

Appendix G Del Amo Circle Apartments Project Noise and Vibration Technical Memo

Appendices

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TECHNICAL MEMORANDUM

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TO Legacy Partners

ADDRESS 5141 California Avenue, Suite 100, Irvine, CA 92617

CONTACT David Pinto, Vice President, Development

FROM Alejandro Garcia, INCE-USA, Senior Associate, Noise and Vibration

SUBJECT Del Amo Circle Apartments Project Noise and Vibration Technical Memo

PROJECT NUMBER LEGP-01.0

This noise technical memorandum is prepared for Legacy Partners (Project Applicant) to evaluate the potential construction and operational noise and vibration impacts pursuant to the California Environmental Quality Act (CEQA) for the proposed Del Amo Circle Apartments project (proposed project) in the City of Torrance.

Project Location

As shown in Figure 1, *Project Location*, the 2.83-acre project site is on the northeast corner of the intersection of West Carson Street and Del Amo Circle West in the City of Torrance, Los Angeles County, California. The site is bounded by Del Amo Circle West to the west, West Carson Street to the south, office buildings and a parking structure to the east, and surface parking to the north.

Project Description

Legacy Partners is proposing to develop a multifamily residential project on the 2.83-acre project site. The proposed project would construct a 234,928-square-foot, multistory apartment building providing 200 dwelling units in five levels, a leasing office, mail/lounge area, and co-working space. The proposed project would include a rooftop pool and 5,638 square feet of space to accommodate a rooftop clubhouse and fitness center (indoor). It would also construct a 169,946-square-foot multilevel parking structure providing a total of 440 parking spaces, with 44 spaces reserved for electric vehicle parking. The proposed parking structure would consist of seven above-ground levels. Other improvements include landscaping along the perimeter and interior open areas of the project site. Also, a new accessway would involve improvements to an approximately 0.09-acre off-site area that includes a portion of the existing driveway on West Carson Street. The project site plan is shown on Figure 2, *Project Plan*.

Overall, construction would occur from August 2023 to December 2025, a duration of approximately 28 months. Construction activities would generally involve demolition of the existing landscaping and surface parking lot, site preparation, grading, vertical construction of the apartment building and parking structure, architectural coating, and paving.

Figure 1 - Project Location



Project Boundary

0 235
Scale (Feet)



Source: Nearmap, 2022

Applicable Standards

CITY OF TORRANCE MUNICIPAL CODE

Exterior Noise Standards

The City’s exterior noise standards are used to assess compliance of the proposed project’s stationary noise sources. The City of Torrance Municipal Code (TMC), Chapter 6, Noise Regulation, establishes exterior noise standards and states that it is unlawful for any person to produce noise in excess of the noise limits on receiving residential land in designated regions. Based on the City’s General Plan Noise Element, the project site is within Region 4. Region 4 noise limits are summarized in Table 1.

Table 1 City of Torrance Exterior Noise Limits

Time Period	Noise Level, dBA
	Region 4
7:00 am–10:00 pm	55
10:00 pm–7:00 am	50

Source: City of Torrance Municipal Code, Chapter 6, Noise Regulation.
dBA = A-weighted sound-pressure level.

Construction Noise

Chapter 6, Section 46.3.1, of the TMC limits construction noise to 50 dB in or adjacent to a residential area between 6:00 pm to 7:30 am Monday through Friday and between 5:00 pm to 9:00 am Saturdays, as measured at property line. This includes power construction tools, construction equipment, and repair work on buildings and structures. Construction shall be prohibited on Sundays and Holidays observed by City Hall.

Federal Transit Administration

The City does not establish quantified daytime thresholds for construction noise; therefore, the Federal Transit Administration (FTA) criteria are used to determine impact significance. A construction noise impact would occur if construction noise levels would exceed 80 dBA Leq at a sensitive receptor property line during the daytime hours of 7:30 am to 6:00 pm Monday through Friday and 9:00 am to 5:00 pm on Saturdays.

The City also does not establish thresholds for acceptable groundborne vibration levels. Therefore, the FTA criteria summarized in Table 2 is used to determine impact significance.

Table 2 Groundborne Vibration Criteria

Building Category	PPV (in/sec)
I. Reinforced concrete, steel, or timber (no plaster)	0.5
II. Engineered concrete and masonry (no plaster)	0.3
III. Nonengineered timber and masonry buildings	0.2
IV. Buildings extremely susceptible to vibration damage	0.12

Source: FTA 2018.
PPV = peak particle velocity

Sensitive Receptors

The nearest sensitive receptors to the project site are:

- » Extended Stay America (hotel) across Del Amo Circle, approximately 95 feet west from the project site boundary.
- » Future senior housing to the north (under development), approximately 65 feet from the project site boundary.
- » Residences to the west across Del Amo Circle and west of Extended Stay America, approximately 280 feet west of the project site boundary.
- » Residences to the southwest across West Carson Avenue, approximately 140 feet to from the project site boundary.

Existing Noise Conditions

The dominant noise source in the project vicinity is vehicle traffic on State Route 107 (SR-107) and Carson Street. Secondary noise sources include existing operations from surrounding commercial, retail, and residential uses. According to the General Plan Noise Element future noise contours, the project site is partially outside the 60 dBA CNEL noise contour, and the southern portion of the project site is within the 65 dBA CNEL noise contour.

Environmental Impacts

- 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?**

PROJECT CONSTRUCTION NOISE

Two types of short-term noise impacts could occur during construction: (1) mobile-source noise from transport of workers, material deliveries, and debris and soil haul and (2) stationary-source noise from use of construction equipment. Existing uses surrounding the project site would be exposed to construction noise.

Construction Vehicles

The transport of workers and materials to and from the construction site would incrementally increase noise levels along access roadways in the project vicinity. Individual construction vehicle pass-bys and haul trucks may create momentary noise levels of up to 85 dBA (L_{max}) at 50 feet from the vehicle, but these occurrences would be temporary and generally short lived as trucks pass by. Existing average daily trips (ADT) along the site access road, West Carson Street, between Anza Avenue and Hawthorne Boulevard are 14,221.¹ The addition of 343 temporary worker and vendor trips during building construction and architectural coating

¹ Existing ADT volumes provided by Linscott, Law & Greenspan, Engineers (LLG).

and 23 haul trips during grading would result in noise increase of up to 0.1 dBA CNEL, which would be a negligible noise increase.²

Construction Equipment

Noise generated during construction is based on the type of equipment used, the location of the equipment relative to sensitive receptors, and the timing and duration of the noise-generating activities. Each activity phase of construction involves the use of different construction equipment, and therefore each activity phase has its own distinct noise characteristics. Noise levels from construction activities are dominated by the loudest piece of construction equipment. The dominant noise source is typically the engine, although work piece noise (such as dropping of materials) can also be noticeable.

The noise generated at each activity phase is determined by combining the L_{eq} contributions from the top three loudest pieces of equipment used at a given time. Construction activities associated with the proposed project would not require blasting or pile driving. Demolition and grading typically generate the highest noise levels because they require the largest equipment. Construction noise quite often exhibits a high degree of variability because factors such as noise attenuation due to distance, the number and type of equipment, and the load and power requirements to accomplish tasks at each construction activity phase result in different noise levels at a given sensitive receptor. Heavy equipment such as a dozer or a loader can have maximum, short-duration noise levels of 85 dBA at 50 feet. Since noise from construction equipment is intermittent and diminishes at a rate of 6 dBA per doubling distance,³ the average noise levels at noise-sensitive receptors would be lower, because mobile construction equipment would move around the site with different loads and power requirements.

Construction noise from activity that occurs throughout the entire site such as demolition, site preparation, and grading is calculated at spatially averaged distances (i.e., from the acoustical center of the general construction site to the property line of the nearest noise sensitive receptors) because the area around the center of construction activities best represents the potential average construction-related noise levels at the various sensitive receptors. For building construction and architectural coating, attenuated noise levels are calculated by measuring the distance from the center of the proposed building. Lastly for paving, attenuated levels are calculated by measuring the distance from the center of paving activities (proposed parking) to the nearest sensitive receptor property line. Therefore, the distances of construction activity to sensitive receptors may vary between construction phases.

As mentioned above, the City of Torrance does not have an established criterion for daytime construction noise levels. Therefore, the FTA daytime criterion of 80 dBA Leq for residential uses is used to determine impact significance. The nearest sensitive receptors to the project site include the Extended Stay America to the west, residences to the southwest across West Carson Street, and additional residences west of the hotel. Project-related construction noise levels at these receptors were modeled using the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM), and construction equipment is based on information provided by the Applicant and CalEEMod default equipment mix. Table 3 summarizes the aggregate noise levels by activity phase at various receptor distances.

As shown in Table 3, construction noise would attenuate to 77 dBA Leq or less at the nearest noise-sensitive receptor, which is below the FTA criterion of 80 dBA Leq.

² Worker, vendor, and haul truck trips based on air quality CalEEMod outputs.

³ The sound attenuation rate of 6 dBA is generally conservative and does not consider additional attenuation provided by existing buildings, structures, and natural landscapes around the project site.

Table 3 Project-Related Construction Noise, Energy-Average (Leq) Noise Levels, dBA

Construction Activity Phase	Noise Level at Nearest Receptors			
	RCNM Reference Noise Level	Extended Stay America (hotel) to west	Residences to southwest	Senior Homes to North (under development)
<i>Distance in feet</i>	50	160	260	130
Demolition ¹	85	75	71	77
Site Preparation ²	85	75	71	77
Grading ³	85	74	70	76
<i>Distance in feet</i>	50	340	390	340
Paving/Finishing ⁴	85	68	67	68
<i>Distance in feet</i>	50	100	160	75
Building Construction ⁵	83	77	73	79
Architectural Coating ⁶	74	68	64	70

Source: RCNM.

Equipment Mix

¹ Demolition: Concrete saw, dozer, tractor

² Site Preparation: Grader, scraper, tractor

³ Grading: Grader, Dozer, tractor

⁴ Tractor, front end loader, pavement scarifier

⁵ Building Construction: Tractor, front end loader, generator

⁶ Architectural Coating: Air compressor

Operational Noise

MECHANICAL EQUIPMENT

The proposed project would have heating, ventilation, and air conditioning systems (HVAC). Mechanical equipment is anticipated to be installed on the rooftop of the proposed residential building. For a conservative analysis, it is assumed that the rooftop HVAC equipment would be installed at the edge of the building closest to receptors and with no acoustical shielding. As mentioned above, the nearest sensitive receptor is the Extended Stay America hotel across Del Amo Circle. HVAC units are typically 72 dBA Leq at a distance of 3 feet. The proposed residential building would be approximately 75 feet from the hotel property line. At 75 feet, noise levels would attenuate to 44 dBA. This would not exceed the TMC daytime nor nighttime exterior noise standard of 55 dBA and 50 dBA, respectively.

A trash compactor will be placed within the interior of the proposed parking garage on the ground floor. All trash compacting noise would be fully shielded and noise would be blocked by the parking garage structure. Therefore, trash compacting noise would be not perceptible to offsite sensitive receptors.

ROOFTOP DECK

The proposed project would have a rooftop amenity deck consisting of an outdoor residential pool, firepits, barbeque pits, and general seating for residents. No amplified equipment is proposed to be installed as part of the rooftop amenity deck. Because these amenities are associated with a residential non-commercial use, the main source generated from the activated outdoor amenities would be speech from conversations. A typical conversation between two people at a distance of 3 feet is 60 dBA and for instance a group of 10 people talking would generate noise levels of approximately 67 dBA if close together (Engineering Toolbox

2005). However, people would likely be scattered throughout the amenity deck. The nearest noise-sensitive receptor to the rooftop amenity deck is approximately 240 feet to the northwest (senior housing under development). At that distance noise levels (for a group of people) would attenuate to approximately 29 dBA. This is well below the existing environment and well below the TMC daytime and nighttime exterior noise standard of 55 dBA and 50 dBA, respectively. Because the amenities would be located on the rooftop, the direct line of sight from the rooftop to the ground receptors would be largely blocked, thereby reducing levels by at least an additional 5 dBA.⁴ Additionally, the rooftop amenities would not be open to the public but would be accessible to residents and guests only.

GROUND-FLOOR COURTYARDS

The proposed project would have two ground-floor courtyards on the western portion of the project site. One courtyard would be largely enclosed by the proposed residential building itself, except for the entryway next to Del Amo Circle. The second courtyard would be just north of the first and partially enclosed by the proposed residential building's north, east, and south facades. The main noise source associated with the proposed courtyards would be conversations typically with two people. These passive spaces are usually quiet in nature used for residences quiet leisure. As stated above, a typical conversation generates noise levels of 67 dBA at a distance of 3 feet for a group of people. The nearest sensitive receptor to the courtyards is the Extended Stay America hotel, approximately 95 feet to the west. At 95 feet, noise levels would attenuate to 37 dBA (not accounting for acoustical shielding due to partial enclosure of the courtyards). Therefore, noise levels would not substantially increase ambient noise levels and noise sensitive receptors and would not exceed the TMC daytime nor nighttime exterior noise standard of 55 dBA and 50 dBA, respectively.

Traffic Noise

A project will normally have a significant effect on the environment related to noise if it will substantially increase the ambient noise levels for adjoining areas. Most people can detect changes in sound levels of approximately 3 dBA under normal, quiet conditions, and changes of 1 to 3 dBA are perceptible under quiet, controlled conditions. Changes of less than 1 dBA are usually indiscernible. A change of 5 dBA is readily discernible to most people in an exterior environment. Based on this, the following thresholds of significance—similar to those recommended by the Federal Aviation Administration (FAA)—are used to assess traffic noise impacts at sensitive receptor locations. A significant impact would occur if traffic noise increase would exceed:

- » 1.5 dBA in an ambient noise environment of 65 dBA CNEL and higher.
- » 3 dBA in an ambient noise environment of 60 to 64 CNEL.
- » 5 dBA in an ambient noise environment of less than 60 dBA CNEL.

Project-related traffic noise increases were calculated using study roadway segment volumes provided by LLG for existing and opening year scenarios with and without the project trip contributions. Results are summarized in Table 4. Traffic modeling based on data provided by LLG indicates that project-related increases would be up to 0.3 dBA CNEL along Carson Street, between Anza Avenue and Hawthorne Boulevard. Traffic noise increases would not exceed 1.5 dBA CNEL (the lowest acceptable increase).

⁴ Federal Highway Administration. 2001. Keeping the Noise Down, Highway Traffic Noise Barriers. https://www.fhwa.dot.gov/Environment/noise/noise_barriers/design_construction/keepdown.pdf. Accessed August 10, 2022.

Table 4 Project Traffic Noise Increase

Roadway Segment	ADT				dBA CNEL	
	Existing No Project	Existing Plus Project	Opening Year Plus Ambient No Project	Opening Year Plus Ambient With Project	Project Noise Increase Over Existing Conditions	Opening Year With Project Noise Increase
Anza Avenue -Torrance Boulevard and Lenore Street	27,425	27,470	27,889	27,934	0.0	0.1
Anza Avenue - Lenore Street and Carson Street	27,425	27,470	27,889	27,934	0.0	0.1
Anza Avenue -Carson Street and Sepulveda Boulevard	26,410	26,501	26,889	26,980	0.0	0.1
Torrance Boulevard - Anza Avenue and Hawthorne Boulevard	28,441	28,555	28,952	29,066	0.0	0.1
Carson Street - Anza Avenue and Hawthorne Boulevard	14,221	14,739	14,729	15,247	0.2	0.3
Ocean Avenue - Torrance Boulevard and Carson Street	2,032	2,055	2,064	2,087	0.0	0.1
Hawthorne Boulevard - Torrance Boulevard and Carson Street	67,040	67,317	68,304	68,581	0.0	0.1
Hawthorne Boulevard - Carson Street and Sepulveda Boulevard	61,961	62,188	63,170	63,397	0.0	0.1
Torrance Boulevard - Hawthorne Boulevard and Madrona Avenue	35,551	35,669	36,193	36,311	0.0	0.1
Carson Street - Hawthorne Boulevard and Madrona Avenue	28,441	28,550	28,965	29,074	0.0	0.1
Madrona Avenue - Torrance Boulevard and Carson Street	33,520	33,538	34,061	34,079	0.0	0.1

Source: LLG Engineers, 2022.

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

Construction can generate varying degrees of ground vibration, depending on the construction procedures and equipment. Operation of construction equipment generates vibrations that spread through the ground and diminish with distance from the source. The effect on buildings in the vicinity of the construction site varies depending on soil type, ground strata, and receptor-building construction. The effects from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibrations at moderate levels, to slight structural damage at the highest levels. Vibration from construction activities rarely reaches the levels that can damage structures.

As stated above in *Applicable Standards*, the City of Torrance does not have established thresholds for vibration. Therefore, the FTA criteria in Table 2 is used to determine impact significance at nearby structures. To determine potential vibration-induced architectural damage, it is conservatively assumed that construction equipment could operate at the edge of the project site. Therefore, the distance from the vibration source (construction equipment) to the sensitive receptor is measured from the edge of the construction site to the nearest structure’s façades. The proposed project involves construction activities adjacent to the parking structure at the Del Amo Crossing Commercial Center. Specifically, pavement stripping, grading, and repaving for the proposed roadway could occur within 15 feet of the adjacent parking structure. Such structures are built with reinforced concrete, and the FTA threshold of 0.5 in/sec PPV could be appropriately applicable, but for a conservative analysis a threshold of 0.3 in/sec PPV is used. Other surrounding nearby structures include the Banc of California at approximately 30 feet to the east, the future senior housing and residential structures approximately 65 feet to the north and 145 feet to the southwest, respectively. Table 5 summarizes vibration levels for typical construction equipment at a reference distance of 25 feet and distances to the surrounding structures.

Table 5 Vibration Levels for Typical Construction Equipment

Equipment	FTA Reference PPV (in/sec) at 25 feet	Parking Structure to northeast at 15 feet	Banc of California Structure to east at 30 feet	Residential Structures to southwest at 145 feet	Future Senior Housing to north at 65 feet
		FTA threshold of 0.3 in/sec PPV	FTA threshold of 0.3 in/sec PPV	FTA threshold of 0.2 in/sec PPV	FTA threshold of 0.2 in/sec PPV
Vibratory Roller	0.21	0.452	0.0160	0.015	0.050
Large Bulldozer	0.089	0.191	0.068	0.006	0.021
Loaded Trucks	0.079	0.164	0.058	0.005	0.018
Jackhammer	0.035	0.075	0.027	0.003	0.008
Small Bulldozer	0.003	0.006	0.002	<0.001	0.001
Exceeds FTA Threshold?		Yes	No	No	No

Source: FTA, 2018. *Transit Noise and Vibration Impact Assessment*, September.

Paving activities and equipment within 15 feet of the parking structure could result in excessive groundborne vibration levels at the adjacent parking structure. However, with incorporation of Reduction Measure NOI-1, project-related vibration levels would be reduced to below 0.3 in/sec PPV.

REDUCTION MEASURE

NOI-1 During construction activity, specifically paving and vibration compaction within 15 feet of any structure, the construction contractor(s) shall use a static roller in lieu of a vibratory roller. Specifically, use of a static roller is predicted to generate vibration levels of approximately 0.05 in/sec PPV at a distance of 25 feet (New Zealand Transport Agency

2012). At 15 feet, vibration levels would be approximately 0.11 in/sec PPV. Prior to issuance of any construction permits, the vibration equipment requirements shall be noted on all construction management plans and architectural building plans and verified by the City of Torrance Planning Division.

c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a 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?

The nearest airport to the project site is Zamperini Field Airport, approximately 1.5 miles to the south. This is outside of the airport land use plan. The proposed project would not expose people residing or working in the project area to excessive noise levels.

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**Attachment A Noise Fundamentals and Noise and Vibration
Modeling Data**

Fundamentals of Noise

NOISE

Noise is most often defined as unwanted sound; whether it is loud, unpleasant, unexpected, or otherwise undesirable. Although sound can be easily measured, the perception of noise and the physical response to sound complicate the analysis of its impact on people. People judge the relative magnitude of sound sensation in subjective terms such as “noisiness” or “loudness.”

Noise Descriptors

The following are brief definitions of terminology used in this chapter:

- **Sound.** A disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- **Noise.** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- **Decibel (dB).** A unitless measure of sound, expressed on a logarithmic scale and with respect to a defined reference sound pressure. The standard reference pressure is 20 micropascals (20 μPa).
- **A-Weighted Decibel (dBA).** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- **Equivalent Continuous Noise Level (L_{eq}); also called the Energy-Equivalent Noise Level.** The value of an equivalent, steady sound level which, in a stated time period (often over an hour) and at a stated location, has the same A-weighted sound energy as the time-varying sound. Thus, the L_{eq} metric is a single numerical value that represents the equivalent amount of variable sound energy received by a receptor over the specified duration.
- **Statistical Sound Level (L_n).** The sound level that is exceeded “n” percent of time during a given sample period. For example, the L_{50} level is the statistical indicator of the time-varying noise signal that is exceeded 50 percent of the time (during each sampling period); that is, half of the sampling time, the changing noise levels are above this value and half of the time they are below it. This is called the “median sound level.” The L_{10} level, likewise, is the value that is exceeded 10 percent of the time (i.e., near the maximum) and this is often known as the “intrusive sound level.” The L_{90} is the sound level exceeded 90 percent of the time and is often considered the “effective background level” or “residual noise level.”
- **Maximum Sound Level (L_{max}).** The highest RMS sound level measured during the measurement period.
- **Root Mean Square Sound Level (RMS).** The square root of the average of the square of the sound pressure over the measurement period.

- **Day-Night Sound Level (L_{dn} or DNL).** The energy-average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the sound levels occurring during the period from 10:00 PM to 7:00 AM.
- **Community Noise Equivalent Level (CNEL).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 5 dB added from 7:00 PM to 10:00 PM and 10 dB from 10:00 PM to 7:00 AM. NOTE: For general community/environmental noise, CNEL and L_{dn} values rarely differ by more than 1 dB (with the CNEL being only slightly more restrictive – that is, higher than the L_{dn} value). As a matter of practice, L_{dn} and CNEL values are interchangeable and are treated as equivalent in this assessment.
- **Peak Particle Velocity (PPV).** The peak rate of speed at which soil particles move (e.g., inches per second) due to ground vibration.
- **Sensitive Receptor.** Noise- and vibration-sensitive receptors include land uses where quiet environments are necessary for enjoyment and public health and safety. Residences, schools, motels and hotels, libraries, religious institutions, hospitals, and nursing homes are examples.

Characteristics of Sound

When an object vibrates, it radiates part of its energy in the form of a pressure wave. Sound is that pressure wave transmitted through the air. Technically, airborne sound is a rapid fluctuation or oscillation of air pressure above and below atmospheric pressure that creates sound waves.

Sound can be described in terms of amplitude (loudness), frequency (pitch), or duration (time). Loudness or amplitude is measured in dB, frequency or pitch is measured in Hertz [Hz] or cycles per second, and duration or time variations is measured in seconds or minutes.

Amplitude

Unlike linear units such as inches or pounds, decibels are measured on a logarithmic scale. Because of the physical characteristics of noise transmission and perception, the relative loudness of sound does not closely match the actual amounts of sound energy. Table 1 presents the subjective effect of changes in sound pressure levels. Ambient sounds generally range from 30 dBA (very quiet) to 100 dBA (very loud). Changes of 1 to 3 dB are detectable under quiet, controlled conditions, and changes of less than 1 dB are usually not discernible (even under ideal conditions). A 3 dB change in noise levels is considered the minimum change that is detectable with human hearing in outside environments. A change of 5 dB is readily discernible to most people in an exterior environment, and a 10 dB change is perceived as a doubling (or halving) of the sound.

Table 1 Noise Perceptibility

Change in dB	Noise Level
± 3 dB	Barely perceptible increase
± 5 dB	Readily perceptible increase
± 10 dB	Twice or half as loud
± 20 dB	Four times or one-quarter as loud

Source: California Department of Transportation (Caltrans). 2013, September. Technical Noise Supplement ("TeNS").

Frequency

The human ear is not equally sensitive to all frequencies. Sound waves below 16 Hz are not heard at all, but are “felt” more as a vibration. Similarly, though people with extremely sensitive hearing can hear sounds as high as 20,000 Hz, most people cannot hear above 15,000 Hz. In all cases, hearing acuity falls off rapidly above about 10,000 Hz and below about 200 Hz.

When describing sound and its effect on a human population, A-weighted (dBA) sound levels are typically used to approximate the response of the human ear. The A-weighted noise level has been found to correlate well with people’s judgments of the “noisiness” of different sounds and has been used for many years as a measure of community and industrial noise. Although the A-weighted scale and the energy-equivalent metric are commonly used to quantify the range of human response to individual events or general community sound levels, the degree of annoyance or other response also depends on several other perceptibility factors, including:

- Ambient (background) sound level
- General nature of the existing conditions (e.g., quiet rural or busy urban)
- Difference between the magnitude of the sound event level and the ambient condition
- Duration of the sound event
- Number of event occurrences and their repetitiveness
- Time of day that the event occurs

Duration

Time variation in noise exposure is typically expressed in terms of a steady-state energy level equal to the energy content of the time varying period (called L_{eq}), or alternately, as a statistical description of the sound level that is exceeded over some fraction of a given observation period. For example, the L_{50} noise level represents the noise level that is exceeded 50 percent of the time; half the time the noise level exceeds this level and half the time the noise level is less than this level. This level is also representative of the level that is exceeded 30 minutes in an hour. Similarly, the L_2 , L_8 and L_{25} values represent the noise levels that are exceeded 2, 8, and 25 percent of the time or 1, 5, and 15 minutes per hour, respectively. These “n” values are typically used to demonstrate compliance for stationary noise sources with many cities’ noise ordinances. Other values typically noted during a noise survey are the L_{min} and L_{max} . These values represent the minimum and maximum root-mean-square noise levels obtained over the measurement period, respectively.

Because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law and many local jurisdictions use an adjusted 24-hour noise descriptor called the Community Noise Equivalent Level (CNEL) or Day-Night Noise Level (L_{dn}). The CNEL descriptor requires that an artificial increment (or “penalty”) of 5 dBA be added to the actual noise level for the hours from 7:00 PM to 10:00 PM and 10 dBA for the hours from 10:00 PM to 7:00 AM. The L_{dn} descriptor uses the same methodology except that there is no artificial increment added to the hours between 7:00 PM and 10:00 PM. Both descriptors give roughly the same 24-hour level, with the CNEL being only slightly more restrictive (i.e., higher). The CNEL or L_{dn} metrics are commonly applied to the assessment of roadway and airport-related noise sources.

Sound Propagation

Sound dissipates exponentially with distance from the noise source. This phenomenon is known as “spreading loss.” For a single-point source, sound levels decrease by approximately 6 dB for each doubling of distance from the source (conservatively neglecting ground attenuation effects, air absorption factors, and barrier shielding). For example, if a backhoe at 50 feet generates 84 dBA, at 100 feet the noise level would be 79 dBA, and at 200 feet it would be 73 dBA. This drop-off rate is appropriate for noise generated by on-site operations from stationary equipment or activity at a project site. If noise is produced by a line source, such as highway traffic, the sound decreases by 3 dB for each doubling of distance over a reflective (“hard site”) surface such as concrete or asphalt. Line source noise in a relatively flat environment with ground-level absorptive vegetation decreases by an additional 1.5 dB for each doubling of distance.

Psychological and Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects the entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions, thereby affecting blood pressure and functions of the heart and the nervous system. Extended periods of noise exposure above 90 dBA results in permanent cell damage, which is the main driver for employee hearing protection regulations in the workplace. For community environments, the ambient or background noise problem is widespread, through generally worse in urban areas than in outlying, less-developed areas. Elevated ambient noise levels can result in noise interference (e.g., speech interruption/masking, sleep disturbance, disturbance of concentration) and cause annoyance. Since most people do not routinely work with decibels or A-weighted sound levels, it is often difficult to appreciate what a given sound pressure level number means. To help relate noise level values to common experience, Table 2 shows typical noise levels from familiar sources.

Table 2 Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
Onset of physical discomfort	120+	
	110	Rock Band (near amplification system)
Jet Flyover at 1,000 feet		
	100	
Gas Lawn Mower at three feet		
	90	
Diesel Truck at 50 feet, at 50 mph		Food Blender at 3 feet
	80	Garbage Disposal at 3 feet
Noisy Urban Area, Daytime		
	70	Vacuum Cleaner at 10 feet
Commercial Area		Normal speech at 3 feet
Heavy Traffic at 300 feet	60	
		Large Business Office
Quiet Urban Daytime	50	Dishwasher Next Room
Quiet Urban Nighttime	40	Theater, Large Conference Room (background)
Quiet Suburban Nighttime		
	30	Library
Quiet Rural Nighttime		Bedroom at Night, Concert Hall (background)
	20	
		Broadcast/Recording Studio
	10	
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

Source: California Department of Transportation (Caltrans). 2013, September. Technical Noise Supplement ("TeNS").

Vibration Fundamentals

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Vibration is normally associated with activities stemming from operations of railroads or vibration-intensive stationary sources, but can also be associated with construction equipment such as jackhammers, pile drivers, and hydraulic hammers. As with noise, vibration can be described by both its amplitude and frequency. Vibration displacement is the distance that a point on a surface moves away from its original static position; velocity is the instantaneous speed that a point on a surface moves; and acceleration is the rate of change of the speed. Each of these descriptors can be used to correlate vibration to human response, building damage, and acceptable equipment vibration levels. During construction, the operation of construction equipment can cause groundborne vibration. During the operational phase of a project, receptors may be subject to levels of vibration that can cause annoyance due to noise generated from vibration of a structure or items within a structure.

Vibration amplitudes are usually described in terms of either the peak particle velocity (PPV) or the root mean square (RMS) velocity. PPV is the maximum instantaneous peak of the vibration signal and RMS is the

square root of the average of the squared amplitude of the signal. PPV is more appropriate for evaluating potential building damage and RMS is typically more suitable for evaluating human response.

As with airborne sound, annoyance with vibrational energy is a subjective measure, depending on the level of activity and the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Persons accustomed to elevated ambient vibration levels, such as in an urban environment, may tolerate higher vibration levels. Table 3 displays the human response and the effects on buildings resulting from continuous vibration (in terms of various levels of PPV).

Table 3 Human Reaction to Typical Vibration Levels

Vibration Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.006–0.019	Threshold of perception, possibility of intrusion	Vibrations unlikely to cause damage of any type
0.08	Vibrations readily perceptible	Recommended upper level of vibration to which ruins and ancient monuments should be subjected
0.10	Level at which continuous vibration begins to annoy people	Virtually no risk of “architectural” (i.e. not structural) damage to normal buildings
0.20	Vibrations annoying to people in buildings	Threshold at which there is a risk to “architectural” damage to normal dwelling – houses with plastered walls and ceilings
0.4–0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause “architectural” damage and possibly minor structural damage

Source: California Department of Transportation (Caltrans). 2020, April. *Transportation and Construction Vibration Guidance Manual*. Prepared by ICF International.

LOCAL REGULATIONS AND STANDARDS

CHAPTER 6
NOISE REGULATION Revised 10/21

ARTICLE 1 - GENERAL PROVISIONS

(Added by O-2170; Amended by O-2211)

46.1.1 DECLARATION OF POLICY.

It is hereby declared to be the policy of the City to prohibit unnecessary, excessive and annoying noises from all sources subject to its police power. At certain levels noises are detrimental to the health and welfare of the citizenry and in the public interests shall be systematically proscribed.

46.1.2 DEFINITIONS.

(Amended by O-2466)

As used in this Chapter, unless the context otherwise clearly indicates, the words and phrases used in this Chapter are defined as follows:

- a) Ambient noise is the all encompassing noise associated with a given environment, being usually a composite of sounds from many sources near and far, without inclusion of intruding noises from isolated identifiable sources.
- b) Decibel (db) shall mean a unit of level which denotes the ratio between two (2) quantities which are proportional to power; the number of decibels corresponding to the ratio to two (2) amounts of power is ten (10) times the logarithm to the base ten (10) of this ratio.
- c) Emergency work shall mean work made necessary to restore property to a safe condition following a public calamity or work required to protect persons or property from an imminent exposure to danger.
- d) Noise level, in decibels, is the A-weighted sound pressure level as measured using the slow dynamic characteristic for sound level meters specified in ASA S1.4-1961, American Standard Specification for General Purpose Sound Level Meters, or latest revision thereof. The reference pressure is twenty (20) micronewtons/square meter (2×10^{-4} microbar).
- e) Person shall mean a person, firm, association, copartnership, joint venture, corporation or any entity, public or private in nature.
- f) Sound level meter shall mean an instrument including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement of noise and sound levels in a specified manner as specified in ASA S1.4-1961, American Standard Specification for General Purpose Sound Level Meters, or latest revision thereof.

- g) Sound pressure level, in decibels (db) of a sound is twenty (20) times the logarithm to the base ten (10) of the ratio of the pressure of this sound to the reference pressure. For the purpose of this Chapter the reference pressure shall be twenty (20) micronewtons/square meter (2×10^{-4} microbar).
- h) Impulsive sound means a short duration sound (such as might be produced by the impact of a drophammer or pile driver) with one (1) second or less duration.
- i) Motor vehicles shall include, but not be limited to, minibikes and go carts.
- j) Sound amplifying equipment shall mean any machine or device for the amplification of the human voice, music, or any other sound. Sound amplifying equipment shall not include standard automobile radios when used and heard only by the occupants of the vehicle in which the automobile radio is installed. Sound amplifying equipment, as used in this Chapter, shall not include warning devices on authorized emergency vehicles or horns or other warning devices on any vehicle used only for traffic safety purposes.
- k) Sound truck shall mean any motor vehicle, or any other vehicle regardless of motive power, whether in motion or stationary, having mounted thereon, or attached thereto, any sound amplifying equipment.
- l) Commercial purpose shall mean and include the use, operation or maintenance of any sound amplifying equipment for the purpose of advertising any business or any goods or any services, or for the purpose of attracting the attention of the public to, or advertising for, or soliciting patronage or customers to or for any performance, show, entertainment, exhibition, or event, or for the purpose of demonstrating any such sound equipment.
- m) Noncommercial purpose shall mean the use, operation or maintenance of any sound equipment for other than a commercial purpose. Noncommercial purposes shall mean and include, but shall not be limited to, philanthropic, political, patriotic and charitable purposes.
- n) Residential land shall mean that land which is utilized for residential purposes or zoned for residential purposes.
- o) Residential purpose means any purpose involving routine and relatively permanent use of a building as a dwelling, as opposed to relatively transient uses such as hotels and motels.
- p) Day means the time period from 7:00 A.M. to 10:00 P.M.
- q) Night means the time period from 10:00 P.M. to 7:00 A.M.

46.1.3 MEASUREMENTS.

Noise levels shall be measured with a sound level meter satisfying the requirements of ASA S1.4-1961, American Standard Specification for General Purpose Sound Level Meters, or latest revision

thereof. Noise level of steady or slowly varying sounds shall be measured using the slow dynamic characteristic of the sound level meter and by reading the central tendency of the needle. Noise level of impulse sounds shall be measured using the fast dynamic characteristic of the sound level meter and by reading the maximum indication of the needle.

ARTICLE 2 - SPECIAL NOISE SOURCES Revised 10/21

46.2.1 RADIOS, TELEVISION SETS AND SIMILAR DEVICES.

a) Use Restricted. It shall be unlawful for any person within the City of Torrance to use or operate any radio receiving set, musical instrument, phonograph, television set, or other machine or device for the producing or reproducing of sound at any time in such a manner as to produce noise levels on residential land which would disturb the peace, quiet and comfort of neighboring residents or any reasonable person of normal sensitiveness residing in the area.

b) Prima Facie Violation. Any noise exceeding the ambient noise level at the property line of any residential land (or if a condominium or apartment house, within any adjoining apartment) by more than five (5) decibels shall be deemed to be prima facie evidence of a violation of the provisions of this Section.

46.2.2 HAWKERS AND PEDDLERS.

It shall be unlawful for any person within the City to sell anything by outcry within any area of the City utilized for residential purposes. The provisions of this Section shall not be construed to prohibit the selling by outcry of merchandise, food and beverages at licensed sporting events, parades, fairs, circuses and other similar licensed public entertainment events.

46.2.3 DRUMS.

It shall be unlawful for any person to use any drum or other instrument or device of any kind for the purpose of attracting attention by the creation of noise within the City. This Section shall not apply to any person who is a participant in a school band or duly licensed parade or who has been otherwise duly authorized by the City to engage in such conduct.

46.2.4 SCHOOLS, HOSPITALS AND CHURCHES.

It shall be unlawful for any person to create any noise on any street, sidewalk or public place adjacent to any school, institution of learning or church while the same is in use or adjacent to any hospital, which noise unreasonably interferes with the workings of such institution or which disturbs or unduly annoys patients in the hospital, provided conspicuous signs are displayed in such streets, sidewalks or public place indicating the presence of a school, church or hospital.

46.2.5 ANIMALS AND FOWL.

No person shall keep or maintain, or permit the keeping of upon any premises owned, occupied or controlled by such person, any animal or fowl otherwise permitted to be kept which, by any sound, cry or behavior shall cause annoyance or discomfort to a reasonable person of normal sensitiveness on any residential land.

46.2.6 MACHINERY, EQUIPMENT, FANS AND AIR CONDITIONING.

It shall be unlawful for any person to operate any machinery, equipment, pump, fan, air conditioning apparatus or similar mechanical device in any manner so as to create any noise which would cause the noise level at the property line of any residential land to exceed the ambient noise level by more than five (5) decibels.

46.2.7 OIL PRODUCTION EQUIPMENT.

(Added by O-2528)

It shall be unlawful for any person to operate, or cause to be operated any oil production equipment in any manner so as to create any noise which would cause the noise level at the nearest property line of any residential land to exceed the ambient noise level by more than five (5) decibels; provided, however, that the aforesaid provisions of this Section shall not apply to oil production equipment being used in the drilling, redrilling, deepening, repair, maintenance or abandonment of an oil well.

46.2.8 TRAIN HORNS AND WHISTLES. Revised 10/21

(Added by O-3894)

It shall be unlawful for any person to operate or sound or cause to be operated or sounded, between the hours of 10:00 p.m. of one day and 7:00 a.m. of the next day, a train horn or train whistle which creates noise in excess of ninety-six (96) dB at any place or point three hundred (300) feet or more distant from along a line normal to the direction of travel of the source of such sound.

ARTICLE 3 - CONSTRUCTION**46.3.1 CONSTRUCTION OF BUILDINGS AND PROJECTS.**

(Amended by O-3712)

- a) It shall be unlawful for any person within the City of Torrance to operate power construction tools, equipment, or engage in the performance of any outside construction or repair work on buildings, structures, or projects in or adjacent to a residential area involving the creation of noise beyond 50 decibels (db) as measured at property lines, except between the hours of 7:30 A.M. to 6:00 P.M. Monday through Friday and 9:00 A.M. to 5:00 P.M. on Saturdays. Construction shall be prohibited on Sundays and Holidays observed by City Hall. An exception exists between the hours of 10:00 A.M. to 4:00 P.M. for homeowners that reside at the property.
- b) The Community Development Director may allow expanded hours and days of construction if unusual circumstances and conditions exist. Such requests must be made in writing and must receive approval by the Director prior to any expansion of the hour and day restrictions listed above.
- c) Every construction project requiring Planning Commission review or considered to be a significant remodel as defined by Section 231.1.2, shall be required to post an information board

along the front property line that displays the property owner's name and contact number, contractor's name and contact number, a copy of TMC Section [46.3.1](#), a list of any special conditions, and the Code Enforcement phone number where violations can be reported.

d) Properties zoned as commercial, industrial or within an established redevelopment District, are exempted from the above day and hour restrictions if a minimum buffer of 300 feet is maintained from the subject property's property line to the closest residential property. The Community Development Director, may, however, revoke such exemption for a particular project if the noise level exceeds 50 decibels (db) at the property line of a residential property beyond the 300 linear foot buffer.

e) Heavy construction equipment such as pile drivers, mechanical shovels, derricks, hoists, pneumatic hammers, compressors or similar devices shall not be operated at any time, within or adjacent to a residential area, without first obtaining from the Community Development Director permission to do so. Such request for permission shall include a list and type of equipment to be used, the requested hours and locations of its use, and the applicant shall be required to show that the selection of equipment and construction techniques has been based on minimization of noise within the limitations of such equipment as is commercially available or combinations of such equipment and auxiliary sound barriers. Such permission to operate heavy construction equipment will be revoked if operation of such equipment is not in accordance to approval. No permission shall be required to perform emergency work as defined in Article 1 of this Chapter.

46.3.2 OPERATION OF OIL EQUIPMENT.

(Added by O-2528)

a) It shall be unlawful for any person to operate machinery or power tools for the repair, maintenance or abandonment of oil well equipment on Sundays and legal holidays and, except between the hours of 7:00 A.M. and 8:00 P.M., on any other day; provided, however, that the provisions of this subsection shall not apply to any well, the surface of which is three hundred (300) or more feet from any dwelling.

b) It shall be unlawful for any person to conduct oil drilling or redrilling operations other than circulation of mud, on Sundays and legal holidays and, except between the hours of 7:00 A.M. and 9:00 P.M., on any other day; provided, however, that the provisions of this subsection shall not apply to any well the surface of which is three hundred (300) or more feet from any dwelling.

c) It shall be unlawful for any person to operate machinery or power tools for the repair, maintenance or abandonment of oil well equipment or to conduct oil well drilling or redrilling operations at any time within three hundred (300) feet of any dwelling without first obtaining from the Director of Building and Safety permission to do so. Such request for permission shall include a list and type of equipment to be used, the requested hours and locations of its use. The Director of Building and Safety shall issue such permit only if the applicant demonstrates to the reasonable

satisfaction of the Director that the selection of equipment and construction techniques has been based on minimization of noise within the limitations of such equipment as is commercially available or combinations of such equipment and auxiliary sound barriers or acoustical sound blankets as provided in Section [46.3.3](#). Such permission to operate oil well equipment shall be revoked if such equipment is not operated and construction is not accomplished in accordance with the conditions of approval. No permission shall be required to perform emergency work as defined in Article 1 of this Chapter. The person performing such emergency work shall first notify the occupants of adjacent residences and the Torrance Police Department as to the nature and extent of the work to be performed.

46.3.3 ACOUSTICAL BLANKETS.

(Added by O-2528)

Acoustical blankets shall be made of fibrous glass insulation 1-1/2 inches thick, 0.50 pounds per cubic foot density, 0.63 pounds per square foot weight, .00010 to .00015 fibre diameter (inches) with phenolic binder having a temperature limit of 450 degrees F. sewed between layers of fire retardant vinyl fibre glass cloth, 15-17 ounces per square yard sewed with dacron thread D-92 with stitches not more than six (6) to the inch. The lacing cord shall be flat vinyl coated tape composed of fibrous glass yard braided, heat set and bonded. The tape shall have a 90 pound tensile strength. Grommets shall be No. 4 brass. Provided, however, that there may be substituted for the aforesaid specifications an acoustical blanket which in the opinion of the Director of Building and Safety is equal to sound-proofing ability and fire resistive qualities to the aforesaid specifications.

ARTICLE 4 - VEHICLES

46.4.1 VEHICLE REPAIRS.

It shall be unlawful for any person within the City of Torrance to repair, rebuild or test any motor vehicle at any time in such a manner that a reasonable person of normal sensitiveness located on residential land is caused discomfort or annoyance by reason of the noise produced therefrom.

46.4.2 MOTOR DRIVEN VEHICLES.

It shall be unlawful for any person to operate any motor driven vehicle within the City in such a manner that a reasonable person of normal sensitiveness residing in the area is caused discomfort or annoyance; provided, however, that any such vehicle which is operated upon any public highway, street or right-of-way shall be excluded from the provisions of this Section, provided the provisions of the California Motor Vehicle Code, Sections 23130, 27150 and 27151 are complied with.

ARTICLE 5 - AMPLIFIED SOUND

(Amended by O-3360)

46.5.1 PURPOSE.

The Council enacts the provisions of this Article for the sole purpose of securing and promoting the

public health, comfort, safety, and welfare for its citizenry. While recognizing that the use of sound amplifying equipment is protected by the constitutional rights of freedom of speech and assembly, the Council nevertheless feels obligated to reasonably regulate the use of sound amplifying equipment in order to protect the correlative constitutional rights of the citizens of this community to privacy and freedom from public nuisance of loud and unnecessary noise.

46.5.2 APPLICATION REQUIRED.

It shall be unlawful for any person, other than personnel of law enforcement or governmental agencies, to install, use or operate within the City a loudspeaker or sound amplifying equipment in a fixed or movable position or mounted upon any sound truck for the purposes of giving instructions, directions, talks, addresses, lectures or transmitting music to any persons or assemblages of persons in or upon any street, alley, sidewalk, park, place or public property without first filing an application and obtaining a permit therefor as set forth in Division 3 of this Code.

46.5.3 REGULATIONS.

The commercial and noncommercial use of sound amplifying equipment shall be subject to the following regulations:

- a) The only sounds permitted shall be either music or human speech, or both.
- b) The operation of sound amplifying equipment shall only occur between the hours of 9:00 A.M. and 9:00 P.M. each day except on Sundays and legal holidays. The operation of sound amplifying equipment for noncommercial purposes on Sundays and legal holidays shall only occur between the hours of 10:00 A.M. and 6:00 P.M.
- c) No sound emanating from sound amplifying equipment shall exceed fifteen (15) dBA above the ambient as measured at any property line.
- d) Notwithstanding the provisions of subsection c) of this Section, sound amplifying equipment shall not be operated within two hundred (200) feet of churches, schools or hospitals.
- e) In any event, the volume of sound shall be so controlled that it will not be unreasonably loud, raucous, jarring, disturbing or a nuisance to reasonable persons of normal sensitiveness within the area of audibility.

ARTICLE 6 - POWERED GARDENING EQUIPMENT Revised 10/21

46.6.1 EXCESSIVE NOISE PROHIBITED. Revised 10/21

(Amended by O-3894)

- a) It shall be unlawful for any person within the City of Torrance to operate power gardening equipment, including but not limited to leaf blowers, mowers and edgers, or engage in the performance of gardening work with powered equipment in or adjacent to a residential area involving the creation of noise beyond fifty (50) decibels (dB) as measured at property lines, except

between the hours of 7:30 a.m. to 6:00 p.m. Monday through Friday and 9:00 a.m. to 5:00 p.m. on Saturdays. Operation of powered gardening equipment shall be prohibited on Sundays and holidays observed by City Hall. An exception exists between the hours of 10:00 a.m. to 4:00 p.m. for homeowners that reside at the property.

b) Properties zoned as commercial, industrial or within an established redevelopment district are exempted from the above day and hour restrictions if a minimum buffer of three hundred (300) feet is maintained from the subject property’s property line to the closest residential property. The Community Development Director may, however, revoke such exemption for a particular property if the noise level exceeds fifty (50) decibels (dB) at the property line of a residential property beyond the three hundred (300) linear foot buffer.

ARTICLE 7 - GENERAL NOISE REGULATIONS

46.7.1 GENERAL NOISE REGULATIONS.

Notwithstanding any other provision of this Chapter and in addition thereto, it shall be unlawful for any person to willfully make or continue, or cause to be made or continued, any loud, unnecessary or unusual noise which disturbs the peace or quiet of any neighborhood or which causes discomfort or annoyance to any reasonable person of normal sensitiveness residing in the area.

46.7.2 NOISE LIMITS.

To provide for methodical enforcement and to give reasonable notice of the performance standards to be met, the foregoing intent is expressed in the following numerical standards. For purposes of this Chapter, the City is divided into regions as set forth in Exhibit A.

a) Noise Limits on Residential Land. It shall be unlawful for any person within the City of Torrance (wherever located) to produce noise in excess of the following levels as received on residential land owned or occupied by another person within the designated regions. In addition to the noise limits stated herein, the noise limits set forth in Sec. 46.7.2.b) shall also be complied with.

- 1) For noise receivers located on residential land, for measurement positions five hundred (500) feet or more distant from the boundaries of Regions 1 and 2, the following limits apply:

REGION (in which noise receiver is located)	NOISE LEVEL, db	
	Day	Night
3	50	45
4	55	50

- 2) For noise receivers located on residential land, for positions within five hundred (500) feet from the boundary of Region 1 or 2, the following limits apply:

Five (5) dB above the limits set forth in Section 46.7.2.a) 1 above, or 5 dB above the ambient noise

level, whichever is the lower number.

b) Noise Limits at Industrial and Commercial Boundaries:

- 1) Noise Sources in Region 1: It shall be unlawful for any person in Region 1 to produce noise levels at the boundary of Region 1 in excess of 70 dB during the day or 65 dB during the night.
- 2) Noise Sources in Region 2: It shall be unlawful for any person in Region 2 to produce noise levels at the boundary of Region 2 in excess of 60 dB during the day or 55 dB during the night.
- 3) Noise Sources in All Remaining Industrial Use Land: It shall be unlawful for any person on industrial use land outside Region 1 and 2 to produce noise levels at his own property boundary in excess of 60 dB during the day or 55 dB during the night.
- 4) Noise Sources on All Land Use for Commercial Purposes: It shall be unlawful for any person on land used for commercial purposes to produce noise levels at his own property boundary in excess of 60 dB during the day or 55 dB during the night.

In addition to the noise limits set forth herein (Sec. 46.7.2.b), the noise limits set forth in Sec. 46.7.2.(a) shall also be complied with.

c) Corrections to the Noise Limits: The numerical limits given in Sec. 46.7.2.(a) and (b) shall be adjusted by addition of the following corrections where appropriate.

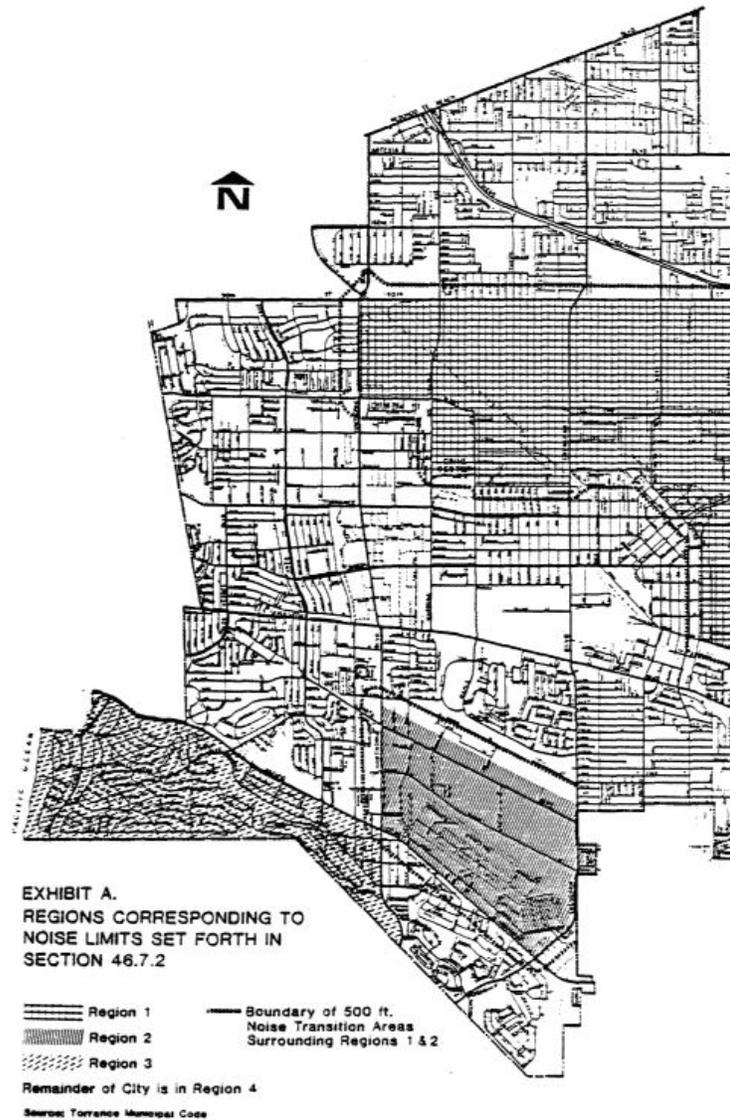
Noise Conditions	Correction to the Limits, decibels
1. Noise contains a steady, audible tone, such as a whine, screech or hum	-5
2. Noise is a repetitive impulsive noise, such as hammering or riveting	-5
3. If the noise is not continuous, one of the following corrections to the limits shall be applied:	
a) Noise occurs less than 5 hours per day or less than 1 hour per night	+5
b) Noise occurs less than 90 minutes per day or less than 20 minutes per night	+10
c) Noise occurs less than 30 minutes per day or less than 6 minutes per night	+15
4. Noise occurs on Sunday morning (between	-5

12:01 A.M. and 12:01 P.M. Sunday)

46.7.3 EXCEPTIONS.

The following noise sources are specifically excluded from the provisions of this Chapter:

- 1) Aircraft in flight.
- 2) Motor vehicles operating in accordance with Sec. 46.4.2. and in accordance with all the sections of the California Motor Vehicles Code.



ARTICLE 8 - AIRPORT NOISE LIMITS

(Added by O-2784)

46.8.1 VIOLATIONS UNLAWFUL.

It shall be unlawful for any person to pilot or operate or permit to be piloted or operated an aircraft in violation of the provisions of Sections [46.8.8.](#), [46.8.9.](#) or [46.8.14.](#)

46.8.2 EXTENDED AIRPORT BOUNDARIES DEFINED.

For the purposes of this Article, the term extended airport boundaries shall mean the area enclosed by Lomita Boulevard on the north, Crenshaw Boulevard on the east, Pacific Coast Highway on the south and Hawthorne Boulevard on the west.

46.8.3 TAKE-OFF DEFINED.

(Amended by O-3270)

For the purposes of this Article, take-off shall mean the flight of an aircraft departing Torrance Airport from the time it commences on its departure on the runway.

46.8.4 LANDING DEFINED.

(Amended by O-3270)

For the purposes of this Article, landing shall mean the flight of an aircraft from the time it begins its landing approach until it is taxied from the runway.

46.8.5 SOUND EXPOSURE LEVEL.

For the purposes of this Article, the sound exposure level is the level of sound accumulated during a given event, with reference to a duration of one second. More specifically, sound exposure level, in decibels, is the level of the time-integrated A-weighted squared sound pressure for a stated time interval or event, based on the reference pressure of 20 micronewtons per square meter and reference duration of one second.

46.8.6 SENEL.

For the purposes of this Article, the single event noise exposure level (SENEL), in decibels, is the sound exposure level of a single event, such as an aircraft fly-by, measured over the time interval between the initial and final times for which the sound level of a single event exceeds the threshold sound level. For implementation of the provisions of this Article, the threshold noise level shall be at least 20 decibels below the numerical value of the single event noise exposure level limits specified in Sections [46.8.8.](#) or [46.8.9.](#) as the case may be.

46.8.7 MAXIMUM SOUND LEVEL DEFINED.

For the purposes of this Article, the maximum sound level, in decibels, is the highest sound level reached at any instant of time during the time interval used in measuring the sound exposure level of a single event.

46.8.8 AIRCRAFT NOISE LIMIT.

Except as provided in Section [46.8.10.](#), no aircraft taking off from or landing on the Torrance

Municipal Airport may exceed a single event noise exposure level (SENEL) of 88 dBA or a maximum sound level of 82 dBA measured at ground level outside the extended Airport boundaries.

46.8.9 AIRCRAFT NOISE LIMIT AT NIGHT.

(Amended by O-3284)

Notwithstanding the provisions of Section [46.8.8](#), except as provided in Section [46.8.10](#), no aircraft taking off from or landing on the Torrance Municipal Airport between the hours of 10:00 P.M. of any day and 7:00 A.M. of the following morning on any Monday through Friday inclusive, nor between the hours of 10:00 P.M. each night and 8:00 A.M. of the following morning on any Saturday or Sunday inclusive, nor on any of the following holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day; provided, however, that if any such holiday falls on a Saturday or Sunday, the observance of which is then moved to the preceding Friday, or the following Monday, then such Friday or Monday shall be considered to be a holiday for purposes of this section, may exceed a single event noise exposure level (SENEL) of 82 dBA or a maximum sound level of 76 dBA measured at ground level outside the extended Airport boundaries.

46.8.10 AIRCRAFT NOISE EXEMPTION.

(Amended by O-3382)

The following categories of aircraft shall be exempt from the provisions of Sections [46.8.8](#) and [46.8.9](#):

- 1) Aircraft operated by the United States of America or the State of California;
- 2) Law enforcement, emergency, fire or rescue aircraft operated by any county or city of said state;
- 3) Aircraft used for emergency purposes during an emergency that has been officially proclaimed by competent authority pursuant to the laws of the United States, said State or the City;
- 4) Civil Air Patrol aircraft when engaged in actual search and rescue missions;
- 5) Aircraft engaged in landings or takeoffs while conducting tests under the direction of the Airport Manager in an attempt to rebut the presumption of aircraft noise violation pursuant to the provisions of Section [46.8.13](#)
- 6) Aircraft while participating in a City-sponsored event approved by City Council.

46.8.11 CULPABILITY OF INSTRUCTOR PILOT.

In the case of any training flight in which both an instructor pilot and a student pilot are in the aircraft which is flown in violation of any of the provisions of this Article, the instructor pilot shall be

rebuttably presumed to have caused such violation.

46.8.12 CULPABILITY OF AIRCRAFT OWNER OR LESSEE.

For purposes of this Article, the beneficial owner of an aircraft shall be presumed to be the pilot of the aircraft with authority to control the aircraft's operations, except that where the aircraft is leased, the lessee shall be presumed to be the pilot. Such presumption may be rebutted only if the owner or lessee identifies the person who in fact was the pilot at the time of the asserted violation.

46.8.13 DENIAL OF USE OF AIRPORT.

(See Section 51.7.2. et seq. concerning denial of the use of the Airport for repeated violations of this Article.)

46.8.14 PRESUMPTION OF AIRCRAFT NOISE VIOLATION.

In the event that the Airport Manager determines to his reasonable satisfaction that available published noise measurements for a particular type or class of aircraft indicate that it cannot meet the noise levels set forth in Sections [46.8.8.](#) and [46.8.9.](#), it shall be presumed that operation of such aircraft will result in violation of the provisions of Sections [46.8.8.](#) and [46.8.9.](#) and such aircraft will not be permitted to land on, tie down on, be based at or take off from the Torrance Municipal Airport, except in emergencies as set forth in Section 51.4.2.; provided, however, that the owner or operator of such aircraft shall be entitled to rebut such presumption to the reasonable satisfaction of the Airport Manager by furnishing evidence to the contrary.

46.8.15 DESIGNATED ENFORCEMENT OFFICIAL.

The Director of Building and Safety, the Administrator of Environmental Quality, the Environmental Quality Officers and such other City employees as are designated by the Director of Building and Safety with the approval of the City Manager, all acting under the direction and control of the City Manager, shall have the duty and authority to enforce the provisions of this Article, pursuant to the provisions of Section 836.5 of the State Penal Code.

Figure N-5

Noise Limit Regions

Legend

NoiseRegions

■ Noise Limit Regions

	Day	Night
Region 1	70	65
Region 2	60	55
Region 3	50	45
Region 4	55	50

Region 4: Remainder of City

▨ 500 Ft. Noise Transition Area

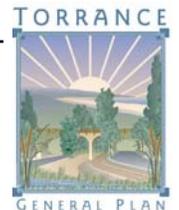
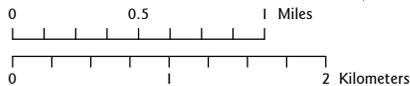
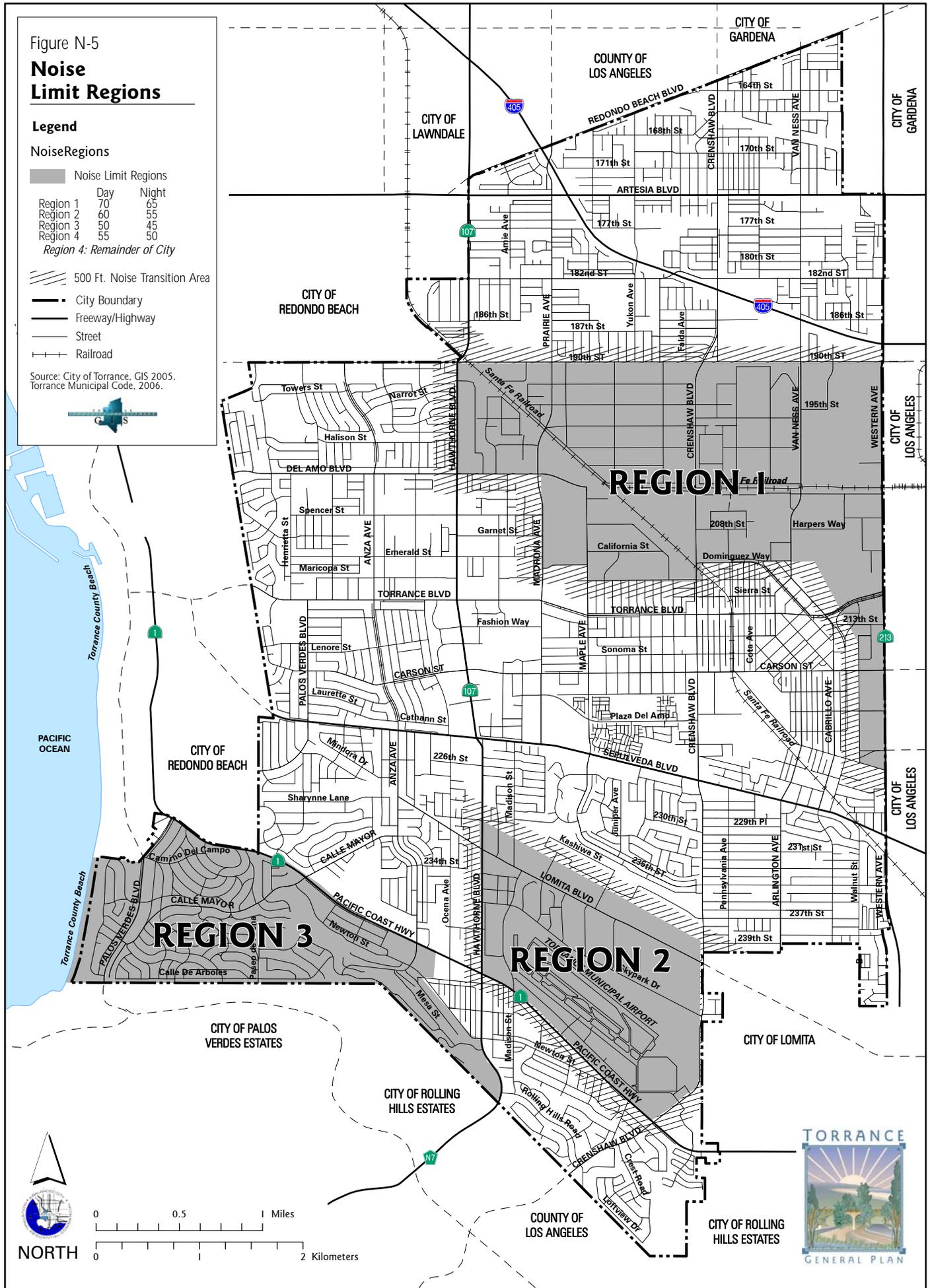
— City Boundary

— Freeway/Highway

— Street

— Railroad

Source: City of Torrance, GIS 2005.
Torrance Municipal Code, 2006.



CONSTRUCTION NOISE MODELING

LEGP-01 Construction Noise Modeling Attenuation Calculations

Levels in dBA Leq

Phase	RCNM Reference Noise Level	Extended Stay		
		America (hotel) to west	Residences to SW	Senior Homes to North
<i>Distance in feet</i>	50	160	260	130
Demolition	85	75	71	77
Site Preperation	85	75	71	77
Grading	85	74	70	76
<i>Distance in feet</i>	50	340	390	340
Paving/Finishing	85	68	67	68
<i>Distance in feet</i>	50	100	160	75
Building Construction	83	77	73	79
Architectural Coating	74	68	64	70

Attenuation calculated through Inverse Square Law: $L_p(R2) = L_p(R1) - 20\text{Log}(R2/R1)$

LEGP-01 Vibration Damage Attenuation Calculations

Levels in in/sec PPV

<i>Distance in feet</i>	Vibration Reference Level at 25 feet	Parking structure to east 15	Bank structure to east 30	Residential structure to southwest 145	Senior Housing to north 65
Vibratory Roller	0.21	0.452	0.160	0.015	0.050
Large Bulldozer	0.089	0.191	0.068	0.006	0.021
Loaded Trucks	0.076	0.164	0.058	0.005	0.018
Jackhammer	0.035	0.075	0.027	0.003	0.008
Small Bulldozer	0.003	0.006	0.002	0.000	0.001
Clam shovel	0.202	0.435	0.154	0.014	0.048

TRAFFIC NOISE MODELING

LEGP-01**Traffic Noise Calculations**

Roadway Segment	ADT Volumes				dBA CNEL Increase	
	Existing No Project	Existing Plus Project	Opening Year Plus Ambient No Project	Opening Year Plus Ambient With Project	Project Noise Increase	Cumulative Increase
Anza Avenue, between Torrance Boulevard and Lenore Street	27,425	27,470	27,889	27,934	0.0	0.1
Anza Avenue, between Lenore Street and Carson Street	27,425	27,470	27,889	27,934	0.0	0.1
Anza Avenue, between Carson Street and Sepulveda Boulevard	26,410	26,501	26,889	26,980	0.0	0.1
Torrance Boulevard, between Anza Avenue and Hawthorne Boulevard	28,441	28,555	28,952	29,066	0.0	0.1
Carson Street, between Anza Avenue and Hawthorne Boulevard	14,221	14,739	14,729	15,247	0.2	0.3
Ocean Avenue, between Torrance Boulevard and Carson Street	2,032	2,055	2,064	2,087	0.0	0.1
Hawthorne Boulevard, between Torrance Boulevard and Carson Street	67,040	67,317	68,304	68,581	0.0	0.1
Hawthorne Boulevard, between Carson Street and Sepulveda Boulevard	61,961	62,188	63,170	63,397	0.0	0.1
Torrance Boulevard, between Hawthorne Boulevard and Madrona Avenue	35,551	35,669	36,193	36,311	0.0	0.1
Carson Street, between Hawthorne Boulevard and Madrona Avenue	28,441	28,550	28,965	29,074	0.0	0.1
Madrona Avenue, between Torrance Boulevard and Carson Street	33,520	33,538	34,061	34,079	0.0	0.1