

## **Appendix C      Noise Analysis**

## Appendices

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# Fundamentals of Noise

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## 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  $\mu\text{Pa}$ ).
- **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 ( $L_{\text{eq}}$ ); 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  $L_{\text{eq}}$  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 ( $L_{\text{max}}$ ).** 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

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**Chapter 8.47 NOISE CONTROL**

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**Note**

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\* **Prior ordinance history:** Ord. Nos. 1949, 1950, and 2258.

**8.47.020 Definitions**

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The following words, phrases, and terms as used in this chapter shall have the meaning as indicated below:

“Actual measured ambient noise level” shall mean that noise level existing in the general area of the noise problem, excluding the noise generated by the noise source being evaluated.

“Ambient base noise level” shall mean the maximum loudness level normally found to be acceptable for given land uses and that serves as the basis for determining loudness noise violations pursuant to the provisions of Section [8.48.040](#) of this chapter.

“Ambient noise level” shall mean the all-encompassing background noise associated with a given environment, being usually a composite of sounds from many sources near and far.

“Commercial use” shall mean any enterprise whose principal endeavor is the sale of goods and/or services.

“Decibel (dB)” shall mean a unit that denotes the ratio between two quantities that are proportional to power: the number of decibels corresponding to the ratio of two amounts of power is 10 times the logarithm to the base 10 of this ratio. The commonly used unit for measuring sound pressure levels.

“Emergency” means operations 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 or work by private or public utilities when restoring utility service.

“Industrial use” means any facility or operations involved in the manufacturing, repairing, testing, processing, warehousing, wholesaling, researching, and treatment of products.

“Institutional use” means an establishment maintained and operated by a society, church, corporation, individual, foundation, or public agency for the purpose of providing religious, charitable, social, educational, fraternal, or similar services.

“Noise” means any sound that exceeds the appropriate actual or presumed ambient noise level, that annoys or tends to disturb humans, or that causes or tends to cause an adverse psychological or physiological effect on humans of normal sensitiveness.

“Office-professional use” means any enterprise engaged in providing business or professional services.

“Residential use” means any structure utilized principally for human habitation, excluding hotels, motels, and recreational vehicle parks.

“Sound amplifying equipment” means any device for the amplification of the human voice, music, or any other sound and does not include standard automobile radios when used and heard only by the occupants of the vehicle in which the automobile radio is installed or devices on authorized emergency vehicles or horns or other warning devices on any vehicle used only for traffic safety purposes.

“Sound level in decibels (dB)” means the sound measured utilizing the A-weighting scale and the slow needle response by a sound level meter.

“Sound level meter” means an instrument meeting American National Standard Institutes Standard S1.4-1971 for Type 1 or Type 2 sound level meters or an equivalent standard. (2802 § 1, 2011; 2660 § 2, 2005)

**8.47.030 Noise Level Measurement**

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All noise level measurements made pursuant to the provisions of this chapter shall be performed using a sound level meter as defined in Section [8.47.020](#), using a fast needle response, utilizing the dB(A) scale. (2802 § 1, 2011; 2660 § 2, 2005)

#### 8.47.040 Ambient Base Noise Levels

The ambient base noise levels contained in the following chart shall be utilized as the basis for determining noise levels in excess of those allowed by this chapter unless the actual measured ambient noise level occurring at the same time as the noise under review is being investigated exceeds the ambient base noise level contained in the chart. When the actual measured ambient noise level exceeds the ambient base noise level, the actual measured ambient noise level shall be utilized as the basis for determining whether or not the subject noise exceeds the level allowed by this section. In situations where two adjoining properties exist within two different use designations, the most restrictive ambient base noise level will apply. This section permits any noise level that does not exceed either the ambient base noise level or the actual measured ambient noise level by 5 dB(A), as measured at the property line of the noise generation property.

USE CATEGORIES	USE DESIGNATIONS	AMBIENT BASE NOISE LEVELS	TIME OF DAY
Sensitive	Residential Use	55 dB(A)	7:00 a.m.—10:00 p.m.
		50 dB(A)	10:00 p.m.—7:00 a.m.
Conditionally Sensitive	Institutional Use	65 dB(A)	Any Time
	Office-Professional Use	65 dB(A)	Any Time
	Hotels & Motels	65 dB(A)	Any Time
Non-Sensitive	Commercial Uses	70 dB(A)	Any Time
	Commercial/ Industrial Uses within 150 feet of Residential	65 dB(A)	7:00 a.m.—10:00 p.m.
		50 dB(A)	10:00 p.m.—7:00 a.m.
	Industrial Use	70 dB(A)	Any Time

(2802 § 1, 2011; 2660 § 2, 2005)

#### 8.47.050 General Noise Regulation

A. **NOISE DISTURBANCE CRITERIA.** It shall be unlawful for any person to willfully make, continue, or cause to be made or continued, any loud, unnecessary, or unusual noise that disturbs the peace or quiet of any neighborhood, or that causes discomfort or annoyance to any person of normal sensitiveness.

B. The criteria that shall be utilized in determining whether a violation of the provisions of this section exists shall include, but not be limited to, the following:

1. The level of the noise.
2. The frequency of occurrence of the noise.
3. Whether the nature of the noise is usual or unusual.
4. The level and intensity of the background noise, if any.
5. The proximity of the noise to residential sleeping facilities.
6. The nature and zoning of the area within which the noise emanates.
7. The density of the inhabitation of the area within which the noise is received.
8. The time of day or night the noise occurs.
9. The duration of the noise.

C. DURATION OF NOISE. The following criteria shall be used whenever the noise level exceeds:

1. The noise standard for a cumulative period of more than 30 minutes in any hour;
2. The noise standard plus five dB(A) for a cumulative period of more than 15 minutes in any hour;
3. The noise standard plus 10 dB(A) for a cumulative period of more than five minutes in any hour;
4. The noise standard plus 15 dB(A) for a cumulative period of more than one minute in any hour; or
5. The noise standard plus 20 dB(A) for any period of time.

D. In the event the ambient noise level exceeds any of the first four noise limit categories above, the cumulative period applicable to said category shall be increased to reflect said ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level. (2802 § 1, 2011; 2660 § 2, 2005)

#### **8.47.060 Special Noise Sources**

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A. RADIOS, TELEVISION SETS, AND SIMILAR DEVICES.

1. USE RESTRICTED. It shall be unlawful for any person within any residential area of the City to use or operate any radio receiving set, musical instrument, stereo equipment, television set, or other machine or device for the producing or reproducing of sound between the hours of 10:00 p.m. of one day and 7:00 a.m. of the following day in such a manner as to disturb the peace, quiet, and comfort of any person of normal sensitiveness residing in the area, as determined utilizing the criteria established in Section [8.47.050\(A\)](#).

2. PRIMA FACIE VIOLATION. Any noise level exceeding the ambient base level at the property line of any property (or, if a condominium or apartment house, within any adjoining apartment) by more than five decibels shall be deemed to be prima facie evidence of a violation of the provisions of this section.

B. MUSICAL INSTRUMENTS—USE RESTRICTED. 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 duly licensed parade or who has been otherwise duly authorized to engage in such conduct.

C. 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 that would cause the noise level at the property line of any property to exceed either the ambient base noise level or the actual measured ambient noise level by more than five decibels.

D. CONSTRUCTION OF BUILDINGS AND PROJECTS. It shall be unlawful for any person within a residential area, or within a radius of 500 feet therefrom, to operate equipment or perform any outside construction or repair work on buildings, structures, or projects, or to operate any pile driver, power shovel, pneumatic hammer, derrick, power hoist, or any other construction type device between the hours of 10:00 p.m. of one day and 7:00 a.m. of the next day in such a manner that a person of normal sensitiveness, as determined utilizing the criteria established in Section [8.47.050\(B\)](#), is caused discomfort or annoyance unless such operations are of an emergency nature.

E. VEHICLE REPAIRS. It shall be unlawful for any person within any residential area of the City to repair, rebuild, or test any motor vehicle in such a manner that a person of normal sensitiveness residing in the area is caused discomfort or annoyance, as determined utilizing the criteria established in Section [8.47.050](#), unless such operations are of an emergency nature.

F. 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 person of normal sensitiveness residing in the area is caused discomfort or annoyance, as determined utilizing the criteria established in Section [8.47.050\(B\)](#), unless such operations are of an emergency nature; provided, however, any such vehicle that is operated upon any public highway, street, or right-of-way shall be excluded from the provisions of this section.

G. AMPLIFIED SOUND.

1. PURPOSE. While recognizing the constitutional rights of freedom of speech and assembly, the City nevertheless feels obligated to reasonably regulate the use of sound amplifying equipment in order to protect the rights of the citizens of the City to privacy and freedom from excessively loud and unnecessary noise.

2. **REGISTRATION.** 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 mounted upon any vehicle for the purposes of warnings, giving instructions, directions, talks, addresses, lectures, or transmitting music to any persons or assemblages of persons without first filing a registration statement at least seven days prior to the date on which the sound amplifying equipment is intended to be used and obtaining approval from the Zoning Administrator.

3. **APPROVAL.** The Zoning Administrator shall return to the applicant an approved copy of the registration statement unless he or she finds that:

a. The conditions of the motor vehicle movement are such that use of the equipment would constitute a detriment to traffic safety; or

b. The conditions of pedestrian movement are such that use of the equipment would constitute a detriment to traffic safety.

4. **DISAPPROVAL.** In the event the registration statement is disapproved, the Zoning Administrator shall endorse upon the statement the reason for disapproval and return it to the applicant.

5. **APPEALS.** Any decision by the Zoning Administrator may be appealed to the City Council within seven days of action of the Zoning Administrator by filing a notice of appeal with the City Clerk.

**H. WASTE HAULERS/COMMERCIAL SWEEPERS AND LEAF BLOWERS.** It shall be unlawful for any person within any commercial, industrial, or office complex area of the City to operate any refuse compacting, processing or collection vehicle, parking lot sweeper or leaf blower within 150 feet of residential property between the hours of 10:00 p.m. of one day and 7:00 a.m. of the following day.

**I. LOADING/UNLOADING.** It shall be unlawful for any person in any commercial or industrial area of the City that abuts or is located adjacent to any residential property between the hours of 10:00 p.m. of one day and 7:00 a.m. of the following day to load or unload any vehicle, or operate any dollies, carts, forklifts, or other wheeled equipment that causes any noise that disturbs the peace or quiet of the residential neighborhood. (2802 § 1, 2011; 2660 § 2, 2005)

#### **8.47.070 Exemptions**

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**A. EMERGENCY ACTIVITIES.** The provisions of this chapter shall not preclude the operation, maintenance, and repair of equipment, apparatus, or facilities of essential public services, including those of governmental agencies and public utilities providing those activities are of an emergency nature or are necessary to maintain the health, safety, and welfare of the citizenry.

**B. COMMUNITY ACTIVITIES.** Community events, as described in Section [8.08.060](#) of the Municipal Code, outdoor gatherings, school bands, dances, shows, and athletic events are hereby exempted from the provisions of this chapter provided such activities are conducted pursuant to a duly authorized license or permit.

**C. STATE AND FEDERAL PREEMPTIONS.** Motor vehicle and aircraft operations and any other activity whose regulation has been preempted by state or federal law is hereby exempted from the provisions of this chapter. (2802 § 1, 2011; 2660 § 2, 2005)

#### **8.47.080 Abatement**

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The City Manager or his or her designee and his or her duly authorized representatives are hereby directed to enforce the provisions of this chapter by requiring that the alleged offender correct violations and achieve compliance with the provisions of this chapter within a reasonable period of time.

**A.** The City Manager or his or her designee shall have the power and duty to enforce the following noise control provisions of this Code: Section [8.47.050](#), Section [8.47.060](#)(A)(2), (C), (H), and (I).

**B.** The Police Department shall have the power and duty to enforce the following noise control provisions of this Code: Section [8.47.060](#) (A)(1), (B), (E), (F), (G)(1) and (2).

**C.** The Building Official shall have the power and duty to enforce the following noise control provisions of this Code: Section [8.47.060](#)(D). (2802 § 1, 2011; 2660 § 2, 2005)

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**Chapter 9.28 NOISE CONTROL**

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**9.28.010 Declaration of policy.**

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A. In order to control unnecessary, excessive and annoying sounds emanating from incorporated areas of the city, it is declared to be the policy of the city to prohibit such sounds generated from all sources as specified in this chapter.

B. It is determined that certain noise levels are detrimental to the public health, welfare and safety and contrary to public interest, therefore, the city council does ordain and declare that creating, maintaining, causing or allowing to create, maintain or cause any noise in a manner prohibited by or not in conformity with the provisions of this chapter is a public nuisance and shall be punishable as such. (Prior code § 9.44.010)

**9.28.020 Definitions.**

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The following words, phrases and terms as used in this chapter shall have the meaning as indicated below:

A. "Ambient noise level" means the all-encompassing level associated with a given environment, being a composite of sounds from all sources, excluding the alleged offensive noise, at the location and approximate time at which a comparison with the alleged offensive noise is to be made.

B. "Cumulative period" means an additive period of time composed of individual time segments which may be continuous or interrupted.

C. "Decibel" ("dB") means a unit which denotes the ratio between two quantities which are proportional to power. The number of decibels corresponding to the ratio of two amounts of power is ten times the logarithm to the base ten of this ratio.

D. "Dwelling unit" means a single unit providing complete, independent living facilities for one or more persons including permanent provisions for living, sleeping, eating, cooking and sanitation.

E. "Emergency machinery, vehicle or work" means any machinery, vehicle or work used, employed or performed in an effort to protect, provide or restore safe conditions in the community or for the citizenry, or work by private or public utilities when restoring utility service.

F. "Fixed noise source" means a stationary device which creates sounds while fixed or motionless including, but not limited to, industrial and commercial machinery and equipment, pumps, fans, compressors, generators, air conditioners and refrigeration equipment.

G. "Grading" means any excavating or filling of earth materials, or any combination thereof, conducted at a site to prepare said site for construction or other improvements thereon.

H. "Impact noise" means the noise produced by the collision of one mass in motion with a second mass which may be either in motion or at rest.

I. "Mobile noise source" means any noise source other than a fixed noise source.

J. "Noise level" means the "A" weighted sound pressure level in decibels obtained by using a sound level meter at slow response with a reference pressure of twenty micronewtons per square meter. The unit of measurement shall be designated as dB(A).

K. "Noise variance board" means an administrative board of five members appointed by the board of supervisors of the county, per Title 4, Division 6, Article 1 of the codified ordinances of the county.

L. "Person" means a person, firm, association, copartnership, joint venture, corporation or any entity, public or private in nature.

M. "Residential property" means a parcel of real property which is developed and used either in part or in whole for residential purposes, other than transient uses such as hotels and motels.

N. "Simple tone noise" means a noise characterized by a predominant frequency or frequencies so that other frequencies cannot be readily distinguished.

O. "Sound level meter" means an instrument meeting American National Standard Institute's Standard S1.4-1971 for Type 1 or Type 2 sound level meters or an instrument and the associated recording and analyzing equipment which will provide equivalent data.

P. "Sound pressure level" of a sound, in decibels, shall mean twenty times the logarithm to the base ten of the ratio of the pressure of the sound to a reference pressure, which reference pressure shall be explicitly stated. (Prior code § 9.44.020)

#### **9.28.025 Excessively loud events.**

City or law enforcement personnel who receive a complaint related to excessively loud, unusual, penetrating, or boisterous noise, disturbance, or commotion shall handle the matter in accordance with the provisions of this chapter and Chapter 9.30 of this title. (Ord. 1021 § 2, 2013; Ord. 838 § 1, 2000)

#### **9.28.030 Noise level measurement criteria.**

Any noise level measurements made pursuant to the provisions of this chapter shall be performed using a sound level meter as defined in Section 9.28.020. (Prior code § 9.44.030)

#### **9.28.040 Designated noise zone.**

The residential properties hereinafter described are hereby assigned to the following noise zones:

Noise Zone 1: all residential properties, whether incorporated or unincorporated. (Prior code § 9.44.040)

#### **9.28.050 Exterior noise standards.**

A. The following noise standards, unless otherwise specifically indicated, shall apply to all residential property within a designated noise zone:

<b>Noise Standards</b>		
<b>Noise Zone</b>	<b>Noise Level</b>	<b>Time Period</b>
1	55 dB(A)	7:00 a.m. - 10:00 p.m.
	50 dB(A)	10:00 p.m. - 7:00 a.m.

In the event the alleged offensive noise consists of impact noise, simple tone noise, speech, music, or any combination thereof, each of the above noise levels shall be reduced by five dB(A).

B. It is unlawful for any person at any location within the incorporated area of the city to create any noise, or to allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, when the foregoing causes the noise level, when measured on any other residential property, either incorporated or unincorporated, to exceed:

1. The noise standard for a cumulative period of more than thirty minutes in any hour; or
2. The noise standard plus five dB(A) for a cumulative period of more than fifteen minutes in any hour; or
3. The noise standard plus ten dB(A) for a cumulative period of more than five minutes in any hour; or
4. The noise standard plus fifteen dB(A) for a cumulative period of more than one minute in any hour; or
5. The noise standard plus twenty dB(A) for any period of time.

C. In the event the ambient noise level exceeds any of the first four noise limit categories above, the cumulative period applicable to said category shall be increased to reflect said ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level. (Prior code § 9.44.050)

### 9.28.060 Interior noise standards.

A. The following interior noise standards, unless otherwise specifically indicated, shall apply to all residential property within a designated noise zone:

Interior Noise Standards		
Noise Zone	Noise Level	Time Period
1	55 dB(A)	7:00 a.m. - 10:00 p.m.
	45 dB(A)	10:00 p.m. - 7:00 a.m.

In the event the alleged offensive noise consists of impact noise, simple tone noise, speech, music, or any combination thereof, each of the above noise levels shall be reduced by five dB(A).

B. It is unlawful for any person at any location within the incorporated area of the city to create any noise, or to allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, when the foregoing causes the noise level when measured within any other dwelling unit on any residential property, either incorporated or unincorporated, to exceed:

1. The interior noise standard for a cumulative period of more than five minutes in any hour; or
2. The interior noise standard plus five dB(A) for a cumulative period of more than one minute in any hour; or
3. The interior noise standard plus ten dB(A) for any period of time.

C. In the event the ambient noise level exceeds either of the first two noise limit categories above, the cumulative period applicable to said category shall be increased to reflect said ambient noise level. In the event the ambient noise level exceeds the third noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level. (Prior code § 9.44.060)

### 9.28.070 Special provisions.

The following activities shall be exempted from the provisions of this chapter:

- A. Activities conducted on the grounds of any public or private nursery, elementary, intermediate or secondary school or college;
- B. Outdoor gatherings, public dances, shows and sporting and entertainment events provided said events are conducted pursuant to a permit issued by the city pursuant to the city code relative to the staging of said events;
- C. Activities conducted on any park or playground provided such park or playground is owned and operated by a public entity;
- D. Any mechanical device, apparatus or equipment used, related to or connected with emergency machinery, vehicle or work;
- E. Noise sources associated with construction, repair, remodeling, or grading of any real property provided said activities do not take place between the hours of eight p.m. and seven a.m. on weekdays, including Saturday, or at any time on Sunday or a federal holiday;

- F. All mechanical devices, apparatus or equipment which are utilized for the protection or salvage of agricultural crops during periods of potential or actual frost damage or other adverse weather conditions;
- G. Mobile noise sources associated with agricultural operations provided such operations do not take place between the hours of eight p.m. and seven a.m. on weekdays, including Saturday, or at any time on Sunday or a federal holiday;
- H. Mobile noise sources associated with agricultural pest control through pesticide application; provided, that the application is made in accordance with restricted material permits issued by or regulations enforced by the agricultural commission;
- I. Noise sources associated with the maintenance of real property provided said activities take place between the hours of seven a.m. and eight p.m. on any day except Sunday or federal holiday, or between the hours of nine a.m. and eight p.m. on Sunday or federal holiday;
- J. Any activity to the extent regulation thereof has been preempted by state or federal law;
- K. Any event or activity sponsored by the city. (Ord. 1021 § 3, 2013; prior code § 9.44.070)

#### **9.28.080 Schools, hospitals and churches— Special provisions.**

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It is unlawful for any person to create any noise which causes the noise level at any school, hospital or church, while the same is in use, to exceed the noise limits as specified in Section 9.28.050 prescribed for the assigned noise zone in which the school, hospital or church is located, or which noise level unreasonably interferes with the use of such institutions or which unreasonably disturbs or annoys patients in the hospital, provided conspicuous signs are displayed in three separate locations within one-tenth of a mile of the institution indicating the presence of a school, church, or hospital. (Prior code § 9.44.080)

#### **9.28.090 Air conditioning and refrigeration—Special provisions.**

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Until January 19, 1979, the noise standards enumerated in Sections 9.28.050 and 9.28.060 shall be increased eight dB(A) where the alleged offensive noise source is an air conditioning or refrigeration system or associated equipment which was installed prior to the effective date of the ordinance codified in this chapter. (Prior code § 9.44.090)

#### **9.28.095 Special noise sources—Radios, television sets and similar devices.**

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- A. Use Restricted. It is unlawful and a misdemeanor, subject to punishment in accordance with Chapter 1.10 of this code, for any person within the city of Stanton 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 sensitivity residing in the area.
- B. Prima Facie Violation. Any noise exceeding the ambient noise level at the property line of any residential area (or if a condominium or apartment house, within any adjoining apartment) by more than five decibels shall be deemed to be prima facie evidence of a violation of the provisions of this section. (Ord. 838 § 2, 2000)

#### **9.28.096 Same—Machinery, fans and other mechanical devices.**

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Any noise level from the use or operation of any machinery, equipment, pump, fan, air conditioning apparatus, refrigerating equipment, or other mechanical or electrical device, or in repairing or rebuilding any motor vehicle, which exceeds the noise limits as set forth in this title at any property line, or, if a condominium or rental unit, within any condominium unit or rental unit within the complex, shall be a violation of this chapter. (Ord. 838 § 3, 2000)

#### **9.28.100 Noise level measurement.**

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The location selected for measuring exterior noise levels shall be at any point on the affected property. Interior noise measurements shall be made within the affected dwelling unit. The measurement shall be made at a point at least four feet

from the wall, ceiling, or floor nearest the alleged offensive noise source and may be made with the windows of the affected unit open. (Prior code § 9.44.100)

#### **9.28.110 Manner of enforcement.**

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A. The county health officer and duly authorized representatives are directed to enforce the provisions of this chapter. The county health officer and duly authorized representatives are authorized, pursuant to Penal Code Section 836.5, to arrest any person without a warrant when they have reasonable cause to believe that such person has committed a misdemeanor in their presence.

B. No person shall interfere with, oppose or resist any authorized person charged with enforcement of this chapter while such person is engaged in the performance of his or her duty. (Prior code § 9.44.110)

#### **9.28.120 Variance procedure.**

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A. The owner or operator of a noise source which violates any of the provisions of this chapter may file an application with the health officer for a variance from the provisions of this chapter wherein said owner or operator shall set forth all actions taken to comply with said provisions, the reasons why immediate compliance cannot be achieved, a proposed method of achieving compliance, and a proposed time schedule for its accomplishment. Said application shall be accompanied by a fee in the amount of seventy-five dollars. A separate application shall be filed for each noise source; provided, however, that several mobile sources under common ownership, or several fixed sources on a single property may be combined into one application. Upon receipt of said application and fee, the health officer shall refer it with his or her recommendation thereon within thirty days to the noise variance board for action thereon in accordance with the provisions of this chapter.

B. An applicant for a variance shall remain subject to prosecution under the terms of this chapter until a variance is granted. (Prior code § 9.44.120)

#### **9.28.130 Noise variance board.**

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The noise variance board shall evaluate all applications for variance from the requirements of this chapter and may grant said variances with respect to time for compliance, subject to such terms, conditions and requirements as it may deem reasonable to achieve maximum compliance with the provisions of this chapter. Said terms, conditions and requirements may include, but shall not be limited to, limitations on noise levels and operating hours. Each such variance shall set forth in detail the approved method of achieving maximum compliance and a time schedule for its accomplishment. In its determinations the board shall consider the magnitude of nuisance caused by the offensive noise; the uses of property within the area of impingement by the noise; the time factors related to study, design, financing and construction of remedial work; the economic factors related to age and useful life of equipment; and the general public interest and welfare. Any variance granted by the board shall be by resolution and shall be transmitted to the health officer for enforcement. Any violation of the terms of the variance shall be unlawful. (Prior code § 9.44.130)

#### **9.28.140 Appeals.**

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A. Within fifteen days following the decision of the variance board on an application, the applicant, the health officer or any member of the city council may appeal the decision to the city council by filing a notice of appeal with the secretary of the variance board. In the case of an appeal by the applicant for a variance, the notice of appeal shall be accompanied by a fee to be computed by the secretary on the basis of the estimated cost of preparing the materials required to be forwarded to the city council as discussed in this section. If the actual cost of such preparation differs from the estimated cost appropriate payments shall be made either to or by the secretary.

B. Within fifteen days following receipt of a notice of appeal fee, the secretary of the variance board shall forward to the city council copies of the application for variance; the recommendation of the health officer; the notice of appeal; all evidence concerning said application received by the variance board and its decision thereon. In addition, any person may file with the city council written arguments supporting or attaching said decision and the city council may in its discretion

hear oral arguments thereon. The city clerk shall mail to the applicant a notice of the date set for hearing of the appeal. The notice shall be mailed at least ten days prior to the hearing date.

C. Within sixty days following its receipt of the notice of the appeal, the city council shall either affirm, modify or reverse the decision of the variance board. Such decision shall be based upon the city council's evaluation of the matters submitted to the city council in light of the powers conferred on the variance board and the factors to be considered both as enumerated in Sections 9.28.120 and 9.28.130.

D. As part of its decision the council may direct the variance board to conduct further proceedings on said application. Failure of the city council to affirm, modify or reverse the decision of the variance board within said sixty-day period shall constitute an affirmance of the decision. (Prior code § 9.44.140)

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#### **9.28.150 Violation—Misdemeanor.**

A. It is unlawful for any person to violate any provision or to fail to comply with any of the requirements of this chapter.

B. Any person violating any provision hereof shall be charged in accordance with Section 1.04.080 of this code and upon conviction shall be punished in accordance therewith.

C. The provisions of this chapter shall not limit any other remedies authorized by law. (Ord. 1021 § 4, 2013; Ord. 677 § 1, 1988; prior code § 9.44.150)

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# CONSTRUCTION NOISE AND VIBRATION MODELING

Roadway Construction Noise Model (RCNM), Version 1.1

Report date: 03/31/2022  
 Case Description: GGSD Rancho Alamitos

\*\*\*\* Receptor #1 \*\*\*\*

Description	Baselines (dBA)			
	Land Use	Daytime	Evening	Night
Light Pole Installation	Residential	65.0	60.0	55.0

Equipment

Description	Impact Device	Usage (%)	Actual Receptor		Estimated Distance (feet)	Shielding (dBA)
			Lmax (dBA)	Lmax (dBA)		
Crane	No	16	80.6	50.0	0.0	
Backhoe	No	40	77.6	50.0	0.0	
Auger Drill Rig	No	20	84.4	50.0	0.0	
Concrete Saw	No	20	89.6	50.0	0.0	

Results

Equipment Lmax Leq	Noise Limits (dBA)						Noise Limit Exceedance (dBA)							
	Calculated (dBA)		Day		Evening		Night		Day		Evening		Night	
	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Crane N/A	80.6	72.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe N/A	77.6	73.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Auger Drill Rig N/A	84.4	77.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Saw N/A	89.6	82.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	89.6	84.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

## GGSD Rancho Alamitos - Construction Noise Attenuation

### Levels in dBA Leq

Phase	RCNM	
	Reference Noise Level	Mobile Homes to west
<i>Distance in feet</i>	50	95
Drill Rig	77.0	71
Concrete Saw	82.6	77

Attenuation calculated through Inverse Square Law:  $L_p(R2) = L_p(R1) - 20L$

## GGSD Rancho Alamitos- Vibration Annoyance Attenuation Calculations

Levels in in/sec PPV

<i>Distance in feet</i>	<b>Vibration Reference Level at 25 feet</b>	<b>Residential to west 100</b>
Large Bulldozer	0.089	0.011
Caisson Drilling	0.089	0.011
Loaded Trucks	0.076	0.010
Jackhammer	0.035	0.004
Small Bulldozer	0.003	0.000

# STATIONARY NOISE CALCULATIONS

## GGSD Rancho Alamitos - Stationary Noise Attenuation Calculations

### Reference Levels, Distances, and Receptor (residences)

#### Distances

	Softball/Baseball	Tennis Courts	Soccer Fields	Football
<i>Reference Distance in feet</i>	72	20	15	72
Reference Levels, dBA Leq	57	60	60	57
Distance and Direction	330 to W	430 to W	15 to W	480 to west
Distance Only	330	430	25	480

#### Levels in dBA Leq

	Softball/Baseball	Tennis Courts	Soccer Fields	Football
	<i>Attenuated Noise Levels</i>			
Attenuated Levels at Receptors	44	33	55	40.4

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

### Normalized Levels and Distances

	Softball/Baseball	Tennis Court	Soccer
	56.9	59.5	59.8
Reference Distance	<b>72</b>	<b>20</b>	<b>15</b>
Normalized Distance	50	50	50
Normalized Level dBA Leq	60	52	49