Chapter 19: Noise

A. INTRODUCTION

Noise pollution in an urban area comes from many sources. Some sources are activities essential to the health, safety, and welfare of a city's inhabitants, such as noise from emergency vehicle sirens, garbage collection operations, and construction and maintenance equipment. Other sources, such as traffic, are essential to the viability of a 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, and there is increasing evidence that excessive noise represents a threat to public health.

The noise analysis presented in this chapter focuses on the traffic-generated changes in noise that would result from the operation of the Proposed Project once construction is complete, the levels of window/wall attenuation that would be necessary at project buildings in order to achieve acceptable interior noise levels, the acceptability of ambient noise levels in the publicly accessible open space on the project site, and noise generated by the project buildings (e.g., mechanical). Noise effects during construction of the Proposed Project are analyzed and discussed in Chapter 20, "Construction."

The noise analysis is based upon the Reasonable Worst Case Development Scenarios (RWCDS) which produce the maximum traffic volumes—the maximum retail/office scenarios. For the weekday midday, PM, and Saturday midday peak hours, RWCDS 3b (see Chapter 1, "Project Description") was used. RWCDS 3b assumes 2,100 residential units, 1,012 hotel rooms, 151,598 gross square feet (gsf) of community facility (a 1,332-seat public school), 325,022 gsf of retail, 52,209 gsf of office, 276,011 gsf of auto showroom, and parking facilities with 1800 parking spaces. For the weekday AM, RWCDS 3d, which is a slight variation on the RWCDS 3b program, was used. In RWCDS 3d, the gross square feet of retail space is reduced to 165,938 gsf and the office space is increased to 211,293 gsf, with all other components of the project remaining constant.

In May 2010, shortly prior to the completion of the Draft SEIS, a substantive update to the 2001 *CEQR Technical Manual* was released. Prior to the public hearing for the Proposed Project, a Technical Memorandum was prepared (published on DCP's website in September 2010) that considered whether one or more analyses contained in the Draft SEIS should be revised in the Final SEIS in light of the updated guidance set forth in the 2010 *CEQR Technical Manual*. This chapter reflects updated 2010 *CEQR Technical Manual* guidance with respect to noise analysis.

PRINCIPAL CONCLUSIONS

The analysis concludes that traffic generated by the Proposed Project would not be expected to result in any significant increases in noise levels. Furthermore, to meet City Environmental Quality Review (CEQR) interior noise level requirements, the analysis prescribes between 28 and 39 A-weighted decibels (dBA) of building attenuation for project buildings. Noise levels in the newly created open spaces would be greater than the 55 dBA $L_{10(1)}$ prescribed by CEQR criteria, but would be comparable to other parks around New York City.

B. SUMMARY OF 1992 FEIS FINDINGS

The 1992 Final Environmental Impact Statement (FEIS) determined that traffic generated by the proposed Riverside South development would result in no significant noise impacts both with and without the relocated highway. However, noise levels at locations in the proposed Riverside South park, both with and without the relocated highway, would exceed the CEQR 55 dBA $L_{10(1)}$ guideline level for outdoor areas requiring serenity and quiet. The projected noise levels in the park would be comparable to levels in existing parks in elsewhere in Manhattan and other parts of New York City that are located adjacent to heavily traveled roadways. The 1992 FEIS concluded that no feasible mitigation is available to reduce noise levels within the park, either with or without the relocated highway, to within the 55 dBA L_{10} guideline level. With regard to building attenuation, the design for all project buildings would have exterior double-glazed windows and air conditioning such that window/wall noise attenuation would be at least 30 dBA. However, the building on Parcel M would contain additional window/wall attenuation to achieve at least a 35 dBA noise reduction. This would ensure that noise levels within all project buildings would not exceed the 45 dBA $L_{10(1)}$ CEQR interior noise requirement for residences.

C. NOISE FUNDAMENTALS

Quantitative information on the effects of airborne noise on people is well-documented. If sufficiently loud, 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. Several noise scales and rating methods are used to quantify the effects of noise on people, taking into consideration such factors as loudness, duration, time of occurrence, and changes in noise level with time. However, it must be noted that all the stated effects of noise on people vary greatly with each individual.

“A”-WEIGHTED SOUND LEVEL (dBA)

Noise is typically measured in units called decibels (dB), which are 10 times the logarithm of the ratio of the sound pressure squared to a standard reference presence squared. Because loudness is important in the assessment of the effects of noise on people, the dependence of loudness on frequency must be taken into account in the noise scale used in environmental assessments. One of the simplified scales that accounts for the dependence of perceived loudness on frequency is the use of a weighting network, known as “A”-weighting, in the measurement system to simulate the response of the human ear. For most noise assessments, the A-weighted sound pressure level in units of dBA is used in view of its widespread recognition and its close correlation with perception. In the current study, all measured noise levels are reported in dBA. Common noise levels in dBA are shown in **Table 19-1**.

ABILITY TO PERCEIVE CHANGES IN NOISE LEVELS

The average ability of an individual to perceive changes in noise levels is well-documented (see **Table 19-2**). Generally, changes in noise levels of less than 3 dBA are barely perceptible to most listeners, whereas changes in noise levels of 10 dBA are normally perceived as doubling (or halving) of noise loudness. These guidelines permit direct estimation of an individual’s probable perception of changes in noise levels.

NOISE DESCRIPTORS USED IN IMPACT ASSESSMENT

Because the sound pressure level unit of dBA describes a noise level at just one moment, and because very few noises are constant, other ways of describing noise over more extended periods have been developed. One way is to describe the fluctuating noise heard over a specific 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 period (e.g., 1 hour, denoted by $L_{eq(1)}$, or 24 hours, denoted by $L_{eq(24)}$), 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 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_{01} levels.

Table 19-1
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.

Table 19-2
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 Newman, Inc., *Fundamentals and Abatement of Highway Traffic Noise*, Report No. PB-222-703. Prepared for Federal Highway Administration, June 1973.

For purposes of the Proposed Project, the maximum 1-hour equivalent sound level ($L_{eq(1)}$) has been selected as the noise descriptor to be used in this noise impact evaluation. $L_{eq(1)}$ 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 for city environmental impact review classification.

D. NOISE STANDARDS AND CRITERIA

Noise levels associated with the construction and operation of the Proposed Project would be subject to the emission source provisions of the New York City Noise Control Code and to noise criteria set for the CEQR process. Other standards and guidelines promulgated by federal agencies do not apply to project noise control, but are useful to review in that they establish measures of impacts. Construction equipment is regulated by the Noise Control Act of 1972 and the NYC Noise Control Code.

NEW YORK CITY NOISE CONTROL CODE

The New York City Noise Control Code, amended in December 2005, contains prohibitions regarding unreasonable noise, requirements for noise due to construction activities, circulation devices, and specific noise standards, with some specific noise sources being prohibited from being a “plainly audible” within a receiving property.

NEW YORK CEQR NOISE CRITERIA

The *CEQR Technical Manual* contains noise exposure guidelines for use in city environmental impact review, and required attenuation values to achieve acceptable interior noise levels. These values are shown in **Tables 19-3 and 19-4**. Noise exposure is classified into four categories: “acceptable,” “marginally acceptable,” “marginally unacceptable,” and “clearly unacceptable.” The *CEQR Technical Manual* criteria are based on maintaining an interior noise level for the worst-case hour L_{10} or less than or equal to 45 A-weighted decibels (dBA).

E. 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 (including residences, play areas, parks, schools, libraries, and houses of worship) 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).

Table 19-3
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
Outdoor area requiring serenity and quiet[2]		$L_{10} \leq 55$ dBA	---------- $Ldn \leq 60$ dBA ----------	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Hospital, nursing home		$L_{10} \leq 55$ dBA		$55 < L_{10} \leq 65$ dBA	---------- $60 < Ldn \leq 65$ dBA ----------	$65 < L_{10} \leq 80$ dBA	(I) $65 < Ldn \leq 70$ dBA, (II) $70 \leq Ldn$	$L_{10} > 80$ dBA	---------- $Ldn \leq 75$ dBA ----------
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	
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-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)	
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)	
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 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 19-4
Required Attenuation Values to Achieve Acceptable Interior Noise Levels

	Marginally Acceptable				Clearly Unacceptable
Noise Level With Proposed Action	$70 < L_{10} \leq 73$	$73 < L_{10} \leq 76$	$76 < L_{10} \leq 78$	$78 < L_{10} \leq 80$	$L_{10} < 80$
Attenuation*	(I) 28 dB(A)	(II) 31 dB(A)	(III) 33 dB(A)	(IV) 35 dB(A)	$36 + (L_{10} - 80)^{B}$ dB(A)

Notes: [A] 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.

[B] Required attenuation values increase by 1 dB(A) increments for L_{10} values greater than 80 dBA.

Source: New York City Department of Environmental Protection

F. NOISE PREDICTION METHODOLOGY

GENERAL METHODOLOGY

At all of the receptor sites in the study area, the dominant operational noise sources are vehicular traffic on adjacent and nearby streets and roadways. Noise from other sources, such as local or nearby industrial or institutional uses, are limited and do not contribute significantly to local ambient noise levels. To calculate noise from traffic on adjacent and nearby streets and roadways, the Federal Highway Administration's Traffic Noise Model (TNM) was used. The noise analysis examined three weekday conditions: AM (7:30 – 9 AM), midday (12 – 2 PM), and PM (4:30 – 6 PM) time periods, and one Saturday condition: midday (12 – 2 PM). The selected time periods are when the Proposed Project would be expected to have maximum traffic generation and/or the maximum potential for significant adverse noise impacts based on the traffic studies presented in Chapter 16, "Traffic and Parking."

In addition to examining potential impacts on sensitive receptors due to project-generated traffic, the amount of building attenuation required for project buildings to achieve acceptable interior noise levels was examined. The Build condition at-grade noise levels adjacent to project buildings were calculated using the TNM, and the change (i.e., "drop-off") in noise level for various project building elevations was calculated using the CadnaA model. The changes in noise level at various building elevations occur due to the geometry of buildings and roadways in and around the project site. At some locations noise levels increase within the first 10 floors above grade due to the elevated Henry Hudson Parkway nearby, increased lines of sight to nearby roadways, or increased reflections from nearby buildings. At higher floors the noise levels eventually decrease due to increased distance from the noise sources, i.e., the roadways. The TNM and CadnaA results were used to calculate the noise level at each elevation to determine the necessary attenuation at each floor of the project buildings.

The TNM and CadnaA model used for analysis are described below.

TRAFFIC NOISE MODEL (TNM)

At all locations the *Traffic Noise Model* Version 2.5 (TNM) was used to calculate noise levels. The TNM is a computerized model developed for the Federal Highway Administration (FHWA) that takes into account various factors due to traffic flow, including traffic volumes, vehicle mix (i.e., percentage of autos, light duty trucks, heavy duty trucks, buses, etc.), sources/receptor geometry, and shielding (including barriers and terrain, ground attenuation, etc.). It is the model recommended in the *CEQR Technical Manual* for traffic noise analysis.

CADNA

The change in noise level with elevation at project buildings was calculated using the CadnaA model, a computerized model developed by DataKustik for sound prediction and assessment. The model can be used for the analysis of a wide variety of sound sources, including stationary sources (e.g., construction equipment, industrial equipment, power generation equipment, etc.), transportation sources (e.g., roads, highways, railroad lines, busways, airports, etc.), and other specialized sources (e.g., sporting facilities, etc.). 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.

This standard is currently under review for adoption by the American National Standards Institute as an American Standard. The CadnaA model is a state-of-the-art analysis for sound analysis.

ANALYSIS PROCEDURE

In general, the following procedure was used in performing the noise analysis:

- Receptor sites were selected by examining the sensitive uses closest to the project site and the locations where project-generated traffic would have the greatest potential for significant noise impacts;
- Existing noise levels were determined at each receptor site, for each analysis time period, by performing field measurements;
- The TNM was used to calculate existing noise levels based on existing traffic data. The difference between calculated and measured existing levels was used to determine site and time-specific adjustment factors;
- Based on the results of the traffic study, future noise levels both without and with the Proposed Project were calculated using the TNM. ;
- Impacts were determined based upon the CEQR impact criteria;
- Changes in noise level with elevation at project buildings were calculated using CadnaA;
- Levels of building attenuation necessary to satisfy CEQR requirements were determined for each project building using a combination of the TNM and existing measurements.
- Noise levels were predicted using TNM for project-generated open spaces and compared to CEQR recommended levels.

G. EXISTING CONDITIONS

SITE DESCRIPTION

The project site (described in detail in Chapter 1, "Project Description") is located on the Upper West Side of Manhattan and is bounded by West End Avenue, the alignment of Riverside Boulevard, and West 59th and West 61st Streets.

SELECTION OF NOISE RECEPTOR LOCATIONS

Eight receptor sites in the study area were selected for project impact assessment purposes. Three additional sites were selected for the purposes of a building attenuation analysis. Site 11 was located at an elevated position nearby the elevated Henry Hudson Parkway in order to represent the noise levels that would occur at project buildings that face the Henry Hudson Parkway and determine the necessary window/wall attenuation that would be needed to ensure acceptable interior noise levels. **Table 19-5** lists the locations of each noise receptor site and their associated existing surrounding land uses. **Figure 19-1** shows the receptor site locations and existing land uses. The receptor sites include representative noise-sensitive locations, principally locations with residential, open space, and institutional land uses, and locations where maximum project impacts would be expected. At other locations, particularly locations outside the study area, project-generated traffic would be less and/or would constitute a small portion of the existing and/or No Build traffic volume, and consequently would not have the potential for causing a significant increase in noise levels.

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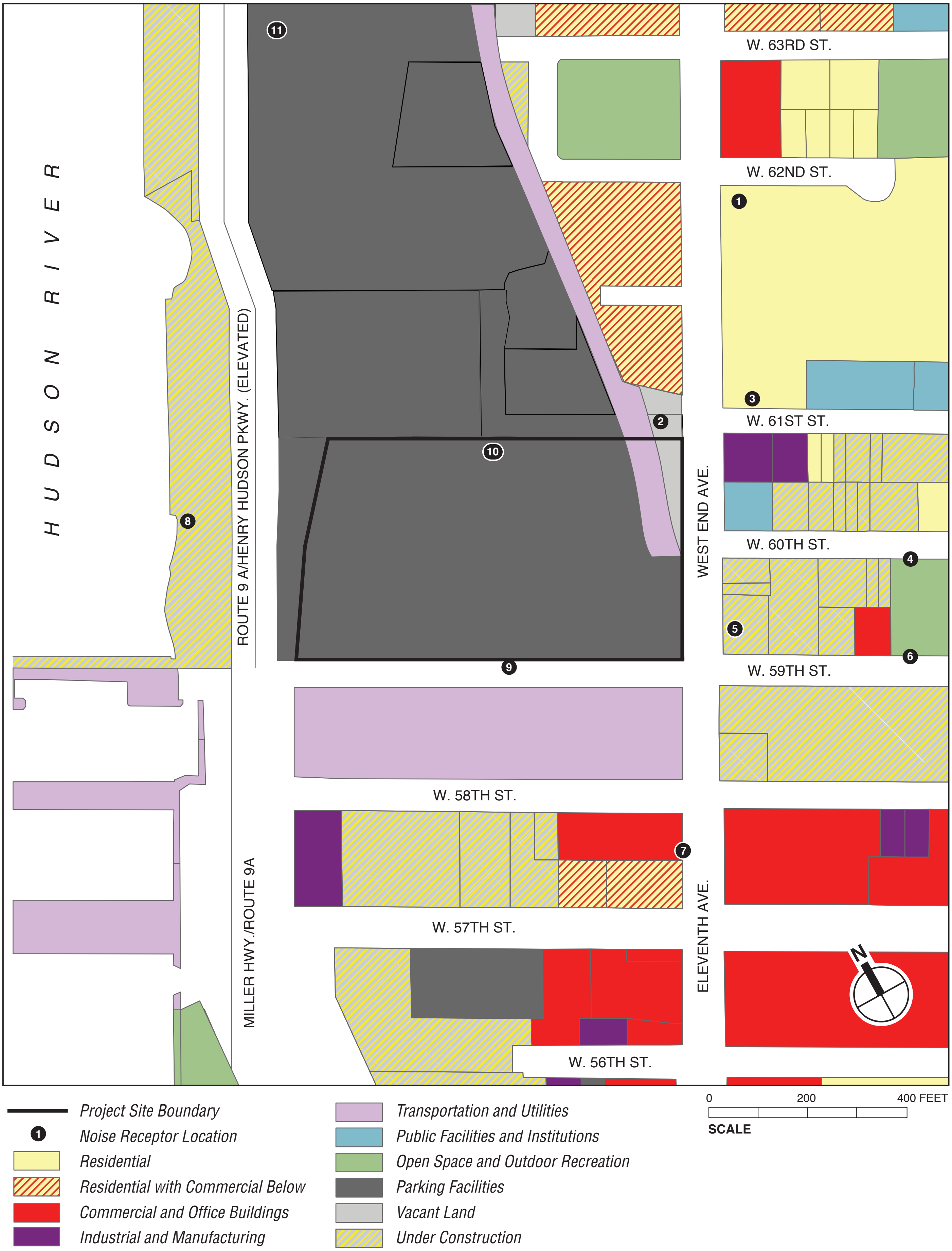

RIVERSIDE CENTER

Noise Receptor Locations
Figure 19-1

Table 19-5
Noise Receptor Locations

Receptor	Location	Associated Land Use	Purpose
1	West End Avenue between West 62nd and West 63rd Streets	Residential	Impact Assessment
2	West 61st Street and West End Avenue	Residential	Impact Assessment
3	West 61st Street between Amsterdam and West End Avenues	Institutional	Impact Assessment
4	West 60th Street between Amsterdam and West End Avenues	Residential/Open Space	Impact Assessment
5	West West End Avenue between 60th and 59th Streets	Residential	Impact Assessment
6	West 59th Street between Amsterdam and West End Avenues	Residential/Open Space	Impact Assessment
7	West End Avenue between West 58th and 57th Streets	Residential	Impact Assessment
8	Hudson River Park at West 60th Street	Open Space	Impact Assessment
9	West 59th Street between Eleventh and Twelfth Avenues	Future Residential	Building Attenuation Analysis
10	West 61st Street and Freedom Place	Future Residential	Building Attenuation Analysis
11	Elevated Position at Riverside Boulevard and West 63rd Street	Future Residential	Building Attenuation Analysis

NOISE MONITORING

At receptor locations 1-8, 20-minute noise measurements were made for three weekday time periods and one Saturday time period to determine existing noise levels. At receptor 9, continuous measurements were performed throughout the daytime on a weekday. At receptor locations 10 and 11, 20-minute noise measurements were made for three weekday time periods. Measurements were taken on March 10, March 14, March 18, March 31, June 13, June 16 and June 17, 2009 and May 13, 2010.

EQUIPMENT USED DURING NOISE MONITORING

Measurements were performed using Brüel & Kjær Sound Level Meters (SLM) Type 2260, Brüel & Kjær Sound Level Calibrators Type 4231, and Brüel & Kjær ½-inch microphones Type 4189. The Brüel & Kjær meters are Type 1 Sound Level Meters. The instruments were mounted on a tripod at a height of 5 feet above the ground, except for site 11. At site 11, the microphone was mounted on a pole 10 feet above the ground, slightly above the nearby Henry Hudson Parkway. 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 by the SLMs 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 were based on the guidelines listed in ANSI Standard S1.13-2005.

RESULTS OF BASELINE MEASUREMENTS

Tables 19-6 and 19-7 summarize the results of the baseline measurements for the Weekday AM, midday, and PM and the Saturday midday analysis hours. Values are shown for specific monitored Weekday and Saturday time periods. In general, noise levels are moderate to relatively high and reflect the level of vehicular activity on the adjacent streets.

In terms of CEQR noise exposure guidelines (shown in **Table 19-4**), during the hour with the highest measured noise levels, existing noise levels at receptors 3, 4, 8, and 10 are in the "marginally acceptable" category, and levels at receptors 1, 2, 5, 6, 7, 9, and 11 are in the "marginally unacceptable" category. These values are based on the measured L_{10} values.

Table 19-6
Measured Existing Noise Levels (in dBA)

Site	Measurement Location	Day	Time	L_{eq}	L_1	L_{10}	L_{50}	L_{90}
1	West End Avenue between West 62nd and West 63rd Streets	Weekday	AM	71.7	81.9	74.6	68.4	63.6
		Weekday	MD	70.0	78.9	73.0	67.7	62.5
		Weekday	PM	69.2	77.6	71.5	67.4	64.2
		Saturday	MD	69.6	74.5	72.0	68.5	66.7
2	West 61st Street and West End Avenue	Weekday	AM	71.8	80.9	74.6	69.7	64.8
		Weekday	MD	73.3	82.5	77.2	70.1	64.3
		Weekday	PM	71.5	80.7	74.8	69.0	62.8
		Saturday	MD	66.5	71.6	68.3	65.9	63.5
3	West 61st Street between Amsterdam and West End Avenues	Weekday	AM	70.0	78.8	72.9	66.9	63.6
		Weekday	MD	68.0	77.6	71.6	63.9	60.9
		Weekday	PM	62.6	67.5	63.9	61.9	60.8
		Saturday	MD	62.6	68.6	64.4	61.5	60.0
4	West 60th Street between Amsterdam and West End Avenues	Weekday	AM	66.6	75.5	68.3	64.4	61.6
		Weekday	MD	62.3	70.5	64.8	60.2	58.2
		Weekday	PM	61.6	70.4	63.7	59.2	57.2
		Saturday	MD	60.0	66.5	61.8	59.0	57.9
5	West West End Avenue between 60th and 59th Streets	Weekday	AM	71.3	80.0	74.3	69.1	64.8
		Weekday	MD	71.8	82.1	73.2	68.7	63.8
		Weekday	PM	68.2	75.9	71.0	66.8	61.2
		Saturday	MD	67.5	76.1	69.8	65.5	61.9
6	West 59th Street between Amsterdam and West End Avenues	Weekday	AM	80.2	70.2	65.2	60.4	68.7
		Weekday	MD	74.0	66.9	62.4	60.0	64.8
		Weekday	PM	66.1	73.5	69.0	63.7	61.3
		Saturday	MD	63.3	70.2	66.8	60.9	57.8
7	West End Avenue between West 58th and 57th Streets	Weekday	AM	73.2	81.1	75.3	71.8	67.8
		Weekday	MD	73.8	77.5	75.4	73.8	70.3
		Weekday	PM	73.8	79.3	74.3	72.7	71.7
		Saturday	MD	69.1	77.2	71.4	67.3	64.5
8	Hudson River Park at West 60th Street	Weekday	AM	67.0	71.7	68.5	66.7	64.5
		Weekday	MD	66.5	71.3	68.3	66.0	63.7
		Weekday	PM	65.5	69.8	67.0	65.1	63.1
		Saturday	MD	65.3	71.1	67.2	64.5	62.5
10	West 61st Street at Freedom Place	Weekday	AM	63.8	70.7	65.9	62.7	60.0
		Weekday	MD	63.8	70.9	65.5	62.8	61.0
		Weekday	PM	60.6	66.6	62.0	59.7	58.0
11	Riverside Boulevard at West 63rd Street	Weekday	AM	72.9	76.0	74.9	72.6	69.7
		Weekday	MD	70.9	73.0	72.3	71.0	68.8
		Weekday	PM	69.7	73.3	72.0	69.3	65.7

Note: Field measurements were performed by AKRF, Inc. on March 10, March 14, March 18, March 31, June 13, June 16 and June 17, 2009 and May 13, 2010.

Table 19-7
Existing Noise Levels at Receptor 9

Date	Start Time	dBA						
		L_{eq}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	$L_{(min)}$	$L_{(max)}$
6/14/2007	7:06 AM	66.6	75.1	68.8	64.8	62.2	60.1	82.7
6/14/2007	8:00 AM	69.9	79.6	71.5	67.7	62.9	59.6	90.7
6/14/2007	9:00 AM	68.5	76.8	71.0	66.9	62.4	59.2	84.6
6/14/2007	10:00 AM	69.0	78.7	71.0	66.8	62.9	60.4	86.2
6/14/2007	11:00 AM	67.6	76.2	69.7	65.8	63.4	60.9	83.0
6/14/2007	12:00 PM	68.7	77.0	69.8	66.7	65.1	62.6	89.5
6/14/2007	1:00 PM	67.5	74.4	69.2	66.4	65.2	63.7	79.0
6/14/2007	2:00 PM	68.4	76.1	69.9	66.6	65.2	63.4	85.9
6/14/2007	3:00 PM	67.7	73.0	69.8	66.5	64.1	61.1	87.1
6/14/2007	4:00 PM	67.7	74.2	71.4	65.5	60.6	57.5	82.4
6/14/2007	5:00 PM	64.7	72.9	67.4	62.4	59.2	55.8	81.8
6/14/2007	6:00 PM	63.1	71.0	65.9	61.2	58.7	54.1	75.2

H. THE FUTURE WITHOUT THE PROPOSED PROJECT

As described above, the noise analysis for the future without the Proposed Project is based on the results of the traffic study. For the traffic study, it was determined that the No Build scenario that would result in the largest traffic increment for the Proposed Project, would be No-Build Scenario 2, which assumes the original FEIS approved program for Parcels L and M would be completed, but Parcel N would remain in its current parking use (see Chapter 16, "Traffic and Parking"). Based on the traffic analysis, and using the methodology previously described, future noise levels without the Proposed Project were calculated for the eight mobile source analysis receptor sites for the 2018 analysis year. These No Build values are shown in **Table 19-8**.

In 2018, at all locations and during all time periods, the increase in $L_{eq(1)}$ noise levels would be less than 1.6 dBA, which would be imperceptible and insignificant according to CEQR criteria. Changes of this magnitude would be barely perceptible but would not be significant based upon CEQR criteria.

At Site 4 during the weekday PM and Saturday Midday (MD) time periods, noise levels would slightly decrease in the future without the proposed project as compared to the existing condition. This is due to changes in traffic speed along the adjacent roadway.

In terms of CEQR noise exposure guidelines, future 2018 noise levels without the Proposed Project would remain in the "marginally acceptable" category for receptor sites 4 and 8, and in the "marginally unacceptable" category for receptor sites 1, 2, 3, 5, 6, and 7. These values are based on the calculated $L_{10(1)}$ values.

Table 19-8
2018 No Build Noise Levels (in dBA)

Site	Day	Time	Existing $L_{eq(1)}$	2018 No Build $L_{eq(1)}$	Change	2018 No Build $L_{10(1)}$
1	Weekday	AM	71.7	72.2	0.5	75.1
	Weekday	MD	70.0	70.6	0.6	73.6
	Weekday	PM	69.2	69.2	0.0	71.5
	Saturday	MD	69.6	69.9	0.3	72.3
2	Weekday	AM	71.8	72.7	0.9	75.5
	Weekday	MD	73.3	74.0	0.7	77.9
	Weekday	PM	71.5	71.5	0.0	74.8
	Saturday	MD	66.5	67.1	0.6	68.9
3	Weekday	AM	70.0	70.9	0.9	73.8
	Weekday	MD	68.0	68.7	0.7	72.3
	Weekday	PM	62.6	63.5	0.9	64.8
	Saturday	MD	62.6	64.2	1.6	66.0
4	Weekday	AM	66.6	66.7	0.1	68.4
	Weekday	MD	62.3	62.9	0.6	65.4
	Weekday	PM	61.6	61.5	-0.1	63.6
	Saturday	MD	60.0	59.8	-0.2	61.6
5	Weekday	AM	71.3	72.0	0.7	75.0
	Weekday	MD	71.8	72.7	0.9	74.1
	Weekday	PM	68.2	68.3	0.1	71.1
	Saturday	MD	67.5	68.0	0.5	70.3
6	Weekday	AM	68.7	69.6	0.9	71.1
	Weekday	MD	64.8	65.9	1.1	68.0
	Weekday	PM	66.1	67.4	1.3	70.3
	Saturday	MD	63.3	64.4	1.1	67.9
7	Weekday	AM	73.2	73.3	0.1	75.4
	Weekday	MD	73.8	74.1	0.3	75.7
	Weekday	PM	73.8	74.2	0.4	74.7
	Saturday	MD	69.1	69.3	0.2	71.6
8	Weekday	AM	67.0	67.7	0.7	69.2
	Weekday	MD	66.5	67.3	0.8	69.1
	Weekday	PM	65.5	66.1	0.6	67.6
	Saturday	MD	65.3	65.8	0.5	67.7

I. THE FUTURE WITH THE PROPOSED PROJECT

Using the methodology described earlier, future noise levels with the proposed project were calculated for the eight mobile source analysis receptor sites for the 2018 analysis year. These Build values are shown in **Table 19-9**.

At all locations and during all time periods, the increase in $L_{eq(1)}$ noise levels in 2018 Build scenario as compared to the No Build scenario would be less than 0.9 dBA, which would be imperceptible, and insignificant based upon CEQR criteria.

At Site 5 during the weekday AM and Midday (MD) time periods, noise levels would slightly decrease in the future with the proposed project as compared to the future without the proposed project. This is due to changes in traffic speed along the adjacent roadway and additional shielding from project buildings.

Table 19-9
2018 Build Noise Levels (in dBA)

Site	Day	Time	2018 No Build $L_{eq(1)}$	2018 Build $L_{eq(1)}$	Change	2018 Build $L_{10(1)}$
1	Weekday	AM	72.2	72.9	0.7	75.8
	Weekday	MD	70.6	71.1	0.5	74.1
	Weekday	PM	69.2	69.7	0.5	72.0
	Saturday	MD	69.9	70.6	0.7	73.0
2	Weekday	AM	72.7	73.2	0.5	76.0
	Weekday	MD	74.0	74.3	0.3	78.2
	Weekday	PM	71.5	71.9	0.4	75.2
	Saturday	MD	67.1	67.5	0.4	69.3
3	Weekday	AM	70.9	71.3	0.4	74.2
	Weekday	MD	68.7	69.1	0.4	72.7
	Weekday	PM	63.5	63.7	0.2	65.0
	Saturday	MD	64.2	64.6	0.4	66.4
4	Weekday	AM	66.7	67.0	0.3	68.7
	Weekday	MD	62.9	63.4	0.5	65.9
	Weekday	PM	61.5	62.4	0.9	64.5
	Saturday	MD	59.8	60.5	0.7	62.3
5	Weekday	AM	72.0	71.8	-0.2	74.8
	Weekday	MD	72.7	72.6	-0.1	74.0
	Weekday	PM	68.3	68.5	0.2	71.3
	Saturday	MD	68.0	68.2	0.2	70.5
6	Weekday	AM	69.6	70.1	0.5	71.6
	Weekday	MD	65.9	66.4	0.5	68.5
	Weekday	PM	67.4	67.8	0.4	70.7
	Saturday	MD	64.4	65.0	0.6	68.5
7	Weekday	AM	73.3	74.0	0.7	76.1
	Weekday	MD	74.1	74.3	0.2	75.9
	Weekday	PM	74.2	74.8	0.6	75.3
	Saturday	MD	69.3	69.6	0.3	71.9
8	Weekday	AM	67.7	67.9	0.2	69.4
	Weekday	MD	67.3	67.5	0.2	69.3
	Weekday	PM	66.1	66.5	0.4	68.0
	Saturday	MD	65.8	66.3	0.5	68.2

In terms of CEQR noise exposure guidelines, future 2018 noise levels with the Proposed Project would remain in the "marginally acceptable" category for receptor sites 4 and 8, and in the "marginally unacceptable" category for receptor sites 1, 2, 3, 5, 6, and 7. These values are based on the calculated $L_{10(1)}$ values.

J. BUILDING ATTENUATION FOR PROJECT BUILDINGS

The *CEQR Technical Manual* also requires an analysis of the effect of introducing a sensitive use, such as a residential building, into an urban environment. As shown in **Table 19-5** earlier in this chapter, the *CEQR Technical Manual* has set noise attenuation values for new buildings that are to be constructed as part of the proposed actions, based on exterior noise levels. Recommended noise attenuation values for residential and school buildings are designed to maintain interior noise levels of 45 dBA $L_{10(1)}$ (50 dBA $L_{10(1)}$ for commercial uses) or lower and are determined based on exterior $L_{10(1)}$ noise levels.

Table 19-10 shows the highest calculated or measured $L_{10(1)}$ noise levels (for the various analysis time periods) at proposed buildings in the study area and the building attenuation that would be required to achieve acceptable interior noise levels at each location. The noise levels at the buildings would vary with elevation, and as a result the necessary attenuation would be different at each floor of the building. The changes in noise level due to elevation were calculated by the method described previously, and applied to the calculated at-grade noise levels to determine the necessary attenuation at elevated floors.

Table 19-10
Minimum Required Building Attenuation

Building	Façade	Governing Noise Receptor Location	Floor(s)	Maximum $L_{10(1)}$ (dBA)[2]	Required Building Attenuation (dBA)[1]
			1-4	79.3	35
			5-9	80.5	37
			10-24	79.9	35
			25-36	77.1	33
	west	11	37	75.3	31
			1-4	76.0	31
			5-14	80.9	37
			15-19	79.4	35
			20-36	77.9	33
	north	11	37	75.5	31
	east	10	all	66.4	31[4]
1	south		all	76.0	35[4]
	east	5	all	69.0	N/A [2]
	north	2	all	68.2	N/A [2]
	south	5	all	74.5[3]	31
2	west	10	all	74.5[3]	35[4]
			1-4	81.9	38
			5-9	82.3	39
			10-14	80.9	37
			15-24	79.5	35
			25-34	77.1	33
	west	11	35-45	75.3	31
			1-14	77.7	33
			15-24	74.8	31
	north	11	25-45	72.8	28
			1-24	75.2	31
			25-39	73.0	28
	south	9	40-45	69.8	N/A [2]
3	east	9	all	65.4	N/A [2]
	east	9	all	68.0	N/A [2]
	south	9	all	69.8	N/A [2]
			1-4	69.5	N/A [2]
	west	9	5-37	72.8	28
			1-4	66.7	N/A [2]
4	north	9	5-37	71.5	28
			1-14	72.2	28
	east	5	15-40	68.9	N/A [2]
			1-4	76.7	33
			5-14	75.1	31
			15-29	72.3	28
	south	9	30-40	69.8	N/A [2]
	west	9	all	68.0	35[4]
5	north	5	all	63.7	N/A [2]

Notes:
1 Required attenuation values shown are for residential and school uses. Commercial uses would require 5 dBA less attenuation.
2 These facades/floors having incident L_{10} values of 70 dBA or less would not require specific window/wall attenuation measures.
3 These L_{10} values are based on predicted playground noise levels rather than traffic noise levels.
4 At these locations, required attenuation values were increased beyond those based on operational noise concerns to account for noise that would be generated by construction of adjacent buildings on the project site (see Chapter 20, “Construction”).

Façades that have a direct line of sight to the proposed school playground on the third story of Building 2 would be expected to experience noise generated by the school playground of up to 74.5 dBA. These values are based upon measurements made at a series of New York City school playgrounds for the New York City School Construction Authority (SCA).[1] Consequently, the required attenuation at Building 2's south and west facades has been adjusted to account for playground noise.

The proposed buildings would be designed with a composite Outdoor-Indoor Transmission Class (OITC) to meet or exceed these attenuation requirements. The OITC of the building façades will depend on the building design measures including window type, façade construction, and air conditioning and ventilation measures. Designing the façades of project buildings based on the results of the building attenuation analysis would provide sufficient attenuation to achieve the CEQR requirements.

K. NOISE LEVELS AT OPEN SPACE AREAS

Noise levels within the new open space areas created on-site as part of the proposed actions would be above the 55 dBA $L_{10(1)}$. This exceeds the noise level for outdoor areas requiring serenity and quiet contained in the *CEQR Technical Manual* noise exposure guidelines (see **Table 19-4**). In the future with the proposed action, $L_{10(1)}$ values at the proposed open space closest to the elevated Miller Highway, between buildings 1 and 3, would be in the mid 70s dBA. There are no practical and feasible mitigation measures that could be implemented to reduce noise levels to below the 55 dBA $L_{10(1)}$ guideline within the open space areas. Although noise levels in these new areas would be above the 55 dBA $L_{10(1)}$ guideline noise level, they would be comparable to noise levels in a number of open space areas that are also located adjacent to heavily trafficked roadways, including Hudson River Park, Riverside Park, Bryant Park, Fort Greene Park, and other urban open space areas. The 55 dBA $L_{10(1)}$ guideline is a worthwhile goal for outdoor areas requiring serenity and quiet. However, due to the level of activity present at most New York City open space areas and parks (except for areas far away from traffic and other typical urban activities) this relatively low noise level is often not achieved.

L. MECHANICAL EQUIPMENT

The building mechanical systems (i.e., heating, ventilation, and air conditioning systems) would be designed to meet all applicable noise regulations (i.e., Subchapter 5, §24-227 of the New York City Noise Control Code addressing circulation devices and the New York City Department of Buildings and Mechanical Codes) to avoid producing levels that would result in any significant increase in ambient noise levels. ✷

[1] SCA Playground Noise Study, Allee King Rosen & Fleming, Inc., October 23, 1992.