Chapter 17: Noise

A. INTRODUCTION

This chapter assesses the potential for the proposed projects to result in significant adverse noise impacts. The analysis determines whether the proposed projects would result in increases in noise levels that could have a significant adverse impact on nearby sensitive receptors and also considers the effect of existing noise levels at the project sites.

PRINCIPAL CONCLUSIONS

The analysis finds that the proposed projects would not result in any significant adverse noise impacts. The proposed projects would not generate sufficient traffic to have the potential to cause a significant noise impact (mobile source). It is assumed that the proposed buildings' mechanical systems (i.e., heating, ventilation, and air conditioning [HVAC] systems) would be designed to meet all applicable noise regulations and to avoid producing levels that would result in any significant increase in ambient noise levels. Therefore, the proposed projects would not result in any significant adverse noise impacts related to building mechanical equipment (stationary sources).

Due to existing high levels of ambient noise in the area, building attenuation would be required to ensure that interior noise levels meet the City Environmental Quality Review (CEQR) criteria. The proposed designs for the three proposed buildings include acoustically rated windows and central air conditioning as alternate means of ventilation. The proposed buildings would provide sufficient attenuation to achieve the CEQR interior $L_{10(1)}$ noise level guideline of 45 dBA or lower for residential or community facility uses and 50 dBA or lower for retail uses. The window/wall attenuation and alternate means of ventilation requirements would be codified in a Noise (E) Designation (E-489) on the project sites.

B. ACOUSTICS 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 discernable 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 17-1**, the threshold of human hearing is defined as 0 dBA; 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 17-1
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.

EFFECTS OF DISTANCE ON SOUND

Sound varies with distance. For example, highway traffic 50 feet away from a receptor (such as a person listening to the noise) typically produces sound levels of approximately 70 dBA. The same highway noise measures 66 dBA at a distance of 100 feet, assuming soft ground conditions. This decrease is known as “drop-off.” The outdoor drop-off rate for line sources, such as traffic, is a decrease of approximately 4.5 dBA (for soft ground) for every doubling of distance between the noise source and receiver (for hard ground the outdoor drop-off rate is 3 dBA for line sources). Assuming soft ground, for point sources, such as amplified rock music, the outdoor drop-off rate is a decrease of approximately 7.5 dBA for every doubling of distance between the noise source and receiver (for hard ground the outdoor drop-off rate is 6 dBA for point sources).

SOUND LEVEL DESCRIPTORS

Because the sound pressure level unit of dBA describes a noise level at just one moment and 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 little, L_{eq} will be approximately equal to the L_{50} or the median value. 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 projects, 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 2014 *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 CEQR classification and building attenuation assessment.

C. NOISE STANDARDS AND CRITERIA

NEW YORK *CEQR TECHNICAL MANUAL* NOISE STANDARDS

The *CEQR Technical Manual* sets external noise exposure standards; these standards are shown in **Table 17-2**. Noise exposure is classified into four categories: acceptable, marginally acceptable, marginally unacceptable, and clearly unacceptable.

The *CEQR Technical Manual* defines attenuation requirements for buildings based on exterior noise level (see **Table 17-3**). Recommended noise attenuation values for buildings are designed to maintain interior noise levels of 45 dBA or lower for residential uses and interior noise levels of 50 dBA or lower for commercial uses and are determined based on exterior $L_{10(1)}$ noise levels.

Table 17-2
Noise Exposure Guidelines For Use in City Environmental Impact Review

Receptor Type	Time Period	Acceptable General External Exposure	Airport[3] Exposure	Marginally Acceptable General External Exposure	Airport[3] Exposure	Marginally Unacceptable General External Exposure	Airport[3] Exposure	Clearly Unacceptable General External Exposure	Airport[3] Exposure
Outdoor area requiring serenity and quiet[2]		$L_{10} \le 55$ dBA	---------- $Ldn \le 60$ dBA ----------	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Hospital, nursing home		$L_{10} \le 55$ dBA		$55 < L_{10} \le 65$ dBA	---------- $60 < Ldn \le 65$ dBA ----------	$65 < L_{10} \le 80$ dBA	(i) $65 < Ldn \le 70$ dBA, (II) $70 \le Ldn$	$L_{10} > 80$ dBA	---------- $Ldn \le 75$ dBA ----------
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	
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–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)	
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)	
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

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.

[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 17-3
Required Attenuation Values to Achieve Acceptable Interior Noise Levels

	Marginally Unacceptable				Clearly Unacceptable
Noise Level with Proposed Project	$70 < L_{10} \le 73$	$73 < L_{10} \le 76$	$76 < L_{10} \le 78$	$78 < L_{10} \le 80$	$80 < L_{10}$
Attenuation[A]	(I) 28 dBA	(II) 31 dBA	(III) 33 dBA	(IV) 35 dBA	$36 + (L_{10} - 80)^{B}$ dBA

Notes:

[A] The above composite window-wall attenuation requirements are for residential dwellings and community facility development. Commercial uses would require 5 dBA 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 dBA increments for L_{10} values greater than 80 dBA.

Source: New York City Department of Environmental Protection.

D. EXISTING NOISE LEVELS

Existing noise levels at the project sites were measured at eight locations. These locations are detailed below in **Table 17-4** and shown in **Figure 17-1**.

Table 17-4
Noise Receptor Locations

Noise Receptor Site	Location
1	Cherry Street between Pike and Rutgers Slips
2	Cherry Street between Rutgers Slip and Jefferson Street
3	Corner of Jefferson Street and Monroe Street
4	Clinton Street between Cherry Street and South Street
5	Corner of Clinton Street and South Street
6	South Street between Rutgers Slip and Clinton Street (elevated approximately 45 feet above the ground)
7	South Street between Rutgers Slip and Clinton Street
8	Park area Below the FDR Drive between Rutgers Slip and Clinton Street

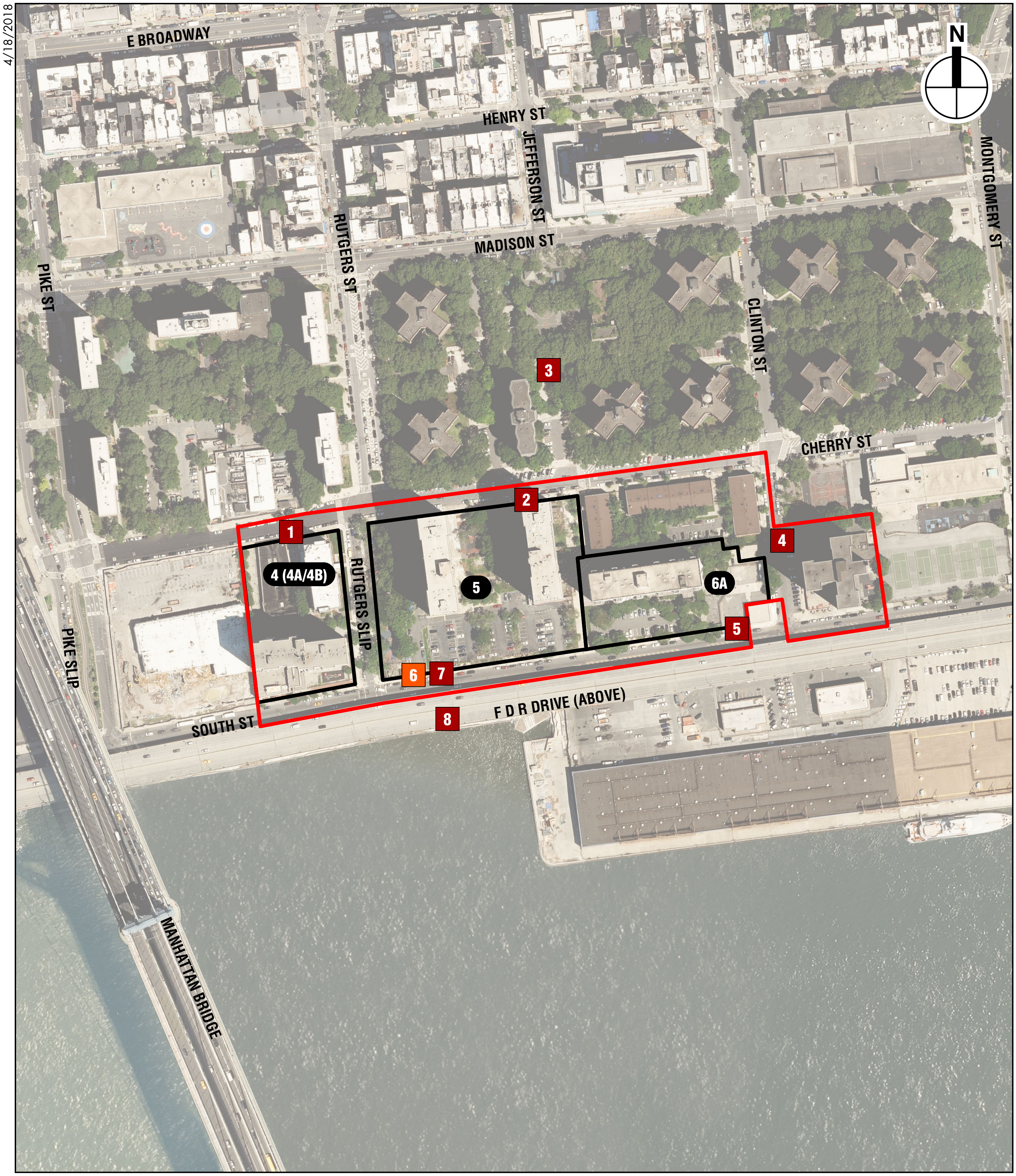
At the receptor sites, the existing noise levels were measured for a one-hour period during the three weekday peak periods—AM (7:00 AM to 9:00 AM), midday (12:00 PM to 2:00 PM), and PM (4:30 PM to 6:30 PM). Measurements were taken on April 5, 2017, May 30, 2017, and May 31, 2017.

EQUIPMENT USED DURING NOISE MONITORING

Measurements were performed using Brüel & Kjær Sound Level Meters (SLMs) Types 2250 and 2260, Brüel & Kjær ½-inch microphones Type 4189, and Brüel & Kjær Sound Level Calibrators Type 4231. The SLMs have a valid laboratory calibration within 1 year, as is standard practice. The Brüel & Kjær SLMs are Type 1 instruments according to ANSI Standard S1.4-1983 (R2006). The microphones for receptor sites 1, 2, 3, 4, 5, 7, and 8 were mounted at a height of approximately five feet above the ground on a tripod and at least approximately five feet away from any large reflecting surfaces. The microphone for receptor site 6 was mounted on a tripod on the 13th floor balcony of 275 South Street facing the FDR Drive at least three 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 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 ⅓ 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 17-5**.

At the receptor sites, vehicular traffic on the adjacent roadways, including the elevated FDR Drive, was the dominant noise source. Measured levels are moderate to relatively high and reflect the level of vehicular activity on adjacent roadways. In terms of the CEQR criteria, the existing noise levels at receptor sites 1, 2, 3, and 4 are in the "marginally acceptable" category, existing noise levels at receptor sites 5, 6, 7, and 8 are in the "marginally unacceptable" category.



Project Sites

Boundary of Two Bridges LSRD

1 Noise Receptor Location

6 Elevated Noise Receptor Location

0 400 FEET

TWO BRIDGES LSRD

Noise Receptor Locations

Figure 17-1

Table 17-5
Existing Noise Levels (in dBA)

Receptor	Measurement Location	Time	L_{eq}	L_1	L_{10}	L_{50}	L_{90}
1	Cherry Street between Pike and Rutgers Slips	AM	65.9	71.8	68.4	64.9	62.3
		MD	66.0	72.5	68.8	64.3	61.7
		PM	65.2	71.1	68.1	64.1	60.1
2	Cherry Street between Rutgers Slip and Jefferson Street	AM	65.1	76.5	65.3	62.7	60.4
		MD	63.8	73.7	65.0	61.8	60.0
		PM	61.6	67.8	64.1	60.8	58.3
3	Corner of Jefferson Street and Monroe Street	AM	63.7	68.2	65.2	63.3	61.5
		MD	64.6	69.3	66.9	63.8	61.0
		PM	60.6	65.2	62.1	60.1	58.6
4	Clinton Street between Cherry Street and South Street	AM	67.3	75.5	67.9	66.0	64.6
		MD	64.9	75.1	66.8	63.6	61.3
		PM	64.2	73.9	65.7	62.1	60.2
5	Corner of Clinton Street and South Street	AM	73.6	79.0	75.1	73.0	71.3
		MD	72.6	81.1	74.2	71.3	69.5
		PM	70.3	80.0	71.8	68.5	65.5
6	South Street between Rutgers Slip and Clinton Street (elevated approximately 45 feet above the ground)	AM	77.1	81.6	78.5	76.9	75.0
		MD	76.6	81.1	78.1	76.2	74.5
		PM	75.5	79.8	77.8	75.3	69.1
7	South Street between Rutgers Slip and Clinton Street	AM	72.4	78.9	74.3	71.4	69.1
		MD	73.0	78.8	75.2	72.3	69.8
		PM	73.1	82.7	74.2	71.0	67.5
8	Park Area below the FDR Drive between Rutgers Slip and Clinton Street	AM	73.6	77.9	75.7	73.2	70.5
		MD	74.6	83.1	75.9	72.7	69.9
		PM	74.6	80.7	77.0	73.7	70.8

Note: Field measurements were performed by AKRF on April 5, 2017, May 30, 2017, and May 31, 2017.

E. NOISE PREDICTION METHODOLOGY

GENERAL METHODOLOGY

Future noise levels (including in the future without the proposed projects and the future with the proposed projects) 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, MD, and PM peak hours at all receptor locations. The selected time periods are when the proposed projects would be expected to produce the maximum traffic generation (based on the traffic studies presented in Chapter 14, “Transportation”) and therefore result in the maximum potential for significant adverse noise impacts. The proportional modeling used for the noise analysis is 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 condition and With Action condition noise levels.

Vehicular traffic volumes are converted into Noise Passenger Car Equivalent (Noise 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 Noise PCEs

E PCE = Existing Noise 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 Noise 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.

F. THE FUTURE WITHOUT THE PROPOSED PROJECTS

Using the methodology described above, No Action condition noise levels were calculated at the 8 mobile source noise analysis receptors for the 2021 analysis year. These No Action values are shown in **Table 17-6**.

By 2021, the maximum increase in $L_{eq(1)}$ noise levels for the No Action condition would be 0.7 dBA or less at all 8 mobile source noise analysis receptors. Changes of this magnitude would be considered imperceptible and not significant according to *CEQR Technical Manual* noise impact criteria. In terms of CEQR noise exposure guidelines, No Action condition noise levels at receptors 1, 2, 3, and 4 would be in the “marginally acceptable” category and No Action condition noise levels at receptors 5, 6, 7, and 8 would be in the “marginally unacceptable” category.

Table 17-6
2021 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	Cherry Street between Pike and Rutgers Slips	AM	65.9	66.4	0.5	68.9
		MD	66.0	66.7	0.7	69.5
		PM	65.2	65.6	0.4	68.5
2	Cherry Street between Rutgers Slip and Jefferson Street	AM	65.1	65.5	0.4	65.7
		MD	63.8	64.4	0.6	65.6
		PM	61.6	61.9	0.3	64.4
3	Corner of Jefferson Street and Monroe Street	AM	63.7	64.1	0.4	65.6
		MD	64.6	65.2	0.6	67.5
		PM	60.6	60.9	0.3	62.4
4	Clinton Street between Cherry Street and South Street	AM	67.3	67.9	0.6	68.5
		MD	64.9	65.6	0.7	67.5
		PM	64.2	64.7	0.5	66.2
5	Corner of Clinton Street and South Street	AM	73.6	74.1	0.5	75.6
		MD	72.6	73.1	0.5	74.7
		PM	70.3	70.8	0.5	72.3
6	South Street between Rutgers Slip and Clinton Street (elevated approximately 45 feet above the ground)	AM	77.1	77.6	0.5	79.0
		MD	76.6	77.1	0.5	78.6
		PM	75.5	76.0	0.5	78.3
7	South Street between Rutgers Slip and Clinton Street	AM	72.4	72.9	0.5	74.8
		MD	73.0	73.5	0.5	75.7
		PM	73.1	73.6	0.5	74.7
8	Park area below the FDR Drive between Rutgers Slip and Clinton Street	AM	73.6	74.1	0.5	76.2
		MD	74.6	75.1	0.5	76.4
		PM	74.6	75.1	0.5	77.5

Note: Noise levels at all receptor locations were calculated by using proportional modeling.

G. THE FUTURE WITH THE PROPOSED PROJECTS

Using the methodology previously described, With Action condition noise levels were calculated at the 8 mobile source noise analysis receptors for the 2021 analysis year. These With Action values are shown in **Table 17-7**.

By 2021, the maximum increase in $L_{eq(1)}$ noise levels for the With Action condition would be 1.2 dBA or less at all 8 mobile source noise analysis receptors. Changes of this magnitude would be considered imperceptible according to *CEQR Technical Manual* guidance and would fall below the CEQR threshold for a significant adverse noise impact. In terms of CEQR noise exposure guidelines, With Action condition noise levels at receptor 1 would change from the “marginally acceptable” category to the “marginally unacceptable” category, With Action condition noise levels at receptors 2, 3, and 4 would remain in the “marginally acceptable” category, and With Action condition noise levels at receptors 5, 6, 7, and 8 would remain in the “marginally unacceptable” category.

Table 17-7
2021 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	Cherry Street between Pike and Rutgers Slips	AM	66.4	67.4	1.0	69.9
		MD	66.7	67.4	0.7	70.2
		PM	65.6	65.9	0.3	68.8
2	Cherry Street between Rutgers Slip and Jefferson Street	AM	65.5	66.7	1.2	66.9
		MD	64.4	65.1	0.7	66.3
		PM	61.9	62.4	0.5	64.9
3	Corner of Jefferson Street and Monroe Street	AM	64.1	65.3	1.2	66.8
		MD	65.2	65.9	0.7	68.2
		PM	60.9	61.4	0.5	62.9
4	Clinton Street between Cherry Street and South Street	AM	67.9	68.8	0.9	69.4
		MD	65.6	66.1	0.5	68.0
		PM	64.7	65.1	0.4	66.6
5	Corner of Clinton Street and South Street	AM	74.1	74.2	0.1	75.7
		MD	73.1	73.2	0.1	74.8
		PM	70.8	70.9	0.1	72.4
6	South Street between Rutgers Slip and Clinton Street (elevated approximately 45 feet above the ground)	AM	77.6	77.7	0.1	79.1
		MD	77.1	77.2	0.1	78.7
		PM	76.0	76.1	0.1	78.4
7	South Street between Rutgers Slip and Clinton Street	AM	72.9	73.0	0.1	74.9
		MD	73.5	73.5	0.0	75.7
		PM	73.6	73.7	0.1	74.8
8	Park area below the FDR Drive between Rutgers Slip and Clinton Street	AM	74.1	74.2	0.1	76.3
		MD	75.1	75.1	0.0	76.4
		PM	75.1	75.2	0.1	77.6

Note: Noise levels at all receptor locations were calculated by using proportional modeling.

H. NOISE ATTENUATION MEASURES

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 or community facility uses and 50 dBA or lower for retail and office uses, and are determined based on exterior $L_{10(1)}$ noise levels.

Table 17-8 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 condition $L_{10(1)}$ noise levels were determined by adjusting the existing noise measurements to account for future increases in traffic with the proposed projects based on the Noise PCE screening analysis results.

Based on the values shown in **Table 17-8**, required attenuation levels were determined for the project sites. Measured noise levels at receptor site 6 were adjusted for distance to represent the portions of the proposed building façades located above the FDR Drive level. These values are shown in **Table 17-9**.

Table 17-8
Required Attenuation at Noise Measurement Locations (in dBA)

Receptor	Location	Highest With Action $L_{10(1)}$ Value	Minimum Required Attenuation[1]
1	Cherry Street between Pike and Rutgers Slips	70.2	28
2	Cherry Street between Rutgers Slip and Jefferson Street	66.9	N/A
3	Corner of Jefferson Street and Monroe Street	68.2	N/A
4	Clinton Street between Cherry Street and South Street	69.4	N/A
5	Corner of Clinton Street and South Street	75.7	31
6	South Street between Rutgers Slip and Clinton Street (elevated approximately 45 feet above the ground)	79.1	35
7	South Street between Rutgers Slip and Clinton Street	75.7	31
8	Park area below the FDR Drive between Rutgers Slip and Clinton Street	77.6	33

Notes:
[1] "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.
Attenuation values are shown for residential or community facility uses; retail and office uses would require 5 dBA less attenuation.

Table 17-9
Required Attenuation at Project Sites (in dBA)

Project Sites	Façade(s)	Elevation	Representative Receptor Site	Maximum Predicted L_{10} Value	Minimum Required Attenuation[2]
Site 4 (4A/4B)	North	All	1	70.2	28
	East, South, West	1–15 (fully shielded by existing building at 82 Rutgers Slip)	1	70.2	28
		16–Top (partially shielded by existing building at 82 Rutgers Slip)	6	71.0[3,4]	28
Site 5	North	All	2	66.9	N/A[1]
	East, South, West	1	7	75.7	31
		2–8	6	79.1	35
		9–18	6	76.1[3]	33
		19–38	6	73.1[3]	31
		39–Top	6	70.1[3]	28
Site 6A	North	All	4	69.4	N/A[1]
	East, South, West	1–2	5	75.7	31
		3–11	6	79.1	35
		12–21	6	76.1[3]	33
		22–40	6	73.1[3]	31
		41–Top	6	70.1[3]	28

Notes:
[1] "NA" 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.
[2] Attenuation values are shown for residential or community facility uses; retail and office uses would require 5 dBA less attenuation.
[3] Approximate 3 dBA reduction for first 100 feet and each subsequent doubling of distance from FDR Drive.
[4] Maximum predicted L_{10} value was determined by projecting the measured L_{10} value at receptor site 6 based on distance to each of the nearest points of the project sites' façade assuming a 3 dBA difference in noise levels per doubling of distance.

To implement the attenuation requirements shown in **Table 17-9**, an (E) Designation for noise (E-489) would be applied to the project sites specifying the appropriate amount of window/wall attenuation and an alternate means of ventilation. The final design of the building, including window OITC ratings to meet the overall composite façade attenuation requirement and the specific alternate means of ventilation, is still being designed and will be reviewed and approved by the New York City Mayor's Office of Environmental Remediation (OER). The text for the (E) Designation would be as follows:

> **To ensure an acceptable interior noise environment, the building façade(s) or future development at the project sites must provide minimum composite building façade attenuation as shown in Table 17-9 of the *Two Bridges LSRD EIS* in order to ensure an interior L_{10} noise level not greater than 45 dBA for residential and community facility uses or not greater than 50 dBA for commercial uses. To maintain a closed-window condition in these areas, an alternate means of ventilation that brings outside air into the buildings without degrading the acoustical performance of the building façade(s) must also be provided.**

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 is composed of the wall, glazing, and any vents or louvers for HVAC systems in various ratios of surface area. The proposed buildings would be designed to provide a composite Outdoor-Indoor Transmission Class (OITC) rating greater than or equal to the attenuation requirements listed in **Table 17-9**. The OITC classification is defined by American Society for Testing and Materials (ASTM) International (ASTM E1332-10) 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 guidelines, the proposed projects would provide sufficient attenuation to achieve the *CEQR Technical Manual* interior noise level guidelines of 45 dBA L_{10} for residential or community facility uses and 50 dBA L_{10} for commercial uses.

I. MECHANICAL EQUIPMENT

It is assumed that the proposed projects' mechanical systems (i.e., HVAC 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 to avoid producing levels that would result in any significant increase in ambient noise levels. Therefore, the proposed projects would not result in any significant adverse noise impacts related to building mechanical equipment. ✷