Chapter 18: Noise

A. INTRODUCTION

Fordham University's Lincoln Center Campus is located on Manhattan's Upper West Side, a densely developed urban setting. Noise pollution in an urban setting comes from many sources. Some sources are activities essential to the health, safety, and welfare of the city's inhabitants, such as noise from emergency vehicle sirens, garbage collection operations, and construction and maintenance equipment. Other sources, such as traffic, stem from the movement of people and goods, activities that are essential to the viability of the city as a place to live and do business. Although these and other noise-producing activities are necessary to a city, the noise they produce is undesirable. Urban noise detracts from the quality of the living environment.

The noise analysis for Fordham University's proposed Master Plan for its Lincoln Center Campus consisted of three parts:

- A screening analysis to determine whether there are any locations where traffic would have the potential for resulting in significant noise impacts;
- A detailed analysis at any location where traffic generated by developments of the proposed Master Plan would have the potential to result in significant noise impacts, to determine the magnitude of the increase in noise level; and
- An analysis to determine the level of building attenuation necessary to ensure that interior noise levels on the Fordham Lincoln Center Campus satisfy applicable interior noise criteria.

In summary, the analysis concludes that project-generated traffic would not be expected to produce significant increases in noise levels at any location near and/or adjacent to the project site. In addition, with the design measures the University would incorporate as new buildings are developed, noise levels within the proposed buildings would comply with all applicable requirements. Therefore, implementation of the proposed Master Plan would not result in any significant adverse noise impacts.

B. BACKGROUND AND METHODOLOGY

NOISE FUNDAMENTALS

Quantitative information on the effects of airborne noise on people is well documented. If sufficiently loud, noise may adversely affect people in several ways. For example, noise may interfere with human activities, such as sleep, speech communication, and tasks requiring concentration or coordination. It may also cause annoyance, hearing damage, and other physiological problems. Although it is possible to study these effects on people on an average or statistical basis, it must be remembered that all the stated effects of noise on people vary greatly with the individual. Several noise scales and rating methods are used to quantify the effects of noise on people. These scales and methods consider such factors as loudness, duration, time of occurrence, and changes in noise level with time.

NOISE MEASUREMENT

A number of factors affect sound, as it is perceived by the human ear. These include the actual level of the sound (or noise), the frequencies involved, the period of exposure to the noise, and changes or fluctuations in the noise levels during exposure. Levels of noise are measured in units called decibels (dB). Since the human ear cannot perceive all pitches or frequencies equally well, these measures are adjusted or weighted to correspond to human hearing. A measurement system that simulates the response of the human ear, the "A-weighted sound level" or "dBA," is used in view of its widespread recognition and its close correlation with human judgment of loudness and annoyance. In the current study, all measured levels are reported in dBA or A-weighted decibels. Sound levels for typical daily activities are shown in Table 18-1.

Table 18-1
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	
Busy city street, loud shout	80
Busy traffic intersection	
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	
Background noise in an office	50
Suburban areas with medium density transportation	
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.
Source: Cowan, James P. Handbook of Environmental Acoustics. Van Nostrand Reinhold, New York, 1994. Egan, M. David, Architectural Acoustics. McGraw-Hill Book Company, 1988.

Although sound levels from a sound level meter are generally given in dBA, measurements are sometimes made in octave band format. An octave band is one of a series of bands that cover the normal range of frequencies included in sound measurements. Such octave bands serve to define the sound in term of its pitch components. Octave band levels are "unweighted" levels corresponding to the overall acoustical energy in the corresponding octave band.

RESPONSE TO CHANGES IN NOISE LEVELS

The average ability of an individual to perceive changes in noise levels is well documented (see Table 18-2). Generally, changes in noise levels less than 3 dBA are barely perceptible to most listeners, whereas 10 dBA changes are normally perceived as doublings (or halvings) of noise levels. These guidelines permit direct estimation of an individual's probable perception of changes in noise levels.

Table 18-2
Average Ability to Perceive Changes in Noise Levels

Change (dBA)	Human Perception of Sound
2-3	Barely perceptible
5	Readily noticeable
10	A doubling or halving of the loudness of sound
20	A dramatic change
40	Difference between a faintly audible sound and a very loud sound

Source: Bolt Beranek and Neuman, Inc., *Fundamentals and Abatement of Highway Traffic Noise*, Report No. PB-222-703. Prepared for Federal Highway Administration, June 1973.

It is also possible to characterize the effects of noise on people by studying the aggregate response of people in communities. The rating method used for this purpose is based on a statistical analysis of the fluctuations in noise levels in a community, and integrates the fluctuating sound energy over a known period of time, most typically during 1 hour or 24 hours. Various government and research institutions have proposed criteria that attempt to relate changes in noise levels to community response. One commonly applied criterion for estimating this response is incorporated into the community response scale proposed by the International Standards Organization (ISO) of the United Nations (see Table 18-3). This scale relates changes in noise level to the degree of community response and permits direct estimation of the probable response of a community to a predicted change in noise level.

Table 18-3
Community Response to Increases in Noise Levels

Change (dBA)	Category	Description
0	None	No observed reaction
5	Little	Sporadic complaints
10	Medium	Widespread complaints
15	Strong	Threats of community action

Source: International Standards Organization, Noise Assessment with Respect to Community Responses, ISO/TC 43 (New York: United Nations, November 1969).

STATISTICAL NOISE LEVELS

Since dBA describes a noise level at just one moment and very few noises are constant, other ways of describing noise over extended periods are needed. 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, $L_{eq(1)}$, or 24 hours, $L_{eq(24)}$, conveys the same sound energy as the actual time-varying sound. Statistical sound level descriptors such as L_1, L_{10}, L_{50}, L_{90}, and L_x are sometimes used to indicate noise levels that are exceeded 1, 10, 50, 90 and x percent of the time, respectively. Discrete event peak levels are given as L_1 levels. L_{eq} is used in the prediction of future noise levels, by adding the contributions from new sources of noise (i.e., increases in traffic volumes) to the existing levels and in relating annoyance to increases in noise levels.

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 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}. The relationship between L_{eq} and exceedance levels has been used in the current studies to characterize the noise sources and to determine the nature and extent of their impact at all receptor locations.

NOISE DESCRIPTORS USED IN IMPACT ASSESSMENT

For the purposes of this project, the maximum 1-hour equivalent sound level ($L_{eq(1)}$) has been selected as the noise descriptor to be used in the noise impact evaluation. $L_{eq(1)}$ is the noise descriptor used in the City Environmental Quality Review (CEQR) standards for vehicular traffic noise and cumulative impact evaluation. Hourly statistical noise levels were used to characterize the relevant noise sources and their relative importance at each receptor location.

NOISE STANDARDS AND CRITERIA

NEW YORK CITY NOISE CODE

In December 2005 the New York City Noise Control Code was amended. The amended noise code contains: prohibitions regarding unreasonable noise; requirements for noise due to construction activities; and specific noise standards, including plainly audible criteria for specific noise sources. In addition, the amended code specifies that no sound source operating in connection with any commercial or business enterprise may exceed the decibel levels in the designated octave bands shown in Table 18-4 at the specified receiving properties.

NEW YORK CEQR NOISE STANDARDS

The New York City Department of Environmental Protection (NYCDEP) has set external noise exposure standards. These standards are shown in Table 18-5. Noise Exposure is classified into four categories: acceptable, marginally acceptable, marginally unacceptable, and clearly unacceptable. The standards shown are based on maintaining an interior noise level for the worst-case hour L_{10} less than or equal to 45 dBA. Mitigation requirements for traffic, rail, and aircraft noise are shown in Table 18-6.

Table 18-4
New York City Noise Codes

Octave Band Frequency (Hz)	Maximum Sound Pressure Levels (dB) as Measured Within a Receiving Property as Specified Below	
	Residential receiving property for mixed-use building and residential buildings (as measured within any room of the residential portion of the building with windows open, if possible)	*Commercial receiving property (as measured within any room containing offices within the building with windows open, if possible)*
31.5	70	74
63	61	64
125	53	56
250	46	50
500	40	45
1000	36	41
2000	34	39
4000	33	38
8000	32	37

Source: Section 24-232 of the Administrative Code of the City of New York, as amended December 2005.

Table 18-5
Noise Exposure Guidelines For Use in City Environmental Impact Review[1]

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
1. Outdoor area requiring serenity and quiet[2]		$L_{10} \leq 55$ dBA	------------ Ldn ≤ 60 dBA ------------	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
2. Hospital, nursing home		$L_{10} \leq 55$ dBA		$55 < L_{10} \leq 65$ dBA	------------ 60 < Ldn ≤ 65 dBA ------------	$65 < L_{10} \leq 80$ dBA	(i) 65 < Ldn ≤ 70 dBA, (II) 70 ≤ Ldn	$L_{10} > 80$ dBA	------------ Ldn ≤ 75 dBA ------------
3. Residence, residential hotel, or motel	7 AM to 10 PM	$L_{10} \leq 65$ dBA		$65 < L_{10} \leq 70$ dBA		$70 < L_{10} \leq 80$ dBA		$L_{10} > 80$ dBA	
	10 PM to 7 AM	$L_{10} \leq 55$ dBA		$55 < L_{10} \leq 70$ dBA		$70 < L_{10} \leq 80$ dBA		$L_{10} > 80$ dBA	
4. School, museum, library, court, house of worship, transient hotel or motel, public meeting room, auditorium, out-patient public health facility		Same as Residential Day (7 AM-11 PM)		Same as Residential Day (7 AM-11 PM)		Same as Residential Day (7 AM-11 PM)		Same as Residential Day (7 AM-11 PM)	
5. Commercial or office		Same as Residential Day (7 AM-11 PM)		Same as Residential Day (7 AM-11 PM)		Same as Residential Day (7 AM-11 PM)		Same as Residential Day (7 AM-11 PM)	
6. 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; (ii) *CEQR Technical Manual* noise criteria for train noise are similar to the above aircraft noise standards: the noise category for train noise is found by taking the L_{dn} value for such train noise to be an L_{dn}^{y} (L_{dn} contour) value.

Table Notes:

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. Examples are grounds for ambulatory hospital patients and patients and residents of sanitariums and nursing homes.

3 One may use the FAA-approved L_{dn} contours supplied by the Port Authority, or the noise contours may be computed from the federally approved INM Computer Model using flight data supplied by the Port Authority of New York and New Jersey.

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).

Table 18-6
Required Attenuation Values to Achieve Acceptable Interior Noise Levels

	Marginally Acceptable	Marginally Unacceptable		Clearly Unacceptable		
Noise level with proposed action	$65<L_{10}\leq70$	$70<L_{10}\leq75$	$75<L_{10}\leq80$	$80<L_{10}\leq85$	$85<L_{10}\leq90$	$90<L_{10}\leq95$
Attenuation[1]	25 dB(A)	30dB(A)	35 dB(A)	40 dB(A)	45 dB(A)	50 dB(A)

Note: [1] The above composite window-wall attenuation values are for residential dwellings. Commercial office spaces and meeting rooms would be 5 dB(A) less in each category. All the above categories require a closed window situation and hence an alternate means of ventilation.
Source: New York City Department of Environmental Protection (DEP)

IMPACT DEFINITION

As recommended in the *CEQR Technical Manual*, this study uses the following criteria to define a significant adverse noise impact:

- An increase of 5 dBA, or more, in Build $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the No Build condition, if the No Build 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 Build $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the No Build condition, if the No Build levels are 61 dBA $L_{eq(1)}$ and the analysis period is not a nighttime period.
- An increase of 3 dBA, or more, in Build $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the No Build condition, if the No Build 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 Build $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the No Build condition, if the analysis period is a nighttime period (defined by the *CEQR Technical Manual* criteria as being between 10 PM and 7 AM).

NOISE PREDICTION METHODOLOGY

Future noise levels were calculated using either a proportional modeling technique or the Federal Highway Administration (FHWA) Traffic Noise Model (TNM) Version 2.5. A proportional modeling technique was used as a screening tool to estimate changes in noise levels. At locations where proportional modeling indicated the potential for significant noise impacts the TNM model was used to obtain more detailed results. Both the proportional modeling technique and the TNM model are analysis methodologies recommended for analysis purposes in the *CEQR Technical Manual*. The analysis examined the weekday AM, midday, PM, and Pre-Theater peak hours. These are the time periods when the proposed development would have its maximum traffic generation and would be most likely to have a significant noise impact. Peak hour traffic conditions for existing conditions, future No Build condition, and Build condition) conditions were based on the traffic analysis as presented in Chapter 15, “Traffic and Parking,” of this EIS.

The proportional modeling technique assumes that traffic on the immediately adjacent street or roadway is the dominant noise source. Using this technique, typically, future noise levels are estimated based upon the changes in traffic volumes between two conditions (i.e., between existing and No Build, and No Build and Build). Vehicular traffic volumes are converted into

Passenger Car Equivalent (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, one bus (carrying more than nine passengers) is assumed to generate the noise equivalent of 18 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. The change in future noise levels is calculated using the following equation:

$$FNL = E\,NL + 10 * \log_{10} (FPCE / EPCE)$$

where:

FNL = Future Noise Level

ENL = Existing Noise Level

FPCE = Future PCEs

EPCE = Existing PCEs

Because sound levels are characterized by a logarithmic scale, this model calculates change in sound levels logarithmically, with traffic change ratios. For example, assume that traffic is the dominant noise source at a particular location. If the existing traffic volume on a street is 100 PCEs and if the future traffic volume were increased by 50 PCEs to a total of 150 PCEs, the noise level would increase by 1.8 dBA. If the future traffic were increased by 100 PCEs, or doubled to a total of 200 PCEs, the noise level would increase by 3.0 dBA.

At receptor 1 (i.e., West 60th Street between Amsterdam and Columbus Avenues) preliminary modeling studies using proportional modeling techniques indicated that the future traffic may have the potential to cause significant increases in noise levels because the westbound traffic lane was eliminated for the Existing condition. Therefore, at this receptor location, a refined analysis was performed using the TNM to calculate noise levels.

The TNM takes into account various factors that influence ambient sound levels due to traffic flow, including traffic volumes; vehicle mix (i.e., percentage of autos, light duty trucks, heavy duty trucks, buses, etc.); source/receptor geometry; shielding, including buildings and terrain, ground attenuation, etc. Noise levels were assumed to be a combination of noise from two sources—noise from the street immediately adjacent to the receptor site, and noise from other sources including roadways in the area. The TNM was used to calculate the noise due to traffic on the streets cited above, and based upon the monitored existing noise levels, the noise component from other sources was calculated as the difference between the measured existing noise levels and the TNM calculated value due to traffic on the immediately adjacent streets. Future noise levels for the No Build and Build conditions were calculated using the TNM to determine noise levels from traffic on the immediately adjacent street, which were added to this calculated noise level from other sources to obtain the total ambient noise levels. The TNM model provided more accurate results than proportional modeling for receptor 1 because a significant amount of noise is due to traffic using nearby Amsterdam and Columbus Avenues. The less refined proportional modeling technique could not account for the noise contributions from these more distant roadways, and thus, over predicts the projected traffic-generated noise levels by attributing all of the noise to traffic and traffic changes on adjacent streets.

Summary tables showing the specific components of the noise analysis are provided in Appendix B, “Noise.”

C. EXISTING CONDITIONS

SITE DESCRIPTION

The project site is located on the Upper West Side of Manhattan, generally bounded by West 62nd Street to the north, Columbus Avenue to the east, West 60th Street to the south, and Amsterdam Avenue to the west. Sensitive noise receptors immediately surrounding the project site include the Lincoln Center for the Performing Arts on the north; the Amsterdam Houses (a large public housing project) and a school (P.S. 191) to the west; John Jay College, the Church of St. Paul the Apostle, and a couple of residential buildings to the south; and residential towers along Columbus Avenue to the east. In addition, a 36-story apartment building (The Alfred) is located on Alvin Ailey Place, which is shared with Fordham University's Lincoln Center Campus on the west portion of the project site.

SELECTION OF NOISE RECEPTOR LOCATIONS

Six receptor locations were selected for noise analyses. The selected receptors are located adjacent to the project site and are the locations where the maximum increases in the project-generated traffic would be expected to occur. These locations have the highest potential for noise impacts from the project-generated traffic, and thus represent those locations where the highest potential window-wall attention may be required. The locations of the 6 receptor locations are shown in Figure 18-1. Table 18-7 lists the locations of each noise receptor and their associated existing surrounding land uses.

Table 18-7
Noise Receptor Locations

Receptor	Location	Associated Land Use
1	West 60th Street between Amsterdam Avenue and Columbus Avenue	Residential/Church
2	West 62nd Street between Amsterdam Avenue and Columbus Avenue	Lincoln Center
3	Amsterdam Avenue between 60th Street and 61st Street	School (P.S. 191)
4	Columbus Avenue between 61st Street and 62nd Street	Residential/commercial
5	Alvin Ailey Place between Amsterdam Avenue and Columbus Avenue	Residential (The Alfred)
6	Amsterdam Avenue between 61st Street and 62nd Street	Residential (the Amsterdam Houses)

NOISE MONITORING

Noise monitoring at the six noise receptor locations was performed on May 15 and 25, 2007. At each of these locations, 20-minute measurements were made during dry weather conditions for the four weekday peak periods—AM (8:00 to 9:30 AM), midday (12:00 noon to 1:30 PM), PM (5:00 to 6:30 PM), and Pre-Theater (7:00 to 8:30 PM). Weather conditions were noted to ensure a true reading as follows: wind speed under 12 mph; relative humidity under 90 percent; and temperature above 14^{o}F and below 122^{o}F. All measurement procedures conformed to the requirements of ANSI Standard S1.13-2005.

EQUIPMENT USED

Measurements were performed using Brüel & Kjær Noise Level Meters Type 2260, Brüel & Kjær Sound Level Calibrators Type 4231, and Brüel & Kjær ½-inch microphones Type 4189. The Brüel & Kjær meters are Type 1 noise meters. The instruments were mounted on a tripod at a height of 5 feet above the ground. The meters were calibrated before and after readings using Brüel & Kjær Type 4231 sound level calibrators with the appropriate adaptors. The data were digitally recorded

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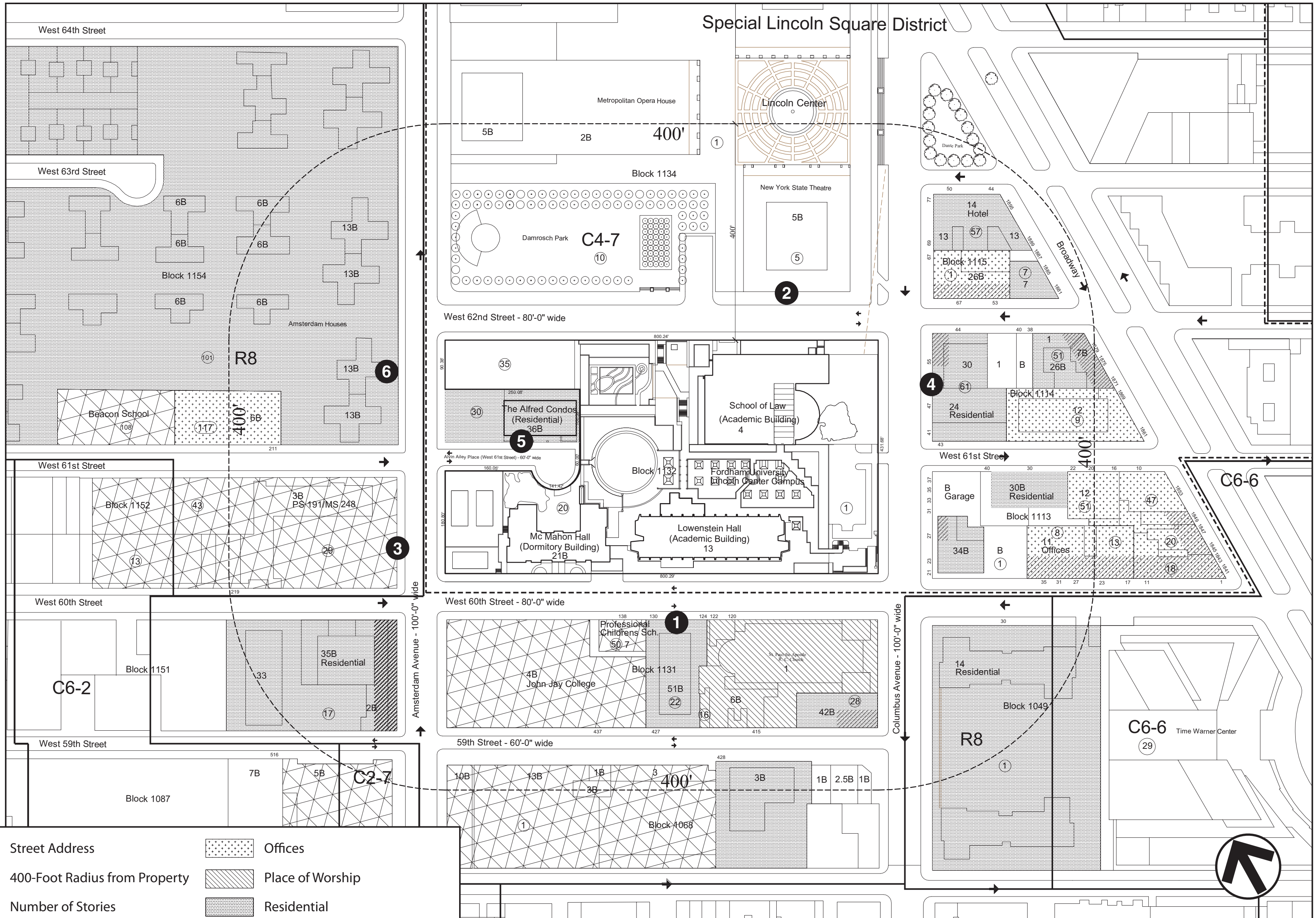

266 Street Address	Offices
400-Foot Radius from Property	Place of Worship
26B Number of Stories	Residential
28 Lot Number	Education
Block 1134 Block Number	Special Lincoln Square District
Retail at Street Level	Noise Receptor Locations

Figure 18-1
Noise Receptor Locations

by the sound meters 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}. Windscreens were used during all sound measurements except for calibration. All measurement procedures conformed to the requirements of ANSI Standard S1.13-2005.

RESULTS OF MEASUREMENTS

Existing L_{eq}, L_1, L_{10}, L_{50}, and L_{90} measured noise levels at the six receptor locations are shown in Table 18-8. At all six locations, traffic on the adjacent streets was the dominant noise source and was the primary generator of the high noise levels.

Table 18-8
Measured Existing Noise Levels (in dBA)

Receptor	Location	Time	$L_{eq(1)}$	L_1	L_{10}	L_{50}	L_{90}
1	West 60th Street between Amsterdam Avenue and Columbus Avenue	AM	65.1	73.0	67.0	62.9	61.5
		MD	66.3	74.5	68.6	64.6	62.3
		PM	67.3	76.9	70.6	63.8	60.6
		Pre-Theater	61.7	71.9	65.4	57.1	53.9
2	West 62nd Street between Amsterdam Avenue and Columbus Avenue	AM	69.3	79.4	72.6	65.2	61.2
		MD	67.4	76.7	71.3	63.3	60.2
		PM	70.8	74.6	72.2	70.6	68.5
		Pre-Theater	69.6	74.0	70.9	69.2	68.5
3	Amsterdam Avenue between 60th Street and 61st Street	AM	71.9	80.9	75.3	69.4	62.6
		MD	71.5	81.3	74.9	68.4	63.5
		PM	72.3	80.9	75.6	69.7	63.1
		Pre-Theater	66.2	75.1	70.0	62.3	57.2
4	Columbus Avenue between 61st Street and 62nd Street	AM	68.4	76.2	71.4	66.2	62.9
		MD	68.5	74.6	71.5	66.9	64.1
		PM	66.3	74.6	69.5	63.6	61.2
		Pre-Theater	65.8	74.7	68.4	63.6	58.7
5	Alvin Ailey Place between Amsterdam Avenue and Columbus Avenue	AM	63.8	68.9	66.1	63.0	61.0
		MD	63.6	68.9	65.8	62.8	61.0
		PM	67.4	69.7	68.3	67.3	66.5
		Pre-Theater	61.3	68.9	61.1	57.0	54.6
6	Amsterdam Avenue between 61st Street and 62nd Street	AM	71.1	78.8	74.0	68.3	63.2
		MD	69.3	77.6	72.0	67.2	64.7
		PM	72.8	79.2	73.8	70.2	67.7
		Pre-Theater	67.1	76.9	71.2	59.9	54.8

Note: Field measurements were performed by AKRF, Inc. on May 15 and 25, 2007, and January 2 and 3, 2008.

In terms of the CEQR Noise Exposure Guidelines, existing noise levels at receptors 1, 2, 3, 4, and 6 are in the “marginally unacceptable” category; and existing noise levels at receptor 5 are in the “marginally acceptable” category.

D. FUTURE WITHOUT THE PROPOSED ACTION—2014

Using the methodology previously described, future noise levels without the proposed action were calculated for the six receptors for the 2014 analysis year. These No Build values are shown in Table 18-9.

Table 18-9
2014 Future Noise Levels Without the Proposed Action (in dBA)

Receptor	Location	Time	Existing $L_{eq(1)}$	No Build $L_{eq(1)}$	$L_{eq(1)}$ Change	No Build $L_{10(1)}$
1	West 60th Street between Amsterdam Avenue and Columbus Avenue	AM	65.1	66.4	1.3	68.3
		MD	66.3	67.2	0.9	69.5
		PM	67.3	68.2	0.9	71.5
		Pre-Theater	61.7	62.4	0.7	66.1
2	West 62nd Street between Amsterdam Avenue and Columbus Avenue	AM	69.3	69.4	0.1	72.7
		MD	67.4	67.6	0.2	71.5
		PM	70.8	70.7	-0.1	72.1
		Pre-Theater	69.6	69.5	-0.1	70.8
3	Amsterdam Avenue between 60th Street and 61st Street	AM	71.9	72.9	1.0	76.3
		MD	71.5	72.4	0.9	75.8
		PM	72.3	73.2	0.9	76.5
		Pre-Theater	66.2	66.9	0.7	70.7
4	Columbus Avenue between 61st Street and 62nd Street	AM	68.4	68.9	0.5	71.9
		MD	68.5	69.0	0.5	72.0
		PM	66.3	66.7	0.4	69.9
		Pre-Theater	65.8	66.2	0.4	68.8
5	Alvin Ailey Place between Amsterdam Avenue and Columbus Avenue	AM	63.8	64.6	0.8	66.9
		MD	63.6	63.7	0.1	65.9
		PM	67.4	67.8	0.4	68.7
		Pre-Theater	61.3	61.5	0.2	61.3
6	Amsterdam Avenue between 61st Street and 62nd Street	AM	71.1	71.6	0.5	74.5
		MD	69.3	69.9	0.6	72.6
		PM	72.8	73.4	0.5	74.4
		Pre-Theater	67.1	67.5	0.4	71.6

Note: Noise levels at receptor 1 were calculated using TNM. Noise levels at the remaining receptor sites were calculated by using proportional modeling.

In 2014, the increase in $L_{eq(1)}$ noise levels would be less than 1.5 dBA at all six receptors. At receptor 2, a small decrease in noise levels was predicted to occur due to a decrease of No Build traffic volume at West 62nd Street between Amsterdam and Columbus Avenues. Changes of these magnitudes would be barely perceptible and insignificant, and they would be below the CEQR threshold for a significant adverse impact. In terms of CEQR Noise Exposure Guidelines, noise levels at receptors 1, 2, 3, 4, and 6 would remain in the “marginally unacceptable” category; and noise levels at receptor 5 would remain in the “marginally acceptable” category.

E. FUTURE WITH THE PROPOSED ACTIONS—2014

Using the methodology previously described, future noise levels with the proposed action were calculated for the six receptors for the 2014 analysis year. These Build values are shown in Table 18-10.

In 2014, the increase in $L_{eq(1)}$ noise levels would be less than 2.5 dBA at all six receptors. Changes of these magnitudes would be barely perceptible and insignificant, and they would be below the CEQR threshold for a significant adverse impact. In terms of CEQR Noise Exposure Guidelines, noise levels at receptors 1, 2, 3, 4, and 6 would remain in the “marginally unacceptable” category; and noise levels at receptor 5 would change from the “marginally acceptable” category to the “marginally unacceptable” category.

Table 18-10
2014 Future Noise Levels With the Proposed Action (in dBA)

Receptor	Location	Time	No Build $L_{eq(1)}$	Build $L_{eq(1)}$	$L_{eq(1)}$ Change	Build $L_{10(1)}$
1	West 60th Street between Amsterdam Avenue and Columbus Avenue	AM	66.4	66.6	0.2	68.5
		MD	67.2	67.6	0.4	69.9
		PM	68.2	68.3	0.1	71.6
		Pre-Theater	62.4	62.4	0.0	66.1
2	West 62nd Street between Amsterdam Avenue and Columbus Avenue	AM	69.4	69.9	0.5	73.2
		MD	67.6	68.2	0.6	72.1
		PM	70.7	71.2	0.5	72.6
		Pre-Theater	69.5	69.6	0.1	70.9
3	Amsterdam Avenue between 60th Street and 61st Street	AM	72.9	73.0	0.1	76.4
		MD	72.4	72.5	0.1	75.9
		PM	73.2	73.3	0.1	76.6
		Pre-Theater	66.9	66.9	0.0	70.7
4	Columbus Avenue between 61st Street and 62nd Street	AM	68.9	68.9	0.1	71.9
		MD	69.0	69.1	0.1	72.1
		PM	66.7	66.8	0.1	70.0
		Pre-Theater	66.2	66.2	0.0	68.8
5	Alvin Ailey Place between Amsterdam Avenue and Columbus Avenue	AM	64.6	66.8	2.2	69.1
		MD	63.7	64.8	1.1	67.0
		PM	67.8	70.1	2.3	71.0
		Pre-Theater	61.5	63.3	1.8	63.1
6	Amsterdam Avenue between 61st Street and 62nd Street	AM	71.6	71.7	0.1	74.6
		MD	69.9	70.0	0.1	72.7
		PM	73.4	73.4	0.0	74.4
		Pre-Theater	67.5	67.6	0.1	71.7

Note: Noise levels at Site 1 were calculated using TNM. Noise levels at the remaining receptor sites were calculated by using proportional modeling.

F. FUTURE WITHOUT THE PROPOSED ACTIONS—2032

Using the methodology previously described, future noise levels without the proposed action were calculated for the 6 receptors for the 2032 analysis year. These No Build values are shown in Table 18-11.

In 2032, the increase in $L_{eq(1)}$ noise levels would be less than 2.0 dBA at all six receptors. Changes of these magnitudes would be barely perceptible and insignificant, and they would be below the CEQR threshold for a significant adverse impact. In terms of CEQR Noise Exposure Guidelines, noise levels at receptors 1, 2, 3, 4, and 6 would remain in the "marginally unacceptable" category; noise levels at receptor 5 would remain in the "marginally acceptable" category.

Table 18-11
2032 Future Noise Levels Without the Proposed Action (in dBA)

Receptor	Location	Time	Existing $L_{eq(1)}$	No Build $L_{eq(1)}$	$L_{eq(1)}$ Change	No Build $L_{10(1)}$
1	West 60th Street between Amsterdam Avenue and Columbus Avenue	AM	65.1	66.7	1.6	68.6
		MD	66.3	67.4	1.1	69.7
		PM	67.3	68.3	1.0	71.6
		Pre-Theater	61.7	62.5	0.8	66.2
2	West 62nd Street between Amsterdam Avenue and Columbus Avenue	AM	69.3	69.7	0.4	73.0
		MD	67.4	67.9	0.5	71.8
		PM	70.8	71.0	0.2	72.4
		Pre-Theater	69.6	69.8	0.2	71.1
3	Amsterdam Avenue between 60th Street and 61st Street	AM	71.9	73.3	1.4	76.7
		MD	71.5	72.8	1.3	76.2
		PM	72.3	73.6	1.3	76.9
		Pre-Theater	66.2	67.2	1.0	71.0
4	Columbus Avenue between 61st Street and 62nd Street	AM	68.4	69.2	0.8	72.2
		MD	68.5	69.3	0.8	72.3
		PM	66.3	67.1	0.8	70.3
		Pre-Theater	65.8	66.6	0.8	69.2
5	Alvin Ailey Place between Amsterdam Avenue and Columbus Avenue	AM	63.8	64.9	1.1	67.2
		MD	63.6	64.2	0.6	66.4
		PM	67.4	68.2	0.8	69.1
		Pre-Theater	61.3	62.0	0.7	61.8
6	Amsterdam Avenue between 61st Street and 62nd Street	AM	71.1	72.0	0.9	74.9
		MD	69.3	70.2	0.9	72.9
		PM	72.8	73.7	0.9	74.7
		Pre-Theater	67.1	67.9	0.8	72.0

Note: Noise levels at receptor 1 were calculated using TNM. Noise levels at the remaining receptor sites were calculated by using proportional modeling.

G. FUTURE WITH THE PROPOSED ACTIONS—2032

Using the methodology previously described, future noise levels with the proposed action were calculated for the six receptors for the 2032 analysis year. These Build values are shown in Table 18-12.

In 2032, the increase in $L_{eq(1)}$ noise levels would be less than 2.5 dBA at all six receptors. Changes of these magnitudes would be barely perceptible and insignificant, and they would be below the CEQR threshold for a significant adverse impact. In terms of CEQR Noise Exposure Guidelines, noise levels at receptors 1, 2, 3, 4, and 6 would remain in the “marginally unacceptable” category; and noise levels at receptor 5 would change from the “marginally acceptable” category to the “marginally unacceptable” category.

Table 18-12
2032 Future Noise Levels With the Proposed Action (in dBA)

Receptor	Location	Time	No Build $L_{eq(1)}$	Build $L_{eq(1)}$	$L_{eq(1)}$ Change	Build $L_{10(1)}$
1	West 60th Street between Amsterdam Avenue and Columbus Avenue	AM	66.7	67.0	0.3	68.9
		MD	67.4	67.8	0.4	70.1
		PM	68.3	69.2	0.9	72.5
		Pre-Theater	62.5	62.6	0.1	66.3
2	West 62nd Street between Amsterdam Avenue and Columbus Avenue	AM	69.7	70.5	0.8	73.8
		MD	67.9	68.9	1.0	72.8
		PM	71.0	71.7	0.7	73.1
		Pre-Theater	69.8	70.0	0.2	71.3
3	Amsterdam Avenue between 60th Street and 61st Street	AM	73.3	73.4	0.1	76.8
		MD	72.8	72.9	0.1	76.3
		PM	73.6	73.7	0.1	77.0
		Pre-Theater	67.2	67.3	0.1	71.1
4	Columbus Avenue between 61st Street and 62nd Street	AM	69.2	69.3	0.1	72.3
		MD	69.3	69.5	0.2	72.5
		PM	67.1	67.2	0.1	70.4
		Pre-Theater	66.6	66.6	0.0	69.2
5	Alvin Ailey Place between Amsterdam Avenue and Columbus Avenue	AM	64.9	67.0	2.1	69.3
		MD	64.2	65.1	0.9	67.3
		PM	68.2	70.3	2.1	71.2
		Pre-Theater	62.0	63.6	1.6	63.4
6	Amsterdam Avenue between 61st Street and 62nd Street	AM	72.0	72.1	0.1	75.0
		MD	70.2	70.4	0.2	73.1
		PM	73.7	73.8	0.1	74.8
		Pre-Theater	67.9	67.9	0.0	72.0

Note: Noise levels at Site 1 were calculated using TNM. Noise levels at the remaining receptor sites were calculated by using proportional modeling.

H. ATTENUATION REQUIREMENTS

As shown in Table 18-6, the *CEQR Technical Manual* has set noise attenuation quantities for buildings, based on exterior noise levels. Recommended noise attenuation values for buildings are designed to maintain interior noise levels of 45 dBA or lower at residences and 50 dBA at non-residences, and are determined based on exterior $L_{10(1)}$ noise levels.

Table 18-13 lists the building attenuation values for each of the project buildings (see Figure 18-2). For buildings facades set back from the street and locations on different floor elevations, TNM was used to determine the attenuation with distance. The values shown in the table are predicted maximum exterior $L_{10(1)}$ levels in the year 2032. Noise levels in the year 2014 would be less than in 2032, and consequently only the 2032 building attenuation values are shown.

The proposed buildings would include both double-glazed windows and central air conditioning (i.e., alternative ventilation). Depending upon the attenuation of the windows selected, these measures, along with good building design, would provide a composite window/wall attenuation of 30 to 35 dBA. Consequently, with these design measures, interior levels within these buildings would satisfy CEQR requirements.

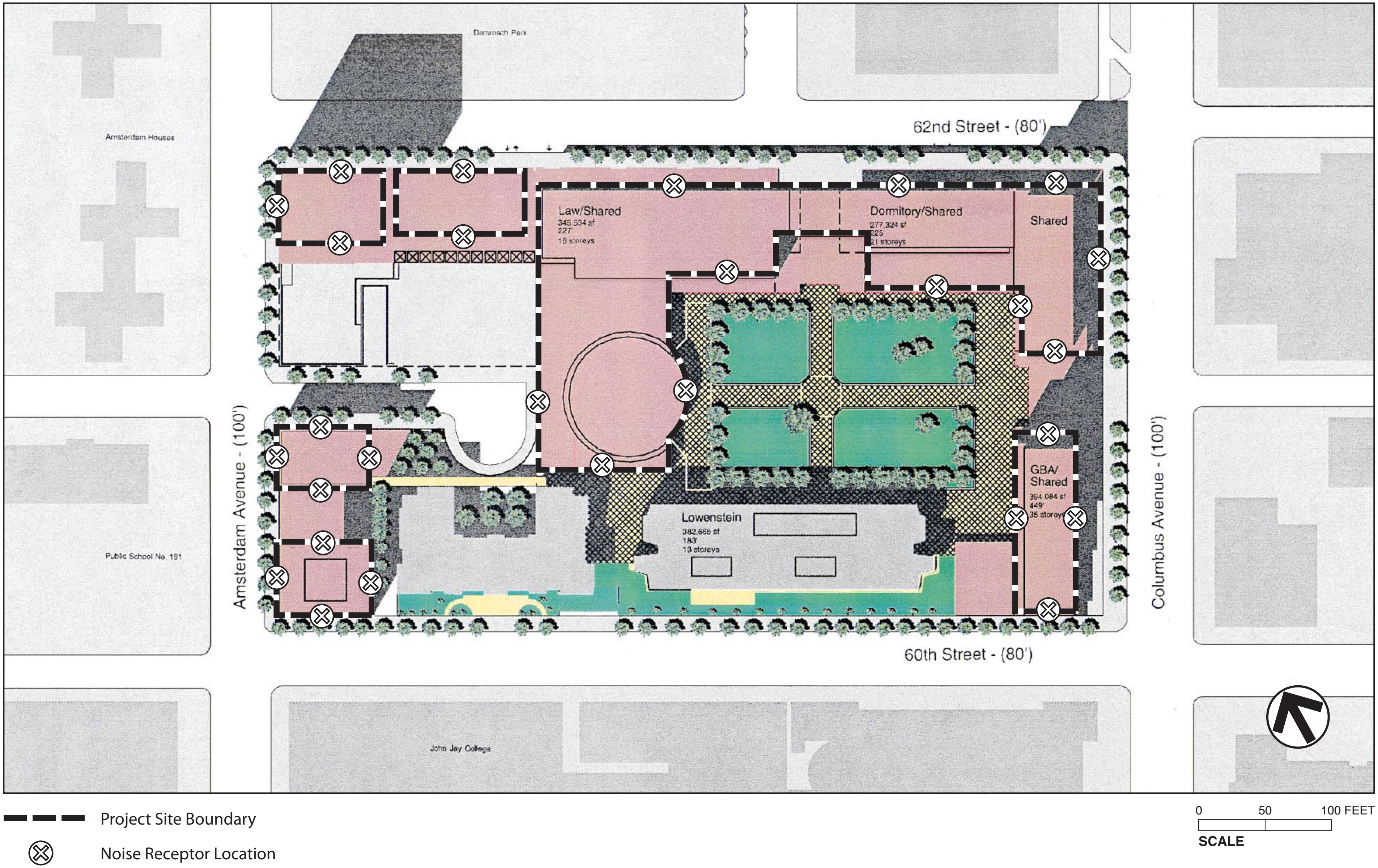

Figure 18-2
Noise Receptor Locations

Table 18-13
Building Attenuation in Compliance with CEQR Requirements in the Year 2032 (in dBA)

Project Building	Façade On	Maximum Build $L_{10(1)}$	CEQR Interior $L_{10(1)}$	Building Attenuation
Site 1 (Dormitory and Academic Building)	East	74.8	45	30
	South	74.0	45	30
	West	68.0	45	25
	North	74.8	45	30
Site 2 (Dormitory and Academic Building)	East	75.3	45	35
	South	74.8	45	30
	West	68.4	45	25
	North	74.0	45	30
Site 3 (Academic, Dormitory and Residential Building)	East	67.5	45	25
	South	73.5	45	30
	West	76.2	45	35
	North	69.8	45	25
Site 3a (Academic, Dormitory and Residential Building)	East	66.1	45	25
	South	69.8	45	25
	West	76.6	45	35
	North	71.9	45	30
Site 4 (Residential Building)	East	67.8	45	25
	South	71.0	45	30
	West	75.8	45	35
	North	74.0	45	30
Site 5 (Dormitory and Academic Building)	East	67.8	45	25
	South	67.6	45	25
	West	69.8	45	25
	North	68.6	45	25
Site 5a (Academic Building)*	East	67.8	50	20
	South	67.6	50	20
	West	69.8	50	20
	North	70.2	50	25
Site 6 (Dormitory and Academic Building)	East	71.2	45	30
	South	66.1	45	25
	West	69.8	45	25
	North	69.6	45	25
Site 7 (Academic Building)*	East	66.0	50	20
	South	66.3	50	20
	West	66.3	50	20
	North	66.1	50	20

*****Non-residential use

I. MECHANICAL SYSTEMS

Design and specifications for mechanical equipment, such as heating, ventilation, and air conditioning (HVAC), and elevator motors, are currently under way. However, this equipment would be designed to incorporate sufficient noise reduction devices to comply with applicable noise regulations and standards (including the standards contained in the revised New York City Noise Control Code), and to ensure that this equipment does not result in any significant increases in noise levels by itself or cumulatively with other project noise sources.

J. CONCLUSION

Based on the analyses presented above, the Fordham University's proposed Master Plan for its Lincoln Center Campus would not result in any predicted exceedances of *CEQR Technical Manual* suggested incremental thresholds at noise receptor locations. Therefore, there would be no predicted significant adverse noise impacts from the proposed Master Plan. ✷