NOISE STUDY

The Parks in LA Project

City of Los Angeles
Wilshire Community Plan Area

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1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of this study is to describe and evaluate the noise and groundborne vibration impacts of The Parks in L.A (project), proposed by CORBeL Architects, in the context of the City of Los Angeles (City) regulatory framework.

1.2 Project Summary

The proposed project would develop a 1.45-acre infill site (site) comprised of seven parcels, with addresses including 3433 West 8th Street, which will remain the address of the project, as shown in **Figure 1-1, Regional Location Map**. The proposed project consists of the construction and operation of a new 8-story, 88.5-ft high, 293,820 square foot (sq. ft.), 251-unit mixed-use development with 11% affordable housing units set aside for very low incomes.

Land uses adjacent to the project site consist of existing residences to the north, residential and commercial uses to the east, commercial uses to the south of W. 8th Street, and commercial uses to the west. Construction of the project would require demolition of existing commercial buildings, surface parking lots, and a separate one-story residence. Grading of the project site would require the excavation and export of approximately 58,300 cubic yards of soil for the proposed subterranean parking.

2.0 NOISE AND VIBRATION FUNDAMENTALS

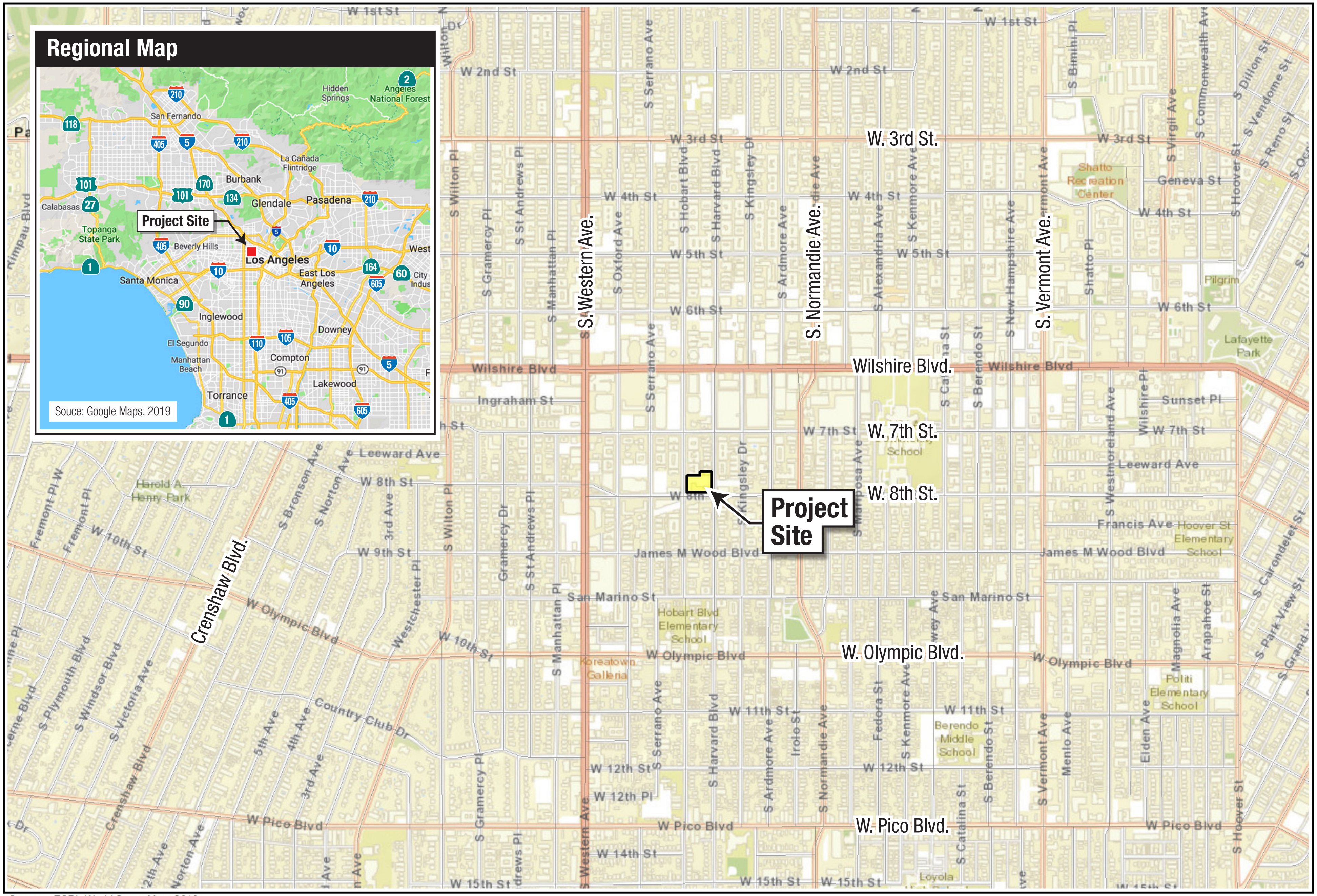
The following introduces the fundamental definitions and concepts used to qualify and quantify noise and vibration impacts used throughout this study.

2.1 Noise Characteristics

In a basic sense, noise is unwanted sound as perceived by a receptor. Sound is energy transmitted in waves through a compressible medium such as air. There are a variety of parameters that describe the rates of oscillation of sound waves, the distance between successive troughs or crests, the speed of propagation, and the pressure level, or energy content, of a given sound wave. Sound pressure level is the most common descriptor used to describe the perceived "loudness" of an ambient sound level. The standard measurement unit of sound pressure is called a decibel (dB).

Given that sound pressure levels can vary in intensity by over one million times within the range of human hearing, a logarithmic scale similar to the Richter Scale used to measure seismicity is used to keep sound intensity numbers convenient and manageable. The ear is not equally sensitive to all sound frequencies within the entire spectrum, so sound pressure levels at maximum human sensitivity are factored more heavily into sound descriptions in a process called "A-weighting", written as dBA. Subsequent references to decibels in this discussion written as "dB" should be understood as A-weighted.

Variations in noise exposure over time are expressed in terms of a steady-state energy level equivalent to the energy content of the time period, called Leq. Because human receptors are more sensitive to unwanted noise intrusion during the evening and at night hours, California statute requires, for planning purposes, an artificial dB increment be added to quiet time noise levels in a 24-hour noise descriptor called the Community Noise Equivalent Level (CNEL) which adds a penalty of 5 dB added for the evening hours of 7:00 p.m. to 10:00 p.m., and a penalty of 10 dB for the nighttime hours of 10:00 p.m. to 07:00 a.m.



Sources: ESRI, World Street Map, 2016.

THE PARKS IN L.A. - NOISE STUDY

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Regional Location Map

0 750 1,500 Feet

FIGURE 1-1

2.2 Vibration Characteristics

As described in the California Department of Transportation (CalTrans) Transportation and Construction Vibration Guidance Manual, the operation of construction equipment generates ground-borne vibration. Maintenance operations and traffic traveling on roadways can also be a source of such vibration. If its amplitudes are high enough, ground vibration has the potential to damage structures, cause cosmetic damage (e.g., crack plaster), or disrupt the operation of vibration-sensitive equipment such as electron microscopes. Ground vibration and ground-borne noise can also be a source of annoyance to individuals who live or work close to vibration-generating activities. Pile driving, demolition activity, blasting, and crack-and-seat operations are the primary sources of vibration addressed by Caltrans.

Traffic, including heavy trucks traveling on a highway, rarely generates vibration amplitudes high enough to cause structural or cosmetic damage. However, heavy trucks traveling over potholes or other discontinuities in the pavement may cause vibration levels high enough to result in complaints from nearby residents. These types of issues typically can be resolved by smoothing the roadway surface. In describing vibration in the ground and in structures, the motion of a particle (i.e., a point in or on the ground or structure) is used. The concepts of particle displacement, velocity, and acceleration are used to describe how the ground or structure responds to excitation. Displacement is rarely used to describe ground and structure borne vibration because most transducers used to measure vibration directly measure velocity or acceleration, not displacement. Accordingly, vibratory motion is commonly described by identifying the peak particle velocity (PPV) or peak particle acceleration (PPA). PPV is generally accepted as the most appropriate descriptor for evaluating the potential for building damage.

3.0 REGULATORY SETTING

Los Angeles General Plan

The Noise Element of the City General Plan applies to the City as a whole. This element addresses noise mitigation regulations, strategies and programs, and delineates federal, state and City jurisdiction relative to rail, automotive, aircraft, and nuisance noise. The noise and land use compatibility guidelines from Exhibit I of the Noise Element are provided in **Table 3-1, Land Use Compatibility Guidelines**. As noted in the Noise Element, this element references the City's noise standards contained in Los Angeles Municipal Code (LAMC) Section 111 et seq.

As shown below in Table 3-1, for commercial uses an exterior sound level of up to 65 dB CNEL is normally acceptable for land use compatibility, and up to 70 dB CNEL is conditionally acceptable for new construction after a detailed analysis of noise mitigation is made and needed noise insulation features are included in the project design. Conventional construction with closed windows and fresh air supply systems or air conditioning normally will suffice as adequate insulation features for land use compatibility of residences within a noise environment of 65 dB CNEL. Noise levels above 75 dB CNEL are considered normally unacceptable for commercial uses, where new construction is discouraged and requires a detailed analysis of noise reduction requirements and noise insulation features in project design.

Table 3-1
Land Use Compatibility Guidelines

Land Use Category	Day-Night Average Exterior Sound Level (CNEL dB) 50	55	60	65	70	75	80
Residential Single Family, Duplex, Mobile Home	A	C	C	C	N	U	U
Residential Multi-Family	A	A	C	C	N	U	U
Transient Lodging, Motel, Hotel	A	A	C	C	N	U	U
School, Library, Church, Hospital, Nursing Home	A	A	C	C	N	N	U
Auditorium, Concert Hall, Ampitheater	C	C	C	C/N	U	U	U
Sports Arena, Outdoor Spectator Sports	C	C	C	C	C/U	U	U
Playground, Neighborhood Park	A	A	A	A/N	N	N/U	U
Golf Course, Riding Stable, Water Recreation, Cemetery	A	A	A	A	N	A/N	U
Office Building, Business, Commercial, Professional	A	A	A	A/C	C	C/N	N
Agriculture, Industrial, Manufacturing, Utilities	A	A	A	A	A/C	C/N	N

A = Normally acceptable. Specified land use is satisfactory, based upon assumption buildings involved are conventional construction, without any special noise insulation.

C = Conditionally acceptable. New construction or development only after a detailed analysis of noise mitigation is made and needed noise insulation features are included in project design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning normally will suffice.

N = Normally unacceptable. New construction or development generally should be discouraged. A detailed analysis of noise reduction requirements must be made and noise insulation features included in the design of a project.

U = Clearly unacceptable. New construction or development generally should not be undertaken.

California Building Code

Title 24 of the California Code of Regulations for multiple family dwellings, hotel and motel rooms, requires an interior CNEL of 45 dBA. In 1988, the State Building Standards Commission expanded that standard to include all habitable rooms in residential use, including single-family dwelling units. Since typical noise attenuation within older, existing residential structures with closed windows is at least 20 dBA, an exterior noise exposure of 65 dBA CNEL is generally the noise land-use compatibility guideline for residential dwellings in California. However, newer construction practices with standard features such as mandatory double paned windows typically offer about 30 dB of noise attenuation, which would provide sufficient noise reduction to meet the residential interior noise requirement of 45 dBA CNEL for projects with an exterior noise exposure of up to 75 dBA. Projects that would require windows and doors to remain closed to achieve an acceptable interior noise level will typically necessitate the use of air conditioning and mechanical ventilation. The exterior noise exposure standard for less sensitive land uses such as commercial or industrial is less stringent because commercial uses are not occupied on a 24-hour basis.

Therefore, interior residential noise exposure may not exceed 45 dBA CNEL with windows and doors closed. Requiring that windows and doors remain closed to achieve an acceptable interior noise level will typically necessitate the use of air conditioning and mechanical ventilation. For commercial uses, an indoor noise level of 50 dB CNEL is appropriate.

Noise Ordinance

The City's noise standards for non-transportation sources are articulated in Chapter XI, Noise Regulation, of the LAMC, which contains the City's Noise Ordinances. This Chapter of the LAMC restricts the level of noise that one type of land use or activity may broadcast across the property line of an adjacent land use. Noise ordinance standards are stated with respect to ambient levels found without the contribution of an identified noise source, such as a piece of construction equipment.

Section 111.03 of the LAMC establishes presumed ambient noise levels as a function of zoning and times of day provided in **Table 3-2, Presumed Ambient Noise Levels in the City Noise Ordinance**. As noted in LAMC Section 111.03, in the absence of site-specific ambient noise measurements, these presumed ambient noise levels may be used as a baseline for the evaluation of noise increases.

Table 3-2
Presumed Ambient Noise Levels in the City Noise Ordinance

Zone	Presumed Ambient Noise Level dB(A)	
	DAY [1]	NIGHT [2]
A1, A2, RA, RE, RS, RD, RW1, RW2, R1, R2, R3, R4, & R5	50	40
P, **PB**, CR, C1, C1.5, **C2**, C4, C5, and CM	60	55
M1, MR1, and MR2	60	55
M2 and M3	65	65

Source: Los Angeles Municipal Code, Section 111.03.
[1] Daytime levels apply from 7:00 a.m. to 10:00 p.m.
[2] Nighttime levels apply from 10:00 p.m. to 7:00 a.m.

As shown in Table 3-2, the presumed ambient daytime noise level for the project site, which is zoned PB-1 and C2-1 is 60 dB(A) and the nighttime noise level is 55 dB(A). Some deviation from these noise levels is allowed during the daytime for short-term (less than 15 minute) noise generation. The LAMC provides the following regulatory requirements related to noise generation in the City.

Operational Noise

- LAMC Section 111.03 establishes presumed ambient noise levels as a function of zoning and times of day to be used as a baseline for evaluating noise increases. The site is zoned Parking Building (PB-1) and C2-1 (Commercial), which the LAMC indicates would have a presumed ambient noise level of 60 dBA in daytime hours (7:00 a.m. to 10:00 p.m.) and 55 dBA in nighttime hours (10:00 p.m. to 7:00 a.m.).
- LAMC Section 112.02 prohibits any heating, ventilation, and air conditioning (HVAC) systems within any zone of the City from causing an increase in ambient noise levels on any other occupied property or if a condominium, apartment house, duplex, or attached business, within any adjoining unit, to exceed the ambient noise level by more than 5 dBA.

- LAMC Section 112.04 prohibits the operation of any lawn mower, backpack blower, lawn edger, riding tractor, or any other machinery equipment, or other mechanical or electrical device, or any hand tool which creates a loud, raucous or impulsive sound, within any residential zone or within 500 feet of a residence between 10:00 p.m. and 7:00 a.m.

Construction Noise

- LAMC Section 41.40(a) and (c) restricts construction activity to the hours below:
  - Monday through Friday between 7:00 a.m. to 9:00 p.m.
  - Saturdays and National Holidays between 8:00 a.m. to 6:00 p.m.
  - Sundays, no construction except for individual residents.
- LAMC Section 112.05 limits the maximum noise level of powered equipment or powered hand tools (e.g., construction equipment, including off-highway trucks). According to LAMC Section 112.05, any powered equipment or hand tool that produces a maximum noise level exceeding 75 dBA within 500 feet of a residential zone, when measured at a distance of 50 feet from the source, is prohibited unless compliance is technically infeasible.

LAMC Section 112.05 states the following:

> Between the hours of 7:00 a.m. and 10:00 p.m., in any residential zone of the City or within 500 feet thereof, no person shall operate or cause to be operated any powered equipment or powered hand tool that produces a maximum noise level exceeding the following noise limits at a distance of 50 feet therefrom:
>
> (a) 75dBA for construction, industrial, and agricultural machinery including crawler-tractors, dozers, rotary drills and augers, loaders, power shovels, cranes, derricks, motor graders, paving machines, off-highway trucks, ditchers, trenchers, compactors, scrapers, wagons, pavement breakers, compressors and pneumatic or other powered equipment;
>
> (b) 75dBA for powered equipment of 20 HP or less intended for infrequent use in residential areas, including chain saws, log chippers and powered hand tools; and
>
> (c) 65dBA for powered equipment intended for repetitive use in residential areas, including lawn mowers, backpack blowers, small lawn and garden tools and riding tractors.
>
> The noise limits for particular equipment listed above in (a), (b), and (c) shall be deemed to be superseded and replaced by noise limits for such equipment from and after their establishment by final regulations adopted by the Federal Environmental Protection Agency and published in the Federal Register.
>
> Said noise limitations shall not apply where compliance therewith is technically infeasible. The burden of proving that compliance is technically infeasible shall be upon the person or persons charged with a violation of this section. Technical infeasibility shall mean that said noise limitations cannot be complied with despite the use of mufflers, shields, sound barriers and/or other noise reduction device or techniques during the operation of the equipment.

Pursuant to LAMC Section 112.05, the impact analysis of construction noise presented in Chapter Six is based on the potential for the project to result in construction noise levels exceeding 75 dBA at a distance of 50 feet.

Groundborne Vibration

When construction equipment travels over unpaved surfaces or engages in soil movement, construction activities generate groundborne vibration. As described in the Federal Transit Administration, Transit Noise and Vibration Impact Assessment report, the effects of ground-borne vibration include discernible movement of building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. Vibration related problems generally occur due to resonances in the structural components of a building that amplify groundborne vibration. The "soft" sedimentary conditions of much of southern California dampen ground borne vibration over a relatively short distance. Because vibration is typically not an issue, few local jurisdictions have adopted regulatory standards specifically pertaining to groundborne vibration.

Federal and state transportation agencies have adopted vibration thresholds for large public works projects, but these relate mostly to structural protection (cracking foundations or stucco) rather than to human annoyance. PPV is the maximum instantaneous positive or negative peak of the vibration signal. PPV is often used in monitoring blasting vibration because PPV is related to the stresses experienced by buildings. **Table 3-3**, **Human Response to Groundborne Vibration Guidelines** provides vibration potential criteria as a guideline to consider for vibration annoyance in terms of human response.

Table 3-3
Human Response to Groundborne Vibration Guidelines

Human Response	Maximum PPV (in/sec)	
	Transient [1]	Intermittent [2]
Severe	2.0	0.4
Strongly perceptible	0.9	0.1
Distinctly perceptible	0.25	0.04
Barely perceptible	0.04	0.01

Source: California Department of Transportation, Transportation and Construction Vibration Guidance Manual, September 2013.

1 Sources of transient vibration create a single isolated vibration event, such as blasting or drop balls.

2 Frequent or intermittent sources include impact or vibratory pile drivers, pogo-stick compactors, crack-and-seat equipment, and vibratory compaction equipment.

As shown in Table 3-3, human responses to groundborne vibration vary depending on whether the source is transient or intermittent and range from severe responses at 2.0 PPV for transient sources to barely perceptible levels of 0.01 PPV for intermittent sources. Groundborne vibration from construction activities rarely reach levels that can damage structures. Although the local lead agency has no officially-adopted regulatory standards for the point at which groundborne vibration levels could cause structural damage, the CalTrans provides guidelines found in **Table 3-4, Vibration Damage Criteria Guidelines**.

Table 3-4
Vibration Damage Criteria Guidelines

Structure and Condition	Maximum PPV (in/sec)	
	Transient [1]	Intermittent [2]
Extremely fragile historic buildings	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: California Department of Transportation, Transportation and Construction Vibration Guidance Manual, September 2013.
1 Transient sources create a single isolated vibration event, such as blasting or drop balls.
2 Frequent or intermittent sources include impact or vibratory pile drivers, pogo-stick compactors, crack-and-seat equipment, and vibratory compaction equipment.

As shown in Table 3-4, a potential threshold for structural vibration damage for modern structures is 0.5 in/sec for intermittent sources, which include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment. The damage criterion of 0.3 in/sec is appropriate for intermittent vibration in older residential structures. Below this level there is virtually no risk of building damage.

4.0 EXISTING CONDITIONS

4.1 Ambient Noise Levels

LAMC Chapter XI, Noise Regulation, Section 111.03 provides presumed ambient noise levels based on zoning. The presumed ambient daytime noise level for the project site, which is zoned PB and C2, is 60 dBA and the presumed ambient nighttime noise level is 55 dBA. LAMC Section 111.03 notes that where the [measured] ambient noise level is less than the presumed ambient noise level, the presumed ambient noise shall be deemed to be the minimum ambient noise level. Where the actual ambient noise level is measured, and is found to be higher, City Planning directs that this actual ambient level may be used as the existing conditions baseline for CEQA analysis. To obtain existing ambient noise levels at the project site, Envicom Corporation measured ambient noise levels on Monday, July 1, 2019, in 15 minute intervals Leq[15][1] at four locations on the project site as shown in **Figure 4-1, Noise Measurement Locations**. **Table 4-1, Ambient Noise Measurements**, shows the ambient noise levels measured at these locations.

As shown below in Table 4-1, measured ambient noise levels ranged from Leq[15] 67.1 dB(A) to 56.7 dB(A). Therefore, the average of the measured noise levels, 62.7 dB(A), was used as the existing ambient noise level for the purpose of this study.

1 In accordance with LAMC Section 111.01, Definitions, subsection (a), "Ambient Noise," that states "ambient noise shall be over a period of at least 15 minutes."

Aerial Source: Google Earth Pro, March 14, 2018.

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Noise Measurement Locations

FEET 0 62.5 125

FIGURE 4-1

Figure 4-1, Noise Measurement Locations

Table 4-1
Ambient Noise Measurements

Location #	Location Name	Times	Leq [15] dB(A) [1]
M1	Project Property – Southwest Corner	1:4 p.m. – 1:56 p.m.	66.8
M2	Project Property – Northwest Corner	1:57 p.m. – 2:12 p.m.	60
M3	Project Property – Eastern Corner	2:17 p.m. – 2:32 p.m.	56.7
M4	Project Property – Southeast Corner	2:34 p.m. – 2:49 p.m.	67.1
		Average Leq [15] dB(A)	**62.7**

Source: Envicom Corporation, field visit July 1, 2019. Measured using a Casella Type 1 Sound Level Meter (Model: CEL-63X) meeting American National Standards Institute (ANSI) Standard S1.4 & S1.43.
[1] (Leq) is the average noise level equivalent to the energy content of the time period. The readings presented are 15-minute Leq measurements (Leq[15]).

4.2 Ambient Transportation Noise Levels

As noted in the Noise Element of the City General Plan, transportation systems are a primary source of urban noise. Management of noise from the most significant of these sources (aircraft, trains and freeways) is generally preempted by federal and state authority. Primary municipal authority is regulation of land use. Management of noise emanating from freeways is generally within the authority of federal and state jurisdictions, namely, the Federal Highway Administration and CalTrans.

5.0 THRESHOLDS OF SIGNIFICANCE

This Chapter presents thresholds of significance for noise from the State CEQA Guidelines approved by the California Office of Administrative Law on December 28, 2018. Project noise and vibration impacts are measured against these thresholds of significance. Local standards codified in the LAMC refine these thresholds by establishing standards.

5.1 Thresholds of Significance

Appendix G of the State CEQA Guidelines presents the following thresholds related to noise:

XIII. NOISE. Would the project result in:

a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

b) Generation of excessive groundborne vibration or groundborne noise levels?

c) For a project located within the vicinity of a private airstrip or an airport land use plan, or where such plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

5.1.1 Standards Established in the Local General Plan and Noise Ordinance

Operational Noise

Local General Plan

In considering whether operation of the project could exceed noise standards, the Noise Element of the City General Plan provides an exterior target for residential multi-family uses of equal to or less than 55 dB

CNEL. However, such a level may not always be possible in urban areas of constant, heavy traffic flow. Therefore, sound exposure up to 65 dB CNEL for multi-family residential uses remain conditionally acceptable if all measures to reduce such exposure have been taken.

Noise Ordinances

LAMC Section 112.02 prohibits any HVAC systems within any zone of the City from causing an increase in the ambient noise levels on any other occupied property by more than 5 dBA. For a condominium, apartment house, duplex, or attached business, an HVAC system may not increase the ambient noise within any adjoining unit level by more than 5 dBA.

LAMC Section 112.04 prohibits the operation of any lawn mower, backpack blower, lawn edger, riding tractor, or any other machinery equipment, or other mechanical or electrical device, or any hand tool which creates a loud, raucous or impulsive sound, within any residential zone or within 500 feet of a residence between 10:00 p.m. and 7:00 a.m..

Construction Noise

In considering whether project construction could generate a substantial temporary increase in ambient noise levels in excess of established standards, LAMC Section 112.05 sets a construction noise standard of 75 dBA at 50 feet, which is used as a threshold of significance in this noise study.

5.1.2 Standards for Excessive Groundborne Vibration

For the purpose of analyzing human response to groundborne vibration impacts, the following analysis relies on a "strongly perceptible" level for intermittent sources of 0.1 PPV in/sec from the Caltrans Transportation and Construction Vibration Guidance Manual as a guideline.

For the purpose of analyzing structural damage from groundborne vibration, the following analysis relies on a criterion for older residential structures of 0.3 PPV in/sec from the Caltrans Transportation and Construction Vibration Guidance Manual as the threshold of significance.

5.1.3 Standards for Location Within Two Miles of A Public Airport

For projects located within two miles of a public airport, a conditionally acceptable sound exposure up to 65 dB CNEL for multi-family residential uses is the threshold of significance from the Noise Element of the City General Plan.

6.0 IMPACT ANALYSIS

The following analysis evaluates the noise and groundborne vibration impacts resulting from both construction and operation of the proposed project. Expected construction noise levels are based on reference noise levels for comparable construction equipment provided in the Federal Highway Administration Construction Noise Handbook. Expected operational noise levels are based on manufacturer's specifications for the proposed HVAC units and the guidance in the CalTrans Technical Noise Supplement to the Traffic Noise Analysis Protocol. Groundborne vibration impacts are based on guidance in the Federal Transit Administration Transit Noise and Vibration Impact Assessment Manual. The analysis then considers whether these impacts would exceed thresholds of significance and provides measures to reduce these impacts where warranted.

6.1 Substantial Temporary or Permanent Increase in Ambient Noise Levels in Excess of Standards Impacts

Temporary increases in ambient noise levels would be due to mobile and stationary equipment used while constructing the proposed project. Permanent increases in ambient noise levels would be due to operation of project components such as roof-mounted HVAC units and vehicle trips generated on local roadways. The following impact analysis considers each of these types of noise impacts by topic.

Construction

The Construction Noise Handbook prepared by the Federal Highway Administration includes a national database of construction equipment noise levels. The Federal Highway Administration uses these reference noise emission levels in the Roadway Construction Noise Model. **Table 6-1, Maximum Construction Equipment Noise,** identifies highest (Lmax) noise levels associated with the quantity and type of construction equipment. Table 6-1 lists equipment types and quantities confirmed by the project applicant.[2] Table 6-1 is organized by equipment and describes the noise level for each individual piece of equipment at a 50-foot distance between the equipment and receptor as specified in LAMC Section 112.05.

As shown in Table 6-1, the construction equipment that could generate the highest sound pressure level is a concrete saw with a sound pressure level (Lmax) of 90 dB(A) at 50 ft between the source and receptor. Construction proceeds in phases such as demolition, site preparation, rough grading, final grading, and vertical construction of the building. Each phase involves the use of different types of construction equipment. Therefore, at any particular phase of construction, contractors would use only the types of equipment needed as shown in Table 6-1, rather than using all the equipment throughout all phases.

Acoustical Usage Factor Methodology

The Federal Highway Administration Construction Noise Handbook includes a national database of construction equipment reference noise emissions levels. The database provides an acoustical usage factor to estimate the fraction of time each piece of equipment is operating at full power during construction. The acoustical usage factor, abbreviated (U.F.), is a key input used to calculate sound levels averaged over time expressed as Leq. **Table 6-2, Acoustical Usage Factor Calculations – Construction,** adjusts the highest (Lmax) sound pressure levels from Table 6-1 for the U.F. published in the Federal Highway Administration Construction Noise Handbook. The sound level prediction equation is expressed as follows for the hourly average sound level (Leq) at distance (D) between the source and receiver.

$$Leq = Lmax\ @\ 50' - 20 \cdot \log(D/50') + 10 \cdot \log(U.F./100) - I.L.$$

Where:

Lmax @ 50' is the published reference noise level at 50 feet
U.F. is the acoustical usage factor for full power operation per hour
I.L. is the insertion loss for intervening barriers

[2] Mick Choi, Corbel Architects, Email communication with Envicom Corporation, June 25, 2019

Table 6-1
Maximum Construction Equipment Noise

Phase	Quantity and Equipment Type [1]	Type	Lmax @ 50 ft (dBA) [2]
Demolition	1 Concrete/Industrial Saw	Stationary	90
	3 Tractor/Loader/Backhoes	Mobile	84
	1 Rubber-tired Dozer	Mobile	82
Site Preparation	1 Rubber-tired Dozer	Mobile	82
	1 Grader	Mobile	85
	1 Tractor/Loader/Backhoe	Mobile	84
Grading	1 Grader	Mobile	85
	1 Rubber-tired Dozer	Mobile	82
	1 Tractor/Loader/Backhoe	Mobile	84
Building Construction	1 Crane	Mobile	81
	1 Forklift (man lift)	Mobile	75
	1 Generator Set	Stationary	81
	1 Loader/Backhoe	Mobile	79
	3 Welders	Mobile	74
Paving	1 Cement/Mortar Mixer	Mobile	79
	1 Paver	Mobile	77
	1 Paving Equipment	Mobile	77
	1 Roller	Mobile	80
	1 Tractor/Loader/Backhoe	Mobile	84
Architectural Coating	Air Compressor	Stationary	78

[1] Construction Equipment List provided by Mick Choi, CORBeL Architects, Email communication with Envicom Corporation, June 25, 2019.
[2] Source: Federal Highway Administration, Construction Noise Handbook, 2006, Ch. 9, Construction Equipment Noise Levels and Ranges.

Table 6-2
Acoustical Usage Factor Calculations – Construction

Equipment (Quantity)	Lmax @ 50 ft. (dB) [2]	U.F. [1, 2]	U.F. Calculation	Reduction	Hourly Leq (dBA)
Concrete Saw	90	20%	10 • log (20/100)	-6.99	83
Tractor/Loader/Backhoe	84	40%	10 • log (40/100)	-3.98	80
Rubber Tired Dozer	82	40%	10 • log (40/100)	-3.98	78
Grader	85	40%	10 • log (40/100)	-3.98	81
Crane	81	16%	10 • log (16/100)	-7.96	73
Forklift (man lift)	75	20%	10 • log (20/100)	-6.99	64
Generator Set	81	50%	10 • log (50/100)	-3.01	78
Loader/Backhoe	79	40%	10 • log (40/100)	-3.98	75
Welder	74	40%	10 • log (20/100)	-6.99	67
Cement Mixer	79	40%	10 • log (40/100)	-3.98	75
Paver	77	50%	10 • log (50/100)	-3.01	74
Paving Equipment	77	50%	10 • log (50/100)	-3.01	74
Roller	80	20%	10 • log (20/100)	-6.99	73
Air Compressor	78	40%	10 • log (40/100)	-3.98	74

[1] Usage Factor (U.F.) is the portion of time equipment is operating at full power during construction.
[2] Data Source: Federal Highway Administration, Construction Noise Handbook, Chapter 9, Construction Equipment Noise Levels and Ranges, accessed August 28, 2018. Noise levels (Lmax @ 50 feet dB) are calculated based on the maximum number of each type of equipment to be used (shown in parenthesis in column one), assuming as a worst-case that they operate simultaneously in the same location.

As shown in Table 6-2, based on the acoustical U.F. for the time each piece of equipment is operating at full power during construction, the loudest piece of equipment would be a concrete saw at 83 dBA at a distance of 50 feet from the source. This would exceed the construction noise threshold of 75 dBA at a distance of 50 feet specified in LAMC Section 112.05.

The loudest expected sound pressure level of a concrete saw is 83 dBA at 50 feet. The City construction noise threshold is 75 dBA at 50 feet from the source unless compliance is "technically infeasible" despite the use of mufflers, shields, sound barriers and/or other noise reduction device or techniques during the operation of the equipment (LAMC Section 112.05). **Table 6-3, Construction Equipment Noise with Regulatory Compliance**, shows the effect of standard noise reduction features and techniques in the use of construction equipment on the project site at a distance of 50 feet. Standard noise reduction techniques include the use of industrial-grade mufflers on mobile equipment or sound transmission obscuring products, such as noise shield barriers or equivalent around the construction site or equipment.

Table 6-3
Construction Equipment Noise with Regulatory Compliance

Equipment	Hourly LEQ (dBA)	Reduction for 75 dBA	LAMC Compliance [1]	LEQ at 50 Feet (dBA)
Concrete Saw	83	8	Enclosure	73
Tractor/Loader/Backhoe	80	5	Industrial Muffler	65
Rubber Tired Dozer	78	3	Industrial Muffler	63
Grader	81	6	Industrial Muffler	66
Crane	73	-	N/A	73
Forklift (man lift)	64	-	N/A	75
Generator Set	78	3	Enclosure	68
Loader/Backhoe	75	-	N/A	75
Welder	67	-	N/A	67
Cement Mixer	75	-	N/A	75
Paver	74	-	N/A	74
Paving Equipment	74	-	N/A	74
Roller	73	-	N/A	73
Air Compressor	74	-	N/A	74

[1] Pursuant to LAMC Section 112.05, compliance refers to the use of mufflers, shields, sound barriers and/or other noise reduction device or techniques during the operation of the equipment.
Source: Federal Highway Administration, Construction Noise Handbook, 2006, Chapter 9, Construction Equipment Noise Levels and Ranges.

As shown in Table 6-3, regulatory compliance with LAMC Section 112.05 standards requiring mufflers, shields, sound barriers and/or other noise reduction device or techniques during the operation of the equipment would reduce the construction noise levels from the equipment to less than 75 dBA at 50 feet through industrial-grade mufflers on mobile equipment and enclosures formed by sound transmission obscuring products around stationary equipment. Specification sheets documenting the reasonably expected effectiveness of mufflers and enclosures for reducing noise levels are provided in **Appendix A**. Mufflers and sound transmission obscuring products, like enclosures, are available from a variety of manufacturers, the examples provided in Appendix A show the reasonably expected effectiveness of these products in reducing noise levels.

Operation

Heating, Ventilation, and Air Conditioning Units

The project proposes 255 stationary noise sources, roof-mounted HVAC units manufactured by Midea (Model #: MCHSU) or equivalent HVAC units. This analysis assumes all 255 roof-mounted HVAC units, shown in Architectural Plan Sheet A1.01 prepared by CORBeL Architects, are in simultaneous use as a "worst-case" scenario although actual HVAC use will depend on weather conditions and tenant occupancy. Given that decibels are expressed in logarithmic units, they cannot be added or subtracted arithmetically. The following formula converts decibels from logarithmic units to linear units for addition of the decibels and to calculate the increase in ambient noise.

$$L = 10 \log_{10} \left(\sum_{i=1}^{n} 10^{Li/10}\right)$$

Where:

L = existing ambient noise level plus construction or operational noise
n = number of individual noise measurements being summed
L_i = reference noise level or existing ambient noise level

Based on the sound pressure levels for the model of HVAC unit specified in the manufacturer's specification sheet, **Table 6-4, HVAC Noise Levels,** provides the dB calculations to find the total noise level due to HVAC use in project operations.

Table 6-4
HVAC Noise Levels

HVAC Unit Make and Model [a]	Sound Pressure Level (dBA) [a]	Qty [b]	Decibel Calculation (dBA)
Midea Outdoor Unit #MCHSU-18PHH2	57	255	$10 \cdot \text{Log}_{10} (10^{5.7} \times 255) = 76.4$

[a] Midea, North America 2017 Residential and Light Commercial Ductless Product, Outdoor Unit: MCHSU-18PHH2. https://us.midea.com/dam/jcr:ced48070-33af-49f8-ade8-8ebd6a59fb9f/Midea_North_ America_Ductless _Catalog_v1.2_81784.pdf
[b] CORBeL Architects, Site Plan, 6/25/2019, Sheet No. A1.01.

As shown in Table 6-4, the simultaneous operation of 255 HVAC units would result in a noise level of 76.4 dB(A) at the source. The proposed HVAC units would be required to comply with the City's noise ordinance standards. LAMC Section 112.02, prohibits any HVAC unit from exceeding the ambient noise level on any other occupied property by more than 5 dBA. Attenuation for the proposed HVAC units was calculated using the following formula used to calculate the sound pressure level (L_2) in dB depending on distance (r_2) based on specification sheets from the HVAC unit manufacturer.

$$L_2 = L_1 - |20 \log (r_1 / r_2)|$$

Where:

L2 = sound pressure level at a given distance
L1= reference sound pressure level
r1 = reference distance of 3 feet
r2 = given distance

The attenuation calculations for HVAC noise provided in **Table 6-5, Attenuation Calculations for Estimated Operational HVAC Noise**, were based on a noise levels 76.4 dBA (L_1) for operations at a distance of one meter (3.3 ft) (r_1) from the source.

Table 6-5
Attenuation Calculations for Estimated Operational HVAC Noise

Lmax (L_1) at 1 meter (3.3 ft.) [a]	Distance (r_2) (ft.) [b]	Attenuation Calculation
76.4 dB(A)	16 ft	L_2 = 76.4 dB - | 20 • log (3.3 ft / 16 ft) | L_2 = 76.4 dB - | 20 • log (0.0206 ft) | L_2 = 76.4 dB - | 20 • -0.686 | L_2 = 76.4 dB - | -13.7 | L_2 = 62.7 dB
	Insertion Loss for Roof Parapet [c]	-5 dB
	Total	**57.7 dB**

[a] Based on correspondence with Media, the manufacturer, specifications are based on measurement at 1 meter.
[b] Architectural Plan Sheet A1.01 by CORBeL Architects shows a 16-foot setback from the northern property line.
[c] Based on the Entitlement Set Architectural Plans prepared by CORBeL Architects, Sheet A3.02, Elevations, the building would feature a parapet (low wall) rising three feet, six inches, above the roof level.

As shown in Table 6-5, the estimated operative sound pressure level from the 255 proposed HVAC units would be 57.7 dB Leq after attenuating for distance and insertion loss for the parapet. Similar to construction equipment that would not be operating at full power during a typical eight-hour work day, HVAC units operate on and off during the day depending on weather conditions. **Table 6-6, Acoustical Usage Factor Calculations – Operations**, gives acoustical usage factor calculations for the operation of HVAC units.

Table 6-6
Acoustical Usage Factor Calculations – Operations

Equipment (Quantity)	Lmax @ 16 ft. (dB)	U.F. [1]	U.F. Calculation	Reduction	Leq (dBA)
HVAC – daytime operation (7:00 a.m. - 10:00 p.m.)	57.7	50%	10 • log (50/100)	-3.01	54.7
HVAC – nighttime operation (10:00 p.m. – 7:00 a.m.)	57.7	50%	10 • log (50/100)	-3.01	54.7

[1] Usage Factor (U.F.) is the assumed portion of time HVAC equipment is operating at full power.

As shown in Table 6-6, based on the acoustical U.F. for the fraction of time HVAC units operate at full power, the equivalent noise level (Leq) for daytime and nighttime operation would be 54.7 dBA for nighttime operation.

Decibel Addition for Ambient Noise Increase

Using the ambient noise level from Table 4-1 and the Leq HVAC noise level from Table 6-6, **Table 6-7, Decibel Addition Calculations for Ambient Noise Increase,** provides the dB addition calculations used to find the increase in the ambient noise level due to the HVAC use in operations.

As shown below in Table 6-7, the addition of 255 proposed HVAC units to the ambient Leq would result in an increase of 0.6 dBA in daytime ambient noise levels and an increase in 2.9 dBA in nighttime ambient noise levels. Therefore, operational HVAC noise would not exceed the ambient noise level by more than 5 dBA in compliance with LAMC Section 112.02.

Table 6-7
Decibel Addition Calculation for Ambient Noise Increase

Ambient Noise Level	HVAC Leq	Decibel Addition Calculation (dBA)	Increase (dBA)
Day – 62.7 dB (7:00 a.m. - 10:00 p.m.)	54.7	$10 \cdot \text{Log}_{10} (10^{6.27} + 10^{5.47}) = 63.3$	0.6
Night – 55 dB [a] (10:00 p.m. – 7:00 a.m.)	54.7	$10 \cdot \text{Log}_{10} (10^{5.5} + 10^{5.47}) = 40.9$	2.9
[a] LAMC Section 111.03 establishes a presumed ambient noise levels of 55 dBA for the PB and C2 zones during the night.			

Vehicle Trip Noise

Long-term operational noise impacts from mixed uses result from vehicular noise on area roadways. As explained in the Federal Highway Administration Highway Traffic Noise Analysis and Abatement Policy and Guidance, sound intensity decreases in proportion with the square of the distance from the source. Generally, sound levels for a point source, such as an individual piece of construction equipment, will decrease or attenuate by 6 dBA for each doubling of distance. Sound levels for a highway line source vary with distance, because sound pressure waves are propagated all along the line and overlap at the point of measurement. A continuous line of vehicles traveling along a roadway becomes a line source and generally produces a 3 dBA decrease in sound level for each doubling of distance. However, experimental evidence has shown that where sound from a highway propagates close to "soft" ground (e.g., plowed farmland, grass, crops, etc.), the most suitable drop-off rate to use is not 3 dBA but rather 4.5 dBA per distance doubling. A drop-off rate of 4.5 dBA is used in traffic noise analyses.

For the purpose of evaluating operational noise impacts, a project would be considered to exceed noise ordinance standards if the new source of operational noise would increase the ambient noise level on another occupied property by more than five dBA (LAMC Sections 112.01 and 112.02.). Upon completion, project-generated vehicle trips would cause an incremental increase in noise levels on local streets throughout the project area. When considering the combined effects of operational noise sources, noise levels cannot be added by arithmetic means because decibels are expressed in logarithmic units. Doubling the noise source would produce only a three (3) dBA increase in the noise level.[3] Therefore, a doubling of traffic volume is required to result in a three (3) dBA increase in noise.[4] Increases of three decibels are the point at which changes are barely perceptible to the human ear. Based on the project Traffic Impact Report, the project would generate a net increase of 1,247 daily area intersection trips.[5] Based on Los Angeles Department of Transportation traffic counts for the intersection nearest to the project site, Harvard Blvd and W. 8th Street, there were of a total of 10,134 trips at this intersection[6] The addition of 1,247 daily area intersection trips daily trips resulting from the project to the 10,134 trips at the Harvard Blvd and W. 8th Street intersection would less than double the existing traffic volume; therefore, the proposed project would not result in a 3 dBA noise increase from operational traffic.

3 U.S. Dept. of Transportation, Federal Highway Administration, Highway Traffic Noise Analysis and Abatement Policy and Guidance, Accessed May 9, 2018 at: https://www.fhwa.dot.gov/environMent/noise/regulations_and_guidance/polguide/polguide02.cfm.

4 California Department of Transportation, Division of Environmental Analysis, Technical Noise Supplement to the Traffic Noise Analysis Protocol, September 2013, page 2.15.

5 Transportation Impact Report for Proposed The Parks at LA (3433 8th Street) Mixed Use Project, Crain and Associates, April 2019, page 27.

6 2,969 north and southbound vehicles and 7,165 east and westbound vehicles measured between the hours of 7:00 a.m. through 10:00 a.m. and 3:00 p.m. through 6:00 p.m. = 10,134 vehicles. City of Los Angeles, Department of Public Works, Bureau of Engineering, Navigate LA, LADOT Traffic Data, Harvard Blvd and W. 8th Street, March, 12, 2012. Accessed on NavigateLA (July 8, 2019).

Landscape Maintenance Noise

Project operations would include the use of lawn mowers, backpack blowers, edgers, and landscape maintenance equipment for site upkeep and operations. Contractors would reasonably be expected to conduct routine landscape maintenance during daytime hours, therefore avoiding the period when such equipment noise is restricted between 10:00 p.m. and 7:00 a.m. required by LAMC Section 112.04.

6.2 Excessive Groundborne Vibration Impacts

Construction

Construction generates groundborne vibration when heavy equipment travels over unpaved surfaces or engages in soil movement; however, the ground surface dampens ground-borne vibration over a relatively short distance. The reference vibration levels at 25 feet between the source and receptor from the Federal Transit Administration Noise and Vibration Impact Assessment Manual may be used in the following formula to calculate PPV for other distances.[7]

$$\mathbf{PPV_{equipment} = PPV_{ref} * (25/D)^{1.5}}$$

Where:

PPV equipment = peak particle velocity (PPV) in inches/second of the equipment adjusted for distance
PPV ref = reference vibration level (PPV) in inches/second at 25 feet
D = distance from the equipment to the receiver

The predicted vibration levels generated by construction equipment is provided in terms of PPV in (in/sec) in **Table 6-8, Estimated Groundborne Vibration Levels During Construction**.

Table 6-8
Estimated Groundborne Vibration Levels During Construction

Equipment	Peak Particle Velocity (PPV) in/sec					
	At 2.5 ft	At 5 ft	At 12.5 ft	At 20 ft	At 25 ft [1]	At 50 ft
Vibratory Roller	6.64	2.35	0.59	0.29	0.210	0.074
Large Bulldozer	2.81	1.0	0.25	0.12	0.089	0.031
Jackhammer	1.11	0.39	0.1	0.05	0.035	0.012
Small Bulldozer	0.09	0.03	0.01	0.004	0.003	0.001

[1] Source: U.S. Department of Transportation, Federal Transit Administration, Transit Noise and Vibration Impact Assessment, September 2018, pg. 184.

As shown in Table 6-8, ground surface dampens groundborne vibration over a relatively short distance. Groundborne vibration is strongly perceptible to humans for intermittent sources at 0.1 PPV in/sec and could cause structural damage in older residential structures at 0.3 PPV in/sec. Based on the age of nearest existing structures, a multi-family residence built in 1962 at 740 S. Hobart Blvd and a multi-family residence at 743 S. Harvard Blvd built in 1954, a structural damage standard for older residential buildings

[7] U.S. Department of Transportation, Federal Transit Administration, Office of Planning and Environment, Transit Noise and Vibration Impact Assessment, Report No. FTA-VA-90-1003-06, May 2006.

(i.e., 0.3 PPV in/sec) is used.[8] The setback of the multi-family residence at 740 S. Hobart Blvd is five feet from the property line adjacent to the project site and the setback of the multi-family residence at 743 S. Harvard Blvd is 2.5 feet from the property line adjacent to the project site.[9]

Based on the construction equipment list, shown in Table 6-1, the construction equipment that would cause the most groundborne vibration is a small bulldozer. As shown in Table 6-8, in a "worst-case scenario" whereby a small bulldozer ran closest to the nearest building at the northern property line of the project site, at two and a half feet between source and receptor, the predicted vibration level would be 0.09 PPV in/sec, below a level that could create structural damage in older residential buildings (i.e., 0.3 PPV in/sec). Groundborne vibration of 0.09 PPV in/sec would not exceed the guideline for causing a strongly perceptible human response (i.e., 0.1 PPV in/sec) and would have a temporary nuisance effect on residents within the adjacent multi-family residential building within the hours for construction allowed under the LAMC. Therefore, provided that equipment used to achieve soil compaction at the northern property line is limited to small bulldozers, groundborne vibration impacts due to project construction would be below applicable thresholds of significance in terms of structural damage and human response. As a precaution, if larger or vibratory construction equipment is needed to achieve soil compaction, a 20-foot buffer from the northern property line is required to ensure groundborne vibration remains below levels that could cause structural damage in older residential buildings (i.e., 0.3 PPV in/sec).

Operation

After construction is complete, and the proposed mixed-use building is occupied, project operations would be similar to surrounding uses and would not include any sources of substantial groundborne vibration. Therefore, groundborne vibration from project operations would be further below applicable thresholds.

6.3 Location Within Two Miles of a Public Airport Noise Impacts

A project located within two miles of a public airport or public use airport may result in a significant impact if a project would expose people residing or working in the project area to excessive noise levels. The project site is not located within two miles of a public airport or public use airport. The project is not located in the vicinity of a private airstrip. Therefore, the project would not result in the exposure of residents or those working in the project area to excessive noise levels from a private airstrip or public airport.

7.0 MEASURES TO REDUCE IMPACTS

7.1 Noise

As shown in Chapter 6.0, impacts resulting from construction noise would be reduced to less than 75 dBA at 50 feet from the limit of construction activity with use of the following noise reduction techniques as required by LAMC Section 112.05:

- Noise barriers, enclosures, or equivalent techniques for concrete saws and generators.
- Industrial-grade mufflers or equivalent, on the following types of mobile construction equipment: tractor/loader/backhoes, rubber-tired dozers, and graders.

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8 Los Angeles County Assessor Portal Data, AIN 5077-015-015, Accessed on July 8, 2019 at: http://maps.assessor.lacounty.gov/GVH_2_2/Index.html?configBase=http://maps.assessor.lacounty.gov/Geocortex/Essentials/REST/sites/PAIS/viewers/PAIS_hv/virtualdirectory/Resources/Config/Default

9 Setback distances measured on the Los Angeles Zoning Information and Map Access System (ZIMAS), accessed July 8, 2019.

Project design features and compliance with regulatory requirements would reduce operational noise impacts to less than significant. However, to ensure regulatory requirements are properly implemented the following mitigation measures (MM) are recommended:

MM NOI-1 (Construction Equipment)

1. All construction equipment shall be properly maintained per manufacturers' specifications and fitted with the best available noise suppression devices (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds silencers, wraps). All intake and exhaust ports on power equipment shall be muffled or shielded.
2. Pneumatic tools used at the site shall be equipped with an exhaust muffler on the compressed air exhaust to minimize noise levels.
3. Back-up beepers for all construction equipment and vehicles shall be broadband sound alarms or adjusted to the lowest noise levels possible, provided that Occupational Safety and Health Administration (OSHA) and California OSHA safety requirements are not violated. On vehicles where back-up beepers are not available, alternative safety measures such as escorts and spotters will be employed.

MM NOI-2 (Enclosures or Barriers)

Enclosures or barriers shall be placed around concrete saws and generators when they operate on site. Alternatively, a temporary noise control barrier shall be installed on the northern property line of the construction site's abutting residential uses. The enclosures or barrier(s) shall be designed to reduce noise levels from each individual piece of equipment to the performance standard of 75 dBA Leq at a distance of 50 feet from the equipment to the extent feasible. Such barriers could include a minimum 8-foot-high temporary barrier with a minimum sound transmission (STC) rating of 26, erected along the northern property line. This barrier could be constructed in one of the following ways:

1. From acoustical blankets hung over or from a supporting frame. The blankets shall be firmly secured to the framework. The blankets shall be overlapped by at least 4 inches at seams and taped and/or closed with hook-and-loop fasteners (i.e., Velcro®) so that no gaps exist. The largest blankets available shall be used in order to minimize the number of seams. The blankets shall be draped to the ground to eliminate any gaps at the base of the barrier.
2. From commercially available acoustical panels lined with sound-absorbing material (the sound-absorptive faces of the panels should face the construction equipment).
3. From common construction materials such as plywood provided that the barrier is designed with overlapping material at the seams to assure that no gaps exist between the panels.

MM NOI-3 (Noticing)

1. The construction management company's name and telephone number(s) shall be posted at a least one location along each street frontage that borders the project site.
2. A designated point of contact shall be identified to address noise-related complaints during construction. The noise disturbance coordinator shall be responsible for responding to any local complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., starting too early, bad muffler) and will be required to implement reasonable measures such that the complaint is resolved.

7.2 Groundborne Vibration

Construction equipment generally associated with generating high vibration levels, such as vibratory rollers or pile drivers would not be used for construction of the proposed project. Based on the anticipated construction equipment that the project proponent indicated would be used onsite, groundborne vibration effects from construction would not exceed applicable guidelines for structural damage of nearby buildings.

As a precaution, if larger or vibratory construction equipment is needed to achieve soil compaction, a 20-foot buffer from the northern property line is required to ensure groundborne vibration remains below levels that could cause structural damage in older residential buildings (i.e., 0.3 PPV in/sec). No added measures to reduce construction vibration are required.

Operational vibration impacts would be similar to surrounding uses and would not include any sources of substantial groundborne vibration. No added measures to reduce operational vibration are required.

8.0 REFERENCES

California Department of Transportation, Transportation and Construction Vibration Guidance Manual, Report No. CT-HWANP-RT-13-069.25.3, September 2013.

City of Los Angeles Municipal Code, Chapter XI, Noise Regulation.

City of Los Angeles, Department of City Planning, General Plan, Noise Element, City Plan Case No. 97-0085, Adopted by the City Council, February 3, 1999.

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U.S. Dept. of Transportation, Federal Highway Administration, Highway Traffic Noise Analysis and Abatement Policy and Guidance, Accessed May 9, 2018 at: https://www.fhwa.dot.gov/environMent/noise/regulations_and_guidance/polguide/polguide02.cfm.

APPENDIX A

Noise Study - Product Specification Sheets

Acoustical Surfaces, Inc.

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- 1 person can do the job of 2 or 3 people

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Echo Barrier temporary fencing is a reusable, outdoor noise barrier. Designed to fit on all types of temporary fencing. Echo Barrier absorbs sound while remaining quick to install, light to carry and tough to last.

BENEFITS: Echo Barrier can help reduce noise complaints, enhance your company reputation, extend site operating hours, reduce project timescales & costs, and improve working conditions.

APPLICATIONS: Echo Barrier works great for construction & demolition sites; rail maintenance & replacement; music, sports and other public events; road construction; utility/maintenance sites; loading and unloading areas; outdoor gun ranges.

DIMENSIONS: 6.56' × 4.49'.

WEIGHT: 13 lbs.

ACOUSTIC PERFORMANCE: 10-20dB noise reduction (greater if barrier is doubled up).

INSTALLATION: The Echo Barrier is easily installed using our quick hook system and specially designed elastic ties.

Echo Barrier Transmission Loss Field Data

	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz
Single Layer	6	12	16	23	28	30	30
Double Layer	7	19	24	28	32	31	32

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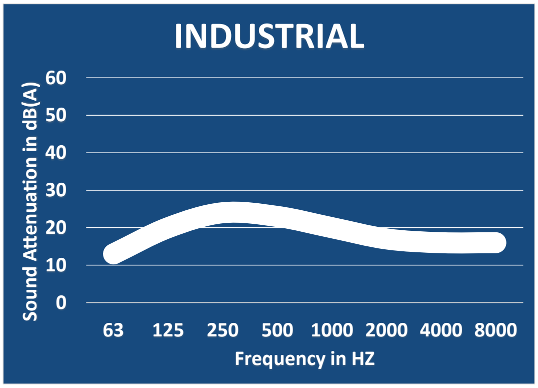
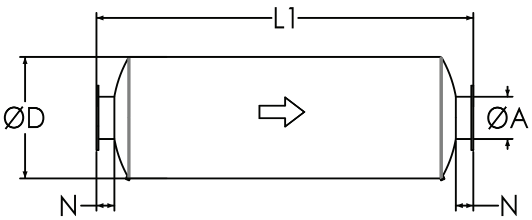
Industrial Grade Silencers

Model NTIN-C (Cylindrical), 15-20 dBA

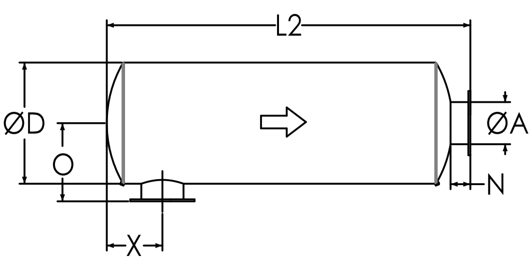
TYPICAL ATTENUATION CURVE



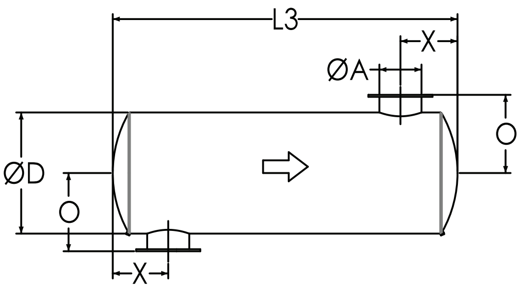
TYPICAL CONFIGURATIONS



END IN END OUT (EI-EO)



SIDE IN END OUT (SI-EO)



SIDE IN SIDE OUT (SI-SO)

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- Thimbles
- Raincaps
- Thermal insulation: integrated or with thermal insulation blankets
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PRODUCT DIMENSIONS (in)

Model*	A Outlet	D Dia	L1 EI-EO	L2 SI-EO	L3 SI-SO	X** Min	X Max	N Nipple	O O
NTIN-C1	1	4	20	18	16	3	7	2	4
NTIN-C1.5	1.5	6	22	20	18	3	8	2	5
NTIN-C2	2	6	22	19	16	3	8	3	6
NTIN-C2.5	2.5	6	24	21	18	4	9	3	6
NTIN-C3	3	8	26	23	20	5	10	3	7
NTIN-C3.5	3.5	9	28	25	22	5	11	3	8
NTIN-C4	4	10	32	29	26	5	12	3	8
NTIN-C5	5	12	36	33	30	6	14	3	9
NTIN-C6	6	14	40	36	32	7	16	4	11
NTIN-C8	8	16	50	46	42	8	21	4	12
NTIN-C10	10	20	52	48	44	11	21	4	14
NTIN-C12	12	24	62	58	54	12	26	4	16
NTIN-C14	14	30	74	69	64	15	31	5	20
NTIN-C16	16	36	82	77	72	18	35	5	23
NTIN-C18	18	40	94	89	84	18	42	5	25
NTIN-C20	20	40	110	105	100	19	52	5	25
NTIN-C22	22	48	118	113	108	22	56	5	29
NTIN-C24	24	48	130	125	120	24	62	5	29

* Other models and custom designs are available upon request. Dimensions subject to change without notice. All silencers are equipped with drain ports on inlet side. The silencer is all welded construction and coated with high heat black paint for maximum durability.
** Standard inlet/outlet position.

NETT® TECHNOLOGIES INC.

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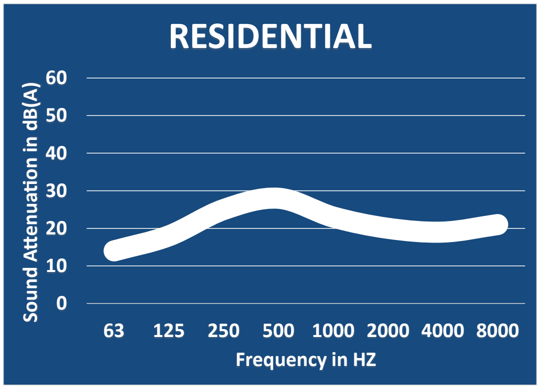
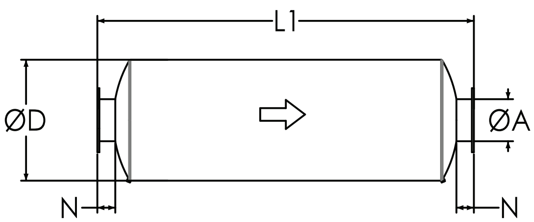
Residential Grade Silencers

Model NTRS-C (Cylindrical), 20-25 dBA

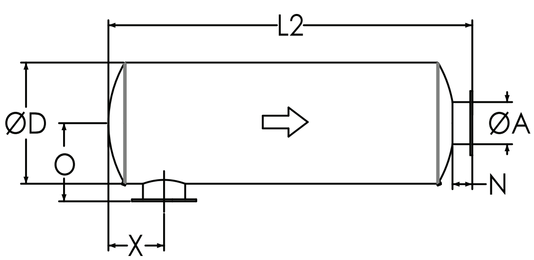
TYPICAL ATTENUATION CURVE



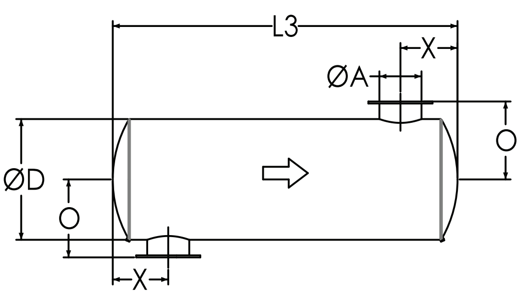
TYPICAL CONFIGURATIONS



END IN END OUT (EI-EO)



SIDE IN END OUT (SI-EO)



SIDE IN SIDE OUT (SI-SO)

Nett Technologies' Residential Grade Silencers are designed to achieve maximum performance with the least amount of backpressure. The silencers are Reactive Silencers and are typically used for reciprocating or positive displacement engines where noise level regulations are medium-low.

FEATURES & BENEFITS

- Over 25 years of excellence in manufacturing noise and emission control solutions
- Compact modular designs providing ease of installations, less weight and less foot-print
- Responsive lead time for both standard and custom designs to meet your needs
- Customized engineered systems solutions to meet challenging integration and engine requirements

Contact Nett Technologies with your projects design requirements and specifications for optimized noise control solutions.

OPTIONS

- Versatile connections including ANSI pattern flanges, NPT, slip-on, engine flange, schedule 40 and others
- Aluminized Steel, Stainless Steel 304 or 316 construction
- Horizontal or vertical mounting brackets and lifting lugs

ACCESSORIES

- Hardware Kits
- Flexible connectors and expansion joints
- Elbows
- Thimbles
- Raincaps
- Thermal insulation: integrated or with thermal insulation blankets
- Please see our accessories catalog for a complete listing

PRODUCT DIMENSIONS (in)

Model*	A	D	L1	L2	L3	X**	X	N	O
	Outlet	Dia	EI-EO	SI-EO	SI-SO	Min	Max	Nipple	O
NTRS-C1	1	4	20	18	16	3	10	2	4
NTRS-C1.5	1.5	6	28	26	24	3	12	2	5
NTRS-C2	2	6	28	25	22	4	12	3	6
NTRS-C2.5	2.5	6	32	29	26	4	14	3	6
NTRS-C3	3	6	34	31	28	5	15	3	6
NTRS-C3.5	3.5	9	36	33	30	5	16	3	8
NTRS-C4	4	10	40	37	34	5	17	3	8
NTRS-C5	5	12	42	39	36	6	18	3	9
NTRS-C6	6	14	44	40	36	7	19	4	11
NTRS-C8	8	16	56	52	48	9	24	4	12
NTRS-C10	10	20	58	54	50	11	24	4	14
NTRS-C12	12	24	70	66	62	13	31	4	16
NTRS-C14	14	30	80	75	70	17	35	5	20
NTRS-C16	16	36	90	85	80	17	40	5	23
NTRS-C18	18	40	102	97	92	18	47	5	25
NTRS-C20	20	42	108	103	98	21	50	5	26
NTRS-C22	22	48	116	111	106	23	54	5	29
NTRS-C24	24	48	130	125	120	26	61	5	29

* Other models and custom designs are available upon request. Dimensions subject to change without notice. All silencers are equipped with drain ports on inlet side. The silencer is all welded construction and coated with high heat black paint for maximum durability.

** Standard inlet/outlet position.