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 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, at times, undesirable. Urban noise detracts from the quality of the living environment and there is increasing evidence that excessive noise may represent a threat to public health.

The noise analysis of the Proposed Project consists of three parts:

- A screening analysis to determine whether there are any locations where traffic generated by the Proposed Project would have the potential to cause significant noise impacts;
- A detailed analysis at any location where traffic generated by the Proposed Project would have the potential to result in significant adverse 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 at the project site 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 proposed buildings' design measures, noise levels within the proposed buildings would comply with all applicable requirements. Therefore, the Proposed Project would not result in any significant adverse noise impacts.

B. 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, 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.

"A"-WEIGHTED SOUND LEVEL (DBA)

Noise is typically measured in units called decibels (dB), which are ten times the logarithm of the ratio of the sound pressure squared to a standard reference pressure 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. Frequency is the rate at which sound pressures fluctuate in a cycle over a given quantity of time, and is measured in Hertz (Hz), where 1 Hz equals 1 cycle per second. Frequency defines sound in terms of pitch components. In the measurement system, 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—that 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 this analysis, all measured noise levels are reported in dBA or A-weighted decibels. Common noise levels in dBA are shown in Table 19-1.

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	
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.

COMMUNITY RESPONSE TO 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 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 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 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 19-3). 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 19-3
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
20	Very strong	Vigorous community action

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

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

For the purposes of this analysis, 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) *Technical Manual* for noise impact evaluation, and is used to provide an indication of highest expected sound levels. $L_{10(1)}$ is the noise descriptor used in the *CEQR Technical Manual* for building attenuation. Hourly statistical noise levels (particularly L_{10} and L_{eq} levels) were used to characterize the relevant noise sources and their relative importance at each receptor location.

C. NOISE STANDARDS AND CRITERIA

NEW YORK CITY NOISE CODE

The New York City Noise Control Code promulgates sound-level standards for motor vehicles, air compressors, and paving breakers; requires that all exhausts be muffled; and prohibits all unnecessary noise adjacent to schools, hospitals, or courts. The code further limits construction activities to weekdays between 7 AM and 6 PM.

This Code contains ambient noise quality criteria and standards based on existing land use zoning designations. Table 19-4 summarizes the ambient noise quality criteria contained in the Code. Conformance with the noise level values contained in the Code is determined by considering noise emitted directly from stationary activities within the boundaries of a project. Construction activities and noise sources outside the boundaries of a project are not included within the provisions of this law.

Table 19-4
City of New York Ambient Noise Quality Zone Criteria (dBA)

Ambient Noise Quality Zone (ANQZ)	Daytime Standards* (7 AM–10 PM)	Nighttime Standards* (10 PM–7 AM)
Low-Density Residential (R1 to R3) Land Uses (N1)	60	50
High-Density Residential (R4 to R10) Land Uses (N2)	65	55
Commercial (C1 to C8) and Manufacturing (M1 to M3) Land Uses (N3)	70	70

Note: * $L_{eq(1\ hour)}$.
Source: City of New York Local Law No. 64.

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 19-5 and 19-6. 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. Attenuation requirements are shown in Table 19-6.

Table 19-5
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]		$L_{10} \le 55$ dBA	---------- Ldn ≤ 60 dBA ----------						
2. Hospital, Nursing Home		$L_{10} \le 55$ dBA		$55 < L_{10} \le 65$ dBA	---------- 60 < Ldn ≤ 65 dBA ----------	$65 < L_{10} \le 80$ 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	$L_{10} \le 65$ 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	
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-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)	
5. 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)	
6. Industrial, public areas only[4]	Note 4	Note 4		Note 4		Note 4		Note 4	

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 old-age 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 19-6
Required Attenuation Values to Achieve Acceptable Interior Noise Levels

	Marginally Acceptable	Marginally Unacceptable		Clearly Unacceptable		
Noise Level With Proposed Action	$65 < L_{10} \le 70$	$70 < L_{10} \le 75$	$75 < L_{10} \le 80$	$80 < L_{10} \le 85$	$85 < L_{10} \le 90$	$90 < L_{10} \le 95$
Attenuation*	25 dB(A)	(I) 30 dB(A)	(II) 35 dB(A)	(I) 40 dB(A)	(II) 45 dB(A)	(III) 50 dB(A)

Note: * 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

In addition, the *CEQR Technical Manual* uses the following criteria to determine whether a Proposed Project would result in a significant adverse noise impact. The impact assessments compare the project's Build condition $L_{eq(1)}$ noise levels to those calculated for the No Build condition, for receptors potentially affected by the Proposed Project.

If the No Build levels are less than 60 dBA $L_{eq(1)}$ and the analysis period is not a nighttime period, the threshold for a significant impact would be an increase of at least 5 dBA $L_{eq(1)}$. For the 5 dBA threshold to be valid, the resultant Build condition noise level would have to be equal to or less than 65 dBA. If the No Build 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 standards as being between 10 PM and 7 AM), the incremental significant impact threshold would be 3 dBA $L_{eq(1)}$. (If the No Build noise level is 61 dBA $L_{eq(1)}$, the maximum incremental increase would be 4 dBA, since an increase higher than this would result in a noise level higher than the 65 dBA $L_{eq(1)}$ threshold.)

D. NOISE PREDICTION METHODOLOGY

GENERAL METHODOLOGY

The noise analysis for the Proposed Project used both proportional modeling techniques and the TNM model (the Federal Highway Administration's [FHWA] *Traffic Noise Model* version 2.5). Proportional modeling techniques were used for two purposes: first, as a screening mechanism, to identify locations where there would be the potential for significant noise impacts due to the Proposed Project, and second, for analysis at locations where traffic is the dominant noise source, and there are no complicating factors. At locations where there is rail noise and/or a dominant noise source, a confluence of roadways (e.g. streets, Major Deegan Expressway, etc.), unusual roadway surfaces (e.g. cobblestone), or special conditions, the TNM model was used to determine the noise component due to roadway traffic.

The noise analysis examined weekday PM and late night (LN), and weekend midday (MD), PM, and late night (LN) peak hour traffic values. These are the time periods when the Proposed Project has its maximum traffic generation and therefore the maximum potential for significant noise impacts.

The proportional modeling technique, the TNM model, and the procedures used for analysis are described below.

PROPORTIONAL MODELING TECHNIQUE

Proportional modeling techniques were used to determine locations that had the potential for having significant noise impacts, and to determine potential project impacts at locations where traffic is the dominant noise source and where there are no other complicating factors. The proportional model is an approved methodology for mobile source analysis and is described in the *CEQR Technical Manual*.

Using this technique, the prediction of future traffic noise levels is based on a calculation using measured existing noise levels and predicted changes in traffic volumes to determine No Build and Build levels. Using this methodology, vehicular traffic volumes were 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 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 PCEs

E PCE = Existing PCEs

With this methodology, assuming traffic is 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.

TNM MODEL

At locations where there is rail noise and/or a dominant noise source, a confluence of roadways (e.g. streets, Major Deegan Expressway, etc.), unusual roadway surfaces (e.g. cobblestone), or special conditions, the TNM model was used to determine the noise component due to roadway traffic. The FHWA Traffic Noise Model, TNM 2.5, calculates the noise contribution of each roadway segment to a given noise receptor. The noise from each vehicle type is determined as a function of the reference energy-mean emission level, corrected for vehicle volume, speed, roadway grade, roadway segment length, and source-receptor distance. Further adjustments needed to model the propagation path include shielding provided by rows of buildings, the effects of different ground types, source and receptor elevations, and effect of any intervening noise barriers.

There were two locations for which the TNM model was used. At the first location, noise from the elevated subway is the dominant noise source. At this location the following procedure was used in the analysis:

- Existing noise levels were determined by field measurements;
- The traffic component of the existing noise levels was calculated based on traffic on adjacent streets using the TNM model and existing traffic conditions;

- Elevated subway noise was determined by subtracting the TNM calculated traffic component from the measured (total) noise levels; and
- Future noise levels for 2009 and 2014 were determined by adding the calculated elevated subway noise component to TNM calculated traffic components, based on traffic on the adjacent street.

For conditions with rail (i.e., elevated subway) noise, it was assumed that rail noise for future conditions would remain similar to the calculated values based upon 2004 baseline conditions.

The second location where the TNM model was utilized is a location where the local street, Exterior Street, has a cobblestone surface, and reflections from buildings on both sides of the street and the elevated Major Deegan Expressway result in almost a tunnel-like condition that significantly increases typical traffic noise. At this location the following procedure was used in the analysis:

- Existing noise levels were determined by field measurements;
- The TNM model was used to calculate existing noise levels due to traffic on Exterior Street;
- Adjustment factors were determined to account for the added effect of the cobblestone roadway surface on Exterior Street, and reflections from the buildings on Exterior Street and the undersurface of the Major Deegan Expressway;
- Future No Build noise levels for 2009 and 2014 were determined by adding these adjustment factors to the TNM modeled Exterior Street traffic components; and
- For Future Build conditions, it was assumed that Exterior Street would be repaved with asphalt which would reduce the calculated adjustment factors by approximately 4 dBA, and future Build noise levels for 2009 and 2014 were determined by adding these reduced adjustment factors to the TNM modeled Exterior Street traffic component.

E. EXISTING CONDITIONS

SITE DESCRIPTION

The project site is located in the West Haven neighborhood of the Bronx and is bounded by Metro North Rail Road tracks to the north, River Avenue to the east, 149th Street to the south, and Exterior Street (also known as Major Deegan Boulevard, the street under the Major Deegan Expressway) to the west. The project site is currently zoned M2-1; however, the Proposed Project would rezone the site to C4-4. The rezoning of the site to C4-4 would place the site in an N3 Ambient Noise Quality Zone (ANQZ). $L_{eq(1)}$ noise level limits for this type of zone are 70 dBA for both daytime (7 AM to 10 PM) and nighttime (10 PM to 7 AM) hours.

SELECTION OF NOISE RECEPTOR LOCATIONS

Three noise receptor locations were chosen on the streets in the vicinity of the project site. Site 1 is located at River Avenue and 153rd Street, Site 2 is located on 149th Street between Walton and Gerard Avenues, and Site 3 is located on Exterior Street north of 150th Street (see Figure 19-1). These sites are representative of other locations in the immediate area, and are generally the locations where maximum project impacts would be expected. These sites were used to assess the potential impacts due to project-generated traffic noise.

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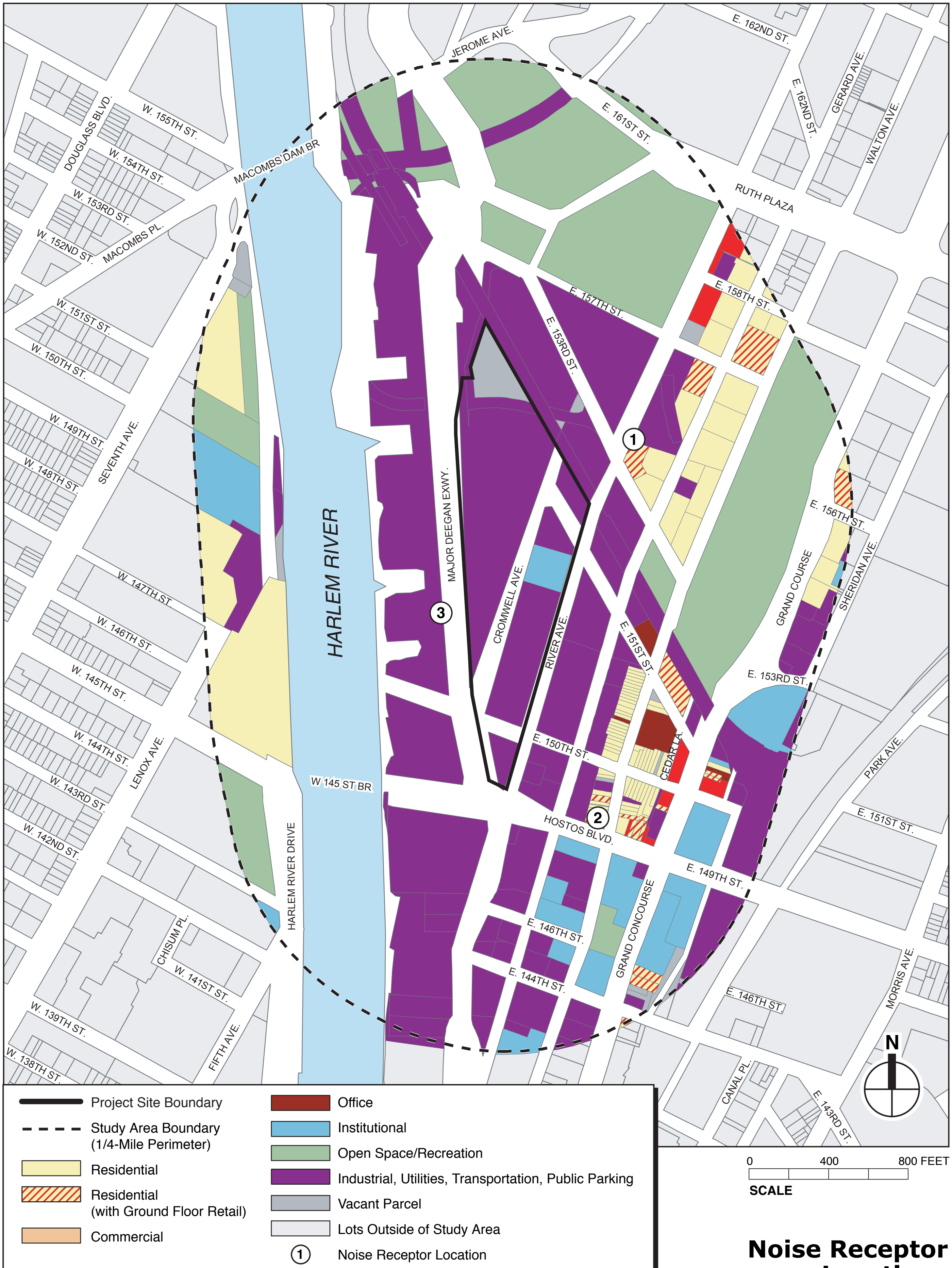

Noise Receptor Locations
Figure 19-1

NOISE MONITORING

Noise monitoring at the three receptor locations (Sites 1 through 3) was performed on June 4, 12, 18, and 19, 2004. At each of these sites, 20-minute spot measurements were taken during the two weekday periods and three weekend periods that reflect peak hours of trip generation: PM weekday (5:00 PM – 7:00 PM), late night (LN) weekday (10:00 PM – 11:00 PM), midday (MD) weekend (12:00 PM – 2:00 PM), PM weekend (5:00 PM – 7:00 PM) and late night (LN) weekend (10:00 PM – 11:00 PM). Given the site's proximity to Yankee Stadium and the traffic generated by Yankee games, noise monitoring at the three receptor locations was performed both during Yankee game day conditions and during non-game day conditions.

EQUIPMENT USED DURING NOISE MONITORING

The instrumentation used for the 20-minute measurements of mobile source noise was a Brüel & Kjær Type 2260 ½-inch microphone connected to a Larson Davis Laboratories (LDL) preamplifier attached to an LDL Model 700 Type 1 (according to ANSI Standard S1.4-1983) sound level meter. This assembly was mounted at a height of 5 feet above the ground surface on a tripod and at least 6 feet away from any large sound-reflecting surface to avoid major interference with sound propagation. The meter was calibrated before and after readings with a Brüel & Kjær Type 4231 sound-level calibrator using the appropriate adaptor. Measurements at each location were made on the A-scale (dBA). The data were digitally recorded by the sound level meter 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. Only traffic-related noise was measured; noise from other sources (e.g. emergency sirens, aircraft flyovers, etc.) was excluded from the measured noise levels. 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 with the requirements of ANSI Standard S1.13-1971 (R1976).

RESULTS OF BASELINE MEASUREMENTS

Noise monitoring results at the three receptor locations are summarized in Tables 19-7 and 19-8. At Site 1 the measured noise was due to a combination of traffic and rail noise sources; at Site 2, traffic on 149th Street was the dominant noise source; and at Site 3 traffic on Exterior Street (and the reflections of that traffic off the surrounding buildings and understructure of the Major Deegan Expressway) was the dominant noise source. Table 19-7 shows noise levels at the three receptor locations with a Yankee game, and Table 19-8 shows noise levels at the three receptor locations without a Yankee game.

In terms of the CEQR criteria, existing noise levels at Sites 1 and 2 are in the "marginally acceptable" category and existing noise levels at Site 3 are in the "clearly unacceptable" category, both with and without a Yankee game during one or more time periods.

As discussed above in the methodology section, for Site 1 the TNM model was used to compute elevated subway noise levels. Existing traffic parameters (i.e., traffic volumes, vehicles mixes, vehicle speeds, etc.) were input to the TNM model, and the difference between the measured noise level and TNM calculated traffic component was the elevated subway noise.

Table 19-7
Measured Existing Noise Levels
With Yankee Game (in dBA)

Site	Measurement Location	Day	Time	L_{eq}	L_1	L_{10}	L_{50}	L_{90}
1	River Avenue and 153rd Street	Weekday	PM	71.3	81.4	73.8	68.4	64.6
		Weekday	LN	71.6	81.8	73.8	69.0	65.6
		Weekend	MD	67.3	74.8	69.4	64.6	60.2
		Weekend	PM	66.9	73.0	69.6	65.4	61.4
		Weekend	LN	64.4	72.4	67.0	62.2	59.8
2	149th Street between Walton and Gerard Avenues	Weekday	PM	70.8	79.2	73.4	68.4	63.4
		Weekday	LN	67.7	77.2	70.0	65.4	62.2
		Weekend	MD	67.8	75.6	71.2	65.6	62.2
		Weekend	PM	68.8	77.0	71.6	66.4	63.2
		Weekend	LN	68.1	75.2	70.6	66.4	62.8
3	Exterior Street north of 150th Street	Weekday	PM	79.2	84.4	81.4	78.4	74.4
		Weekday	LN	76.5	83.8	80.0	74.6	67.4
		Weekend	MD	76.5	86.8	77.4	73.8	72.4
		Weekend	PM	74.3	81.2	77.6	72.2	68.0
		Weekend	LN	76.5	83.8	80.0	74.0	71.6

Note: Field measurements were performed by AKRF, Inc. on June 4 and 12, 2004.

Table 19-8
Measured Existing Noise Levels
Without Yankee Game (in dBA)

Site	Measurement Location	Day	Time	L_{eq}	L_1	L_{10}	L_{50}	L_{90}
1	River Avenue and 153rd Street	Weekday	PM	69.8	80.0	72.5	66.5	62.0
		Weekday	LN	65.9	73.5	70.0	63.5	59.5
		Weekend	MD	68.1	81.0	69.5	63.5	60.0
		Weekend	PM	68.6	77.0	71.0	66.0	63.5
		Weekend	LN	69.8	79.5	72.5	67.0	62.5
2	149th Street between Walton and Gerard Avenues	Weekday	PM	70.4	78.5	72.5	68.0	64.5
		Weekday	LN	66.6	75.5	69.5	64.0	60.0
		Weekend	MD	70.6	78.0	74.0	68.5	64.5
		Weekend	PM	72.4	80.5	73.5	68.0	65.0
		Weekend	LN	70.1	77.5	73.0	68.0	65.0
3	Exterior Street north of 150th Street	Weekday	PM	78.4	85.5	81.5	76.5	73.0
		Weekday	LN	76.0	84.5	79.5	73.5	70.0
		Weekend	MD	75.3	82.5	77.5	74.0	70.5
		Weekend	PM	75.9	82.5	79.0	74.0	69.5
		Weekend	LN	74.4	81.5	78.0	71.5	67.0

Note: Field measurements were performed by AKRF, Inc. on June 18 and 19, 2004.

Similarly, as discussed in the methodology section, for Site 3 the TNM model was used to calculate an adjustment factor to account for the cobblestone roadway surface on Exterior Street and reflections due to the surrounding buildings on Exterior Street and from the undersurface of the elevated Major Deegan Expressway. Existing traffic parameters (i.e., traffic volumes, vehicles mixes, vehicle speeds, etc.) were input to the TNM model, and difference between the measured noise levels and TNM calculated Exterior Street noise levels was used to calculate adjustment factors.

F. THE FUTURE WITHOUT THE PROPOSED ACTIONS

2009

Using the modeling methodology previously described, future noise levels without the Proposed Project in the year 2009 were calculated for conditions both with and without a Yankee game (see Tables 19-9 and 19-10). Future 2009 No Build noise levels at all sites both with and without a Yankee game would be less than 0.5 dBA higher than existing noise levels.[1] Changes of this magnitude would be insignificant and imperceptible.

Table 19-9
Future 2009 No Build Noise Levels
With Yankee Game (in dBA)

Site	Day	Time	Existing $L_{eq(1)}$	2009 No Build $L_{eq(1)}$	Change
1	Weekday	PM	71.3	71.3	0.0
	Weekday	LN	71.6	71.6	0.0
	Weekend	MD	67.3	67.3	0.0
	Weekend	PM	66.9	67.0	0.1
	Weekend	LN	64.4	64.5	0.1
2	Weekday	PM	70.8	70.7	0.1
	Weekday	LN	67.7	67.6	0.1
	Weekend	MD	67.8	67.7	0.1
	Weekend	PM	68.8	68.8	0.0
	Weekend	LN	68.1	68.0	0.1
3	Weekday	PM	79.2	79.3	0.1
	Weekday	LN	76.5	76.8	0.1
	Weekend	MD	76.5	76.7	0.2
	Weekend	PM	74.3	74.3	0.0
	Weekend	LN	76.5	76.6	0.1

In terms of the CEQR criteria, 2009 future No Build noise levels at Sites 1 and 2 would remain in the "marginally acceptable" category and 2009 future No Build noise levels at Site 3 would remain in the "clearly unacceptable" category, both with and without a Yankee game during one or more time periods.

2014

Using the modeling methodology previously described, future noise levels without the Proposed Project in the year 2014 were calculated for conditions both with and without a Yankee game (see Tables 19-11 and 19-12). Future 2014 No Build noise levels at all sites both with and without a Yankee game would be less than 0.5 dBA higher than existing noise levels. Changes of this magnitude would be insignificant and imperceptible.

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[1] Due to traffic change caused by traffic network changes, at Site 2 the 2009 No Build $L_{eq(1)}$ noise levels are slightly less than existing $L_{eq(1)}$ noise levels.

Table 19-10
Future 2009 No Build Noise Levels Without Yankee Game (in dBA)

Site	Day	Time	Existing $L_{eq(1)}$	2009 No Build $L_{eq(1)}$	Change
1	Weekday	PM	69.8	69.8	0.0
	Weekday	LN	65.9	65.9	0.0
	Weekend	MD	68.1	68.1	0.0
	Weekend	PM	68.6	68.6	0.0
	Weekend	LN	69.8	69.9	0.1
2	Weekday	PM	70.4	70.3	0.1
	Weekday	LN	66.6	66.6	0.0
	Weekend	MD	70.6	70.5	0.1
	Weekend	PM	72.4	72.3	0.1
	Weekend	LN	70.1	70.0	0.1
3	Weekday	PM	78.4	78.5	0.1
	Weekday	LN	76.0	76.1	0.1
	Weekend	MD	75.3	75.5	0.2
	Weekend	PM	75.9	75.9	0.0
	Weekend	LN	74.4	74.6	0.2

Table 19-11
Future 2014 No Build Noise Levels With Yankee Game (in dBA)

Site	Day	Time	Existing $L_{eq(1)}$	2014 No Build $L_{eq(1)}$	Change
1	Weekday	PM	71.3	71.3	0.0
	Weekday	LN	71.6	71.6	0.0
	Weekend	MD	67.3	67.4	0.1
	Weekend	PM	66.9	67.1	0.2
	Weekend	LN	64.4	64.5	0.1
2	Weekday	PM	70.8	70.8	0.0
	Weekday	LN	67.7	67.7	0.0
	Weekend	MD	67.8	67.8	0.0
	Weekend	PM	68.8	68.9	0.1
	Weekend	LN	68.1	68.1	0.0
3	Weekday	PM	79.2	79.3	0.1
	Weekday	LN	76.5	76.6	0.1
	Weekend	MD	76.5	76.7	0.2
	Weekend	PM	74.3	74.4	0.1
	Weekend	LN	76.5	76.6	0.1

In terms of the CEQR criteria, 2009 future No Build noise levels at Sites 1 and 2 would remain in the “marginally acceptable” category and 2009 future No Build noise levels at Site 3 would remain in the “clearly unacceptable” category, both with and without a Yankee game during one or more time periods.

Table 19-12
Future 2014 No Build Noise Levels
Without Yankee Game (in dBA)

Site	Day	Time	Existing $L_{eq(1)}$	2014 No Build $L_{eq(1)}$	Change
1	Weekday	PM	69.8	69.9	0.1
	Weekday	LN	65.9	65.9	0.0
	Weekend	MD	68.1	68.2	0.1
	Weekend	PM	68.6	68.6	0.0
	Weekend	LN	69.8	69.9	0.1
2	Weekday	PM	70.4	70.4	0.0
	Weekday	LN	66.6	66.7	0.1
	Weekend	MD	70.6	70.6	0.0
	Weekend	PM	72.4	72.4	0.0
	Weekend	LN	70.1	70.1	0.0
3	Weekday	PM	78.4	78.5	0.1
	Weekday	LN	76.0	76.1	0.1
	Weekend	MD	75.3	75.5	0.2
	Weekend	PM	75.9	76.1	0.2
	Weekend	LN	74.4	74.6	0.2

F. PROBABLE IMPACTS OF THE PROPOSED ACTIONS

2009

Using the modeling methodology previously described, future noise levels with the Proposed Project in the year 2009 were calculated for conditions both with and without a Yankee game (see Tables 19-13 and 19-14). Future 2009 Build noise levels at all sites both with and without a Yankee game would be less than 0.6 dBA higher than future 2009 No Build noise levels. (At Site 3 Build noise levels would be less than No Build noise levels due to the resurfacing of Exterior Street and the replacement of the cobblestone surface with asphalt.) Changes of this magnitude would be imperceptible and insignificant.

In terms of the CEQR criteria, 2009 future No Build noise levels at Sites 1 and 2 would remain in the "marginally acceptable" category and 2009 future No Build noise levels at Site 3 would remain in the "clearly unacceptable" category, both with and without a Yankee game during one or more time periods.

Noise levels in the 2-acre public open space that would be developed by the City with contributions from the project sponsor (west of Exterior Street) would be slightly less than the values at Site 3 on Exterior Street. Noise levels at the open space would decrease by approximately 3 dBA per doubling of distance going west from Exterior Street. Maximum $L_{eq(1)}$ noise levels in the proposed open space would range from approximately 75 to 76 dBA; maximum $L_{10(1)}$ noise levels would be approximately 3 dBA higher than the $L_{eq(1)}$ noise levels. A guideline level of 55 dBA $L_{10(1)}$ for outdoor areas requiring serenity and quiet has been established in the *CEQR Technical Manual's* Table 3R-3, "Noise Exposure Guidelines for Use in City Environmental Impact Review" (presented here as Table 19-5). Noise levels in the proposed open space, would be higher than 55 dBA $L_{10(1)}$. Therefore, based upon these guideline values, noise levels in the new off-site open space would cause a significant impact on users of

Table 19-13
Future 2009 Build Noise Levels
With Yankee Game (in dBA)

Site	Day	Time	2009 No Build $L_{eq(1)}$	2009 Build $L_{eq(1)}$	Change
1	Weekday	PM	71.3	71.4	0.1
	Weekday	LN	71.6	71.6	0.0
	Weekend	MD	67.3	67.3	0.0
	Weekend	PM	67.0	67.0	0.1
	Weekend	LN	64.5	64.6	0.1
2	Weekday	PM	70.7	71.0	0.3
	Weekday	LN	67.6	67.7	0.1
	Weekend	MD	67.7	68.0	0.3
	Weekend	PM	68.8	69.0	0.2
	Weekend	LN	68.0	68.1	0.1
3	Weekday	PM	79.3	77.4	-1.9
	Weekday	LN	76.6	74.7	-1.9
	Weekend	MD	76.7	74.4	-2.3
	Weekend	PM	74.3	72.2	-2.1
	Weekend	LN	76.6	74.5	-2.1

Table 19-14
Future 2009 Build Noise Levels
Without Yankee Game (in dBA)

Site	Day	Time	2009 No Build $L_{eq(1)}$	2009 Build $L_{eq(1)}$	Change
1	Weekday	PM	69.8	70.3	0.5
	Weekday	LN	65.9	66.1	0.2
	Weekend	MD	68.1	68.5	0.4
	Weekend	PM	68.6	69.0	0.4
	Weekend	LN	69.9	70.0	0.1
2	Weekday	PM	70.3	70.6	0.3
	Weekday	LN	66.6	66.7	0.1
	Weekend	MD	70.5	70.8	0.3
	Weekend	PM	72.3	72.6	0.3
	Weekend	LN	70.0	70.1	0.1
3	Weekday	PM	78.5	76.6	-1.9
	Weekday	LN	76.1	73.8	-2.3
	Weekend	MD	75.5	73.8	-1.7
	Weekend	PM	75.9	73.9	-2.0
	Weekend	LN	74.6	72.9	-1.7

this open space. There are no practical and feasible mitigation measures that could be implemented to reduce noise levels within the open spaces to below the 55 dBA $L_{10(1)}$ guideline noise level. (A sound barrier on Exterior Street would present problems with respect to aesthetics and safety, and unless the barrier extended well above the height of the elevated roadway, it would not be effective in reducing noise from the Major Deegan Expressway.) While noise levels in the open space would be above the 55 dBA $L_{10(1)}$ guideline and are therefore identified as a significant impact, they would be comparable to noise levels in a number of well-used and attractive open spaces in New York City that are also located adjacent to heavily trafficked roadways, such as the Hudson River Park, Empire State Park, and the East River Esplanade.

2014

Using the modeling methodology previously described, future noise levels with the Proposed Project in the year 2014 were calculated for conditions both with and without a Yankee game (see Tables 19-15 and 19-16). Future 2014 Build noise levels at all sites both with and without a Yankee game would be less than 1.0 dBA higher than future 2014 No Build noise levels. (At Site 3 Build noise levels would be less than No Build noise levels due to the resurfacing of Exterior Street and the replacement of the cobblestone surface with asphalt.) Changes of this magnitude would be imperceptible and insignificant.

In terms of the CEQR criteria, 2009 future No Build noise levels at Sites 1 and 2 would remain in the "marginally acceptable" category and 2009 future No Build noise levels at Site 3 would remain in the "clearly unacceptable" category, both with and without a Yankee game during one or more time periods.

As discussed above, noise levels in the 2-acre public open space that would be developed by the City with contributions from the project sponsor (i.e., adjacent to Exterior Street) would be slightly less than the values at Site 3 on Exterior Street. Noise levels would decrease by approximately 3 dBA per doubling of distance going west from Exterior Street. Maximum $L_{eq(1)}$ noise levels in the proposed open space would range from approximately 75 to 76 dBA. As discussed above, noise levels in the proposed public open space would be higher than the 55 dBA $L_{10(1)}$ noise level for outdoor areas requiring serenity and quiet contained in the *CEQR Technical Manual's* Table 3R-3, "Noise Exposure Guidelines for Use in City Environmental Impact Review" (presented here as Table 19-5). Therefore, based upon these guideline values, noise levels in the new off-site open space would cause a significant impact on users of this open space. There are no practical and feasible mitigation measures that could be implemented to reduce noise levels within the open space below the 55 dBA $L_{10(1)}$ guideline noise level. While noise levels in the open space would be above the 55 dBA $L_{10(1)}$ guideline noise level, they would be comparable to noise levels in a number of well-used and attractive open spaces in New York City that are also located adjacent to heavily trafficked roadways, such as the Hudson River Park, Empire State Park, and the East River Esplanade.

ATTENUATION REQUIREMENTS

As shown in Table 19-6, 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, and are determined based on exterior $L_{10(1)}$ noise levels. The proposed buildings' designs include the use of well-sealed, double-glazed windows and air conditioning (i.e., alternate means of ventilation). With these measures, the window/wall attenuation would provide up to 40 dBA reduction for all facades of the proposed buildings. Based upon the $L_{10(1)}$ values measured at the project site, these design measures would provide sufficient attenuation to achieve the CEQR requirements.

Also, the buildings' mechanical systems (i.e., heating, ventilation, and air conditioning systems) would be designed to meet all applicable noise regulations and noise levels from the proposed buildings' mechanical system would avoid producing levels that would result in any significant increase in ambient noise levels.

Table 19-15
Future 2014 Build Noise Levels
With Yankee Game (in dBA)

Site	Day	Time	2014 No Build $L_{eq(1)}$	2014 Build $L_{eq(1)}$	Change
1	Weekday	PM	71.3	71.4	0.1
	Weekday	LN	71.6	71.6	0.0
	Weekend	MD	67.4	67.8	0.4
	Weekend	PM	67.1	67.1	0.0
	Weekend	LN	64.5	64.7	0.2
2	Weekday	PM	70.8	71.1	0.3
	Weekday	LN	67.7	67.9	0.2
	Weekend	MD	67.8	68.1	0.3
	Weekend	PM	68.9	69.1	0.2
	Weekend	LN	68.1	68.2	0.1
3	Weekday	PM	79.3	77.5	-1.8
	Weekday	LN	76.6	74.9	-1.7
	Weekend	MD	76.7	74.5	-2.2
	Weekend	PM	74.4	72.5	-1.9
	Weekend	LN	76.6	75.0	-1.6

Table 19-16
Future 2014 Build Noise Levels
Without Yankee Game (in dBA)

Site	Day	Time	2014 No Build $L_{eq(1)}$	2014 Build $L_{eq(1)}$	Change
1	Weekday	PM	69.9	70.3	0.4
	Weekday	LN	65.9	66.1	0.2
	Weekend	MD	68.2	68.5	0.3
	Weekend	PM	68.6	69.1	0.5
	Weekend	LN	69.9	70.0	0.1
2	Weekday	PM	70.4	70.7	0.3
	Weekday	LN	66.7	66.8	0.1
	Weekend	MD	70.6	70.9	0.3
	Weekend	PM	72.4	72.7	0.3
	Weekend	LN	70.1	70.2	0.1
3	Weekday	PM	78.5	76.7	-1.8
	Weekday	LN	76.1	73.9	-2.2
	Weekend	MD	75.5	74.0	-1.5
	Weekend	PM	76.1	74.1	-2.0
	Weekend	LN	74.6	73.1	-1.5

*