Chapter 20: Noise

A. INTRODUCTION

Noise pollution in an urban area comes from many sources. Some sources are activities essential to the health, safety, and welfare of the city's inhabitants, such as noise from emergency vehicle sirens, garbage collection operations, and construction and maintenance equipment. Other sources, such as traffic, stem from the movement of people and goods and are activities that are essential to the viability of the city as a place to live and do business. Although these and other noise-producing activities are necessary to a city, the noise they produce is undesirable. Urban noise detracts from the quality of the living environment, and there is increasing evidence that excessive noise represents a threat to public health.

The proposed project is expected to change traffic volumes in the general vicinity of the project site. Since traffic on adjacent roadways and the nearby Williamsburg Bridge are the main sources of ambient noise, this could lead to changes in the ambient noise level. Increases of at least 3 dBA between the future without the proposed project and the future with the proposed project would constitute significant impacts. An analysis was designed and conducted to identify and quantify any such impacts.

The noise analysis for the proposed project consisted of two parts:

- A detailed analysis at locations where traffic generated by the proposed project would have the potential to result in significant adverse noise impacts to determine the magnitude of the increase in noise level; and
- An analysis to determine the level of building attenuation necessary to ensure that interior noise levels throughout the study area satisfy applicable interior noise criteria.

Based on a survey of land uses in the area, it was determined that no stationary noise sources contribute significantly to noise levels in the area, and a stationary noise source analysis would not be necessary.

PRINCIPAL CONCLUSIONS

In summary, the analysis concludes that the traffic generated by the proposed project would be expected to produce significant increases in noise levels on South 3rd Street between Kent and Wythe Avenues and on South 4th Street between Kent and Wythe Avenues. These increases would constitute significant adverse impacts at these locations. There are residential, industrial, and manufacturing uses at both of these locations. However, the absolute noise levels at these location with the proposed project would be in the low 70s of dBA, which would be typical of areas near highly trafficked roadways in New York City.

Recently, Kent Avenue has been reconfigured from two-way north-south operation to one-way northbound operation between Clymer and North 14th Streets. As discussed in Chapter 17, "Traffic and Parking," with the reconfiguration of Kent Avenue, there is the potential that traffic

volumes on Kent and Wythe Avenues would increase. The traffic volume increases are not expected to be large enough to substantially affect the noise levels or result in different noise mitigation measures along either of these corridors because of the heavy existing traffic at these locations, however new noise readings will be conducted between the Draft and Final EIS if warranted.

With the incorporation of the attenuation levels specified below under "Attenuation Requirements," noise levels within the proposed buildings would comply with all applicable requirements.

NOISE FUNDAMENTALS

Quantitative information on the effects of airborne noise on people is well documented. If sufficiently loud, noise may adversely affect people in several ways. For example, noise may interfere with human activities such as sleep, speech communication, and tasks requiring concentration or coordination. It may also cause annoyance, hearing damage, and other physiological problems. Although it is possible to study these effects on people on an average or statistical basis, it must be remembered that all the stated effects of noise on people vary greatly with the individual. Several noise scales and rating methods are used to quantify the effects of noise on people. These scales and methods consider factors such as loudness, duration, time of occurrence, and changes in noise level with time.

"A"-WEIGHTED SOUND LEVEL (dBA)

Noise is typically measured in units called decibels (dB), which are ten times the logarithm of the ratio of the sound pressure squared to a standard reference pressure squared. Because loudness is important in the assessment of the effects of noise on people, the dependence of loudness on frequency must be taken into account in the noise scale used in environmental assessments. Frequency is the rate at which sound pressures fluctuate in a cycle over a given quantity of time, and is measured in Hertz (Hz), where 1 Hz equals 1 cycle per second. Frequency defines sound in terms of pitch components. In the measurement system, one of the simplified scales that accounts for the dependence of perceived loudness on frequency is the use of a weighting network—known as A-weighting—that simulates the response of the human ear. For most noise assessments, the A-weighted sound pressure level in units of dBA is used due to its widespread recognition and its close correlation to perception. In this analysis, all measured noise levels are reported in dBA or A-weighted decibels. Common noise levels in dBA are shown in Table 20-1.

COMMUNITY RESPONSE TO CHANGES IN NOISE LEVELS

The average ability of an individual to perceive changes in noise levels is well documented (see Table 20-2). Generally, changes in noise levels less than 3 dBA are barely perceptible to most listeners, whereas 10 dBA changes are normally perceived as doublings (or halvings) of noise levels. These guidelines permit direct estimation of an individual's probable perception of changes in noise levels.

Table 20-1
Common Noise Levels

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

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

Table 20-2
Average Ability to Perceive Changes in Noise Levels

Change (dBA)	Human Perception of Sound
2-3	Barely perceptible
5	Readily noticeable
10	A doubling or halving of the loudness of sound
20	A dramatic change
40	Difference between a faintly audible sound and a very loud sound

Source: Bolt Beranek and Neuman, Inc., *Fundamentals and Abatement of Highway Traffic Noise*, Report No. PB-222-703. Prepared for Federal Highway Administration, June 1973.

It is also possible to characterize the effects of noise on people by studying the aggregate response of people in communities. The rating method used for this purpose is based on a statistical analysis of the fluctuations in noise levels in a community, and integrates the fluctuating sound energy over a known period of time, most typically during 1 hour or 24 hours. Various government and research institutions have proposed criteria that attempt to relate changes in noise levels to community response. One commonly applied criterion for estimating this response is incorporated into the community response scale proposed by the International

Standards Organization (ISO) of the United Nations (see Table 20-3). This scale relates changes in noise level to the degree of community response and permits direct estimation of the probable response of a community to a predicted change in noise level.

Table 20-3
Community Response to Increases in Noise Levels

Change (dBA)	Category	Description
0	None	No observed reaction
5	Little	Sporadic complaints
10	Medium	Widespread complaints
15	Strong	Threats of community action
20	Very strong	Vigorous community action

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

NOISE DESCRIPTORS USED IN IMPACT ASSESSMENT

Because the sound pressure level unit, dBA, describes a noise level at just one moment, and very few noises are constant, other ways of describing noise over extended periods have been developed. One way of describing fluctuating sound is to describe the fluctuating noise heard over a specific time period as if it had been a steady, unchanging sound. For this condition, a descriptor called the "equivalent sound level," L_{eq}, can be computed. L_{eq} is the constant sound level that, in a given situation and time period (e.g., 1 hour, denoted by $L_{eq(1)}$, or 24 hours, denoted as $L_{eq(24)}$), conveys the same sound-energy as the actual time-varying sound. Statistical sound level descriptors such as L_1, L_{10}, L_{50}, L_{90}, and L_x, are sometimes used to indicate noise levels that are exceeded 1, 10, 50, 90 and x percent of the time, respectively. Discrete event peak levels are given as L_1 levels. L_{eq} is used in the prediction of future noise levels, by adding the contributions from new sources of noise (i.e., increases in traffic volumes) to the existing levels and in relating annoyance to increases in noise levels.

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

For the purposes of this analysis, the maximum 1-hour equivalent sound level ($L_{eq(1)}$) has been selected as the noise descriptor to be used in the noise impact evaluation. $L_{eq(1)}$ is the noise descriptor used in the *New York City Environmental Quality Review (CEQR) Technical Manual* for noise impact evaluation, and is used to provide an indication of highest expected sound levels. $L_{10(1)}$ is the noise descriptor used in the *CEQR Technical Manual* for building attenuation. Hourly statistical noise levels (particularly L_{10} and L_{eq} levels) were used to characterize the relevant noise sources and their relative importance at each receptor location.

B. NOISE PREDICTION METHODOLOGY

PROPORTIONAL MODELING

Proportional modeling was used to determine locations which had the potential for having significant noise impacts and to quantify the magnitude of those potential impacts. Proportional modeling is one of the techniques recommended in the New York City *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 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:

FB NL - FNA NL = 10 * $\log_{10}$ (FB PCE / FNB PCE)

where:

FB NL = Future Build Noise Level

FNA NL = Future No Action Noise Level

FB PCE = Future Build PCEs

FNA PCE = Future No Action 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.

Analyses were conducted for three time periods: the weekday AM, weekday midday (MD), and weekday PM peak hours. These time periods are the hours when the maximum traffic generation is expected and, therefore the hours when future with the proposed project conditions are most likely to result in maximum noise impacts.

As described in Chapter 17, "Traffic and Parking," Kent Avenue has recently been reconfigured from two-way north-south operation to a one-way northbound operation. It should be noted that the baseline traffic data upon which this noise analysis is based were collected with Kent Avenue operating as a two-way street for the purposes of developing the existing conditions for the Draft Environmental Impact Statement (DEIS). Therefore, the DEIS traffic and noise analysis reflect conditions in which Kent Avenue has both northbound and southbound traffic. The traffic patterns resulting from the reconfiguration of Kent Avenue are still in an early stage, and are expected to stabilize in the near future. Furthermore, the New York City Department of Transportation (DOT) is expected to assess the efficacy of the new Kent Avenue configuration and determine whether further network modifications are necessary. It is anticipated that this

assessment would be done in winter 2009. The proposed project's impacts under this new Kent Avenue configuration would be studied and included in the Final EIS.

APPLICABLE NOISE CODES AND IMPACT CRITERIA

NEW YORK CITY NOISE CODE

The New York City Noise Control Code, amended in December 2005, contains prohibitions regarding unreasonable noise and specific noise standards, including plainly audible criteria for specific noise sources. In addition, the amended code specifies that no sound source operating in connection with any commercial or business enterprise may exceed the decibel levels in the designated octave bands shown in Table 20-4 at the specified receiving properties.

Table 20-4
New York City Noise Codes

Octave Band Frequency (Hz)	Maximum Sound Pressure Levels (dB) as Measured Within a Receiving Property	
	Residential receiving property for mixed-use building and residential buildings[1]	Commercial receiving property[2]
31.5	70	74
63	61	64
125	53	56
250	46	50
500	40	45
1000	36	41
2000	34	39
4000	33	38
8000	32	37

Notes:
1. As measured within any room of the residential portion of the building with windows open, if possible.
2. As measured within any room containing offices within the building with windows open, if possible.

Source: Section §24-232 of the Administrative Code of the City of New York, as amended December 2005.

NEW YORK CEQR NOISE STANDARDS

The New York City Department of Environmental Protection (DEP) has set external noise exposure standards. These standards are shown in Table 20-4 and 20-5. Noise Exposure is classified into four categories: acceptable, marginally acceptable, marginally unacceptable, and clearly unacceptable. The standards shown are based on maintaining an interior noise level for the worst-case hour L_{10} less than or equal to 45 dBA. Attenuation requirements are shown in Table 20-6.

Table 20-5
Noise Exposure Guidelines
For Use in City Environmental Impact Review[1]

Receptor Type	Time Period	Acceptable General External Exposure	Airport[3] Exposure	Marginally Acceptable General External Exposure	Airport[3] Exposure	Marginally Unacceptable General External Exposure	Airport[3] Exposure	Clearly Unacceptable General External Exposure	Airport[3] Exposure
1. Outdoor area requiring serenity and quiet[2]		$L_{10} \leq 55$ dBA	---------- Ldn ≤ 60 dBA ----------		---------- 60 < Ldn ≤ 65 dBA ----------		(1) 65 < Ldn ≤ 70 dBA, (II) 70 ≤ Ldn		---------- Ldn ≤ 75 dBA ----------
2. Hospital, Nursing Home		$L_{10} \leq 55$ dBA		55 < $L_{10} \leq 65$ dBA		65 < $L_{10} \leq 80$ dBA		$L_{10} > 80$ dBA	
3. Residence, residential hotel or motel	7 AM to 10 PM	$L_{10} \leq 65$ dBA		65 < $L_{10} \leq 70$ dBA		70 < $L_{10} \leq 80$ dBA		$L_{10} > 80$ dBA	
	10 PM to 7 AM	$L_{10} \leq 55$ dBA		55 < $L_{10} \leq 70$ dBA		70 < $L_{10} \leq 80$ dBA		$L_{10} > 80$ dBA	
4. School, museum, library, court, house of worship, transient hotel or motel, public meeting room, auditorium, out-patient public health facility		Same as Residential Day (7 AM-10 PM)		Same as Residential Day (7 AM-10 PM)		Same as Residential Day (7 AM-10 PM)		Same as Residential Day (7 AM-10 PM)	
5. Commercial or office		Same as Residential Day (7 AM-10 PM)		Same as Residential Day (7 AM-10 PM)		Same as Residential Day (7 AM-10 PM)		Same as Residential Day (7 AM-10 PM)	
6. Industrial, public areas only[4]	Note 4	Note 4		Note 4		Note 4		Note 4	

Notes:
(i) In addition, any new activity shall not increase the ambient noise level by 3 dBA or more;
[1] Measurements and projections of noise exposures are to be made at appropriate heights above site boundaries as given by American National Standards Institute (ANSI) Standards; all values are for the worst hour in the time period.
[2] Tracts of land where serenity and quiet are extraordinarily important and serve an important public need and where the preservation of these qualities is essential for the area to serve its intended purpose. Such areas could include amphitheaters, particular parks or portions of parks or open spaces dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet. Examples are grounds for ambulatory hospital patients and patients and residents of sanitariums and old-age homes.
[3] One may use the FAA-approved L_{dn} contours supplied by the Port Authority, or the noise contours may be computed from the federally approved INM Computer Model using flight data supplied by the Port Authority of New York and New Jersey.
[4] External Noise Exposure standards for industrial areas of sounds produced by industrial operations other than operating motor vehicles or other transportation facilities are spelled out in the New York City Zoning Resolution, Sections 42-20 and 42-21. The referenced standards apply to M1, M2, and M3 manufacturing districts and to adjoining residence districts (performance standards are octave band standards).
Source: New York City Department of Environmental Protection (adopted policy 1983).

Table 20-6
Required Attenuation Values to Achieve Acceptable Interior Noise Levels

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

Note: * The above composite window-wall attenuation values are for residential dwellings. Commercial office spaces and meeting rooms would be 5 dB(A) less in each category. All the above categories require a closed window situation and hence an alternate means of ventilation.
Source: New York City Department of Environmental Protection

In addition, the *CEQR Technical Manual* uses the following criteria to determine whether a proposed project would result in a significant adverse noise impact. The impact assessments compare the projected future with the proposed project condition $L_{eq(1)}$ noise levels to those calculated for the No Action condition, for receptors potentially affected by the proposed project. If the No Action levels are less than 60 dBA $L_{eq(1)}$ and the analysis period is not a

nighttime period, the threshold for a significant impact would be an increase of at least 5 dBA $L_{eq(1)}$. For the 5 dBA threshold to be valid, the resultant Build condition noise level would have to be equal to or less than 65 dBA. If the No Action noise level is equal to or greater than 62 dBA $L_{eq(1)}$, or if the analysis period is a nighttime period (defined in the CEQR standards as being between 10 PM and 7 AM), the incremental significant impact threshold would be 3 dBA $L_{eq(1)}$. (If the No Action noise level is 61 dBA $L_{eq(1)}$, the maximum incremental increase would be 4 dBA, since an increase higher than this would result in a noise level higher than the 65 dBA $L_{eq(1)}$ threshold.)

C. EXISTING CONDITIONS

STUDY AREA

The study area for this analysis is roughly bounded by the East River to the west, Grand Street to the north, Wythe Avenue to the east, and the Williamsburg Bridge to the south. These blocks make up the study area, and are thus the areas with the highest potential for noise impacts.

SELECTION OF NOISE RECEPTOR LOCATIONS

Based upon a screening analysis, seven noise receptor locations were chosen within the study area (see Figure 20-1). Site 1 is located on Grand Street between Kent and Wythe Avenues. Site 2 is located on South 1st Street between Kent and Wythe Avenues. Site 3 is located on South 2nd Street between Kent and Wythe Avenues. Site 4 is located on South 3rd Street between Kent and Wythe Avenues. Site 5 is located on South 4th Street between Kent and Wythe Avenues. Site 6 is located on Kent Avenue between South 3rd and South 4th Streets. Site 7 is located on the roof of the existing Adant House at the south end of the project site, adjacent to the Williamsburg Bridge. Measurements performed at Sites 1-6 were done as part of the impact identification and building attenuation analyses. These sites are representative of other locations in the immediate area, and are generally the locations where maximum impacts would be expected. The sites were used to assess the potential impacts of traffic noise generated by the proposed project. Measurements at Site 7 were performed as part of the building attenuation analysis only to account for noise generated by traffic on the Williamsburg Bridge.

NOISE MONITORING

At each receptor site, existing noise levels were determined by field measurements for each of the three noise analysis time periods. Noise monitoring was performed at Sites 1 through 7 during October 2007. Kent Avenue was two-way at the time of the measurements. At Sites 1-6, 20-minute spot measurements were taken during the three weekday periods that reflect peak hours of trip generation: AM weekday (8 AM to 9 AM), MD weekday (12 Noon to 1:30 PM), and PM weekday (5 PM to 6:30 PM). At receptor Site 7, a continuous measurement was performed between 8 AM and 6 PM in order to determine the maximum noise that would result from automobile and subway traffic on the Williamsburg Bridge.

EQUIPMENT USED DURING NOISE MONITORING

The instrumentation used for the measurements was a Brüel & Kjær Type 4189 ½-inch microphone connected to a Brüel & Kjær Model 2260 Type 1 (according to ANSI Standard S1.4-1983) sound level meter. This assembly was mounted at a height of 5 feet above the ground surface on a tripod and at least 6 feet away from any large sound-reflecting surface to avoid major interference with

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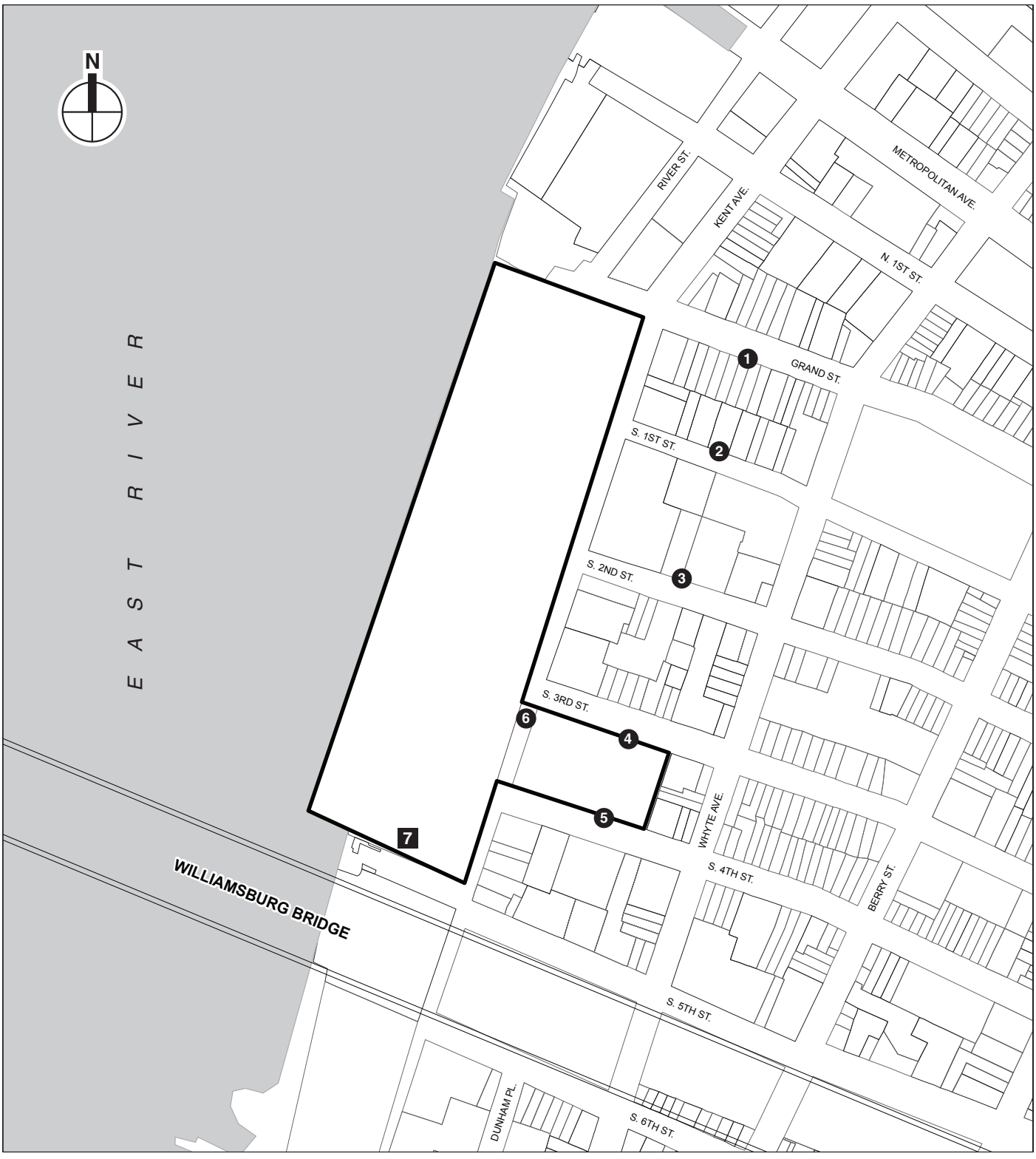

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Noise Receptor Locations
Figure 20-1

sound propagation. The meter was calibrated before and after readings with a Brüel & Kjær Type 4231 sound-level calibrator using the appropriate adaptor. Measurements at each location were made on the A-scale (dBA). The data were digitally recorded by the sound level meter and displayed at the end of the measurement period in units of dBA. Measured quantities included L_{eq}, L_1, L_{10}, L_{50}, and L_{90}. A windscreen was used during all sound measurements except for calibration. Only traffic-related noise was measured; noise from other sources (e.g., emergency sirens, aircraft flyovers, etc.) was excluded from the measured noise levels. Weather conditions were noted to ensure a true reading as follows: wind speed under 12 mph; relative humidity under 90 percent; and temperature above 14°F and below 122°F. All measurement procedures conformed to the requirements of ANSI Standard S1.13-1971 (R2005).

EXISTING NOISE LEVELS AT NOISE RECEPTOR LOCATIONS

MEASURED NOISE LEVELS

Noise monitoring results for the seven receptor locations are summarized in Tables 20-7 and 20-8. Traffic was the dominant noise source at all seven sites, and the values shown reflect the level of vehicular activity on the adjacent streets.

Table 20-7
Existing Noise Levels at Noise Receptor Sites 1 through 6
(in dBA)

Site	Measurement Location	Day	Time	L_{eq}	L_1	L_{10}	L_{50}	L_{90}
1	Grand Street Between Kent Avenue and Wythe Avenue	Weekday	AM	65.2	77.2	65.5	58.4	55.2
		Weekday	MD	66.4	77.5	68.2	59.6	55.0
		Weekday	PM	65.5	76.8	67.5	59.6	55.6
2	South 1st Street Between Kent Avenue and Wythe Avenue	Weekday	AM	69.8	80.8	72.0	63.3	58.1
		Weekday	MD	65.4	73.6	68.3	63.0	59.7
		Weekday	PM	64.3	74.7	67.0	58.7	56.3
3	South 2nd Street Between Kent Avenue and Wythe Avenue	Weekday	AM	62.7	72.6	65.0	59.3	57.1
		Weekday	MD	59.8	68.0	62.6	56.9	54.0
		Weekday	PM	60.8	70.0	63.3	58.8	56.3
4	South 3rd Street Between Kent Avenue and Wythe Avenue	Weekday	AM	64.1	71.1	68.1	61.4	58.1
		Weekday	MD	63.6	71.2	66.9	61.0	58.3
		Weekday	PM	67.9	76.5	70.2	65.4	62.6
5	South 4th Street Between Kent Avenue and Wythe Avenue	Weekday	AM	64.1	74.7	66.3	60.2	55.3
		Weekday	MD	64.1	74.0	66.7	60.2	57.1
		Weekday	PM	62.8	72.4	65.0	60.2	58.0
6	Kent Avenue between South 4th Street and South 3rd Street	Weekday	AM	72.1	83.1	75.2	67.1	59.6
		Weekday	MD	70.6	81.3	73.8	65.6	60.6
		Weekday	PM	71.0	80.1	73.5	69.2	63.3

Notes: Field measurements were performed by AKRF, Inc. during October 2007.
Refer to Figure 20-1 for noise monitoring locations.

Table 20-8
Existing Noise Levels at Receptor Site 7
(in dBA)

Date	Start Time	dBA						
		L_{eq}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	$L_{(min)}$	$L_{(max)}$
10/16/2007	8:00 AM	69.5	76.6	73.2	67.1	62.0	59.1	78.9
10/16/2007	9:00 AM	68.1	76.2	71.7	65.4	61.1	58.7	81.4
10/16/2007	10:00 AM	67.5	75.8	70.9	64.4	61.7	59.7	83.3
10/16/2007	11:00 AM	67.3	75.6	70.6	64.8	62.1	58.9	82.9
10/16/2007	12:00 PM	68.5	77.2	72.2	64.7	60.9	58.5	87.5
10/16/2007	1:00 PM	68.7	77.0	72.3	65.5	63.6	61.1	82.9
10/16/2007	2:00 PM	68.2	76.5	71.5	65.8	64.0	61.5	78.4
10/16/2007	3:00 PM	68.8	76.9	72.8	65.8	63.9	59.4	79.7
10/16/2007	4:00 PM	68.6	76.5	72.4	65.9	63.9	60.8	79.4
10/16/2007	5:00 PM	70.0	77.5	73.7	66.5	64.2	61.4	91.8

Note: Field measurements were performed by AKRF, Inc. during October 2007.

At the time of the noise measurements, Kent Avenue was operating two ways, north and south. Its recent reconfiguration to one-way northbound operation would not be likely to make a substantial change in noise levels along Kent Avenue or Wythe Avenue because of the high existing traffic volumes along those streets.

In terms of CEQR noise criteria, noise levels at Sites 1, 3, and 5 are in the "marginally acceptable" category, and noise levels at Sites 2, 4, 6, and 7 are in the "marginally unacceptable" category.

D. THE FUTURE WITHOUT THE PROPOSED PROJECT

Using the methodology previously described, future noise levels in the No Action condition were calculated for the three analysis periods in the year 2020. Table 20-9 shows the calculated noise levels.

Table 20-9
Future No Action Noise Levels (in dBA)

Noise Receptor Site	Day	Time	Existing $L_{eq(1)}$	2020 No Action $L_{eq(1)}$	Change	2020 No Action $L_{10(1)}$
1	Weekday	AM	65.2	65.6	0.4	65.9
	Weekday	MD	66.4	66.9	0.5	68.7
	Weekday	PM	65.5	66.0	0.5	68.0
2	Weekday	AM	69.8	70.2	0.4	72.4
	Weekday	MD	65.4	65.8	0.4	68.7
	Weekday	PM	64.3	65.0	0.7	67.7
3	Weekday	AM	62.7	63.1	0.4	65.4
	Weekday	MD	59.8	60.3	0.5	63.1
	Weekday	PM	60.8	61.3	0.5	63.8
4	Weekday	AM	64.1	65.4	1.3	69.4
	Weekday	MD	63.6	67.2	3.6	70.5
	Weekday	PM	67.9	70.8	2.9	73.1
5	Weekday	AM	64.1	64.6	0.5	66.8
	Weekday	MD	64.1	64.8	0.7	67.4
	Weekday	PM	62.8	65.6	2.8	67.8
6	Weekday	AM	72.1	74.1	2.0	77.2
	Weekday	MD	70.6	72.3	1.7	75.5
	Weekday	PM	71.0	73.0	2.0	75.5

Comparing future No Action noise levels with existing noise levels, the increases in $L_{eq(1)}$ noise level would be between 0.0 and 3.6 dBA. Increases of less than 3.0 dBA would be barely perceptible, and based upon CEQR impact criteria would not be significant. The increase of 3.6 dBA, which would occur at Site 4 during the mid-day time period would occur as a result of additional truck traffic that would be expected to occur with the No Action development.

In terms of CEQR noise criteria, noise levels at Sites 1, 3, and 5 would remain in the "marginally acceptable" category, and noise levels at Sites 2, 4, and 6 would remain in the "marginally unacceptable" category.

As noted previously, measurements at receptor Site 7 were taken only as part of the building attenuation analysis and, therefore, modeling of future noise levels was not performed at this location.

E. THE FUTURE WITH THE PROPOSED PROJECT

Using the methodology previously described, noise levels in the future with the proposed project were calculated for the three peak analysis periods in the year 2020. Table 20-10 presents noise levels in the future with the proposed project at the seven receptor locations in the year 2020.

Table 20-10
Future Build Noise Levels (in dBA)

Noise Receptor Site	Day	Time	2020 No Action $L_{eq(1)}$	2020 Build $L_{eq(1)}$	Change	2020 Build $L_{10(1)}$
1	Weekday	AM	65.6	65.7	0.1	66.0
	Weekday	MD	66.9	66.9	0.0	68.7
	Weekday	PM	66.0	66.0	0.0	68.0
2	Weekday	AM	70.2	70.3	0.1	72.5
	Weekday	MD	65.8	66.3	0.5	69.2
	Weekday	PM	65.0	65.6	0.6	68.3
3	Weekday	AM	63.1	63.2	0.1	65.5
	Weekday	MD	60.3	60.5	0.2	63.3
	Weekday	PM	61.3	61.9	0.6	64.4
4	Weekday	AM	65.4	71.6	**6.2**	75.6
	Weekday	MD	67.2	71.3	**4.1**	74.6
	Weekday	PM	70.8	73.2	2.4	75.5
5	Weekday	AM	64.6	69.6	**5.0**	71.8
	Weekday	MD	64.8	69.1	**4.3**	71.7
	Weekday	PM	65.6	71.0	**5.4**	73.2
6	Weekday	AM	74.1	74.5	0.4	77.6
	Weekday	MD	72.3	72.8	0.5	76.0
	Weekday	PM	73.0	73.6	0.6	76.1

Comparing future with the proposed project noise levels with No Action noise levels, at Sites 1, 2, 3, and 6, the maximum increase in $L_{eq(1)}$ noise level would be less than 1.0 dBA. Increases of this magnitude would not be perceptible, and based upon CEQR impact criteria would not be significant.

However, at Site 4 (located on South 3rd Street between Kent and Wythe Avenues) and Site 5 (located on South 4th Street between Kent and Wythe Avenues), traffic due to the proposed project would result in noise level increases of up to 6.2 dBA, which would exceed the CEQR impact criteria and result in significant adverse noise impacts at these two locations. Exceedances of the CEQR noise impact criteria are shown in bold in Table 20-10.

The large noise level increases generally occur as a result of increased traffic using South 3rd and South 4th Streets to enter and exit the project site, whereas there was little traffic at all on

these streets in the existing condition, and substantially less in the No Action condition. While the noise level increases do exceed CEQR noise impact criteria, the resultant noise levels are not much greater than what is often found near highly trafficked areas of New York City. In fact, the future with the proposed project noise levels at Sites 4 and 5 are comparable to the existing condition noise levels at Site 6. Furthermore, the sensitive uses (i.e., residences) along the impacted blocks include double-glazed windows and air conditioning units and would therefore be likely to have interior $L_{10(1)}$ noise levels less than 45 dBA, which would meet CEQR interior noise level criteria. Mitigation measures for these impacts are discussed in Chapter 23, "Mitigation."

The reconfiguration of Kent Avenue from two-way north-south operation to one-way northbound operation would not be likely to affect the results of this analysis. The changes in traffic resulting from the reconfiguration occur primarily on Kent and Wythe Avenues, which already have high traffic volumes and existing noise levels. As such, it is not expected that the reconfiguration would create enough traffic to significantly affect the noise levels at these locations, however additional noise readings will be taken between the Draft and Final EIS if warranted.

In terms of CEQR noise criteria, noise levels at Sites 1 and 3 would remain in the "marginally acceptable" category, noise levels at Site 5 would change from the "marginally acceptable" category to the "marginally unacceptable" category, and noise levels at Sites 2, 4, and 6 would remain in the "marginally unacceptable" category.

F. OTHER NOISE CONCERNS

MECHANICAL EQUIPMENT

No detailed designs of the buildings' mechanical systems (i.e., heating, ventilation, and air conditioning systems) are available at this time. However, those systems will be designed to meet all applicable noise regulations and requirements, and would be designed to produce noise levels which would not result in any significant increases in ambient noise levels.

ATTENUATION REQUIREMENTS

As shown in Table 20-6, 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 and community facility uses and 50 dBA or lower for retail, and office uses, and are determined based on exterior $L_{10(1)}$ noise levels. The results of the building attenuation analysis are summarized in Table 20-11.

Table 20-11
Minimum Building Attenuation to Comply with CEQR Requirements at the Project Site

Site	Proposed Land Use	Governing Noise Sites	Required Building Attenuation* (dBA)
A	Residential/Retail/Office/Community Facility	2,6	35 on East Façade, 30 on all other facades
B	Residential/Retail	2,6	35 on East Façade, 30 on all other facades
C	Residential/Retail	6,7	35 on East Façade, 30 on all other facades
D	Residential/Retail	6,7	35 on East Façade, 30 on all other facades
E	Residential/Retail	4,5,6	35 on West and North Facades, 30 on all others
Refinery	Residential/Retail/Community Facility	4,6	35 on East Façade, 30 on all other facades
Notes: *The required attenuation values shown are for residential and certain community facility uses. Required attenuation for retail, and office uses would be 5 dBA less.			

Attenuation would be required at certain sites due to the high existing background noise levels to achieve interior residential noise levels of 45 dBA or lower in residential zoning districts. This zoning attenuation would be mandated for the proposed project via the Restrictive Declaration.

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/air conditioning units in various ratios of area. The proposed design for all project buildings includes the use of well-sealed double-glazed windows and air conditioning units. The proposed buildings' facades, including these elements, would be designed to provide a composite Outdoor-Indoor Transmission Class (OITC) rating greater than or equal to the attenuation requirements listed in Table 20-11. The OITC classification is defined by the American Society of Testing and Materials (ASTM E1332-90 [Reapproved 2003]) 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 buildings will thus provide sufficient attenuation to achieve the CEQR interior noise level guideline of 45 dBA L_{10}.

Based upon the predicted $L_{10(1)}$ values 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.

Building designs for buildings on the streets listed above would be required to provide at least the level of building attenuation specified in Table 20-11. Buildings on other streets that are part of this action would be required to provide either a minimum of 35 dBA attenuation, or to provide noise analyses which show that sufficient building attenuation would be provided to satisfy CEQR building attenuation requirements, as shown in Table 20-6. ✷