

Noise Analysis

Noise Impact Assessments

- Primary Issues
 - Shaft Sites
 - Blasting
 - Duration of construction
 - Proximity to receptors
 - Water Main Connections
 - Proximity to receptors
 - Duration of construction
- Methodology
- Significance Determination
- Mitigation Measures

Noise Impact Assessment Terminology

- Noise, in its simplest definition, is unwanted sound
- Noise levels are measured in decibels (dB)
- The "A-weighted sound level" or dBA is used for impact assessment purposes because it corresponds to the human perception of noise
- Noise surveys were performed at monitoring locations that are representative of sensitive uses in the vicinity of project noise sources
- Receptors are noise-sensitive locations where human activity may be adversely affected by project-related noise

Noise Impact Assessment Concepts

- Noise generated from a point source drops off at a rate of 6 dB with each doubling of distance
- Noise levels are reduced by structures that obstruct a direct line of sight between the noise source and a receptor
- Noise is added logarithmically

Noise Levels from Common Sources

Sound Source	Sound Pressure Level (dBA)
Air Raid Siren at 50 feet	120
Maximum Levels at Rock Concerts (Rear Seats)	110
On Platform by Passing Subway Train	100
On Sidewalk by Passing Heavy Truck or Bus	90
On Sidewalk by Typical Highway	80
On sidewalk by Passing Automobile with Mufflers	70
Typical Urban Area	60-70
Typical Suburban Area	50-60
Quiet Suburban Area at Night	40-50
Typical Rural Area at Night	30-40
Isolated Broadcast Studio	20
Audiometric (Hearing Testing) Booth	10
Threshold of Hearing	0
<p>Note: A change of 3 dBA is a just noticeable change in Sound Pressure Level (SPL). A change in 10 dBA is perceived as a doubling or halving in SPL.</p> <p>Source: <i>CEQR Technical Manual, Table 3R-1</i></p>	

Average Ability to Perceive Changes in Noise Levels

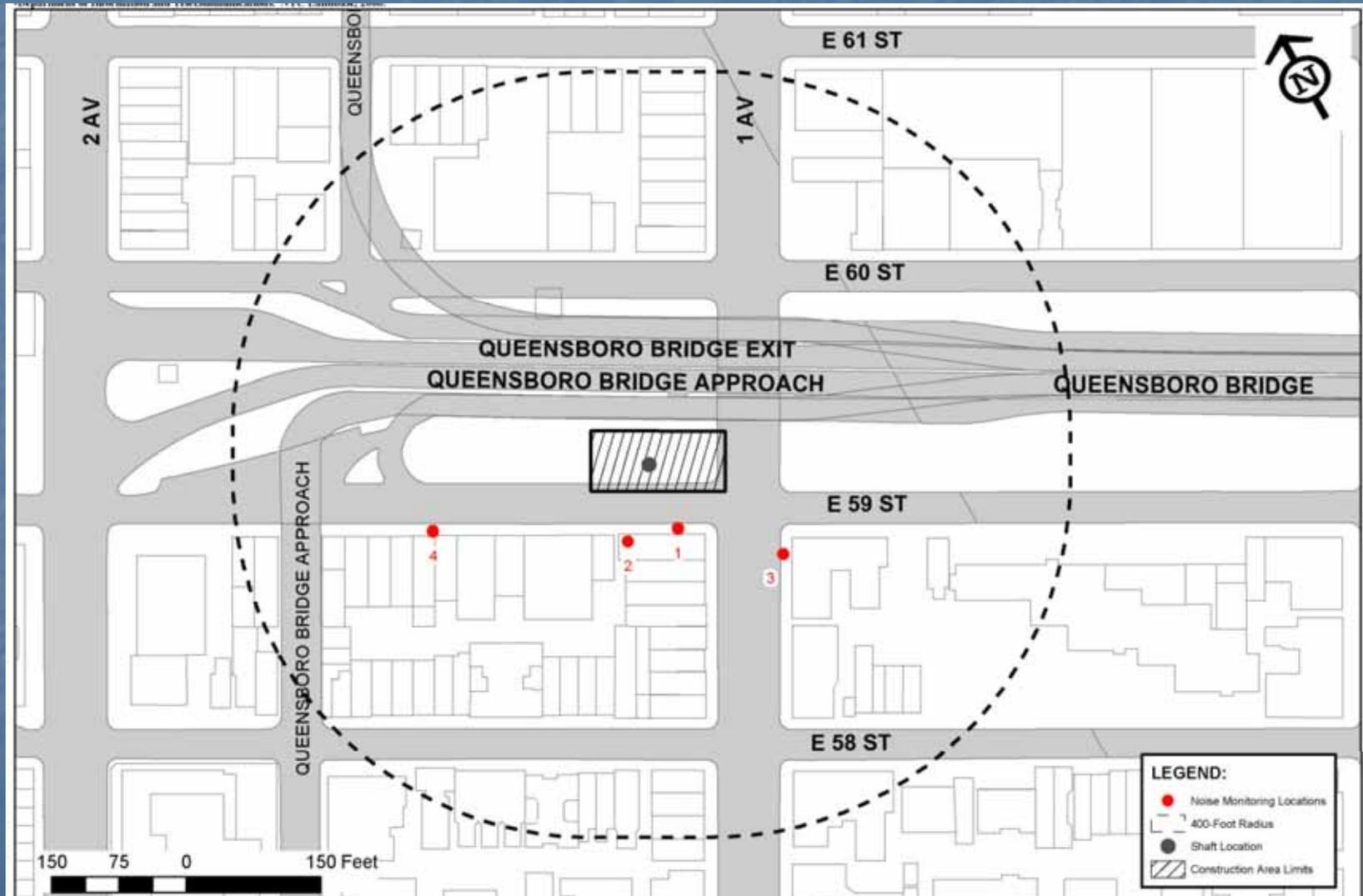
Change	Human Perception of Sound
2-3	Barely perceptible
5	Readily noticeable
10	A doubling or “halving” of the loudness of sound
20	A “dramatic change”
40	Difference between a faintly audible sound and a very loud sound

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

Noise Methodology

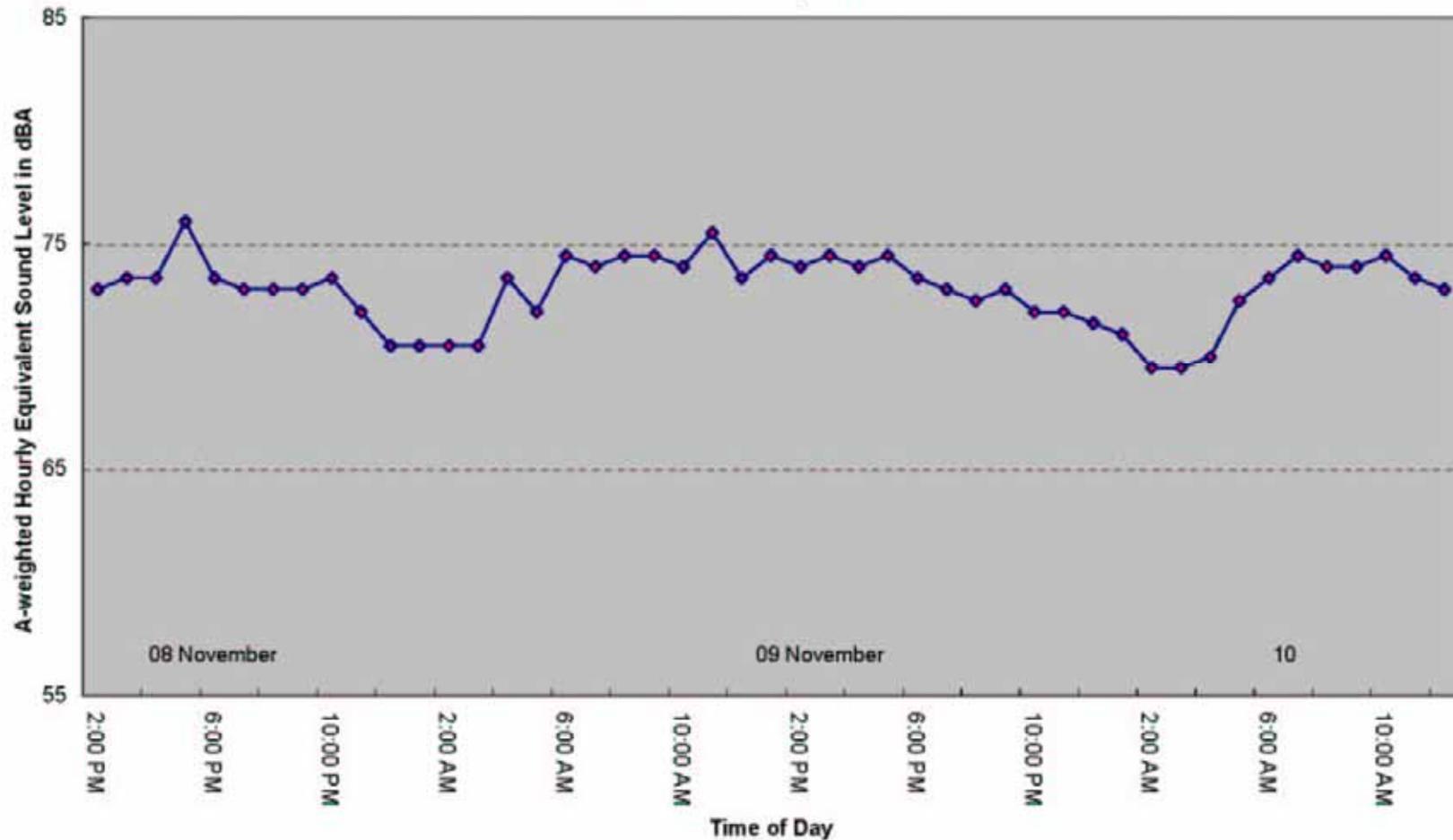
- Determine Baseline Conditions
 - Noise surveys around each site and along each water main route
 - Identification of sensitive uses
- Determine Construction Noise
 - Identification of receptors
 - Equipment types/sound levels
 - Site Layout/proximity to sensitive uses
 - Duration of usage
 - Peak activities vs. average conditions
 - Raise bore vs. surface excavation
 - Identify/account for measures to reduce noise
- Overlay Shaft Construction Effect on Baseline Conditions
 - CEQR Technical Manual Guidance
 - Time Periods Analyzed
- Mitigation

Noise Monitoring Locations Preferred Site



Ambient Noise Monitoring – Preferred Shaft Site

Location J1
Tree near southwest corner of East 59th Street and 1st Avenue
Hourly Equivalent Baseline Ambient Sound Levels
November 08 to 10, 2004



Equipment Usage, Preferred Shaft Site – Average Conditions

**NYC DEP Shaft 33B EIS
Noise Analysis Input Table
Site: 59th and 1st
Average Conditions**

Equip. Name	50 Foot Noise Level Leq (dBA)	Percentage of Time Used During Stage							
		Stage 1	Stage 2A	Stage 2B	Stage 2C	Stage 3	Stage 4A	Stage 4B	Stage 4C
Rock Drill (1/2)	90			15					
Rock Drill (1/2)	90			15					
Concrete Truck	85				15	25		25	
Concrete Truck	85						5		
Pneumatic hammer	83			5					
Jackhammer	83	5						10	
Rock Drill	83				25				
Backhoe	81	10						25	
Pile Drilling Rig	81	25							
Excavator	80	25		15		5	5		
FE Loader	79	30	10	10	5	5	10	10	10
Dump Truck at Idle	76	5					5	5	5
Flatbed Truck at Idle	76	5					5	5	5
Dump Truck at Idle	76		5	5					
Flatbed Truck at Idle	76		5	5	5	5			
Derrick Crane	75		5	5	20	25	10		
Telescoping Crane	82	20						10	
Compactor	73						5	10	
Welder	70	10	5	5	5	20	20	10	
Saw, electric	70	10	5	5	5	15	20	25	
Compressor, NYC	60	5		70	70	5	5	25	
Raise Bore Machine	54		80						
Concrete Pump	53				10	25			

Equipment Usage, Preferred Shaft Site – Peak Conditions

NYC DEP Shaft 33B EIS
 Noise Analysis Input Table
 Site: 59th and 1st
 Peak Conditions

Equip. Name	50 Foot Noise Level Leq (dBA)	Percentage of Time Used During Stage							
		Stage 1	Stage 2A	Stage 2B	Stage 2C	Stage 3	Stage 4A	Stage 4B	Stage 4C
Rock Drill (1/2)	90			75					
Rock Drill (1/2)	90			75					
Concrete Truck	85				75	75		75	
Concrete Truck	85								
Pneumatic hammer	83								
Jackhammer	83								
Rock Drill	83								
Backhoe	81							75	
Pile Drilling Rig	81	75							
Excavator	80	75							
FE Loader	79	75		75			75		75
Dump Truck at Idle	76						75		75
Flatbed Truck at Idle	76								
Dump Truck at Idle	76								
Flatbed Truck at Idle	76								
Derrick Crane	75				75	75			
Telescoping Crane	82								
Compactor	73								
Welder	70								
Saw, electric	70								
Compressor, NYC	60			75	75	75			
Raise Bore Machine	54		75						
Concrete Pump	53				75	75			

Measures To Reduce Noise – Shaft Sites

- 20-foot-high concrete wall (10-foot-high wall during Stage 4B) will be constructed around the perimeter of the Shaft Site, except for the 54th Street and Second Avenue Shaft Site which will have a 10-foot-high wall
- The wall will be covered with a sound absorptive fabric to reduce reflective noise
- Concrete trucks will be enclosed in an acoustical enclosure inside the concrete perimeter wall, providing 15 dBA attenuation
- DEP will require the contractor to
 - Implement noise monitoring program
 - Use a high quality muffler on the crane engine
 - Use newer equipment (2003 or later)
 - Minimize idling on site

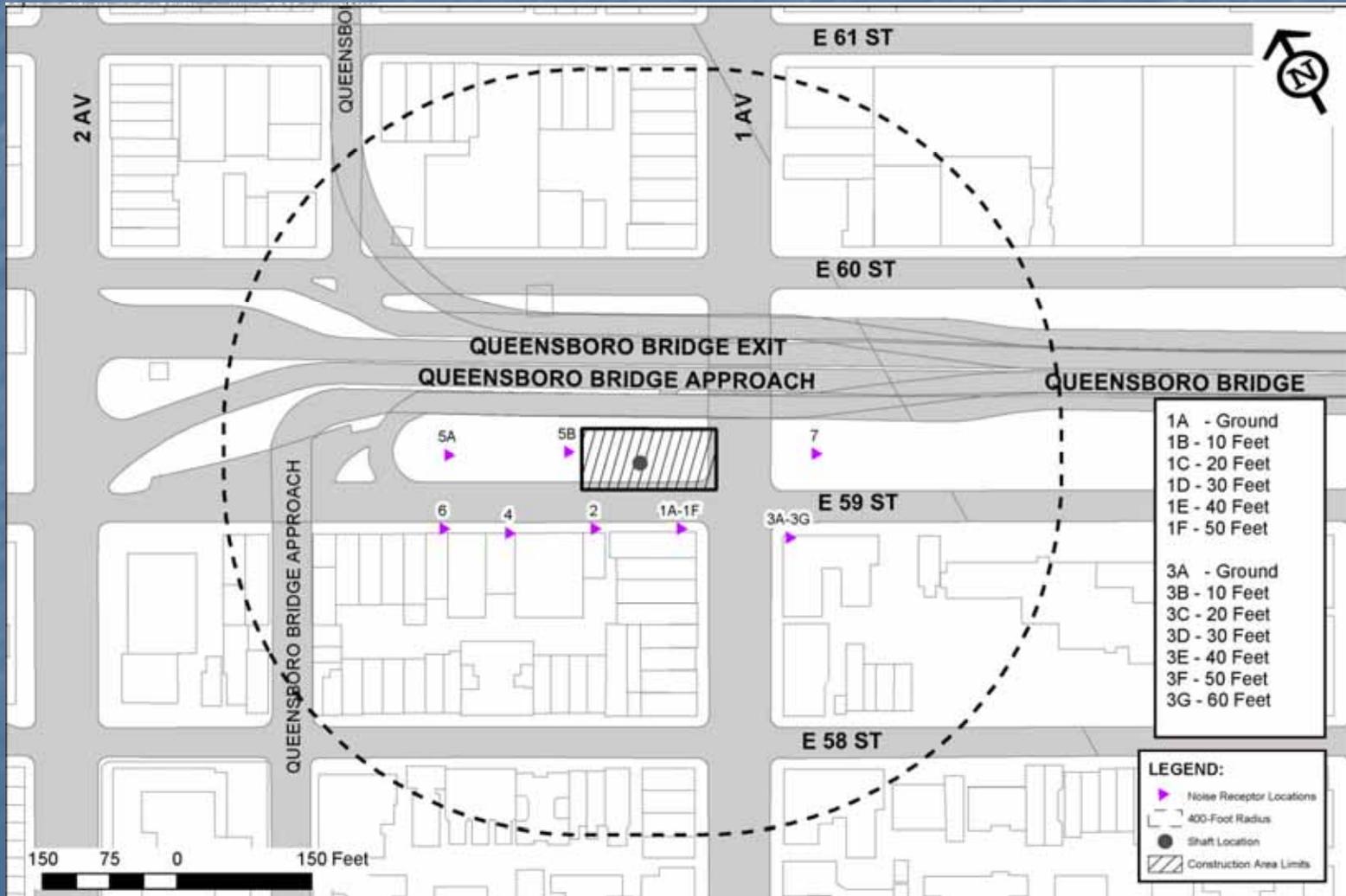
Blasting Noise

- Blasting would result in high instantaneous noise levels
- Blasting would occur for eight months at the Preferred Site
 - Noise associated with blasting would diminish over time as work moves down the shaft
- Noise associated with blasting is dependent on the:
 - Amount of explosive used
 - Distance between the blast site and the receptor
 - Depth of the blast site
 - Protective measures implemented

Measures to Minimize Blasting Effects

- NYCDEP will implement protective measures and a noise and vibration control plan to minimize potential noise impacts from blasting:
 - Blasting/vibration expert
 - Neighborhood notification program
 - Noise monitoring
 - Initial small explosive charges to refine blasting procedures
 - Use of timed multiple charges and blast mats

Noise Receptor Locations Preferred Site



Sample Summary Impact Table Preferred Shaft Site

Stage 2B Construction				
		Shift 1		
Receptor	Baseline	Construction	Combined	Increase
1A	73	64	74	0.5
1B	72	65.5	73	0.9
1C	71	67.6	73	1.6
1D	70	72.1	74	4.2
1E	69	72.9	74	5.4
1F	67	72.6	74	6.7
2	73	62.5	73	0.4
3A	73	60	73	0.2
3B	72	61.1	72	0.3
3C	71	62.8	72	0.6
3D	70	64.9	71	1.2
3E	69	67.6	71	2.4
3F	67	67.5	70	3.3
3G	66	72.8	74	7.6
4	73	60	73	0.2
5A	71	59.5	71	0.3
5B	71	63.7	72	0.7
6	71	57.6	71	0.2
7	73	61.9	73	0.3

Potentially Significant Adverse Noise Impacts – Shaft Sites

- Preferred Site - two buildings
- E. 59th Street and Second Ave - three buildings
- E. 61st Street - receptors between Shaft and First Ave
- E. 54th Street and Second Avenue - between First Ave and midblock to Third Ave and along Second Ave between E. 53rd and E. 55th Streets

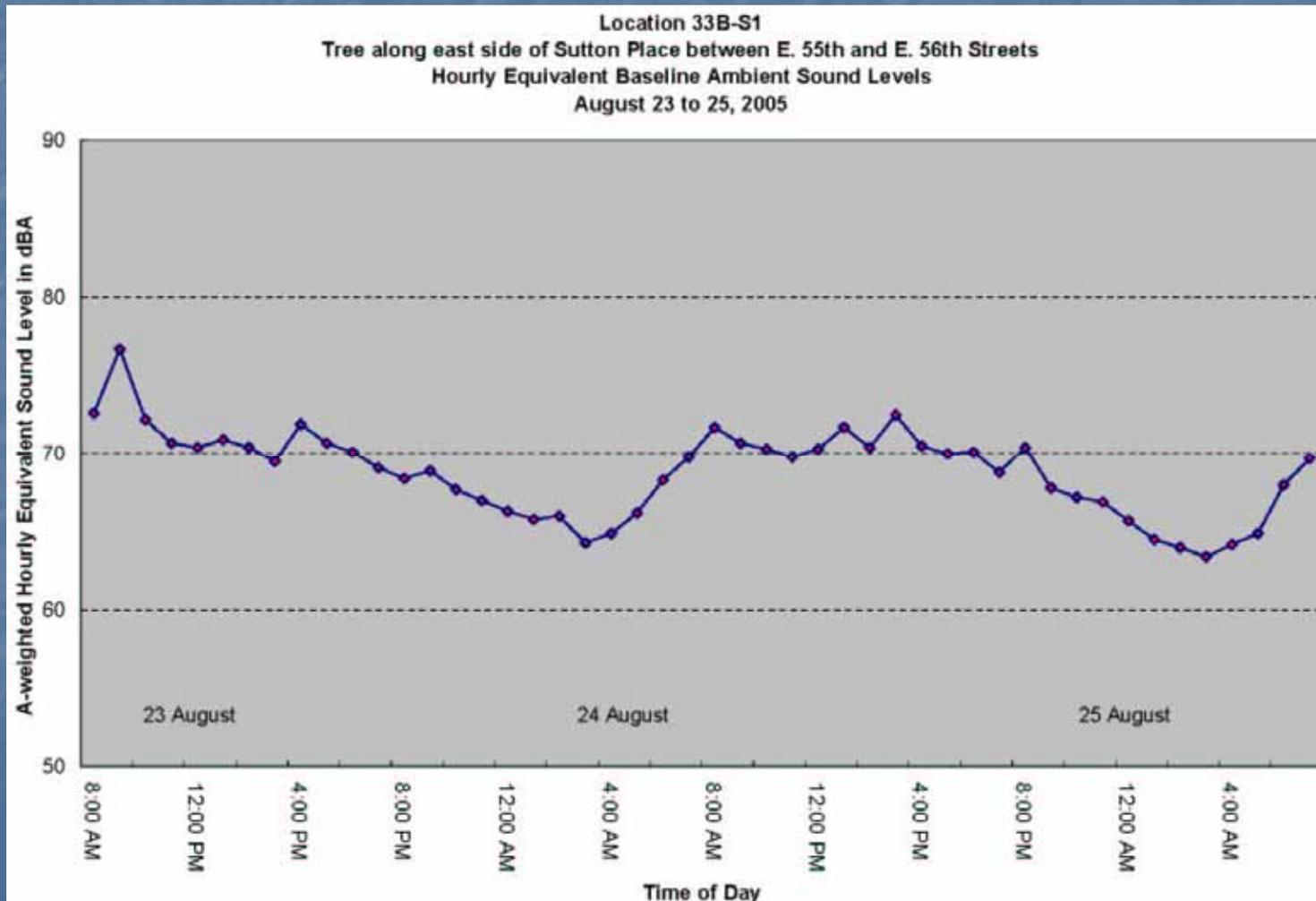
Comparison of Noise Issues for Shaft Sites

Range of Significant Impacts	Shaft Site			
	Preferred	E. 59 th St/ Second Ave	E. 61 st St	E. 54 th St/ Second Ave
Average Conditions	Shift 1: 3.2 -9.2 dBA Shift 2: 3.4 -8.0 dBA	Shift 1: 3.9-6.2 dBA Shift 2: 4.0-7.0 dBA	Shift 1: 3.3- 17.1 dBA Shift 2: 3.1- 19.1 dBA	Shift 1: 3.0-15.0 dBA Shift 2: 3.0- 19.0 dBA
Peak Conditions	Shift 1: 3.0-11.6 dBA Shift 2: 3.0-10.7 dBA	Shift 1: 3.2-7.6 dBA Shift 2: 3.1-9.3 dBA	Shift 1: 3.1 -20.0 dBA Shift 2: 3.3 - 22.0 dBA	Shift 1: 3.0 -20.5 dBA Shift 2: 3.1-24.5 dBA
Geographical Extent of Impacts to Sensitive Receptors	2 apartment buildings affected	3 apartment buildings affected	Certain receptors between the Shaft Site and First Avenue	Certain receptors along E. 54th St between First Ave. and midblock to Third Ave.; along Second Ave. between E. 53rd and E. 55th Sts.

Noise Survey Locations - Water Main Connections



Ambient Noise Monitoring Water Main Route



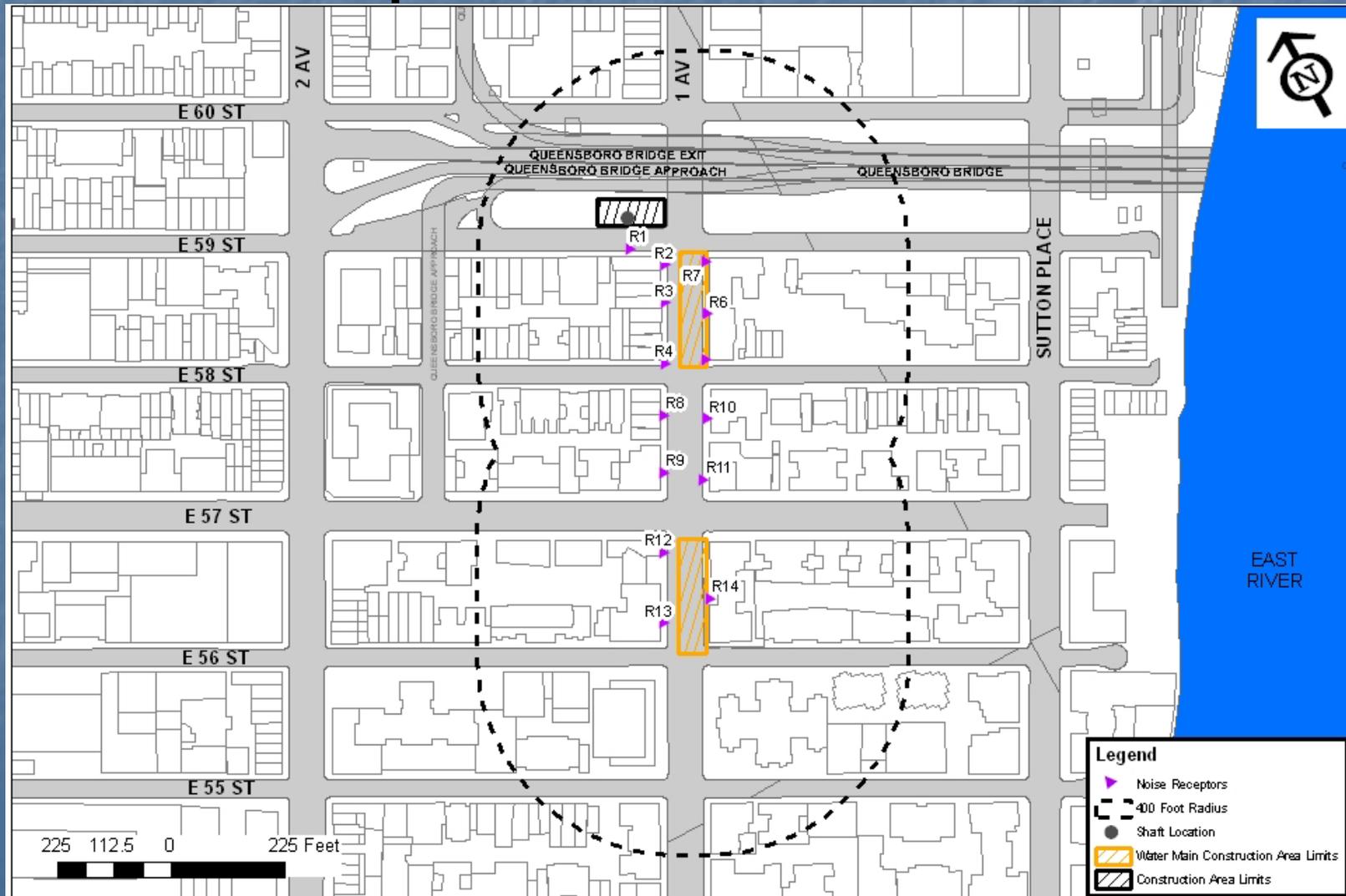
Equipment Input Summary

Water Main Construction

**NYC DEP Shaft 33B EIS
Noise Analysis Input Table
Watermain Construction - Block (w/o venturi)
Average Conditions**

<u>Equip. Name</u>	<u>Equip. ID</u>	<u>50 Foot Noise Level Leq (dBA)</u>	<u>Percentage of Time Used During Stage</u>			
			<u>Stage 1</u>	<u>Stage 2</u>	<u>Stage 3</u>	<u>Stage 4</u>
Pavement Cutter	PC	93	15			
Jackhammer	JH	83	15	15		
Compressor, NYC	C	60	25	25		
Paver	PAV	84				50
Excavator	Ex	80	50	50	50	50
Dump Truck at Idle	DT	76	5		5	5
Flatbed Truck at Idle	FT	76	5		5	
Concrete Truck	CT	85		25		
Payloader	PL	79				25
Soil Compactor	SC	73				50
Telescoping Crane	TC	82			25	
Welder	Weld	70			25	
Saw, gas	SG	72	25	25		

First Avenue Route Noise Receptor Locations



First Avenue Route – Cross Street Noise Receptor Locations



Sample Summary Impact Table

Water Main Connections

Shift 1				
Receptor	Baseline	Construction	Combined	Increase
1	73	61.1	73	0.3
2	73	79.9	81	7.7
3	73	82.5	83	10.0
4	73	80	81	7.8
5	73	83.7	84	11.1
6	73	90.4	90	17.5
7	73	85	85	12.3
8	73	75	77	4.1
9	73	74.3	77	3.7
10	73	75.5	77	4.4
11	73	74.6	77	3.9
12	73	80.9	82	8.6
13	73	82.1	83	9.6
14	73	89.2	89	16.3

Temporary Adverse Noise Impacts Water Main Connection Routes

- Noise impacts along a construction segment would be similar for all three routes
- Noise impacts would range from marginally perceptible to, at times, highly intrusive
- Shorter connection routes would impact a smaller geographic area
 - The E. 59th Street/E. 61st Street Route
 - E. 54th Street and Second Avenue Shaft Site
- Impacts would occur for up to 34 weeks at any location as construction progresses along the route

Comparison of Noise Issues Water Main Routes

Range of Adverse Impacts	Water Main Connection Route		
	First Avenue	Sutton Place Route	E. 59 th St./ E. 61 st St
Average Conditions	4.0 – 26.4 dBA	6.0 – 26.4 dBA	4.2 – 23.4 dBA
Peak Conditions	3.0 – 35.7 dBA	3.9 – 35.7 dBA	3.1 – 32.7 dBA

Measures to Attenuate Noise, Water Main Connections

- NYCDEP will work with NYCDDC to identify measures to minimize potential noise impacts
- The measures could include:
 - Use of newer equipment; mufflers and silencers; and housings or enclosures around noise-producing equipment
 - Prohibition of the use of air- or gasoline-driven saws and similar equipment
 - Implementation of a noise monitoring program

Questions

END