

III - IDENTIFICATION OF RISKS

C. CONSTRUCTION NOISE AND DUST CONTROL

New York, March 2009

Ronald Eligator

ACOUSTIC DIMENSIONS

Scope

- Noise control
 - Code requirements
 - Noise sources
 - Compliance thresholds
 - Construction hours
 - Mitigation options
- Dust control
 - Code requirements
 - Hazardous materials



Construction Noise Control

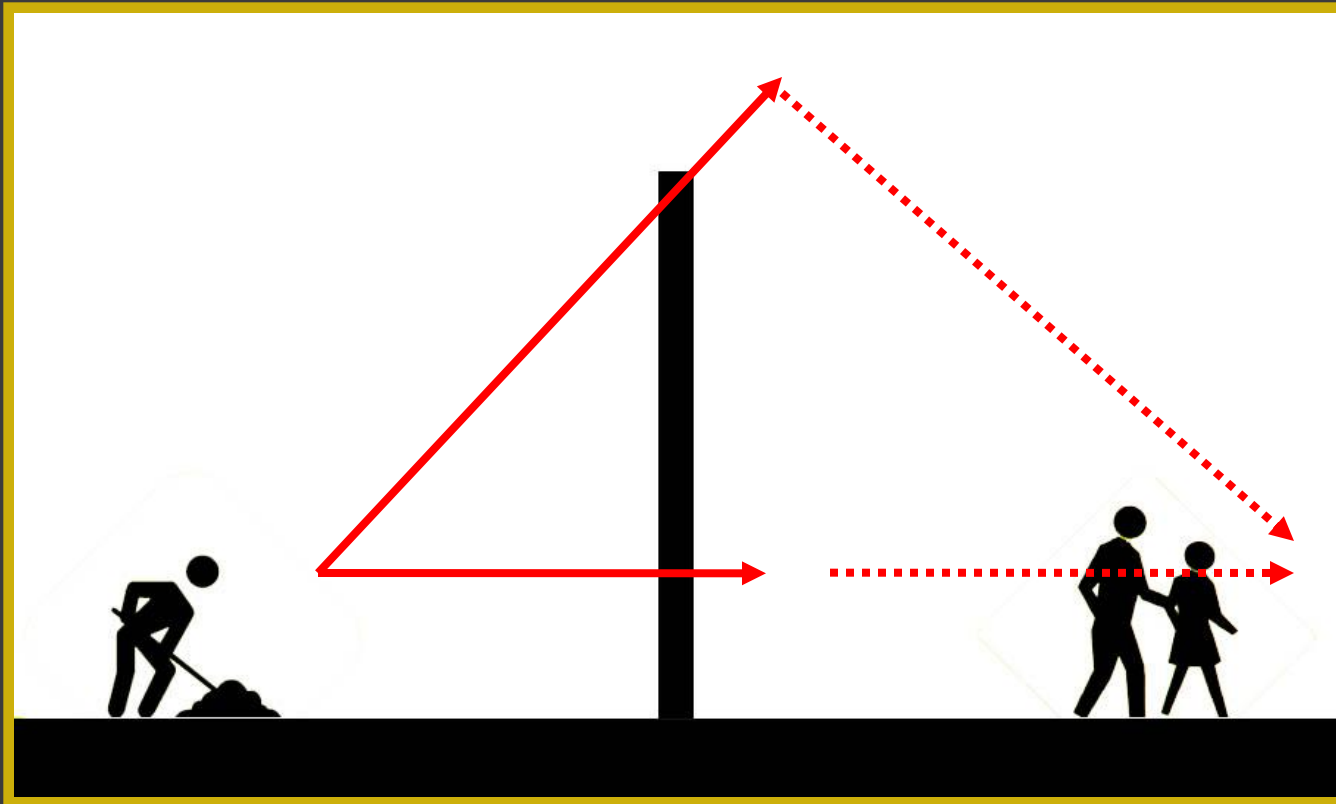
- **Risks of Construction Site Noise**
 - Hearing damage
 - Annoyance
 - Property damage
 - Fines and construction delays

Types of Sound

- Non-impulsive (aka steady state)
 - Peaks last longer than 2 seconds
 - Continuous or near-continuous
 - Examples: auger drill rig; concrete saw; dozer; truck; generator; compressor; pneumatic tools; fan
- Impulsive
 - Peaks last 2 seconds or less
 - Abrupt onset; rapid decay
 - Examples: blasting; impact pile driver; jackhammer; chipping hammer

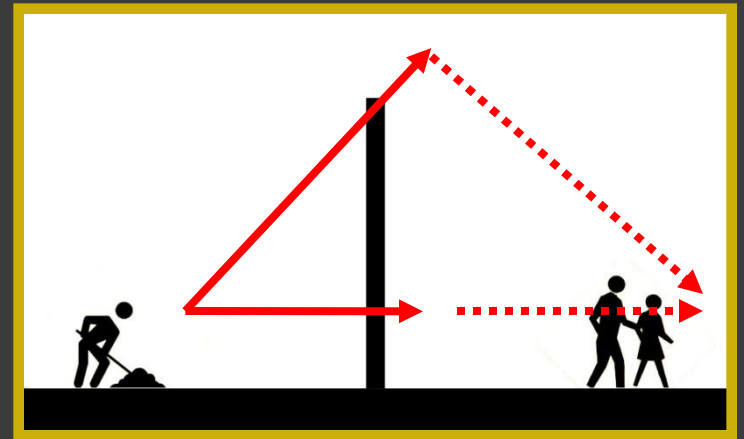
Noise Control - General

- Source – Path – Receiver



Noise Control - General

- For Receivers on a construction site, the owner and contractor have control of all three components (S/P/R)
- For Receivers off a construction site (e.g. neighbors), the owner and contractor have control of Source and Path (partial) only.



Construction Noise Control

- Mandated by local codes:
 - NYC Noise Control Code: Local Law 113, subchapters 4 and 5
 - Title 24, Sections 202 through 232 (12/29/2005)
 - NYC Construction Noise Mitigation Rules:
 - Title 15, Chapter 28 (1/18/2007)
- Enforced by NYC Department of Environmental Protection

NYC Construction Noise Control

- Requirements
 - Keep noise below allowable decibel levels
 - Develop noise mitigation plan before starting construction
 - DEP commissioner to approve mitigation plan
 - Additional measures for sensitive receptors
 - Hospitals
 - Schools

- Construction permit holder is accountable
 - Workers must be aware of the plan

- Exceptions
 - Emergency work
 - Existing 1 or 2 family, owner-occupied dwelling (J-3)
 - Convents & rectories
 - Others (limited)

Construction Equipment Noise

- NYC Code (§28-109)
 - References the Federal Highway Administration Roadway Construction Noise Model User's Guide, Jan. 2006
 - Lists maximum noise levels permitted from over 50 types of construction equipment

2 EXAMPLES:

Label ID	Equipment Description	Impact Device?	Usage Factor (%)	Lmax @ 50 ft	Actual Measured @ 50 ft.
J	Air Compressor	No	40	80	78
AE	Jack Hammer	Yes	20	85	89

Sources of Construction Noise

- Air compressors
- Pile drivers
- Sledgehammers
- Bulldozers
- Pneumatic hammers & other tools
- Steam shovels
- Derricks
- Cranes
- Steam or electric hoists
- Off-road construction vehicles (not trucks)
- Pumps
- Blasting
- Power tools
- Tunneling machines
- Construction devices with internal combustion engines
- Construction devices that emit impulsive sound
- Construction devices that create vibration
- Metal plates used in street construction to temporarily cover excavations
- ...others too

Measuring Construction Noise

- NYC Code §24-217
- Use Precision sound level meter with real-time analyzer
- Set to Lmax, slow response
- Measurements may be made at any point on the receiving property. Property line sound levels closest to the construction site are generally noisiest locations.



Examples of Allowable Decibel Levels

Noise Source	Sound dB(A)	Measurement Location	Impulsive Sound dB(A)	Measurement Location
Circulation device*	45	3 feet inside a fully-open window	-	-
Air compressor	75	1 meter from compressor	-	-
Paving breakers	95	1 meter from paving breaker	-	-
Construction, Exhaust, Other devices	85	50 ft from source at public right-of-way	15 increase	50 ft from source at public right-of-way
Containers, Construction mat'l	10 increase	15 ft from source at public right-of-way	15 increase	15 ft from source at public right-of-way

*Any device that circulates gas or fluid (AC, pumps, blowers, fans, etc.)

Construction Noise Mitigation

- Noise mitigation plans required for all construction sites
 - Self-certified
 - Exceptions: plans not required for
 - Existing 1 or 2 family, owner-occupied dwelling (J-3)
 - Convents & rectories
- Must address a large variety of construction equipment
- Techniques include:
 - Acoustical blanket insulation (source control)
 - Exhaust mufflers (source control)
 - Acoustical fences, fixed barriers or enclosures (path control)
 - Portable barriers (path control)

Construction Noise Mitigation

- Construction work limited to weekdays 7 am to 6 pm
 - Exceptions: work permitted weekends 10 am to 4 pm for:
 - Existing 1 or 2 family, owner-occupied dwelling (J-3)
 - Convents & rectories
 - NOTE: either one must be at least 300 ft from a house of worship
 - After hours work permits required:
 - Weekends and weekdays 6 pm to 7 am
 - Available for limited circumstances
 - Emergency work
 - Public safety
 - City project
 - Minimal noise impact < 8dB(A)
 - Undue hardship

NYC Noise Mitigation

- NYC Admin Code §28-101
- All construction sites require self-certified noise mitigation plans:
 - Tools and equipment maintained to operate normally and equipped with appropriate noise reduction devices
 - Keep engine enclosures closed; cover portable equipment with noise-insulating fabric
 - Vehicle idling restrictions per NYC Admin Code §24-163
 - Outfit vehicles with quieter back-up alarms
 - Follow rules regarding noise barrier construction fences
 - Create and follow noise mitigation training program
 - Cooperate with nearby schools, places of worship, hospitals, etc: schedule noisy activity off-hours.
 - Limit work hours to 7 AM to 6 PM

NYC Noise Mitigation

- NYC Admin Code §28-102
- Defines equipment requiring special noise control:
 - Impact Equipment: Pile Drivers, Jack Hammers, Hoe Rams, Blasting
 - Earth Moving Devices: Vacuum Extractors
 - Construction Trucks: Dump Trucks
 - Stationary Devices: Cranes, Auger Drills, Street Plates, Backup Alarms
 - Manual Devices: Concrete Saws

NYC Noise Mitigation

- NYC Admin Code §28-102 (continued)
- For each device requiring additional noise mitigation:
 - General Rules of Operation
 - Source Controls: Quieter Models and Mufflers
 - Path Controls: Barriers and Enclosures

NYC Noise Mitigation

- NYC Admin Code §28-102 (continued)
- Example: Dump Trucks
 - Use smallest size for job
 - Thick Rubber Bed Liner
 - Consider quieter European models
 - Position truck to minimize impact on nearby receptors
 - Provide effective muffler
 - Don't slam tail gate
 - Keep engine housing closed
 - Use a noise barrier between work site and receptors

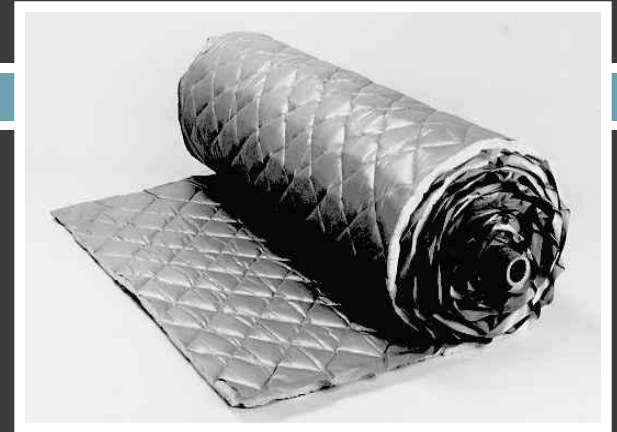
Noise Mitigation Methods

- Source Control
 - Select quieter sources
 - Electric equipment vs. pneumatic
 - Insulated and/or enclosed motors
 - Equipment retrofit and maintenance
 - Rubber chucks in jackhammers and chippers
 - Mufflers, silencers
 - Sharpen, balance tools
 - Repair silencing equipment
 - Replace worn parts & open airways



Noise Mitigation Methods

- Path Control
 - Barriers, Fences
 - Portable or fixed
 - Sound absorptive finishes (e.g. acoustical insulation) on barriers can improve performance
 - Must block line –of-site between source and receiver at a minimum .
 - Placing as close to source as possible generally most effective.
 - Active noise cancellation devices
 - Noise source location
 - Move away from reflective surfaces – up to 3 dB less
 - Move away from corners – up to 6 dB less



Noise Mitigation Methods

- Receiver Control – construction site
 - Relocate workers during noisy activities to limit exposures
 - Hearing protection for exposed workers
 - Hearing protection plan required by OSHA when noise exposure exceed 80 dBA.



Construction Dust Control

- **Risks of Construction Site Dust**
 - Damage to respiratory system
 - Cleaning costs
 - Water and air pollution
 - Property damage
 - Fines and construction delays

Construction Dust Control

- NYC Building Code, Title 27, Subchapter 19
 - Article 2, §27-1018
 - (a) All areas used by the public shall be maintained free from...debris, equipment...that may constitute a slipping, tripping, or other hazard.
 - Article 6, §27-1039
 - (f) Dust producing operations shall be wetted down to the extend necessary to lay the dust.
 - Article 7, §27-1041
 - Where alterations are conducted in occupied buildings, barricades, signs, drop cloths, etc., shall be erected as required to provide reasonable protection for the occupants against hazard and nuisance.

Construction Dust Control

- Common hazardous materials in NYC
 - Asbestos – NYC Asbestos Control Program
 - Lead
- Permissible exposure levels (PEL)
 - Defined by OSHA, EPA
- Dust control equipment
 - Respirators
 - Drop cloths
 - Spraying water



OSHA Asbestos Requirements

- OSHA Hazard Communication Standards 29 CFR
 - Subpart Z – Toxic and Hazardous Substances
- PELs
 - Average: 0.1 fiber / cm³ air / 8 hours
 - Excursion limit: 1 fiber / cm³ air / 30 min
- Respirators and protective clothing
 - Respirators comply with 29 CFR 1910.134
 - Full face piece
 - Coveralls or whole-body clothing



OSHA Asbestos Requirements

- Critical barriers required to isolate area
- Prohibited activities while exposed
 - Drinking
 - Smoking
 - Chewing gum or tobacco
 - Applying cosmetics
 - Using high-speed abrasive disc saws w/o point-of-cut ventilator
 - Compressed air to removed asbestos
 - Dry sweeping, shoveling, or dry clean-up of asbestos
- Ventilation while producing asbestos dust
 - Move contaminated air away
 - HEPA filter air in collection device
 - 4 air changes / hour

Construction Dust Control



Construction Dust Control



III - IDENTIFICATION OF RISKS

C. CONSTRUCTION NOISE AND DUST CONTROL

New York, March 2009

Ronald Eligator

ACOUSTIC DIMENSIONS