Chapter 12: Noise

A. INTRODUCTION

The proposed Memorial Sloan-Kettering Cancer Center (MSK)/The City University of New York (CUNY)-Hunter project has the potential to generate sufficient traffic to cause a significant noise impact (i.e., it would result in a doubling of noise passenger car equivalents [Noise PCEs] which would cause a 3-dBA increase in noise levels). A screening level analysis and a detailed mobile source noise analysis are presented below.

Ambient noise levels adjacent to the project site were considered in order to address New York City Environmental Quality Review (CEQR) noise abatement requirements for the building. The building attenuation analysis also accounts for changes in noise due to increases in traffic in the future with the proposed project (the "Build" condition).

An analysis is also presented to examine whether the newly created open spaces accessible to CUNY-Hunter faculty, staff, and students as well as MSK staff, visitors, and patients would meet CEQR noise level guidelines for open spaces.

Noise abatement requirements are assessed below.

PRINCIPAL CONCLUSIONS

The analysis finds that the proposed project would not result in any significant adverse noise impacts due to operations of the project.

The detailed mobile source noise analysis concludes that there would be no significant adverse noise impact with respect to mobile source noise.

The CEQR building-attenuation analysis concludes that in order to meet CEQR interior noise level requirements, up to 38 dBA of building attenuation for the project building would be required by placement of an (E) designation for noise on Block 1485, Lot 15. Because the project building would be designed to satisfy these specifications, there would be no significant adverse noise impact with respect to building attenuation.

Noise levels in the newly created open spaces would be greater than the 55 dBA $L_{10(1)}$ CEQR guideline, but would be comparable to other parks around New York City. Therefore, there would be no significant adverse noise impacts with respect to the newly created open spaces.

B. ACOUSTICAL FUNDAMENTALS

Sound is a fluctuation in air pressure. Sound pressure levels are measured in units called "decibels" ("dB"). The particular character of the sound that we hear (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 1 Hertz ("Hz"). People can hear over a relatively limited range of sound frequencies, generally between 20 Hz and 20,000 Hz, and the human ear does not perceive all frequencies equally well. High frequencies (e.g., a whistle) are more easily discernible and therefore more intrusive than many of the lower frequencies (e.g., the lower notes on the French horn).

"A"-WEIGHTED SOUND LEVEL (dBA)

In order to establish a uniform noise measurement that simulates people's perception of loudness and annoyance, the decibel measurement is weighted to account for those frequencies most audible to the human ear. This is known as the A-weighted sound level, or "dBA," and it is the descriptor of noise levels most often used for community noise. As shown in **Table 12-1**, 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 12-1
Common Noise Levels

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

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

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

SOUND LEVEL DESCRIPTORS

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 that fluctuates over extended periods have been developed. One way is to describe the fluctuating sound 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 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.

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

For purposes of the proposed project, the $L_{eq(1)}$ descriptor 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 noise impact evaluation, and is used to provide an indication of highest expected sound levels. The 1-hour L_{10}, or $L_{10(1)}$, is the noise descriptor used in the *CEQR Technical Manual* noise exposure guidelines for City environmental impact review classification.

C. NOISE STANDARDS AND CRITERIA

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 12-2 and 12-3**. 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 $L_{10(1)}$ less than or equal to 45 dBA for classroom, laboratory, and other noise sensitive uses and less than or equal to 50 dBA for ambulatory care, office, and conference room uses.

Table 12-2
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
Chapter 0: Outdoor area requiring serenity and quiet[2]		$L_{10} \le 55$ dBA	---------- Ldn ≤ 60 dBA ----------	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Chapter 1: 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 ----------
Chapter 2: 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	
Chapter 3: 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)	
Chapter 4: 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)	
Chapter 5: 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 12-3
Required Attenuation Values to Achieve Acceptable Interior Noise Levels

	Marginally Unacceptable				Clearly Unacceptable
Noise Level With Proposed Project	$70 < L_{10} \leq 73$	$73 < L_{10} \leq 76$	$76 < L_{10} \leq 78$	$78 < L_{10} \leq 80$	$80 < L_{10}$
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 classroom, laboratory, and other noise sensitive uses, and ambulatory care, office, and conference room uses 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.

D. 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).

E. EXISTING NOISE LEVELS

Existing noise levels were measured at three locations near the proposed project site. Site 1 was located on the west side of the Franklin Delano Roosevelt (FDR) Drive between East 74th and East 73rd Streets, Site 2 was located on East 74th Street between York Avenue and FDR Drive, and Site 3 was located on East 73rd Street between York Avenue and FDR Drive (see **Figure 12-1**).

At all of the receptor sites, existing noise levels were measured for 20-minute periods during the three weekday peak periods—AM (7:30 AM to 9:00 AM), midday (MD) (12:00 PM to 1:00 PM), and PM (5:00 PM to 6:30 PM). Measurements were taken on September 12, October 10, and October 16, 2012, respectively.

EQUIPMENT USED DURING NOISE MONITORING

Measurements were performed using Brüel & Kjær Sound Level Meters (SLMs) Type 2260 and 2250, Brüel & Kjær ½-inch microphones Type 4189, and a Brüel & Kjær Sound Level Calibrator Type 4231. The SLMs have a laboratory calibration date within one year of use. The

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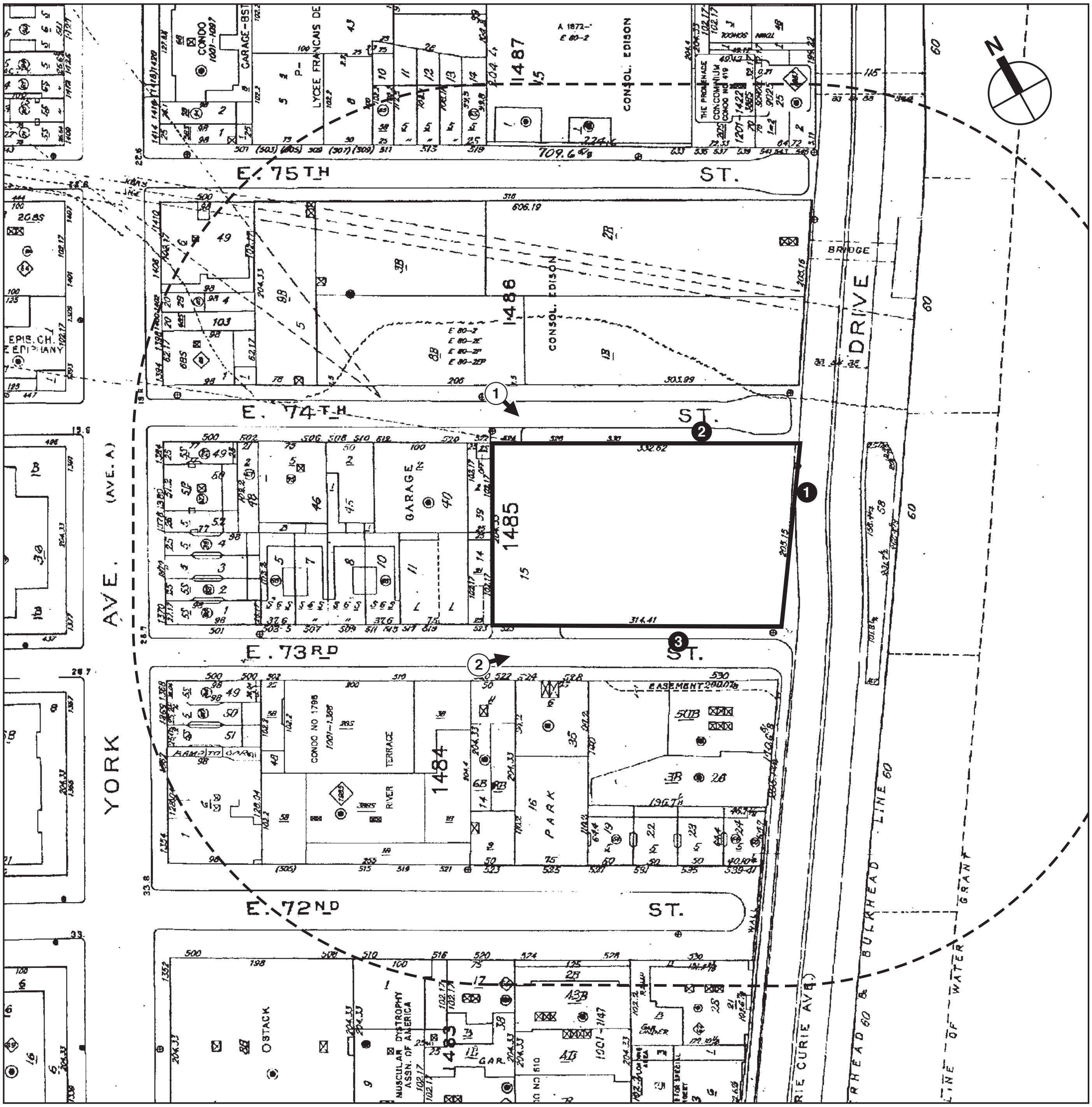

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SCALE

Project Site Boundary

1 Noise Receptor Location

Noise Receptor Locations

Figure 12-1

Brüel & Kjær SLM is a Type 1 instrument according to ANSI Standard S1.4-1983 (R2006). The microphone was mounted on a tripod at a height of approximately 5 feet above the ground and was mounted at least approximately 5 feet away from any large reflecting surfaces. The SLMs were 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}, L_{90}, and 1/3 octave band levels. 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.

The results of the existing noise level measurements are summarized in **Table 12-4**.

Table 12-4
Existing Noise Levels (in dBA)

Site	Measurement Location	Time	L_{eq}	L_1	L_{10}	L_{50}	L_{90}
1	FDR Drive viaduct between East 74th and East 73rd Streets	AM	79.3	83.7	81.5	78.9	75.5
		MD	78.7	84.0	81.4	77.5	74.5
		PM	79.7	83.4	81.6	79.5	76.2
2	East 74th Street between York Avenue and FDR Drive	AM	66.6	68.6	67.7	66.5	65.4
		MD	67.5	73.0	69.0	66.9	65.5
		PM	66.4	70.5	67.4	66.1	65.1
3	East 73rd Street between York Avenue and FDR Drive	AM	64.9	70.6	66.9	64.1	62.3
		MD	65.5	73.4	67.1	64.6	62.0
		PM	65.6	71.2	67.3	64.9	62.9

Note: Measurements were conducted by AKRF Acoustics Department on September 12, October 10, and October 16, 2012.

At all receptor sites, vehicular traffic from FDR Drive was the dominant noise source. Noise from the immediately adjacent streets was also audible at Sites 2 and 3. Measured levels are moderate to high and reflect the level of vehicular activity on the adjacent streets. In terms of the CEQR criteria, the existing noise levels at Site 1 would be in the “clearly unacceptable” category, existing noise levels at Sites 2 and 3 would be in the “marginally acceptable” category.

F. NOISE PREDICTION METHODOLOGY

GENERAL METHODOLOGY

Future noise levels were calculated using either a proportional modeling technique or the Federal Highway Administration (FHWA) *Traffic Noise Model* (TNM) Version 2.5. The proportional modeling technique was used as a screening tool to estimate changes in noise levels. At locations where proportional modeling indicated the potential for a doubling of Noise PCEs, the TNM was used to obtain detailed noise level results. Both the proportional modeling technique and the TNM are analysis methodologies recommended for analysis purposes in the *CEQR Technical Manual*. The noise analysis examined the weekday AM, midday (MD), and PM peak hours. The selected time periods are when the proposed project would be expected to produce the maximum traffic generation (based on the traffic studies presented in Chapter 9, “Transportation”) and therefore result in the maximum potential for significant adverse noise impacts. The proportional modeling and TNM procedures used for the noise analysis 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 Build and Build 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:

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

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)

At Site 2, preliminary modeling studies using the proportional modeling technique indicated that the future traffic may have the potential to result in a doubling of Noise PCEs, which would have the potential to cause significant increases in noise levels due to project vehicles traveling to and from the project site on East 74th Street. 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 TNM provided more accurate results than proportional modeling for Site 1 because there was very little traffic present on East 74th Street. The less refined proportional modeling technique could 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.

ANALYSIS PROCEDURE

The following procedure was used in performing the noise analysis:

- Noise monitoring locations were selected adjacent to and on the proposed project site to determine the appropriate level of building attenuation required to satisfy CEQR interior noise level criteria.
- Existing noise levels were determined at each of the three receptor sites listed above, for each analysis time period, by performing field measurements.
- Using the results of the analyses presented in Chapter 9, "Transportation," a screening analysis was performed using proportional modeling to identify locations that had the potential for a doubling of Noise PCEs (and thus a significant increase in noise levels).
- At locations where the screening analysis indicated the potential for a significant increase in noise levels (i.e., Site 2), existing noise levels were calculated at the receptor site, for each analysis time period, using the TNM and traffic data for existing conditions.
- The calculated TNM existing noise level for each analysis time period was subtracted from the measured existing noise level. The remainder was assumed to be a correction factor (to account for noise from model inaccuracies, etc.).
- Noise levels for the future without the proposed project ("No Build") and Build conditions, for the receptor site and for each analysis time period, were determined using either the proportional model or the sum of calculated TNM results and the calculated correction factor based on projected traffic conditions.
- Potential impacts were assessed comparing Build and No Build noise levels for each of the receptor sites.
- Lastly, the level of building attenuation to satisfy CEQR requirements was determined for the proposed project's building based on the noise monitoring and TNM results.

Summary tables showing the specific components of the noise analysis are provided in **Appendix D**.

G. THE FUTURE WITHOUT THE PROPOSED PROJECT

Using the methodology previously described, future noise levels without the proposed project were calculated at the three mobile source noise analysis receptors (1, 2, and 3) for the 2019 analysis year. These No Build values are shown in **Table 12-5**. Because initial screening results using proportional modeling techniques indicated the potential for significant noise impacts at Site 2, noise levels at this site were calculated using the TNM model. (The results shown for Sites 1 and 3 were obtained using proportional modeling.)

In 2019, the maximum increase in $L_{eq(1)}$ noise levels for the No Build condition would be 0.6 dBA or less at all of the mobile source noise analysis receptors. Changes of this magnitude would be imperceptible. In terms of CEQR noise exposure guidelines, noise levels at Site 1 would remain in the "clearly unacceptable" category, and noise levels at Sites 2 and 3 would remain in the "marginally acceptably" category.

Table 12-5
2019 Future Noise Levels Without the Proposed Project (in dBA)

Receptor	Location	Time	Existing $L_{eq(1)}$	No Build $L_{eq(1)}$	$L_{eq(1)}$ Change	No Build $L_{10(1)}$
1	FDR Drive between East 74th and East 73rd Streets	AM	79.3	79.4	0.1	81.6
		MD	78.7	78.8	0.1	81.5
		PM	79.7	79.8	0.1	81.7
2	East 74th Street between York Avenue and FDR Drive	AM	66.6	66.7	0.1	67.8
		MD	67.5	67.8	0.3	69.3
		PM	66.4	66.4	0.0	67.4
3	East 73rd Street between York Avenue and FDR Drive	AM	64.9	65.1	0.2	67.1
		MD	65.5	66.1	0.6	67.7
		PM	65.6	66.1	0.5	67.8

Notes: Noise levels at Site 2 were calculated using TNM. Noise levels at Sites 1 and 3 were calculated by using proportional modeling.

H. PROBABLE IMPACTS OF THE PROPOSED PROJECT

Using the methodology previously described, future noise levels with the proposed project were calculated at the three mobile source noise analysis receptors (1, 2, and 3) for the 2019 analysis year. These Build values are shown in **Table 12-6**. Because initial screening results using proportional modeling techniques indicated the potential for significant noise impacts at Site 2, noise levels at this site were calculated using the TNM model. (The results shown for Sites 1 and 3 were obtained using proportional modeling.)

Table 12-6
2019 Future Noise Levels With the Proposed Project (in dBA)

Receptor	Location	Time	No Build $L_{eq(1)}$	Build $L_{eq(1)}$	$L_{eq(1)}$ Change	Build $L_{10(1)}$
1	FDR Drive between East 74th and East 73rd Streets	AM	79.4	79.4	0.0	81.6
		MD	78.8	78.8	0.0	81.5
		PM	79.8	79.8	0.0	81.7
2	East 74th Street between York Avenue and FDR Drive	AM	66.7	67.0	0.3	68.1
		MD	67.8	68.3	0.5	69.8
		PM	66.4	66.8	0.4	67.8
3	East 73rd Street between York Avenue and FDR Drive	AM	65.1	65.8	0.7	67.8
		MD	66.1	67.3	1.2	68.9
		PM	66.1	66.6	0.5	68.3

Notes: Noise levels at Receptor Site 2 were calculated using TNM. Noise levels at Receptor Site 1 and 3 were calculated by using proportional modeling.

In 2019, the maximum increase in $L_{eq(1)}$ noise levels for the Build condition would be 1.2 dBA or less at all of the mobile source noise analysis receptors. Changes of this magnitude would be imperceptible and would fall well below the CEQR threshold for a significant adverse impact. In terms of CEQR noise exposure guidelines, noise levels at Site 1 would remain in the “clearly unacceptable” category, and noise levels at Sites 2 and 3 would remain in the “marginally acceptable” category.

I. NOISE ATTENUATION MEASURES

As shown in **Table 12-3**, the *CEQR Technical Manual* has set noise attenuation quantities for buildings based on exterior $L_{10(1)}$ noise levels in order to maintain interior noise levels of 45 dBA for classroom, laboratory, and other noise sensitive uses and less than or equal to 50 dBA for ambulatory care, office, and conference room uses. The results of the building attenuation analysis are summarized in **Table 12-7**.

Table 12-7
MSK/CUNY-Hunter CEQR Attenuation Requirements

Façade Location	Applicable Noise Receptor	Maximum Calculated L_{10} (in dBA)	Distance from East Property Line (in feet)	Height (in feet)	Attenuation Required (in dBA)[2]
North	2	82.0	0 to 10	-	38
		77.7	11 to 20	-	33
		75.9	21 to 70	-	31
		72.9	71 to 130	-	28
		69.8[3]	More Than 131	-	N/A[1]
East	1	81.7	-	0-100	38
		78.7[4]	-	101-top	35
South	3	81.9	0 to 10	-	38
		77.6	11 to 20	-	33
		75.7	21 to 60	-	31
		72.8	61 to 130	-	28
		68.9[3]	More Than 131	-	N/A[1]
West	2, 3	69.8[3]	N/A	-	N/A[1]

Notes:

Attenuation requirements are for spaces containing noise sensitive (i.e., classroom and laboratory) uses. Non-noise sensitive (i.e., ambulatory care, office, and conference room) uses would require 5 dBA less attenuation.

CEQR attenuation requirements do not apply to mechanical space uses.

(1) "N/A" indicates that the L_{10} value is less than 70 dB(A). The CEQR Technical Manual does not address noise levels this low, therefore there is no minimum attenuation guidance.

(2) Calculated based on the maximum predicted noise level at Site 1 (adjusted for difference between the proposed building and FDR Drive) of 81.7 dBA and the maximum predicted noise level at the adjacent streets.

(3) Measured noise level at 130 feet from the eastern property line.

(4) The maximum L_{10} at this façade at elevations above 100 feet was conservatively assumed to be 3 dBA less than the level at-grade due to increased distance from the roadway, which is the dominant noise source at this location.

A range of attenuation values is present for the north, east, and south building façades. Attenuation requirements for the north façade of the proposed building range from "N/A" up to 38 dBA. Starting from the eastern edge of the north façade, the first 10 feet would require 38 dBA of attenuation, the next 10 feet would require 33 dBA of attenuation, the next 45 feet would require 31 dBA of attenuation, the next 40 feet would require 28 dBA of attenuation, and the rest of the north façade would not have any attenuation requirements due to low predicted $L_{10(1)}$ noise levels. Attenuation requirements for the south façade of the proposed building also range from "N/A" up to 38 dBA. Starting from the eastern edge of the south façade, the first 10 feet would require 38 dBA of attenuation, the next 10 feet would require 33 dBA of attenuation, the next 35 feet would require 31 dBA of attenuation, the next 45 feet would require 28 dBA of attenuation, and the rest of the south façade would not have any attenuation requirements due to low predicted $L_{10(1)}$ noise levels. The noise level drop-off rate for building attenuation calculations for the north and south façades was based on a 3 dBA reduction per doubling of distance from the dominant noise sources (i.e., FDR Drive and the adjacent streets). Attenuation requirements for the east façade of the proposed building range from 35 to 38 dBA. For elevations from 0 to 100 feet, the east façade would require 38 dBA of attenuation, and for elevations from 101 feet to the top of the building, the east façade would require 35 dBA of attenuation. The noise level at the east façade at elevations above 100 feet was conservatively assumed to be 3 dBA less than the level at-grade due to increased distance from the roadway, which is the dominant noise source at this location. Consequently the amount of building attenuation required at this façade at elevations above 100 feet is 3 dBA less. The building attenuation requirements in **Table 12-7** would be enforced via an (E) designation for noise placed on Block 1485, Lot 15.

For building façade locations requiring 28 to 38 dBA of window/wall attenuation, the following (E) designation text would apply:

"In order to ensure an acceptable interior noise environment, future residential uses must provide a closed window condition with a minimum of [28-38] dBA of window/wall attenuation in order to maintain an interior noise level of 45 dBA. The minimum require window/wall attenuation for future commercial uses would be 5 dBA less than that for residential uses. In order to maintain a closed window condition, an alternate means of ventilation that brings outside air into the building without degrading the acoustical performance of the building must also be provided. Alternate means of ventilation includes, but is not limited to, central air conditioning.

The attenuation of a composite structure is a function of the attenuation provided by each of its component parts and how much of the area is made up of each part. Normally, a building façade consists of wall, glazing, and any vents or louvers associated with the building mechanical systems in various ratios of area. Currently, the proposed design for the building includes acoustically rated windows and central air conditioning (i.e., alternate ventilation). The proposed building's façades, including these elements, would be designed to provide a composite Outdoor-Indoor Transmission Class (OITC) rating greater than or equal to the requirements outlined above in **Table 12-7**. The OITC classification is defined by the ASTM International (ASTM E1332-10a) 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. By adhering to these design requirements, the proposed developments' building façades will thus provide sufficient attenuation to achieve the CEQR interior noise level guideline of 45 dBA for classroom, laboratory, and other noise sensitive uses and less than or equal to 50 dBA for ambulatory care, office, and conference room uses.

Based upon the $L_{10(1)}$ values calculated at the project site, the proposed project's design measures would be expected to provide sufficient attenuation to achieve the CEQR interior noise level requirements.

J. NOISE LEVELS AT THE PROPOSED OPEN SPACE AREAS

The proposed project would include a terrace open space along the north and east façades on the second floor that would be accessible to CUNY-Hunter faculty, staff, and students as well as MSK staff and a terrace open space on the sixth floor that would be accessible to MSK patients and visitors. Based on predicted noise levels at receptor 2, noise levels within the proposed project's open space are expected to be above 55 dBA $L_{10(1)}$. This exceeds the recommended noise level for outdoor areas requiring serenity and quiet contained in the *CEQR Technical Manual* noise exposure guidelines (see **Table 12-2**). In the future with the proposed project, $L_{10(1)}$ values at the proposed open space would be in the upper 70s dBA on the second floor terrace and the lower 70s dBA on the sixth floor terrace. Because the dominant noise at the project site results from traffic noise, there are no practical and feasible mitigation measures that could be implemented to reduce noise levels to below the CEQR 55-dBA $L_{10(1)}$ guidelines within the proposed open space. Although noise levels in these areas would be above the guideline noise levels, they would be comparable to noise levels in a number of existing open space areas that are located adjacent to roadways, including Hudson River Park, Riverside Park, Bryant Park, Fort Greene Park, and other urban open space areas. Further, noise levels in the proposed open spaces would be expected to be less than noise levels at the waterfront esplanade on the east side of FDR Drive, which is at the same elevation as the roadway. The CEQR guidelines are 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, a relatively low noise level is often not achieved. Therefore, the future projected noise levels would not constitute a significant adverse noise impact to the proposed project's open space areas.

K. MECHANICAL EQUIPMENT

In addition, the building mechanical system (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 and the New York City Department of Buildings Code) and to avoid producing levels that would result in any significant increase in ambient noise levels. ✷