A. INTRODUCTION

This chapter assesses the potential for the Proposed Actions to result in significant adverse noise impacts. The analysis determines whether the Proposed Actions would result in increases in noise levels that could have a significant adverse impact on nearby sensitive receptors and also considers the effect of noise exposure at the projected and potential development sites on the proposed uses in the future with the Proposed Actions.

B. PRINCIPAL CONCLUSIONS

The noise analysis concludes that noise level increases of up to 4.9 dBA would be experienced on Richmond Street between Fulton Street and Dinsmore Place as a result of increased traffic on that block, which constitutes a significant adverse impact with respect to mobile source noise associated with operations of the Proposed Actions for this location. At all other noise receptor sites, the maximum noise level increase would be 2.2 dBA, which would not be considered a significant adverse noise impact.

The school playground analysis concludes that noise associated with the proposed school playground on projected development site 66's Building B would not meaningfully contribute to noise level increases at any nearby existing noise receptors. Therefore, there would be no significant adverse noise impact to existing noise receptors due to the school playground. At projected development site 66's Buildings A and B, the school playground would be the dominant noise source. Window wall attenuation would be required to result in acceptable interior noise levels at these buildings. Consequently, the buildings would not experience a significant adverse noise impact.

The building attenuation analysis concludes that in order to meet CEQR interior noise level requirements, up to 40 dBA of building attenuation would be required for project buildings and in order to meet U.S. Department of Housing and Urban Development (HUD) interior noise level guidelines, 31 dBA of building attenuation would be required for project buildings. The requirement for these levels of façade attenuation as well as the requirement for an alternate means of ventilation will be included in an (E) designation (E-366) for all affected privately-held projected and potential development sites. For the City-owned parcel located within projected development site 66 (Block 4142, Lot 32), the requirement for façade attenuation as well as the requirement for an alternate means of ventilation will be required through the Land Disposition Agreement (LDA) between the New York City Department of Housing Preservation and Development (HPD) and the future developer. Therefore, there would be no significant adverse noise impact with respect to building attenuation.

C. ACOUSTICAL FUNDAMENTALS

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

"A"-Weighted Sound Level (dBA)

In order to establish a uniform noise measurement that simulates people's perception of loudness and annoyance, the decibel measurement is weighted to account for those frequencies most audible to the human ear. This is known as the A-weighted sound level, or "dBA," and it is the descriptor of noise levels most often used for community noise. As shown in Table 16-1, the threshold of human hearing is defined as 0 dBA; very quiet conditions (as in a library, for example) are approximately 40 dBA; levels between 50 dBA and 70 dBA define the range of noise levels generated by normal daily activity; levels above 70 dBA would be considered noisy, and then loud, intrusive, and deafening as the scale approaches 130 dBA.

TABLE 16-1
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 ten dBA increase in level appears to double the loudness, and a ten dBA decrease halves the apparent loudness.
Sources: Cowan, James P. *Handbook of Environmental Acoustics,* Van Nostrand Reinhold, New York, 1994. Egan, M. David, Architectural Acoustics. McGraw-Hill Book Company, 1988.

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

Noise Descriptors Used In Impact Assessment

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

The relationship between L_{eq} and levels of exceedance is worth noting. Because L_{eq} is defined in energy rather than straight numerical terms, it is not simply related to the levels of exceedance. If the noise fluctuates very little, L_{eq}

will approximate L_{50} or the median level. If the noise fluctuates broadly, the L_{eq} will be approximately equal to the L_{10} value. If extreme fluctuations are present, the L_{eq} will exceed L_{90} or the background level by ten or more decibels. Thus the relationship between L_{eq} and the levels of exceedance will depend on the character of the noise. In community noise measurements, it has been observed that the L_{eq} is generally between L_{10} and L_{50}.

For purposes of the Proposed Actions, the maximum one-hour equivalent sound level (i.e., $L_{eq(1)}$) 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 is used to provide an indication of highest expected sound levels. The one-hour L_{10} is the noise descriptor used in the *CEQR Technical Manual* noise exposure guidelines for city environmental impact review classification. The L_{dn} is the noise descriptor used in the *HUD Noise Guidebook* sets exterior noise standards for housing construction projects receiving federal funds.

D. NOISE STANDARDS AND CRITERIA

New York CEQR Technical Manual Noise Standards

The *CEQR Technical Manual* defines attenuation requirements for buildings based on exterior noise level (see Table 16-2). Recommended noise attenuation values for buildings are designed to maintain interior noise levels of 45 dBA or lower for residential uses and 50 dBA or lower for commercial uses, and are determined based on exterior $L_{10(1)}$ noise levels.

TABLE 16-2
Required Attenuation Values to Achieve Acceptable Interior Noise Levels

	Marginally Unacceptable				Clearly Unacceptable
Noise Level With Proposed Actions	$70 < L_{10} \leq 73$	$73 < L_{10} \leq 76$	$76 < L_{10} \leq 78$	$78 < L_{10} \leq 80$	$80 < L_{10}$
Attenuation[A]	(I) 28 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. Retail and office spaces 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 (DEP).

HUD Development Guidelines

The *HUD Noise Guidebook* sets exterior noise standards for housing construction projects based L_{dn} values (see Table 16-3). The L_{dn} refers to a 24-hour average noise level with a ten dB penalty applied to the noise levels during the hours between 10 PM and 7 AM, due to increased sensitivity to noise levels during these hours. If the exterior noise level is 65 L_{dn} to 70 L_{dn}, 25 dBA of noise attenuation must be provided; if the exterior noise level is 70 L_{dn} to 75 L_{dn}, 30 dBA of noise attenuation is required; and if the exterior noise level exceeds 75 L_{dn}, sufficient attenuation must be provided to bring interior levels down to 45 L_{dn} or lower for residential uses.

TABLE 16-3
HUD Exterior Noise Standards

	Acceptable	Normally Unacceptable	Unacceptable
Noise Level With Proposed Actions	$L_{dn} \leq 65$	$65 < L_{dn} \leq 75$	$75 < L_{dn}$

Source: U.S. Department of Housing and Urban Development (HUD)

For this analysis, L_{dn} levels were estimated using the following equation:

$$L_{dn} = L_{10} - 3$$

The method used to determine L_{dn} values is to measure the loudest hourly L_{10} for a typical day and then to estimate the L_{dn} from this loudest hourly L_{10}, which is consistent with the *HUD Noise Guidebook*.

E. EXISTING NOISE LEVELS

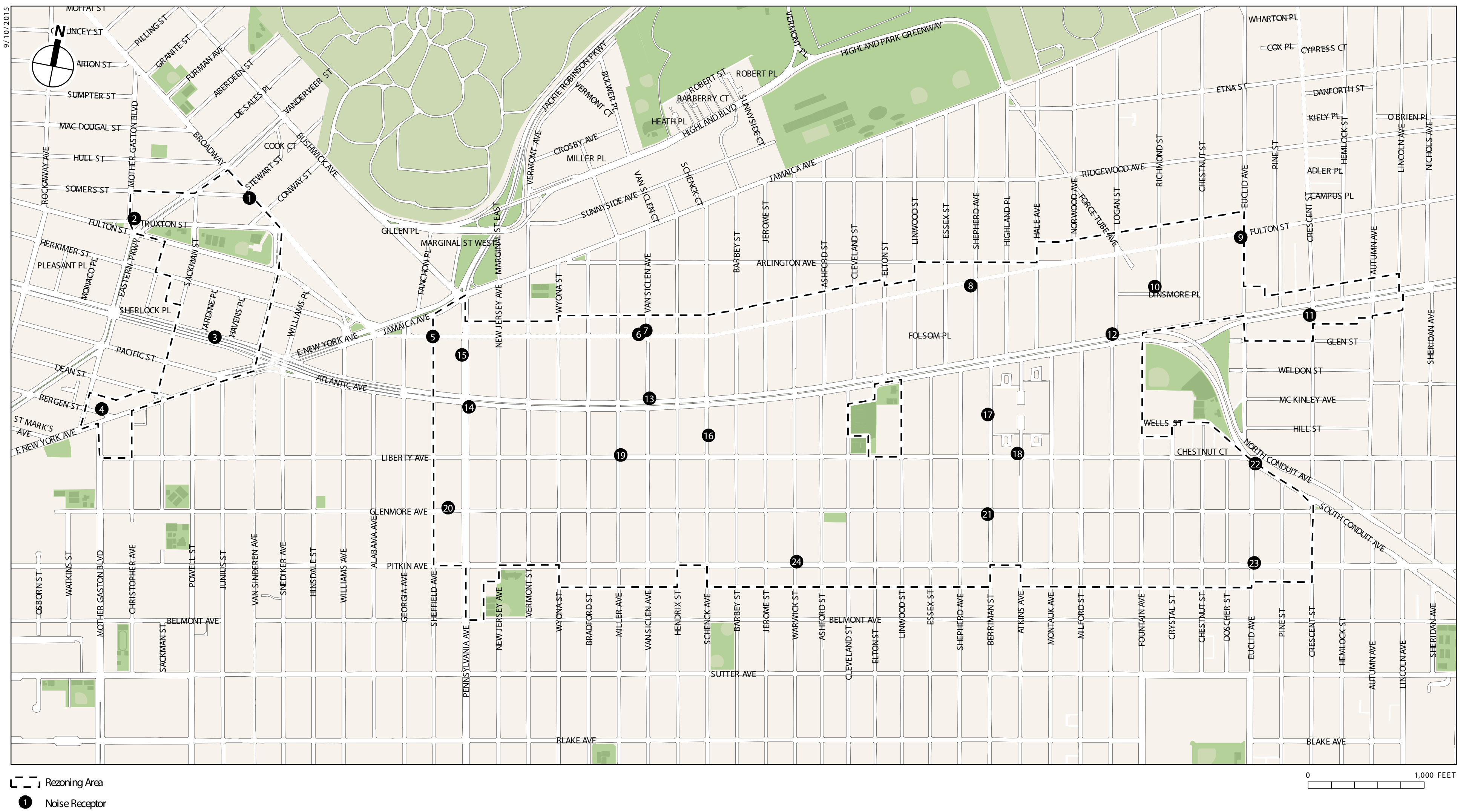
Selection of Noise Receptor Locations

A total of 24 receptor locations within the Rezoning Area were selected for evaluation of noise attenuation requirements. These locations are detailed below in Table 16-4 and shown in Figure 16-1.

TABLE 16-4
Noise Receptor Locations

Receptor	Location
1	Broadway and Somers Street
2	Mother Gaston Boulevard and Fulton Street
3	Atlantic Avenue between Jardine and Havens Places
4	East New York Avenue and Mother Gaston Boulevard
5	Fulton Street and Sheffield Avenue
6	Fulton Street and Van Siclen Avenue
7	Van Siclen Avenue MTA Station Platform
8	Fulton Street and Shepherd Avenue
9	Fulton Street and Euclid Avenue
10	Richmond Street between Dinsmore Place and Fulton Street
11	Atlantic Avenue and Crescent Street
12	Atlantic Avenue and Logan Street
13	Atlantic Avenue and Van Siclen Avenue
14	Atlantic Avenue and Pennsylvania Avenue
15	Pennsylvania Avenue between Fulton Street and Atlantic Avenue
16	Schenck Avenue between Atlantic and Liberty Avenues
17	Berriman Street between Liberty and Atlantic Avenues
18	Liberty Avenue and Atkins Avenue
19	Liberty Avenue and Miller Avenue
20	Glenmore Avenue between Sheffield and Pennsylvania Avenues
21	Glenmore Avenue and Berriman Street
22	South Conduit Avenue and Euclid Avenue
23	Pitkin Avenue and Euclid Avenue
24	Pitkin Avenue and Warwick Street

Noise receptor locations were selected based on the following criteria: (1) locations near projected and potential development sites; and (2) to provide comprehensive geographic coverage throughout the study area to get an accurate picture of the ambient noise environment.



East New York Rezoning Proposal

Figure 16-1
Noise Receptor Locations

Noise Monitoring

At each receptor site, existing noise levels were determined by field measurements. Noise monitoring was performed between February 25, 2015 and March 25, 2015. At Sites 1, 3, 5, 6, 7, 8, 9, and 15, one-hour spot measurements were performed. At all other sites, 20-minute spot measurements were performed. All measurements were performed during the weekday peak periods—AM (7:00 to 9:30 AM), midday (MD) (12:00 to 2:00 PM), and PM (4:30 to 7:00 PM). Receptors 18 and 21 were also measured during the midafternoon period (MidPM) (2:00 to 3:00 PM) to account for the traffic associated with the adjacent schools at these locations.

Equipment Used During Noise Monitoring

Measurements were performed using Brüel & Kjær Sound Level Meters (SLM) Types 2260, 2250 and 2270, Brüel & Kjær ½-inch microphones Type 4189, and Brüel & Kjær Sound Level Calibrators Type 4231. The Brüel & Kjær SLMs are Type 1 instruments according to ANSI Standard S1.4-1983 (R2006). The SLMs had a laboratory calibration date within the past year at the time of use, as is standard practice. The microphones were mounted at a height of approximately five feet above the ground surface on a tripod and approximately six feet or more away from any large sound-reflecting surface to avoid major interference with sound propagation. The SLMs were calibrated before and after readings with a Brüel & Kjær Type 4231 Sound Level Calibrator using the appropriate adaptor. The data were digitally recorded by the SLMs and displayed at the end of the measurement period in units of dBA. Measured quantities included the L_{eq}, L_1, L_{10}, L_{50}, L_{90}, and 1/3 octave band data. A windscreen was used during all sound measurements except for calibration. All measurement procedures were based on the guidelines outlined in ANSI Standard S1.13-2005.

Existing Noise levels At Noise Receptor locations

Measured Noise Levels

The results of the measurements of existing noise levels are summarized in Table 16-5. Vehicular traffic was the dominant noise source at receptor sites 2, 4, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23, and 24. Elevated subway noise was the dominant noise source at receptor sites 1, 3, 5, 6, 7, 8, 9, and 15. Noise levels vary over a wide range and reflect the proximity of receptors to elevated rail lines and the level of rail and vehicular activity present on the adjacent rail lines and roadways.

In terms of *CEQR Technical Manual* criteria, existing noise levels at receptor site 17 are in the "acceptable" category, existing noise levels at receptor sites 20 and 21 are in the "marginally acceptable" category, existing noise levels at receptor sites 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 19, 22, 23, and 24 are in the "marginally unacceptable" category and existing noise levels at receptor sites 1 and 9 are in the "clearly unacceptable" category.

Existing L_{dn} Noise Levels

As part of the Proposed Actions, projected development site 66 would receive Federal funding. L_{dn} noise levels were therefore calculated for the corresponding receptor site 10 as described above in the "HUD Development Guidelines" section. The L_{dn} for receptor site 10 was estimated according to the methodology described above to be 68.9 dBA. According to HUD criteria, the calculated Existing L_{dn} noise level at receptor site 10 would be in the "normally unacceptable" category.

TABLE 16-5
Existing Noise Levels (in dBA)

Receptor	Measurement Location	Time	L_{eq}	L_1	L_{10}	L_{50}	L_{90}
1	Broadway and Somers Street	AM	77.6	90.3	80.3	69.0	62.3
		MD	75.9	87.6	79.6	67.4	59.1
		PM	79.2	90.6	81.5	70.7	62.7
2	Mother Gaston Boulevard and Fulton Street	AM	71.0	78.0	74.8	68.8	59.8
		MD	67.8	75.8	72.2	63.2	56.0
		PM	69.7	76.5	74.1	66.5	56.9
3	Atlantic Avenue between Jardine and Havens Places	AM	74.3	83.8	77.9	70.7	64.9
		MD	74.2	82.9	75.2	68.1	61.8
		PM	73.1	82.3	76.7	69.6	63.6
4	East New York Avenue and Mother Gaston Boulevard	AM	72.7	79.4	75.9	70.3	60.4
		MD	71.2	78.3	75.4	67.1	56.9
		PM	72.6	78.8	75.9	72.1	57.7
5	Fulton Street and Sheffield Avenue	AM	75.6	88.4	78.6	68.1	61.5
		MD	74.8	88.1	77.4	67.2	60.6
		PM	76.8	89.3	78.6	70.3	65.4
6	Fulton Street and Van Siclen Avenue	AM	75.4	88.4	78.2	62.2	53.7
		MD	73.8	87.1	75.1	60.9	53.1
		PM	73.7	86.7	76.0	63.9	57.8
7	Van Siclen Avenue MTA Station Platform	AM	72.2	84.4	75.2	59.3	54.4
		MD	70.4	82.4	73.0	58.9	52.8
		PM	73.5	85.5	77.5	61.2	55.0
8	Fulton Street and Shepherd Avenue	AM	82.4	96.8	78.9	64.6	55.8
		MD	81.1	96.3	71.0	59.7	52.5
		PM	82.1	96.4	75.5	63.3	59.1
9	Fulton Street and Euclid Avenue	AM	77.6	89.7	81.5	66.7	56.7
		MD	78.2	90.1	80.1	67.4	59.4
		PM	79.0	90.6	82.8	69.3	62.8
10	Richmond Street between Dinsmore Place and Fulton Street	AM	64.4	75.8	68.1	54.2	51.7
		MD	70.8	83.7	71.9	58.3	55.2
		PM	64.4	76.2	68.5	57.2	54.1
11	Atlantic Avenue and Crescent Street	AM	72.3	81.0	75.8	69.9	63.7
		MD	71.7	82.2	74.1	68.1	61.9
		PM	71.6	79.5	75.0	69.2	63.1
12	Atlantic Avenue and Logan Street	AM	74.1	82.9	76.8	72.0	66.7
		MD	70.4	77.6	73.3	68.9	63.4
		PM	71.0	79.6	73.2	69.0	63.9
13	Atlantic Avenue and Van Siclen Avenue	AM	72.6	82.9	74.2	67.7	61.8
		MD	71.9	81.1	75.4	68.9	60.3
		PM	73.1	81.6	76.5	71.7	59.0
14	Atlantic Avenue and Pennsylvania Avenue	AM	76.2	85.9	79.5	73.1	68.1
		MD	74.7	83.6	77.5	72.6	66.5
		PM	77.2	88.5	79.7	73.0	68.0
15	Pennsylvania Avenue between Fulton Street and Atlantic Avenue	AM	72.4	82.1	76.0	69.3	64.6
		MD	74.7	83.2	77.1	70.6	64.5
		PM	73.7	82.7	76.0	69.3	63.9
16	Schenck Avenue between Atlantic and Liberty Avenues	AM	67.9	78.6	70.7	63.4	60.3
		MD	65.3	77.2	67.3	60.5	56.0
		PM	65.3	74.5	68.2	62.1	58.4
17	Berriman Street between Liberty and Atlantic Avenues	AM	60.6	71.9	62.7	55.6	51.2
		MD	65.7	75.7	64.4	55.3	50.9
		PM	59.5	70.4	62.8	53.6	49.2
18	Liberty Avenue and Atkins Avenue	AM	69.3	80.1	70.6	65.1	60.0
		MD	62.5	71.8	65.8	59.1	54.4
		MidPM[1]	65.1	74.2	67.4	62.9	58.0
		PM	62.9	69.8	66.3	61.1	56.3

TABLE 16-5 (cont'd) Existing Noise Levels (in dBA)

Receptor	Measurement Location	Time	L_{eq}	L_1	L_{10}	L_{50}	L_{90}
19	Liberty Avenue and Miller Avenue	AM	67.7	78.1	71.1	63.6	53.9
		MD	65.2	76.5	68.1	60.6	54.6
		PM	65.5	78.1	68.0	57.1	50.0
20	Glenmore Avenue between Sheffield and Pennsylvania Avenues	AM	64.8	74.3	67.2	62.5	58.1
		MD	64.2	73.7	66.9	61.4	56.9
		PM	63.8	71.6	66.7	62.0	57.0
21	Glenmore Avenue and Berriman Street	AM	67.5	79.6	67.9	60.3	54.4
		MD	60.9	71.1	64.1	55.9	50.0
		MidPM[1]	61.2	71.2	63.3	57.4	53.1
		PM	61.3	69.0	61.2	54.5	49.8
22	South Conduit Avenue and Euclid Avenue	AM	74.2	84.4	77.5	70.7	62.2
		MD	75.8	84.5	79.2	72.9	65.6
		PM	76.2	84.2	79.3	74.1	66.8
23	Pitkin Avenue and Euclid Avenue	AM	70.6	79.2	72.2	65.6	59.8
		MD	67.4	76.6	70.2	64.9	60.0
		PM	68.8	78.9	71.2	65.6	59.8
24	Pitkin Avenue and Warwick Street	AM	69.6	80.9	70.8	62.3	53.0
		MD	67.4	77.6	71.3	61.8	52.0
		PM	66.2	74.2	70.2	63.5	54.9

Note:
(1) These receptors were also measured during the midafternoon period to account for the traffic associated with the adjacent schools at these locations.

F. NOISE PREDICTION METHODOLOGY

General Methodology

Future noise levels were calculated using a proportional modeling technique, which was used as a screening tool to estimate changes in noise levels. The proportional modeling technique is an analysis methodology recommended for analysis purposes in the *CEQR Technical Manual*. The noise analysis examined the weekday AM, midday (MD), and PM peak hours and the mid-afternoon (MidPM) period at receptor sites 18 and 21 and examined the weekday AM, MD, and PM peak hours at the remaining sites. The selected time periods are when development facilitated by the Proposed Actions would be expected to produce the maximum traffic generation (based on the traffic studies presented in Chapter 13, "Transportation") and therefore result in the maximum potential for significant noise level increases. The methodologies used for the noise analyses are described below.

Proportional Modeling

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

Using this technique, the prediction of future noise levels where traffic is the dominant noise source is based on a calculation using measured existing noise levels and predicted changes in traffic volumes to determine No-Action and With-Action noise levels. 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, and one heavy-duty truck (having a gross weight of more than 26,400 pounds) is assumed to generate the noise equivalent of 47 cars, and one bus (vehicles designed to carry more than nine passengers) is assumed to generate the noise equivalent of 18 cars. Future noise levels are calculated using the following equation: $F\ NL - E\ NL = 10 * \log_{10} (F\ PCE / E\ PCE)$

where:

F NL = Future Noise Level

E NL = Existing Noise Level

F PCE = Future PCEs

E PCE = Existing PCEs

Sound levels are measured in decibels and therefore increase logarithmically with sound source strength. In this case, the sound source is traffic volumes measured in PCEs. For example, assume that 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.

Traffic Noise Model (TNM)

Preliminary modeling studies using the proportional modeling technique indicated that the future traffic may have the potential to cause noticeable increases in noise levels due to large increases in auto and bus traffic at receptor site 10. Therefore, at this location, a refined analysis was performed using the TNM (described below).

The TNM is a computerized model developed for the FHWA that 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 considerations included in modeling the propagation path include identifying the shielding provided by rows of buildings, analyzing the effects of different ground types, identifying source and receptor elevations, and analyzing the effects of any intervening noise barriers. The existing TNM noise levels were subtracted from the measured existing noise levels and added to the predicted TNM No-Action and With-Action noise levels to account for background noise not attributable to vehicular traffic. The less refined proportional modeling technique does not account for the noise contributions from adjacent roadways, and thus, over predicts the project-generated traffic noise levels by attributing all of the noise due to traffic and traffic changes to the immediately adjacent street.

Noise from the School Playground

A detailed site plan is not available for projected development site 66. Therefore, the location of the general playground area was assumed to be potentially anywhere on the site, and playground noise levels were calculated at all surrounding project and existing buildings.

The *CEQR Technical Manual* provides the following guidance to determine sound effects of the proposed playground at projected development site 66:

> *"…based upon noise measurements made at 10 school playground sites in 1987, it may be assumed the $L_{eq(1)}$ noise levels at the boundary would be 75 dB(A), 15 feet from the boundary would be 73 dB(A), 30 feet from the boundary would be 70 dB(A), and the noise level would decrease by 4.5 dB(A) per doubling of distance beyond 30 feet."*

The analysis of the proposed playground consisted of the following procedure:

- Existing noise measurements were made at receptor site 10;
- The distances between the playground boundary and nearby noise-sensitive buildings were determined;
- Play area noise levels were predicted at each nearby noise receptor using the *CEQR Technical Manual* guidance outlined above;
- Play area noise levels were combined with the predicted With-Action traffic noise levels to determine total future noise levels with the Proposed Actions; and

- Total future noise levels with the Proposed Actions were compared to the predicted No-Action noise levels for purposes of impact determination.

G. THE FUTURE WITHOUT THE PROPOSED ACTIONS (NO-ACTION CONDITION)

Using the methodologies previously described, No-Action noise levels for the 2030 analysis year were calculated at the 24 mobile source noise analysis receptors. These No-Action values are shown in Table 16-6.

TABLE 16-6
2030 No-Action Condition Noise Levels (in dBA)

Receptor	Location	Time	Existing $L_{eq(1)}$	No-Action $L_{eq(1)}$	$L_{eq(1)}$ Change	No-Action $L_{10(1)}$
1	Broadway and Somers Street	AM	77.6	77.9	0.3	80.6
		MD	75.9	76.1	0.2	79.8
		PM	79.2	79.4	0.2	81.7
2	Mother Gaston Boulevard and Fulton Street	AM	71.0	71.2	0.2	75.0
		MD	67.8	68.0	0.2	72.4
		PM	69.7	69.9	0.2	74.3
3	Atlantic Avenue between Jardine and Havens Places	AM	74.3	75.3	1.0	78.9
		MD	74.2	75.2	1.0	76.2
		PM	73.1	74.3	1.2	77.9
4	East New York Avenue and Mother Gaston Boulevard	AM	72.7	72.9	0.2	76.1
		MD	71.2	71.5	0.3	75.7
		PM	72.6	72.8	0.2	76.1
5	Fulton Street and Sheffield Avenue	AM	75.6	75.9	0.3	78.9
		MD	74.8	75.0	0.2	77.6
		PM	76.8	77.0	0.2	78.8
6	Fulton Street and Van Siclen Avenue	AM	75.4	75.6	0.2	78.4
		MD	73.8	74.0	0.2	75.3
		PM	73.7	73.9	0.2	76.2
7	Van Siclen Avenue MTA Station Platform	AM	72.2	72.4	0.2	75.4
		MD	70.4	70.6	0.2	73.2
		PM	73.5	73.7	0.2	77.7
8	Fulton Street and Shepherd Avenue	AM	82.4	82.6	0.2	79.1
		MD	81.1	81.3	0.2	71.2
		PM	82.1	82.3	0.2	75.7
9	Fulton Street and Euclid Avenue	AM	77.6	77.9	0.3	81.8
		MD	78.2	78.5	0.3	80.4
		PM	79.0	79.3	0.3	83.1
10	Richmond Street between Dinsmore Place and Fulton Street	AM	64.4	66.0	1.6	69.7
		MD	70.8	70.8	0.0	71.9
		PM	64.4	64.5	0.1	68.6

TABLE 16-6 (cont'd)
2030 No-Action Condition Noise Levels (in dBA)

Receptor	Location	Time	Existing $L_{eq(1)}$	No-Action $L_{eq(1)}$	$L_{eq(1)}$ Change	No-Action $L_{10(1)}$
11	Atlantic Avenue and Crescent Street	AM	72.3	72.6	0.3	76.1
		MD	71.7	72.0	0.3	74.4
		PM	71.6	71.9	0.3	75.3
12	Atlantic Avenue and Logan Street	AM	74.1	74.4	0.3	77.1
		MD	70.4	70.6	0.2	73.5
		PM	71.0	71.2	0.2	73.4
13	Atlantic Avenue and Van Siclen Avenue	AM	72.6	72.9	0.3	74.5
		MD	71.9	72.2	0.3	75.7
		PM	73.1	73.3	0.2	76.7
14	Atlantic Avenue and Pennsylvania Avenue	AM	76.2	76.6	0.4	79.9
		MD	74.7	75.1	0.4	77.9
		PM	77.2	77.6	0.4	80.1
15	Pennsylvania Avenue between Fulton Street and Atlantic Avenue	AM	72.4	72.9	0.5	76.5
		MD	74.7	75.1	0.4	77.5
		PM	73.7	74.3	0.6	76.6
16	Schenck Avenue between Atlantic and Liberty Avenues	AM	67.9	70.1	2.2	72.9
		MD	65.3	68.0	2.7	70.0
		PM	65.3	67.5	2.2	70.4
17	Berriman Street between Liberty and Atlantic Avenues	AM	60.6	60.8	0.2	62.9
		MD	65.7	65.9	0.2	64.6
		PM	59.5	59.7	0.2	63.0
18	Liberty Avenue and Atkins Avenue	AM	69.3	69.9	0.6	71.2
		MD	62.5	63.4	0.9	66.7
		MidPM	65.1	66.0	0.9	68.3
		PM	62.9	63.6	0.7	67.0
19	Liberty Avenue and Miller Avenue	AM	67.7	68.5	0.8	71.9
		MD	65.2	66.2	1.0	69.1
		PM	65.5	66.5	1.0	69.0
20	Glenmore Avenue between Sheffield and Pennsylvania Avenues	AM	64.8	65.0	0.2	67.4
		MD	64.2	64.4	0.2	67.1
		PM	63.8	64.1	0.3	67.0
21	Glenmore Avenue and Berriman Street	AM	67.5	67.7	0.2	68.1
		MD	60.9	61.1	0.2	64.3
		MidPM	61.2	61.3	0.1	63.4
		PM	61.3	61.5	0.2	61.4
22	South Conduit Avenue and Euclid Avenue	AM	74.2	74.7	0.5	78.0
		MD	75.8	76.3	0.5	79.7
		PM	76.2	76.6	0.4	79.7
23	Pitkin Avenue and Euclid Avenue	AM	70.6	70.8	0.2	72.4
		MD	67.4	67.6	0.2	70.4
		PM	68.8	69.0	0.0	71.4
24	Pitkin Avenue and Warwick Street	AM	69.6	70.2	0.6	71.4
		MD	67.4	68.0	0.6	71.9
		PM	66.2	66.8	0.6	70.8

Note:
Noise levels at receptor site 10 were calculated using TNM. Noise levels at all other receptor sites were calculated using proportional modeling.

In 2030, the maximum increase in $L_{eq(1)}$ noise levels for the No-Action condition would be 2.7 dBA. Changes of this magnitude would be barely perceptible. In terms of CEQR noise exposure guidelines, noise levels at receptor site 17 would remain in the "acceptable" category, noise levels at receptor sites 20 and 21 would remain in the "marginally acceptable" category, noise levels at receptor sites 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 15, 16, 18, 19, 22, 23, and 24 would remain in the "marginally unacceptable" category, noise levels at receptor site 14 would change from the "marginally unacceptable" category to the "clearly unacceptable" category and noise levels at receptor sites 1 and 9 would remain in the "clearly unacceptable" category.

No-Action L_{dn} Noise Levels

As described above in the "HUD Development Guidelines" section, the L_{dn} for receptor site 10 was estimated according to the methodology described above to be 68.9 dBA. According to HUD criteria, the calculated No-Action L_{dn} noise level at receptor site 10 would remain in the "normally unacceptable" category.

H. THE FUTURE WITH THE PROPOSED ACTIONS (WITH-ACTION CONDITION)

Noise Impact Identification

Using the methodologies previously described, With-Action noise levels were calculated at the 24 noise impact analysis receptors for the 2030 analysis year. The With-Action noise levels for all receptors other than site 10 are shown in Table 16-7. With-Action noise levels for site 10, which includes noise from the proposed school playground on projected development site 66 Building B as well as noise from vehicular traffic on adjacent roadways, are shown in Table 16-8.

In 2030, the maximum increase in $L_{eq(1)}$ noise levels for the With-Action condition compared to the No-Action condition for all receptor sites except for receptor site 10 would be 2.2 dBA. Changes of this magnitude would be barely perceptible and would not constitute a significant noise impact according to *CEQR Technical Manual* impact criteria. In terms of CEQR noise exposure guidelines, noise levels at receptor site 17 would remain in the "acceptable" category, noise levels at receptor sites 20 and 21 would remain in the "marginally acceptable" category, noise levels at receptor sites 2, 3, 4, 5, 7, 8, 10, 11, 12, 13, 15, 16, 18, 19, 23, and 24 would remain in the "marginally unacceptable" category, noise levels at receptor sites 6 and 22 would change from the "marginally unacceptable" category to the "clearly unacceptable" category and noise levels at receptor sites 1, 9, and 14 would remain in the "clearly unacceptable" category.

In 2030, the maximum increase in $L_{eq(1)}$ noise levels for the With-Action condition compared to the No-Action condition for receptor site 10 would be 4.9 dBA. This is a result of substantially increased traffic traveling along Richmond Street between Fulton Street and Dinsmore Place in the future With-Action condition; noise from the proposed playground associated with the school on projected development site 66 Building B would not contribute substantially to noise levels at this site. Changes of the magnitude predicted to occur at site 10 would be readily noticeable. According to field observations, all of the residences along Richmond Street between Fulton Street and Dinsmore Place appear to have double-glazed windows, and most of these residences also appear to have a means of alternate ventilation in the form of through-wall air conditions or window air conditioners. Residential units with double-glazed windows and an alternate means of ventilation would be expected to achieve approximately 25 dBA of attenuation resulting in interior $L_{10(1)}$ values of approximately 50 dBA during the AM peak hour and approximately 47 dBA during the PM peak hour, which would not be considered acceptable according to CEQR Technical Manual criteria. At residential units that do not have an alternate means of ventilation, the typical attenuation would be reduced from 25 dBA to 5 dBA for an open window condition resulting in interior $L_{10(1)}$ values of approximately 70 dBA during the AM peak hour and approximately 67 dBA during the PM peak hour, which would not be acceptable according to CEQR Technical Manual criteria. Therefore, noise level increases during the AM peak hour would be considered a significant adverse noise impact. During the MD, noise level increases are predicted to be 0.7 dBA or less and would not be considered a significant adverse noise impact.

TABLE 16-7
2030 With-Action Condition Noise Levels (in dBA)

Receptor	Location	Time	No-Action $L_{eq(1)}$	With-Action $L_{eq(1)}$	$L_{eq(1)}$ Change	With-Action $L_{10(1)}$
1	Broadway and Somers Street	AM	77.9	78.5	0.6	81.2
		MD	76.1	76.7	0.6	80.4
		PM	79.4	79.7	0.3	82.0
2	Mother Gaston Boulevard and Fulton Street	AM	71.2	71.2	0.0	75.0
		MD	68.0	68.0	0.0	72.4
		PM	69.9	69.9	0.0	74.3
3	Atlantic Avenue between Jardine and Havens Places	AM	75.3	75.9	0.6	79.5
		MD	75.2	75.7	0.5	76.7
		PM	74.3	74.6	0.3	78.2
4	East New York Avenue and Mother Gaston Boulevard	AM	72.9	73.0	0.1	76.2
		MD	71.5	71.5	0.0	75.7
		PM	72.8	72.9	0.1	76.2
5	Fulton Street and Sheffield Avenue	AM	75.9	76.5	0.6	79.5
		MD	75.0	75.4	0.4	78.0
		PM	77.0	77.5	0.5	79.3
6	Fulton Street and Van Siclen Avenue	AM	75.6	77.8	2.2	80.6
		MD	74.0	74.9	0.9	76.2
		PM	73.9	74.4	0.5	76.7
7	Van Siclen Avenue MTA Station Platform	AM	72.4	74.6	2.2	77.6
		MD	70.6	71.5	0.9	74.1
		PM	73.7	74.2	0.5	78.2
8	Fulton Street and Shepherd Avenue	AM	82.6	83.4	0.8	79.9
		MD	81.3	81.7	0.4	71.6
		PM	82.3	82.8	0.5	76.2
9	Fulton Street and Euclid Avenue	AM	77.9	78.1	0.2	82.0
		MD	78.5	78.7	0.2	80.6
		PM	79.3	79.7	0.4	83.5
11	Atlantic Avenue and Crescent Street	AM	72.6	72.8	0.2	76.3
		MD	72.0	72.2	0.2	74.6
		PM	71.9	72.0	0.1	75.4
12	Atlantic Avenue and Logan Street	AM	74.4	74.8	0.4	77.5
		MD	70.6	71.0	0.4	73.9
		PM	71.2	71.5	0.3	73.7
13	Atlantic Avenue and Van Siclen Avenue	AM	72.9	73.4	0.5	75.0
		MD	72.2	72.6	0.4	76.1
		PM	73.3	73.6	0.3	77.0
14	Atlantic Avenue and Pennsylvania Avenue	AM	76.6	76.9	0.3	80.2
		MD	75.1	75.4	0.3	78.2
		PM	77.6	77.8	0.2	80.3
15	Pennsylvania Avenue between Fulton Street and Atlantic Avenue	AM	72.9	73.0	0.1	76.6
		MD	75.1	75.2	0.1	77.6
		PM	74.3	74.4	0.1	76.7
16	Schenck Avenue between Atlantic and Liberty Avenues	AM	70.1	70.8	0.7	73.6
		MD	68.0	68.3	0.3	70.3
		PM	67.5	67.9	0.4	70.8

TABLE 16-7 (continued)
2030 With-Action Condition Noise Levels (in dBA)

Receptor	Location	Time	No-Action $L_{eq(1)}$	With-Action $L_{eq(1)}$	$L_{eq(1)}$ Change	With-Action $L_{10(1)}$
17	Berriman Street between Liberty and Atlantic Avenues	AM	60.8	60.9	0.1	63.0
		MD	65.9	66.1	0.2	64.8
		PM	59.7	59.9	0.2	63.2
18	Liberty Avenue and Atkins Avenue	AM	69.9	70.4	0.5	71.7
		MD	63.4	64.5	1.1	67.8
		MidPM	66.0	67.7	1.7	70.0
		PM	63.6	64.5	0.9	67.9
19	Liberty Avenue and Miller Avenue	AM	68.5	68.9	0.4	72.3
		MD	66.2	66.7	0.5	69.6
		PM	66.5	66.9	0.4	69.4
20	Glenmore Avenue between Sheffield and Pennsylvania Avenues	AM	65.0	65.0	0.0	67.4
		MD	64.4	64.4	0.0	67.1
		PM	64.1	64.1	0.0	67.0
21	Glenmore Avenue and Berriman Street	AM	67.7	68.3	0.6	68.7
		MD	61.1	61.8	0.7	65.0
		MidPM	61.3	61.9	0.6	64.0
		PM	61.5	63.0	1.5	62.9
22	South Conduit Avenue and Euclid Avenue	AM	74.7	74.9	0.2	78.2
		MD	76.3	76.7	0.4	80.1
		PM	76.6	76.8	0.2	79.9
23	Pitkin Avenue and Euclid Avenue	AM	70.8	70.9	0.1	72.5
		MD	67.6	67.9	0.3	70.7
		PM	69.0	69.1	0.1	71.5
24	Pitkin Avenue and Warwick Street	AM	70.2	70.6	0.4	71.8
		MD	68.0	68.3	0.3	72.2
		PM	66.8	67.1	0.3	71.1

Note:
Noise levels at receptor site 10 were calculated using TNM. Noise levels at all other receptor sites were calculated using proportional modeling.

TABLE 16-8
2030 With-Action Condition Noise Levels-Receptor Site 10 (in dBA)

Receptor	Location	Time	No-Action $L_{eq(1)}$	With-Action Traffic $L_{eq(1)}$	With-Action Playground $L_{eq(1)}$	Total With-Action $L_{eq(1)}$	$L_{eq(1)}$ Change	Total With-Action $L_{10(1)}$
10	Richmond Street between Fulton Street and Dinsmore Place	AM	66.0	70.5	60.3	70.9	4.9	74.6
		MD	70.8	71.1	60.3	71.5	0.7	72.6
		PM	64.5	66.8	60.3	67.7	3.2	71.8

Note:
Noise levels at receptor site 10 were calculated using TNM. Noise levels at all other receptor sites were calculated using proportional modeling.

With-Action L_{dn} Noise Levels

As described above in the "HUD Development Guidelines" section, the L_{dn} for receptor site 10 was estimated according to the methodology described above including the maximum predicted playground noise levels and was determined to be 71.6 dBA. According to HUD criteria, the calculated With-Action L_{dn} noise level at receptor site 10 would remain in the "normally unacceptable" category.

Noise from the School Playground at Projected and Potential Development Sites

Table 16-9 shows the results of the playground noise analysis at projected and potential development sites with a line of sight to the playground.

TABLE 16-9
Noise Levels due to the School Playground (in dBA)

Analysis Location	Time	Approximate Distance (feet)	With-Action Traffic L_{eq}	With-Action Playground L_{eq}	With-Action Total L_{eq}	Predicted L_{10}[1]
Projected Site 65	AM	33	70.5	69.4	73.0	75.8
	MD		71.1	69.4	73.4	76.2
	PM		66.8	69.4	71.3	74.1
Projected Site 66 Building A	AM	10	70.5	73.7	75.4	78.2
	MD		71.1	73.7	75.6	78.4
	PM		66.8	73.7	74.5	77.3
Projected Site 66 Building B	AM	5	70.5	74.3	75.8	78.6
	MD		71.1	74.3	76.0	78.8
	PM		66.8	74.3	75.0	77.8
Projected Site 67	AM	70	70.5	64.8	71.5	75.2
	MD		71.1	64.8	72.0	73.1
	PM		66.8	64.8	68.9	73.0
Potential Site A98	AM	33	70.5	69.4	73.0	75.8
	MD		71.1	69.4	73.4	76.2
	PM		66.8	69.4	71.3	74.1
Potential Site A99	AM	33	70.5	69.4	73.0	75.8
	MD		71.1	69.4	73.4	76.2
	PM		66.8	69.4	71.3	74.1
Potential Site A100	AM	120	70.5	61.0	71.0	73.8
	MD		71.1	61.0	71.5	74.3
	PM		66.8	61.0	67.8	70.6
Potential Site A101	AM	33	70.5	69.4	73.0	75.8
	MD		71.1	69.4	73.4	76.2
	PM		66.8	69.4	71.3	74.1

Notes:
[1] Predicted L_{10} is calculated by adding 2.8 dBA to the predicted combined L_{eq} based on SCA Playground Noise Study, AKRF, Inc., October 23, 1992.

Predicted playground L_{10} noise levels at projected development site 65, Buildings A and B of projected development site 66, projected development site 67 and potential development sites A98, A99, A100 and A101 were used to determine building attenuation requirements at those locations.

Noise Attenuation Measures

CEQR

The *CEQR Technical Manual* has set noise attenuation requirements 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 for residential uses and 50 dBA or lower for commercial uses, and are determined based on exterior $L_{10(1)}$ noise levels.

Table 16-10 shows the minimum window/wall attenuation necessary to meet *CEQR Technical Manual* requirements for internal noise levels at each of the noise measurement locations. The With-Action $L_{10(1)}$ noise levels were calculated using the existing noise measurements, the traffic noise analysis, and the playground noise analysis. Based on the values shown in Table 16-10, required attenuation levels were determined for all projected and potential development sites. These values are shown in Appendix G.

TABLE 16-10
Required Attenuation at Noise Measurement Locations

Receptor #	Location	Maximum Calculated Total $L_{10(1)}$ Noise Level in dBA	CEQR Minimum Required Attenuation in dBA[2]
1	Broadway and Somers Street	82.0	39
2	Mother Gaston Boulevard and Fulton Street	75.0	31
3	Atlantic Avenue between Jardine and Havens Places	79.5	35
4	East New York Avenue and Mother Gaston Boulevard	76.2	33
5	Fulton Street and Sheffield Avenue	79.5	35
6	Fulton Street and Van Siclen Avenue	80.6	37
7	Van Siclen Avenue MTA Station Platform	78.2	35
8	Fulton Street and Shepherd Avenue	80.0	35
9	Fulton Street and Euclid Avenue	83.5	40
10	Richmond Street between Dinsmore Place and Fulton Street	74.6	31
11	Atlantic Avenue and Crescent Street	76.3	33
12	Atlantic Avenue and Logan Street	77.5	33
13	Atlantic Avenue and Van Siclen Avenue	77.0	33
14	Atlantic Avenue and Pennsylvania Avenue	80.3	37
15	Pennsylvania Avenue between Fulton Street and Atlantic Avenue	77.6	33
16	Schenck Street between Atlantic and Liberty Avenues	73.6	31
17	Berriman Street between Liberty and Atlantic Avenues	64.8	N/A
18	Liberty Avenue and Atkins Avenue	71.7	28
19	Liberty Avenue and Miller Avenue	72.3	28
20	Glenmore Avenue between Sheffield and Pennsylvania Avenues	67.4	N/A
21	Glenmore Avenue and Berriman Street	68.7	N/A
22	South Conduit Avenue and Euclid Avenue	80.1	37
23	Pitkin Avenue and Euclid Avenue	72.5	28
24	Pitkin Avenue and Warwick Street	72.2	28

Notes:
[1] Attenuation values are shown for residential uses; retail and office uses would be 5 dBA less.
[2] "N/A" indicates that the highest calculated L_{10} is below 70 dBA. The *CEQR Technical Manual* does not specify minimum attenuation guidance for exterior L_{10} values below this level.

The attenuation of a composite structure is a function of the attenuation provided by each of its component parts and the surface area of each part. Normally, a building façade consists of wall, glazing, and any vents or louvers associated with the building mechanical systems in various ratios of area. The designs for the projected and potential development site With-Action buildings would include acoustically rated windows and air conditioning (a means of alternate ventilation). The buildings would be designed, including these elements, to provide a composite Outdoor-Indoor Transmission Class (OITC) rating[1] greater than or equal to the values listed in Appendix G, along with an alternative means of ventilation in all habitable rooms of the residential units.

[1] The OITC classification is defined by ASTM International (ASTM E1332) and provides a single-number rating that is used for designing a building façade including walls, doors, glazing, and combinations thereof. The OITC rating is designed to evaluate building elements by their ability to reduce the overall loudness of ground and air transportation noise.

The requirement for these levels of façade attenuation as well as the requirement for an alternate means of ventilation will be included in an (E) designation for all privately-held projected and potential development sites.

HUD

As described above in the "HUD Development Guidelines" section, the L_{dn} for receptor site 10 was estimated and is shown above. Receptor site 10 is further away from the playground noise levels than projected development site 66's Building B. Therefore, a separate building attenuation analysis was performed.

A total With-Action L_{10} noise level was determined to be 78.8 dBA for projected development site 66's Building B as shown above in Table 16-9. Based on the methodology for estimating the L_{dn} value described above in the "HUD Development Guidelines" section, the L_{dn} for projected development site 66's Building B was determined to be 75.8 dBA, which would require a minimum 31 dBA of building attenuation to satisfy HUD development guidelines.

For the City-owned parcel located within projected development site 66 (Block 4142, Lot 32), the requirement for façade attenuation as well as the requirement for an alternate means of ventilation will be required through the LDA between HPD and the future developer.

Based upon the $L_{10(1)}$ and L_{dn} values predicted at the projected and potential development sites, with these design requirements, sensitive receptors newly introduced by the Proposed Actions would be expected to achieve CEQR interior noise level requirements.

(E) designations or comparable measures are required on 74 out of 81 projected development sites and 94 out of 105 potential development sites. With the requirements of the (E) designations or comparable measures on these 168 projected and potential development sites, interior noise levels would meet *CEQR Technical Manual* guidelines.

I. MECHANICAL EQUIPMENT

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