaluate transportation conditions with and without the DOT-proposed projects in the No Action to cover the overall worst-case conditions.

TRAFFIC OPERATIONS

The No Action condition traffic volumes are shown in **Figures 11-13 through 11-15** for the weekday AM, midday, and PM peak hours, respectively. The No Action condition traffic volumes were projected by layering on top of the existing traffic volumes the background growth and trips generated by discrete No Build projects in the area. It should be noted that no traffic mitigation was assumed for any of the 74 No Action redevelopment projects, which presents extremely conservative future conditions. A summary of the 2025 No Action condition traffic analysis results is presented in **Table 11-21**. Details on LOS, v/c ratios, and average delays are presented in **Table 11-22**.

2/5/2018

Project Site

0 400 FEET

2025 No Action Traffic Volumes
Weekday AM Peak Hour
Figure 11-13

ECF 80 FLATBUSH AVENUE

2/5/2018

Project Site

0 400 FEET

ECF 80 FLATBUSH AVENUE

2025 No Action Traffic Volumes
Weekday Midday Peak Hour
Figure 11-14

2/5/2018

Project Site

0 400 FEET

2025 No Action Traffic Volumes Weekday PM Peak Hour

Figure 11-15

ECF 80 FLATBUSH AVENUE

Table 11-21
Summary of 2025 No Action Traffic Analysis Results

LOS	Analysis Peak Hours: Weekday AM	Weekday Midday	Weekday PM
Signalized Intersections			
Lane Groups at LOS A/B/C	31	26	20
Lane Groups at LOS D	13	11	13
Lane Groups at LOS E	7	7	10
Lane Groups at LOS F	11	18	19
Total	**62**	**62**	**62**
Lane Groups with v/c ≥ 0.90	18	27	32
Unsignalized Intersections			
Lane Groups at LOS A/B/C	1	1	1
Lane Groups at LOS D	0	0	0
Lane Groups at LOS E	0	0	0
Lane Groups at LOS F	0	0	0
Total	**1**	**1**	**1**
Lane Groups with v/c ≥ 0.90	0	0	0

Table 11-22
2017 Existing Conditions and 2025 No Action Condition LOS Analysis
Signalized Intersections

	Weekday AM								Weekday Midday								Weekday PM							
	2017 Existing				2025 No Action				2017 Existing				2025 No Action				2017 Existing				2025 No Action			
Intersection	Lane Group	v/c Ratio	Delay (sec)	LOS	Lane Group	v/c Ratio	Delay (sec)	LOS	Lane Group	v/c Ratio	Delay (sec)	LOS	Lane Group	v/c Ratio	Delay (sec)	LOS	Lane Group	v/c Ratio	Delay (sec)	LOS	Lane Group	v/c Ratio	Delay (sec)	LOS
Flatbush Avenue and DeKalb Avenue																								
WB	LTR	0.69	39.5	D	LTR	1.03	79.4	E	LTR	0.75	42.3	D	LTR	1.58	306.4	F	LTR	0.84	47.8	D	LTR	1.67	349.3	F
NB	T	0.83	30.1	C	T	0.92	37.0	D	T	0.78	28.2	C	T	0.96	42.7	D	T	0.73	26.0	C	T	0.87	32.4	C
SB	TR	0.73	26.3	C	TR	0.93	38.5	D	TR	0.75	27.0	C	TR	1.13	96.8	F	TR	0.73	26.0	C	TR	1.03	57.3	E
	Int.		30.2	C	Int.		45.8	D	Int.		30.1	C	Int.		124.8	F	Int.		29.9	C	Int.		118.9	F
Flatbush Avenue and Fulton Street																								
EB	LTR	0.58	48.3	D	LTR	0.59	48.5	D	LTR	0.66	54.9	D	LTR	0.80	72.6	E	LTR	0.69	54.9	D	LTR	0.84	74.4	E
WB	LT	1.05	117.1	F	LT	1.16	154.4	F	LT	1.05	116.2	F	LT	1.40	246.3	F	LT	1.05	117.9	F	LT	1.50	290.5	F
	R	0.52	26.8	C	R	0.52	26.5	C	R	0.14	16.3	B	R	0.17	16.7	B	R	0.35	19.6	B	R	0.37	19.8	B
NB	T	0.81	37.0	D	T	0.91	43.7	D	T	0.95	52.1	D	T	1.17	121.6	F	T	0.78	38.9	D	T	0.95	52.1	D
SB	L	1.05	128.0	F	L	1.96	498.6	F	L	1.05	118.5	F	L	2.68	814.3	F	L	1.05	117.2	F	L	2.40	690.0	F
	T	0.51	15.7	B	T	0.59	17.1	B	T	0.50	15.5	B	T	0.66	18.5	B	T	0.53	15.9	B	T	0.66	18.3	B
	Int.		41.0	D	Int.		88.6	F	Int.		49.3	D	Int.		201.6	F	Int.		41.1	D	Int.		147.9	F
Nevins Street and Schermerhorn Street																								
EB	TR	0.52	16.2	B	TR	0.82	30.1	C	TR	0.79	25.8	C	TR	1.25	146.1	E	TR	0.84	29.0	C	TR	1.16	109.4	F
WB	LT	0.15	10.6	B	LT	0.26	11.9	B	LT	0.14	10.7	B	LT	0.37	14.3	B	LT	0.07	9.9	A	LT	0.23	11.7	B
SB	LTR	0.98	74.2	E	LTR	1.20	143.5	F	LTR	0.67	35.2	D	LTR	1.40	226.5	F	LTR	0.82	45.0	D	LTR	1.48	257.7	F
	Int.		40.8	D	Int.		75.1	E	Int.		27.0	C	Int.		159.9	F	Int.		33.4	C	Int.		162.6	F
Nevins Street and State Street																								
EB	TR	0.31	23.4	C	TR	0.43	25.6	C	TR	0.37	24.5	C	TR	0.70	33.7	C	TR	0.46	26.0	C	TR	0.78	37.7	D
SB	LT	0.38	13.5	B	LT	0.63	19.2	B	LT	0.35	13.0	B	LT	0.69	21.0	C	LT	0.50	15.5	B	LT	0.90	36.8	D
	Int.		17.2	B	Int.		21.4	C	Int.		17.9	B	Int.		26.4	C	Int.		19.8	B	Int.		37.2	D
3rd Avenue and Schermerhorn Street																								
EB	L	0.37	36.4	D	L	1.03	99.2	F	L	0.36	36.0	D	L	1.22	164.0	F	L	0.39	36.7	D	L	1.16	140.0	F
	LT	0.47	39.3	D					LT	0.86	60.7	E					LT	0.85	58.4	E				
NB	LTR	0.67	38.8	D	LT	1.06	93.5	F	LTR	0.46	34.1	C	LT	1.04	85.4	F	LTR	0.47	34.2	C	LT	0.94	60.5	E
	Int.		38.6	D	Int.		95.3	F	Int.		43.4	D	Int.		115.8	F	Int.		42.4	D	Int.		90.9	F
3rd Avenue and State Street																								
EB	LT	0.25	31.8	C	LT	0.51	37.8	D	LT	0.48	49.5	D	LT	1.34	226.4	F	LT	0.71	61.0	E	LT	1.65	357.5	F
NB	TR	0.45	14.1	B	TR	0.56	16.1	B	TR	0.30	6.3	A	TR	0.49	8.1	A	TR	0.27	6.0	A	TR	0.41	7.1	A
	Int.		16.5	B	Int.		20.8	C	Int.		14.3	B	Int.		73.6	E	Int.		20.1	C	Int.		134.9	F
3rd Avenue and Atlantic Avenue																								
EB	TR	0.61	26.1	C	TR	0.71	29.1	C	TR	0.72	25.7	C	TR	0.89	35.2	D	TR	0.77	29.4	C	TR	0.94	42.4	D
WB	T	1.05	71.6	E	T	1.12	96.8	F	T	0.75	26.6	C	T	0.82	29.5	C	T	0.86	34.1	C	T	0.94	41.7	D
	R	0.69	33.8	C	R	0.81	42.2	D	R	0.46	21.6	C	R	0.55	24.3	C	R	0.38	21.7	C	R	0.52	25.3	C
NB	LTR	0.67	38.5	D	LTR	0.84	46.9	D	LTR	0.72	45.2	D	LTR	1.11	109.7	F	LTR	0.85	49.9	D	LTR	1.10	104.1	F
	Int.		50.5	D	Int.		63.9	E	Int.		29.3	C	Int.		49.4	D	Int.		35.4	D	Int.		56.3	E
Flatbush Ave and Lafayette Ave																								
EB	L	0.56	41.8	D	L	1.40	243.2	F	L	0.49	38.8	D	L	2.05	529.6	F	L	0.48	40.6	D	L	1.71	378.9	F
	LT	0.65	42.2	D	LT	0.87	55.4	D	LT	0.55	38.6	D	LT	0.88	55.6	D	LT	0.68	44.2	D	LT	0.95	65.8	E
NB	TR	1.00	55.7	E	TR	1.03	62.0	E	TR	0.98	50.5	D	TR	1.13	101.2	F	TR	0.98	53.1	D	TR	1.11	94.0	F
SB	L	0.49	48.0	D	DefL	0.55	48.4	D	L	0.63	53.8	D	DefL	0.69	56.8	E	L	0.55	44.9	D	DefL	0.56	44.1	D
	T	0.58	14.0	B	T	0.78	19.8	B	T	0.59	14.6	B	T	0.95	33.7	C	T	0.65	14.2	B	T	0.96	34.0	C
	Int.		38.9	D	Int.		63.0	D	Int.		35.9	D	Int.		113.1	E	Int.		35.9	D	Int.		89.8	F
Flatbush Avenue and State Street																								
EB					R	0.51	29.5	C					R	0.69	35.5	D					R	0.73	37.7	D
NB					T	0.90	34.8	C					T	0.95	39.8	D					T	0.86	31.6	C
SB					T	0.65	23.9	C					T	0.81	28.9	C					T	0.93	37.1	D
					Int.		30.2	C					Int.		34.8	D					Int.		34.8	C
Flatbush Avenue and 4th Avenue																								
NB	T	0.80	31.5	C	T	0.75	29.2	C	T	0.70	28.1	C	T	0.74	28.9	C	T	0.68	27.7	C	T	0.71	27.8	C
SB	TR	0.88	39.1	D	T	0.59	26.2	C	TR	1.05	74.6	E	T	0.96	48.4	D	TR	1.05	72.1	E	T	0.89	39.4	D
	R	0.56	27.6	C	R	1.42	233.2	F	R	0.55	27.1	C	R	1.48	260.7	F	R	0.59	28.1	C	R	1.57	298.1	F
	Int.		33.8	C	Int.		74.9	E	Int.		48.4	F	Int.		84.5	F	Int.		47.1	D	Int.		94.1	F
Flatbush Avenue and Atlantic Avenue																								
EB	T	0.69	29.3	C	T	0.76	31.9	C	T	0.71	30.2	C	T	0.81	34.1	C	T	0.96	49.0	D	T	1.04	68.5	E
	R	0.33	32.0	C	R	0.80	53.3	D	R	0.46	35.1	D	R	1.22	163.7	F	R	0.52	37.7	D	R	1.56	311.5	F
WB	TR	1.05	80.1	F	TR	1.60	316.8	F	TR	0.91	49.8	D	TR	1.44	243.1	F	TR	0.87	46.2	D	TR	1.38	218.6	F
	R	0.56	39.4	D	R	0.69	46.1	D	R	1.00	93.4	F	R	1.25	178.6	F	R	0.78	55.5	E	R	0.98	89.6	F
NB	T	0.70	27.5	C	T	0.75	29.0	C	T	0.57	24.6	C	T	0.71	27.8	C	T	0.61	25.3	C	T	0.73	28.2	C
SB	T	0.38	21.4	C	T	0.44	22.3	C	T	0.51	23.4	C	T	0.72	28.2	C	T	0.49	23.0	C	T	0.67	26.8	C
	Int.		43.4	D	Int.		112.3	F	Int.		36.6	D	Int.		95.6	F	Int.		37.6	D	Int.		98.4	F
4th Avenue and Atlantic Avenue																								
EB	T	0.56	27.5	C	T	0.67	30.0	C	T	0.81	39.7	D	T	1.01	65.7	E	T	1.00	66.9	E	T	1.20	138.7	F
	R	0.26	27.8	C	R	0.28	28.1	C	R	0.54	41.3	D	R	0.57	42.3	D	R	0.49	42.4	D	R	0.51	42.8	D
WB	T	0.73	30.8	C	T	0.78	32.5	C	T	0.65	32.5	C	T	0.72	34.5	C	T	0.84	41.8	D	T	0.93	50.1	D
NB	L	0.89	64.9	E	L	0.90	78.7	E	L	0.42	42.0	D	L	0.55	48.0	D	L	0.54	45.8	D	L	0.70	56.5	E
					LR	0.88	74.9	E					LR	0.53	47.6	D					LR	0.67	55.3	E
	R	0.90	82.2	F	R	0.85	72.9	E	R	0.74	60.0	E	R	0.52	47.3	D	R	0.96	92.3	F	R	0.65	54.5	D
SB	LT	1.05	97.1	F	LT	1.11	117.8	F	LT	0.83	52.7	D	LT	0.98	74.2	E	LT	0.89	52.8	D	LT	1.01	74.0	E
	R	0.36	44.4	D	R	0.68	61.9	E	R	0.39	41.3	D	R	0.50	45.7	D	R	0.15	30.7	C	R	0.27	33.3	C
	Int.		49.9	D	Int.		55.3	E	Int.		41.2	D	Int.		53.7	D	Int.		54.7	D	Int.		81.3	F
Ashland Place and Fulton Street																								
EB	LT	0.58	19.0	B	LT	1.75	371.4	F	LT	0.54	17.5	B	LT	1.81	392.3	F	LT	0.69	21.8	C	LT	2.08	516.8	F
	R	0.04	10.7	B	R	0.09	11.2	B	R	0.06	10.9	B	R	0.16	12.0	B	R	0.07	10.9	B	R	0.18	12.3	B
WB	LT	0.69	21.2	C	LT	0.71	22.1	C	LT	0.46	15.7	B	LT	0.75	28.0	C	LT	0.50	16.4	B	LT	1.33	193.2	F
	R	0.54	19.0	B	R	0.73	27.5	C	R	0.30	13.8	B	R	0.69	24.6	C	R	0.23	13.2	B	R	0.65	25.2	C
NB	LTR	0.71	31.7	C	L	0.26	22.0	C	LTR	0.56	27.3	C	L	0.66	34.2	C	LTR	0.87	48.1	D	L	0.87	55.5	E
					TR	0.82	38.6	D					TR	0.55	26.5	C					TR	0.63	28.5	C
SB	L	0.41	27.4	C	L	0.59	39.7	D	L	0.48	27.8	C	L	0.57	32.7	C	L	0.78	47.0	D	L	0.95	77.9	E
	TR	0.09	19.1	B	TR	0.09	19.0	B	TR	0.19	20.1	C	TR	0.19	20.1	C	TR	0.35	22.7	C	TR	0.34	22.5	C
	Int.		23.1	C	Int.		123.8	F	Int.		19.8	B	Int.		160.4	F	Int.		28.9	C	Int.		240.6	F
Ashland Place and Lafayette Avenue																								
EB	LTR	0.82	30.8	C	LTR	0.84	30.5	C	LTR	0.83	21.4	C	LTR	1.00	41.9	D	LTR	0.90	35.6	D	LTR	0.81	24.9	C
NB	TR	0.58	35.1	D	TR	0.71	41.1	D	TR	0.49	20.7	C	TR	0.74	30.0	C	TR	0.55	37.0	D	TR	0.84	54.1	D
SB	LT	0.16	25.8	C	LT	0.31	29.1	C	LT	0.38	19.1	B	LT	0.97	75.8	E	LT	0.54	37.6	D	LT	1.20	166.3	F
	Int.		31.6	C	Int.		32.7	C	Int.		20.9	C	Int.		44.0	D	Int.		36.1	D	Int.		49.8	D
Fort Greene Place and Hanson Place																								
EB	TR	0.37	14.5	B	TR	0.42	15.6	B	TR	0.45	15.6	B	TR	0.57	18.4	B	TR	0.67	21.5	C	TR	0.75	25.7	C
WB	LT	0.35	14.1	B	LT	0.39	14.7	B	LT	0.35	14.2	B	LT	0.42	15.4	B	LT	0.48	17.2	B	LT	0.57	20.0	B
NB	LR	0.37	14.6	B	LR	0.41	15.5	B	LR	0.76	28.0	C	LR	0.97	55.6	E	LR	0.89	43.0	D	LR	1.07	85.8	F
SB	LTR	0.17	11.7	B	LTR	0.34	13.5	B	LTR	0.14	11.3	B	LTR	0.32	13.2	B	LTR	0.24	12.7	B	LTR	0.41	14.6	B
	Int.		14.0	B	Int.		14.7	B	Int.		19.8	B	Int.		30.3	C	Int.		26.8	C	Int.		41.7	D

Notes: L = Left-turn; T = Through; R = Right-turn; DefL = Defacto Left-turn; EB = Eastbound; WB = Westbound; NB = Northbound; SB = Southbound; Int. = Intersection
*Unsignalized intersection in 2017 Existing Conditions

Based on the analysis results presented in **Table 11-22** the majority of the approaches/lane groups in the No Action condition will operate at the same LOS as in the existing conditions or within acceptable mid-LOS D or better (delays of 45 seconds or less per vehicle for signalized intersections) for all peak hours. The following approaches/lane-groups in the No Action condition are expected to operate at deteriorated LOS when compared to the existing conditions:

Flatbush Avenue

- Southbound approach at the Flatbush Avenue and DeKalb Avenue intersection will deteriorate to LOS F with a v/c ratio of 1.13 and a delay of 96.8 spv in the weekday midday peak hour and will deteriorate to LOS E with a v/c ratio of 1.03 and a delay of 57.3 spv in the weekday PM peak hour;
- Northbound approach at the Flatbush Avenue and Fulton Street intersection will deteriorate to LOS F with a v/c ratio of 1.17 and a delay of 121.6 spv in the weekday midday peak hour;, and to LOS D with a v/c ratio of 0.95 and a delay of 52.1 spv in the weekday PM peak hour;
- Northbound approach at the Flatbush Avenue and Lafayette Avenue intersection will deteriorate to LOS F with a v/c ratio of 1.13 and a delay of 101.2 spv in the weekday midday peak hour, and to LOS F with a v/c ratio of 1.11 and a delay of 94.0 spv in the weekday PM peak hour;
- Southbound defacto left-turn at the Flatbush Avenue and Lafayette Avenue intersection will deteriorate to LOS E with a v/c ratio of 0.69 and a delay of 56.8 spv in the weekday midday peak hour;
- Southbound through at the Flatbush Avenue and 4th Avenue intersection will deteriorate to LOS D with a v/c ratio to 0.96 and a delay of 48.4 spv in the weekday midday peak hour; and
- Southbound right-turn at the Flatbush Avenue and 4th Avenue intersection will deteriorate to LOS F with a v/c ratio to 1.42 and a delay of 233.2 spv in the weekday AM peak hour, to LOS F with a v/c ratio of 1.48 and a delay of 260.7 spv in the weekday midday peak hour, and to LOS F with a v/c ratio of 1.57 and a delay of 298.1 spv in the weekday PM peak hour.

Nevins Street

- Southbound approach at the Nevins Street and Schermerhorn Street intersection will deteriorate to LOS F with a v/c ratio of 1.20 and a delay of 143.5 spv in the weekday AM peak hour, to LOS F with a v/c ratio of 1.40 and a delay of 226.5 spv in the weekday midday peak hour, and to LOS F with a v/c ratio of 1.48 and a delay of 257.7 spv in the weekday PM peak hour.

3rd Avenue

- Northbound approach at the 3rd Avenue and Atlantic Avenue intersection will deteriorate to LOS D with a v/c ratio of 0.84 and a delay of 46.9 spv in the weekday AM peak hour, to LOS F with a v/c ratio of 1.11 and a delay of 109.7 spv in the weekday midday peak hour, and to LOS F with a v/c ratio of 1.10 and a delay of 104.1 spv in the weekday PM peak hour; and
- Northbound approach at the 3rd Avenue and Schermerhorn Street intersection will deteriorate to LOS F with a v/c ratio of 1.06 and a delay of 93.5 spv in the weekday AM peak hour, to LOS F with a v/c ratio of 1.04 and a delay of 85.4 spv in the weekday midday peak hour, and to LOS E with a v/c ratio of 0.94 and a delay of 60.5 spv in the weekday PM peak hour.

4th Avenue

- Northbound left-turn at the 4th Avenue and Atlantic Avenue intersection will deteriorate to LOS D with a v/c ratio of 0.55 and a delay of 48.0 spv in the weekday midday peak hour, and to LOS E with a v/c ratio of 0.70 and a delay of 56.5 spv in the weekday PM peak hour; Southbound left-turn/through at the 4th Avenue and Atlantic Avenue intersection will deteriorate to LOS E with a v/c ratio of 0.98 and a delay of 74.2 spv in the weekday midday peak hour, and to LOS E with a v/c ratio of 1.01 and a delay of 74.0 spv in the weekday PM peak hour; and

- Southbound right-turn at the 4th Avenue and Atlantic Avenue intersection will deteriorate to LOS E with a v/c ratio of 0.68 and a delay of 61.9 spv in the weekday AM peak hour and to LOS D with a v/c ratio of 0.50 and a delay of 45.7 spv in the weekday midday peak hour.

Ashland Place

- Northbound left-turn at the Ashland Place and Fulton Street intersection will deteriorate to LOS E with a v/c ratio of 0.87 and a delay of 55.5 spv in the weekday PM peak hour;
- Southbound left-turn at the Ashland Place and Fulton Street intersection will deteriorate to LOS E with a v/c ratio of 0.95 and a delay of 77.9 spv in the weekday PM peak hour; and
- Southbound approach at the Ashland Place and Lafayette Avenue intersection will deteriorate to LOS E with a v/c ratio of 0.97 and a delay of 75.8 spv in the weekday midday peak hour, and to LOS F with a v/c ratio of 1.20 and a delay of 166.3 spv in the weekday PM peak hour.

Fort Greene Place

- Northbound approach at the Fort Greene Place and Hanson Place intersection will deteriorate to LOS E with a v/c ratio of 0.97 and a delay of 55.6 spv in the weekday midday peak hour, and to LOS F with a v/c ratio of 1.07 and a delay of 85.8 spv in the weekday PM peak hour.

DeKalb Avenue

- Westbound approach at the Flatbush Avenue and DeKalb Avenue intersection will deteriorate to LOS E with a v/c ratio of 1.03 and a delay of 79.4 spv in the weekday AM peak hour, to LOS F with a v/c ratio of 1.58 and a delay of 306.4 spv in the weekday midday peak hour, and to LOS F with a v/c ratio of 1.67 and a delay of 349.3 spv in the weekday PM peak hour.

Fulton Street

- Eastbound approach at the Flatbush Avenue and Fulton Street intersection will deteriorate to LOS E with a v/c ratio of 0.80 and a delay of 72.6 spv in the weekday midday peak hour, and to LOS E with a v/c ratio of 0.84 and a delay of 74.4 spv in the weekday PM peak hour;
- Eastbound left-turn/through at the Ashland Place and Fulton Street intersection will deteriorate to LOS F with a v/c ratio of 1.75 and a delay of 371.4 spv in the weekday AM peak hour, to LOS F with a v/c ratio of 1.81 and a delay of 392.3 spv in the weekday midday peak hour, and to LOS F with a v/c ratio of 2.08 and a delay of 516.8 spv in the weekday PM peak hour; and
- Westbound left-turn/through at the Ashland Place and Fulton Street intersection will deteriorate to LOS F with a v/c ratio of 1.33 and a delay of 193.2 spv in the weekday PM peak hour.

Schermerhorn Street

- Eastbound left-turn at the 3rd Avenue and Schermerhorn Street intersection will deteriorate to LOS F with a v/c ratio of 1.03 and a delay of 99.2 spv in the weekday AM peak hour, to LOS F with a v/c ratio of 1.22 and a delay of 164.0 spv in the weekday midday peak hour, and to LOS F with a v/c ratio of 1.16 and a delay of 140.0 spv in the weekday PM peak hour; and

- Eastbound through/right-turn at the Nevins Street and Schermerhorn Street intersection will deteriorate to LOS F with a v/c ratio of 1.25 and a delay of 146.1 spv in the weekday midday peak hour, and to LOS F with a v/c ratio of 1.16 and a delay of 109.4 spv in the weekday PM peak hour.

Lafayette Avenue

- Eastbound left-turn at the Flatbush Avenue and Lafayette Avenue intersection will deteriorate to LOS F with a v/c ratio of 1.40 and a delay of 243.2 spv in the weekday AM peak hour, to LOS F with a v/c ratio of 2.05 and a delay of 529.6spv in the weekday midday peak hour, and to LOS F with a v/c ratio of 1.71 and a delay of 378.9 spv in the weekday PM peak hour; and
- Eastbound left-turn/through at the Flatbush Avenue and Lafayette Avenue intersection will deteriorate to LOS E with a v/c ratio of 0.87 and a delay of 55.4 spv in the weekday AM peak hour, to LOS E with a v/c ratio of 0.88 and a delay of 55.6 spv in the weekday midday peak hour, and to LOS E with a v/c ratio of 0.95 and a delay of 65.8 spv in the weekday PM peak hour;

State Street

- Eastbound approach at the 3rd Avenue and State Street intersection will deteriorate to LOS F with a v/c ratio of 1.34 and a delay of 226.4 spv in the weekday midday peak hour, and to LOS F with a v/c ratio of 1.65 and a delay of 357.5 spv in the weekday PM peak hour.

Atlantic Avenue

- Westbound through at the 3rd Avenue and Atlantic Avenue intersection will deteriorate to LOS F with a v/c ratio of 1.12 and a delay of 96.8 spv in the weekday AM peak hour;
- Westbound through at the 4th Avenue and Atlantic Avenue intersection will deteriorate to LOS D with a v/c ratio of 0.93 and a delay of 50.1 spv in the weekday PM peak hour;
- Eastbound through at the 4th Avenue and Atlantic Avenue intersection will deteriorate to LOS E with a v/c ratio of 1.01 and a delay of 65.7 spv in the weekday midday peak hour, and to LOS F with a v/c ratio of 1.20 and a delay of 138.7 spv in the weekday PM peak hour;
- Eastbound through at the Flatbush Avenue and Atlantic Avenue intersection will deteriorate to LOS E with a v/c ratio of 1.04 and a delay of 68.5 spv in the weekday PM peak hour;
- Eastbound right-turn at the Flatbush Avenue and Atlantic Avenue intersection will deteriorate to LOS D with a v/c ratio of 0.80 and a delay of 53.3 spv in the weekday midday peak hour, LOS F with a v/c ratio of 1.22 and a delay of 163.7 spv in the weekday midday peak hour, and to LOS F with a v/c ratio of 1.56 and a delay of 311.5 spv in the weekday PM peak hour;
- Westbound through-right turn at the Flatbush Avenue and Atlantic Avenue intersection will deteriorate to LOS F with a v/c ratio of 1.44 and a delay of 243.1 spv in the weekday midday peak hour, and to LOS F with a v/c ratio of 1.38 and a delay of 218.6 spv in the weekday PM peak hour; and
- Westbound right-turn at the Flatbush Avenue and Atlantic Avenue intersection will deteriorate to LOS D with a v/c ratio of 0.69 and a delay of 46.1 spv in the weekday AM peak hour and to LOS F with a v/c ratio of 0.98 and a delay of 89.6 spv in the weekday PM peak hour.

2025 NO ACTION CONDITION WITHOUT SCHERMERHORN STREET CLOSURE

As previously stated, DOT-proposed street modifications including the closure of Schermerhorn Street to vehicular traffic between 3rd Avenue and Flatbush Avenue have been evaluated in this EIS to cover the overall worst-case conditions. The conditions with Schermerhorn Street closed between 3rd Avenue and Flatbush Avenue were presented, since they show the more conservative future conditions with the diversion of traffic and reconfiguration of the eastbound approach of 3rd Avenue and Schermerhorn Street from one 10.5-foot left turn lane and one 13.0-foot shared left-turn/through lane to one 13-foot left turn lane. This diversion would cause increased traffic along State Street and Atlantic Avenue between Nevins Street and Flatbush Avenue. Absent the implementation of the street closure by DOT, the conditions presented above would be improved at Atlantic Avenue and 3rd Avenue, State Street and 3rd Avenue, Atlantic Avenue and Nevins Street, State Street and Nevins Street, and 3rd Avenue and Schermerhorn Street.

FUTURE WITH THE PROPOSED ACTIONS

In the future with the proposed actions, the project site would be redeveloped with approximately 922 residential DUss, 50,000 gsf of local retail, 145,000 gsf of public school use (350-seat high school and 350-seat lower school); approximately 50,000 gsf of retail use; approximately 15,000 gsf for a cultural community facility. The proposed project would result in approximately 248, 47, and 247 incremental vehicle trips during the weekday AM, midday, and PM peak hours, respectively. The incremental auto trips were assigned to the off-street parking facilities. Taxi trips were distributed to the various project site entrances. All delivery trips were assigned to the development site via DOT-designated truck routes.

TRAFFIC OPERATIONS

The 2025 With Action condition traffic volumes are shown in **Figures 11-16 through 11-18** for the weekday AM, midday, and PM peak hours. The 2025 With Action traffic volumes were constructed by layering on top of the No Action condition traffic volumes the incremental vehicle trips shown in **Figures 11-1 through 11-3**. A summary of the 2025 With Action condition traffic analysis results is presented in **Table 11-23**.

Table 11-23
Summary of 2025 With Action Traffic Analysis Results

LOS	Analysis Peak Hours		
	Weekday AM	Weekday Midday	Weekday PM
Signalized Intersections			
Lane Groups at LOS A/B/C	28	25	18
Lane Groups at LOS D	16	12	13
Lane Groups at LOS E	5	6	9
Lane Groups at LOS F	13	19	22
Total	**62**	**62**	**62**
Lane Groups with v/c ≥ 0.90	23	27	36
Unsignalized Intersections			
Lane Groups at LOS A/B/C	1	1	1
Lane Groups at LOS D	0	0	0
Lane Groups at LOS E	0	0	0
Lane Groups at LOS F	0	0	0
Total	**1**	**1**	**1**
Lane Groups with v/c ≥ 0.90	0	0	0

Significant Adverse Impacts

Details on LOS, v/c ratios, and average delays are presented in **Tables 11-24 and 11-25**. As discussed below, significant adverse traffic impacts were identified at 28 approaches/lane groups (of 15 different intersections). Potential measures that can be implemented to mitigate these significant adverse traffic impacts are discussed in Chapter 19, “Mitigation.”

2/5/2018

Project Site

0 400 FEET

2025 With Action Traffic Volumes
Weekday AM Peak Hour
Figure 11-16

2/5/2018

Project Site

0 400 FEET

2025 With Action Traffic Volumes
Weekday Midday Peak Hour
Figure 11-17

ECF 80 FLATBUSH AVENUE

Project Site

2025 With Action Traffic Volumes
Weekday PM Peak Hour
Figure 11-18

ECF 80 FLATBUSH AVENUE

Table 11-24
2025 No Action and With Action Condition LOS Analysis
Signalized Intersections

Weekday AM

Intersection	2025 No Action Lane Group	v/c Ratio	Delay (sec)	LOS	2025 With Action Lane Group	v/c Ratio	Delay (sec)	LOS	
Flatbush Avenue and DeKalb Avenue									
WB	LTR	1.03	79.4	E	LTR	1.04	82.3	F	
NB	T	0.92	37.0	D	T	0.94	38.7	D	
SB	TR	0.93	38.5	D	TR	0.95	40.9	D	
	Int.		45.8	D	Int.		48.0	D	
Flatbush Avenue and Fulton Street									
EB	LTR	0.59	48.5	D	LTR	0.59	48.5	D	
WB	LT	1.16	154.4	F	**LT**	**1.28**	**197.9**	**F**	+
	R	0.52	26.5	C	R	0.53	26.7	C	
NB	T	0.91	43.7	D	T	0.93	45.2	D	
SB	L	1.96	498.6	F	**L**	**2.01**	**521.9**	**F**	+
	T	0.59	17.1	B	T	0.60	17.3	B	
	Int.		88.6	F	Int.		95.7	F	
Nevins Street and Schermerhorn Street									
EB	TR	0.82	30.1	C	**TR**	**0.94**	**47.6**	**D**	+
WB	LT	0.26	11.9	B	LT	0.27	12.1	B	
SB	LTR	1.20	143.5	F	**LTR**	**1.29**	**180.4**	**F**	+
	Int.		75.1	E	Int.		99.0	E	
Nevins Street and State Street									
EB	TR	0.43	25.6	C	TR	0.44	25.8	C	
SB	LT	0.63	19.2	B	LT	0.75	24.0	C	
	Int.		21.4	C	Int.		24.5	C	
3rd Avenue and Schermerhorn Street									
EB	L	1.03	99.2	F	**L**	**1.07**	**109.5**	**F**	+
NB	LT	1.06	93.5	F	**LT**	**1.12**	**112.6**	**F**	+
	Int.		95.3	F	Int.		111.6	F	
3rd Avenue and State Street									
EB	LT	0.51	37.8	D	LT	0.65	42.9	D	
NB	TR	0.56	16.1	B	TR	0.59	16.8	B	
	Int.		20.8	C	Int.		23.3	C	
3rd Avenue and Atlantic Avenue									
EB	TR	0.71	29.1	C	TR	0.71	29.1	C	
WB	T	1.12	96.8	F	**T**	**1.14**	**105.7**	**F**	+
	R	0.81	42.2	D	**R**	**0.90**	**53.1**	**D**	+
NB	LTR	0.84	46.9	D	LTR	0.84	46.9	D	
	Int.		63.9	E	Int.		69.1	E	
Flatbush Ave and Lafayette Ave									
EB	L	1.40	243.2	F	**L**	**1.48**	**278.4**	**F**	+
	LT	0.87	55.4	E	**LT**	**0.91**	**60.2**	**E**	+
NB	TR	1.03	62.0	E	**TR**	**1.06**	**70.7**	**E**	+
SB	DefL	0.55	48.4	D	DefL	0.55	48.7	D	
	T	0.78	19.8	B	T	0.79	20.0	C	
	Int.		63.0	E	Int.		71.2	E	
Flatbush Avenue and State Street									
EB	R	0.51	29.5	C	R	0.63	33.4	C	
NB	T	0.90	34.8	C	T	0.92	36.2	D	
SB	T	0.65	23.9	C	T	0.65	24.0	C	
	Int.		31.4	C	Int.		31.4	C	
Flatbush Avenue and 4th Avenue									
NB	T	0.75	29.2	C	T	0.76	29.5	C	
SB	T	0.59	26.2	C	T	0.59	26.3	C	
	R	1.42	233.2	F	**R**	**1.54**	**283.4**	**F**	+
	Int.		45.8	D	Int.		89.5	F	
Flatbush Avenue and Atlantic Avenue									
EB	T	0.76	31.9	C	T	0.76	31.9	C	
	R	0.80	53.3	D	R	0.80	53.3	D	
WB	TR	1.60	316.8	F	**TR**	**1.63**	**327.8**	**F**	+
	R	0.69	46.1	D	R	0.69	46.1	D	
NB	T	0.75	29.0	C	T	0.77	29.4	C	
SB	T	0.44	22.3	C	T	0.44	22.4	C	
	Int.		112.3	F	Int.		116.0	F	
4th Avenue and Atlantic Avenue									
EB	T	0.67	30.0	C	T	0.67	30.0	C	
	R	0.28	28.1	C	R	0.28	28.1	C	
WB	T	0.78	32.5	C	T	0.79	33.0	C	
NB	L	0.90	78.7	E	L	0.90	78.7	E	
	LR	0.88	74.9	E	LR	0.88	74.9	E	
	R	0.85	72.9	E	R	0.85	72.9	E	
SB	LT	1.11	117.8	F	**LT**	**1.12**	**122.9**	**F**	+
	R	0.68	61.9	E	**R**	**1.00**	**115.0**	**F**	+
	Int.		55.3	E	Int.		58.8	E	
Ashland Place and Fulton Street									
EB	LT	1.75	371.4	F	**LT**	**1.77**	**378.4**	**F**	+
	R	0.09	11.2	B	R	0.12	11.6	B	
WB	LT	0.71	22.1	C	LT	0.72	22.3	C	
	R	0.73	27.5	C	R	0.73	27.5	C	
NB	L	0.26	22.0	C	L	0.34	23.5	C	
	TR	0.82	38.6	D	TR	0.86	42.8	D	
SB	L	0.59	39.7	D	**L**	**0.64**	**45.1**	**D**	+
	TR	0.09	19.0	B	TR	0.09	19.0	B	
	Int.		123.3	F	Int.		123.6	F	
Ashland Place and Lafayette Avenue									
EB	LTR	0.84	30.5	C	LTR	0.90	35.7	D	
NB	TR	0.71	41.1	D	TR	0.76	44.2	D	
SB	LT	0.31	29.1	C	LT	0.35	30.0	C	
	Int.		32.7	C	Int.		37.2	D	
Fort Greene Place and Hanson Place									
EB	TR	0.42	15.6	B	TR	0.55	18.8	B	
WB	LT	0.39	14.7	B	LT	0.46	16.1	B	
NB	LR	0.41	15.5	B	LR	0.46	16.6	B	
SB	LTR	0.34	13.5	B	LTR	0.37	13.8	B	
	Int.		14.7	B	Int.		16.3	B	

Weekday Midday

Intersection	2025 No Action Lane Group	v/c Ratio	Delay (sec)	LOS	2025 With Action Lane Group	v/c Ratio	Delay (sec)	LOS	
Flatbush Avenue and DeKalb Avenue									
WB	LTR	1.58	306.4	F	LTR	1.58	306.4	F	
NB	T	0.96	42.7	D	T	0.96	43.4	D	
SB	TR	1.13	96.8	F	TR	1.14	98.9	F	
	Int.		124.8	F	Int.		125.7	F	
Flatbush Avenue and Fulton Street									
EB	LTR	0.80	72.6	E	LTR	0.81	74.3	E	
WB	LT	1.40	246.3	F	**LT**	**1.43**	**259.2**	**F**	+
	R	0.17	16.7	B	R	0.18	16.8	B	
NB	T	1.17	121.6	F	T	1.17	122.4	F	
SB	L	2.68	814.3	F	**L**	**2.69**	**821.1**	**F**	+
	T	0.66	18.5	B	T	0.66	18.5	B	
	Int.		201.6	F	Int.		204.3	F	
Nevins Street and Schermerhorn Street									
EB	TR	1.25	146.1	F	**TR**	**1.27**	**154.5**	**F**	+
WB	LT	0.37	14.3	B	LT	0.38	14.4	B	
SB	LTR	1.40	226.5	F	**LTR**	**1.42**	**235.5**	**F**	+
	Int.		159.9	F	Int.		167.7	F	
Nevins Street and State Street									
EB	TR	0.70	33.7	C	TR	0.70	33.7	C	
SB	LT	0.69	21.0	C	LT	0.71	21.6	C	
	Int.		26.4	C	Int.		26.7	C	
3rd Avenue and Schermerhorn Street									
EB	L	1.22	164.0	F	**L**	**1.23**	**168.2**	**F**	+
NB	LT	1.04	85.4	F	**LT**	**1.05**	**88.9**	**F**	+
	Int.		115.8	F	Int.		119.5	F	
3rd Avenue and State Street									
EB	LT	1.34	226.4	F	**LT**	**1.37**	**239.1**	**F**	+
NB	TR	0.49	8.1	A	TR	0.50	8.2	A	
	Int.		73.6	E	Int.		78.0	E	
3rd Avenue and Atlantic Avenue									
EB	TR	0.89	35.2	D	TR	0.89	35.4	D	
WB	T	0.82	29.5	C	T	0.82	29.6	C	
	R	0.55	24.3	C	R	0.57	24.8	C	
NB	LTR	1.11	109.7	F	LTR	1.11	109.7	F	
	Int.		49.4	D	Int.		49.4	D	
Flatbush Ave and Lafayette Ave									
EB	L	2.05	529.6	F	**L**	**2.06**	**535.6**	**F**	+
	LT	0.88	55.6	E	LT	0.89	56.6	E	
NB	TR	1.13	101.2	F	TR	1.14	102.0	F	
SB	DefL	0.69	56.8	E	DefL	0.70	57.4	E	
	T	0.95	33.7	C	T	0.95	33.9	C	
	Int.		113.1	F	Int.		114.4	F	
Flatbush Avenue and State Street									
EB	R	0.68	35.5	D	R	0.70	36.1	D	
NB	T	0.95	39.8	D	T	0.95	39.8	D	
SB	T	0.81	28.9	C	T	0.81	28.9	C	
	Int.		34.9	C	Int.		34.9	C	
Flatbush Avenue and 4th Avenue									
NB	T	0.74	28.9	C	T	0.74	28.9	C	
SB	T	0.96	48.4	D	T	0.96	48.5	D	
	R	1.48	260.7	F	**R**	**1.50**	**267.4**	**F**	+
	Int.		84.7	F	Int.		86.3	F	
Flatbush Avenue and Atlantic Avenue									
EB	T	0.81	34.1	C	T	0.81	34.2	C	
	R	1.22	163.7	F	R	1.22	163.7	F	
WB	TR	1.44	243.1	F	TR	1.44	244.6	F	
	R	1.25	178.6	F	R	1.25	178.6	F	
NB	T	0.71	27.8	C	T	0.71	27.9	C	
SB	T	0.72	28.2	C	T	0.72	28.2	C	
	Int.		95.6	F	Int.		96.0	F	
4th Avenue and Atlantic Avenue									
EB	T	1.01	65.7	E	T	1.01	66.2	E	
	R	0.57	42.3	D	R	0.57	42.3	D	
WB	T	0.72	34.5	C	T	0.72	34.5	C	
NB	L	0.55	48.0	D	L	0.55	48.0	D	
	LR	0.53	47.6	D	LR	0.53	47.6	D	
	R	0.52	47.3	D	R	0.52	47.3	D	
SB	LT	0.98	74.2	E	LT	0.98	74.6	E	
	R	0.50	45.7	D	R	0.54	47.3	D	
	Int.		53.7	D	Int.		53.9	D	
Ashland Place and Fulton Street									
EB	LT	1.81	392.3	F	**LT**	**1.82**	**396.7**	**F**	+
	R	0.16	12.0	B	R	0.17	12.1	B	
WB	LT	0.75	28.0	C	LT	0.76	28.4	C	
	R	0.69	24.6	C	R	0.69	24.6	C	
NB	L	0.66	34.2	C	L	0.69	35.8	D	
	TR	0.55	26.5	C	TR	0.56	26.7	C	
SB	L	0.57	32.7	C	L	0.58	33.0	C	
	TR	0.19	20.1	C	TR	0.19	20.1	C	
	Int.		160.4	F	Int.		161.3	F	
Ashland Place and Lafayette Avenue									
EB	LTR	1.00	41.9	D	LTR	1.01	44.5	D	
NB	TR	0.74	30.0	C	TR	0.77	31.5	C	
SB	LT	0.97	75.8	E	LT	1.01	87.9	F	+
	Int.		44.0	D	Int.		47.6	D	
Fort Greene Place and Hanson Place									
EB	TR	0.57	18.4	B	TR	0.59	19.1	B	
WB	LT	0.42	15.4	B	LT	0.42	15.5	B	
NB	LR	0.97	55.6	E	**LR**	**1.00**	**64.7**	**E**	+
SB	LTR	0.32	13.2	B	LTR	0.33	13.3	B	
	Int.		30.4	C	Int.		34.0	C	

Weekday PM

Intersection	2025 No Action Lane Group	v/c Ratio	Delay (sec)	LOS	2025 With Action Lane Group	v/c Ratio	Delay (sec)	LOS	
Flatbush Avenue and DeKalb Avenue									
WB	LTR	1.67	349.3	F	LTR	1.68	350.9	F	
NB	T	0.87	32.4	C	T	0.89	33.7	C	
SB	TR	1.03	57.3	E	**TR**	**1.04**	**61.3**	**E**	+
	Int.		118.9	F	Int.		120.6	F	
Flatbush Avenue and Fulton Street									
EB	LTR	0.84	74.4	E	**LTR**	**0.90**	**88.4**	**F**	+
WB	LT	1.50	290.5	F	**LT**	**1.71**	**379.7**	**F**	+
	R	0.37	19.8	B	R	0.39	20.3	C	
NB	T	0.95	52.1	D	T	0.97	54.5	D	
SB	L	2.40	690.0	F	**L**	**2.43**	**704.4**	**F**	+
	T	0.66	18.3	B	T	0.67	18.4	B	
	Int.		147.9	F	Int.		159.3	F	
Nevins Street and Schermerhorn Street									
EB	TR	1.16	109.4	F	**TR**	**1.22**	**134.8**	**F**	+
WB	LT	0.23	11.7	B	LT	0.24	11.8	B	
SB	LTR	1.48	257.78	F	**LTR**	**1.55**	**288.1**	**F**	+
	Int.		162.6	F	Int.		189.3	F	
Nevins Street and State Street									
EB	TR	0.78	37.7	D	TR	0.79	38.7	D	
SB	LT	0.90	36.8	D	**LT**	**1.00**	**55.8**	**E**	+
	Int.		37.2	D	Int.		49.2	D	
3rd Avenue and Schermerhorn Street									
EB	L	1.16	140.0	F	**L**	**1.17**	**143.7**	**F**	+
NB	LT	0.94	60.5	E	**LT**	**0.99**	**70.6**	**E**	+
	Int.		90.9	F	Int.		97.9	F	
3rd Avenue and State Street									
EB	LT	1.65	357.5	F	**LT**	**1.84**	**441.3**	**F**	+
NB	TR	0.41	7.1	A	TR	0.43	7.3	A	
	Int.		134.9	F	Int.		172.7	F	
3rd Avenue and Atlantic Avenue									
EB	TR	0.94	42.4	D	TR	0.94	43.0	D	
WB	T	0.94	41.7	D	T	0.95	44.4	D	
	R	0.52	25.3	C	R	0.61	28.2	C	
NB	LTR	1.10	104.1	F	LTR	1.10	104.6	F	
	Int.		56.3	E	Int.		57.3	E	
Flatbush Ave and Lafayette Ave									
EB	L	1.71	378.9	F	**L**	**1.79**	**415.8**	**F**	+
	LT	0.95	65.8	E	**LT**	**0.97**	**71.7**	**E**	+
NB	TR	1.11	94.0	F	**TR**	**1.13**	**101.4**	**F**	+
SB	DefL	0.56	44.1	D	DefL	0.57	44.6	D	
	T	0.96	34.0	C	T	0.98	36.2	D	
	Int.		89.8	F	Int.		98.0	E	
Flatbush Avenue and State Street									
EB	R	0.73	37.7	D	R	0.81	43.0	D	
NB	T	0.86	31.6	C	T	0.87	32.1	C	
SB	T	0.93	37.1	D	T	0.94	38.4	D	
	Int.		36.2	D	Int.		36.2	D	
Flatbush Avenue and 4th Avenue									
NB	T	0.71	27.8	C	T	0.71	28.0	C	
SB	T	0.89	39.4	D	T	0.91	40.6	D	
	R	1.57	298.1	F	**R**	**1.67**	**340.7**	**F**	+
	Int.		94.1	F	Int.		107.2	F	
Flatbush Avenue and Atlantic Avenue									
EB	T	1.04	68.5	E	T	1.04	69.9	E	
	R	1.56	311.5	F	R	1.56	311.5	F	
WB	TR	1.38	218.6	F	**TR**	**1.40**	**225.8**	**F**	+
	R	0.98	89.6	F	R	0.98	89.6	F	
NB	T	0.73	28.2	C	T	0.74	28.4	C	
SB	T	0.67	26.8	C	T	0.68	27.0	C	
	Int.		98.4	F	Int.		100.3	F	
4th Avenue and Atlantic Avenue									
EB	T	1.20	138.7	F	T	1.21	140.7	F	
	R	0.51	42.8	D	R	0.51	42.8	D	
WB	T	0.93	50.1	D	T	0.94	51.7	D	
NB	L	0.70	56.5	E	L	0.70	56.5	E	
	LR	0.67	55.3	E	LR	0.67	55.3	E	
	R	0.65	54.5	D	R	0.65	54.5	D	
SB	LT	1.01	74.0	E	LT	1.02	76.8	E	
	R	0.27	33.3	C	R	0.44	38.0	D	
	Int.		81.3	E	Int.		82.5	F	
Ashland Place and Fulton Street									
EB	LT	2.08	516.8	F	**LT**	**2.11**	**526.7**	**F**	+
	R	0.18	12.3	B	R	0.21	12.6	B	
WB	LT	1.33	193.2	F	**LT**	**1.35**	**199.0**	**F**	+
	R	0.65	25.2	C	R	0.65	25.2	C	
NB	L	0.87	55.5	E	**L**	**1.08**	**103.5**	**F**	+
	TR	0.62	28.5	C	TR	0.69	30.8	C	
SB	L	0.95	77.9	E	**L**	**1.03**	**102.7**	**F**	+
	TR	0.34	22.5	C	TR	0.34	22.5	C	
	Int.		240.6	F	Int.		245.7	F	
Ashland Place and Lafayette Avenue									
EB	LTR	0.81	24.9	C	LTR	0.84	26.6	C	
NB	TR	0.84	54.1	D	**TR**	**0.99**	**78.8**	**E**	+
SB	LT	1.20	166.3	F	**LT**	**1.42**	**258.7**	**F**	+
	Int.		49.8	D	Int.		68.8	E	
Fort Greene Place and Hanson Place									
EB	TR	0.75	25.7	C	TR	0.78	28.0	C	
WB	LT	0.57	20.0	B	LT	0.59	20.6	C	
NB	LR	1.07	85.8	F	**LR**	**1.24**	**146.7**	**F**	+
SB	LTR	0.41	14.6	B	LTR	0.45	15.1	B	
	Int.		41.7	D	Int.		64.3	E	

Notes: L = Left-turn; T = Through; R = Right-turn; DefL – Defacto Left Turn LOS = Level of Service; EB = Eastbound; WB = Westbound; NB = Northbound; SB = Southbound; Int. = Intersection
*Unsignalized intersection in 2017 Existing Conditions
+ Denotes significant adverse impact

Table 11-25
2025 No Action and With Action Condition LOS Analysis
Signalized Intersections

Intersection	Weekday AM								Weekday Midday								Weekday PM							
	2025 No Action				2025 With Action				2025 No Action				2025 With Action				2025 No Action				2025 With Action			
	Lane Group	v/c Ratio	Delay (sec)	LOS	Lane Group	v/c Ratio	Delay (sec)	LOS	Lane Group	v/c Ratio	Delay (sec)	LOS	Lane Group	v/c Ratio	Delay (sec)	LOS	Lane Group	v/c Ratio	Delay (sec)	LOS	Lane Group	v/c Ratio	Delay (sec)	LOS
Rockwell Place and Lafayette Avenue																								
SB	L	0.11	16.5	C	L	0.11	17.2	C	L	0.19	18.5	C	L	0.19	18.9	C	L	0.15	19.4	C	L	0.16	20.1	C

Flatbush Avenue

- Southbound left-turn at the Flatbush Avenue and Fulton Street intersection would deteriorate within LOS F (from a v/c ratio of 1.96 and 498.6 spv of delay to a v/c ratio of 2.01 and 521.9 spv of delay) in the weekday AM peak hour, within LOS F (from a v/c ratio of 2.68 and 814.3 spv of delay to a v/c ratio of 2.69 and 821.1 spv of delay) in the weekday midday peak hour, and within LOS F (from a v/c ratio of 2.40 and 690.0 spv of delay to a v/c ratio of 2.43 and 704.4 spv of delay) in the weekday PM peak hour, increases in delay of more than 3 seconds. These projected increases in delay constitute significant adverse impacts;
- Northbound approach at the Flatbush Avenue and Lafayette Avenue intersection would deteriorate within LOS E (from a v/c ratio of 1.03 and 62.0 spv of delay to a v/c ratio of 1.06 and 70.7 spv of delay) and within LOS F (from a v/c ratio of 1.11 and 94.0 spv of delay to a v/c ratio of 1.13 and 101.4 spv of delay), increases in delay of more than 4 seconds and 5 seconds during the weekday AM and PM peak hours, respectively. These projected increases in delay constitute significant adverse impacts; and
- Southbound right-turn at the Flatbush Avenue and 4th Avenue intersection would deteriorate within LOS F (from a v/c ratio of 1.42 and 233.2 spv of delay to a v/c ratio of 1.54 and 283.4 spv of delay) in the weekday AM peak hour, within LOS F (from a v/c ratio of 1.48 and 260.7 spv of delay to a v/c ratio of 1.50 and 267.4 spv of delay) in the weekday midday peak hour, and within LOS F (from a v/c ratio of 1.57 and 298.1 spv of delay to a v/c ratio of 1.67 and 340.7 spv of delay) in the weekday PM peak hour, increases in delay of more than 3 seconds. These projected increases in delay constitute significant adverse impacts.

Nevins Street

- Southbound approach at the Nevins Street and Schermerhorn Street intersection would deteriorate within LOS F (from a v/c ratio of 1.20 and 143.5 spv of delay to a v/c ratio of 1.29 and 180.4 spv of delay) in the weekday AM peak hour, within LOS F (from a v/c ratio of 1.40 and 226.5 spv of delay to a v/c ratio of 1.42 and 235.5 spv of delay) in the weekday midday peak hour, and within LOS F (from a v/c ratio of 1.48 and 257.7 spv of delay to a v/c ratio of 1.55 and 288.1 spv of delay) in the weekday PM peak hour, increases in delay of more than 3 seconds. These projected increases in delay constitute significant adverse impacts; and
- Southbound approach at the Nevins Street and State Street intersection would deteriorate from LOS D (v/c ratio of 0.90 and 36.8 spv of delay) to LOS E (v/c ratio of 1.00 and 55.8 spv of delay), an increase in delay of more than 5 seconds in the weekday PM peak hour. This projected increase in delay constitutes a significant adverse impact.

3rd Avenue

- Northbound approach at the 3rd Avenue and Schermerhorn Street intersection would deteriorate within LOS F (from a v/c ratio of 1.06 and 93.5 spv of delay to a v/c ratio of 1.12 and 112.6 spv of delay) in the weekday AM peak hour, within LOS F (from a v/c ratio of 1.04

and 85.4 spv of delay to a v/c ratio of 1.05 and 88.9 spv of delay) in the weekday midday peak hour, and within LOS E (from a v/c ratio of 0.94 and 60.5 spv of delay to a v/c ratio of 0.99 and 70.6 spv of delay) in the weekday PM peak hour, increases in delay of more than 3 seconds, 3 seconds, and 4 seconds, respectively. These projected increases in delay constitute significant adverse impacts.

4th Avenue

- Southbound left-turn/through at the 4th Avenue and Atlantic Avenue intersection would deteriorate within LOS F (from a v/c ratio of 1.11 and 117.8 spv of delay to a v/c ratio of 1.12 and 122.9 spv of delay) in the weekday AM peak hour, an increase in delay of more than 3 seconds. These projected increases in delay constitute significant adverse impacts; and
- Southbound right-turn at the 4th Avenue and Atlantic Avenue intersection would deteriorate from LOS E (from a v/c ratio of 0.68 and 61.9 spv of delay) to LOS F (to a v/c ratio of 1.00 and 115.0 spv of delay) in the weekday AM peak hour, an increase in delay of more than 4 seconds. These projected increases in delay constitute significant adverse impacts.

Ashland Place

- Northbound left-turn at the Ashland Place and Fulton Street intersection would deteriorate from LOS E (v/c ratio of 0.87 and 55.5 spv of delay) to LOS F (v/c ratio of 1.08 and 103.5 spv of delay) in the weekday PM peak hour, an increase of delay of more than 4 seconds. This projected increase in delay constitutes a significant adverse impact;
- Southbound left-turn at the Ashland Place and Fulton Street intersection would deteriorate within LOS D (from a v/c ratio of 0.59 and 39.7 spv of delay to a v/c ratio of 0.64 and 45.1 spv of delay) in the weekday AM peak hour, and from LOS E (v/c ratio of 0.95 and 77.9 spv of delay) to LOS F (v/c ratio of 1.03 and 102.7 spv of delay) in the weekday PM peak hour, increases in delay of more than 5 seconds and 4 seconds, respectively. These projected increases in delay constitute significant adverse impacts;
- Northbound approach at the Ashland Place and Lafayette Avenue intersection would deteriorate from LOS D (v/c ratio of 0.84 and 54.1 spv of delay) to LOS E (v/c ratio of 0.99 and 78.8 spv of delay) in the weekday PM peak hour, an increase of delay of more than 5 seconds. This projected increase in delay constitutes a significant adverse impact; and
- Southbound approach at the Ashland Place and Lafayette Avenue intersection would deteriorate from LOS E (v/c ratio of 0.97 and 75.8 spv of delay) to LOS F (v/c ratio of 1.01 and 87.9 spv of delay) in the weekday midday peak hour, and within LOS F (from a v/c ratio of 1.20 and 166.3 spv of delay to a v/c ratio of 1.42 and 258.7 spv of delay) in the weekday PM peak hour, increases in delay of more than 4 seconds and 3 seconds, respectively. These projected increases in delay constitute significant adverse impacts.

Fort Greene Place

- Northbound left-turn/right-turn at the Fort Greene Place and Hanson Place intersection would deteriorate within LOS E (from a v/c ratio of 0.97 and 55.6 spv of delay to a v/c ratio of 1.00 and 64.7 spv of delay) in the weekday midday peak hour, and within LOS F (from a v/c ratio of 1.07 and 85.8 spv of delay to a v/c ratio of 1.24 and 146.7 spv of delay) in the weekday PM peak hour, increases in delay of more than 4 seconds and 3 seconds, respectively. These projected increases in delay constitute significant adverse impacts.

Fulton Street

- Eastbound approach at the Flatbush Avenue and Fulton Street intersection would deteriorate from LOS E (v/c ratio of 0.84 and 74.4 spv of delay) to LOS F (v/c ratio of 0.90 and 88.4 spv of delay) in the weekday PM peak hour, an increase in delay of more than 4 seconds. This projected increase in delay constitutes a significant adverse impact;
- Westbound left-turn/through at the Flatbush Avenue and Fulton Street intersection would deteriorate within LOS F (from a v/c ratio of 1.16 and 154.4 spv of delay to a v/c ratio of 1.28 and 197.9 spv of delay) in the weekday AM peak hour, within LOS F (from a v/c ratio of 1.40 and 246.3 spv of delay to a v/c ratio of 1.43 and 259.2 spv of delay) in the weekday midday peak hour, and within LOS F (v/c ratio of 1.50 and 290.5 spv of delay to a v/c ratio of 1.71 and 379.7 spv of delay) in the weekday PM peak hour, increases in delay of more than 3 seconds. These projected increases in delay constitute significant adverse impacts;
- Eastbound left-turn/through at the Ashland Place and Fulton Street intersection would deteriorate within LOS F (from a v/c ratio of 1.75 and 371.4 spv of delay to a v/c ratio of 1.77 and 378.4 spv of delay) in the weekday AM peak hour, within LOS F (from a v/c ratio of 1.81 and 392.3 spv of delay to a v/c ratio of 1.82 and 396.7 spv of delay) in the weekday midday peak hour, and within LOS F (from a v/c ratio of 2.08 and 516.8 spv of delay to a v/c ratio of 2.11 and 526.7 spv of delay) in the weekday PM peak hour, increases in delay of more than 3 seconds. These projected increases in delay constitute significant adverse impacts; and
- Westbound left-turn/through at the Ashland Place and Fulton Street intersection would deteriorate within LOS F (from a v/c ratio of 1.33 and 193.2 spv of delay to a v/c ratio of 1.35 and a 199.0 spv of delay) in the weekday PM peak hour, increases in delay of more than 3 seconds. This projected increase in delay constitutes a significant adverse impact.

Lafayette Avenue

- Eastbound left-turn at the Flatbush Avenue and Lafayette Avenue intersection would deteriorate within LOS F (from a v/c ratio of 1.40 and 243.2 spv of delay to a v/c ratio of 1.48 and 278.4 spv of delay) in the weekday AM peak hour, within LOS F (from a v/c ratio of 2.05 and 529.6 spv of delay to a v/c ratio of 2.06 and 535.6 spv of delay) in the weekday midday peak hour, and within LOS F (from a v/c ratio of 1.71 and 378.9 spv of delay to a v/c ratio of 1.79 and 415.8 spv of delay) in the weekday PM peak hour, increases in delay of more than 3 seconds. These projected increases in delay constitute significant adverse impacts;
- Eastbound left-turn/through at the Flatbush Avenue and Lafayette Avenue intersection would deteriorate from within LOS E (v/c ratio of 0.87 and 55.4 spv of delay) to LOS E (v/c ratio of 0.91 and 60.2 spv of delay) in the weekday AM peak hour, and within LOS E (from a v/c ratio of 0.95 and 65.8 spv of delay to a v/c ratio of 0.97 and 71.7 spv of delay) in the weekday PM peak hour, increases in delay of more than 4 seconds. These projected increases in delay constitute significant adverse impacts; and

Schermerhorn Street

- Eastbound approach at the Nevins Street and Schermerhorn Street intersection would deteriorate from LOS C (a v/c ratio of 0.82 and 30.1 spv of delay) to LOS D (a v/c ratio of 0.94 and 47.6 spv of delay) in the weekday AM peak hour, within LOS F (from a v/c ratio of 1.25 and 146.1 spv of delay to a v/c ratio of 1.27 and 154.5 spv of delay) in the weekday midday peak hour, and within LOS F (from a v/c ratio of 1.16 and 109.4 spv of delay to a v/c ratio of 1.22 and 134.8 spv of delay) in the weekday PM peak hour, increases in delay of more than 5 seconds, 3 seconds, and 3 seconds respectively. These projected increases in delay constitute significant adverse impacts; and

- Eastbound approach at the 3rd Avenue and Schermerhorn Street intersection would deteriorate within LOS F (from a v/c ratio of 1.03 and 99.2 spv of delay to a v/c ratio of 1.07 and 109.5 spv of delay) in the weekday AM peak hour, within LOS F (from a v/c ratio of 1.22 and 164.0 spv of delay to a v/c ratio of 1.23 and 168.2 spv of delay) in the weekday midday peak hour, and within LOS F (from a v/c ratio of 1.16 and 140.0 spv of delay to a v/c ratio of 1.17 and 143.7 spv of delay) in the weekday PM peak hour, increases in delay of more than 3 seconds. These projected increases in delay constitute significant adverse impacts.

State Street

- Eastbound approach at the 3rd Avenue and State Street intersection would deteriorate within LOS F (from a v/c ratio of 1.34 and 226.4 spv of delay to a v/c ratio of 1.37 and 239.1 spv of delay) in the weekday midday peak hour, and within LOS F (from a v/c ratio of 1.65 and 357.5 spv of delay to a v/c ratio of 1.84 and 441.3 spv of delay) in the weekday PM peak hour, increases in delay of more than 5 seconds, 3 seconds, and 3 seconds, respectively. These projected increases in delay constitute significant adverse impacts.

- The eastbound approach at the Flatbush Avenue and State Street intersection would operate at a level of service better than mid-LOS D in the weekday AM, midday, and PM peak hours. The eastbound approach would be a location with a potential for additional significant traffic impacts that would be fully mitigated by installing a traffic signal, should the DOT project not signalize the intersection as proposed in their 2016 plans.

Atlantic Avenue

- Westbound through at the 3rd Avenue and Atlantic Avenue intersection would deteriorate within LOS F (from a v/c ratio of 1.12 and 96.8 spv of delay to a v/c ratio of 1.14 and 105.7 spv of delay) in the weekday AM peak hour, an increase in delay of more than 3 seconds. This projected increase in delay constitutes a significant adverse impact;
- Westbound right-turn at the 3rd Avenue and Atlantic Avenue intersection would deteriorate within LOS D (from a v/c ratio of 0.81 and 42.2 spv of delay to a v/c ratio of 0.90 and 53.1 spv of delay), an increase in delay of more than 5 seconds. This projected increase in delay constitutes a significant adverse impact; and
- Westbound through-right turn at the Flatbush Avenue and Atlantic Avenue intersection would deteriorate within LOS F (from a v/c ratio of 1.60 and 316.8 spv of delay to a v/c ratio of 1.63 and 327.8 spv of delay) in the weekday AM peak hour, and within LOS F (from a v/c ratio of 1.38 and 218.6 spv of delay to a v/c ratio of 1.40 and 225.8 spv of delay) in the weekday PM peak hour, increases in delay of more than 3 seconds. These projected increases in delay constitute significant adverse impacts.

D. DETAILED TRANSIT ANALYSIS

As described above in Section B, “Preliminary Analysis Methodology and Screening Assessment”, the Atlantic Avenue–Barclays Center station (B, D, N, Q, R and No. 2, 3, 4, 5 trains) has been selected for station analysis for the weekday AM and PM peak hours.

2017 EXISTING CONDITIONS

SUBWAY SERVICE

Subway station data collection was conducted in June 2017 during the hours of 7:00 AM to 10:00 AM and 4:00 PM to 7:00 PM to establish the baseline volumes for the subway station analysis. As shown in **Tables 11-26 and 11-27**, all analyzed vertical circulation elements and control areas currently operate at acceptable levels during the weekday AM and PM peak periods, with the exception of the P8 (D, N, R train platform) and U15 stairways during the AM peak period (v/c = 1.20 and 1.30, respectively), and the P7 (D,N,R train platform), U15, and U20A/U20B stairways during the PM peak period (v/c = 1.23, 1.15, and 1.02, respectively).

Table 11-26
2017 Existing Conditions Subway Vertical Circulation Element Analysis
Atlantic Avenue–Barclays Center Station

			Peak Hour Volumes		Peak 15-Minute Volumes			Surge Factor			
Stair	Location	Effective Width (ft)	Entry (Down)	Exit (Up)	Entry (Down)	Exit (Up)	Friction Factor	Down	Up	V/C Ratio	LOS
AM Peak Hour											
P7	B,Q Platforms	4.66	263	362	82	113	90%	100%	75%	0.37	A
P7	D,N,R Platforms	6.00	1,115	343	348	107	90%	100%	75%	0.61	B
P8	B,Q Platforms	4.50	152	143	48	45	90%	100%	75%	0.18	A
P8	D,N,R Platforms	6.00	490	1,959	153	612	90%	100%	75%	1.20	D
P11	D,N,R Platforms	6.00	91	77	28	24	90%	100%	75%	0.07	A
P14	D,N,R Platforms	6.00	575	556	180	174	90%	100%	75%	0.51	B
P15	D,N,R Platforms	6.00	871	97	272	30	90%	100%	75%	0.39	A
P18	D,N,R Platforms	6.00	878	979	274	306	90%	100%	75%	0.84	C
U15	4,5 Platforms	6.83	1,101	1,768	344	553	90%	75%	75%	1.30	D
U17	2,3 Platforms	6.83	159	404	50	126	90%	75%	75%	0.25	A
U18 A+B	2,3,4,5 Platforms	6.75	204	613	64	192	90%	75%	75%	0.37	A
U19 A+B	2,3 Platforms	14.41	74	39	23	12	90%	75%	75%	0.02	A
U20 A+B	2,3,4,5 Platforms	7.75	1,576	691	493	216	90%	75%	75%	0.90	C
U22 A+B	4,5 Platforms	14.25	960	764	300	239	90%	75%	75%	0.37	A
U23 A+B	4,5 Platforms	10.41	580	614	181	192	90%	75%	75%	0.35	A
M2 A+B	D,N,R Street Level	6.75	730	791	228	247	90%	100%	75%	0.55	B
S1	D,N,R Street Level	4.75	747	609	233	190	90%	100%	90%	0.69	B
PM Peak Hour											
P7	B,Q Platforms	4.66	161	282	50	88	90%	100%	75%	0.27	A
P7	D,N,R Platforms	6.00	1,328	1,398	415	437	90%	100%	75%	1.23	D
P8	B,Q Platforms	4.50	181	229	57	72	90%	100%	75%	0.25	A
P8	D,N,R Platforms	6.00	98	1,501	31	469	90%	100%	75%	0.81	C
P11	D,N,R Platforms	6.00	322	344	101	108	90%	100%	75%	0.30	A
P14	D,N,R Platforms	6.00	184	325	58	102	90%	100%	75%	0.24	A
P15	D,N,R Platforms	6.00	1,511	374	472	117	90%	100%	75%	0.78	C
P18	D,N,R Platforms	6.00	314	535	98	167	90%	100%	75%	0.40	A
U15	4,5 Platforms	6.83	1,574	967	492	302	90%	75%	75%	1.15	D
U17	4,5 Platforms	6.83	1,007	442	315	138	90%	75%	75%	0.66	B
U18 A+B	2,3,4,5 Platforms	6.75	34	1,397	11	437	90%	75%	75%	0.66	B
U19 A+B	2,3 Platforms	14.41	760	86	238	27	90%	75%	75%	0.18	A
U20 A+B	2,3,4,5 Platforms	7.75	1,039	1,533	325	479	90%	75%	75%	1.02	D
U22 A+B	4,5 Platforms	14.25	1,401	365	438	114	90%	75%	75%	0.38	A
U23 A+B	4,5 Platforms	10.41	856	484	268	151	90%	75%	75%	0.40	A
M2 A+B	D,N,R Street Level	6.75	520	1,179	163	368	90%	100%	75%	0.63	B
S1	D,N,R Street Level	4.75	408	799	128	250	90%	100%	90%	0.63	B

Table 11-27
2017 Existing Conditions Fare Array Analysis
Atlantic Avenue–Barclays Center Station

Control Element	Quantity	Peak Hour Pedestrian Volume		Peak15-Minute Volumes		Surging Factor	Friction Factor	v/c Ratio	LOS
		Entry	Exit	Entry	Exit				
AM Peak Hour									
High Entry/Exit Turnstile (HEET) at Fare Control Area B001 (B,Q Trains)	2	419	228	131	71	90%	90%	0.37	LOS A
High Exit Only at Fare Control Area B001 (B,Q Trains)	1	0	176	0	55	90%	100%	0.11	LOS A
Two-way Turnstile at Fare Control Area R610 (2,3,4,5 Trains)	8	2,324	850	726	266	75%	90%	0.32	LOS A
Two-way Turnstile at Fare Control Area C009 (D,N,R Trains)	8	1,477	1,400	462	438	75%	90%	0.28	LOS A
PM Peak Hour									
High Entry/Exit Turnstile (HEET) at Fare Control Area B001 (B,Q Trains)	2	223	211	70	66	90%	90%	0.23	LOS A
High Exit Only at Fare Control Area B001 (B,Q Trains)	1	0	155	0	48	90%	100%	0.10	LOS A
Two-way Turnstile at Fare Control Area R610 (2,3,4,5 Trains)	8	1,076	2,683	336	838	75%	90%	0.35	LOS A
Two-way Turnstile at Fare Control Area C009 (D,N,R Trains)	8	928	1,978	290	618	75%	90%	0.27	LOS A

FUTURE WITHOUT THE PROPOSED ACTIONS

SUBWAY SERVICE

Projected future development independent of the proposed actions that would have a potential effect on baseline 2025 subway demand at the analyzed station and subway lines was included in the No Action subway analysis. The No Action uses on the project sites were assumed, and No Action development projects in the study area were taken into account.

As shown in **Tables 11-28 and 11-29**, all critical analysis elements at the Atlantic Avenue–Barclays Center station, including vertical circulation elements and control areas, will operate at acceptable LOS during the weekday AM and PM peak periods or will operate at the same LOS as in the existing conditions, with the exception of the U15 stairway, which will deteriorate from LOS D with v/c = 1.30 to LOS E with v/c = 1.38 during the AM peak period.

FUTURE WITH THE PROPOSED ACTIONS

SUBWAY SERVICE

Based on discussions with NYCT, 58 percent of the project-generated subway trips are expected to be distributed to the Atlantic Avenue–Barclays Center subway station. The subway station analysis results presented in **Tables 11-30 and 11-31** show that no potential significant adverse stairway or escalator impacts would be expected for the Atlantic Avenue–Barclays Center subway station, with LOS similar to the No Action condition. As shown in **Table 11-31**, control areas at that station would also continue to operate within operating capacities.

Table 11-28
2025 No Action Condition Subway Vertical Circulation Element Analysis
Atlantic Avenue–Barclays Center Station

Stair	Location	Effective Width (ft)	Peak Hour Volumes Entry (Down)	Peak Hour Volumes Exit (Up)	Peak 15-Minute Volumes Entry (Down)	Peak 15-Minute Volumes Exit (Up)	Friction Factor	Surge Factor Down	Surge Factor Up	V/C Ratio	LOS
AM Peak Hour											
P7	B,Q Platforms	4.66	292	410	91	128	90%	100%	75%	0.42	A
P7	D,N,R Platforms	6.00	1,146	371	358	116	90%	100%	75%	0.63	B
P8	B,Q Platforms	4.50	179	187	56	58	90%	100%	75%	0.22	A
P8	D,N,R Platforms	6.00	574	2,115	179	661	90%	100%	75%	1.31	D
P11	D,N,R Platforms	6.00	105	100	33	31	90%	100%	75%	0.09	A
P14	D,N,R Platforms	6.00	660	689	206	215	90%	100%	75%	0.61	B
P15	D,N,R Platforms	6.00	885	99	277	31	90%	100%	75%	0.39	A
P18	D,N,R Platforms	6.00	892	995	279	311	90%	100%	75%	0.86	C
U15	4,5 Platforms	6.83	1,203	1,850	376	578	90%	75%	75%	1.38	E
U17	2,3 Platforms	6.83	183	424	57	133	90%	75%	75%	0.27	A
U18 A+B	2,3,4,5 Platforms	6.75	369	725	115	227	90%	75%	75%	0.50	B
U19 A+B	2,3 Platforms	14.41	75	40	23	13	90%	75%	75%	0.02	A
U20 A+B	2,3,4,5 Platforms	7.75	1,602	702	501	219	90%	75%	75%	0.92	C
U22 A+B	4,5 Platforms	14.25	976	777	305	243	90%	75%	75%	0.38	A
U23 A+B	4,5 Platforms	10.41	645	659	202	206	90%	75%	75%	0.39	A
M2 A+B	D,N,R Street Level	6.75	831	950	260	297	90%	100%	90%	0.65	B
S1	D,N,R Street Level	4.75	848	765	265	239	90%	100%	90%	0.83	C
PM Peak Hour											
P7	B,Q Platforms	4.66	204	310	64	97	90%	100%	75%	0.31	A
P7	D,N,R Platforms	6.00	1,375	1,440	430	450	90%	100%	75%	1.27	D
P8	B,Q Platforms	4.50	224	256	70	80	90%	100%	75%	0.29	A
P8	D,N,R Platforms	6.00	243	1,632	76	510	90%	100%	75%	0.93	C
P11	D,N,R Platforms	6.00	352	369	110	115	90%	100%	75%	0.33	A
P14	D,N,R Platforms	6.00	330	436	103	136	90%	100%	75%	0.35	A
P15	D,N,R Platforms	6.00	1,536	380	480	119	90%	100%	75%	0.79	C
P18	D,N,R Platforms	6.00	319	544	100	170	90%	100%	75%	0.40	A
U15	4,5 Platforms	6.83	1,717	1,084	537	339	90%	75%	75%	1.27	D
U17	4,5 Platforms	6.83	1,052	474	329	148	90%	75%	75%	0.69	B
U18 A+B	2,3,4,5 Platforms	6.75	259	1,614	81	504	90%	75%	75%	0.86	C
U19 A+B	2,3 Platforms	14.41	772	87	241	27	90%	75%	75%	0.18	A
U20 A+B	2,3,4,5 Platforms	7.75	1,056	1,558	330	487	90%	75%	75%	1.04	D
U22 A+B	4,5 Platforms	14.25	1,424	371	445	116	90%	75%	75%	0.39	A
U23 A+B	4,5 Platforms	10.41	948	560	296	175	90%	75%	75%	0.45	A
M2 A+B	D,N,R Street Level	6.75	697	1,323	218	413	90%	100%	90%	0.74	C
S1	D,N,R Street Level	4.75	583	937	182	293	90%	100%	90%	0.79	C

Table 11-29
2025 No Action Condition Fare Array Analysis
Atlantic Avenue–Barclays Center Station

Control Element	Quantity	Peak Hour Pedestrian Volumes Entry	Peak Hour Pedestrian Volumes Exit	Peak 15 Minute Volumes Entry	Peak 15 Minute Volumes Exit	Surging Factor	Friction Factor	v/c Ratio	LOS
AM Peak hour									
High Entry/Exit Turnstile (HEET) at Fare Control Area B001 (B,Q Trains)	2	477	279	149	87	90%	90%	0.42	LOS A
High Exit Only at Fare Control Area B001 (B,Q Trains)	1	0	216	0	68	90%	100%	0.14	LOS A
Two-way Turnstile at Fare Control Area R610 (2,3,4,5 Trains)	8	2,643	1,041	826	325	75%	90%	0.37	LOS A
Two-way Turnstile at Fare Control Area C009 (D,N,R Trains)	8	1,680	1,714	525	536	75%	90%	0.33	LOS A
PM Peak Hour									
High Entry/Exit Turnstile (HEET) at Fare Control Area B001 (B,Q Trains)	2	308	241	96	75	90%	90%	0.29	LOS A
High Exit Only at Fare Control Area B001 (B,Q Trains)	1	0	177	0	55	90%	100%	0.11	LOS A
Two-way Turnstile at Fare Control Area R610 (2,3,4,5 Trains)	8	1,483	3,065	463	958	75%	90%	0.43	LOS A
Two-way Turnstile at Fare Control Area C009 (D,N,R Trains)	8	1,278	2,259	399	706	75%	90%	0.33	LOS A

Table 11-30
2025 With Action Condition Subway Vertical Circulation Element Analysis
Atlantic Avenue–Barclays Center Station

Stair	Location	Effective Width (ft)	Peak Hour Volumes Entry (Down)	Peak Hour Volumes Exit (Up)	Peak 15-Minute Volumes Entry (Down)	Peak 15-Minute Volumes Exit (Up)	Friction Factor	Surge Factor Down	Surge Factor Up	V/C Ratio	LOS
AM Peak Hour											
P7	B,Q Platforms	4.66	305	439	95	137	90%	100%	75%	0.44	A
P7	D,N,R Platforms	6.00	1,153	386	360	121	90%	100%	75%	0.64	B
P8	B,Q Platforms	4.50	192	216	60	68	90%	100%	75%	0.25	A
P8	D,N,R Platforms	6.00	614	2,202	192	688	90%	100%	75%	1.37	E
P11	D,N,R Platforms	6.00	112	115	35	36	90%	100%	75%	0.10	A
P14	D,N,R Platforms	6.00	700	776	219	243	90%	100%	75%	0.67	B
P15	D,N,R Platforms	6.00	885	99	277	31	90%	100%	75%	0.39	A
P18	D,N,R Platforms	6.00	892	995	279	311	90%	100%	75%	0.86	C
U15	4,5 Platforms	6.83	1,247	1,887	390	590	90%	75%	75%	1.42	E
U17	2,3 Platforms	6.83	194	433	61	135	90%	75%	75%	0.28	A
U18 A+B	2,3,4,5 Platforms	6.75	454	796	142	249	90%	75%	75%	0.57	B
U19 A+B	2,3 Platforms	14.41	75	40	23	13	90%	75%	75%	0.02	A
U20 A+B	2,3,4,5 Platforms	7.75	1,602	702	501	219	90%	75%	75%	0.92	C
U22 A+B	4,5 Platforms	14.25	976	777	305	243	90%	75%	75%	0.38	A
U23 A+B	4,5 Platforms	10.41	674	684	211	214	90%	75%	75%	0.40	A
M2 A+B	D,N,R Street Level	6.75	878	1,052	274	329	90%	100%	90%	0.70	C
S1	D,N,R Street Level	4.75	895	867	280	271	90%	100%	90%	0.91	C
PM Peak Hour											
P7	B,Q Platforms	4.66	228	319	71	100	90%	100%	75%	0.32	A
P7	D,N,R Platforms	6.00	1,390	1,447	434	452	90%	100%	75%	1.28	D
P8	B,Q Platforms	4.50	248	265	78	83	90%	100%	75%	0.31	A
P8	D,N,R Platforms	6.00	327	1,674	102	523	90%	100%	75%	0.99	C
P11	D,N,R Platforms	6.00	367	376	115	118	90%	100%	75%	0.34	A
P14	D,N,R Platforms	6.00	414	478	129	149	90%	100%	75%	0.40	A
P15	D,N,R Platforms	6.00	1,536	380	480	119	90%	100%	75%	0.79	C
P18	D,N,R Platforms	6.00	319	544	100	170	90%	100%	75%	0.40	A
U15	4,5 Platforms	6.83	1,786	1,124	558	351	90%	75%	75%	1.31	D
U17	4,5 Platforms	6.83	1,069	484	334	151	90%	75%	75%	0.70	B
U18 A+B	2,3,4,5 Platforms	6.75	392	1,690	123	528	90%	75%	75%	0.95	C
U19 A+B	2,3 Platforms	14.41	772	87	241	27	90%	75%	75%	0.18	A
U20 A+B	2,3,4,5 Platforms	7.75	1,056	1,558	330	487	90%	75%	75%	1.04	D
U22 A+B	4,5 Platforms	14.25	1,424	371	445	116	90%	75%	75%	0.39	A
U23 A+B	4,5 Platforms	10.41	994	587	311	183	90%	75%	75%	0.47	B
M2 A+B	D,N,R Street Level	6.75	796	1,372	249	429	90%	100%	90%	0.80	C
S1	D,N,R Street Level	4.75	682	986	213	308	90%	100%	90%	0.87	C

Table 11-31
2025 With Action Condition Fare Array Analysis
Atlantic Avenue–Barclays Center Station

Control Element	Quantity	Peak Hour Pedestrian Volume Entry	Peak Hour Pedestrian Volume Exit	Peak 15-Minute Volumes Entry	Peak 15-Minute Volumes Exit	Surging Factor	Friction Factor	v/c Ratio	LOS
AM Peak hour									
High Entry/Exit Turnstile (HEET) at Fare Control Area B001 (B,Q Trains)	2	504	312	158	98	90%	90%	0.46	LOS B
High Exit Only at Fare Control Area B001 (B,Q Trains)	1	0	242	0	76	90%	100%	0.15	LOS A
Two-way Turnstile at Fare Control Area R610 (2,3,4,5 Trains)	8	2,790	1,165	872	364	75%	90%	0.39	LOS A
Two-way Turnstile at Fare Control Area C009 (D,N,R Trains)	8	1,773	1,918	554	599	75%	90%	0.36	LOS A
PM Peak Hour									
High Entry/Exit Turnstile (HEET) at Fare Control Area B001 (B,Q Trains)	2	356	251	111	78	90%	90%	0.33	LOS A
High Exit Only at Fare Control Area B001 (B,Q Trains)	1	0	185	0	58	90%	100%	0.12	LOS A
Two-way Turnstile at Fare Control Area R610 (2,3,4,5 Trains)	8	1,713	3,198	535	999	75%	90%	0.46	LOS A
Two-way Turnstile at Fare Control Area C009 (D,N,R Trains)	8	1,477	2,357	462	737	75%	90%	0.36	LOS A

E. DETAILED PEDESTRIAN ANALYSIS

As described above in Section B, "Preliminary Analysis Methodology and Screening Assessment," Level 1 and Level 2 screening analyses were prepared to identify the pedestrian elements that warranted a detailed analysis. Based on the assignment of pedestrian trips, 8 sidewalks, 9 corner reservoirs, and 10 crosswalks were selected for analysis for the weekday AM, midday, and PM peak hours.

2017 EXISTING CONDITIONS

Pedestrian data were collected in June 2017 during the school year in accordance with procedures outlined in the *CEQR Technical Manual* during the weekday hours of 7:00 AM to 10:00 AM, 11:00 AM to 2:00 PM, and 4:00 PM to 7:00 PM.

STREET-LEVEL PEDESTRIAN OPERATIONS

Peak hours were determined by comparing rolling hourly averages and the highest 15-minute volumes within the selected peak hours were selected for analysis. During data collection, the southwest corner at Lafayette Avenue and Ashland Place had a temporarily augmented geometry due to construction activities. This pedestrian element is noted in the pedestrian analysis tables below and will have updated geometry measurements in the No Action and With Action conditions analyses.

The existing peak-hour pedestrian volumes are shown in **Figures 11-19 through 11-21**. As shown in **Tables 11-32 through 11-34**, all sidewalk, corner reservoir, and crosswalk analysis locations currently operate at favorable LOS B or better.

Table 11-32
2017 Existing Conditions: Sidewalk Analysis

Location	Sidewalk	Effective Width (ft)	Two-way Peak Hour Volume	PHF	SFP	Platoon LOS
Weekday AM Peak Hour						
West Sidewalk along Flatbush Avenue between Schermerhorn Street and State Street	West	4.5	320	0.93	206.95	B
North Sidewalk along State Street between 3rd Avenue and Flatbush Avenue	North	3.5	44	0.79	989.95	A
West Sidewalk along Flatbush Avenue between State Street and 4th Avenue	West	10.5	709	0.98	229.49	B
North Sidewalk along State Street between Nevins Street and 3rd Avenue	North	2.0	118	0.63	168.82	B
South Sidewalk along Hanson Place between St. Felix Street and Ashland Place	South	11.5	1,175	0.83	128.22	B
West Sidewalk along Flatbush Avenue between Nevins Street and Livingston Street	West	7.5	422	0.83	233.43	B
West Sidewalk along Flatbush Avenue between Livingston Street and 3rd Avenue	West	9.5	250	0.66	397.13	B
South Sidewalk along Schermerhorn Street between Nevins Street and 3rd Avenue	South	8.5	200	0.78	524.99	B
Weekday Midday Peak Hour						
West Sidewalk along Flatbush Avenue between Schermerhorn Street and State Street	West	4.5	507	0.87	121.61	B
North Sidewalk along State Street between 3rd Avenue and Flatbush Avenue	North	3.5	30	0.75	1,385.96	A
West Sidewalk along Flatbush Avenue between State Street and 4th Avenue	West	10.5	915	0.88	159.58	B
North Sidewalk along State Street between Nevins Street and 3rd Avenue	North	2.0	49	0.88	568.85	A
South Sidewalk along Hanson Place between St. Felix Street and Ashland Place	South	11.5	1,006	0.73	131.21	B
West Sidewalk along Flatbush Avenue between Nevins Street and Livingston Street	West	7.5	420	0.70	197.73	B
West Sidewalk along Flatbush Avenue between Livingston Street and 3rd Avenue	West	9.5	364	0.82	338.83	B
South Sidewalk along Schermerhorn Street between Nevins Street and 3rd Avenue	South	8.5	329	0.79	323.13	B
Weekday PM Peak Hour						
West Sidewalk along Flatbush Avenue between Schermerhorn Street and State Street	West	4.5	608	0.97	113.02	B
North Sidewalk along State Street between 3rd Avenue and Flatbush Avenue	North	3.5	42	0.81	1,066.10	A
West Sidewalk along Flatbush Avenue between State Street and 4th Avenue	West	10.5	1,166	0.94	133.72	B
North Sidewalk along State Street between Nevins Street and 3rd Avenue	North	2.0	74	0.66	282.36	B
South Sidewalk along Hanson Place between St. Felix Street and Ashland Place	South	11.5	1,225	0.96	142.38	B
West Sidewalk along Flatbush Avenue between Nevins Street and Livingston Street	West	7.5	810	0.85	124.23	B
West Sidewalk along Flatbush Avenue between Livingston Street and 3rd Avenue	West	9.5	768	0.92	179.96	B
South Sidewalk along Schermerhorn Street between Nevins Street and 3rd Avenue	South	8.5	250	0.74	398.40	B

Project Site

0 400 FEET

2017 Existing Pedestrian Volumes
Weekday AM Peak Hour
Figure 11-19

ECF 80 FLATBUSH AVENUE

Project Site

2017 Existing Pedestrian Volumes
Weekday Midday Peak Hour
Figure 11-20

Project Site

0 400 FEET

ECF 80 FLATBUSH AVENUE

2017 Existing Pedestrian Volumes
Weekday PM Peak Hour
Figure 11-21

Table 11-33
2017 Existing Conditions: Corner Analysis

Location	Corner	Weekday AM Peak Hour SFP	Weekday AM Peak Hour LOS	Weekday Midday Peak Hour SFP	Weekday Midday Peak Hour LOS	Weekday PM Peak Hour SFP	Weekday PM Peak Hour LOS
4th Avenue and Flatbush Avenue	Northwest	201.26	A	147.96	A	144.51	A
3rd Avenue and Schermerhorn Street	Southwest	1,227.54	A	912.35	A	853.01	A
3rd Avenue and State Street	Northeast	98.66	A	118.15	A	78.97	A
	Northwest	210.63	A	269.25	A	233.28	A
Flatbush Avenue and Livingston Street	Northwest	372.38	A	303.01	A	277.99	A
	Southwest	332.32	A	234.44	A	211.42	A
Schermerhorn Street and Nevins Street	Southeast	356.50	A	362.68	A	386.48	A

Table 11-34
2017 Existing Conditions: Crosswalk Analysis

Location	Crosswalk	Crosswalk Length (ft)	Crosswalk Width (ft)	2-way Peak Hour Volume	SFP	LOS
Weekday AM Peak Hour						
4th Avenue and Flatbush Avenue	North	78.0	14.0	518	68.79	A
	South	85.0	20.0	663	77.05	A
	West	41.0	11.0	155	135.52	A
3rd Avenue and Schermerhorn Street	South	40.0	12.0	34	1,498.84	A
3rd Avenue and State Street	North	40.0	11.5	160	116.99	A
Flatbush Avenue and Livingston Street	West	80.0	25.0	358	176.69	A
Flatbush Avenue and Lafayette Avenue / Schermerhorn Street	West	52.0	12.0	337	157.81	A
	South	74.0	15.0	143	128.72	A
Weekday Midday Peak Hour						
4th Avenue and Flatbush Avenue	North	78.0	14.0	470	80.36	A
	South	85.0	20.0	467	107.63	A
	West	41.0	11.0	285	88.26	A
3rd Avenue and Schermerhorn Street	South	40.0	12.0	51	1,097.58	A
3rd Avenue and State Street	North	40.0	11.5	131	70.85	A
Flatbush Avenue and Livingston Street	West	80.0	25.0	478	143.48	A
Flatbush Avenue and Lafayette Avenue / Schermerhorn Street	West	52.0	12.0	502	101.08	A
	South	74.0	15.0	137	147.11	A
Weekday PM Peak Hour						
4th Avenue and Flatbush Avenue	North	78.0	14.0	547	64.67	A
	South	85.0	20.0	867	60.23	A
	West	41.0	11.0	302	88.95	A
3rd Avenue and Schermerhorn Street	South	40.0	12.0	55	1,107.71	A
3rd Avenue and State Street	North	40.0	11.5	177	46.65	B
Flatbush Avenue and Livingston Street	West	80.0	25.0	578	130.02	A
Flatbush Avenue and Lafayette Avenue / Schermerhorn Street	West	52.0	12.0	580	89.52	A
	South	74.0	15.0	199	83.25	A

FUTURE WITHOUT THE PROPOSED ACTIONS

Future 2025 No Action condition pedestrian volumes were estimated by increasing existing pedestrian levels to reflect expected growth in overall travel through and within the study area. As per CEQR guidelines, an annual background growth rate of 0.25 percent was assumed for the years 2017 to 2022, and an annual background growth rate of 0.125 percent was assumed for the years 2022 to 2025.

Pedestrian volumes from projects that are anticipated to be completed in the study area were also added to determine the No Action condition pedestrian volumes.

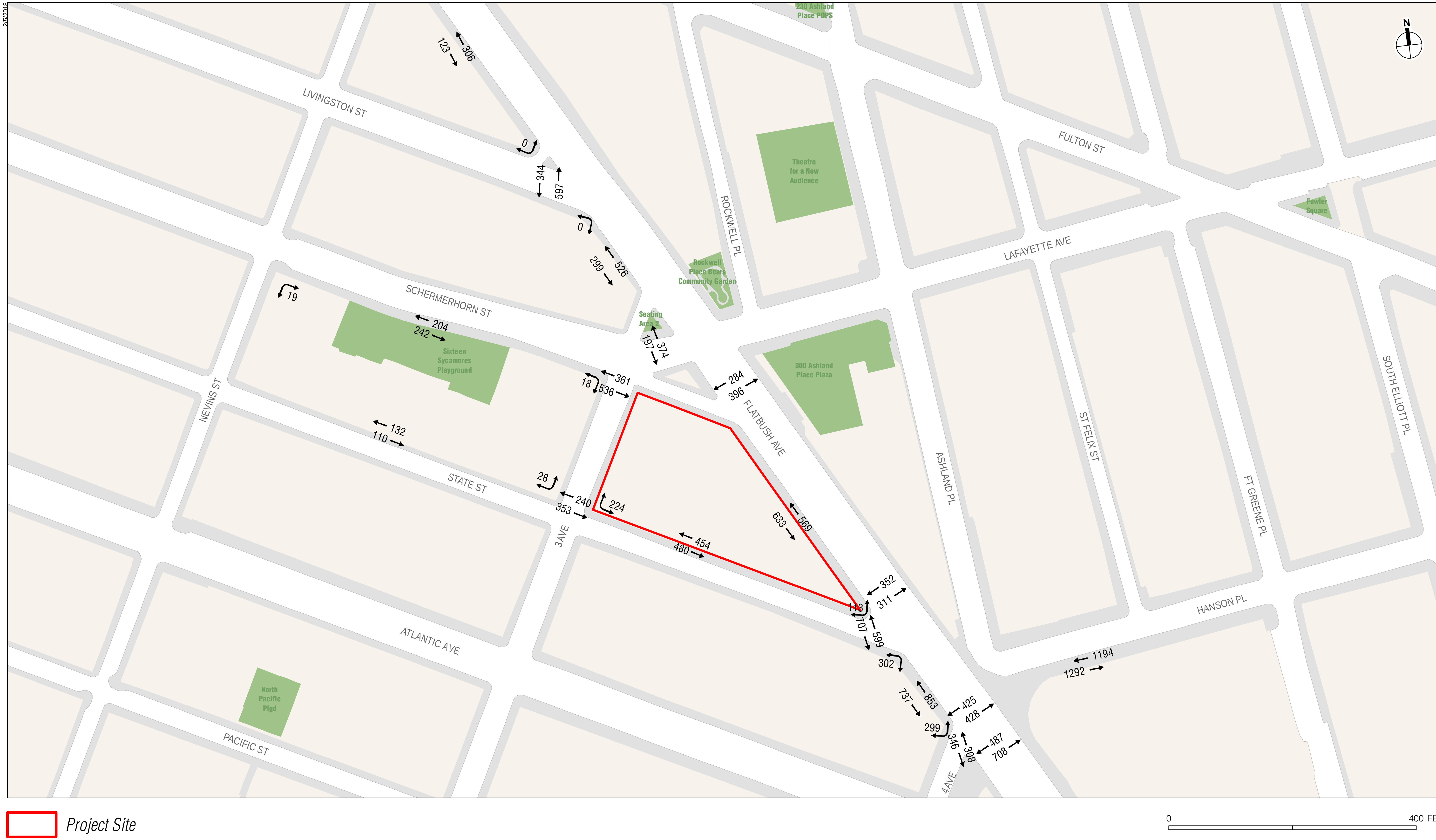
As outlined above in Section B, “Preliminary Analysis Methodology and Screening Assessment,” DOT has proposed but not yet obtained final approval for a neighborhood pedestrian safety project that would include curb extensions, larger plazas, and shorter crossings for pedestrians, and a bus lane project on Fulton Street that would modify lane widths at Fulton Street and Flatbush Avenue. The proposal to close Schermerhorn Street to vehicular traffic between 3rd and Flatbush Avenues would obviate the need to analyze the south sidewalk along Schermerhorn Street between 3rd Avenue and Flatbush Avenue intersection for the No Action and With Action pedestrian studies. From the pedestrian safety improvements project, there would be modifications that would affect the traffic and pedestrian study areas in the No Action and With Action conditions. The proposal to install a signalized crosswalk crossing Flatbush Avenue at the north leg of State Street would require the pedestrian analysis of that new crosswalk, the northwest and southwest corners of State Street and Flatbush Avenue, and the crosswalk across State Street at Flatbush Avenue. These pedestrian safety improvements were assumed to be implemented in the No Action and With Action conditions, and the additional analysis elements at State Street and Flatbush Avenue are included in the No Action and With Action pedestrian analyses below.

The total No Action peak-hour pedestrian volumes for the weekday AM, midday, and PM peak periods are presented in **Figures 11-22 through 11-24**.

STREET-LEVEL PEDESTRIAN OPERATIONS

As shown in **Tables 11-35 through 11-37**, all sidewalk, corner reservoir, and crosswalk analysis locations will operate at acceptable mid-LOS D or better service levels (31.5 SFP platoon flows for sidewalks; minimum of 19.5 SFP for corners and crosswalks) or will operate at the same LOS as under existing conditions, except for the pedestrian elements listed below:

- The west sidewalk along Flatbush Avenue between Schermerhorn Street and State Street will deteriorate from LOS B with 121.6 SFP to LOS E with 22.67 SFP during the weekday midday peak hour, and from LOS B with 113.02 SFP to LOS D with 30.33 SFP during the PM peak hour;
- The northeast corner of 3rd Avenue and State Street will deteriorate from LOS A with 118.15 SFP to LOS F with 3.91 SFP during the weekday midday peak hour; and from LOS A with 78.97 SFP to LOS F with 3.48 SFP during the weekday PM peak hour;
- The north crosswalk at 3rd Avenue and State Street will deteriorate from LOS A with 70.85 SFP to LOS E with 8.20 SFP during the weekday midday peak hour, and from LOS B with 46.65 SFP to LOS F with 7.66 SFP during the weekday PM peak hour; and
- The south crosswalk at Flatbush Avenue and Lafayette Avenue / Schermerhorn Street will deteriorate from LOS A with 83.25 SFP to LOS D with 16.55 SFP during the weekday PM peak hour.



2025 No Action Pedestrian Volumes
Weekday AM Peak Hour
Figure 11-22

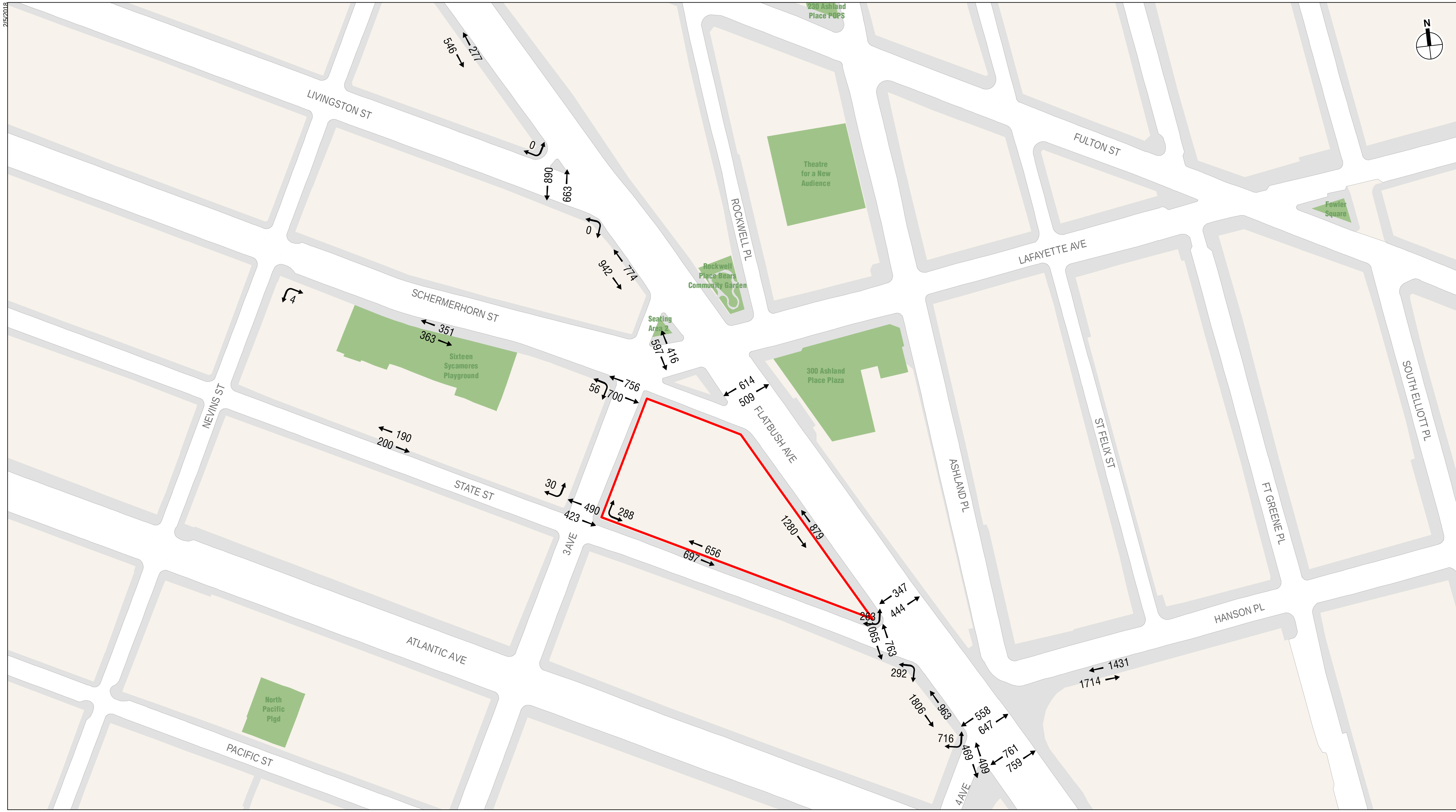
ECF 80 FLATBUSH AVENUE

Project Site

0 400 FEET

2025 No Action Pedestrian Volumes
Weekday Midday Peak Hour
Figure 11-23

ECF 80 FLATBUSH AVENUE



Project Site

0 400 FEET

2025 No Action Pedestrian Volumes
Weekday PM Peak Hour
Figure 11-24

ECF 80 FLATBUSH AVENUE

2/5/2018

Table 11-35
2025 No Action Condition: Sidewalk Analysis

Location	Sidewalk	Effective Width (ft)	Two-way Peak Hour Volume	PHF	SFP	Platoon LOS
Weekday AM Peak Hour						
West Sidewalk along Flatbush Avenue between Schermerhorn Street and State Street	West	4.5	1,202	0.93	54.18	C
North Sidewalk along State Street between 3rd Avenue and Flatbush Avenue	North	3.5	934	0.79	45.47	C
West Sidewalk along Flatbush Avenue between State Street and 4th Avenue	West	10.5	1,590	0.98	101.91	B
North Sidewalk along State Street between Nevins Street and 3rd Avenue	North	2.0	242	0.63	81.81	C
South Sidewalk along Hanson Place between St. Felix Street and Ashland Place	South	11.5	2,486	0.83	59.91	C
West Sidewalk along Flatbush Avenue between Nevins Street and Livingston Street	West	7.5	429	0.83	229.61	B
West Sidewalk along Flatbush Avenue between Livingston Street and 3rd Avenue	West	9.5	825	0.66	119.93	B
South Sidewalk along Schermerhorn Street between Nevins Street and 3rd Avenue	South	8.5	446	0.78	235.24	B
Weekday Midday Peak Hour						
West Sidewalk along Flatbush Avenue between Schermerhorn Street and State Street	West	4.5	2,495	0.87	22.67	E
North Sidewalk along State Street between 3rd Avenue and Flatbush Avenue	North	3.5	1,217	0.75	32.57	D
West Sidewalk along Flatbush Avenue between State Street and 4th Avenue	West	10.5	2,505	0.88	57.50	C
North Sidewalk along State Street between Nevins Street and 3rd Avenue	North	2.0	608	0.88	44.67	C
South Sidewalk along Hanson Place between St. Felix Street and Ashland Place	South	11.5	2,437	0.73	53.57	C
West Sidewalk along Flatbush Avenue between Nevins Street and Livingston Street	West	7.5	427	0.70	194.47	B
West Sidewalk along Flatbush Avenue between Livingston Street and 3rd Avenue	West	9.5	1,441	0.82	85.00	C
South Sidewalk along Schermerhorn Street between Nevins Street and 3rd Avenue	South	8.5	906	0.79	116.94	B
Weekday PM Peak Hour						
West Sidewalk along Flatbush Avenue between Schermerhorn Street and State Street	West	4.5	2,159	0.97	30.33	D
North Sidewalk along State Street between 3rd Avenue and Flatbush Avenue	North	3.5	1,353	0.81	31.55	D
West Sidewalk along Flatbush Avenue between State Street and 4th Avenue	West	10.5	2,769	0.94	55.50	C
North Sidewalk along State Street between Nevins Street and 3rd Avenue	North	2.0	390	0.66	52.60	C
South Sidewalk along Hanson Place between St. Felix Street and Ashland Place	South	11.5	3,145	0.96	54.63	C
West Sidewalk along Flatbush Avenue between Nevins Street and Livingston Street	West	7.5	823	0.85	122.25	B
West Sidewalk along Flatbush Avenue between Livingston Street and 3rd Avenue	West	9.5	1,716	0.92	80.00	C
South Sidewalk along Schermerhorn Street between Nevins Street and 3rd Avenue	South	8.5	714	0.74	139.15	B

Table 11-36
2025 No Action Condition: Corner Analysis

Location	Corner	Weekday AM Peak Hour		Weekday Midday Peak Hour		Weekday PM Peak Hour	
		SFP	LOS	SFP	LOS	SFP	LOS
Flatbush Avenue and State Street*	Northwest	53.23	B	32.18	C	32.33	C
	Southwest	85.20	A	52.75	B	58.08	B
4th Avenue and Flatbush Avenue	Northwest	74.33	A	54.01	B	50.66	B
3rd Avenue and Schermerhorn Street	Southwest	49.11	B	31.02	C	35.65	C
3rd Avenue and State Street	Northeast	22.17	D	3.91	F	3.48	F
	Northwest	63.32	A	29.07	C	34.98	C
Flatbush Avenue and Livingston Street	Northwest	156.05	A	76.58	A	98.69	A
	Southwest	125.64	A	72.67	A	85.51	A
Schermerhorn Street and Nevins Street	Southeast	151.16	A	72.90	A	96.15	A

Note: *Included in the No Action and With Action analyses to account for proposed DOT pedestrian safety improvement

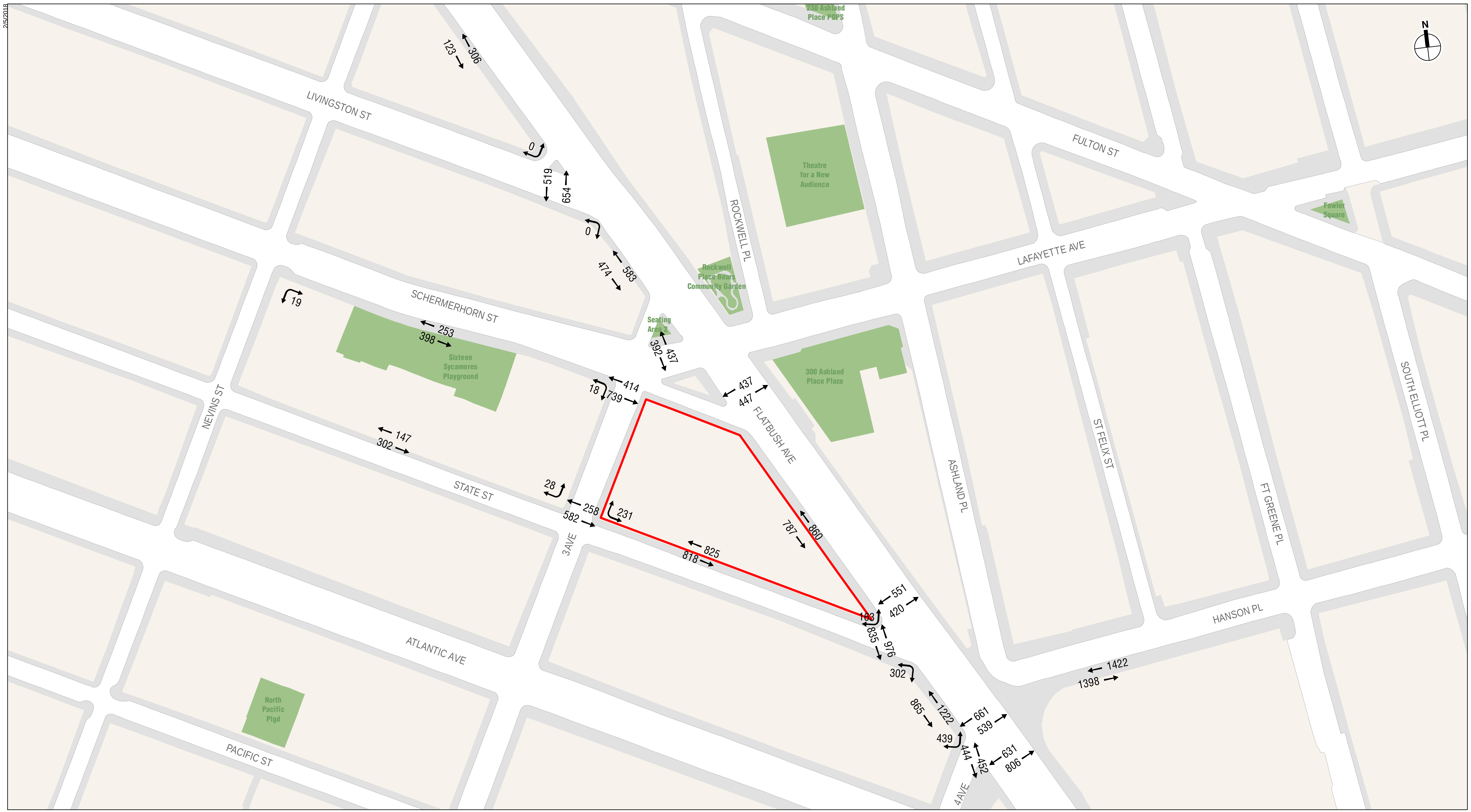
Table 11-37
2025 No Action Condition: Crosswalk Analysis

Location	Crosswalk	Crosswalk Length (ft)	Crosswalk Width (ft)	2-way Peak Hour Volume	SFP	LOS
Weekday AM Peak Hour						
State Street and Flatbush Avenue*	North	71.0	18.0	663	78.48	A
	West	58.0	21.0	1,306	53.67	B
4th Avenue and Flatbush Avenue	North	78.0	14.0	853	40.74	B
	South	85.0	20.0	1,195	41.50	B
	West	41.0	11.0	654	29.04	C
3rd Avenue and Schermerhorn Street	South	40.0	12.0	897	51.83	B
3rd Avenue and State Street	North	40.0	11.5	593	28.85	C
Flatbush Avenue and Livingston Street	West	80.0	25.0	941	65.35	A
Flatbush Avenue and Lafayette Avenue / Schermerhorn Street	West	52.0	12.0	571	91.54	A
	South	74.0	18.0	680	31.19	C
Weekday Midday Peak Hour						
State Street and Flatbush Avenue*	North	71.0	18.0	553	91.55	A
	West	58.0	21.0	2,127	31.81	C
4th Avenue and Flatbush Avenue	North	78.0	14.0	1,089	33.07	C
	South	85.0	20.0	854	57.59	B
	West	41.0	11.0	532	45.26	B
3rd Avenue and Schermerhorn Street	South	40.0	12.0	1,621	29.96	C
3rd Avenue and State Street	North	40.0	11.5	945	8.20	E
Flatbush Avenue and Livingston Street	West	80.0	25.0	1,642	39.74	C
Flatbush Avenue and Lafayette Avenue / Schermerhorn Street	West	52.0	12.0	1,103	43.69	B
	South	74.0	18.0	1,288	17.18	D
Weekday PM Peak Hour						
State Street and Flatbush Avenue*	North	71.0	18.0	791	48.93	B
	West	58.0	21.0	1,828	37.42	C
4th Avenue and Flatbush Avenue	North	78.0	14.0	1,205	27.86	C
	South	85.0	20.0	1,520	33.22	C
	West	41.0	11.0	878	27.90	C
3rd Avenue and Schermerhorn Street	South	40.0	12.0	1,456	36.95	C
3rd Avenue and State Street	North	40.0	11.5	913	7.66	F
Flatbush Avenue and Livingston Street	West	80.0	25.0	1,553	50.49	B
Flatbush Avenue and Lafayette Avenue / Schermerhorn Street	West	52.0	12.0	1,013	49.59	B
	South	74.0	18.0	1,123	16.55	D

Note: *Included in the No Action and With Action analyses to account for proposed DOT pedestrian safety improvement

FUTURE WITH THE PROPOSED ACTIONS

Project-generated pedestrian volumes were assigned to the pedestrian network considering current land uses in the area, population distribution, nearby parking locations, available transit services, and surrounding pedestrian facilities. The geometries of pedestrian elements along sidewalks abutting the site were updated to reflect the proposed project site plans. The co-applicants would be reconstructing sidewalks adjacent to the project site, including the west sidewalk along Flatbush Avenue between Schermerhorn Street and State Street, where the minimum width would be widened from 7 feet to 7.8 feet; the north sidewalk along State Street between 3rd Avenue and Flatbush Avenue, where the minimum width would be widened from 6 feet to 7.51 feet; and the east sidewalk along 3rd Avenue between State Street and Schermerhorn Street, where the minimum width would be widened from 4.5 feet to 10.9 feet (all sidewalk effective widths in pedestrian analysis tables include a subtraction of 2.5 feet of “shy distance” from the minimum width as per DOT guidance).The hourly incremental pedestrian volumes presented above in **Figures 11-5 through 11-7**, were added to the projected 2025 No Action volumes to generate the 2025 With Action pedestrian volumes for analysis (see **Figures 11-25 through 11-27**).



Project Site

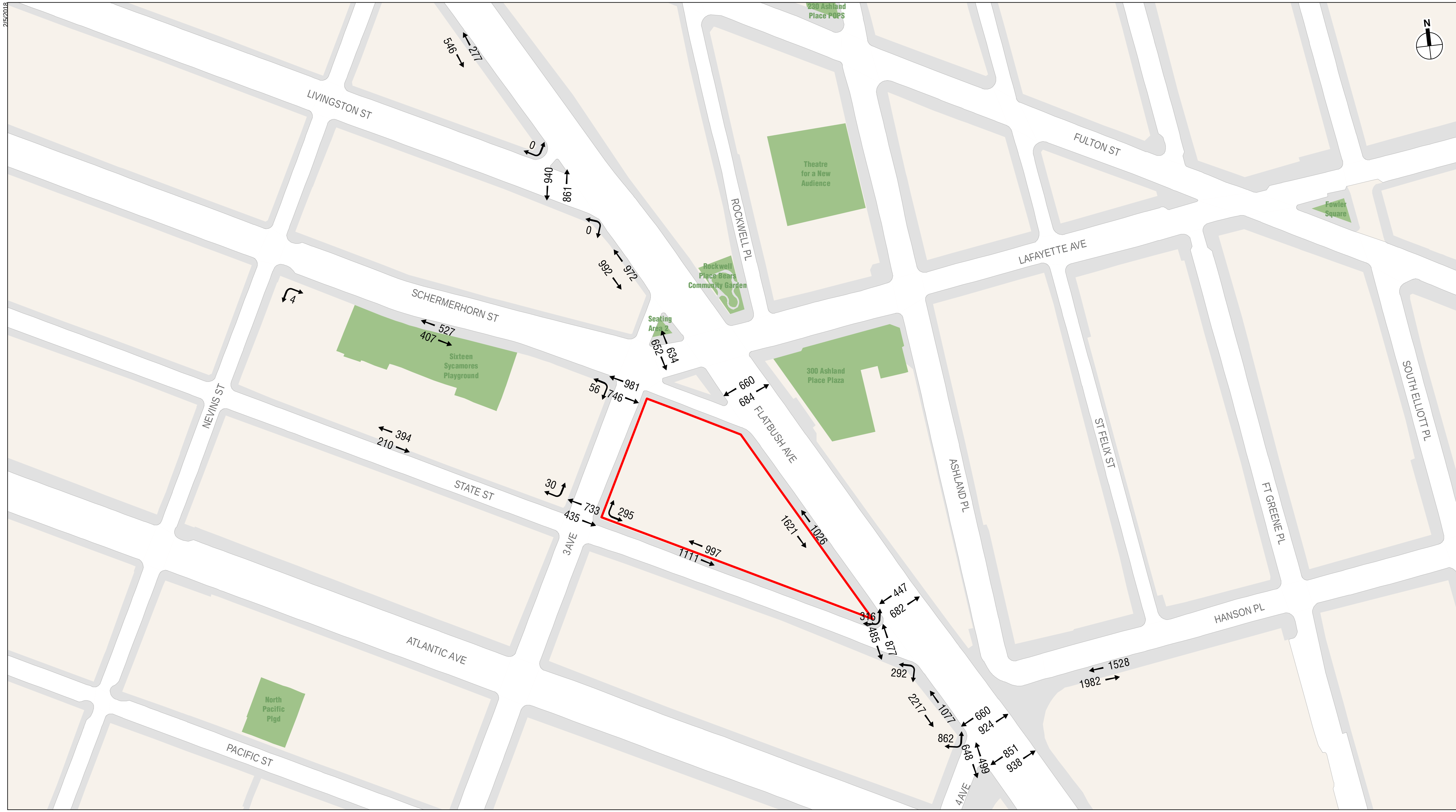
0 400 FEET

2025 With Action Pedestrian Volumes
Weekday AM Peak Hour
Figure 11-25

Project Site

2025 With Action Pedestrian Volumes
Weekday Midday Peak Hour
Figure 11-26

ECF 80 FLATBUSH AVENUE



Project Site

0 400 FEET

2025 With Action Pedestrian Volumes
Weekday PM Peak Hour
Figure 11-27

ECF 80 FLATBUSH AVENUE

STREET-LEVEL PEDESTRIAN OPERATIONS AND SIGNIFICANT ADVERSE IMPACTS

Details on pedestrian SFP and LOS are presented in **Tables 11-38 through 11-40**. Based on the *CEQR Technical Manual* sliding scale impact thresholds, significant adverse pedestrian impacts, as detailed below, were identified for one crosswalk during the weekday AM and midday peak hours, and two crosswalks during the weekday PM peak hour. Potential measures that can be implemented to mitigate these significant adverse pedestrian impacts are discussed in Chapter 19, "Mitigation."

Crosswalks

- The north crosswalk of 3rd Avenue and State Street would deteriorate from LOS C with 28.85, LOS E with 8.20 SFP, and LOS F with 7.66 SFP to LOS D with 19.06 SFP, to LOS F with 6.63 SFP, and to LOS F with 5.59 SFP during the weekday AM, midday, and PM peak hours, respectively; and
- The south crosswalk of Flatbush Avenue and Lafayette Avenue / Schermerhorn Street would deteriorate from LOS D with 16.55 SFP to LOS E with 13.60 SFP during the weekday PM peak hour.

Furthermore, the 4th Avenue/Flatbush Avenue intersection would be a location with a potential for additional significant pedestrian impacts whose mitigation would be investigated in the FEIS, should the DOT project not signalize the intersection of State Street and Flatbush Avenue to provide an additional signalized pedestrian crossing at State Street as proposed in their 2016 plans. In addition, the Lafayette Avenue/Flatbush Avenue and Schermerhorn Street/Flatbush Avenue intersections would be locations with a potential for additional significant pedestrian impacts whose mitigation would be investigated in the FEIS, should the DOT project not close Schermerhorn Street between 3rd Avenue and Flatbush Avenue to provide the pedestrian plaza as proposed in their 2016 plans.

Table 11-38
2025 With Action Condition: Sidewalk Analysis

Location	Sidewalk	Effective Width (ft)	Two-way Peak Hour Volume	PHF	SFP	Platoon LOS
Weekday AM Peak Hour						
West Sidewalk along Flatbush Avenue between Schermerhorn Street and State Street	West	5.3	1,647	0.93	46.27	C
North Sidewalk along State Street between 3rd Avenue and Flatbush Avenue	North	5.01	1,643	0.79	36.52	D
West Sidewalk along Flatbush Avenue between State Street and 4th Avenue	West	10.5	2,087	0.98	77.35	C
North Sidewalk along State Street between Nevins Street and 3rd Avenue	North	2.0	449	0.63	43.23	C
South Sidewalk along Hanson Place between St. Felix Street and Ashland Place	South	11.5	2,820	0.83	52.59	C
West Sidewalk along Flatbush Avenue between Nevins Street and Livingston Street	West	7.5	429	0.83	229.61	B
West Sidewalk along Flatbush Avenue between Livingston Street and 3rd Avenue	West	9.5	1,057	0.66	93.38	B
South Sidewalk along Schermerhorn Street between Nevins Street and 3rd Avenue	South	8.5	651	0.78	160.98	B
Weekday Midday Peak Hour						
West Sidewalk along Flatbush Avenue between Schermerhorn Street and State Street	West	5.3	3,153	0.87	20.82	E
North Sidewalk along State Street between 3rd Avenue and Flatbush Avenue	North	5.01	1,584	0.75	36.13	D
West Sidewalk along Flatbush Avenue between State Street and 4th Avenue	West	10.5	2,752	0.88	52.16	C
North Sidewalk along State Street between Nevins Street and 3rd Avenue	North	2.0	764	0.88	35.00	D
South Sidewalk along Hanson Place between St. Felix Street and Ashland Place	South	11.5	2,549	0.73	51.13	C
West Sidewalk along Flatbush Avenue between Nevins Street and Livingston Street	West	7.5	427	0.70	194.47	B
West Sidewalk along Flatbush Avenue between Livingston Street and 3rd Avenue	West	9.5	1,501	0.82	81.55	C
South Sidewalk along Schermerhorn Street between Nevins Street and 3rd Avenue	South	8.5	978	0.79	108.26	B
Weekday PM Peak Hour						
West Sidewalk along Flatbush Avenue between Schermerhorn Street and State Street	West	5.3	2,647	0.97	29.00	D
North Sidewalk along State Street between 3rd Avenue and Flatbush Avenue	North	5.01	2,108	0.81	28.71	D
West Sidewalk along Flatbush Avenue between State Street and 4th Avenue	West	10.5	3,294	0.94	46.32	C
North Sidewalk along State Street between Nevins Street and 3rd Avenue	North	2.0	604	0.66	33.05	D
South Sidewalk along Hanson Place between St. Felix Street and Ashland Place	South	11.5	3,510	0.96	48.73	C
West Sidewalk along Flatbush Avenue between Nevins Street and Livingston Street	West	7.5	823	0.85	122.25	B
West Sidewalk along Flatbush Avenue between Livingston Street and 3rd Avenue	West	9.5	1,964	0.92	69.72	C
South Sidewalk along Schermerhorn Street between Nevins Street and 3rd Avenue	South	8.5	934	0.74	106.16	B

Table 11-39
2025 With Action Condition: Corner Analysis

Location	Corner	Weekday AM Peak Hour SFP	Weekday AM Peak Hour LOS	Weekday Midday Peak Hour SFP	Weekday Midday Peak Hour LOS	Weekday PM Peak Hour SFP	Weekday PM Peak Hour LOS
Flatbush Avenue and State Street*	Northwest	36.18	C	26.24	C	21.05	D
	Southwest	62.09	A	47.04	B	45.95	B
4th Avenue and Flatbush Avenue	Northwest	50.10	B	47.01	B	34.93	C
3rd Avenue and Schermerhorn Street	Southwest	42.15	B	30.12	C	32.18	C
3rd Avenue and State Street	Northeast	70.76	A	38.66	C	33.83	C
	Northwest	39.21	C	23.30	D	27.90	C
Flatbush Avenue and Livingston Street	Northwest	126.42	A	74.28	A	87.08	A
	Southwest	100.54	A	69.88	A	71.88	A
Schermerhorn Street and Nevins Street	Southeast	121.11	A	70.29	A	83.54	A

Note: *Included in the No Action and With Action analyses to account for proposed DOT pedestrian safety improvement

Table 11-40
2025 With Action Condition: Crosswalk Analysis

Location	Crosswalk	Crosswalk Length (ft)	Crosswalk Width (ft)	2-way Peak Hour Volume	SFP	LOS
Weekday AM Peak Hour						
State Street and Flatbush Avenue*	North	71.0	18.0	971	52.74	B
	West	58.0	21.0	1,811	37.86	C
4th Avenue and Flatbush Avenue	North	78.0	14.0	1,200	28.15	C
	South	85.0	20.0	1,437	34.11	C
	West	41.0	11.0	896	20.23	D
3rd Avenue and Schermerhorn Street	South	40.0	12.0	1,153	39.12	C
3rd Avenue and State Street	North	40.0	11.5	840	19.06	D
Flatbush Avenue and Livingston Street	West	80.0	25.0	1,173	52.00	B
Flatbush Avenue and Lafayette Avenue / Schermerhorn Street	West	52.0	12.0	829	61.97	A
	South	74.0	18.0	884	23.63	D
Weekday Midday Peak Hour						
State Street and Flatbush Avenue*	North	71.0	18.0	656	76.76	A
	West	58.0	21.0	2,377	28.17	C
4th Avenue and Flatbush Avenue	North	78.0	14.0	1,218	29.29	C
	South	85.0	20.0	930	52.67	B
	West	41.0	11.0	608	39.09	C
3rd Avenue and Schermerhorn Street	South	40.0	12.0	1,702	28.34	C
3rd Avenue and State Street	North	40.0	11.5	1,127	6.63	F
Flatbush Avenue and Livingston Street	West	80.0	25.0	1,702	38.25	C
Flatbush Avenue and Lafayette Avenue / Schermerhorn Street	West	52.0	12.0	1,168	41.04	B
	South	74.0	18.0	1,403	15.64	D
Weekday PM Peak Hour						
State Street and Flatbush Avenue*	North	71.0	18.0	1,129	33.47	C
	West	58.0	21.0	2,362	28.18	C
4th Avenue and Flatbush Avenue	North	78.0	14.0	1,584	20.53	D
	South	85.0	20.0	1,789	27.84	C
	West	41.0	11.0	1,147	20.46	D
3rd Avenue and Schermerhorn Street	South	40.0	12.0	1,727	30.42	C
3rd Avenue and State Street	North	40.0	11.5	1,168	5.59	F
Flatbush Avenue and Livingston Street	West	80.0	25.0	1,801	43.19	B
Flatbush Avenue and Lafayette Avenue / Schermerhorn Street	West	52.0	12.0	1,286	38.32	C
	South	74.0	18.0	1,344	13.60	E

Note: *Included in the No Action and With Action analyses to account for proposed DOT pedestrian safety improvement

F. VEHICULAR AND PEDESTRIAN SAFETY EVALUATION

METHODOLOGY

An evaluation of vehicular and pedestrian safety is necessary for locations within the traffic and pedestrian study areas that have been identified as high crash locations, where 48 or more total reportable and non-reportable crashes or 5 or more pedestrian/bicyclist injury crashes occurred in any consecutive 12 months of the most recent 3-year period for which data are available. For these locations, crash trends are identified to determine whether projected vehicular and pedestrian traffic would further impact safety at these locations. The determination of potential significant safety impacts depends on the type of area where the project site is located, traffic volumes, crash types and severity, and other contributing factors. Where appropriate, measures to improve traffic and pedestrian safety are identified and coordinated with DOT.

CRASH DATA

Crash data for the study area intersections were obtained from NYSDOT for the time period between March 1, 2014, and February 28, 2017. The data obtained quantify the total number of reportable crashes (involving fatality, injury, or more than $1,000 in property damage), fatalities, and injuries during the study period, as well as a yearly breakdown of vehicular crashes with pedestrians and bicycles at each location.

During the March 1, 2014 and February 28, 2017 3-year period, a total of 416 reportable and non-reportable crashes, 1 fatality, 409 injuries, and 95 pedestrian/bicyclist-related crashes occurred at the study area intersections. A rolling total of crash data identifies three high crash locations in the 2014 to 2017 period: Flatbush Avenue and Atlantic Avenue, Flatbush Avenue and Fulton Street, and Flatbush Avenue and Lafayette Avenue. **Table 11-41** depicts total crash characteristics by intersection during the study period, as well as a breakdown of pedestrian and bicycle crashes by year and location. **Table 11-42** shows a detailed description of each pedestrian/bicyclist-related crash at the high crash locations listed above during the 3-year period.

DOT-PROPOSED SAFETY IMPROVEMENT PROJECTS

DOT has proposed but not yet obtained final approval for a neighborhood pedestrian safety project that would include curb extensions, larger plazas, and shorter crossings for pedestrians. DOT's proposal to close Schermerhorn Street to vehicular traffic between 3rd and Flatbush Avenues and 3rd Avenue between Flatbush Avenue and Schermerhorn Street would eliminate vehicular conflicts at four crosswalks by creating pedestrian plazas. At State Street and Flatbush Avenue, DOT's project would also add a curb extension on the southwest corner to align it with Flatbush Avenue and signalize it to allow for a new crosswalk across Flatbush Avenue on the north leg of the intersection, and place the existing west leg crosswalk under signalized control. There would be several other pedestrian and vehicular safety improvements in the area, including curb extensions, medians, and pedestrian refuge islands at 3rd Avenue and Schermerhorn Street, Rockwell Place and Lafayette Avenue, Lafayette Avenue and Ashland Place, Ashland Place and Hanson Place, 4th Avenue and Flatbush Avenue, Atlantic Avenue and Flatbush Avenue, and 4th Avenue and Atlantic Avenue.

Table 11-41
Crash Summary

Intersection		Study Period						Crashes by Year							
North-South Roadway	East-West Roadway	All Crashes by Year				Total Fatalities	Total Injuries	Pedestrian				Bicycle			
		2014	2015	2016	2017			2014	2015	2016	2017	2014	2015	2016	2017
Ashland Place	Fulton Street	7	7	6	1	0	19	3	0	0	1	1	4	0	0
Ashland Place	Lafayette Avenue	2	1	3	1	0	7	0	0	1	1	0	0	1	0
Flatbush Avenue	**Atlantic Avenue**	20	17	13	0	0	58	3	3	2	0	4	0	0	0
Flatbush Avenue	DeKalb Avenue	8	15	8	0	1	32	1	2	2	0	0	2	0	0
Flatbush Avenue	Fleet Street	2	1	2	0	0	5	0	0	0	0	0	0	0	0
Flatbush Avenue	**Fulton Street**	19	12	9	2	0	34	7	2	1	0	0	0	0	0
Flatbush Avenue	**Lafayette Avenue**	13	15	9	0	0	39	3	3	2	0	0	1	0	0
Flatbush Avenue	Livingston Street	8	7	5	1	0	21	3	0	0	0	0	0	0	0
Flatbush Avenue	Schermerhorn St	1	1	4	0	0	7	0	1	2	0	0	0	0	0
Flatbush Avenue	State Street	4	5	4	1	0	23	1	0	0	0	0	0	0	0
Flatbush Avenue	Willoughby Street	5	7	10	0	0	25	2	3	2	0	0	0	0	0
Fort Greene Place	Hanson Place	1	4	2	0	0	6	0	2	1	0	0	1	0	0
Hudson Avenue	Fulton Street	0	3	0	0	0	3	0	1	0	0	0	1	0	0
Nevins Street	Flatbush Avenue	7	1	3	1	0	14	3	0	0	0	0	0	0	0
Nevins Street	Schermerhorn St	1	3	1	2	0	5	0	2	0	0	0	0	0	2
Nevins Street	State Street	1	1	1	0	0	2	0	1	0	0	1	0	0	0
Rockwell Place	Fulton Street	0	2	0	0	0	1	0	1	0	0	0	0	0	0
Rockwell Place	Lafayette Avenue	0	1	1	0	0	1	0	0	0	0	0	0	1	0
Saint Felix Street	Hanson Place	1	0	0	0	0	1	0	0	0	0	1	0	0	0
University Plaza	Flatbush/DeKalb	0	0	4	0	0	3	0	0	0	0	0	0	1	0
3rd Avenue	Atlantic Avenue	7	9	12	2	0	25	1	1	1	0	1	0	0	0
3rd Avenue	Livingston/ Schermerhorn	2	1	4	0	0	3	1	0	0	0	0	0	0	0
3rd Avenue	State Street	2	2	3	0	0	7	0	0	1	0	0	0	0	0
4th Avenue	Atlantic Avenue	17	12	14	2	0	42	1	0	2	0	1	0	0	0
4th Avenue	Flatbush Avenue	4	16	8	2	0	26	0	2	0	0	0	0	0	0

Note: Bold intersections are high crash locations.
Source: NYSDOT March 1, 2014 and February 28, 2017 crash data.

Table 11-42
Vehicle and Pedestrian Crash Details

Intersection	Year	Date	Time	Crash Class		Action of Vehicle	Action of Pedestrian	Cause of Crash			
				Injured	Killed			Left / Right Turns	Pedestrian Error/ Confusion	Driver Inattention	Other
Flatbush Avenue at Atlantic Avenue	2014	5/3	7:20 PM	X		Going straight–south	Crossing against signal		X		
		5/18	9:30 PM	X		Going straight– east	Crossing with signal			X	
		6/5	2:50 PM	X		Going straight–south	Getting on/off vehicle			X	
		6/6	6:27 AM	X		Going straight–north	Crossing against signal				Traffic control devices disregarded
		7/21	8:15 AM	X		Going straight–east	Crossing with signal			X	
		7/22	11:45 PM	X		Making right turn–west	Along highway with traffic	X		X	
		11/22	8:30 PM	X		Going straight–east	Along highway with traffic			X	
	2015	1/8	9:30 AM	X		Going straight–north	Working in roadway			X	
		1/28	7:35 PM	X		Going straight–south	Other actions in roadway			X	
		9/19	5:10 PM	X		Going straight–north	Crossing with signal				Failure to yield R.o.W.
	2016	2/24	7:13 PM	X		Going straight–west	Crossing against signal		X		
		9/11	6:04 PM	X		Making left turn–east	Crossing with signal	X			Failure to yield R.o.W.
Flatbush Avenue at Fulton Street	2014	4/3	10:50 AM	X		Going straight–south	Crossing/No signal or Xwalk				Unknown
		6/13	1:06 AM	X		Making left turn–south	Crossing with signal	X			Failure to yield R.o.W.
		6/13	2:30 PM	X		Going straight–west	Crossing with signal				Failure to yield R.o.W.
		6/17	8:25 PM	X		Going straight–north	Crossing with signal				Failure to yield R.o.W.
		7/9	7:05 PM	X		Going straight–north	Crossing with signal		X		Passing or lane usage improper
		12/9	1:03 PM	X		Making left turn–south	Crossing with signal	X			Failure to yield R.o.W.
		12/28	6:00 PM	X		Going straight–south	Crossing against signal				Unsafe speed
	2015	9/24	10:55 AM	X		Making left turn–south	Unknown				Failure to yield R.o.W. / Physical disability
		9/24	1:45 PM	X		Not applicable	Crossing with signal				Unknown
	2016	8/4	10:10 PM	X		Making left turn–east	Crossing with signal	X			Passenger distraction
Flatbush Avenue at Lafayette Avenue	2014	6/15	11:52 AM	X		Making left turn–east	Crossing with signal	X			Failure to yield R.o.W.
		10/24	8:16 AM	X		Making left turn–east	Crossing with signal	X			
		12/20	5:35 PM	X		Making left turn–north	Crossing with signal	X			Failure to yield R.o.W.
	2015	3/13	1:00 PM	X		Making left turn–northeast	Crossing with signal	X			Reaction to other uninvolved vehicle
		6/16	2:50 PM	X		Going straight–west	Along highway against traffic		X		
		7/23	12:05 PM	X		Backing–west	Crossing with signal				Backing unsafely
		10/15	6:26 AM	X		Making left turn–east	Crossing with signal	X			Failure to yield R.o.W.
	2016	12/8	11:00 AM	X		Stopped in traffic–north	Other actions in roadway				Unknown
		12/9	12:22 PM	X		Unknown	Crossing with signal				Unknown

FLATBUSH AVENUE AND ATLANTIC AVENUE

Based on the review of the crash history at the intersection of Flatbush Avenue and Atlantic Avenue, no prevailing trends with regard to geometric deficiencies were identified as the primary causes of recorded crashes. Notably, 8 of 10 crashes involved turning vehicles from the intersection's approaches. With respect to geometric deficiencies that could potentially cause safety hazards, the intersection of Flatbush Avenue and Atlantic Avenue is signalized and provides three school crosswalks; the south crosswalk is currently paved over and has not been restriped. In addition, countdown timers are present on all crosswalks. In terms of project-generated activity, this intersection would experience incremental peak-hour volume increases of approximately 49 or fewer vehicle trips and 45 or fewer pedestrian trips at any crosswalk during each of the three analysis peak hours. Additional safety measures, such as restriping the intersection's crosswalks to all be high visibility, can be implemented to further improve pedestrian safety at this intersection. A DOT-proposed pedestrian safety street improvement project would also improve vehicular and pedestrian safety at this location by constructing curb extensions on the northeast and northwest corners and pedestrian refuge islands on the north, east, and south legs of the intersection, which reduce pedestrian crossing distances and should reduce vehicular through and turning traffic speeds by narrowing travel lanes and creating tighter turns.

FLATBUSH AVENUE AND FULTON STREET

Based on the review of the crash history at the intersection of Flatbush Avenue and Fulton Street, no prevailing trends with regard to geometric deficiencies were identified as the primary causes of recorded crashes. With respect to geometric deficiencies that could potentially cause safety hazards, the intersection of Flatbush Avenue and Fulton Street is signalized and provides four high visibility crosswalks. In addition, countdown timers are present on the north, east, and south crosswalks; a normal pedestrian signal is present on the west crosswalk. In terms of Project-generated activity, this intersection would experience incremental peak-hour volume increases of approximately 92 or fewer vehicle trips and 161 or fewer pedestrian trips at any crosswalk during each of the three analysis peak hours. Additional safety measures, such as installing a countdown timer on the west crosswalk can be implemented to further improve pedestrian and bicycle safety at this intersection.

FLATBUSH AVENUE AND LAFAYETTE AVENUE

Based on the review of the crash history at the intersection of Flatbush Avenue and Lafayette Avenue, no prevailing trends with regard to geometric deficiencies were identified as the primary causes of recorded crashes. With respect to geometric deficiencies that could potentially cause safety hazards, the intersection of Flatbush Avenue and Lafayette Avenue is signalized and provides four high visibility crosswalks. In addition, countdown timers are present on the north, east, and south crosswalks; a normal pedestrian signal is present on the west crosswalk. A bicycle lane is present along the south side of Lafayette Avenue west of the intersection; this transitions into a shared bike route east of the intersection. In terms of project-generated activity, this intersection would experience incremental peak hour volume increases of approximately 73 or fewer vehicle trips and 273 or fewer pedestrian trips at any crosswalk during each of the three analysis peak hours. Additional safety measures, such as installing a countdown timer on the west crosswalk can be implemented to further improve pedestrian and bicycle safety at this intersection. A DOT-proposed pedestrian safety street improvement project would also improve vehicular and pedestrian safety at this location by constructing curb extensions on the northeast and southeast corners, narrowing the eastbound approach with neckdowns, and a raised median with a pedestrian refuge area on the south leg of the intersection, which reduce pedestrian crossing distances and should reduce vehicular through and turning traffic speeds by narrowing travel lanes and creating tighter turns.

SCHOOL SAFETY ASSESSMENT

The *CEQR Technical Manual* also recommends that a school safety assessment be conducted for any projects with a new or expanded school. Because it is not known whether students to the proposed schools would mainly come from the immediate neighborhood or from all around New York City, all of the intersections included in the pedestrian and vehicular safety assessment were included in the school safety assessment. This assessment includes intersections with a high number of pedestrian crashes, uncontrolled pedestrian crossings, narrow sidewalks, and non ADA-compliant pedestrian ramps. According to the latest 3 years of available crash data, there were three intersections with a high number of pedestrian crashes in the study area: Flatbush Avenue at Fulton Street, Flatbush

Avenue and Lafayette Avenue, and Flatbush Avenue and Atlantic Avenue. At these locations, students walking to the proposed schools would be within marked, signalized crosswalks. Safety improvements at these locations have been recommended in the pedestrian and vehicular safety assessment. In addition to these recommendations, advanced school crosswalk warning signage should be placed on the blocks approaching the school on Flatbush Avenue, 3rd Avenue, Schermerhorn Street, and State Street, and either a reduced school speed zone or speed humps should be considered on State Street where the entrance to the proposed primary school would be.

The next step is to assess students at uncontrolled crossings. Under the future with the proposed actions, the only unsignalized intersection in the study area would be Rockwell Place at Lafayette Avenue. The north leg crosswalk is controlled by a stop sign, and north-south crossings are facilitated at the east leg crosswalk immediately adjacent to this intersection at Flatbush Avenue and Lafayette Avenue. Therefore, it is not anticipated that there would be any uncontrolled crossings at the study area intersections.

Narrow sidewalks are those with a width of fewer than 5 feet at any location. Narrow sidewalks were observed at six locations in the study area. These conditions are located on these blocks:

1. Ashland Place between Fulton Street and DeKalb Avenue (east and west sidewalks)
2. Rockwell Place between Lafayette Avenue and Fulton Street (west sidewalk)
3. Nevins Street between State Street and Schermerhorn Street (west sidewalk)
4. State Street between 3rd Avenue and Nevins Street (north and south sidewalks)
5. Nevins Street between Atlantic Avenue and State Street (east sidewalk)
6. State Street between Nevins Street and Bond Street (south sidewalk)

Because the narrow sidewalk conditions are primarily on residential streets with low observed pedestrian foot traffic and are not narrow for prolonged lengths, the narrow sidewalks do not represent a significant safety issue to the school-related pedestrian trips, and it is not recommended that they be mitigated.

Non ADA-compliant ramps were found at the following study area locations:

1. Flatbush Avenue and DeKalb Avenue—northwest corner
2. Flatbush Avenue and Lafayette Avenue—northeast corner
3. Flatbush Avenue and 4th Avenue—southwest corner
4. Flatbush Avenue and Atlantic Avenue—northwest corner
5. State Street and Nevins Street—northwest and northeast corners
6. Schermerhorn Street and Nevins Street—northwest corner
7. Lafayette Avenue and Ashland Place—northwest and southwest corners
8. Fort Greene Place and Hanson Place—northwest corner

It is recommended that DOT consider upgrading these pedestrian ramps to be ADA compliant to accommodate the school-related pedestrian trips and improve safety for users of all abilities.

G. PARKING ASSESSMENT

2017 EXISTING CONDITIONS

An inventory of on- and off-street parking within a ¼-mile of the project site was conducted in September 2016 and June 2017. The on-street survey involved recording curbside regulations and performing general observations of daytime utilization. The off-street survey provided an inventory of the area's public parking facilities and their legal capacities and daytime utilization.

ON-STREET PARKING

Curbside parking regulations within a ¼-mile of the project site are illustrated in **Figure 11-28** and summarized in **Table 11-43**. The curbside regulations in the area generally include limited 1-hour metered parking, no standing or no parking anytime except authorized vehicles, and alternate side parking to accommodate street-cleaning. Based on field observations, on-street parking in the area is generally at or near full utilization during weekday daytime hours.

Table 11-43
On-Street Parking Regulations

No.	Regulation	No.	Regulation
1	NS Anytime	25	NP Midnight–3 AM Tues., Thurs., Sat.
2	NP Anytime	26	2 hr MP Fri. 9 AM–4 PM, Sat. 9 AM–7 PM
3	NP 9:30–11 AM Tues.	27	NP 7:30–8 AM except Sun.
4	NP 9:30–11 AM Thurs.	28	No Stopping Anytime
5	NP 8 AM–Midnight except Sun.	29	NS Authorized Commuter Vans Only
6	NS 7–10 AM Mon–Fri.	30	Truck Loading Only 10 AM–6 PM except Sun.
7	NP 9:30–11 AM Mon.	31	Authorized Vehicles Only, Fire Department
8	NP 11 AM–12:30 PM Tues.	31	NS Hotel Loading Zone
9	NP 11 AM–12:30 PM Wed.	32	NS 7–10 AM, 4–7 PM Mon–Fri.
10	NP 9–10:30 AM Fri.	33	1 hr MP 10 AM–4 PM Mon–Fri., 9 AM–7 PM Sat.
11	NP 7–7:30 AM except Sun.	34	NS 7 AM–7 PM Mon–Fri.
12	1 hr MP 7:30 AM–7:30 PM except Sun.	35	Authorized Vehicles Only MTA Police
13	1 hr MP 8 AM–7 PM except Sun.	36	NSA except Authorized Vehicles NYS Vehicles
14	NP 7:30–8 AM Thurs.	37	NS 7 AM–7 PM Mon–Fri. except Authorized Vehicles, NYS DMV
15	NP 7:30–8 AM Tues.	38	NP 11:30 AM–1 PM Mon.
16	NS 4–7 PM Mon–Fri.	39	NP 11:30 AM–1 PM Tues.
17	NP School Days 7 AM–4 PM	40	Ambulance only 5 AM–11 PM except Sun.
18	NP 9:30–11 AM Fri.	41	Truck Loading Only 8 AM–6 PM Mon–Fri.
19	NP Midnight-3 AM Mon., Wed., Fri.	42	Truck Loading Only 6 AM–6 PM Mon–Fri.
20	1 hr MP 9 AM–7 PM	43	NP 8 AM–6 PM Mon–Fri.
21	2 hr MP 9 AM–7 PM	44	Truck Loading Only 7 AM–4 PM All Days
22	Truck Loading Only 8 AM–Noon Mon-Fri.	45	Taxi Stand
23	2 hr MP Fri. Noon–7 PM, Sat 8 AM–7 PM	46	NP 8 AM–Midnight including Sunday
24	NS 4 PM–8 PM Mon–Fri.	B	Bus Stop

Notes:
NP = No Parking; NS = No Standing; Sun = Sunday; Mon = Monday; Tue = Tuesday; Wed = Wednesday; Thu = Thursday; Fri = Friday; Sat = Saturday; MP=Metered Parking
Sources: Surveys conducted by AKRF, Inc.; November 2017

OFF-STREET PARKING

Off-street publicly accessible parking lots and garages (see **Figure 11-29**) within ¼-mile of the project site were surveyed in April 2016. Each facility's operating license and legal capacity were noted. Based on responses given by parking attendants and visual inspections, where possible, estimates were made on the parking occupancy or utilization at each facility for the weekday morning, midday, evening, and overnight time periods. A summary of the recorded information and the area's overall off-street public parking supply and utilization is presented in **Table 11-44**.

12/5/2017

Project Site

1. Parking Regulation

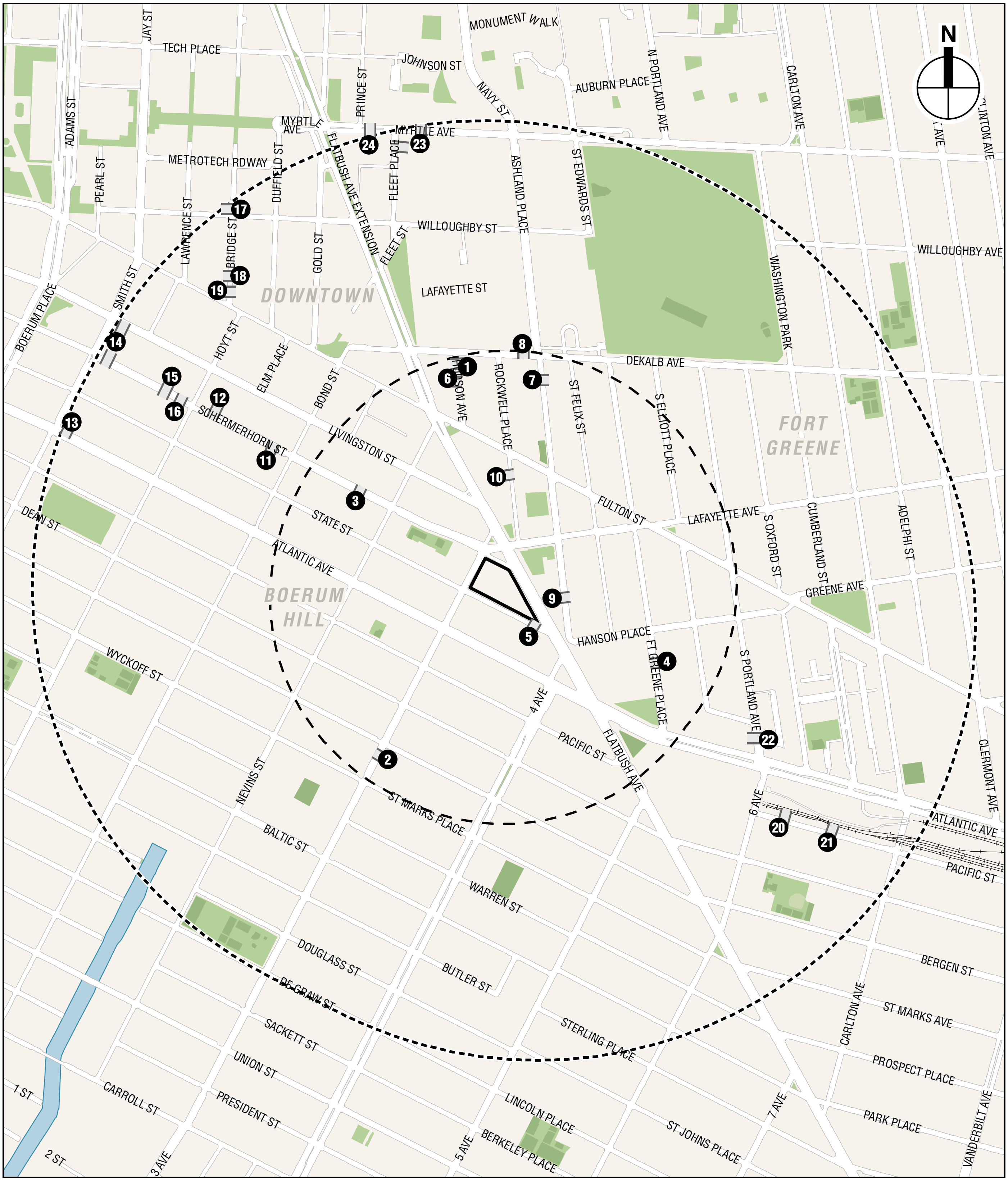
Study Area (Quarter-mile boundary)

0 500 FEET

ECF 80 FLATBUSH AVENUE

On-Street Parking Regulations

Figure 11-28



Project Site

Study Area (Half-mile boundary)

Study Area (Quarter-mile boundary)

❶ Off-Street Parking Facility

ECF 80 FLATBUSH AVENUE

Off-Street Parking Facilities

Figure 11-29

Table 11-44
Existing Off-Street Parking—¼-Mile: Weekday Utilization

Map #	Name/Address	License Number	Licensed Capacity	Utilization Rate AM	Utilization Rate MD	Utilization Rate PM	Utilization Rate ON	Utilized Spaces AM	Utilized Spaces MD	Utilized Spaces PM	Utilized Spaces ON	Available Spaces AM	Available Spaces MD	Available Spaces PM	Available Spaces ON
1	Central Parking System of NY / 74 DeKalb Avenue	1346796	126	75%	90%	60%	50%	101	113	101	101	25	13	25	25
2	312 Bergen St. Parking / 312 Bergen Street	2036981	42	65%	95%	45%	20%	38	40	34	36	4	2	8	6
3	LAZ Parking of NY/NU Inc / 300 Schermerhorn Street	2035633	30	90%	90%	70%	30%	27	27	23	23	3	3	7	7
4	Ochre Car Park LLC / 625 Atlantic Avenue	1242325	650	50%	80%	70%	40%	455	553	553	429	195	97	97	221
5	Impark / 556 State Street	1328826	25	75%	85%	50%	25%	23	23	23	23	2	2	2	2
6	MPG 470 Flatbush Avenue / 395 Flatbush Avenue Extension	1187231	140	75%	85%	50%	25%	119	126	133	126	21	14	7	14
7	Discount Parking / 180 Ashland Place	1009614	316	90%	95%	60%	25%	253	284	284	253	63	32	32	63
8	LAZ Parking of NY Inc. / 97-103 DeKalb Avenue	1435944	155	60%	70%	50%	50%	124	140	140	124	31	15	15	31
9	Park Kwik LLC / 286 Ashland Place	2050330	175	80%	90%	90%	80%	140	158	158	140	35	17	17	35
10	Rockwell Car Park LLC / 66 Rockwell Place	2022970-DCA	92	40%	70%	75%	50%	37	64	69	46	55	28	23	46
			1,751	75%	87%	87%	74%	1,317	1,528	1,518	1,301	434	223	233	450

Notes: MD = Midday; ON = Overnight
Source: Survey conducted by AKRF Inc., September 2016, June 2017

Within the ¼-mile parking study area, 10 public parking facilities were inventoried. The combined capacity of these facilities totals 1,751 parking spaces. Overall, they were 75-, 87-, 87-, and 74-percent utilized, with 434, 223, 233, and 450 parking spaces available during the weekday morning, midday, evening, and overnight time periods, respectively.

FUTURE WITHOUT THE PROPOSED ACTIONS

Overall off-street public parking utilization is expected to experience the same growth as projected for traffic. No Build projects are expected to include a total of up to 2,192 off-street accessory parking spaces. As presented in **Table 11-45**, accounting for the displacement of the public parking spaces, the addition of the off-street accessory parking spaces, and the parking demand generated from background growth and discrete projects that would advance absent the proposed project, the No Action condition public parking utilization is expected to increase to 100-, 115-, 108-, and 96-percent utilized during the weekday AM, midday, and PM time periods, respectively. Per *CEQR Technical Manual* parking analysis guidance, 98 percent parking utilization is considered to be "at capacity." Therefore, the parking utilization within the ¼-mile parking study area during the weekday AM, midday, and PM time periods would be considered parking shortfalls.

Table 11-45
2017 Existing and 2025 No Action Parking Supply and Utilization

	Weekday AM	Weekday Midday	Weekday PM	Weekday Overnight
2017 Existing Public Parking Supply	1,751	1,751	1,751	1,751
2017 Existing Public Parking Demand	1,317	1,528	1,518	1,301
2017 Existing Public Parking Utilization	75%	87%	87%	74%
2025 No Action Background Incremental Parking Demand	22	25	25	21
Discrete No Build Projects Parking Demand	2,623	2,990	2,742	2,491
Discrete No Build Projects Accessory Parking Supply	115	115	115	115
Discrete No Build Projects Parking Demand Accommodated by Public Parking	2,516	2,883	2,633	2,383
2025 No Action Public Parking Supply Total	3,943	3,943	3,943	3,943
2025 No Action Public Parking Demand Total	3,944	4,517	4,256	3,795
2025 No Action Public Parking Utilization	100%	115%	108%	96%
2025 No Action Available Spaces (Shortfall)	(1)	(574)	(313)	148

Note:
Sample Calculation,
2025 No Action Parking Demand Total = 2017 Existing Public Parking Demand + 2025 No Action Background Incremental Parking Demand + Discrete No Build Projects Parking Demand Accommodated by Public Parking.
2025 No Action Weekday AM Public Parking Demand Total = 2,125 + 32 + 218 = 2,375.

At least one additional parking facility will be available by 2025. A 120-space parking garage at 333 Schermerhorn Street (Steiner/The Hub) is expected to be opening in 2018, which will add to the parking supply within ¼-mile of the proposed project. However, since the utilization of that facility is not known, it has not been added to the No Action parking supply.

FUTURE WITH THE PROPOSED ACTIONS

The weekday parking demand generated by the proposed project is presented in **Table 11-46**.

Table 11-46
Proposed Project Parking Demand—Weekday

Hour	Residential	Office	Local Retail	Primary/ High School Staff	Primary / High School Students	Community Facility	Total
12 AM–AM	295	0	0	0	0	0	295
1 AM–2 AM	295	0	0	0	0	0	295
2 AM–3 AM	295	0	0	0	0	0	295
3 AM–4 AM	295	0	0	0	0	0	295
4 AM–5 AM	295	0	0	0	0	0	295
5 AM–6 AM	295	0	0	0	0	0	295
6 AM–7 AM	295	0	0	0	0	0	295
7 AM–8 AM	281	3	3	2	0	2	291
8 AM–9 AM	252	31	3	17	0	3	306
9 AM–10 AM	233	52	4	19	0	2	310
10 AM–11 AM	221	50	5	19	0	1	296
11 AM–12 PM	217	50	5	19	0	2	293
12 PM–1 PM	217	48	5	19	0	3	292
1 PM–2 PM	217	49	5	19	0	5	295
2 PM–3 PM	217	49	5	19	0	5	295
3 PM–4 PM	218	47	5	19	0	6	295
4 PM–5 PM	225	41	5	19	0	5	295
5 PM–6 PM	240	9	5	4	0	3	261
6 PM–7 PM	258	3	5	1	0	2	269
7 PM–8 PM	274	1	5	0	0	1	281
8 PM–9 PM	281	0	3	0	0	0	284
9 PM–10 PM	286	0	0	0	0	0	286
10 PM–11 PM	291	0	0	0	0	0	291
11 PM–12 AM	295	0	0	0	0	0	295

As presented in **Table 11-47**, accounting for the No Action parking supply and demand utilization, and the parking demand generated by the proposed project, the With Action public parking utilization is expected to increase to 111-, 126-, 118-, and 107-percent utilized during the weekday morning, midday, evening, and overnight time periods, respectively. Per *CEQR Technical Manual* parking analysis guidance, 98 percent parking utilization is considered to be "at capacity." Therefore, the parking utilization within the ¼-mile parking study area during the weekday AM, midday, PM, and overnight time periods would be considered parking shortfalls. This represents a parking shortfall of 437, 994, 705, and 277 spaces during the weekday AM, midday, PM, and overnight peak periods, respectively.

Table 11-47
2025 No Action and With Action Parking Supply and Utilization

	Weekday AM	Weekday Midday	Weekday PM	Weekday Overnight
2025 No Action Public Parking Supply Total	3,943	3,943	3,943	3,943
2025 No Action Public Parking Demand Total	3,944	4,517	4,256	3,795
2025 No Action Public Parking Utilization	100%	115%	108%	96%
Proposed Project Change in Parking Supply	-130	-130	-130	-130
Proposed Project Parking Demand	306	292	261	295
2025 With Action Public Parking Supply Total	3,813	3,813	3,813	3,813
2025 With Action Public Parking Demand Total	4,250	4,809	4,517	4,090
2025 With Action Public Parking Utilization	111%	126%	118%	107%
2025 With Action Available Spaces (Shortfall)	(437)	(996)	(704)	(277)

Note:
Sample Calculation:
2025 With Action Parking Demand Total = 2025 No Action Public Parking Demand Total + Proposed Project Parking Demand Accommodated by Public Parking.
2025 With Action Weekday AM Public Parking Demand Total = 2,375 + 218 = 2,593.

In consideration of this potential parking shortfall, an additional inventory of off-street parking resources was conducted to determine if the overflow demand could be accommodated at a slightly longer walking distance from the project site. As shown in **Table 11-48** and **Figure 11-29**, there are 14 additional parking facilities between ¼-mile and ½-mile of the project site that would yield 939, 714, 681, 1,348 additional available parking spaces during the weekday AM, midday, PM, and overnight peak periods, respectively. It is expected that most or all of the excess demand of 437, 996, 704, and 277 spaces during the weekday AM, midday, PM, and overnight peak periods, respectively, could be accommodated with a slightly longer walking distance beyond the ¼-mile radius.

As concluded above, the With Action parking utilization levels are projected to result in a parking shortfall within ¼-mile of the project site during the weekday AM, midday, PM, and overnight time periods. However, given the proximity of multiple transit options to the proposed project, as well as that most of the excess demand is expected to be accommodated by parking spaces outside of the ¼-mile parking study area radius, the potential parking shortfall would not constitute a significant adverse impact.

Table 11-48
2017 Existing Off-Street Parking Utilization—Between ¼-Mile and ½-Mile of the Project Site

Map #	Name/Address	License Number	Licensed Capacity	Utilization Rate				Utilized Spaces				Available Spaces			
				AM	MD	PM	ON	AM	MD	PM	ON	AM	MD	PM	ON
11	Schermerhorn Parking Management / 200 Schermerhorn Street	1246208	144	60%	75%	75%	40%	86	108	108	58	58	36	36	86
12	Quik Park SCH Garage / 236 Livingston Street	1412999	109	50%	70%	80%	60%	55	76	87	65	54	33	22	44
13	Smith Car Park LLC / 75 Smith Street	1432578	64	80%	90%	90%	50%	51	58	58	32	13	6	6	32
14	Edison NY Parking LLC / 160 Livingston Street	926765	100	55%	75%	85%	45%	55	75	85	45	45	25	15	55
15	WOC Schermerhorn Garage Co / 189 Schermerhorn Street	2041027	200	66%	66%	66%	66%	132	132	132	132	68	68	68	68
16	State Street Parking LLC / 71 Smith Street	1157614	750	50%	60%	60%	20%	375	450	450	150	375	300	300	600
17	Belltel 365 Parking LLC / 101 Willoughby Street	2054343	88	80%	90%	95%	33%	70	79	84	29	18	9	4	59
18	Brooklyn Metro Parking LLC / 100 Willoughby Street	2046303	45	80%	80%	65%	50%	36	36	29	23	9	9	16	22
19	388 Garage LLC / 388 Bridge Street	2028510	142	60%	75%	70%	15%	85	107	99	21	57	35	43	121
20	WOC Pacific Garage Company, LLC / 670 Pacific Street	2042860-DCA	85	50%	70%	90%	Closed	43	60	77	Closed	42	25	8	Closed
21	Pacific Parking, LLC / 700 Pacific Street	1244293	170	50%	60%	50%	1%	85	102	85	2	85	68	85	168
22	Imperial US Parking, LLC / 212 s. Oxford Street	1461246	45	50%	50%	100%	Closed	23	23	45	Closed	22	22	0	Closed
23	Quik Park Ely Garage LLC / 81 Fleet Place	2030482	150	60%	70%	70%	60%	90	105	105	90	60	45	45	60
24	Fort Greene & Gold Garage LLC / 150 Myrtle Avenue	N/A	97	66%	66%	66%	66%	64	64	64	64	33	33	33	33
Between ¼-Mile and ½-Mile Area Total			**2,189**	**57%**	**67%**	**69%**	**32%**	**1,250**	**1,475**	**1,508**	**711**	**939**	**714**	**681**	**1,348**

Notes: MD = Midday; ON = Overnight; N/A = Not Available
Source: Collected by AKRF in November 2017

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Chapter 12: Air Quality

A. INTRODUCTION

This chapter examines the potential for the proposed actions to result in significant adverse air quality impacts. As described in Chapter 1, "Project Description," the co-applicants, the New York City Educational Construction Fund (ECF) and 80 Flatbush Avenue, LLC, are seeking a rezoning and other actions to allow the construction of a mixed-use development, which includes a replacement facility for an existing high school, a new lower school as well as residential, office, retail, and cultural community facility use (the "proposed project"). The proposed project would result in five new or adaptively reused buildings on the project site. Building A would house the replacement high school and the new lower school in a building with anticipated heights ranging from 50 feet to 130 feet located in the center of the project site, with frontage along State and Schermerhorn Streets and Flatbush Avenue. Building B would be a wedge-shaped mixed-use tower located at State Street and Flatbush Avenue on the easternmost portion of the project site. The building would rise to an anticipated height of 560 feet. Building C would be a mixed-use tower located on the western portion of the project site with an anticipated height of 986 feet. Based on the currently proposed design, two of the existing school buildings would be retained and adaptively reused. School Building 2/Building D would be the former school building located at the corner of Schermerhorn Street and 3rd Avenue, which is expected to be adaptively reused as cultural facility space. School Building 1/Building E would be the former original P.S. 15 building at 3rd Avenue and State Street, which is expected to be adaptively reused with retail space.

Air quality impacts can be either direct or indirect. Direct impacts result from emissions generated by stationary sources at a development site, such as emissions from on-site fuel combustion for heat and hot water systems. Indirect impacts are caused by off-site emissions associated with a project, such as emissions from nearby existing stationary sources (i.e., impacts on the development site) or by emissions from on-road vehicle trips ("mobile sources") generated by a proposed project or other changes to future traffic conditions due to a project.

The maximum hourly incremental traffic volumes generated by the proposed project are not expected to exceed the 2014 *City Environmental Quality Review* (*CEQR*) *Technical Manual* carbon monoxide (CO) screening threshold of 160 peak-hour vehicle trips at any intersection in the study area, but would exceed the particulate matter (PM) emission screening threshold discussed in Chapter 17, Sections 210 and 311 of the *CEQR Technical Manual*. Therefore, a quantified assessment of emissions from project-generated traffic was performed for PM.

Boiler plants would provide space heating and domestic hot water to the proposed buildings. Buildings B and C (including the existing adjacent school spaces that would be adaptively reused) and Building A would each use separate heating and hot water systems with individual exhausts. Therefore, a stationary source analysis was conducted to evaluate potential future pollutant concentrations from the proposed project on both the surrounding neighborhood (project-on-existing) and the proposed project itself (project-on-project).

The proposed replacement high school would include science laboratories. Therefore, this chapter examines the expected use of potentially hazardous materials in the proposed laboratories, and the procedures and systems that would be employed in the proposed laboratories to ensure the safety of staff and the surrounding community in the event of a chemical spill in one of the proposed laboratories.

PRINCIPAL CONCLUSIONS

The analyses conclude that the proposed project would not result in any significant adverse air quality impacts on sensitive uses in the surrounding community, and the proposed actions would not be adversely affected by existing sources of air emissions.

The mobile source analysis results show that the annual and daily (24-hour) $PM_{2.5}$ increments are predicted to be below the *de minimis* criteria. Therefore, there would be no potential for significant adverse impacts on air quality from vehicle trips generated by the proposed project. An analysis of the laboratory exhaust system for the proposed public high school determined there would be no significant impacts in the proposed buildings or on the surrounding community in the event of a chemical spill in a laboratory.

Analysis of the emissions and dispersion of nitrogen dioxide (NO_2) and PM less than 10 microns in diameter (PM_{10}) from the proposed project's heating and hot water systems indicate that these emissions would not result in a violation of National Ambient Air Quality Standards (NAAQS). In addition, the maximum predicted $PM_{2.5}$ incremental concentrations from the proposed project would be less than the applicable 24-hour and annual average criteria. To ensure that there are no significant adverse impacts resulting from the proposed project due to heating and hot water system emissions, fuel and vent stack location restrictions associated with Buildings B and C would be required as part of the proposed project through the development agreement between ECF and 80 Flatbush Avenue LLC.

B. POLLUTANTS FOR ANALYSIS

Air quality is affected by air pollutants produced by both motor vehicles and stationary sources. Emissions from motor vehicles are referred to as mobile source emissions, while emissions from fixed facilities are referred to as stationary source emissions. Ambient concentrations of CO are predominantly influenced by mobile source emissions. PM, volatile organic compounds (VOCs), and nitrogen oxides (NO and NO_2, collectively referred to as NO_x) are emitted from both mobile and stationary sources. Fine PM is also formed when emissions of NO_x, sulfur oxides (SO_x), ammonia, organic compounds, and other gases react or condense in the atmosphere. Emissions of SO_2 are associated mainly with stationary sources, and some sources utilizing non-road diesel such as large international marine engines. On-road diesel vehicles currently contribute very little to SO_2 emissions since the sulfur content of on-road diesel fuel, which is federally regulated, is extremely low. Ozone is formed in the atmosphere by complex photochemical processes that include NO_x and VOCs. Ambient concentrations of CO, PM, NO_2, SO_2, ozone and lead are regulated by the U.S. Environmental Protection Agency (EPA) under the Clean Air Act (CAA), and are referred to as "criteria pollutants;" emissions of VOCs, NO_x, and other precursors to criteria pollutants are also regulated by EPA.

CARBON MONOXIDE

CO, a colorless and odorless gas, is produced in the urban environment primarily by the incomplete combustion of gasoline and other fossil fuels. In urban areas, approximately 80 to 90 percent of CO emissions are from motor vehicles. CO concentrations can diminish rapidly over relatively short distances; elevated concentrations are usually limited to locations near crowded intersections, heavily traveled and congested roadways, parking lots, and garages. Consequently, CO concentrations must be predicted on a local, or microscale, basis.

The proposed project would not result in an increase in vehicle trips higher than the *CEQR Technical Manual* screening threshold of 160 trips at any intersection. Therefore, a mobile source analysis to evaluate future CO concentrations was not warranted.

NITROGEN OXIDES, VOCS, AND OZONE

NO_x are of principal concern because of their role, together with VOCs, as precursors in the formation of ozone. Ozone is formed through a series of reactions that take place in the atmosphere in the presence of sunlight. Because the reactions are slow, and occur as the pollutants are advected downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. Therefore, the effects of NOx and VOC emissions from all sources are generally examined on a regional basis. The contribution of any action or project to regional emissions of these pollutants would include any added stationary or mobile source emissions.

The proposed project would not have a significant effect on the overall volume of vehicular travel in the metropolitan area; therefore, no measurable impact on regional NO_x emissions or on ozone levels is predicted. An analysis of project-related emissions of these pollutants from mobile sources was therefore not warranted.

In addition to being a precursor to the formation of ozone, NO_2 (one component of NO_x) is a regulated pollutant. Since NO_2 is mostly formed from the transformation of NO in the atmosphere, it has primarily been of concern farther downwind from large stationary point sources, and is not a local concern from mobile sources. (NO_x emissions from fuel combustion are typically greater than 90 percent NO with the remaining fraction primarily NO_2 at the source.[1]) However, with the promulgation of the 2010 1-hour average standard for NO_2, local sources such as mobile sources have become of greater concern for this pollutant. The proposed project would include natural gas-fired heating and hot water systems; therefore, emissions of NO_2 from the proposed project's stationary sources were analyzed.

LEAD

Current airborne lead emissions are principally associated with industrial sources. Lead in gasoline has been banned under the CAA and would not be emitted from any other component of proposed project. Therefore, an analysis of this pollutant was not warranted.

RESPIRABLE PARTICULATE MATTER—PM_{10} AND $PM_{2.5}$

PM is a broad class of air pollutants that includes discrete particles of a wide range of sizes and chemical compositions, as either liquid droplets (aerosols) or solids suspended in the atmosphere. The constituents of PM are both numerous and varied, and they are emitted from a wide variety of sources (both natural and anthropogenic). Natural sources include the condensed and reacted forms of naturally occurring VOCs; salt particles resulting from the evaporation of sea spray; wind-borne pollen, fungi, molds, algae, yeasts, rusts, bacteria, and material from live and decaying plant and animal life; particles eroded from beaches, soil, and rock; and particles emitted from volcanic and geothermal eruptions, and forest fires. Naturally occurring PM is generally greater

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[1] EPA Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: *Stationary Point and Area Sources*, Section 1.3, Table 1.3-1.

than 2.5 micrometers in diameter. Major anthropogenic sources include the combustion of fossil fuels (e.g., vehicular exhaust, power generation, boilers, engines, and home heating), chemical and manufacturing processes, all types of construction, agricultural activities, as well as wood-burning stoves and fireplaces. PM also acts as a substrate for the adsorption (accumulation of gases, liquids, or solutes on the surface of a solid or liquid) of other pollutants, often toxic, and some likely carcinogenic compounds.

As described below, PM is regulated in two size categories: particles with an aerodynamic diameter of less than or equal to 2.5 micrometers ($PM_{2.5}$) and particles with an aerodynamic diameter of less than or equal to 10 micrometers (PM_{10}, which includes $PM_{2.5}$). $PM_{2.5}$ has the ability to reach the lower regions of the respiratory tract, delivering with it other compounds that adsorb to the surfaces of the particles, and is also extremely persistent in the atmosphere. $PM_{2.5}$ is directly emitted from combustion material that has volatilized and then condensed to form primary PM (often soon after the release from a source exhaust) or from precursor gases reacting in the atmosphere to form secondary PM.

All gasoline-powered and diesel-powered vehicles, especially heavy-duty trucks and buses operating on diesel fuel, are a significant source of respirable PM, most of which is $PM_{2.5}$; PM concentrations may, consequently, be locally elevated near roadways.

Since the proposed project would exceed the PM emission screening threshold discussed in Chapter 17, Sections 210 and 311 of the *CEQR Technical Manual*, a quantified assessment of emissions from Project-generated traffic was performed for PM. The proposed project would include natural gas-fired heating and hot water systems; therefore, emissions of PM from the proposed project's stationary sources were analyzed.

SULFUR DIOXIDE

SO_2 emissions are primarily associated with the combustion of sulfur-containing fuels (oil and coal). SO_2 is also of concern as a precursor to $PM_{2.5}$ and is regulated as a $PM_{2.5}$ precursor under the New Source Review permitting program for large sources. Due to the federal restrictions on the sulfur content in diesel fuel for on-road vehicles, no significant quantities are emitted from vehicular sources. Vehicular sources of SO_2 are not significant, and, therefore, an analysis of SO_2 from mobile sources is not warranted.

Natural gas would be used in the proposed project's heating and hot water systems. The sulfur content of natural gas is negligible; therefore, no SO_2 analysis was required.

C. AIR QUALITY STANDARDS, REGULATIONS, AND BENCHMARKS

NATIONAL AND STATE AIR QUALITY STANDARDS

As required by the CAA, primary and secondary NAAQS have been established for six major air pollutants: CO, NO_2, ozone, respirable PM (both $PM_{2.5}$ and PM_{10}), SO_2, and lead. The primary standards represent levels that are requisite to protect the public health, allowing an adequate margin of safety. The secondary standards are intended to protect the nation's welfare, and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the environment. The primary standards are generally either the same as the secondary standards or more restrictive. The NAAQS are presented in **Table 12-1**. The NAAQS for CO, annual NO_2, and 3-hour SO_2 have also been adopted as the ambient air quality standards for New York State, but are defined on a running 12-month basis rather than for calendar years only. New York State also has standards for total suspended PM, settleable particles, non-methane hydrocarbons, 24-hour and annual SO_2 and ozone that correspond to federal standards that have since been revoked or replaced, and for beryllium, fluoride, and hydrogen sulfide.

Table 12-1
National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary		Secondary	
	ppm	µg/m³	ppm	µg/m³
CO				
8-Hour Average	9[1]	10,000	None	
1-Hour Average	35[1]	40,000		
Lead				
Rolling 3-Month Average[2]	N/A	0.15	N/A	0.15
NO_2				
1-Hour Average[2]	0.100	188	None	
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average[3]	0.070	140	0.070	140
PM_{10}				
24-Hour Average[1]	N/A	150	N/A	150
$PM_{2.5}$				
Annual Mean[4]	N/A	12	N/A	15
24-Hour Average[5]	N/A	35	N/A	35
Sulfur Dioxide (SO_2)[8]				
1-Hour Average[6]	0.075	196	N/A	N/A
Maximum 3-Hour Average[1]	N/A	N/A	0.50	1,300

Notes:
ppm—parts per million (unit of measure for gases only)
µg/m³—micrograms per cubic meter (unit of measure for gases and particles, including lead)
N/A—not applicable
All annual periods refer to calendar year.
Standards are defined in ppm. Approximately equivalent concentrations in µg/m³ are presented.
[1] Not to be exceeded more than once a year.
[2] 3-year average of the annual 98th percentile daily maximum 1-hour average concentration. Effective April 12, 2010.
[3] 3-year average of the annual fourth-highest daily maximum 8-hour average concentration.
[4] 3-year average of annual mean. EPA has lowered the primary standard from 15 µg/m³, effective March 2013.
[5] Not to be exceeded by the annual 98th percentile when averaged over 3 years.
[6] 3-year average of the annual 99th percentile daily maximum 1-hour average concentration.
Source: 40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards.

EPA lowered the primary annual average $PM_{2.5}$ standard from 15 µg/m³ to 12 µg/m³, effective March 2013.

The current 8-hour ozone standard of 0.075 ppm is effective as of May 2008, and the previous 1997 ozone standard was fully revoked effective April 1, 2015. Effective December 2015, EPA further reduced the 2008 ozone NAAQS, lowering the primary and secondary NAAQS from the current 0.075 ppm to 0.070 ppm. It is expected that EPA will issue final area designations; those designations likely would be based on 2014–2016 air quality data.

EPA lowered the primary and secondary standards for lead to 0.15 $\mu g/m^3$, effective January 12, 2009. EPA revised the averaging time to a rolling 3-month average and the form of the standard to not-to-exceed across a 3-year span.

EPA established a new 1-hour average NO_2 standard of 0.100 ppm, effective April 10, 2010, in addition to the current annual standard. The statistical form is the 3-year average of the 98th percentile of daily maximum 1-hour average concentration in a year.

EPA also established a 1-hour average SO_2 standard of 0.075 ppm, replacing the 24-hour and annual primary standards, effective August 23, 2010. The statistical form is the 3-year average of the 99th percentile of the annual distribution of the daily maximum 1-hour average concentration.

NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLANS

The CAA, as amended in 1990, defines nonattainment areas (NAA) as geographic regions that have been designated as not meeting one or more of the NAAQS. When an area is designated as NAA by EPA, the state is required to develop and implement a State Implementation Plan (SIP), which delineates how a state plans to achieve air quality that meets the NAAQS under the deadlines established by the CAA, followed by a plan for maintaining attainment status once the area is in attainment.

In 2002, EPA re-designated New York City as in attainment for CO. Under the resulting maintenance plans, New York City is committed to implementing site-specific control measures throughout the city to reduce CO levels, should unanticipated localized growth result in elevated CO levels during the maintenance period. The second CO maintenance plan for the region was approved by EPA on May 30, 2014.

Manhattan, which had been designated as a moderate NAA for PM_{10} on July 29, 2015 EPA clarified that the designation only applied to the revoked annual standard.

The five New York City counties and Nassau, Suffolk, Rockland, Westchester, and Orange Counties, which had been designated as a $PM_{2.5}$ NAA (New York Portion of the New York–Northern New Jersey–Long Island, NY–NJ–CT NAA), were re-designated as in attainment for the standard on April 18, 2014, and is now under a maintenance plan. As stated above, EPA lowered the annual average primary standard to 12 $\mu g/m^3$, effective March 2013. EPA designated the area as in attainment for the new 12 $\mu g/m^3$ NAAQS, effective April 15, 2015.

Effective June 15, 2004, EPA designated Nassau, Rockland, Suffolk, Westchester, and the five New York City counties as in moderate nonattainment for the 1997 8-hour average ozone standard. In March 2008 EPA strengthened the 8–hour ozone standards. EPA designated these same areas as a marginal NAA for the 2008 ozone NAAQS, effective July 20, 2012. On April 11, 2016, as requested by New York State, EPA reclassified the area as a moderate NAA. New York State began submitting SIP documents in December 2014. On July 19, 2017 DEC announced that the New York Metropolitan Area (NYMA) is not projected to meet the July 20, 2018 attainment deadline and NYSDEC is therefore requesting that EPA reclassify the NYMA to "serious" nonattainment, which would impose a new attainment deadline of July 20, 2021 (based on 2018–2020 monitored data).

New York City is currently in attainment of the annual average NO_2 standard. EPA has designated the entire state of New York as “unclassifiable/attainment” for the new 1-hour NO_2 standard effective February 29, 2012. Since additional monitoring is required for the 1-hour standard, areas will be reclassified once 3 years of monitoring data are available.

EPA has established a new 1-hour SO_2 standard, replacing the former 24-hour and annual standards, effective August 23, 2010. Based on the available monitoring data, all New York State counties currently meet the 1-hour standard. In January 2017, New York State recommended that EPA designate most of State of New York, including New York City, as in attainment for this standard; the remaining areas will be designated upon the completion of required monitoring by December 31, 2020.

DETERMINING THE SIGNIFICANCE OF AIR QUALITY IMPACTS

The State Environmental Quality Review Act (SEQRA) regulations and the *CEQR Technical Manual* state that the significance of a predicted consequence of a project (i.e., whether it is material, substantial, large, or important) should be assessed in connection with its setting (e.g., urban or rural), its probability of occurrence, its duration, its irreversibility, its geographic scope, its magnitude, and the number of people affected.[2] In terms of the magnitude of air quality impacts, any action predicted to increase the concentration of a criteria air pollutant to a level that would exceed the concentrations defined by the NAAQS (see **Table 12-1**) would be deemed to have a potential significant adverse impact.

In addition, in order to maintain concentrations lower than the NAAQS in attainment areas, or to ensure that concentrations will not be significantly increased in NAAs, *de minimis* threshold levels have been defined for certain pollutants; any action predicted to increase the concentrations of these pollutants above the thresholds would be deemed to have a potential significant adverse impact, even in cases where violations of the NAAQS are not predicted.

CO DE MINIMIS CRITERIA

New York City has developed *de minimis* criteria to assess the significance of the increase in CO concentrations that would result from the impact of proposed projects or actions on mobile sources, as set forth in the *CEQR Technical Manual*. These criteria set the minimum change in CO concentration that defines a significant environmental impact. Significant increases of CO concentrations in New York City are defined as (1) an increase of 0.5 ppm or more in the maximum 8-hour average CO concentration at a location where the predicted No Action 8-hour concentration is equal to or between 8 and 9 ppm; or (2) an increase of more than half the difference between baseline (i.e., No Action) concentrations and the 8-hour standard, when No Action concentrations are below 8.0 ppm.

$PM_{2.5}$ DE MINIMIS CRITERIA

For projects subject to CEQR, the *de minimis* criteria currently employed for determination of potential significant adverse $PM_{2.5}$ impacts are as follows:

- Predicted increase of more than half the difference between the background concentration and the 24-hour standard; or
- Annual average $PM_{2.5}$ concentration increments that are predicted to be greater than 0.1 $\mu g/m^3$ at ground level on a neighborhood scale (i.e., the annual increase in concentration representing the average over an area of approximately 1 square kilometer, centered on the location where

[2] New York City. *CEQR Technical Manual*. Chapter 1, section 222. March 2014; and New York State Environmental Quality Review Regulations, 6 NYCRR § 617.7

the maximum ground-level impact is predicted for stationary sources; or at a distance from a roadway corridor similar to the minimum distance defined for locating neighborhood scale monitoring stations); or

- Annual average $PM_{2.5}$ concentration increments that are predicted to be greater than 0.3 $\mu g/m^3$ at a discrete or ground- level receptor location.

Actions under CEQR predicted to increase $PM_{2.5}$ concentrations by more than the CEQR *de minimis* criteria above will be considered to have a potential significant adverse impact.

The above *de minimis* criteria have been used to evaluate the significance of predicted impacts on $PM_{2.5}$ concentrations and determine the need to minimize PM emissions resulting from the proposed actions.

D. METHODOLOGY FOR PREDICTING POLLUTANT CONCENTRATIONS

MOBILE SOURCES

The prediction of vehicle-generated emissions and their dispersion in an urban environment incorporates meteorological phenomena, traffic conditions, and physical configuration. Air pollutant dispersion models mathematically simulate how traffic, meteorology, and physical configuration combine to affect pollutant concentrations. The mathematical expressions and formulations contained in the various models attempt to describe an extremely complex physical phenomenon as closely as possible. However, because all models contain simplifications and approximations of actual conditions and interactions, and since it is necessary to predict the reasonable worst-case condition, most dispersion analyses predict conservatively high concentrations of pollutants, particularly under adverse meteorological conditions.

The mobile source analysis for the proposed project uses an EPA approved model that has been widely used for evaluating air quality impacts of projects in New York City, other parts of New York State, and throughout the country. The modeling approach includes a series of conservative assumptions relating to meteorology, traffic, and background concentration levels resulting in a conservatively high estimate of expected pollutant concentrations that could ensue from the proposed project.

VEHICLE EMISSIONS

Engine Emissions

Vehicular PM engine emission factors were computed using the EPA mobile source emissions model, MOVES2014a.[3] This emissions model is capable of calculating engine emission factors for various vehicle types, based on the fuel type (e.g., gasoline, diesel, or natural gas), meteorological conditions, vehicle speeds, vehicle age, roadway type and grade, number of starts per day, engine soak time, and various other factors that influence emissions, such as inspection maintenance programs. The inputs and use of MOVES incorporate the most current guidance available from the New York City Department of Environmental Conservation (DEC).

[3] EPA, Motor Vehicle Emission Simulator (MOVES), User Guide for MOVES2014a, November 2015.

Vehicle classification data were based on field studies. Appropriate credits were used to accurately reflect the inspection and maintenance program.[4]

County-specific hourly temperature and relative humidity data obtained from DEC were used.

Road Dust

The contribution of re-entrained road dust to PM_{10} concentrations, as presented in the PM_{10} SIP, is considered to be significant; therefore, the PM_{10} estimates include both exhaust and road dust. $PM_{2.5}$ emission rates were determined with fugitive road dust to account for their impacts in local microscale analyses. However, fugitive road dust was not included in the neighborhood scale $PM_{2.5}$ microscale analyses, since the New York City Department of Environmental Protection (DEP) considers it to have an insignificant contribution on that scale. Road dust emission factors were calculated according to the latest procedure delineated by EPA[5] and the *CEQR Technical Manual*.

TRAFFIC DATA

Traffic data for the intersection analysis were derived from existing traffic counts, projected future growth in traffic, and other information developed as part of the traffic analysis for the proposed project (see Chapter 11, "Transportation"). Traffic data for the future without the proposed actions (the "No Action" condition) and the future with the proposed actions (the "With Action" condition) were employed in the respective air quality modeling scenarios. The peak morning, midday, and evening period traffic volumes were used as a baseline for determining off-peak volumes. Off-peak traffic volumes in the future without the proposed actions, and off-peak increments from the proposed project were determined by adjusting the peak period volumes by the 24-hour distributions of actual vehicle counts collected at appropriate locations. For annual impacts, average weekday 24-hour distributions were used to more accurately simulate traffic patterns over longer periods.

DISPERSION MODEL FOR MICROSCALE ANALYSES

Maximum contributions from vehicular emissions to PM concentrations adjacent to each analysis site were calculated using the CAL3QHCR model Version 2.0.[6] The CAL3QHCR model employs a Gaussian (normal distribution) dispersion assumption and includes an algorithm for estimating vehicular queue lengths at signalized intersections. CAL3QHC calculates emissions and dispersion of PM from idling and moving vehicles. The queuing algorithm includes site-specific traffic parameters, such as signal timing and delay (from the 2000 *Highway Capacity Manual* traffic forecasting model), saturation flow rate, vehicle arrival type, and signal actuation (*i.e.*, pre-timed or actuated signal) characteristics to project the number of idling vehicles.

The CAL3QHCR is an extended module of the CAL3QHC model, and allows for the incorporation of hourly meteorological data into the modeling. This refined version of the model can utilize hourly

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[4] The inspection and maintenance programs require inspections of automobiles and light trucks to determine if pollutant emissions from each vehicle exhaust system are lower than emission standards. Vehicles failing the emissions test must undergo maintenance and pass a repeat test to be registered in New York State.

[5] EPA. *Compilations of Air Pollutant Emission Factors AP-42*. Fifth Edition, Volume I: Stationary Point and Area Sources, Ch. 13.2.1. NC. http://www.epa.gov/ttn/chief/ap42. January 2011.

[6] EPA. User's Guide to CAL3QHC, A Modeling Methodology for Predicted Pollutant Concentrations Near Roadway Intersections. EPA454R92006.

traffic and meteorology data, and is therefore more appropriate for calculating the 24-hour and annual average concentrations required to address the timescales of the PM NAAQS.

METEOROLOGY

In general, the transport and concentration of pollutants from vehicular sources are influenced by three principal meteorological factors: wind direction, wind speed, and atmospheric stability. Wind direction influences the direction in which pollutants are dispersed, and atmospheric stability accounts for the effects of vertical mixing in the atmosphere. These factors, therefore, influence the concentration at a particular prediction location (receptor).

For computation of PM concentrations, the CAL3QHCR model includes the modeling of hourly concentrations based on hourly traffic data and 5 years of monitored hourly meteorological data. The data consists of surface data collected at LaGuardia Airport and upper air data collected at Brookhaven, New York for the period 2012–2016. All hours were modeled, and the highest resulting concentration for each averaging period is presented.

ANALYSIS YEAR

The microscale analyses were performed for 2025, the year by which the proposed project is likely to be completed. The future analysis was performed for both the No Action condition and the With Action condition.

BACKGROUND CONCENTRATIONS

Background concentrations are those pollutant concentrations originating from distant sources that are not directly included in the modeling analysis, which directly accounts for vehicular emissions on the streets within 1,000 feet and in the line of sight of the analysis site. Background concentrations must be added to modeling results to obtain total pollutant concentrations at an analysis site.

The background concentrations for the nearest monitored location are presented in **Table 12-2**. PM concentrations are based on the latest available three years of monitored data (2014–2016) consistent with the statistical format of the NAAQS. These values were used as the background concentrations for the mobile source analysis.

Table 12-2
Maximum Background Pollutant Concentration for Mobile Source Analysis

Pollutant	Average Period	Location	Concentration	NAAQS
$PM_{2.5}$	24-hour	JHS 126, Brooklyn	20.5	35 µg/m^3
PM_{10}	24-hour	Division Street, Manhattan	44	150 µg/m^3

Notes:
PM_{10} concentrations are the maximum second-highest from the most recent 3 years of data.
$PM_{2.5}$ concentrations represent the average of the 98th percentile day from the most recent 3 years.
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2014–2016.

ANALYSIS SITE

Intersections in the study area were reviewed for microscale analysis based on the *CEQR Technical Manual* guidance. The incremental traffic volumes for the weekday AM, midday, and PM periods were reviewed and intersections with increments exceeding the PM volume thresholds were identified. Of those intersections, one intersection was selected for microscale analysis: State Street and 3rd Avenue. The potential impact from vehicle emissions of PM_{10}, and $PM_{2.5}$ was analyzed at this site.

RECEPTOR PLACEMENT

Multiple receptors (i.e., precise locations at which concentrations are evaluated) were modeled at the selected site; receptors were placed along the approach and departure links and roadway segments at regularly spaced intervals. Receptors in the analysis models for predicting annual average neighborhood-scale $PM_{2.5}$ concentrations were placed at a distance of 15 meters, from the nearest moving lane at each analysis location, based on the *CEQR Technical Manual* procedure for neighborhood-scale corridor $PM_{2.5}$ modeling.

STATIONARY SOURCES

HEATING AND HOT WATER SYSTEMS

A stationary source analysis was conducted to evaluate potential impacts from heating and hot water systems associated with the proposed mixed-use and school buildings. Based on design information, three of the proposed buildings (Buildings A, B, and C) would have a boiler installation that would generate hot water for building heating and domestic hot water, and would utilize natural gas exclusively. The two existing school buildings currently proposed to be adaptively reused with the proposed project (Buildings D and E) would be served by Building C's heating and hot water system. It was assumed that the exhaust stack would be located on the tallest portion of the roof of the buildings, with the exception of a small boiler plant proposed for the lower portion of the Building C, which would be located on a lower roof.

Annual emissions rates for the heating and hot water systems of the proposed buildings were calculated based on fuel consumption estimates, using energy use estimates based on type of development and size of the building as recommended in the *CEQR Technical Manual.* Short-term emissions were conservatively estimated assuming a 100-day heating season.

The exhaust velocity was calculated based on the exhaust flowrate for the boiler capacity, estimated using the energy use of the Proposed Project and EPA's fuel factors. Assumptions for stack diameter and exhaust temperature for the proposed systems were obtained from a survey of boiler exhaust data undertaken and provided by DEP.

Emissions rates for the boilers were calculated based on emissions factors obtained from the EPA *Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources.* PM_{10} and $PM_{2.5}$ emissions include both the filterable and condensable fractions. **Table 12-3** presents the stack parameters and emission rates used in the heating and hot water system analysis.

Dispersion Modeling

Potential impacts were evaluated using the EPA/AMS AERMOD dispersion model.[7] AERMOD is a state-of-the-art dispersion model, applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources (including point, area, and volume sources). AERMOD is a steady-state plume model that incorporates current concepts about flow and dispersion in complex terrain, including updated treatments of the boundary layer theory, understanding of turbulence and dispersion, and includes handling of terrain interactions. The AERMOD model calculates pollutant concentrations from one or more points (e.g., exhaust

[7] EPA. *AERMOD Implementation Guide*. 454/B-16-013. December 2016; EPA. AERMOD Model Formulation and Evaluation. 454/R-17-001. May 2017; EPA. User's Guide for the AMS/EPA Regulatory Model (AERMOD). 454/B-16-011. December 2016.

Table 12-3
Boiler Stack Parameters and Emission Rates

Parameter		Proposed Buildings: Building B	Building C Tall Tower	Building C Lower Roof Boiler Plant	Building A
Building Size (gsf)		397,887	1,107,626	150,000	145,000
Building Height (ft)		561	926	59	121
Stack Exhaust Temp. (°F)(2)		307.8	307.8	307.8	307.8
Stack Exhaust Height (ft)		534	929	70	124
Height Above Roof (ft)		3	3	11	3
Stack Exhaust Diameter (ft)(3)		3.2	5.0	2.0	2.0
Stack Exhaust Flow (ACFM)(1)(4)		2,617	7,284	986	862
Stack Exhaust Velocity (ft/s)		5.5	6.2	5.2	4.6
Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas
Short-Term Emission Rates:					
g/s(5)	NO_x	0.045(6)	0.340	0.017(6)	0.040
	PM_{10}	0.009	0.026	0.004	0.003
	PM_{25}	0.009	0.026	0.004	0.003
Annual Emission Rates:					
g/s(5)	NO_x	0.0124(6)	0.0932	0.0047(6)	0.0110
	PM_{25}	0.0025	0.0071	0.0010	0.0008

Notes:
(1) ACFM = actual cubic feet per minute.
(2) Stack parameters are based on boiler specifications from DEP Boiler Permit Database.
(3) Stack diameter based on DEP Boiler Database.
(4) The stack exhaust flow rate was estimated based on the type of fuel and heat input rates.
(5) Emission rates based on EPA AP-42 data.
(6) Emission rate based on 30 ppm low NOx burners.

stacks) based on hourly meteorological data, and has the capability to calculate pollutant concentrations at locations where the plume from the exhaust stack is affected by the aerodynamic wakes and eddies (downwash) produced by nearby structures. The analysis of potential impacts from exhaust stacks was performed assuming stack tip downwash, urban dispersion and surface roughness length, with and without building downwash, and elimination of calms. The AERMOD model also incorporates the algorithms from the PRIME model, which is designed to predict impacts in the "cavity region" (i.e., the area around a structure which under certain conditions may affect an exhaust plume, causing a portion of the plume to become entrained in a recirculation region). The Building Profile Input Program (BPIP) program for the PRIME model (BPIPRM) was used to determine the projected building dimensions modeling with the building downwash algorithm enabled. The modeling of downwash from sources accounts for all obstructions within a radius equal to five obstruction heights of the stack.

Methodology Utilized for Estimating NO_2 Concentrations

Annual NO_2 concentrations from stationary sources were estimated using a NO_2 to NO_x ratio of 0.75, as described in EPA's Guideline on Air Quality Models at 40 CFR part 51 Appendix W, Section 5.2.4.

The 1-hour average NO_2 concentration increments from the proposed project's stationary combustion sources were estimated using AERMOD model's Plume Volume Molar Ratio Method (PVMRM) module to analyze chemical transformation within the model. The PVMRM module incorporates hourly background ozone concentrations to estimate NO_x transformation within the source plume. Ozone concentrations were taken from the DEC Queens College monitoring station that is the nearest ozone monitoring station and had complete five years of hourly data available. An initial NO_2 to NO_x ratio of 10 percent at the source exhaust stack was assumed, which is considered representative.

The results represent the 5-year average of the annual 98th percentile of the maximum daily 1-hour average, added to background concentrations (see below).

Meteorological Data

The meteorological data set consisted of 5 consecutive years of meteorological data: surface data collected at La Guardia Airport (2012–2016), and concurrent upper air data collected at Brookhaven, New York. The meteorological data provide hour-by-hour wind speeds and directions, stability states, and temperature inversion elevation over the 5-year period. These data were processed using the EPA AERMET program to develop data in a format which can be readily processed by the AERMOD model. The land uses around the site where meteorological surface data were available were classified using categories defined in digital United States Geological Survey (USGS) maps to determine surface parameters used by the AERMET program.

Receptor Placement

A comprehensive receptor network (i.e., locations with continuous public access) was developed for the modeling analyses. Discrete receptors (i.e., locations at which concentrations are calculated) were modeled along the existing and proposed buildings' façades to represent potentially sensitive locations such as operable windows and intake vents. For each of the proposed buildings, receptors were conservatively placed on the façades of the maximum development envelope. Rows of receptors at spaced intervals on the modeled buildings were analyzed at multiple elevations. Receptors were also placed at publicly accessible ground-level locations.

Background Concentrations

As with the mobile source analysis, to estimate the maximum expected total pollutant concentrations, the calculated impacts from the emission sources must be added to a background value that accounts for existing pollutant concentrations from other sources (see **Table 12-4**). The background levels are based on concentrations monitored at the nearest DEC ambient air monitoring stations over the most recent 5-year period for which data are available (2012–2016), with the exception of PM_{10}, which is based on 3 years of data, consistent with current DEP guidance (2014–2016). For the 24-hour PM_{10} concentration the highest second-highest measured values over the specified period were used.

Table 12-4
Maximum Background Pollutant Concentrations for Heating and Hot Water System Analysis

Pollutant	Average Period	Location	Concentration (μg/m³)	NAAQS (μg/m³)
NO_2	1-hour	Queens College, Queens	120.9(1)	188
	Annual	Queens College, Queens	32.9	100
$PM_{2.5}$	24-hour	JHS 126, Brooklyn	20.5	35
PM_{10}	24-hour	Division Street, Manhattan	44	150

Note:
(1) The 1-Hour NO_2 background concentration is not presented in the table since the AERMOD model determines the total 98th percentile 1-Hour NO_2 concentration at each receptor.
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2012-2016.

Total 1-hour NO_2 concentrations were determined following methodologies that are accepted by the EPA, and which are considered appropriate and conservative. The methodology used to determine the compliance of total 1-hour NO_2 concentrations from the proposed sources with the

1-hour NO_2 NAAQS[8] was based on adding the monitored background to modeled concentrations, as follows: hourly modeled concentrations from proposed sources were first added to the seasonal hourly background monitored concentrations; then the highest combined daily 1-hour NO_2 concentration was determined at each receptor location and the 98th percentile daily 1-hour maximum concentration for each modeled year was calculated within the AERMOD model; finally the 98th percentile concentrations were averaged over the latest 5 years.

LARGE AND MAJOR SOURCES

The *CEQR Technical Manual* requires an analysis of projects that may result in a significant adverse impact due to certain types of new uses located near a "large" or "major" emissions source. Major sources are defined as those located at facilities that have a Title V or Prevention of Significant Deterioration air permit, while large sources are defined as those located at facilities that require a State Facility Permit. To assess the potential effects of these existing sources on the projected and potential development sites, a review of existing permitted facilities was conducted. Sources of information reviewed included the EPA's Envirofacts database,[9] the DEC Title V, and State Facility Permit websites.[10] No facilities with a State Facility, Title V, or PSD Permit within the 1,000-foot study area around the project site were identified. Therefore, no analysis of large or major sources of emissions on the proposed project was required.

CHEMICAL SPILL ANALYSIS

Emissions from the proposed public high school building's fume hood exhaust system were evaluated, in the event of an accidental chemical spill in one of the laboratories. Impacts were evaluated using information, procedures, and methodologies described in the *CEQR Technical Manual*. Maximum concentrations were compared to the short-term exposure levels (STELs) or to the ceiling levels recommended by the U.S. Occupational Safety and Health Administration (OSHA) for each chemical examined.

The following section details the expected usage of potentially hazardous chemicals, as well as the ventilation system that would be employed at the public high schools to ensure the safety of the students and staff and the surrounding community in the event of an accidental laboratory chemical spill in the science laboratories. Two quantitative analyses employing mathematical modeling were prepared to determine potential impacts at (1) operable windows and air intakes in nearby buildings and at nearby places of public access; and (2) the school itself due to recirculation into air intake systems, windows, and open air terraces.

Laboratory Fume Hood Exhausts

All laboratories in which hazardous chemicals are used would be equipped with fume hoods. Fume hoods are workstation enclosures that are maintained under negative pressure and continuously vented to the outside when work is taking place. Their function is to protect teachers, staff, and students from potentially harmful fumes. By providing an exhaust from laboratory rooms, they also prevent any fumes released within the laboratory from escaping into other areas of the building, or through windows to the outside.

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[8]http://www.epa.gov/ttn/scram/guidance/clarification/Additional_Clarifications_AppendixW_Hourly-NO2-NAAQS_FINAL_03-01-2011.pdf.

[9] EPA, Envirofacts Data Warehouse, http://oaspub.epa.gov/enviro/ef_home2.air

[10] DEC Title V and State Facility permit websites: http://www.dec.ny.gov/dardata/boss/afs/issued_atv.html; http://www.dec.ny.gov/dardata/boss/afs/issued_asf.html

Since design information is not yet available on the fume hood exhaust system, a set of conservative assumptions was used. While the fume hood exhausts would likely be combined and vented to the building roof through a single stack, the worst-case analysis assumed a single fume hood vented separately to the roof. The fume hood exhaust stack height was assumed to be 3 feet above the building roof. An exhaust fan sufficient to maintain a minimum exit velocity of 1,500 feet per minute through a 12-inch stack discharge was also assumed.

Chemicals for Analysis

An inventory of the types and quantities of typical chemicals that are likely to be used in a public school laboratory was used for the analysis. From the chemical inventory, 14 chemicals were selected for further examination, based on their toxicity and potential for air quality impacts. Common buffers, salts, enzymes, nucleotides, peptides, and other bio-chemicals were not considered in the analysis since they are not typically categorized as air pollutants. Nonvolatile chemicals (i.e., with a vapor pressure of less than 10 mm Hg) were excluded as well since they would largely not be released in a spill.

The hazardous chemicals selected are presented in **Table 12-5**. The vapor pressure shown for each chemical is a measure of its volatility (tendency to evaporate) or to form vapors, which is a critical parameter in determining potential airborne impacts from chemical spills. Exposure standards are safety- and health-based standards indicative of the chemical’s toxicity—substances with higher toxicity have lower exposure standards. These include OSHA’s permissible exposure limit (PEL), National Institute for Occupational Safety and Health (NIOSH) and/or OSHA’s STEL, ceiling, and immediately dangerous to life or health (IDLH) values.

Table 12-5
Expected Hazardous Materials in the Proposed School Laboratories

Chemical [CAS #]	Vapor Pressure mm Hg	PEL PPM	STEL PPM	IDLH PPM	Ceiling PPM
Acetone [67-64-1]	180	1,000	–	2,500	250
Allyl Alcohol [107-18-6]	17	2	4	20	2
Benzene [71-43-2]	75	1	1	500	–
Cyclohexene [110-83-8]	67	300	–	2,000	300
Ether [60-29-7]	442	400	–	1,900	–
Ethyl Acetate [141-78-6]	76	400	–	1,900	–
Ethyl Alcohol [64-17-5]	44	1,000	–	3,300	1,000
Isopropyl Alcohol [67-63-0]	33	400	500	2,000	400
Methyl Alcohol [67-56-1]	96	200	250	6,000	200
Nitric Acid [7697-37-2]	48	2	4	25	2
n-Butyl Acetate [123-86-4]	10	150	200	1,700	150
Petroleum distillates (Naphtha) [80002-05-9]	40	500	–	1,100	1,800
t-Butyl Alcohol [76-65-0]	31	100	–	1,600	100
Toluene [108-88-3]	21	100	150	500	100

Notes:
PEL: Permissible Exposure Limit, Time Weighted Average (TWA) for up to a 10-hour workday during a 40-hour workweek.
STEL: Short-Term Exposure Limit, a 15-minute TWA exposure that should not be exceeded at any time during a workday.
IDLH: Immediately Dangerous to Life or Health.
Ceiling: Level set by NIOSH or OSHA not to be exceeded in any working exposure.
PPM: parts per million.
Where a hyphen (-) appears there is no recommended corresponding guideline value.

Estimates of Worst-Case Emission Rates

The dispersion of hazardous chemicals from a chemical spill within one of the proposed school laboratories was analyzed to assess the potential for exposure of the general public, and of students and staff within the school to hazardous vapors in the event of an accident. Evaporation rates for volatile hazardous chemicals expected to be used in the proposed laboratory were estimated using the model developed by the Shell Development Company.[11] The Shell model, which was developed specifically to assess air quality impacts from chemical spills, calculates evaporation rates based on physical properties of the compound, temperature, and rate of air flow over the spill surface. Room temperature conditions of 20°C and an air-flow rate of 0.5 meters per second were assumed for calculating evaporation rates.

Based on relative STELs and the vapor pressures of the chemicals listed in **Table 12-5**, the most potentially hazardous chemicals, shown in **Table 12-6**, were selected for the "worst-case" spill analysis. Besides the relative toxicities, other factors such as molecular weight, container size, and frequency of use were also considered. Chemicals with high vapor pressures evaporate most rapidly. The chemicals selected also have the lowest STEL. Since the chemicals selected for detailed analysis are most likely to have a relatively higher emission rate and the lowest exposure standards, if the analysis of these chemicals results in no significant adverse air quality impacts, it would indicate that the other chemicals listed in **Table 12-5** would also not present any significant potential impacts.

Table 12-6
Chemicals Selected for Worst-Case Spill Analysis

Chemical	Quantity (liters)	Evaporation Rate (gram/meter^2/sec)	Emission Rate* (gram/sec)
Allyl Alcohol	0.10	0.07	0.08
Benzene	0.40	0.36	0.41
Nitric Acid	0.20	0.27	0.30
Note: * Average emission rate.			

The analysis conservatively assumes that a chemical spill in a fume hood would extend to an area of 12 square feet (sf) (approximately 1.11 square meters). The emission rates were determined using the evaporation rates and assuming this maximum spill area. For modeling purposes, the emission rates shown in **Table 12-6** are assumed to continue for a 15-minute time period after which the spill would be contained. The vapor from the spill would be drawn into the fume hood exhaust system and released into the atmosphere via the roof exhaust fans. The high volume of air drawn through this system provides a high degree of dilution for hazardous fumes before they are released above the roof. The exhaust height of the fan would be at an elevation of 3 feet above the building roof.

Dispersion Modeling—Recirculation in the Laboratory Building Intakes

The potential for recirculation of the fume hood emissions back into the proposed laboratory building air intakes was assessed using the Wilson method.[12] This empirical procedure, which has been verified by both wind-tunnel and full-scale testing, is a refinement of the 1981 *ASHRAE Handbook* procedure, and takes into account such factors as plume momentum, stack-tip

[11] Fleischer, M.T. An Evaporation/Air Dispersion Model for Chemical Spills on Land. Shell Development Company. December 1980.

[12] D.J. Wilson. A Design Procedure for Estimating Air Intake Contamination from Nearby Exhaust Vents, ASHRAE TRAS 89, Part 2A, pp. 136-152, 1983.

downwash, and cavity recirculation effects. The procedure determines the worst-case, absolute minimum dilution between exhaust vent and air intake. Three separate effects determine the eventual dilution: internal system dilution, obtained by combining exhaust streams (i.e., mixing in plenum chambers of multiple exhaust streams, and introducing fresh air supplied from roof intakes); wind dilution, dependent on the distance from vent to intake and the exit velocity; and dilution from the stack, caused by stack height and plume rise from vertical exhaust velocity. The critical wind speed for worst-case dilution is dependent on the exit velocity, the distance from vent to intake, and the cross-sectional area of the exhaust stack.

Dispersion Modeling—Dispersion in the Surrounding Area

Maximum concentrations at elevated receptors downwind of the fume exhausts were estimated using the EPA AERMOD dispersion model.

Concentrations were evaluated at nearby buildings and publicly accessible areas. This included locations along the façades and roof of the buildings, operable windows, intake vents, and otherwise accessible locations. Multiple elevations were analyzed at spaced intervals on the buildings.

The power law relationship was used to convert the calculated 1-hour average maximum concentrations to short-term 15-minute averages. The 15-minute average concentrations were then compared to the STELs or to the ceiling levels for the chemicals examined.

E. EXISTING CONDITIONS

Recent concentrations of all criteria pollutants at DEC air quality monitoring stations nearest the study area are presented in **Table 12-7**. All data statistical forms and averaging periods are consistent with the definitions of the NAAQS. It should be noted that these values are somewhat different than the background concentrations presented in **Table 12-4**, above.

Table 12-7
Representative Monitored Ambient Air Quality Data

Pollutant	Location	Units	Averaging Period	Concentration	NAAQS
CO	Queens College, Queens	ppm	1-hour	1.5	35
			8-hour	1.4	9
SO_2	Queens College, Queens	µg/m^3	3-hour	42.1	1,300
			1-hour	24.8	196
PM_{10}	Division Street, Manhattan	µg/m^3	24-hour	34	150
$PM_{2.5}$	JHS 126, Brooklyn	µg/m^3	Annual	8.6	12
			24-hour	20.5	35
NO_2	Queens College, Queens	µg/m^3	Annual	29.7	100
			1-hour	121	188
Lead	IS 52, Bronx	µg/m^3	3-month	0.0047	0.15
Ozone	Queens College, Queens	ppm	8-hour	0.069	0.070

Notes:
The CO, PM_{10}, and 3-hour SO_2 concentrations for short-term averages are the second-highest from the most recent year with available data.
$PM_{2.5}$ annual concentrations are the average of 2014–2016 annual concentrations, and the 24-hour concentration is the average of the annual 98th percentiles in the same period.
8-Hour average ozone concentrations are the average of the fourth-highest-daily values from 2014 to 2016.
SO_2 1-hour and NO_2 1-hour concentrations are the average of the 99th percentile and 98th percentile, respectively, of the highest daily 1-hour maximum from 2014 to 2016.
Source: New York State Air Quality Report Ambient Air Monitoring System, DEC, 2012–2016.

These existing concentrations are based on recent published measurements, averaged according to the NAAQS (e.g., $PM_{2.5}$ concentrations are averaged over the 3 years); the background concentrations are the highest values in past years, and are used as a conservative estimate of the highest background concentrations for future conditions.

There were no monitored violations of the NAAQS for the pollutants at these sites in 2016.

F. FUTURE WITHOUT THE PROPOSED ACTIONS

In the future without the proposed actions, stationary source emissions in the area would be higher than existing conditions due to the development under the No Action condition.

MOBILE SOURCES

PM_{10} concentrations in the No Action condition were determined by using the methodology previously described. Predicted future PM_{10} 24-hour concentrations, including background concentrations, at the analyzed intersection in the No Action condition are presented in **Table 12-8**. The values shown are the highest predicted concentrations for the receptor locations. As shown in the table, No Action condition concentrations are predicted to be well below the PM_{10} NAAQS.

Table 12-8
Maximum Predicted 24-Hour Average
PM_{10} No Action Concentration (μg/m^3)

Analysis Site	Location	Concentration
1	State Street and 3rd Avenue	53.6

Notes:
NAAQS—24-hour average 150 μg/m^3.
Concentration includes a background concentration of 44.0 μg/m^3.

$PM_{2.5}$ concentrations for the No Action condition are not presented, since impacts are assessed on an incremental basis.

G. FUTURE WITH THE PROPOSED ACTIONS

The proposed project would result in increased mobile source emissions in the immediate vicinity of the project site and also have the potential to affect the surrounding community with emissions from the proposed buildings' heating and hot water systems. The following sections describe the results of the studies performed to analyze the potential impacts on the surrounding community from these sources for the 2025 analysis year.

MOBILE SOURCES

PM_{10} concentrations with the proposed project were determined using the methodology previously described and used in the No Action condition. **Table 12-9** presents the predicted PM_{10} 24-hour concentrations at the analyzed intersection in the With Action condition. The values shown are the highest predicted concentrations for the modeled receptor locations and include background concentrations.

Table 12-9
Maximum Predicted 24-Hour Average PM_{10}
With Action Concentration (μg/m^3)

Analysis Site	Location	No Action	With Action
1	State Street and 3rd Avenue	53.6	54.1

Notes:
NAAQS—24-hour average 150 μg/m^3.
Concentrations presented include a background concentration of 44.0 μg/m^3.

Using the methodology previously described, maximum predicted 24-hour and annual average $PM_{2.5}$ concentration increments were calculated so that they could be compared with the *de minimis* criteria. Based on this analysis, the maximum predicted localized 24-hour average and neighborhood-scale annual average incremental $PM_{2.5}$ concentrations are presented in **Tables 12-10 and 12-11**, respectively. Note that $PM_{2.5}$ concentrations in the No Action condition are not presented, since impacts are assessed on an incremental basis.

Table 12-10
Maximum Predicted 24-Hour Average PM2.5
Incremental Concentration (µg/m3)

Analysis Site	Location	Increment	*De Minimis* Criterion
1	State Street and 3rd Avenue	0.5	7.25
Note: $PM_{2.5}$ *de minimis* criteria—24-hour average, not to exceed more than half the difference between the background concentration and the 24-hour standard of 35 µg/m^3.			

Table 12-11
Maximum Predicted Annual Average $PM_{2.5}$
Incremental Concentration (µg/m^3)

Analysis Site	Location	Increment	*De Minimis* Criterion
1	State Street and 3rd Avenue	0.059	0.1
Note: $PM_{2.5}$ *de minimis* criteria—annual (neighborhood scale), 0.1 µg/m^3.			

The results show that the annual and daily (24-hour) $PM_{2.5}$ increments are predicted to be below the *de minimis* criteria. Therefore, there would be no potential for significant adverse impacts on air quality from vehicle trips generated by the proposed project.

STATIONARY SOURCES

HEATING AND HOT WATER SYSTEMS

Tables 12-12 and 12-13 present the maximum predicted concentrations from the heating and hot water systems of the proposed residential towers, and public school building at off-site and project receptors, respectively. As shown in the tables, maximum predicted concentrations from the proposed project's buildings are below the NAAQS and $PM_{2.5}$ *de minimis* criteria. Therefore, the proposed project would not result in a significant impact due to its heating and hot water system emissions.

To ensure that there are no significant adverse impacts of $PM_{2.5}$ or NO_2 from some of the proposed project's heating and hot water systems emissions, certain restrictions would be required as part of the proposed project through the development agreement between ECF and 80 Flatbush LLC for air quality. The restrictions would be as follows:

Table 12-12
Maximum Modeled Pollutant Concentrations from Heating and Hot Water Systems Off-Site Receptors (μg/m³)

Pollutant	Averaging Period	Maximum Modeled Impact	Background	Total Concentration	Criterion
NO_2	1-hour	(1)	(1)	153.4	188(2)
NO_2	Annual	0.53	32.9	33.4	100(2)
$PM_{2.5}$	24-hour	4.9	20.5	N/A	7.25(3)
	Annual	0.06	N/A	N/A	0.3(4)
PM_{10}	24-hour	4.9	44	48.9	150

Notes:
N/A—Not Applicable.
(1) The 1-hour NO_2 concentration presented represents the maximum of the total 98th percentile 1-hour NO_2 concentration predicted at any receptor using seasonal-hourly background concentrations.
(2) 1-hour average NAAQS.
(3) $PM_{2.5}$ *de minimis* criteria—24-hour average, not to exceed more than half the difference between the background concentration and the 24-hour standard of 35 μg/m³.
(4) $PM_{2.5}$ *de minimis* criteria—annual (discrete receptor), 0.3 μg/m³.

Table 12-13
Maximum Modeled Pollutant Concentrations from Heating and Hot Water Systems On the Proposed Project (μg/m³)

Pollutant	Averaging Period	Maximum Modeled Impact	Background	Total Concentration	Criterion
NO_2	1-hour	(1)	(1)	168.2	188(2)
	Annual	0.57	32.9	33.5	100(2)
$PM_{2.5}$	24-hour	5.83	20.5	N/A	7.25(3)
	Annual	0.15	N/A	N/A	0.3(4)
PM_{10}	24-hour	5.8	44	49.8	150

Notes:
N/A—Not Applicable.
(1) The 1-hour NO_2 concentration presented represents the maximum of the total 98th percentile 1-hour NO2 concentration predicted at any receptor using seasonal-hourly background concentrations.
(2) 1-hour average NAAQS.
(3) $PM_{2.5}$ *de minimis* criteria—24-hour average, not to exceed more than half the difference between the background concentration and the 24-hour standard of 35 μg/m³.
(4) $PM_{2.5}$ *de minimis* criteria—annual (discrete receptor), 0.3 μg/m³.

Building B

Any new development on the above-referenced property must utilize only natural gas in any fossil fuel-fired heating and hot water equipment, be fitted with low NO_x (30 ppm) burners, and with heating and hot water exhaust stacks located at least 50 feet away from the proposed public school on the project site, to avoid any potential significant air quality impacts.

Building C

Any fossil fuel-fired heating and hot water equipment located on the lower roof of the above-referenced property must utilize only natural gas in any fossil fuel-fired heating and hot water equipment, be fitted with low NO_x (30 ppm) burners, and with heating and hot water exhaust stacks located no greater than 35 feet away from the lot line facing State Street and no greater than 71 feet away from the lot line facing 3rd Avenue, and are located at least 70 feet above grade, to avoid any potential significant air quality impacts.

CHEMICAL SPILL ANALYSIS

Recirculation in Laboratory Building Intakes

The recirculation analysis indicates that the minimum potential dilution factor between the fan exhausts and the nearest sensitive receptor is over 336 (i.e., pollutant concentrations at the nearest intake to the exhaust fan would be 336 times less than the concentration at the fan exhaust).

The results of the recirculation analysis are presented in **Table 12-14**. The results indicate that a spill in a fume hood as described above would produce a maximum concentration at the nearest intake location below the corresponding STELs or ceiling values set by OSHA and/or NIOSH for each of the chemicals analyzed. Consequently, it can be concluded that no significant impact would be expected due to recirculation of fume hood emissions back into the proposed public high school building's air intakes in the event of a chemical spill.

Table 12-14
Fume Hood Recirculation Analysis
Maximum Predicted Concentrations (ppm)

Chemical	STEL/OSHA Ceiling	15-Minute Average
Allyl Alcohol	2	0.013
Benzene	1	0.681
Nitric Acid	2	0.045
Note: * 15-Minute Average emission rate.		

Dispersion in Surrounding Area

The results of the analysis of potential emissions from the fume hood exhaust system in the surrounding area are shown in **Table 12-15**. As shown in the table, the maximum predicted concentrations at elevated receptors downwind of the fume hood exhausts were determined to be below the STEL/OSHA levels. The results of the dispersion analysis demonstrate that would be no significant adverse impacts from the exhaust system of the proposed public high school laboratories to the proposed project or the surrounding community.

Table 12-15
Maximum Predicted Concentrations (ppm)

Chemical	STEL/OSHA Ceiling	15-Minute Average
Allyl Alcohol	2	0.11
Benzene	1	0.45
Nitric Acid	2	0.41
Note: * 15-Minute Average emission rate.		

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Chapter 13: Greenhouse Gas Emissions and Climate Change

A. INTRODUCTION

This chapter evaluates the greenhouse gas (GHG) emissions that would be generated by the operation of the proposed project and its consistency with the citywide GHG reduction goals. Per the 2014 *City Environmental Quality Review (CEQR) Technical Manual*, evaluation of GHG emissions serves as a proxy for evaluating the proposed project's impact on climate change.

As discussed in the *CEQR Technical Manual*, climate change is projected to have wide-ranging effects on the environment, including rising sea levels, increases in temperature, and changes in precipitation levels. Although this is occurring on a global scale, the environmental effects of climate change are also likely to be experienced at the local level. New York City's sustainable development policy, starting with PlaNYC, and continued and enhanced in OneNYC, established sustainability initiatives and goals for greatly reducing GHG emissions and for adapting to climate change in the City.

Per the *CEQR Technical Manual,* the citywide GHG reduction goal is currently the most appropriate standard by which to analyze a project under CEQR. The *CEQR Technical Manual* recommends that a GHG consistency assessment be undertaken for any project preparing an environmental impact statement expected to result in 350,000 square feet (sf) or more of development and other energy-intense projects. The proposed project would result in approximately 1.3 million gsf of developed floor area. Accordingly, a GHG consistency assessment is provided.

PRINCIPAL CONCLUSIONS

An assessment that evaluates the GHG emissions that would be generated as a result of the proposed actions and their consistency with the citywide GHG reduction goals has been included in this DEIS. The building energy use and vehicle use associated with the proposed project would result in up to approximately 13 thousand metric tons of carbon dioxide equivalent (CO_2e) emissions per year. As summarized below, the proposed project would support the goal identified in the *CEQR Technical Manual* of building efficient buildings.

The *CEQR Technical Manual* defines five goals by which a project's consistency with the City's emission reduction goal is evaluated: (1) efficient buildings; (2) clean power; (3) sustainable transportation; (4) construction operation emissions; and (5) building materials carbon intensity.

The schools would be designed to New York City School Construction Authority's (SCA) building standards. In accordance with Local Law 86 of 2005 (LL86), the design and construction of the school facilities would comply with or exceed the energy efficiency standards of SCA's green building standards, including following the *New York City Green School Guide 2016* or later version applicable at the time of design. The current version of the *New York City Green School Guide 2016*, issued in April 2016, was designed to reduce school energy costs by at least 20 percent compared to the baseline referenced in Leadership in Energy and Environmental Design (LEED) for Schools 2009/EA Credit 1 or the New York State Energy Conservation and

Construction Code (NYSECCC) which was in effect at that time, whichever is more stringent. An additional 5 or 10 percent energy cost savings beyond the 20 percent mandate must be implemented, unless the payback on the investment exceeds 7 years. Effective October 2016, New York City and New York State have updated their energy codes (NYSECCC, which is also adopted by New York City) to incorporate a much stricter energy efficiency requirement. Therefore, it is unclear at this time how design compliant with the current (April 2016) SCA guidance would compare with the current building code. Should SCA update its guidance prior to the design of the schools, the energy use and the ensuing GHG emissions associated with the schools would be substantially lower than that of buildings built to meet but not exceed the current New York City Building Energy Code.

Regarding the proposed uses other than the schools, the co-applicants are currently evaluating the specific energy efficiency measures and design elements that may be implemented. The proposed project is required at a minimum to achieve the energy efficiency requirements of the New York City Building Code. As described above, in 2016, as part of the City's implementation of strategies aimed at achieving the OneNYC GHG reduction goals, the City adopted a more stringent building energy code which substantially increased the energy efficiency required. In 2016, the City also published a pathway to achieving the GHG reduction goals in the building sector. Should the measures identified as part of that pathway or other measures not yet implemented be adopted by the City in the future, they may apply to the proposed project similar to any new building (if prior to building approval) or existing building (after construction) and the proposed project would implement any measures required under such programs. Therefore, the proposed project would support the goal identified in the *CEQR Technical Manual* of building efficient buildings.

The proposed project would also support the other GHG goals by virtue of its proximity to public transportation, reliance on natural gas, commitment to construction air quality controls, and the fact that as a matter of course, construction in New York City uses recycled steel and includes cement replacements. All of these factors demonstrate that the proposed development supports the GHG reduction goal.

Therefore, based on the commitment to energy efficiency and by virtue of location and nature, the proposed project would be consistent with the City's emissions reduction goals, as defined in the *CEQR Technical Manual*.

B. POLLUTANTS OF CONCERN

GHGs are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere, and clouds. The general warming of the earth's atmosphere caused by this phenomenon is known as the "greenhouse effect." Water vapor, carbon dioxide (CO_2), nitrous oxide (N_2O), methane, and ozone are the primary GHGs in the Earth's atmosphere.

There are also a number of entirely anthropogenic GHGs in the atmosphere, such as halocarbons and other chlorine- and bromine-containing substances, which also damage the stratospheric ozone layer (and contribute to the "ozone hole"). Since these compounds are being replaced and phased out due to the 1987 Montreal Protocol, there is no need to address them in GHG assessments for most projects. Although ozone itself is also a major GHG, it does not need to be assessed as such at the project level since it is a rapidly reacting chemical and efforts are ongoing to reduce ozone concentrations as a criteria pollutant (see Chapter 12, "Air Quality"). Similarly, water vapor is of great importance to global climate change, but is not directly of concern as an emitted pollutant since the negligible quantities emitted from anthropogenic sources are inconsequential.

CO_2 is the primary pollutant of concern from anthropogenic sources. Although not the GHG with the strongest effect per molecule, CO_2 is by far the most abundant and, therefore, the most influential GHG. CO_2 is emitted from any combustion process (both natural and anthropogenic); some industrial processes, such as the manufacture of cement, mineral production, metal production, and the use of petroleum-based products; volcanic eruptions; and the decay of organic matter. CO_2 is removed ("sequestered") from the lower atmosphere by natural processes such as photosynthesis and uptake by the oceans. CO_2 is included in any analysis of GHG emissions.

Methane and N_2O also play an important role since the removal processes for these compounds are limited and because they have a relatively high impact on global climate change as compared with an equal quantity of CO_2. Emissions of these compounds, therefore, are included in GHG emissions analyses when the potential for substantial emission of these gases exists.

The *CEQR Technical Manual* lists six GHGs that could potentially be included in the scope of a GHG analysis: CO_2, N_2O, methane, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), (NF_3), and sulfur hexafluoride (SF_6). This analysis focuses mostly on CO_2, N_2O, and methane. There are no significant direct or indirect sources of HFCs, PFCs, or SF_6 associated with the proposed project.

To present a complete inventory of all GHGs, component emissions are added together and presented as CO_2e emissions—a unit representing the quantity of each GHG weighted by its effectiveness using CO_2 as a reference. This is achieved by multiplying the quantity of each GHG emitted by a factor called global warming potential (GWP). GWPs account for the lifetime and the radiative forcing[1] of each chemical over a period of 100 years (e.g., CO_2 has a much shorter atmospheric lifetime than SF_6, and therefore has a much lower GWP). The GWPs for the main GHGs discussed here are presented in **Table 13-1**.

Table 13-1
GWP for Major GHGs

Greenhouse Gas	100-year Horizon GWP
Carbon Dioxide (CO_2)	1
Methane (CH_4)	21
Nitrous Oxide (N_2O)	310
Hydrofluorocarbons (HFCs)	140 to 11,700
Perfluorocarbons (PFCs)	6,500 to 9,200
Sulfur Hexafluoride (SF_6)	23,900

Note:
The GWPs presented above are based on the Intergovernmental Panel on Climate Change's (IPCC) Second Assessment Report (SAR) to maintain consistency in GHG reporting. The IPCC has since published updated GWP values that reflect new information on atmospheric lifetimes of GHGs and an improved calculation of the radiative forcing of CO_2. In some instances, if combined emission factors were used from updated modeling tools, some slightly different GWP may have been used for this study. Since the emissions of GHGs other than CO_2 represent a very minor component of the emissions, these differences are negligible.
Source: *CEQR Technical Manual.*

[1] *Radiative forcing* is a measure of the influence a gas has in altering the balance of incoming and outgoing energy in the earth-atmosphere system and is an index of the importance of the gas as a GHG.

C. POLICY, REGULATIONS, STANDARDS, AND BENCHMARKS FOR REDUCING GHG EMISSIONS

Because of the growing consensus that GHG emissions resulting from human activity have the potential to profoundly impact the earth's climate, countries around the world have undertaken efforts to reduce emissions by implementing both global and local measures addressing energy consumption and production, land use, and other sectors. Although the U.S. has not ratified the international agreements that set emissions targets for GHGs, in December 2015, the U.S. signed the international Paris Agreement[2] that pledges deep cuts in emissions, with a stated goal of reducing annual emissions to a level that would be between 26 and 28 percent lower than 2005 emissions by 2025.[3] On June 1, 2017, the President of the United States announced that "the United States will withdraw from the Paris Climate Accord."[4]

Regardless of the Paris Agreement, the U.S. Environmental Protection Agency (EPA) is required to regulate GHGs under the Clean Air Act and has begun preparing and implementing regulations. In coordination with the National Highway Traffic Safety Administration (NHTSA), EPA currently regulates GHG emissions from newly manufactured on-road vehicles. In addition, EPA regulates transportation fuels via the Renewable Fuel Standard program, which will phase in a requirement for the inclusion of renewable fuels increasing annually up to 36.0 billion gallons in 2022. In 2015, EPA also finalized rules to address GHG emissions from both new and existing power plants that would, for the first time, set national limits on the amount of carbon pollution that power plants can emit. The Clean Power Plan sets carbon pollution emission guidelines and performance standards for existing, new, and modified and reconstructed electric utility generating units. On February 9, 2016, the Supreme Court stayed implementation of the Clean Power Plan pending judicial review.

There are also regional and local efforts to reduce GHG emissions. In 2009, Governor Paterson issued Executive Order No. 24, establishing a goal of reducing GHG emissions in New York State by 80 percent, compared with 1990 levels, by 2050, and creating a Climate Action Council tasked with preparing a climate action plan outlining the policies required to attain the GHG reduction goal; an interim draft plan has been published.[5] The State is now seeking to achieve some of the emission reduction goals via local and regional planning and projects through its Cleaner Greener Communities and Climate Smart Communities programs. The State has also adopted California's GHG vehicle standards (which are at least as strict as the federal standards).

The New York State Energy Plan outlines the State's energy goals and provides strategies and recommendations for meeting those goals. The latest version of the plan was published in June 2015. The new plan outlines a vision for transforming the state's energy sector that would result in increased energy efficiency (both demand and supply), increased carbon-free power production,

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[2] Conference of the Parties, 21st Session. *Adoption of The Paris Agreement, decision -/CP.21*. Paris, December 12, 2015.

[3] United States of America. *Intended Nationally Determined Contributions (INDCs)* as submitted. March 31, 2015.

[4] Under the Agreement, countries are allowed to withdraw four years from the date the agreement entered into force—meaning the United States can officially withdraw on November 4, 2020. However, given the voluntary nature of the agreement, any action in the U.S. may or may not occur regardless of this status.

[5] New York State Climate Action Council. *New York State Climate Action Plan Interim Report*. November 2010.

and cleaner transportation, in addition to achieving other goals not related to GHG emissions. The 2015 plan also establishes new targets: (1) reducing GHG emissions in New York State by 40 percent, compared with 1990 levels, by 2030; (2) providing 50 percent of electricity generation in the State from renewable sources by 2030; and (3) increasing building energy efficiency gains by 600 trillion British thermal units (BTUs) by 2030.

New York State has also developed regulations to cap and reduce CO_2 emissions from power plants to meet its commitment to the Regional Greenhouse Gas Initiative (RGGI). Under the RGGI agreement, the governors of nine northeastern and Mid-Atlantic states have committed to regulate the amount of CO_2 that power plants are allowed to emit, gradually reducing annual emissions to half the 2009 levels by 2020. The RGGI states and Pennsylvania have also announced plans to reduce GHG emissions from transportation, through the use of biofuel, alternative fuel, and efficient vehicles.

Many local governments worldwide, including New York City, are participating in the Cities for Climate Protection™ campaign and have committed to adopting policies and implementing quantifiable measures to reduce local GHG emissions, improve air quality, and enhance urban livability and sustainability. New York City's long-term comprehensive plan for a sustainable and resilient New York City, which began as PlaNYC 2030 in 2007, and continues to evolve today as OneNYC, includes GHG emissions reduction goals, many specific initiatives that can result in emission reductions, and initiatives aimed at adapting to future climate change impacts. The goal to reduce citywide GHG emissions to 30 percent below 2005 levels by 2030 ("30 by 30") was codified by Local Law 22 of 2008, known as the New York City Climate Protection Act (the "GHG reduction goal").[6] The City has also announced a longer-term goal of reducing emissions to 80 percent below 2005 levels by 2050 ("80 by 50"), which was codified by Local Law 66 of 2014, and has published a study evaluating the potential for achieving that goal. More recently, as part of OneNYC, the City has announced a more aggressive goal for reducing emissions from building energy down to 30 percent below 2005 levels by 2025.

In December 2009, the New York City Council enacted four laws addressing energy efficiency in large new and existing buildings, in accordance with PlaNYC. The laws require owners of existing buildings larger than 50,000 sf to conduct energy efficiency audits and retro-commissioning every 10 years, to optimize building energy efficiency, and to "benchmark" the building energy and water consumption annually, using an EPA online tool. By 2025, commercial buildings over 50,000 sf will also require lighting upgrades, including the installation of sensors and controls, more efficient light fixtures, and the installation of submeters, so that tenants can be provided with information on their electricity consumption. The legislation also creates a local New York City Energy Conservation Code, which along with the NYSECCC (as updated in 2016), requires equipment installed during a renovation to meet current efficiency standards.

To achieve the 80 by 50 goal, the City is convening Technical Working Groups (TWGs) to analyze the GHG reduction pathways from the building sector, power, transportation, and solid waste sectors to develop action plans for these sectors. The members of the TWGs will develop and recommend the data analysis, interim metrics and indicators, voluntary actions, and potential mandates to effectively achieve the City's emissions reduction goal. In 2016, the City published the building sector TWG report, which included commitments by the City to change to building energy code and take other measures aimed at substantially reducing GHG emissions.

[6] Administrative Code of the City of New York, §24-803.

For certain projects subject to CEQR (e.g., projects with 350,000 gsf or more of development or other energy intense projects), an analysis of the projects' contributions to GHG emissions is required to determine consistency with the City's reduction goal, which is currently the most appropriate standard by which to analyze a project under CEQR, and is therefore applied in this chapter.

A number of benchmarks for energy efficiency and green building design have also been developed (green building design considerations include factors such as material selection, which affects GHG emissions associated with materials extraction, production, delivery, and disposal.) For example, the LEED system is a benchmark for the design, construction, and operation of high-performance green buildings that includes energy efficiency components. Similarly, Envision is a voluntary system for benchmarking performance and resiliency of physical infrastructure projects. EPA's Energy Star is a voluntary labeling program designed to identify and promote the construction of new energy efficient buildings, facilities, and homes and the purchase of energy efficient appliances, heating and cooling systems, office equipment, lighting, home electronics, and building envelopes.

D. METHODOLOGY

Climate change is driven by the collective contributions of diverse individual sources of emissions to global atmospheric GHG concentrations. Identifying potential GHG emissions from a proposed action can help decision makers identify practicable opportunities to reduce GHG emissions and ensure consistency with policies aimed at reducing overall emissions. While the increments of criteria pollutants and toxic air emissions are assessed in the context of health-based standards and local impacts, there are no established thresholds for assessing the significance of a project's contribution to climate change. Nonetheless, prudent planning dictates that all sectors address GHG emissions by identifying GHG sources and practicable means to reduce them. Therefore, this chapter presents the total GHG emissions potentially associated with the proposed project and identifies measures that would be implemented and measures that are still under consideration to limit emissions. Note that this differs from most other technical areas in that it does not account for only the increment between the future with the proposed actions (the "With Action" condition) and the future without the proposed actions (the "No Action" condition). The reason for that different approach is that to truly account for the incremental emissions only would require speculation regarding where people would live in a No Action condition if dwelling units (DUs) are not built at this location, what energy use and efficiency might be like for those alternatives and other related considerations, and similar assumptions regarding commercial and other uses. The focus is therefore on the total emissions associated with the uses, and on the effect of measures to reduce those emissions.

Estimates of potential GHG emissions associated with the proposed project are based on the methodology presented in the *CEQR Technical Manual*. Estimates of emissions of GHGs from the development have been quantified, including off-site emissions associated with use of electricity and steam, on-site emissions from heat and hot water systems, and emissions from vehicle use associated with the proposed development. GHG emissions that would result from construction are discussed as well. As per the guidance, analysis of building energy is based on the average carbon intensity of electricity in 2008, which will likely be lower in the 2025 build year and lower still in future years as the fraction of electricity generated from renewable sources continues to increase. Vehicular emission factors will also continue to decrease in future years as vehicle engine efficiency increases and emissions standards continue to decrease, resulting in lower emissions in future years. Since the methodology does not account for future years and other changes described above, it also does not explicitly address potential changes in future consumption associated with climate change, such as increased electricity for cooling, or decreased on-site fuel for heating. Overall, this analysis results in conservatively high estimates of potential GHG emissions.

CO_2 is the primary pollutant of concern from anthropogenic emission sources and is accounted for in the analysis of emissions from all development projects. GHG emissions for gases other than CO_2 are included where practicable or in cases where they comprise a substantial portion of overall emissions. The various GHG emissions are added together and presented as metric tons of CO_2e emissions per year (see Section B, "Pollutants of Concern").

BUILDING OPERATIONAL EMISSIONS

Estimates of emissions due to building electricity and fuel use were prepared using building carbon intensity by use type as detailed in the *CEQR Technical Manual*. Per *CEQR Technical Manual* guidance, the building carbon intensity data represents 2008 citywide averages by use type and not projections for the future build year (2025). Estimates of emissions due to school electricity and fuel use were prepared using school building carbon intensities calculated from the 2014 local law 88 benchmark data,[7] representing citywide average for schools (carbon intensity for schools is not available in the *CEQR Technical Manual*.) Future emissions are expected to be lower as efficiency and renewable energy use for grid-supplied electric power continue to increase with the objective of meeting State and City future GHG reduction goals. The school energy use and emissions would be lower since the school would be built to meet Passive House standards or the SCA design criteria.

MOBILE SOURCE EMISSIONS

The number of annual weekday and Saturday vehicle trips by mode (cars, taxis, and trucks) that would be generated by the proposed project was calculated using the transportation planning assumptions developed for the analysis and presented in Chapter 11, "Transportation." The assumptions used in the calculation include average daily weekday and Saturday person trips and delivery trips by proposed use, the percentage of vehicle trips by mode, and the average vehicle occupancy. To calculate annual totals, the number of trips on Sundays was assumed to be the same as on Saturday. Travel distances shown in Table 18-6 and 18-7 and associated text of the *CEQR Technical Manual* were used in the calculations of annual vehicle miles traveled by cars, taxis, and trucks. Table 18-8 of the *CEQR Technical Manual* was used to determine the percentage of vehicle miles traveled by road type and the mobile GHG emissions calculator provided with the manual was used to estimate GHG emissions from car, taxi, and truck trips attributable to the proposed project.

Based on the latest fuel lifecycle model from Argonne National Laboratory,[8] emissions from producing and delivering fuel ("well-to-pump") are estimated to add an additional 25 percent to the GHG emissions from gasoline and 27 percent from diesel. Although upstream emissions (emissions associated with production, processing, and transportation) of all fuels can be substantial and are important to consider when comparing the emissions associated with the consumption of different fuels, fuel alternatives are not being considered for the proposed development, and as per the *CEQR Technical Manual* guidance, the well-to-pump emissions are

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[7] New York City Mayor's Office of Sustainability. 2015 LL84 Energy and Water Data Disclosure (Data for Calendar Year 2014). Latest version dated 12/8/15.

[8] Based on GREET1_2016 model from Argonne National Laboratory.

not considered in the analysis. The assessment of tailpipe emissions only is in accordance with the *CEQR Technical Manual* guidance on assessing GHG emissions and the methodology used in developing the New York City GHG inventory, which is the basis of the GHG reduction goal.

The total projected annual vehicle miles traveled by roadway type, forming the basis for the GHG emissions calculations from mobile sources, are summarized in **Table 13-2**.

Table 13-2
Vehicle Miles Traveled per Year

Roadway Type	Passenger	Taxi	School Bus	Truck
Local	613,273	71,380	699	371,775
Arterial	1,257,209	146,330	1,434	762,138
Interstate/Expressway	1,195,882	139,192	1,364	724,961
Total	**3,066,364**	**356,902**	**3,496**	**1,858,874**

CONSTRUCTION EMISSIONS

A description of construction activities is provided in Chapter 16, “Construction.” Consistent with CEQR practice, emissions associated with construction have not been estimated explicitly for the proposed project, but analyses of similar projects have shown that construction emissions (both direct and emissions embedded in the production of materials, including on-site construction equipment, delivery trucks, and upstream emissions from the production of steel, rebar, aluminum, and cement used for construction) are equivalent to the total operational emissions over approximately 5 to 10 years.

EMISSIONS FROM SOLID WASTE MANAGEMENT

The proposed project would not fundamentally change the City’s solid waste management system. Therefore, as per the *CEQR Technical Manual*, the GHG emissions from solid waste generation, transportation, treatment, and disposal are not quantified.

E. PROJECTED GHG EMISSIONS

The building floor area, emission intensity, and resulting GHG emissions from each of the uses are presented in detail in **Table 13-3**. Note that, as described above, these do not include any specific design measures related to energy efficiency.

The mobile-source-related GHG emissions from the proposed project are presented in detail in **Table 13-4**.

In addition to the direct emissions included in the analysis, an additional approximately 25 percent would be emitted upstream, associated with fuel extraction, production, and delivery.

Table 13-3
Annual Building Operational Emissions

Source Use	Building Area (gsf)	GHG Intensity [1] (kg CO_2e / gsf / year)	Annual GHG Emissions (metric tons CO_2e)
School	145,000	5.25[(2)]	761
Residential	830,000	6.59	5,470
Office	245,000	9.43	2,310
Retail	50,000	9.43	472
Community Facility	15,000	9.43	141
		Total	**9,154**

Notes:
Totals may not sum due to rounding.
Per *CEQR Technical Manual* guidance, electricity emissions are representative of existing conditions in 2012 and not the future build year (2025). Future emissions are expected to be lower.
Representative emission intensity for existing buildings are higher than new and future construction, and do not include the expected energy efficiency measures.
Sources:
[1] *CEQR Technical Manual.*
[2] AKRF, 2017, based on *Local Law 84 Benchmarking Data Disclosure* (for 2015 disclosure, 2014 data).

Table 13-4
Annual Mobile Source Emissions (metric tons CO_2e, 2025)

Use	Passenger Vehicle	Taxi	School Bus	Truck	*Total*
Schools	134	1	4	312	*451*
Residential	439	52	0	931	*1,421*
Office	284	22	0	1,179	*1,485*
Retail	172	35	0	272	*479*
Community Facility	74	4	0	90	*168*
Total	**1,103**	**114**	**4**	**2,784**	***4,005***

A summary of operational GHG emissions by source type is presented in **Table 13-5**. Note that if new buildings were to be constructed elsewhere to accommodate the same number of DUs and space for other uses, the emissions from the use of electricity, energy for heating and hot water, and vehicle use could equal or exceed those estimated for the proposed project, depending on their location, access to transit, building type, and energy efficiency measures. As described in Section D, "Methodology," construction emissions were not modeled explicitly, but are estimated to be equivalent to approximately 5 to 10 years of operational emissions, including both direct energy and emissions embedded in materials (extraction, production, and transport). The proposed project is not expected to fundamentally change the City's solid waste management system, and therefore emissions associated with solid waste are not presented.

Table 13-5
Summary of Annual GHG Emissions, 2025 (metric tons CO_2e)

Use	Building Operations	Mobile	*Total*
Schools	761	451	*1,212*
Residential	5,470	1,421	*6,891*
Office	2,310	1,485	*3,795*
Retail	472	479	*951*
Community Facility	141	168	*310*
Total	**9,154**	**4,005**	***13,159***

The operational emissions from building energy use include on-site emissions from fuel consumption as well as emissions associated with the production and delivery of the electricity to be used on-site.

F. ELEMENTS THAT WOULD REDUCE GHG EMISSIONS

In general, dense, mixed-use development with access to transit and existing roadways is consistent with sustainable land use planning and smart growth strategies to reduce the carbon footprint of new development. These features and other measures currently under consideration are discussed in this section, addressing the PlaNYC/OneNYC City's GHG reduction goals as outlined in the *CEQR Technical Manual*. The implementation of the various design measures and features described would result in development that is consistent with the City's emissions reduction goal, as defined in the *CEQR Technical Manual*.

BUILD EFFICIENT BUILDINGS

The co-applicants are committed to designing and constructing the lower school and high school buildings so as to meet the SCA design criteria, including following the *New York City Green School Guide 2016* (or later version applicable at the time of design). The current version of the SCA guidance, issued in April 2016, was designed to reduce school energy costs by at least 20 percent compared to the baseline referenced in LEED for Schools 2009/EA Credit 1 or the NYSECCC which was in effect at that time, whichever is more stringent, and Passive House standards are more energy efficient than that. An additional 5 or 10 percent energy cost savings beyond the 20 percent mandate must be implemented, unless the payback on the investment exceeds 7 years. Effective October 2016, New York City and NYSECCC (which is also adopted by New York City) were revised to incorporate much stricter energy efficiency requirements. Therefore, it is unclear at this time how design compliant with the current (April 2016) SCA guidance would compare with the current building code. Should SCA update its guidance prior to the design of the schools, the energy use and the ensuing GHG emissions associated with the schools would be substantially lower than that of buildings built to meet but not exceed the current New York City Building Energy Code.

Regarding the uses other than schools, the co-applicants are required at a minimum to achieve the energy efficiency requirements of the New York City Building Code. In 2016, as part of the City's implementation of strategies aimed at achieving the OneNYC GHG reduction goals, the City adopted the 2016 New York City Energy Conservation Construction Code, which substantially increased the stringency of the building energy efficiency requirements and adopted the ASHRAE 90.1-2013 standard as a benchmark. In 2016, the City also published the findings of a the Buildings TWG convened by the City to identify the pathway to achieving the GHG reduction goals in the building sector;[9] should the measures identified by the Buildings TWG or other measures not yet implemented be adopted by the City in the future, they may apply to the proposed project and the proposed project would implement any measures required under such programs.

Therefore, the proposed project would support the goal identified in the *CEQR Technical Manual* of building efficient buildings.

[9] The City of New York. *Technical Working Group Report: Transforming New York City Buildings for a Low-Carbon Future*. 2016.

USE CLEAN POWER

The proposed project would use natural gas, a lower carbon fuel, for the normal operation of the heat and hot water systems.

TRANSIT-ORIENTED DEVELOPMENT AND SUSTAINABLE TRANSPORTATION

The proposed project is located in an area heavily supported by many transit options, including

- multiple adjacent and nearby subway stations, including the Hoyt-Schermerhorn Street station serving A, C, and G trains, Atlantic Avenue–Barclays Center station serving B, D, N, Q, R, and No. 2, 3, 4, and 5 trains, Nevins Street station serving No. 2, 3, 4, and 5 trains, Fulton Street station serving the G train, and Lafayette Avenue station serving the C train;
- adjacent bus stops serving the B41, B45, B63, B67, and B103 bus routes, and bus stops serving the B25, B26, B38, and B52 routes within a short walking distance; and
- the adjacent Atlantic Terminal serving the Long Island Rail Road connections to Long Island.

In addition, the proposed project is adjacent to the dedicated bike route on Lafayette Avenue and Schermerhorn Street, connecting to all major bike routes, and next to two Citi Bike stations to the north and south.

REDUCE CONSTRUCTION OPERATION EMISSIONS

Construction specifications would include an extensive diesel emissions reduction program, as described in detail in Chapter 16 “Construction,” including diesel particle filters for large construction engines and other measures. These measures would reduce particulate matter emissions; while particulate matter is not included in the list of standard GHGs (“Kyoto gases”), recent studies have shown that black carbon—a constituent of particulate matter—may play an important role in climate change.

USE BUILDING MATERIALS WITH LOW CARBON INTENSITY

Recycled steel would most likely be used for most structural steel since the steel available in the region is mostly recycled. Some cement replacements such as fly ash and/or slag may also be used, and concrete content would be optimized to the extent feasible. ✷

A. INTRODUCTION

This chapter assesses the potential for the proposed actions to result in significant adverse noise impacts. The analysis determines whether the proposed actions would result in increases in noise levels that could have a significant adverse impact on nearby sensitive receptors and also considers the effect of existing noise levels at the projected and potential development. The project site was previously analyzed as a projected development site in the Downtown Brooklyn Development Final Environmental Impact Statement (FEIS). As a result of the analysis of this site in that FEIS, a noise (E) Designation (E-124) was mapped on a portion of the site requiring window/wall attenuation and an alternate means of ventilation.

PRINCIPAL CONCLUSIONS

The analysis finds that the proposed actions would not result in any significant adverse noise impacts at nearby noise receptors.

The building attenuation analysis determined that the proposed actions would require between 28 and 37 A-weighted decibels (dBA) window/wall attenuation to meet 2014 *City Environmental Quality Review (CEQR) Technical Manual* interior noise level requirements. These attenuation requirements account for measured existing noise levels, future changes in mobile sources of noise (e.g., traffic on adjacent roadways), and stationary sources of noise (e.g., noise from playground spaces included in the proposed schools, noise from mechanical equipment) and consequently supersede the attenuation levels established for this location in the Downtown Brooklyn Development FEIS. Given the levels of attenuation to be provided and because the (E) Designation would require proposed buildings to satisfy its specifications prior to obtaining building permits, there would be no significant adverse noise impact with respect to the proposed buildings.

The school playground analysis concludes that noise associated with the proposed high and lower school playgrounds would not meaningfully contribute to noise level increases at any nearby existing noise receptors. Therefore, there would be no significant adverse noise impact to noise receptors in the surrounding area due to the high and lower school playgrounds.

B. ACOUSTICAL FUNDAMENTALS

Sound is a fluctuation in air pressure. Sound pressure levels are measured in units called decibels (dB). The particular character of the sound that we hear (e.g., a whistle compared with a French horn) is determined by the speed, or frequency, at which the air pressure fluctuates, or oscillates. Frequency defines the oscillation of sound pressure in terms of cycles per second. One cycle per second is known as 1 Hertz (Hz). People can hear over a relatively limited range of sound frequencies, generally between 20 Hz and 20,000 Hz, and the human ear does not perceive all frequencies equally well. High frequencies (e.g., a whistle) are more easily discernible and therefore more intrusive than many of the lower frequencies (e.g., the lower notes on the French horn).

A-WEIGHTED SOUND LEVEL (DBA)

In order to establish a uniform noise measurement that simulates people's perception of loudness and annoyance, the decibel measurement is weighted to account for those frequencies most audible to the human ear. This is known as the A-weighted sound level, or dBA, and it is the descriptor of noise levels most often used for community noise. As shown in **Table 14-1**, the threshold of human hearing is defined as 0 dBA; very quiet conditions (e.g., a library) are approximately 40 dBA; normal daily activity levels are between 50 dBA and 70 dBA; noisy levels are above 70 dBA; and loud, intrusive, and deafening levels approach 130 dBA.

Table 14-1
Common Noise Levels

Sound Source	(dBA)
Military jet, air raid siren	130
Amplified rock music	110
Jet takeoff at 500 meters	100
Freight train at 30 meters	95
Train horn at 30 meters	90
Heavy truck at 15 meters	80–90
Busy city street, loud shout	80
Busy traffic intersection	70–80
Highway traffic at 15 meters, train	70
Predominantly industrial area	60
Light car traffic at 15 meters, city or commercial areas, or residential areas close to industry	50–60
Background noise in an office	50
Suburban areas with medium-density transportation	40–50
Public library	40
Soft whisper at 5 meters	30
Threshold of hearing	0

Note: A 10 dBA increase in level appears to double the loudness, and a 10 dBA decrease halves the apparent loudness.
Sources: Cowan, James P. *Handbook of Environmental Acoustics,* Van Nostrand Reinhold, New York, 1994. Egan, M. David, Architectural Acoustics. McGraw-Hill Book Company, 1988.

In considering these values, it is important to note that the dBA scale is logarithmic, meaning that each increase of 10 dBA describes a doubling of perceived loudness. Thus, the background noise in an office, at 50 dBA, is perceived as twice as loud as a library at 40 dBA. For most people to perceive an increase in noise, it must be at least 3 dBA. At 5 dBA, the change will be readily noticeable.

NOISE DESCRIPTORS USED IN IMPACT ASSESSMENT

Because the sound pressure level unit of dBA describes a noise level at just one moment and very few noises are constant, other ways of describing noise over extended periods have been developed. One way of describing fluctuating sound is to describe the fluctuating noise heard over a specific time period as if it had been a steady, unchanging sound. For this condition, a descriptor called the "equivalent sound level," L_{eq}, can be computed. L_{eq} is the constant sound level that, in a given situation and time period (e.g., 1 hour, denoted by $L_{eq(1)}$, or 24 hours, denoted as $L_{eq(24)}$), conveys the same sound energy as the actual time-varying sound. The Day-Night Sound Level, L_{dn}, refers to a 24-hour average noise level with a 10 dB penalty applied to the noise levels during the hours between 10 PM and 7 AM, due to increases sensitivity to noise levels during these hours. Statistical sound level descriptors such as L_1, L_{10}, L_{50}, L_{90}, and L_x, are used to indicate noise levels that are exceeded 1, 10, 50, 90, and x percent of the time, respectively.

The relationship between L_{eq} and levels of exceedance is worth noting. Because L_{eq} is defined in energy rather than straight numerical terms, it is not simply related to the levels of exceedance. If the noise fluctuates very little, L_{eq} will approximate L_{50} or the median level. If the noise fluctuates broadly, the L_{eq} will be approximately equal to the L_{10} value. If extreme fluctuations are present, the L_{eq} will exceed L_{90} or the background level by 10 or more decibels. Thus the relationship between L_{eq} and the levels of exceedance will depend on the character of the noise. In community noise measurements, it has been observed that the L_{eq} is generally between L_{10} and L_{50}.

For purposes of the proposed actions, the 1-hour L_{eq} descriptor has been selected as the noise descriptor to be used in this noise impact evaluation, and the 1-hour L_{10} has been selected as the noise descriptor used to evaluate noise exposure at newly introduced noise receptors. These are the descriptors recommended by the *CEQR Technical Manual* for City environmental impact review classification. The L_{dn} is the noise descriptor used in the *HUD Noise Guidebook* and sets exterior noise standards for housing construction projects receiving federal funds.

C. NOISE STANDARDS AND CRITERIA

NEW YORK CEQR TECHNICAL MANUAL NOISE STANDARDS

The *CEQR Technical Manual* sets external noise exposure standards; these standards are shown in **Table 14-2**. Noise exposure is classified into four categories: acceptable, marginally acceptable, marginally unacceptable, and clearly unacceptable.

Table 14-2
Noise Exposure Guidelines For Use in City Environmental Impact Review

Receptor Type	Time Period	Acceptable General External Exposure	Airport[3] Exposure	Marginally Acceptable General External Exposure	Airport[3] Exposure	Marginally Unacceptable General External Exposure	Airport[3] Exposure	Clearly Unacceptable General External Exposure	Airport[3] Exposure
Outdoor area requiring serenity and quiet[2]		$L_{10} \le 55$ dBA	---------- $Ldn \le 60$ dBA ----------	N/A	N/A	N/A	N/A	N/A	N/A
Hospital, nursing home		$L_{10} \le 55$ dBA		$55 < L_{10} \le 65$ dBA	---------- $60 < Ldn \le 65$ dBA ----------	$65 < L_{10} \le 80$ dBA	(i) $65 < Ldn \le 70$ dBA, (II) $70 \le Ldn$	$L_{10} > 80$ dBA	---------- $Ldn \le 75$ dBA ----------
Residence, residential hotel, or motel	7 AM to 10 PM	$L_{10} \le 65$ dBA		$65 < L_{10} \le 70$ dBA		$70 < L_{10} \le 80$ dBA		$L_{10} > 80$ dBA	
	10 PM to 7 AM	$L_{10} \le 55$ dBA		$55 < L_{10} \le 70$ dBA		$70 < L_{10} \le 80$ dBA		$L_{10} > 80$ dBA	
School, museum, library, court, house of worship, transient hotel or motel, public meeting room, auditorium, outpatient public health facility		Same as Residential Day (7 AM-10 PM)		Same as Residential Day (7 AM-10 PM)		Same as Residential Day (7 AM-10 PM)		Same as Residential Day (7 AM-10 PM)	
Commercial or office		Same as Residential Day (7 AM–10 PM)		Same as Residential Day (7 AM–10 PM)		Same as Residential Day (7 AM–10 PM)		Same as Residential Day (7 AM–10 PM)	
Industrial, public areas only[4]	Note 4	Note 4		Note 4		Note 4		Note 4	

Notes:
(i) In addition, any new activity shall not increase the ambient noise level by 3 dBA or more
[1] Measurements and projections of noise exposures are to be made at appropriate heights above site boundaries as given by American National Standards Institute (ANSI) Standards; all values are for the worst hour in the time period.
[2] Tracts of land where serenity and quiet are extraordinarily important and serve an important public need, and where the preservation of these qualities is essential for the area to serve its intended purpose. Such areas could include amphitheaters, particular parks, or portions of parks, or open spaces dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet.
[3] One may use FAA-approved L_{dn} contours supplied by the Port Authority of New York and New Jersey (PANYNJ), or the noise contours may be computed from the federally approved INM Computer Model using flight data supplied by the PANYNY.
[4] External Noise Exposure standards for industrial areas of sounds produced by industrial operations other than operating motor vehicles or other transportation facilities are spelled out in the New York City Zoning Resolution, Sections 42-20 and 42-21. The referenced standards apply to M1, M2, and M3 manufacturing districts and to adjoining residence districts (performance standards are octave band standards).
Source: New York City Department of Environmental Protection (adopted policy 1983).

The *CEQR Technical Manual* defines attenuation requirements for buildings based on exterior noise level (see **Table 14-3**). Recommended noise attenuation values for buildings are designed to maintain interior noise levels of 45 dBA or lower for residential or classroom uses and 50 dBA or lower for retail, administrative, laboratory, or office uses, and are determined based on exterior $L_{10(1)}$ noise levels.

Table 14-3
Required Attenuation Values to Achieve Acceptable Interior Noise Levels

	Marginally Unacceptable				Clearly Unacceptable
Noise Level With Proposed Actions	$70 < L_{10} \leq 73$	$73 < L_{10} \leq 76$	$76 < L_{10} \leq 78$	$78 < L_{10} \leq 80$	$80 < L_{10}$
Attenuation[A]	(I) 28 dBA	(II) 31 dBA	(III) 33 dBA	(IV) 35 dBA	$36 + (L_{10}–80)^B$ dBA

Notes:
[A] The above composite window-wall attenuation values are for residential dwelling units (DUs). Retail and office spaces would be 5 dBA less in each category. All the above categories require a closed window situation and hence an alternate means of ventilation.
[B] Required attenuation values increase by 1 dBA increments for L_{10} values greater than 80 dBA.
Source: New York City Department of Environmental Protection.

IMPACT DEFINITION

The determination of significant adverse noise impacts in this analysis is informed by the use of both absolute noise level limits and relative impact criteria. The *CEQR Technical Manual* states that "it is reasonable to consider 65 dBA $L_{eq(1)}$ as an absolute noise level that should not be significantly exceeded." Therefore, the determination of impacts first considers whether a projected noise increase would result in noise levels exceeding 65 dBA $L_{eq(1)}$. This study uses the following relative impact criteria to define a significant adverse noise impact as recommended in the *CEQR Technical Manual*:

- An increase of 5 dBA, or more, in With Action $L_{eq(1)}$ noise levels at sensitive receptors (including residences, play areas, parks, schools, libraries, and houses of worship) over those calculated for the No Action condition, if the No Action levels are less than 60 dBA $L_{eq(1)}$ and the analysis period is not a nighttime period.
- An increase of 4 dBA, or more, in With Action $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the No Action condition, if the No Action levels are 61 dBA $L_{eq(1)}$ and the analysis period is not a nighttime period.
- An increase of 3 dBA, or more, in With Action $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the No Action condition, if the No Action levels are greater than 62 dBA $L_{eq(1)}$ and the analysis period is not a nighttime period.
- An increase of 3 dBA, or more, in With Action $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the No Action condition, if the analysis period is a nighttime period (defined by the *CEQR Technical Manual* criteria as being between 10 PM and 7 AM).

D. EXISTING NOISE LEVELS

Existing noise levels at the project site were measured at four locations. Site 1 was located on Flatbush Avenue between Schermerhorn Street and State Street; Site 2 was located on State Street between Flatbush Avenue and 3rd Avenue; Site 3 was located on 3rd Avenue between State Street and Schermerhorn Street; and Site 4 was located on Schermerhorn Street between 3rd Avenue and

Flatbush Avenue (see **Figure 14-1**). At each receptor site, 20-minute spot noise measurements were conducted on June 14, 2017, June 15, 2017, and June 20, 2017 during typical weekday AM (7:00 AM–9:00 AM), midday (MD) (12:00 PM–2:00 PM), and PM (4:30 PM–6:30 PM) peak periods.

EQUIPMENT USED DURING NOISE MONITORING

Measurements were performed using Brüel & Kjær Sound Level Meters (SLM) Type 2270 and Type 2260, Brüel & Kjær ½-inch microphone Type 4189, and a Brüel & Kjær Sound Level Calibrator Type 4231. The Brüel & Kjær SLM is a Type 1 instrument according to ANSI Standard S1.4-1983 (R2006). The SLM has a laboratory calibration date within 1 year of the date of the measurement, as is standard practice. At each Site, the microphone was mounted at a height of approximately 4 feet above the ground and was mounted away from any large reflecting surfaces that could affect the sound level measurement. The SLM was calibrated before and after the reading with a Brüel & Kjær Type 4231 Sound Level Calibrator using the appropriate adaptor. Measurements at the location were made on the A-scale (dBA). The data were digitally recorded by the SLM and displayed at the end of the measurement period in units of dBA. Measured quantities included L_{eq}, L_1, L_{10}, L_{50}, and L_{90}. A windscreen was used during all sound measurements except for calibration. All measurement procedures were based on the guidelines outlined in ANSI Standard S1.13-2005.

EXISTING NOISE LEVELS AT NOISE RECEPTOR LOCATIONS

MEASURED NOISE LEVELS

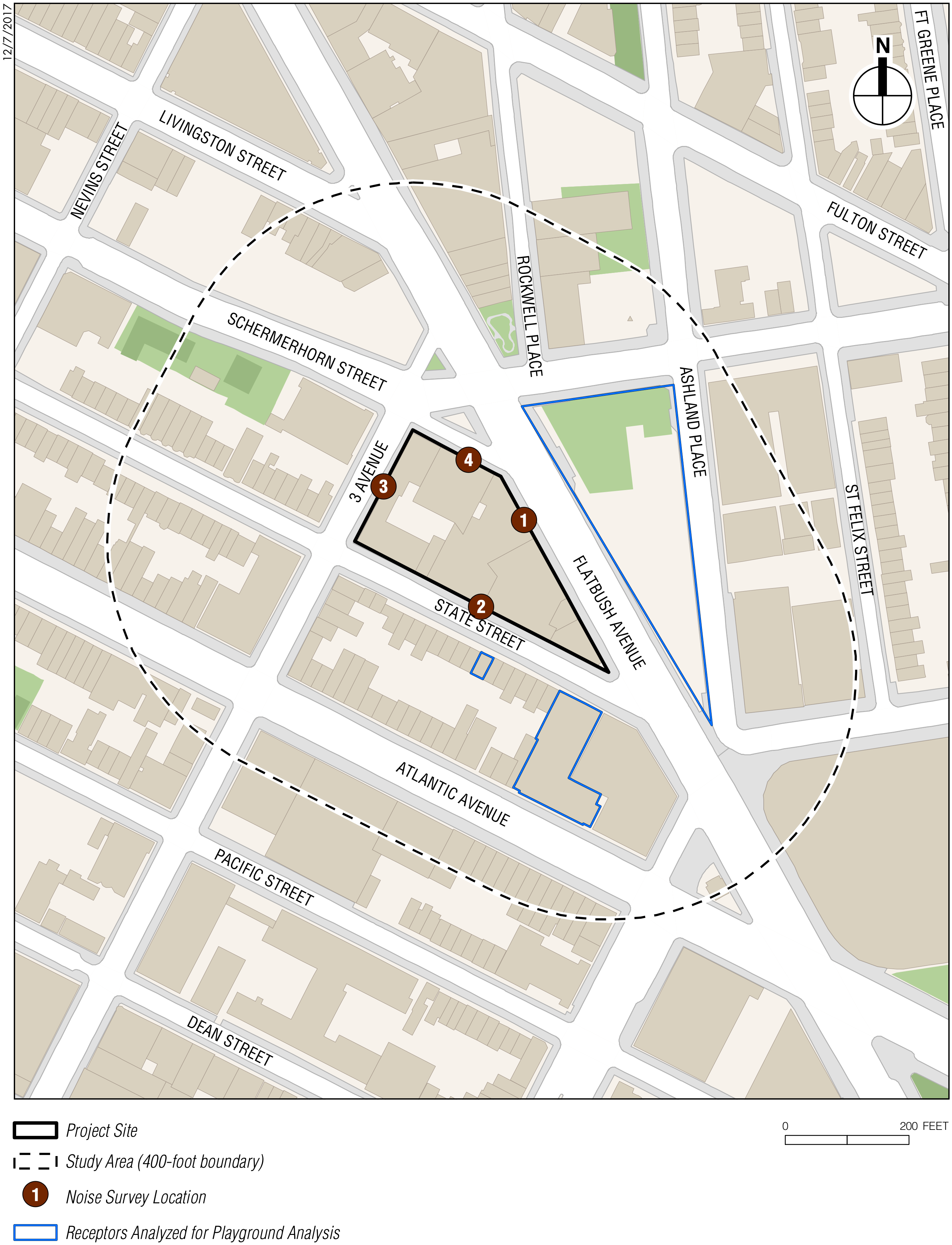
The results of the measurements of existing noise levels are summarized in **Table 14-4**. Vehicular traffic was the dominant noise source throughout the study area. Noise levels are moderate to relatively high and reflect the level of vehicular activity on adjacent roadways.

Table 14-4
Existing Noise Levels (in dBA)

Receptor	Measurement Location	Time	L_{eq}	L_1	L_{10}	L_{50}	L_{90}
1	Flatbush Avenue between Schermerhorn Street and State Street	AM	76.9	85.8	79.7	72.9	66.1
		MD	74.1	83.7	77.6	70.8	64.3
		PM	75.0	85.5	77.0	71.2	65.2
2	State Street between Flatbush Avenue and 3rd Avenue	AM	61.2	67.9	62.7	59.8	57.8
		MD	61.3	69.4	62.9	59.8	58.4
		PM	62.6	73.1	64.2	58.6	57.0
3	3rd Avenue between State Street and Schermerhorn Street	AM	73.3	83.1	78.0	68.5	64.1
		MD	69.6	76.9	72.6	67.3	64.6
		PM	66.1	74.8	68.5	63.9	60.7
4	Schermerhorn Street between 3rd Avenue and Flatbush Avenue	AM	73.8	84.5	75.7	70.7	66.7
		MD	70.9	79.2	72.5	69.2	66.9
		PM	67.8	75.6	70.2	66.2	63.6

Note: (1) Field measurements were performed by AKRF, Inc. between June 14 and June 20, 2017.

In terms of *CEQR Technical Manual* criteria, receptor Sites 1, 2, 3, and 4 are in the “marginally unacceptable” category.



ECF 80 FLATBUSH AVENUE

Noise Survey Locations

Figure 14-1

E. NOISE PREDICTION METHODOLOGY

GENERAL METHODOLOGY

Future noise levels were calculated using a proportional modeling technique, which was used as a screening tool to estimate changes in noise levels. The proportional modeling technique is an analysis methodology recommended for analysis purposes in the *CEQR Technical Manual*. The noise analysis examined the weekday AM, MD, and PM peak hours at all receptor Sites. The selected time periods are when the proposed project would be expected to produce the maximum traffic generation (based on the traffic studies presented in Chapter 11, "Transportation") and therefore result in the maximum potential for significant adverse noise impacts. The proportional modeling used for the noise analysis is described below.

Noise levels associated with the rooftop play areas that would be included in the proposed primary school and high school were calculated at surrounding receptors using data collected in measurements made at a series of New York City school playgrounds for the New York City School Construction Authority (SCA).[1] The projected playground noise levels in the future with the proposed actions (the "With Action" condition) were compared to future without the proposed actions (the "No Action" condition) noise levels at the receptors during the potential hours of playground use, and the projected incremental changes in noise level were compared to CEQR impact criteria. The playground noise analysis methodology is described below.

PROPORTIONAL MODELING

Proportional modeling was used to determine locations with the potential for having significant noise impacts. Proportional modeling is one of the techniques recommended in the *CEQR Technical Manual* for mobile source analysis.

Using this technique, the prediction of future noise levels where traffic is the dominant noise source is based on a calculation using measured existing noise levels and predicted changes in traffic volumes to determine No Action and With Action condition noise levels. Vehicular traffic volumes are converted into Noise Passenger Car Equivalent (Noise PCE) values, for which one medium-duty truck (having a gross weight between 9,900 and 26,400 pounds) is assumed to generate the noise equivalent of 13 cars, and one heavy-duty truck (having a gross weight of more than 26,400 pounds) is assumed to generate the noise equivalent of 47 cars, and one bus (vehicles designed to carry more than nine passengers) is assumed to generate the noise equivalent of 18 cars. Future noise levels are calculated using the following equation:

$$F\ NL - E\ NL = 10 * \log_{10} (F\ PCE / E\ PCE)$$

where:

F NL = Future Noise Level

E NL = Existing Noise Level

F PCE = Future Noise PCEs

E PCE = Existing Noise PCEs

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[1] SCA Playground Noise Study, AKRF, Inc., October 23, 1992.

Sound levels are measured in decibels and therefore increase logarithmically with sound source strength. In this case, the sound source is traffic volumes measured in Noise PCEs. As an example, traffic is assumed to be the dominant noise source at a particular location. If the existing traffic volume on a street is 100 PCE and if the future traffic volume were increased by 50 PCE to a total of 150 PCE, the noise level would increase by 1.8 dBA. Similarly, if the future traffic were increased by 100 PCE, or doubled to a total of 200 PCE, the noise level would increase by 3.0 dBA.

SCHOOL PLAYGROUND NOISE

Table 14-5 shows maximum hourly playground boundary noise levels based upon measurements made at a series of New York City school playgrounds for the SCA. [2]

Table 14-5
Reference Playground Boundary Noise $L_{eq(1)}$ Noise Levels (dBA)

Early Childhood	Elementary Schools	Intermediate Schools	High Schools
71.5	71.4	71.0	68.2
Source: SCA Playground Noise Study, AKRF, Inc., October 23, 1992.			

Geometric spreading and the consequent dissipation of sound energy with increasing distance from the playground decreases noise levels at varying distances from the playground boundary. Based upon measurements and acoustical principles, hourly noise levels were assumed to decrease by the following values at the specified distances from the playground boundary: 4.8 dBA at 20 feet, 6.8 dBA at 30 feet, and 9.1 dBA at 40 feet. For all distances between 40 and 300 feet, a 4.5-dBA drop-off per doubling of distances from the playground boundary was assumed.

The rooftop play area included in the proposed lower school is assumed to have both early childhood and elementary school use; consequently, the maximum playground boundary noise emission level of 71.5 dBA is used for the noise analysis of that play area. The outdoor terrace included in the proposed high school is assumed to have a maximum playground boundary noise emission level of 68.2 dBA.

F. FUTURE WITHOUT THE PROPOSED ACTIONS

Using the methodology previously described, No Action condition noise levels were calculated at the four mobile source noise analysis receptors for the 2025 analysis year. These No Action condition values are shown in **Table 14-6**.

In 2025, the maximum increase in $L_{eq(1)}$ noise levels for the No Action condition would be up to 5.1 dBA greater than existing noise levels at Site 2 on State Street. Changes of this magnitude would be considered noticeable. The increases in noise level along State Street would occur because of additional traffic volume on State Street rerouted as a result of the future closure of Schermerhorn Street between 3rd Avenue and Flatbush Avenue.

[2] *SCA Playground Noise Study*, AKRF, Inc., October 23, 1992.

Table 14-6
2025 No Action Condition Noise Levels (in dBA)

Receptor	Location	Time	Existing $L_{eq(1)}$	No Action $L_{eq(1)}$	$L_{eq(1)}$ Change	No Action $L_{10(1)}$
1	Flatbush Avenue between Schermerhorn Street and State Street	AM	76.9	77.3	0.4	80.1
		MD	74.1	75.0	0.9	78.5
		PM	75.0	75.7	0.7	77.7
2	State Street between Flatbush Avenue and 3rd Avenue	AM	61.2	66.3	5.1	67.8
		MD	61.3	65.9	4.6	67.5
		PM	62.6	67.5	4.9	69.1
3	3rd Avenue between State Street and Schermerhorn Street	AM	73.3	73.6	0.3	78.3
		MD	69.6	71.1	1.5	74.1
		PM	66.1	67.3	1.2	69.7
4	Schermerhorn Street between 3rd Avenue and Flatbush Avenue	AM	73.8	74.2	0.4	76.1
		MD	70.9	71.8	0.9	73.4
		PM	67.8	68.5	0.7	70.9

Note: Noise levels at all receptor Sites were calculated by using proportional modeling.

In 2025, the maximum increase in $L_{eq(1)}$ noise levels for the No Action condition would be up to 5.1 dBA greater than existing noise levels at Site 2 on State Street. Changes of this magnitude would be considered noticeable. The increases in noise level along State Street would occur because of additional traffic volume on State Street rerouted as a result of the future closure of Schermerhorn Street between 3rd Avenue and Flatbush Avenue.

The maximum increase in $L_{eq(1)}$ would be 1.5 dBA or less at Sites 1, 3, and 4. Changes of this magnitude would be considered imperceptible and not significant according to *CEQR Technical Manual* noise impact criteria. In terms of CEQR noise exposure guidelines, noise levels at Site 1 would be in the “Clearly Unacceptable” category, noise levels at Sites 2, 3, and 4 would be in the “Marginally Unacceptable” category.

G. FUTURE WITH THE PROPOSED ACTIONS

MOBILE SOURCE NOISE

Using the methodology previously described, With Action condition noise levels due to mobile source noise were calculated at the four noise analysis receptors for the 2025 analysis year. The With Action condition noise levels for each receptor site are shown in **Table 14-7**.

Table 14-7
2025 With Action Condition Noise Levels (in dBA)

Receptor	Location	Time	No Action $L_{eq(1)}$	With Action $L_{eq(1)}$	$L_{eq(1)}$ Change	With Action $L_{10(1)}$
1	Flatbush Avenue between Schermerhorn Street and State Street	AM	77.3	77.3	0.0	80.1
		MD	75.0	75.0	0.0	78.5
		PM	75.7	75.7	0.0	77.7
2	State Street between Flatbush Avenue and 3rd Avenue	AM	66.3	68.6	2.3	70.1
		MD	65.9	66.7	0.8	68.3
		PM	67.5	68.3	0.8	69.9
3	3rd Avenue between State Street and Schermerhorn Street	AM	73.6	73.9	0.3	78.6
		MD	71.1	71.2	0.1	74.2
		PM	67.3	67.6	0.3	70.0
4	Schermerhorn Street between 3rd Avenue and Flatbush Avenue	AM	74.2	74.2	0.0	76.1
		MD	71.8	71.8	0.0	73.4
		PM	68.5	68.5	0.0	70.9

In 2025, the maximum increase in $L_{eq(1)}$ noise levels for the With Action condition would be 2.3 dBA. Changes of this magnitude would be considered imperceptible or just noticeable according to *CEQR Technical Manual* guidance and would fall below the CEQR threshold for a significant adverse noise impact. In terms of CEQR noise exposure guidelines, With Action condition noise levels at Site 1 would remain in the "Clearly Unacceptable" category, With Action noise levels at Site 2 would change from the "Marginally Acceptable" category to the "Marginally Unacceptable" category, and With Action condition noise levels at Sites 2, 3 and 4 would remain in the "Marginally Unacceptable" category.

NOISE FROM THE PROPOSED ROOFTOP SCHOOL PLAY AREAS

The proposed primary school playground would be located along State Street at an elevation of approximately 53 feet above grade. The proposed high school outdoor terrace would be located along Flatbush Avenue at an elevation of approximately 85 feet above grade.

The nearest sensitive receptors to the proposed playgrounds are the residential buildings at 300 Ashland Place, 538 State Street, and 556 State Street. Using the methodology previously described, noise levels were determined at these receptors with the proposed playgrounds. The predicted noise levels in the future with the proposed school rooftop play areas are shown in **Table 14-8** (the full noise analysis of the proposed rooftop play areas is shown in **Appendix C**).

Table 14-8
Noise Levels due to the Lower and High School Playgrounds (in dBA)

Receptor	Time Period	No Action L_{eq}	With Action Traffic L_{eq}	Lower School Playground L_{eq}	High School Terrace L_{eq}	Total L_{eq}	L_{eq} Increment	Total L_{10}
300 Ashland	MD	75.0	75.0	54.1	54.2	75.1	0.1	78.6
	PM	75.7	75.7	54.1	54.2	75.8	0.1	77.8
538 State Street	MD	65.9	66.7	61.0	50.8	67.8	1.9	69.4
	PM	67.5	68.3	61.0	50.8	69.1	1.6	70.7
556 State Street	MD	65.9	66.7	57.5	50.8	67.3	1.4	68.9
	PM	67.5	68.3	57.5	50.8	68.7	1.2	70.3

The maximum predicted increase in $L_{eq(1)}$ noise level resulting from the proposed rooftop play areas would be 1.9 dBA. Noise level increases of this magnitude would be considered imperceptible to just noticeable and not significant according to *CEQR Technical Manual* noise impact criteria. Since this represents a conservative analysis using worst-case playground noise levels, and the predicted noise level increments do not exceed the impact criteria, the predicted level of noise generated by the proposed school rooftop play areas would not have a significant adverse impact according to CEQR criteria at any surrounding noise receptors.

Additionally, playground noise was projected to the façades of buildings included in the proposed actions that would have a line of sight to the proposed playgrounds. The maximum combined L_{10} noise levels at these locations resulting from both proposed play areas are shown in **Table 14-9**.

Table 14-9
Playground Noise Levels at Proposed Buildings (in dBA)

Building	Façade	Maximum $L_{10(1\text{-hour})}$
B (Wedge Shaped mixed-use Tower)	Overlooking Lower School Playground	73.8
A (High School and Lower School)	Block Interior North Overlooking Flatbush Avenue	75.7
	Block Interior East/South Overlooking Lower School Playground	73.8
C (Mixed-Use Tower)	Interior Block Overlooking Lower School Playground	73.8
	Block Interior (Overlooking High School Terrace)	76.4

H. NOISE ATTENUATION MEASURES

As described above, due to the analysis of the project site in the Downtown Brooklyn Redevelopment FEIS, a noise (E) Designation was placed on a portion the site (Brooklyn Block 174, Lots 9, 13, 18, 23 &24) to create a mechanism for providing sufficient building noise attenuation. Specifically, the following commitment was made in the noise (E) Designation (E-124):

"In order to ensure an acceptable interior noise environment at the projected and potential development sites, future uses on the sites must provide a minimum window/wall attenuation of either 25, 30, 35, or 40 dBA (depending on the site). Noise attenuation measures could include the installation of double or triple-glazed windows, central air conditioning, air conditioning sleeves containing air or HUD-approved fans."

In the case of this project site, the required level of attenuation per the Downtown Brooklyn Redevelopment FEIS was 35 dBA. This requirement was based on the then-current 2001 *CEQR Technical Manual*. However, the noise requirements were subsequently revised. The *CEQR Technical Manual* now defines attenuation requirements for buildings based on exterior noise level (which are set forth in **Table 14-3**). Recommended noise attenuation values for buildings are designed to maintain interior noise levels of 45 dBA or lower for residential or classroom uses and 50 dBA or lower for retail, administrative, laboratory, or office uses and are determined based on exterior $L_{10(1)}$ noise levels. The results of the building attenuation analysis are summarized in **Table 14-10**.

The attenuation of a composite structure is a function of the attenuation provided by each of its component parts and how much of the area is made up of each part. Normally, a building façade consists of wall, glazing, and any vents or louvers associated with the building mechanical systems in various ratios of area. The design for the proposed buildings will acoustically rated windows and air conditioning as an alternate means of ventilation. The proposed buildings' façades, including these elements, would be designed to provide a composite façade attenuation level greater than or equal to those listed in above in **Table 14-10**, along with an alternative means of ventilation.

The noise (E) Designation requirements will be revised to reflect the requirements shown in **Table 14-10** based on the updated analysis and current *CEQR Technical Manual* noise exposure guidance. The New York City Office of Environmental Remediation (OER) is responsible for enforcement of the noise (E) Designation for project buildings. To demonstrate compliance with the noise (E) Designation, a Noise Remedial Action Plan (RAP) must be submitted to OER for the project building, describing the specific façade construction and alternate means of ventilation that will be used to meet the noise (E) Designation. If OER approves the RAP for the building, it will issue a Notice to Proceed (NTP) allowing construction to begin on the (E) designated site.

Lot 1 was not mapped with an (E) Designation for noise. To ensure an appropriate level of window/wall attenuation is provided in proposed buildings developed on Lot 1, attenuation measures comparable to the (E) Designation would be required as part of the proposed project through the development agreement between the New York City Educational Construction Fund (ECF) and 80 Flatbush Avenue, LLC.

By adhering to these design specifications, the proposed buildings will thus provide sufficient attenuation to meet the *CEQR Technical Manual* interior noise level requirement of no greater than 45 dBA $L_{10(1)}$ for residential or classroom uses and no greater than 50 dBA $L_{10(1)}$ for retail, laboratory, administrative, or office uses. With these measures in place, there would be no potential for significant adverse noise impacts.

Table 14-10
Minimum Required Building Attenuation (in dBA)

Building	Façade	Governing Noise Receptor Site	Maximum With Action $L_{10(1)}$	Minimum Attenuation Requirement[1]
B (Wedge Shaped mixed-use Tower)	Flatbush Avenue	1	80.1	37
	State Street (within 100 feet of Flatbush Avenue)	1	80.1	37
	State Street (more than 100 feet from Flatbush Avenue)	2	70.1	28
	Overlooking Lower School Playground	Lower School Playground	73.8	31
	Block Interior (west)	1	80.1	37
A (High School and Lower School)	Flatbush Avenue	1	80.1	37
	Schermerhorn Street	4	76.1	33
	State Street	2	70.1	28
	Block Interior East Overlooking Flatbush Avenue	1	80.1	37
	Block Interior North Overlooking Flatbush Avenue	1	80.1	37
	Block Interior East/South Overlooking Lower School Playground	Lower School Playground	73.8	31
C (Mixed-Use Tower)	3rd Avenue	3	78.6	35
	Schermerhorn Street	4	76.1	33
	State Street (within 100 feet of 3rd Avenue)	3	78.6	35
	State Street (more than 100 feet from 3rd Avenue)	2	70.1	28
	Block Interior (South, more than 100 feet from 3rd Avenue)	2	70.1	28
	Block Interior (Overlooking High School Terrace)	4	76.4	33
	Block Interior (South, within 100 feet of 3rd Avenue)	3	78.6	35
	Interior Block Overlooking Lower School Playground	Lower School Playground	73.8	31
D Northwest Repurposed Building Cultural Community Space)	Schermerhorn Street	4	76.1	33
	3rd Avenue	3	78.6	35
E (Southwest Repurposed Building Retail Space)	3rd Avenue	3	78.6	35
	State Street within 100 feet of 3rd Avenue	3	78.6	35
	State Street more than 100 feet from 3rd Avenue	2	70.1	28

Note:
1 Attenuation values are shown for residential, classroom, and community facility uses; retail/commercial/administrative/laboratory/gymnasium/cafeteria uses would require 5 dBA less attenuation.

I. MECHANICAL EQUIPMENT

It is assumed that the building mechanical systems (i.e., HVAC systems) would be designed to meet all applicable noise regulations (i.e., Subchapter 5, §24-227 of the New York City Noise Control Code, the New York City Department of Buildings Code) and to avoid producing levels that would result in any significant increase in ambient noise levels. Therefore, the proposed actions would not result in any significant adverse noise impacts related to building mechanical equipment. ✷

A. INTRODUCTION

This chapter assesses the proposed actions' effect on public health. As defined by the 2014 *City Environmental Quality Review (CEQR) Technical Manual*, public health is the organized effort of society to protect and improve the health and well-being of the population through monitoring; assessment and surveillance; health promotion; prevention of disease, injury, disorder, disability, and premature death; and reducing inequalities in health status. The goal of CEQR with respect to public health is to determine whether adverse impacts on human health may occur as a result of a proposed project and, if so, to identify measures to mitigate such effects.

According to the *CEQR Technical Manual*, for most proposed projects, a public health analysis is not necessary. Where no significant unmitigated adverse impact is found in other CEQR analysis areas, such as air quality, water quality, hazardous materials, or noise, a public health analysis is not warranted. If an unmitigated significant adverse impact is identified in one of these analysis areas, the lead agency may determine that a public health assessment is warranted for that specific technical area. This assessment represents a distinct layer of inquiry; as its criteria are informed by public health considerations and are therefore different from the criteria that triggered the need to conduct a public health assessment.

As described in the relevant analyses of this Draft Environmental Impact Statement (DEIS), upon completion of construction, the proposed actions would not result in significant adverse impacts in any of the technical areas related to public health. However, as described in Chapter 16, "Construction," construction activities for the proposed project could potentially result in unmitigated significant adverse noise impacts. This significant adverse noise impact would be temporary as it is due to construction of the proposed project.

PRINCIPAL CONCLUSIONS

The proposed actions would not result in significant adverse public health impacts. As described in the relevant analyses of this DEIS, the proposed actions would not result in unmitigated significant adverse impacts in the areas of air quality, operational noise, water quality, or hazardous materials. However, as discussed in Chapter 16, "Construction," the proposed actions could result in temporary unmitigated construction noise impacts as defined by *CEQR Technical Manual* thresholds. As such, it was determined that a public health assessment of construction noise was appropriate. The assessment was conducted, and for the reasons discussed below, it was determined that the construction noise impact would not generate a significant adverse public health impact.

B. METHODOLOGY

The construction noise analysis presented in Chapter 16, "Construction," identified the extent of the potential noise exposure to the public as a result of construction of the proposed project. At locations and during times where either noise analysis determined the potential for significant adverse noise impacts, the projected noise effects were examined further to determine whether they would constitute significant adverse impacts to public health. The *CEQR Technical Manual* thresholds for noise exposure and construction noise impacts are based on quality of life considerations and not on public health considerations. The potential noise exposure identified in Chapter 16, "Construction" was evaluated for its potential to impact the health of the affected population by comparing it with the relevant health-based noise criteria as described in the *CEQR Technical Manual*, which identifies chronic exposure to high levels of noise, prolonged exposure to noise levels above 85 dBA (the *CEQR Technical Manual* recommended threshold for potential hearing loss), and episodic and unpredictable exposure to short-term impacts of noise at high decibel levels of concern for public health effects.

C. PUBLIC HEALTH ASSESSMENT

Construction of the proposed project would include noise control measures as required by the *New York City Noise Control Code.* These measures include a variety of source (i.e., reducing noise levels at the source or during the most sensitive time periods) and path (e.g., placement of equipment, implementation of barriers or enclosures between equipment and sensitive receptors) controls. Even with these noise control measures, the analysis presented in Chapter 16, "Construction," found that predicted noise levels due to construction-related activities would result in noise levels at receptors in the vicinity of the project's work area that would constitute potential significant adverse impacts. These significant adverse noise impacts would be temporary as they are due to construction of the proposed project.

Although the *CEQR Technical Manual* thresholds for significant adverse construction noise impacts are predicted to be exceeded at certain locations during construction, these exceedances would not constitute a significant adverse public health impact. As discussed above, the *CEQR Technical Manual* thresholds for construction noise are based on quality of life considerations and not on public health considerations. An impact found pursuant to a quality of life framework (i.e., significant adverse construction noise impact) does not definitively imply that an impact will exist when the analysis area is evaluated in terms of public health (i.e., significant adverse public health impact).

The predicted noise impacts identified would not constitute chronic exposure to high levels of noise because of the short term and intermittent nature of construction noise as described in Chapter 16, "Construction." The maximum predicted construction noise levels occur over a limited duration during the construction period based on the amount and type of construction work occurring in the construction work areas. Furthermore, construction activity would typically be limited to a single shift during the day with limited exceptions that would require variances from the New York City Department of Buildings, leaving the remainder of the day and the evening unaffected by construction noise. Since the construction noise would fluctuate in level and would not occur constantly throughout the construction period, which itself is limited in duration, it would not be described as "chronic." Consequently, construction of the proposed project would not have the potential to result in chronic exposure to high levels of noise.

The predicted absolute noise levels would be below the threshold for potential hearing loss of 85 dBA at all analyzed receptors. Based on the predicted noise levels described in Chapter 16, "Construction," it is also not expected that construction of the proposed project would result in unpredictable exposure to short-term impacts of noise at high decibel levels. Because of the limited magnitude by which interior noise levels would exceed the acceptable threshold at residential receptors and construction noise would not occur during the nighttime when residences are most sensitive to noise, predicted noise levels due to construction of the proposed project would not constitute unpredictable exposure to short-term impacts of noise at high decibel levels.

Additionally, the predicted noise exposure for occupants of the residential buildings that could experience potentially significant adverse construction noise impacts would depend on the amount of façade noise attenuation provided by the buildings. The façade noise attenuation is a factor of the building façade construction as well as whether the building's windows can remain closed. Buildings that have an alternate means of ventilation (e.g., some form of air conditioning) are assumed to be able to maintain a closed-window condition, which results in a higher level of façade noise attenuation.

At the existing residential receptors located along State Street and 3rd Avenue, standard building façade construction, along with an alternate means of ventilation allowing for the maintenance of a closed-window condition at this receptor, would be expected to provide approximately 25 dBA window/wall attenuation.[1] Since, as described above, the noise would not be chronic, and would not exceed the threshold of short-term high decibel levels, the predicted noise resulting from construction of the proposed project would not constitute a potential significant adverse public health impact. Therefore, there would not be significant adverse public health impacts due to construction of the proposed project. ✷

[1] Interior noise levels would be 25 dBA less than exterior noise levels. Standard façade construction using insulated glass windows typically provides approximately 25 dBA window/wall attenuation.

Chapter 16: Construction

A. INTRODUCTION

This chapter summarizes the construction program for the proposed project and assesses the potential for significant adverse impacts during construction. The City, state, and federal regulations and policies that govern construction are described, followed by the anticipated construction schedule and the types of activities likely to occur during the construction of the proposed project. The types of equipment to be used during construction are discussed, along with the expected number of workers and truck deliveries. Based on this information, an assessment of the potential impacts from construction activities is provided.

As described in Chapter 1, "Project Description," the future with the proposed actions (the "With Action" condition) assumes the construction of a mixed-use development on the project site, including a replacement facility for the existing high school on-site and a new lower school as well as residential, office, retail, and cultural community facility use. The proposed project is located on Block 174, Lots 1, 9, 13, 18, 23, and 24 in Downtown Brooklyn (the "project site") (see Figures 1-1 and 1-2).

The proposed project would include up to five distinct buildings, including two towers, on the project site. Construction would initially begin on a structure at the center of the site for the replacement high school and new lower school (Building A), and a mixed-use tower on the eastern side of the project site (Building B). Construction would commence on the eastern side of the site while the existing Khalil Gibran International Academy school buildings remain operational on the western side of the project site. Upon completion, the Khalil Gibran International Academy would be relocated into the new building. Construction would then begin on the mixed-use tower on the western portion of the project site (Building C). Based on the current design, the existing school building (School Building 1/Building E)at the southwestern corner of the project site would be adaptively reused as retail space, and the existing school building at the northwestern corner of the site (School Building 2/Building D) would be adaptively reused as cultural community facility space. Additional retail components would be located along Schermerhorn Street and Flatbush Avenue. Construction of the new buildings in the middle and eastern portions of the site is expected to take place over approximately 32 months from 2019 to 2021, while construction of the new building and construction activity involving the adaptive reuse of the school buildings on the western portion of the site is anticipated to take place over approximately 39 months from 2021 to 2024.

Development of the proposed project would be governed by the use and density regulations of the Special Downtown Brooklyn District (SDBD) and the proposed C6-9 zoning district, and the maximum zoning envelope permitted by the bulk modifications provided under the special permit. The maximum zoning envelope for the proposed project is larger than the space that would be occupied by the proposed buildings. Building C would not be constructed until the new school facilities are completed and the existing high school has relocated to its new facility. The larger envelope is to provide design flexibility in order to facilitate development of the complex and mixed-use nature of the program and to encourage/stimulate Class A commercial tenancy through the ability to create larger floor plates. Because the maximum zoning envelope would encompass School Building 2/Building D and allow for its demolition, and could partially extend into the footprint of School Building 1/Building E (or cantilever over it), the potential effects associated with the maximum zoning envelope are considered in the analysis below.

PRINCIPAL CONCLUSIONS

For analysis purposes, a reasonable worst-case conceptual construction phasing and schedule was developed to illustrate how construction of the proposed project would occur over an approximately 6-year period. The reasonable worst-case schedule conservatively accounts for overlapping construction activities and simultaneously operating construction equipment, thus capturing the cumulative nature of construction impacts that would result in the greatest impacts at nearby receptors.

For each of the various technical areas presented below, appropriate construction analysis periods were selected to represent reasonable worst-case conditions relevant to that technical area, which can occur at different times for different analyses. For example, the noisiest part of the construction may not be at the same time as the heaviest construction traffic. Therefore, the analysis periods may differ for different analysis areas. Where appropriate, the analysis accounted for the effects of elements of the proposed project that would be completed and operational during the selected construction analysis periods.

The conceptual construction schedule and plans on which the construction analysis was based assumed that School Buildings 1 and 2 on the project block would remain in place and be adaptively re-used. However, the maximum zoning envelope would allow for partial demolition of School Building 1 on 3rd Avenue at State Street and complete demolition of School Building 2 on 3rd Avenue at Schermerhorn Street along with a slightly larger footprint for the proposed buildings on the western portion of the project block. If such demolition were to occur, it would result in minor changes to the placement/location of construction equipment and the duration of individual construction activities on the western portion of the project block. Given the amount of construction equipment projected to be operating on the project site and the duration over which it would be operating, the logistics and schedule changes would not change in the conclusions of the construction analysis with respect to the maximum zoning envelope.

Construction of the proposed project—as is the case with most construction projects—would result in temporary disruptions in the surrounding area. However, the New York City Educational Construction Fund (ECF) and 80 Flatbush Avenue, LLC (the “co-applicants”) have committed to implementing a variety of measures during construction to minimize the effects of the proposed project on the nearby community, including:

COMMUNITY SAFETY

- Maintenance and Protection of Traffic (MPT) plans would be developed for any temporary sidewalk, lane, and/or street closures. Approval of these plans and implementation of the closures would be coordinated with the New York City Department of Transportation (DOT)’s Office of Construction Mitigation and Coordination (OCMC);
- A number of measures would be employed to ensure public safety during the construction of the proposed project, including many that exceed the code requirements; the measures include the erection of sidewalk bridges and roof protection, the employment of flag persons, the

erection of a construction fence, the installation of a vertical enclosure system, horizontal nets, and full height vertical netting;

- All New York City Department of Building (DOB) safety requirements and protocols would be followed and construction of the proposed project would be undertaken so as to ensure the safety of the community and the construction workers themselves; and
- Notifications would be made to the public/community when special construction activities would occur.

ENVIRONMENTAL PERFORMANCE

- An emissions reduction program would be implemented during construction to minimize the effects on air quality and would include to the extent practicable measures such as the use of dust control, Ultra-Low-sulfur diesel (ULSD) fuel, diesel particulate filters on all diesel engines, best available technologies, and newer and cleaner equipment;
- Construction of the proposed project would not only include noise control measures as required by the New York City Noise Control Code but would include additional measures such as the use of an 8-foot high with an additional 4-foot cantilever plywood fence on State Street with insulation blankets, a noise curtain, or other suitable noise control mounted on the inside of the fence during excavation and foundation stages of construction;
- Regulatory requirements relating to the existing buildings to be adaptively reused and the remedial measures required by the (E) Designation and other applicable regulatory requirements would be implemented; and
- A Construction Protection Plan (CPP) would be developed in coordination with New York City Landmarks Preservation Commission (LPC) to protect the historic buildings to be retained on the project site (the P.S. 15 structure and the ca. 1898 addition fronting on Schermerhorn Street), the Baptist Temple on the west side of 3rd Avenue and the buildings on the south side of State Street (522-550 State Street).

With the implementation of the measures described above, the construction effects of the proposed project on the surrounding area would be substantially reduced. However, as described in detail below, even with these measures in place, construction activities associated with the proposed project would potentially result in temporary significant adverse transportation and noise impacts. Additional information for key technical areas is summarized below.

TRANSPORTATION

Peak construction conditions were considered for the analysis. The proposed project is not expected to result in any significant adverse parking, transit, or pedestrian impacts during construction.

During peak construction, project-generated vehicle trips would be less than what would be realized with the full build-out of the proposed projects in 2025. Therefore, the potential traffic impacts during peak construction would be within the envelope of significant adverse traffic impacts identified for the With Action condition in Chapter 11, "Transportation." As summarized in Chapter 19, "Mitigation," the majority of the locations where significant adverse traffic impacts are predicted to occur could be fully mitigated with the implementation of standard traffic mitigation measures (e.g., signal timing changes, lane restriping, parking regulation changes) except for the intersections of: Flatbush Avenue and Fulton Street; Flatbush Avenue and Lafayette Avenue; Flatbush Avenue and 4th Avenue; and Fulton Street and Ashland Place, where the potential impacts could not be fully mitigated with standard traffic mitigation measures.

AIR QUALITY

The air pollutant emission levels associated with construction of the proposed project would not be considered out of ordinary in terms of intensity and are typical of ground-up building construction in New York City. Measures would be taken to minimize pollutant emissions during construction in accordance with all applicable laws, regulations, and building codes. These measures would include dust suppression measures, idling restrictions, and the use of ULSD fuel. In addition, to minimize air pollutant emissions during construction, emissions reduction measures such as the use of best available technologies and the use of newer and cleaner equipment during construction of the proposed project would be implemented to the extent practicable. With these measures in place and based on the duration and intensity of construction activities, the location of nearby sensitive receptors, and an examination of construction on-road sources, the proposed project would not result in any significant adverse construction air quality impacts.

NOISE

The detailed modeling analysis concluded that construction of the proposed project has the potential to result in construction noise levels that exceed 2014 *City Environmental Quality Review* (*CEQR) Technical Manual* noise impact criteria for an extended period of time at residences immediately across State Street south of the project site, the Khalil Gibran International Academy, and residences along 3rd Avenue between Schermerhorn Street and Atlantic Avenue. The conceptual construction schedule on which the noise analysis was based represented a conservative potential timeline for construction that tended to show the most construction activity and the most construction equipment operating simultaneously, the conditions of which would result in the largest increase in noise levels at the nearby receptors.

The affected residences on State Street would experience exterior noise levels in the mid-70s A-weighted decibels (dBA), which represent increases in noise level up to approximately 13 dBA compared with existing levels, for intermittent periods during approximately 18 non-consecutive months during construction at the middle and eastern portions of the site. During the remainder of the construction period, the affected residences on State Street would at times experience exterior noise levels in the mid-70s dBA, which represent increases in noise level up to approximately 10 dBA. The affected residences on the west side of 3rd Avenue would experience exterior noise levels in the mid-70s dBA, which represent increases in noise level up to approximately 11 dBA compared with existing levels, for portions of up to approximately 12 months during construction at the middle and eastern portions of the site. During the remainder of the construction period, the affected residences on the west side of 3rd Avenue would at times experience exterior noise levels in the mid-70s dBA, which represent increases in noise level up to approximately 8 dBA. The affected residences on the east side of 3rd Avenue would experience exterior noise levels in the mid-70s dBA, which represent increases in noise level up to approximately 6 dBA compared with existing levels, for up to approximately 10 months during construction at the middle and eastern portion of the site. The existing Khalil Gibran International Academy would at times experience exterior noise levels in the mid-70s dBA, resulting increases in noise level up to approximately 12 dBA compared to existing levels for portions of up to approximately 25 months during construction at the middle and eastern portions of the site.

Potential construction noise levels of this magnitude over the course of such an extended duration would constitute a temporary significant adverse impact. Field observations determined that many of these buildings have insulated glass windows and alternate means of ventilation (i.e., air conditioning). Even with these measures, buildings with these constructions would be expected to experience episodic interior $L_{10(1)}$ values greater than the 45 dBA guideline recommended for residential, community, and house of worship spaces according to CEQR noise exposure guidelines. Older buildings that do not include insulated windows and alternate means of ventilation would be expected to experience higher interior noise levels.

At other receptors near the project site, including open space, residential, and community facility receptors, noise resulting from construction of the proposed project may at times be noticeable, but would be temporary and would generally not exceed typical noise levels in the general area and therefore would not rise to the level of a significant adverse noise impact.

NEIGHBORHOOD CHARACTER

Construction activities would adhere to the provisions of the New York City Building Code and other applicable regulations. In addition, throughout the construction period, measures would be implemented to control noise, vibration, and air emissions including dust. Fencing would be erected to reduce potentially undesirable views of construction areas, to buffer noise emitted from construction activities, and to protect the safety of pedestrians during construction. Access to surrounding residences and businesses would be maintained throughout the duration of the construction period. Overall, construction of the proposed project is not expected to result in significant adverse neighborhood character impacts in neighborhoods surrounding the project site.

However, temporary adverse effects relating to increased traffic, noise, and views of construction activity would occur in the immediate vicinity of the project site. During construction, the project site and the immediately surrounding area would be subject to added traffic from construction trucks and worker vehicles and partial sidewalk and lane closures. In particular, construction traffic and noise would temporarily change the character of State Street to the south of the project site. In addition, staging activities, temporary sidewalks, construction fencing, and construction equipment and building superstructure would be visible to pedestrians in the immediate vicinity of the project site. The effects would be localized, confined largely to streets surrounding the project site, but no immediate area would experience the effects of the proposed project's construction activities for the full project construction duration. MPT plans would be developed for any temporary sidewalk, lane, and/or street closures and early implementation of traffic mitigation measures as described above under "Transportation" would ameliorate traffic issues.

Measures to control noise, vibration, and dust on construction sites, including the erection of construction fencing, which would reduce views of construction sites and buffer noise emitted from construction activities. As described in detail above under "Noise," the detailed modeling analysis concluded that construction of the proposed project has the potential to result in construction noise levels that exceed the *CEQR Technical Manual* noise impact criteria for an extended period of time at residences immediately across State Street south of the project site, the existing Khalil Gibran International Academy, and residences across 3rd Avenue from the project site. However, these impacts are temporary and limited to a few areas within the community, and the construction noise levels would vary depending on the portion of the site being developed and the intensity of construction.

Furthermore, to minimize the effects of noise during construction, construction of the proposed project would not only include noise control measures as required by the New York City Noise Control Code but would include additional measures such as the use of a 8-foot high with an additional 4-foot cantilever plywood fence on State Street with insulation blankets, a noise curtain, or other suitable noise control mounted on the inside of the fence during excavation and foundation stages of construction. Therefore, although there is the potential for adverse effects during construction, these effects would be temporary and localized and would not result in significant impacts to the neighborhood character.

B. GOVERNMENTAL COORDINATION AND OVERSIGHT

Construction oversight involves several City, state, and federal agencies. **Table 16-1** lists the primary involved agencies and their areas of responsibility. For projects in New York City, primary construction oversight lies with DOB, which oversees compliance with the New York City Building Code. The areas of oversight include installation and operation of equipment, such as cranes, sidewalk bridges, safety netting, and scaffolding. DOB also enforces safety regulations to protect workers and the general public during construction. The New York City Department of Environmental Protection (DEP) enforces the New York City Noise Code and regulates water disposal into the sewer system. The New York City Office of Environmental Remediation (OER) reviews and approves any needed Remedial Action Work Plans (RAWPs) and associated Construction Health and Safety Plans (CHASPs). The New York City Fire Department (FDNY) has primary oversight of compliance with the New York City Fire Code and the installation of tanks containing flammable materials. DOT's OCMC reviews and approves any traffic lane and sidewalk closures. The New York City Transit (NYCT) is responsible for bus stop relocations, if necessary. LPC approves the CPP and oversees measures established to prevent damage to historic structures.

Table 16-1
Summary of Primary Agency Construction Oversight

Agency	Areas of Responsibility
New York City	
Department of Buildings	Building Code, site safety, and public protection
Department of Environmental Protection	Noise Code, dewatering discharge
Office of Environmental Remediation	RAWPs and CHASPs
Fire Department	Compliance with Fire Code, fuel tank installation
Department of Transportation	Lane and sidewalk closures
New York City Transit	Bus stop relocation
Landmarks Preservation Commission	Archaeological and architectural protection
New York State	
Department of Labor	Asbestos workers
Department of Environmental Conservation	Hazardous materials and fuel/chemical storage tanks
United States	
Environmental Protection Agency	Air emissions, noise, hazardous materials
Occupational Safety and Health Administration	Worker safety

At the state level, the New York State Department of Labor (NYSDOL) licenses asbestos workers. The New York State Department of Environmental Conservation (NYSDEC) regulates disposal of hazardous materials, and construction and operation of bulk petroleum and chemical storage tanks. At the federal level, although the U.S. Environmental Protection Agency (EPA) has wide-ranging authority over environmental matters, including air emissions, noise, and hazardous materials, much of its responsibility is delegated to the state and city levels. The Occupational Safety and Health Administration (OSHA) set standards for work site safety and construction equipment.

C. CONSTRUCTION SCHEDULE

The anticipated construction schedule for the proposed project is presented in **Tables 16-2** and **Figure 16-1**. The proposed project would include up to five distinct buildings, including two towers, on the project site. The construction sequencing incorporates the need to maintain the operations of the existing school at its current location until the replacement school is completed. Construction of the new buildings in the middle and eastern portions of the site is expected to take place over approximately 32 months from 2019 to 2021, while construction of the new building and construction activity involving the adaptive reuse of the school buildings on the western portion of the site is anticipated to take place over approximately 39 months from 2021 to 2024.

Table 16-2
Anticipated Construction Schedule

Construction Task	Approximate Start Month	Approximate Finish Month	Approximate Duration
New Buildings (Middle and Eastern Portions of Project Site)	**Month 1**	**Month 32**	**32**
Abatement Demolition	Month 1	Month 7	7
Excavation and Foundation	Month 4	Month 14	11
Superstructure	Month 14	Month 19	6
Exterior	Month 18	Month 27	10
Interior	Month 21	Month 32	12
New Building and Adaptive Reuse of School Buildings (Western Portion of Project Site)	**Month 34**	**Month 72**	**39**
Abatement Demolition	Month 34	Month 38	5
Excavation and Foundation	Month 38	Month 43	6
Superstructure	Month 43	Month 58	16
Exterior	Month 58	Month 66	9
Interior	Month 67	Month 72	6

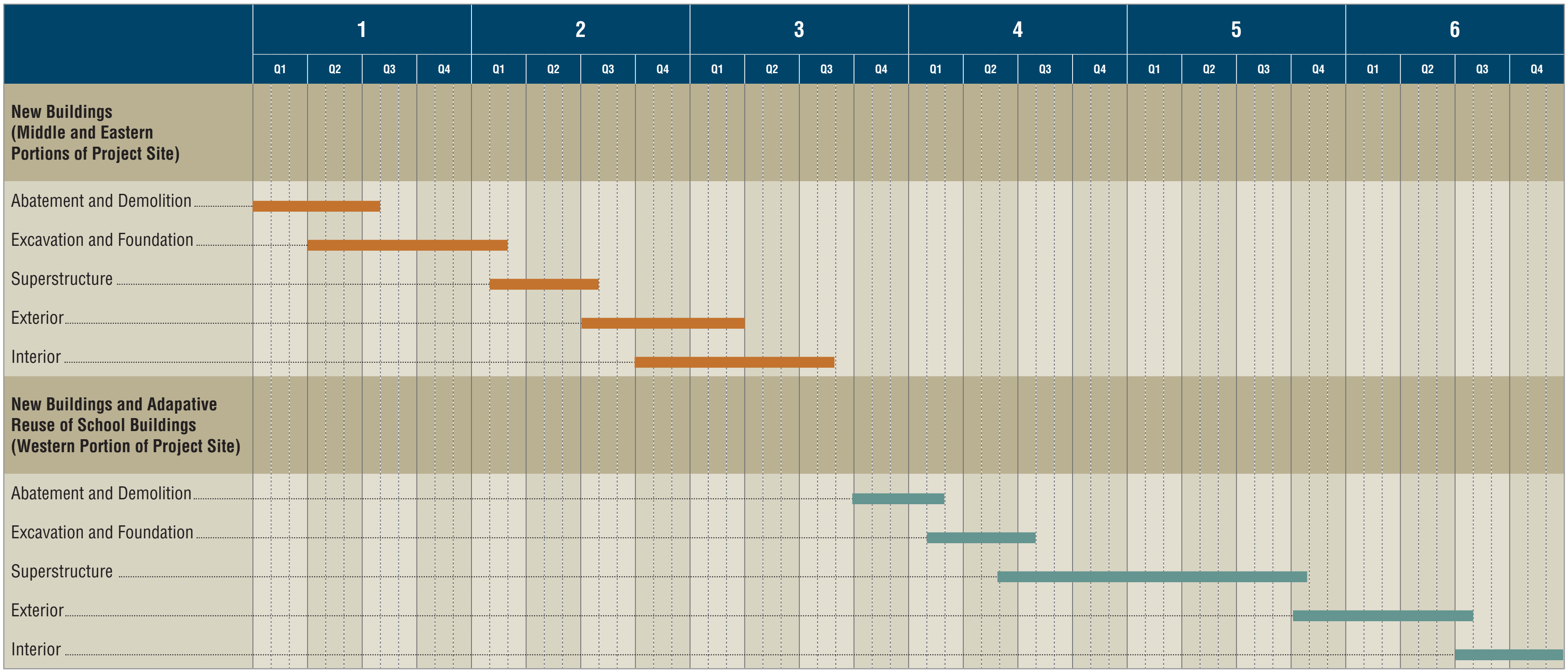
Source: Sciame, December 2016.

Construction for each of the proposed new buildings would consist of the following primary construction stages, which may overlap at certain times: abatement and demolition; excavation and foundations; superstructure; exterior; and interior. These construction stages are described in greater details below under Section E, “General Construction Stages.” In addition to these primary stages of construction, the existing school building at the southwestern corner of the project site would be adaptively reused as retail space, and the existing school building at the northwestern corner of the site would be adaptively reused as cultural community space.

D. GENERAL CONSTRUCTION PRACTICES

HOURS OF WORK

Construction of the proposed project would be carried out in accordance with New York City laws and regulations, which allow construction activities between 7:00 AM and 6:00 PM on weekdays, with most workers arriving between 6:00 AM and 7:00 AM. Construction activities would typically occur in one 8-hour shift from 7:00 AM to 3:30 PM, 5 days a week on weekdays. However, in order to complete certain critical tasks (e.g., finishing a concrete pour for a floor deck), it can be expected that the workday may occasionally be extended beyond normal work hours. Any extended workdays would generally last until approximately 6:00 PM and would not include all construction workers on-site, but only those involved in the specific task requiring additional work time.



ECF 80 FLATBUSH AVENUE

Anticipated Construction Schedule
Figure 16-1

Weekend or night work may also be occasionally required for certain construction activities. Appropriate work permits from DOB would be obtained for any necessary work outside of normal construction and no work outside of normal construction hours would be performed until such permits are obtained. The numbers of workers and pieces of equipment in operation for weekend work would typically be limited to those needed to complete the particular authorized task. Therefore, the level of activity for any weekend or night work would be less than that of a normal workday.

ACCESS, DELIVERIES, AND STAGING AREAS

Access to the proposed project construction areas would be fully controlled. The work areas would be fenced off, and limited access points for workers and construction-related trucks would be provided. Construction workers are generally prohibited from parking their vehicles on-site during the construction period.

Based on preliminary construction logistics, during the construction in the middle and eastern portions of the site, construction trucks such as dump trucks are anticipated to enter and exit the proposed project construction area via State Street. Truck loading and unloading areas as well as materials staging area are also anticipated to be along State Street and Schermerhorn Street. Based on preliminary logistics, the slip lane of Schermerhorn Street between Schermerhorn Street and Flatbush Avenue is anticipated to be closed during construction. As discussed in Chapter 11, “Transportation,” DOT has proposed but not yet obtained final approval for a neighborhood pedestrian safety project that would include the closing of Schermerhorn Street to vehicular traffic between 3rd and Flatbush Avenues. Where feasible and practicable, superstructure activities, concrete operations, and materials deliveries are anticipated to occur within the proposed building where the work would be shielded from nearby sensitive receptors such as schools and residences. MPT plans would be developed for any required temporary sidewalk, lane, and/or street closures to ensure the safety of the construction workers and the public passing through the area. Approval of these plans and implementation of the closures would be coordinated with DOT’s OCMC. Measures specified in the MPT plans that are anticipated to be implemented would typically include but not be limited to the following: curbside lane closures; safety signs; safety barriers; and construction fencing. Sidewalk bridges are also anticipated to be installed along Flatbush Avenue and State Street to provide overhead protection for the public traversing the existing walkways. The preliminary construction logistics plans for the western portion of the project site would be developed as the design progresses but it is anticipated that the construction access and egress point would be via 3rd Avenue. In addition, during construction activities on the western portion of the site, efforts would be made to avoid potential conflicts between construction trucks and school buses for the new lower school to the extent practicable while school is in session.

PUBLIC SAFETY

A variety of measures would be employed to ensure public safety during the construction of the proposed project including sidewalk bridges to provide overhead protection; safety signs to alert the public about active construction work; safety barriers to ensure the safety of the public passing by the project construction areas; flaggers to control trucks entering and exiting the proposed project construction areas and/or to provide guidance for pedestrians and bicyclists safety; and safety nettings during demolition and on the sides of the proposed buildings as the superstructure work advances upward to prevent debris from failing to the ground. In addition, roof protection would be installed on the surrounding buildings where necessary. All DOB safety requirements would be followed and construction of the proposed project would be undertaken so as to ensure the safety of the community and the construction workers themselves.

COMMUNITY OUTREACH

The communities would be informed of upcoming construction activities through notifications and/or newsletters. A community construction liaison representative would be available during construction of the proposed project to serve as the contacts for the community and local leaders, and would be available to address concerns or problems that may arise during the construction period. The representative would maintain direct communication with the construction project managers and would be able to quickly troubleshoot and respond to construction-related inquiries. In addition, New York City maintains a 24-hour telephone hotline (3-1-1) so that concerns can be registered with the city. Coordination would be made with the school community to reschedule or avoid particularly noisy construction activities that occur for a limited period of time during yearly school testing periods.

RODENT CONTROL

Construction contracts would include provisions for a rodent control program. Before the start of construction, the contractor would survey and bait the appropriate areas and provide for proper site sanitation. During construction, the contractor would carry out a maintenance program, as necessary. Measures that may be implemented during construction include baiting the construction sites and providing covered trash receptacles that would be emptied daily. To keep the community safe, signage on all baiting areas would be posted, and coordination would be conducted with the appropriate public agencies.

E. GENERAL CONSTRUCTION STAGES

Prior to the commencement of construction, the work area would first be prepared for construction. Preparation of the work areas would include the installation of public safety measures such as fencing, netting, and signs. The plywood fence on State Street would be 8-feet high with an additional 4-foot cantilever. Insulation blankets, a noise curtain, or other suitable noise control would be mounted on the inside of the fence during excavation and foundation stages of construction. Where applicable, the fence would be mounted to the sidewalk shed, jersey barriers, or other structure. The proposed project construction areas would be cleared and worker and truck access points would be established. Portable toilets, construction trailers, and dumpsters for trash would be brought on-site and installed.

After site preparation activities are complete, construction of each of the proposed buildings would proceed with the construction stages detailed below.

ABATEMENT AND DEMOLITION

Before the commencement of demolition or renovation activities, the portion of the buildings to be demolished or renovated would first be abated of any hazardous materials. A New York City-certified asbestos investigator would inspect the building for asbestos-containing materials (ACM), and if present, those materials would be removed by a NYSDOL-licensed asbestos abatement contractor prior to interior demolition. Asbestos abatement is strictly regulated by DEP, NYSDOL, EPA, and OSHA to protect the health and safety of construction workers and nearby residents, workers, and visitors. Depending on the extent and type of ACMs (if any), these agencies would be notified of the asbestos removal and may inspect the abatement area to ensure that work is being performed in accordance with applicable New York State and New York City regulations. Any activities with the potential to disturb lead-based paint (LBP) would be performed in accordance with the applicable OSHA regulation (including federal OSHA regulation 29 CFR 1926.62—*Lead Exposure in Construction*). In addition, any suspected polychlorinated biphenyls (PCB)-containing equipment (such as fluorescent light ballasts) that would be disturbed would be evaluated prior to disturbance. Unless labeling or test data indicate the contrary, such equipment would be assumed to contain PCBs, and would be removed and disposed of at properly licensed facilities in accordance with all applicable regulatory requirements.

Demolition work would begin with removal of any economically salvageable materials that could be reused. Then the interior of the building would be deconstructed to the floor plates and columns before these structural elements are demolished and removed. Netting around the exterior of the building would be used to prevent falling materials. Jackhammers and hydraulic break rams would be used for the demolition of the existing structure and debris would be loaded into dump trucks for transport. Demolition debris would typically be sorted prior to being disposed at landfills to maximize recycling opportunities.

EXCAVATION AND FOUNDATION

Excavation and foundation work would follow similar procedures for the proposed buildings. First, sheeting would be installed to contain soil around the excavation area and excavators would then be used to excavate soil. The soil would be loaded onto dump trucks for transport to a licensed disposal facility or for reuse on any portion of the project site that need fill. As the excavation becomes deeper, a temporary ramp may be built to provide access for the dump trucks to the excavation area. No blasting is anticipated for the construction of the proposed project, but an excavator with a hoe ram would be used to break down any rock encountered during excavation. Based on preliminary geotechnical borings at the site, rock is not expected to be encountered during excavation. Concrete trucks would be used to pour the foundation and the below-grade structures, including walls and columns. Excavation and foundation activities may also involve the use of drill rigs, generators, and compressors.

DEWATERING

Water from rain and snow collected in the excavation area during construction would be removed using a dewatering pump. If groundwater dewatering is required, it would be performed in accordance with DEP sewer use requirements.

SUPERSTRUCTURE

The superstructure work would include each of the proposed buildings' frameworks, such as beams, slabs, and columns. Construction of the interior structure—or core—of the buildings would include elevator shafts; vertical risers for mechanical, electrical, and plumbing systems; electrical and mechanical equipment rooms; core stairs; and restroom areas. A crane would first be brought onto each of the proposed project construction areas during the superstructure task and would be used to lift structural components and other large materials. The crane would be on-site for both the superstructure and exterior façade stages of construction if required. Superstructure activities may also include the use of compressors, generators, welders, and a variety of trucks. In addition, temporary construction elevators (hoists) would be used for the vertical movement of workers and materials during superstructure activities.

EXTERIOR

The exterior façades of the proposed buildings would be installed during this stage of construction. The façade elements would arrive on trucks and be lifted into place for attachment by the tower crane or loaded and lifted by hoist for installation from each floor.

INTERIOR

Interior work would include the construction of interior partitions, installation of lighting fixtures, and interior finishes (e.g., flooring, painting, etc.), and mechanical and electrical work, such as the installation of elevators and lobby finishes. Final cleanup and touchup of the buildings and final building system (e.g., electrical system, fire alarm, plumbing, etc.) testing and inspections would be part of this stage of construction. Equipment used during interior work would include hoists, welders, delivery trucks, and a variety of small handheld tools.

Interior work would be the quietest stage of construction in terms of its effect on the public, because most of the construction activities would occur inside the building with the façades substantially complete and the proposed buildings enclosed.

ADAPTIVE REUSE

As discussed above, the southwestern corner of the project site would be adaptively reused as retail space, and the existing school building at the northwestern corner of the site would be adaptively reused as cultural community space. For adaptive reuse work, any economically salvageable materials are first removed followed by the disassembly of non-structural elements and interior partitions. Then such interior work as the construction of interior partitions, installation of lighting fixtures, and interior finishes (e.g., flooring, painting, etc.), would commence. A variety of handheld tools would generally be used for adaptive reuse activities.

NUMBER OF CONSTRUCTION WORKERS AND MATERIAL DELIVERIES

The average number of workers throughout the construction period would be approximately 294 per day and the peak number of workers by calendar quarter would be approximately 450 per day, occurring during the interior stage of construction for the western tower. For truck trips, the average number of truck trips throughout the construction period would be approximately 9 per day, and the peak number of deliveries by calendar quarter would also occur during interior stage of construction for the western tower with approximately 25 truck trips per day.

F. FUTURE WITHOUT THE PROPOSED ACTIONS

As described in Chapter 1, “Project Description,” in the future without the proposed actions (the “No Action” condition), the non-City-owned portion of the project site would be developed with an as-of-right mixed-use building (400 feet in height, including bulkhead) that complies with the current zoning regulations, and the Khalil Gibran International Academy would remain in its existing facility. The development under the No Action condition would contain approximately 252,590 gross square feet (gsf) of market-rate residential use; approximately 53,185 gsf of retail use; approximately 2,108 gsf of community facility; and approximately 20,000 gsf of parking use, as well as the existing public school use (approximately 43,750 gsf).

G. FUTURE WITH THE PROPOSED ACTIONS

Construction of the proposed project—as is the case with most large construction projects—would result in some temporary disruptions in the surrounding area. The following analysis describes the overall temporary effects on transportation, air quality, noise, vibration, as well as consideration of other technical areas, including land use, neighborhood character, socioeconomic conditions, community facilities and services, open space, historic and cultural resources, natural resources, and hazardous materials.

TRANSPORTATION SYSTEMS

The construction transportation analysis assesses the potential for construction activities to result in significant adverse impacts on traffic, parking conditions, and transit and pedestrian facilities. The analysis is based on the peak worker and truck trips, which are developed based on several factors, including worker modal splits, vehicle occupancy and trip distribution, truck passenger car equivalents (PCEs), and arrival/departure patterns.

For a reasonable worst-case analysis, the following sections evaluate the potential for the proposed project's construction worker and truck trips during the peak construction period to result in significant adverse impacts to traffic, parking, transit facilities, and pedestrian elements (i.e., sidewalks, corners, and crosswalks).

TRAFFIC

An evaluation of construction sequencing and worker/truck projections was undertaken to assess potential traffic impacts.

Construction Trip-Generation Projections

The average worker and truck trip projections discussed above in "Number of Construction Workers and Materials Deliveries" were further refined to account for worker modal splits and vehicle occupancy, arrival and departure distribution, and truck PCEs.

Daily Workforce and Truck Deliveries

For a reasonable worst-case analysis of potential transportation-related impacts during construction, the combined daily workforce and truck trip projections in the peak quarter were used as the basis for estimating peak-hour construction trips. Construction of the proposed project is estimated to have a peak of approximately 450 workers and 25 truck deliveries per day during the interior stage of construction for the western tower. These estimates of construction activities are discussed further below.

Construction Worker Modal Splits and Vehicle Occupancy

Based on the latest available U.S. Census data (2000 Census data) for workers in the construction and excavation industry, it is anticipated that 57 percent of construction workers would commute to the project site using private autos at an average occupancy of approximately 1.45 persons per vehicle.

Peak Hour, Construction Worker Vehicle, and Truck Trips

Similar to other construction projects in New York City, most of the construction activities at the project site are expected to take place from 7:00 AM to 3:30 PM. While construction truck trips would occur throughout the day (with more trips during the morning), and most trucks would remain in the area for short durations, construction workers would commute during the hours before and after the work shift. For analysis purposes, each truck delivery was assumed to result in two truck trips during the same hour (one "in" and one "out"), whereas each worker vehicle was assumed to arrive near the work shift start hour and depart near the work shift end hour. Further, in accordance with the *CEQR Technical Manual*, the traffic analysis assumed that each truck has a PCE of two.

The estimated daily vehicle trips were distributed throughout the workday based on projected work shift allocations and likely arrival/departure patterns for construction workers and trucks. For construction workers, the majority (approximately 80 percent) of the arrival and departure trips would take place during the hour before and after each work shift (6:00 AM to 7:00 AM for arrival and 3:00 PM to 4:00 PM for departure on a regular day shift). Construction truck deliveries typically peak during the hour before each shift (25 percent), overlapping with construction worker arrival traffic.

Table 16-3 presents the hourly trip projections for the peak construction quarter. As shown, the maximum construction-related traffic increments would be approximately 158 PCEs between 6:00 AM and 7:00 AM and 146 PCEs between 3:00 PM and 4:00 PM.

Projected traffic levels generated during the peak construction period and those upon full build-out of the proposed project are compared in **Table 16-4**. As presented in **Table 16-4,** the construction traffic increments would be substantially lower than the operational traffic increments for the full build-out of the proposed project. Therefore, the potential traffic impacts during peak construction are expected to be within the envelope of significant adverse traffic impacts identified for the With Action condition in Chapter 11, "Transportation." Therefore, all potential traffic impacts and required mitigation measures have been identified as part of that assessment, and a detailed construction traffic analysis is not warranted. As summarized in Chapter 19, "Mitigation," the majority of the locations where significant adverse traffic impacts are predicted to occur could be fully mitigated with the implementation of standard traffic mitigation measures (e.g., signal timing changes, lane restriping, parking regulation changes) except for the intersections of: Flatbush Avenue and Fulton Street; Flatbush Avenue and Lafayette Avenue; Flatbush Avenue and 4th Avenue; and Fulton Street and Ashland Place, where the potential impacts could not be fully mitigated with standard traffic mitigation measures.

Table 16-3
Peak Construction Vehicle Trip Projections

	Auto Trips			Truck Trips			Total					
	Regular Shift			Regular Shift			Vehicle Trips			PCE Trips		
Hour	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
6 AM–7 AM	142	0	142	6	6	12	148	6	154	154	12	166
7 AM–8 AM	36	0	36	3	3	6	39	3	42	42	6	48
8 AM–9 AM	0	0	0	3	3	6	3	3	6	6	6	12
9 AM–10 AM	0	0	0	3	3	6	3	3	6	6	6	12
10 AM–11 AM	0	0	0	3	3	6	3	3	6	6	6	12
11 AM–12 PM	0	0	0	3	3	6	3	3	6	6	6	12
12 PM–1 PM	0	0	0	3	3	6	3	3	6	6	6	12
1 PM–2 PM	0	0	0	1	1	2	1	1	2	2	2	4
2 PM–3 PM	0	9	9	0	0	0	0	9	9	0	9	9
3 PM–4 PM	0	142	142	0	0	0	0	142	142	0	142	142
4 PM–5 PM	0	27	27	0	0	0	0	27	27	0	27	27
Daily Total	178	178	356	25	25	50	203	203	406	228	228	456

Note: Hourly construction worker and truck trips were derived from an estimated quarterly average number of construction workers and truck deliveries per day, with each truck delivery resulting in two daily trips (arrival and departure).

Table 16-4
Comparison of Incremental Construction and Operational Peak Period Vehicle Trips in PCEs

Time	Peak Incremental Construction Vehicle Trips in PCEs			Peak Incremental Operational Vehicle Trips in PCEs		
	In	Out	Total	In	Out	Total
AM Peak Period (6:00 AM to 9:00AM)						
AM Peak Hour[1]	154	12	166	167	151	318
PM Peak Period (3:00 PM to 6:00PM)						
PM Peak Hour[2]	0	142	142	137	168	305

Notes:
[1] The AM peak hour is 6:00 AM to 7:00 AM for construction and 8:00 AM to 9:00 AM for operational.
[2] The PM peak hour is 3:00 PM to 4:00 PM for construction and 5:00 PM to 6:00 PM for operational.

PARKING

As described above, the peak number of construction workers would be 450 per day. It is anticipated that 57 percent of construction workers would commute to the project site by private autos at an average occupancy of approximately 1.45 persons per vehicle. The anticipated construction activities are therefore projected to generate a maximum parking demand of 177 parking spaces. Based on the parking analysis presented in Chapter 11, “Transportation,” this construction parking demand is expected to be adequately accommodated by the off-street spaces and parking facilities available within a ½-mile radius of the project site. Therefore, construction for the proposed project would not result in any parking shortfalls or the potential for any significant adverse parking impacts.

TRANSIT

It is anticipated that approximately 30 percent of construction workers would commute to the project site via transit. The project site is served by multiple mass transit options and is located in the vicinity of multiple subway stations, including the Hoyt-Schermerhorn Street station (A, C, and G trains), the Atlantic Avenue–Barclays Center station (B, D, N, Q, R and No. 2, 3, 4, 5 trains), the Nevins Street station (No. 2, 3, 4, and 5 trains), the Fulton Street station (G train), and the Lafayette Avenue station (C train), and the B41, B45, B63, and B67 bus routes. During the peak construction period when 450 average daily construction workers would be on-site, approximately 180 would travel by transit. With 80 percent of these workers arriving or departing during the construction peak hours, the estimated number of peak-hour transit trips would be 144, which is well below the *CEQR Technical Manual* 200-transit-trip analysis threshold warranting further assessment. Therefore, construction of the proposed project would not result in any significant adverse transit impacts.

PEDESTRIANS

As summarized above, 450 average daily construction workers are projected in the 7:00 AM to 3:30 PM shift during the peak construction period. With 80 percent of these workers arriving or departing during the construction peak hours (6:00 AM to 7:00 AM and 3:00 PM to 4:00 PM. the corresponding numbers of peak-hour pedestrian trips traversing the study area’s sidewalks, corners, and crosswalks would be 360. As presented in **Tables 16-5**, the construction pedestrian increments would be much lower than the operational pedestrian increments for the full build-out of the proposed project. The pedestrian trips are expected to be dispersed to pedestrian elements surrounding the project site, such that no single pedestrian element would incur construction-related pedestrian trips that would exceed the *CEQR Technical Manual* analysis threshold of 200 pedestrian trips. Furthermore, because these peak construction pedestrian increments would take place during hours when background pedestrian levels are substantially lower than the 8:00 AM to 9:00 AM and 5:00 PM to 6:00 PM commuter peak hours, there would not be a potential for significant adverse pedestrian impacts attributable to the projected construction worker pedestrian trips.

Table 16-5
Comparison of Incremental Construction and Operational Peak Period Pedestrian Trips

Time	Peak Incremental Construction Pedestrian Trips			Peak Incremental Operational Pedestrian Trips		
	In	Out	Total	In	Out	Total
AM Peak Period (6:00 AM to 9:00 AM)						
AM Peak Hour[1]	360	0	0	1,191	438	1,629
PM Peak Period (3:00 PM to 6:00 PM)						
PM Peak Hour[2]	0	360	0	388	1,355	1,743

Notes:
[1] The AM peak hour is 6:00 AM to 7:00 AM for construction and 8:00 AM to 9:00 AM for operational.
[2] The PM peak hour is 3:00 PM to 4:00 PM for construction and 5:00 PM to 6:00 PM for operational.

AIR QUALITY

Emissions from on-site construction equipment and on-road construction-related vehicles, as well as dust-generating construction activities, have the potential to affect air quality. In general, much of the heavy equipment used in construction has diesel-powered engines and produces relatively high levels of nitrogen oxides (NO_x) and particulate matter (PM). Dust generated by construction activities is also a source of PM. Gasoline engines produce relatively high levels of carbon monoxide (CO). Since EPA mandates the use of ULSD[1] fuel for all highway and non-road diesel engines, sulfur oxides (SO_x) emitted from the proposed project's construction activities would be negligible.

The *CEQR Technical Manual* lists several factors for consideration in determining whether a quantified on-site and/or off-site construction impact assessment for air quality is appropriate. These factors include the use of emission control measures, the duration and intensity of construction activities, the location of nearby sensitive receptors, and project-generated, construction-related vehicle trips.

EMISSION CONTROL MEASURES

Measures would be taken to reduce pollutant emissions during construction in accordance with all applicable laws, regulations, and building codes. These include the use of clean fuel, dust suppression measures, and idling restrictions:

- *Clean Fuel.* ULSD fuel would be used exclusively for all diesel engines throughout the construction site.

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[1] EPA required a major reduction in the sulfur content of diesel fuel intended for use in locomotive, marine, and non-road engines and equipment, including construction equipment. As of 2015, the diesel fuel produced by all large refiners, small refiners, and importers must be ULSD; fuel sulfur levels in non-road diesel fuel are limited to a maximum of 15 parts per million.

- *Dust Control Measures.* To minimize dust emissions from construction activities, a strict dust control plan, including a watering program, would be required as part of contract specifications. For example, stabilized truck exit areas would be established for washing off the wheels of all trucks that exit the construction sites; truck routes within the project site would be either watered as needed or, in cases where such route would remain in the same place for an extended duration, the routes would be stabilized, covered with gravel, or temporarily paved to avoid the resuspension of dust; all trucks hauling loose material would be equipped with tight-fitting tailgates and their loads securely covered prior to leaving the project site; water sprays would be used for all demolition, excavation, and transfer of soils to ensure that materials would be dampened as necessary to avoid the suspension of dust into the air. Loose materials would be watered, stabilized with chemical suppressing agent, or covered. All measures required by the portion of DEP's *Construction Dust Rules* regulating construction-related dust emissions would be implemented.
- *Idling Restriction.* As required by local law, all stationary vehicles on roadways adjacent to the job site would be prohibited from idling for more than 3 minutes. This excludes vehicles that are using their engines to operate a loading, unloading, or processing device (e.g., concrete-mixing trucks) or otherwise required for the proper operation of the engine.

In addition, the following measures would be implemented to the extent practicable to further reduce air pollutant emissions during construction:

- *Diesel Equipment Reduction.* As early in the construction period as logistics would allow, diesel- or gas-powered equipment would be replaced with electrical-powered equipment such as welders, water pumps, bench saws, and table saws (i.e., early electrification) to the extent feasible and practicable.
- *Best Available Tailpipe Reduction Technologies.* Non-road diesel engines with a power rating of 50 horsepower (hp) or greater and controlled truck fleets (i.e., truck fleets under long-term contract with the proposed project), including but not limited to, concrete mixing and pumping trucks would utilize the best available technology (BAT) (currently diesel particulate filters) for reducing diesel particulate matter (DPM) emissions.
- *Utilization of Newer Equipment.* EPA's Tier 1 through 4 standards for non-road engines regulate the emission of criteria pollutants from new engines, including PM, CO, NO_x, and hydrocarbons (HC). Efforts would be made throughout construction to utilize non-road construction equipment and engines meeting the tier standards.

Overall, this emissions control program is expected to significantly reduce DPM emissions by a similar reduction level that would be achieved by applying the currently defined best available control technologies under New York City Local Law 77, which are required only for publicly funded City projects.

DURATION AND INTENSITY OF CONSTRUCTION ACTIVITIES

Construction of the proposed project, as is the case with any construction project, would result in temporary disruption to the surrounding area. The construction duration for the middle and eastern portions of the site is anticipated to be completed over a period of approximately 32 months, and the western portion of the project site is expected to be completed in 39 months. The entire project site is not expected to experience construction activities for the full duration of construction. Furthermore, the most intense construction activities in terms of air pollutant emissions (demolition, excavation, and foundation activities where the largest number of large non-road diesel engines such as drill rigs, excavators, and loaders would be employed) would generally occur over a period of approximately 10 to 14 months for proposed buildings. Moreover, construction sources would move around the project site over the construction period such that the air pollutant concentration increments due to construction of the proposed project would not persist in any single location. The other stages of construction, including superstructure, exterior, and interior work as well as work related to adaptive reuses, would result in substantially lower air emissions since they would require fewer pieces of heavy-duty diesel equipment and would not involve soil disturbance activities that generate dust emissions. In addition, interior construction work would generally occur within an enclosed building, thereby shielding nearby sensitive receptors.

The approach and procedures for constructing the proposed buildings would be typical of the methods utilized in other building construction projects throughout New York City and therefore would not be considered out of the ordinary in terms of intensity. The air pollutant emission levels associated with construction of the proposed project are typical of ground-up building construction in New York City that would require demolition, excavation, and foundation construction (where large equipment such as drill rigs, excavators, and loaders would be employed). Overall, emissions associated with the construction of the proposed project would likely be lower than a typical project due to the emission control measures to be implemented during construction (see "Emission Control Measures," above).

LOCATION OF NEARBY SENSITIVE RECEPTORS

The area surrounding the project site is characterized by mixed residential and commercial high-rise buildings, multifamily walk-up buildings, one- and two-family buildings, public facilities and institutions, and open space and outdoor recreation, as well as a small number of commercial and office buildings, parking facilities, transportation and utilities, and vacant land. The existing Khalil Gibran International Academy school buildings would remain operational on the western side of the project site during construction at the middle and eastern portions of the site. In addition, the project components in the middle and eastern portions of the site would be complete and operational during the construction at the western portion of the project site. Other sensitive receptor locations (i.e., residences, public facilities and institutions, open spaces) in the area are separated by State Street to the south, 3rd Avenue to the west, Schermerhorn Street and Lafayette Avenue to the north, and Flatbush Avenue to the east. Such distances between the construction sources and nearby sensitive locations would result in enhanced dispersion of pollutants and therefore, potential concentration increments from on-site construction sources at these locations would be reduced.

Although there are sensitive receptors locations surrounding the project site, in particular the existing Khalil Gibran International Academy school buildings during construction at the middle and eastern portions of the site and the replacement high school and new lower school during construction at the western portion of the site, as discussed above under "Emission Control Measures," measures would be taken to reduce pollutant emissions during construction. For example, a watering program would be implemented to minimize dust emissions from construction activities and all measures required by the portion of DEP's *Construction Dust Rules* regulating construction-related dust emissions would be strictly followed. In addition, to further minimize air pollutant emissions during construction, emissions reduction measures including the use of BAT and the use of newer and cleaner equipment would be implemented during construction. Furthermore, the construction areas would be fenced off, including between the construction area and the school locations, which would serve as a buffer between the emission sources and nearby sensitive receptor locations. As described above under "Duration and Intensity of Construction Activities," sources would move throughout the project site over the construction period such that the air pollutant concentration increments due to construction of the proposed project would not persist in any single location and no portion of the adjacent sensitive receptors would be subject to the full effects of construction for the entire construction period. In addition, the approach and procedures for constructing the proposed buildings would be typical of the methods utilized in other building construction projects throughout New York City and therefore would not be considered out of the ordinary in terms of intensity. Therefore, due to these reasons, potential concentration increments from on-site construction sources at nearby sensitive receptor locations including school locations would be substantially reduced and would not rise to the level of a significant adverse impact.

ON-ROAD SOURCES

Construction worker commuting trips and construction truck deliveries would generally occur during off-peak hours. In addition, when distributed over the transportation network, the construction trip increments would not concentrate at any single location. Construction-generated traffic increments from the proposed project would also not exceed the *CEQR Technical Manual* CO screening threshold of 170 peak hour trips at intersections in the area, or the fine particulate matter ($PM_{2.5}$) emissions screening thresholds discussed in Chapter 17, Sections 210 and 311 of the *CEQR Technical Manual*. Therefore, further mobile source analysis is not required.

CONCLUSION

Based on the analyses provided and implementation of the emissions reduction program described above, construction of the proposed project would not result in any significant adverse construction air quality impacts, and no further analysis is required. Implementation of the emissions reduction measures would be required through the development agreement between ECF and 80 Flatbush Avenue, LLC.

NOISE

INTRODUCTION

Potential impacts on community noise levels during construction of the proposed project could result from noise due to construction equipment operation and from noise due to construction vehicles and delivery vehicles traveling to and from the project site. Noise and vibration levels at a given location are dependent on the kind and number of pieces of construction equipment being operated, the acoustical utilization factor of the equipment (i.e., the percentage of time a piece of equipment is operating at full power), the distance from the construction site, and any shielding effects (from structures such as buildings, walls, or barriers). Noise levels caused by construction activities would vary widely, depending on the stage of construction and the location of the construction relative to receptor locations. The most significant construction noise sources are expected to be impact equipment such as chipping guns, tower cranes, and excavators with hydraulic break rams, as well as the movements of trucks.

Construction noise is regulated by the requirements of the New York City Noise Control Code (also known as Chapter 24 of the *Administrative Code of the City of New York*, or Local Law 113) and the DEP Notice of Adoption of Rules for Citywide Construction Noise Mitigation (also known as Chapter 28). These requirements mandate that specific construction equipment and motor vehicles meet specified noise emission standards; that construction activities be limited to weekdays between the hours of 7 AM and 6 PM; and that construction materials be handled and transported in such a manner as not to create unnecessary noise. As described above, for weekend and after hour work, permits would be required to be obtained, as specified in the New York City Noise Control Code. As required under the New York City Noise Control Code, a site-specific noise mitigation plan for the proposed project would be developed and implemented that may include source controls, path controls, and receiver controls.

SOUND LEVEL DESCRIPTORS

Chapter 14, "Noise," defines the sound level descriptors. The $L_{eq(1)}$ is the noise descriptor recommended for use in the *CEQR Technical Manual* for vehicular traffic and construction noise impact evaluation, and is used to provide an indication of highest expected sound levels. The 1-hour L_{10} is the noise descriptor used in the *CEQR Technical Manual* noise exposure guidelines. The maximum 1-hour equivalent sound level ($L_{eq(1)}$) was selected as the noise descriptor used in the construction noise impact evaluation.

CONSTRUCTION NOISE IMPACT CRITERIA

Chapter 22, Section 100 of the *CEQR Technical Manual* breaks construction duration into "short-term" and "long-term" and states that construction noise is not likely to require analysis unless it "affects a sensitive receptor over a long period of time." Consequently, the construction noise analysis considers both the potential for construction of a project to create high noise levels (the "intensity"), and whether construction noise would occur for an extended period of time (the "duration") in evaluating potential construction noise effects.

Chapter 19, Section 421 of the *CEQR Technical Manual* states that the impact criteria for vehicular sources, using conditions without the proposed project, or the "No Action" noise level as the baseline, should be used for assessing construction effects. As recommended in Chapter 19, Section 410 of the *CEQR Technical Manual*, this study uses the following criteria to define a significant adverse noise impact from mobile and on-site construction activities:

- If the No Action noise level is less than 60 dBA $L_{eq(1)}$, a 5 dBA $L_{eq(1)}$ or greater increase would be considered significant.
- If the No Action noise level is between 60 dBA $L_{eq(1)}$ and 62 dBA $L_{eq(1)}$, a resultant $L_{eq(1)}$ of 65 dBA or greater would be considered a significant increase.
- If the No Action noise level is equal to or greater than 62 dBA $L_{eq(1)}$, or if the analysis period is a nighttime period (defined in the CEQR criteria as being between 10 PM and 7 AM), the incremental significant impact threshold would be 3 dBA $L_{eq(1)}$.

NOISE ANALYSIS FUNDAMENTALS

As stated above, construction activities for the proposed project would be expected to result in increased noise levels as a result of (1) the operation of construction equipment on-site; and (2) the movement of construction-related vehicles (i.e., worker trips, and material and equipment trips) on the roadways to and from the project site. The effect of each of these noise sources was evaluated. The results presented below show the effects of construction activities (i.e., noise due to both on-site construction equipment and construction-related vehicle operation) on noise levels at nearby noise receptor locations.

Noise from the operation of construction equipment at a specific receptor location near a construction site is generally calculated by computing the sum of the noise produced by all pieces of equipment operating at the construction site. For each piece of equipment, the noise level at a receptor site is a function of the following:

- The noise emission level of the equipment;
- A usage factor, which accounts for the percentage of time the equipment is operating at full power;
- The distance between the piece of equipment and the receptor;
- Topography and ground effects; and
- Shielding.

Similarly, noise levels due to construction-related traffic are a function of the following:

- The noise emission levels of the type of vehicle (e.g., auto, light-duty truck, heavy-duty truck, bus, etc.);
- Volume of vehicular traffic on each roadway segment;
- Vehicular speed;
- The distance between the roadway and the receptor;
- Topography and ground effects; and
- Shielding.

CONSTRUCTION NOISE MODELING

Noise effects from construction activities were evaluated using the CadnaA model, a computerized model developed by DataKustik for noise prediction and assessment. The model can be used for the analysis of a wide variety of noise sources, including stationary sources (e.g., construction equipment, industrial equipment, power generation equipment) and transportation sources (e.g., roads, highways, railroad lines, busways, waterways, airports). The model takes into account the reference sound pressure levels of the noise sources at 50 feet, attenuation with distance, ground contours, reflections from barriers and structures, attenuation due to shielding, etc. The CadnaA model is based on the acoustic propagation standards promulgated in International Standard ISO 9613-2. The CadnaA model is a state-of-the-art tool for noise analysis and is approved for construction noise level prediction by the *CEQR Technical Manual*.

Geographic input data to be used with the CadnaA model includes CAD drawings defining planned site work areas, adjacent building footprints and heights, locations of streets, and locations of sensitive receptors. For each analysis period, the geographic location and operational characteristics of each piece of construction equipment were input to the model. Reflections and shielding by barriers and project elements erected on the construction site and shielding from adjacent buildings were also accounted for in the model. The model produces A-weighted $L_{eq(1)}$ noise levels at each receptor location for each analysis period, as well as the contribution from each noise source.

NOISE ANALYSIS METHODOLOGY

The construction noise methodology involved the following process:

1. Select analysis hours for cumulative on-site equipment and construction truck noise analysis. The 7 AM hour was selected as the analysis hour because this would be the hour when the

highest number of truck trips to and from the construction site would overlap with on-site equipment operation.

2. Select receptor locations for cumulative on-site equipment and construction truck noise analysis. Selected receptors were representative of open space, residential, or other noise-sensitive uses potentially affected by the construction of the proposed project during operation of on-site construction equipment and/or along routes taken to and from the project site by construction trucks.
3. Establish existing noise levels at selected receptors. Noise levels were measured at several at-grade locations, and calculated for the other noise receptor locations included in the analysis. **Figure 16-2** shows the construction noise measurement locations. Existing noise levels at noise receptors other than the selected noise measurement locations were established using the CadnaA model along with existing condition traffic information.
4. Establish worst-case noise analysis periods under the projected construction phasing schedule. The worst-case noise analysis periods are the periods during the construction schedule that are expected to have the greatest potential to result in construction noise effect. The selected time periods are described below in the "Analysis Periods" section.
5. Calculate construction noise levels for each analysis period at each receptor location. Given the on-site equipment and construction truck trips that are expected during each of the analysis periods, and the location of the equipment, which was based on construction logistics diagrams and construction truck and worker vehicle trip assignments, a CadnaA model file for each analysis period was created. All model files included each of the construction noise sources during the analysis period and hour, calculation points representing multiple locations on various façades and floors of the associated receptors previously identified, as well as the noise control measures that would be used on the site, as described below.
6. Determine total noise levels and noise level increments during construction. For each analysis period and each noise receptor, the calculated level of construction noise was logarithmically added to the existing noise level to determine the cumulative total noise level. The existing noise level at each receptor was then arithmetically subtracted from the cumulative noise level in each analysis period to determine the noise level increments.
7. Establish construction noise duration. For each receptor, the noise level increments in each analysis period were examined to determine the duration during construction that the receptor would experience substantially elevated noise levels.
8. Compare noise level increments with impact criteria as set forth in the *CEQR Technical Manual*. At each receptor, based on the magnitude and duration of predicted noise level increases due to construction, a determination of whether the proposed project would have the potential to result in significant adverse construction noise effects was made.

NOISE ANALYSIS PERIODS

The detailed construction noise analysis estimated construction noise levels based on projected activity and equipment usage as well as the level of construction traffic for various phases of construction on the project site. Fourteen time periods were selected for detailed construction noise analysis. These time periods were selected to capture each major construction phase (e.g., excavation/foundation work, superstructure work, interior fit-out work) at building to be constructed under the proposed actions, including major overlaps of construction stages between

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