Chapter 15: Noise

A. INTRODUCTION

The Proposed Action includes improvements to the existing esplanade that runs through the project site, the creation of new public open space on piers, and the construction of retail and cultural space in pavilions under the Franklin D. Roosevelt (FDR) Drive and in a reconstructed New Market Building.

This noise analysis examines three issues:

- Potential noise concerns due to changes in traffic and roadway alignment at the eight noise receptor locations along South Street and at adjacent noise sensitive receptor locations;
- Potential noise concerns due to changes in traffic and road configuration due to the new Battery Maritime Building (BMB) plaza; and
- Concerns with regard to noise levels in the new open space areas created as part of the Proposed Action.

Depending on location, noise levels in the project area are due to a combination of sources. At most locations the dominant noise sources are traffic on nearby and adjacent streets, and traffic on the elevated FDR Drive. At some locations traffic on the Brooklyn Bridge, traffic and trains on the Manhattan Bridge, aircraft flyovers (including at locations near and adjacent to the Pier 6 heliport), and boat traffic are contributing noise sources. The Proposed Action would add new traffic to nearby streets and roadways and would change roadway geometries, and, therefore, would have the potential to increase noise levels.

The noise analysis for the Proposed Action consisted of the following:

- A field measurement program to determine existing noise levels; and
- A screening analysis to determine whether there are any locations where changes in traffic due to the Proposed Action would have the potential for resulting in significant adverse noise impacts.

If any locations were identified where changes in traffic due to the Proposed Action would have the potential for resulting in significant adverse noise impacts, a detailed analysis would have to be performed to determine the magnitude of the increase in noise levels, and, if necessary, the feasibility of implementing noise mitigation may also have to be examined. As discussed below, the Proposed Action would not have the potential for significantly increasing noise levels and consequently no detailed analysis was needed.

However, noise levels within some of the new open space areas created as part of the Proposed Action would be above the 55 dBA L_{10} noise level for outdoor areas requiring serenity and quiet contained in the *City Environmental Quality Review (CEQR) Technical Manual* noise exposure guidelines. In terms of U.S. Department of Housing and Urban Development (HUD) criteria, noise levels in these areas would be in the “normally unacceptable” and “unacceptable” categories. Based on the HUD criteria, the noise levels at some of the new open space areas would result in potentially significant adverse noise impacts on their users. Because of safety and aesthetic considerations, there are no practical and feasible mitigation measures that could be implemented to reduce noise levels to below the 55 dBA $L_{10(1)}$ guideline within the open space areas. Although noise levels in these new areas would be above the 55 dBA $L_{10(1)}$ CEQR guideline noise level as well as HUD standards, they would be comparable to noise levels in a number of open space areas that are also located adjacent to heavily trafficked roadways, including the Hudson River Park, the East River Drive Park, Central Park, Riverside Park, and other urban open space areas.

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 such factors as loudness, duration, time of occurrence, and changes in noise level with time.

"A"-WEIGHTED SOUND LEVEL (dBA)

Noise is typically measured in units called decibels (dB), which are 10 times the logarithm of the ratio of the sound pressure squared to a standard reference pressure squared. Because loudness is important in the assessment of the effects of noise on people, the dependence of loudness on frequency must be taken into account in the noise scale used in environmental assessments. Frequency is the rate at which sound pressures fluctuate in a cycle over a given quantity of time, and is measured in Hertz (Hz), where 1 Hz equals 1 cycle per second. Frequency defines sound in terms of pitch components. In the measurement system, one of the simplified scales that accounts for the dependence of perceived loudness on frequency is the use of a weighting network—known as A-weighting—that simulate response of the human ear. For most noise assessments the A-weighted sound pressure level in units of dBA is used in view of its widespread recognition and its close correlation with perception. In this analysis, all measured noise levels are reported in dBA or A-weighted decibels. Common noise levels in dBA are shown in Table 15-1.

COMMUNITY RESPONSE TO CHANGES IN NOISE LEVELS

The average ability of an individual to perceive changes in noise levels is well documented (see Table 15-2). 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.

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.

Table 15-1
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 15-2
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.

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 15-3). 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 15-3
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

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

NOISE DESCRIPTORS USED IN IMPACT ASSESSMENT

Because the sound pressure level unit of dBA describes a noise level at just one moment and very few noises are constant, other ways of describing noise over extended periods have been developed. One way of describing fluctuating sound is to describe the fluctuating noise heard over a specific time period as if it had been a steady, unchanging sound. For this condition, a descriptor called the "equivalent sound level," L_{eq} , can be computed. L_{eq} is the constant sound level that, in a given situation and time period (e.g., 1 hour, denoted by $L_{eq(1)}$, or 24 hours, denoted as $L_{eq(24)}$), conveys the same sound energy as the actual time-varying sound. Statistical sound level descriptors such as L_1, L_{10}, L_{50}, L_{90}, and L_x , are sometimes used to indicate noise levels that are exceeded 1, 10, 50, 90, and x percent of the time, respectively. Discrete event peak levels are given as L_{01} levels. L_{eq} is used in the prediction of future noise levels, by adding the contributions from new sources of noise (e.g., 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.

Another descriptor for 24-hour exposure is the day-night sound level, abbreviated as L_{dn}. This is a 24-hour measure that accounts for the moment-to-moment fluctuations in A-weighted noise levels due to all sound sources during 24 hours, combined. Mathematically, the L_{dn} noise level is the energy average of all $L_{eq(1)}$ noise levels over a 24-hour period, where nighttime noise levels (10 PM to 7 AM) are increased by 10 dBA before averaging.

For the purposes of this project, the maximum 1-hour equivalent sound level ($L_{eq(1)}$) and the day-night sound level (L_{dn}) have been selected as the noise descriptors to be used in the noise impact evaluation. $L_{eq(1)}$ is the noise descriptor used in the 2001 *CEQR Technical Manual* for noise impact evaluation, and is used to provide an indication of highest expected sound levels. L_{dn} is used by HUD for determining project acceptability and the necessary mitigation measures for projects subject to their jurisdiction. In addition, $L_{10(1)}$ is used because the L_{10} is the noise descriptor used in the *CEQR Technical Manual* for noise level category classification.

B. NOISE STANDARDS AND CRITERIA

NEW YORK CITY NOISE CODE

In December 2005, the New York City Noise Control Code was amended. The amended noise code contains: prohibitions regarding unreasonable noise; requirements for noise due to construction activities (including noise limits from specific pieces of construction equipment, noise limits on total construction noise, limits on hours of construction [weekdays between 7:00 AM and 6:00 PM], and requirements for adopting and implementing noise mitigation plans for each construction site prior to the start of construction); and specifies noise standards, including plainly audible criteria, for specific noise sources (e.g., refuse collection vehicles, air compressors, circulation devices, exhausts, paving breakers, commercial music, personal audio devices, sound reproduction devices, animals, motor vehicles including motorcycles and trucks, sound signal devices, burglar alarms, emergency signal devices, lawn care devices, snow blowers, etc.). In addition, the amended code specifies that 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 15-4 at the specified receiving properties.

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 Tables 15-5 and 15-6. Noise exposure is classified into four categories: "acceptable," "marginally acceptable," "marginally unacceptable," and "clearly unacceptable." The standards shown are based on maintaining an interior noise level for the worst-case hour L_{10} less than or equal to 45 dBA. Attenuation requirements are shown in Table 15-6.

Table 15-4
New York City Noise Codes

Octave Band Frequency (Hz)	Maximum Sound Pressure Levels (dB) as Measured Within a Receiving Property as Specified Below	
	Residential receiving property for mixed use building and residential buildings (as measured within any room of the residential portion of the building with windows open, if possible)	*Commercial receiving property (as measured within any room containing offices within the building with windows open, if possible)*
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

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

Table 15-5
Noise Exposure Guidelines
For Use in City Environmental Impact Review[1]

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

Notes:

[1] Measurements and projections of noise exposures are to be made at appropriate heights above site boundaries as given by American National Standards Institute (ANSI) Standards; all values are for the worst hour in the time period.

[2] Tracts of land where serenity and quiet are extraordinarily important and serve an important public need and where the preservation of these qualities is essential for the area to serve its intended purpose. Such areas could include amphitheaters, particular parks or portions of parks or open spaces dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet. Examples are grounds for ambulatory hospital patients and patients and residents of sanitariums and old-age homes.

[3] One may use the FAA-approved L_{dn} contours supplied by the Port Authority, or the noise contours may be computed from the federally approved INM Computer Model using flight data supplied by the Port Authority of New York and New Jersey.

[4] External Noise Exposure standards for industrial areas of sounds produced by industrial operations other than operating motor vehicles or other transportation facilities are spelled out in the New York City Zoning Resolution, Sections 42-20 and 42-21. The referenced standards apply to M1, M2, and M3 manufacturing districts and to adjoining residence districts (performance standards are octave band standards).

Source: New York City Department of Environmental Protection (adopted policy 1983).

Table 15-6
Required Attenuation Values to Achieve Acceptable Interior Noise Levels

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

Note:

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

Source: New York City Department of Environmental Protection

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

If the No Build levels are less than 60 dBA $L_{eq(1)}$ and the analysis period is not a nighttime period, the threshold for a significant impact would be an increase of at least 5 dBA $L_{eq(1)}$. For the 5 dBA threshold to be valid, the resultant Build condition noise level would have to be equal to or less than 65 dBA. If the No Build noise level is equal to or greater than 62 dBA $L_{eq(1)}$, or if the analysis period is a nighttime period (defined in the CEQR standards as being between 10:00 PM and 7:00 AM), the incremental significant impact threshold would be 3 dBA $L_{eq(1)}$. (If the No Build noise level is 61 dBA $L_{eq(1)}$, the maximum incremental increase would be 4 dBA, since an increase higher than this would result in a noise level higher than the 65 dBA $L_{eq(1)}$ threshold.)

HUD CRITERIA AND STANDARDS

HUD has developed criteria and guidelines for determining project acceptability and the necessary mitigation measures to achieve a goal of a suitable living environment for projects which are subject to their jurisdiction. The HUD goal is that interior noise levels of residences not exceed an L_{dn} noise level of 45 dBA. Table 15-7 shows the HUD noise classification and criteria. HUD does not have noise standards pertaining specifically to outdoor public open space.

Table 15-7
HUD Noise Criteria

L_{dn}	Site Acceptability	Special Approvals & Requirements
$L_{dn} < 65$	Acceptable	none required
$65 \leq L_{dn} < 70$	Normally unacceptable	special approval & 5 dBA additional sound attenuation
$70 \leq L_{dn} < 75$	Normally unacceptable	special approval & 10 dBA additional sound attenuation
$75 \leq L_{dn}$	Unacceptable	special approval by the Assistant Secretary for CPD of the additional attenuation measures

Source: Federal Register: March 26, 1996 (Volume 61, Number 59).

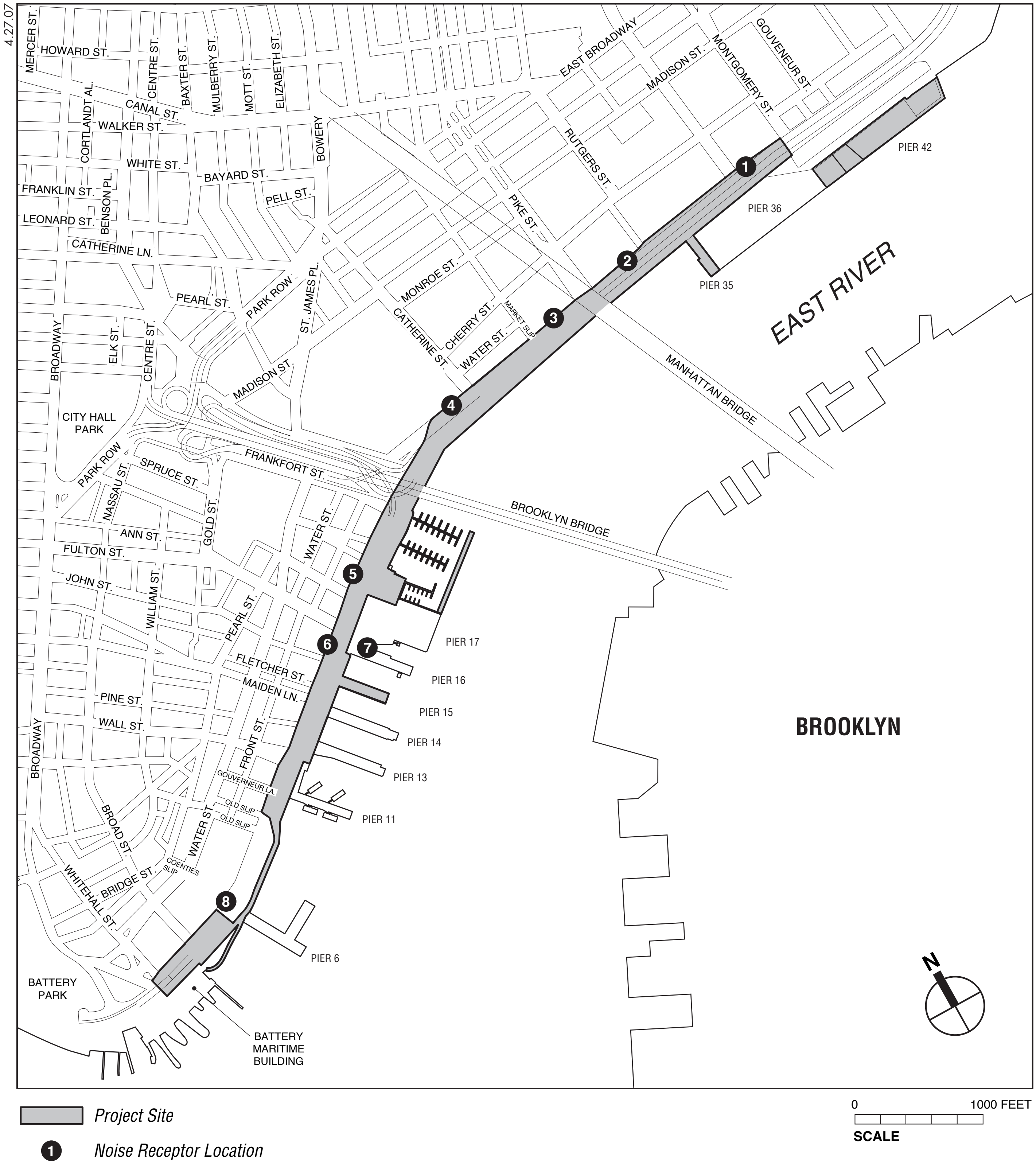
C. EXISTING CONDITIONS

STUDY AREA

The site of the Proposed Action is located along South Street in Manhattan between Montgomery Street in the north and Whitehall Street in the south. It includes the existing esplanade and walkway/bikeway along the waterfront, the area beneath the elevated FDR Drive, the area in front of the BMB, Piers 15, 35, and 42, and a portion of Pier 36.

SELECTION OF NOISE RECEPTOR LOCATIONS

Eight noise receptor locations were chosen along South Street within the study area (see Figure 15-1). Site 1 is located on South Street between Montgomery and Clinton Streets. Site 2 is located on South Street between Rutgers and Pike Streets. Site 3 is located on South Street between Pike Street and Market Slip. Site 4 is located on South Street between Catherine Street and Wagner Place. Site 5 is located on South Street between Peck Slip and Beekman Street. Site 6 is located on South Street between Fulton and John Streets. Site 7 is located on the South Street Seaport Pier. Site 8 is located on South Street between Old Slip and Broad Street in front of the Vietnam Veterans' Plaza. These sites are representative of other locations in the immediate area and are generally the locations where maximum impacts would be expected.



Noise Receptor Locations

Figure 15-1

These sites were used to assess the potential impacts due to traffic noise generated by the Proposed Action.

NOISE MONITORING

At each receptor site existing noise levels were determined for each of the four noise analysis time periods by field measurements. Noise monitoring was performed on May 10, 11, and 13, 2006. At each of these sites, 20-minute spot measurements were taken during the four periods that reflect peak hours of trip generation: AM weekday (8:00 AM to 9:00 AM), midday (MD) weekday (12:00 PM to 1:30 PM), PM weekday (5:00 PM to 6:30 PM), and midday (MD) weekend (12:00 PM to 2:00 PM).

EQUIPMENT USED DURING NOISE MONITORING

The instrumentation used for the 20-minute noise 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 five feet above the ground surface on a tripod and at least six feet away from any large sound-reflecting surface to avoid major interference with sound propagation. The meter was calibrated before and after readings with a Brüel & Kjær Type 4231 sound-level calibrator using the appropriate adaptor. Measurements at each location were made on the A-scale (dBA). The data were digitally recorded by the sound level meter and displayed at the end of the measurement period in units of dBA. Measured quantities included L_{eq}, L_1, L_{10}, L_{50}, and L_{90}. A windscreen was used during all sound measurements except for calibration. Only traffic related noise was measured; noise from other sources (e.g., emergency sirens, aircraft flyovers, etc.) was excluded from the measured noise levels. Weather conditions were noted to ensure a true reading as follows: wind speed under 12 mph; relative humidity under 90 percent; and temperature above 14 degrees F and below 122 degrees F. All measurement procedures conformed to the requirements of ANSI Standard S1.13-1971 (R1976).

NOISE MONITORING RESULTS

Noise monitoring results for the eight receptor locations are summarized in Table 15-8. Traffic from South Street and the elevated FDR Drive was the dominant noise source at all eight noise receptor sites. Measured values are generally moderately to relatively high, and reflect the high level of vehicular activity on adjacent roadways. At Sites 2 and 3, noise generated by subway trains traveling on the Manhattan Bridge also contributes to ambient noise levels. At site 8, helicopters traveling to and from the heliport on Pier 6 contribute to ambient noise levels.

In terms of CEQR noise criteria, noise levels at Sites 1, 2, 4, 6, 7 and 8 are in the "marginally unacceptable" category and noise levels at Sites 3 and 5 are in the "clearly unacceptable" category. These classifications are based upon the highest measured L_{10} values.

Table 15-9 shows calculated L_{dn} noise levels. These calculated values were estimated based upon the measured L_{eq} noise levels. At receptor sites 1, 2, 3, 5, 6, and 8 (i.e., receptors located on South Street between Montgomery and Clinton Streets, between Rutgers and Pike Street, between Pike Street and Market Slip, between Peck Slip and Beekman Place, between Fulton Street and John Street, and between Old Slip and Broad Street) the L_{dn} values are within the HUD "unacceptable" category. At receptor sites 4 and 7 (i.e., receptors located on South Street between Catherine Street and Wagner Place, and on the South Street Seaport Pier) the L_{dn} values are within the HUD "normally unacceptable" category.

Table 15-8
Existing Noise Levels at Sites 1 through 8 (in dBA)

Site	Measurement Location	Day	Time	Leq	L1	L10	L50	L90
1	South Street between Montgomery and Clinton Streets	Weekday	AM	75.4	81.8	78.2	74.1	71.3
		Weekday	MD	75.1	83.4	77.4	73.4	71.0
		Weekday	PM	75.8	81.6	78.8	74.6	70.2
		Weekend	MD	73.2	80.4	75.0	71.8	69.4
2	South Street between Rutgers and Pike Streets	Weekday	AM	76.2	81.6	78.8	75.0	72.4
		Weekday	MD	74.7	82.2	77.0	72.8	70.8
		Weekday	PM	76.7	80.8	79.0	76.0	72.8
		Weekend	MD	72.8	76.0	74.6	72.4	70.0
3	South Street between Pike Street and Market Slip	Weekday	AM	77.4	82.8	80.6	75.8	71.2
		Weekday	MD	77.2	86.0	80.2	74.0	72.0
		Weekday	PM	77.4	82.6	80.0	76.0	74.0
		Weekend	MD	74.5	83.0	77.8	72.0	69.4
4	South Street between Catherine Street and Wagner Place	Weekday	AM	71.6	78.2	74.4	70.0	66.6
		Weekday	MD	71.9	79.0	74.0	70.6	68.2
		Weekday	PM	71.3	78.6	73.0	70.0	66.6
		Weekend	MD	71.8	80.0	73.4	70.0	66.8
5	South Street between Peck Slip and Beekman Street	Weekday	AM	74.3	82.8	86.2	72.8	69.8
		Weekday	MD	75.4	85.0	78.2	72.0	67.6
		Weekday	PM	72.2	78.8	74.0	71.4	68.8
		Weekend	MD	73.1	81.8	74.2	69.4	65.8
6	South Street between Fulton Street and John Street	Weekday	AM	74.6	81.4	76.6	73.4	70.4
		Weekday	MD	76.5	82.4	78.8	75.2	72.6
		Weekday	PM	73.7	81.4	75.6	72.2	69.4
		Weekend	MD	75.0	83.4	77.8	73.2	71.3
7	South Street Seaport Pier	Weekday	AM	69.9	74.8	70.8	69.2	67.4
		Weekday	MD	69.6	74.2	71.2	69.0	67.2
		Weekday	PM	67.9	73.0	69.6	67.2	65.4
		Weekend	MD	69.6	74.4	71.6	68.8	67.0
8	South Street between Old Slip and Broad Street	Weekday	AM	72.4	80.2	75.2	70.6	67.2
		Weekday	MD	71.0	82.0	72.4	68.6	65.4
		Weekday	PM	72.3	78.0	74.4	71.6	68.2
		Weekend	MD	68.7	78.2	71.4	66.0	62.8

Note: Field measurements were performed by AKRF, Inc. on May 10, May 11, and May 13, 2006.

Table 15-9
Calculated L_{dn} Noise Levels (dBA)

Site	L_{dn}
1	78.6
2	79.3
3	80.6
4	74.9
5	77.7
6	78.2
7	73.1
8	75.4

These classifications of existing noise levels at these sites are typically of the classifications that occur at locations adjacent to heavily trafficked areas of the City.

D. THE FUTURE WITHOUT THE PROPOSED ACTION

A proportional modeling technique was used as a screening tool to estimate changes in noise level due to changes in traffic volumes, and therefore to determine whether there would be any locations which had the potential for having significant noise impacts. Proportional modeling is a one of the methodologies recommended in the *CEQR Technical Manual* for mobile source noise analysis.

Using this technique, the prediction of future traffic noise levels is based on a calculation using measured existing noise levels and predicted changes in traffic volumes to determine No Build and Build levels. No Build traffic volumes were based on applying a growth factor to the existing traffic volumes. Future Build traffic volumes were obtained by adding project-generated traffic values to No Build conditions. The vehicular traffic volumes were converted into Passenger Car Equivalent (PCE) values, for which one medium-duty truck (having a gross weight between 9,900 and 26,400 pounds) is assumed to generate the noise equivalent of 13 cars, one heavy-duty truck (having a gross weight of more than 26,400 pounds) is assumed to generate the noise equivalent of 47 cars, and one bus (vehicles designed to carry more than nine passengers) is assumed to generate the noise equivalent of 18 cars. Future noise levels are calculated using the following equation:

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

where:

F NL = Future Noise Level

E NL = Existing Noise Level

F PCE = Future PCEs

E PCE = Existing PCEs

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.

As described in Chapter 13, “Traffic and Transportation,” in the year 2009, future traffic volumes without the proposed would be similar to existing traffic volumes. The maximum increase in traffic on any roadway would be less than 10 percent (comparing future No Build traffic volumes with existing traffic volumes). Based upon this level of increase in traffic volume, using proportional modeling as described above, the maximum increase in $L_{eq(1)}$ and L_{dn} noise levels would be less than 0.5 dBA. Changes of this magnitude would be imperceptible and insignificant.

In terms of CEQR noise criteria, noise levels at Sites 1, 2, 4, 6, 7, and 8 would remain in the “marginally unacceptable” category and noise levels at Sites 3 and 5 would remain in the “clearly unacceptable” category. In terms of the HUD noise criteria, Sites 1, 2, 3, 5, 6, and 8 would remain in the HUD "unacceptable" category, Site 4 would move into the HUD "unacceptable" category, and Site 7 would remain in the HUD "normally unacceptable" category.

E. PROBABLE IMPACTS OF THE PROPOSED ACTION

The Proposed Action presents three areas of possible concern in terms of noise: (1) potential noise concerns due to changes in traffic and roadway alignment at the eight noise receptor locations along South Street and at adjacent noise sensitive receptor locations; (2) potential noise concerns due to changes in traffic and road configuration due to the new BMB Plaza; and (3) concerns with regard to noise levels in the new open space areas created as part of the Proposed Action.

With regard to the first concern—noise effects due to changes in traffic and roadway alignment at the eight noise receptor locations along South Street and at adjacent noise sensitive receptor locations—the changes in geometry (e.g., adding turning bays) would not significantly change vehicle speeds, or receptor/source distances, and the Proposed Action would only generate a very small number of vehicle trips. The change in roadway alignment would add at most 0.1-0.3 dBA to No Build noise levels. Traffic volumes would increase by less than 5 to 10 percent on any roadway. Based upon this level of increase in traffic volume, using proportional modeling as described above, the maximum increase in $L_{eq(1)}$ and L_{dn} noise levels would be 0.2 to 0.4 dBA. Therefore, the maximum increase in noise levels at the 8 receptor locations along South Street and at adjacent noise sensitive receptor locations would be 0.5 dBA. Changes of this magnitude would be imperceptible and insignificant.

With regard to the second concern—noise effects due to changes in traffic and road configuration due to the new BMB Plaza—this also would have an imperceptible and insignificant effect on noise levels. Noise levels at locations adjacent to the new Battery Park Underpass section would be lower, since a number of lanes of traffic would be within a tunnel section. Traffic volumes on the two streets most affected by changes in traffic due to this part of the Proposed Action would be Whitehall Street and Broad Street. On Whitehall Street, traffic volumes would decrease and consequently noise levels would decrease. On Broad Street, traffic volumes would increase by approximately 15 percent (and speeds and vehicle mixes would not change appreciably). Based upon this level of increase in traffic volume, using proportional modeling as described above, the maximum increase in $L_{eq(1)}$ and L_{dn} noise levels would be approximately 0.6 dBA. Increases of this magnitude would be imperceptible and insignificant.

In terms of CEQR noise criteria, noise levels at Sites 1, 2, 4, 6, 7, and 8 would remain in the "marginally unacceptable" category and noise levels at Sites 3 and 5 would remain in the "clearly unacceptable" category. In terms of the HUD noise criteria, Sites 1, 2, 3, 5, 6, and 8 would remain in the HUD "unacceptable" category, and Sites 4 and 7 would remain in the HUD "normally unacceptable" category.

With regard to the third concern—noise levels in the new open space areas created as part of the Proposed Action—noise levels within some of the new open space areas created as part of the Proposed Action would be above the 55 dBA L_{10} noise level for outdoor areas requiring serenity and quiet contained in the *CEQR Technical Manual* noise exposure guidelines (see Table 15-5). However, current esplanade users are currently exposed to noise levels above 55 dBA. One-hour L_{10} noise levels at open space area locations would range from the mid-70s to mid-80s dBA. Noise levels would be lower on piers because of attenuation due to distance from sources. Additionally, on Pier 42 the berm constructed by the East River Access Projects would provide further attenuation. These high predicted noise levels would result from the noise generated by traffic on South Street, the FDR Drive, and the Manhattan Bridge. Based on the HUD noise standards described above, the noise levels at some of the new open space areas would result in potentially significant adverse noise impacts on their users. Because of safety and aesthetic considerations, there are no practical and feasible mitigation measures that could be implemented to reduce noise levels to below the 55 dBA $L_{10(1)}$ guideline within the open space areas. While a wall made of either transparent Lucite or an opaque material could be constructed as a sound barrier, such a wall would block physical access to the waterfront, thereby defeating one of the Proposed Action's primary goals. An opaque wall would block visual access to the waterfront as well and would therefore have a detrimental effect on safety and urban design. A transparent barrier made of Lucite would be difficult to keep clean and would likely have graffiti scratched into it over time. This would greatly diminish the visual appeal of the open spaces that would be created or enhanced under the Proposed Action.

Although noise levels in some of the new areas would be above the 55 dBA $L_{10(1)}$ guideline noise level, they would be comparable to noise levels in a number of open space areas that are also located adjacent to heavily trafficked roadways, including the Hudson River Park, the East River Drive Park, Central Park, Riverside Park, and other urban open space areas. The 55 dBA $L_{10(1)}$ guideline is 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 (except for areas far away from traffic and other typical urban activities), this relatively low noise level is often not achieved. ✷