

NOISE IMPACT ANALYSIS
28-UNIT APARTMENT COMPLEX
LA MIRADA, CALIFORNIA

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Date:

July 27, 2016

Project No.: P16-045 N

NOISE SETTING

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise is generally considered to be unwanted sound. Sound is characterized by various parameters that describe the rate of oscillation of sound waves, the distance between successive troughs or crests, the speed of propagation, and the pressure level or energy content of a given sound. In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level.

Loud or soft, noisy or quiet, high-and-low pitch are all qualitative terms used to describe sound. These terms are relative descriptions. The science of acoustics attempts to quantify the human perception of sound into a quantitative and measurable basis. Amplitude is the measure of the pressure exerted by sound waves. Amplitude may be so small as to be inaudible by humans, or so great as to be painful. Frequency refers to pitch or tone. The unit of measure is in cycles per second called "hertz". Very low frequency bass tones and ultra-high frequency treble are difficult for humans to detect. Many noise generators in the ambient world are multi-spectral.

The decibel (dB) scale is used to quantify sound pressure levels. Although decibels are most commonly associated with sound, "dB" is a generic descriptor that is equal to ten times the logarithmic ratio of any physical parameter versus some reference quantity. For sound, the reference level is the faintest sound detectable by a young person with good auditory acuity.

Since the human ear is not equally sensitive to all sound frequencies within the entire auditory spectrum, human response is factored into sound descriptions by weighting sounds within the range of maximum human sensitivity more heavily in a process called "A-weighting," written as dB(A). Any further reference in this discussion to decibels written as "dB" should be understood to be A-weighted.

Leq is a time-averaged sound level; a single-number value that expresses the time-varying sound level for the specified period as though it were a constant sound level with the same total sound energy as the time-varying level. Its unit is the decibel (dB). The most common averaging period for Leq is hourly.

Because community receptors are more sensitive to unwanted noise intrusion during more sensitive evening and nighttime hours, state law requires that an artificial dBA increment be added to quiet time noise levels. The 24-hour noise descriptor with a specified evening and nocturnal penalty is called the Community Noise Equivalent Level (CNEL). CNEL's are a weighted average of hourly Leq's.

PLANNING STANDARDS

The City of La Mirada has established guidelines for acceptable community noise levels that are based upon the CNEL rating scale to insure that noise exposure is considered in any development. CNEL-based standards apply to noise sources whose noise generation is preempted from local control (such as from on-road vehicles, trains, airplanes, etc.) and are used to make land use decisions as to the suitability of a given site for its intended use. These CNEL-based standards are articulated in the Noise Element of the General Plan.

Figure 1 shows the noise compatibility guidelines for various uses. These guidelines would apply in usable outdoor space such as patios, yards, spas, etc. The guidelines indicate that an exterior noise level of 60 dB CNEL is considered to be a “normally acceptable” noise level for single family, duplex and mobile homes involving normal conventional construction, without any special noise insulation requirements. Exterior noise levels up to 65 dB CNEL are typically considered “conditionally acceptable”, and residential construction should only occur after a detailed analysis of the noise reduction requirements is made and needed noise attenuation features are included in the project design. Exterior noise attenuation features include, but are not limited to, setbacks to place structures outside the conditionally acceptable noise contour, orienting structures so no windows open to the noise source, and /or installing noise barriers such as berms or solid walls.

An interior CNEL of 45 dB is mandated by the State of California Noise Insulation Standards (CCR, Title 24, Part 6, Section T25-28) for multiple family dwellings and hotel and motel rooms. In 1988, the State Building Standards Commission expanded that standard to include all habitable rooms in residential use, included single-family dwelling units. Since normal noise attenuation within residential structures with closed windows is 20-30 dB, an exterior noise exposure of 65-75 dB CNEL allows the interior standard to be met without any specialized structural attenuation (dual paned windows, etc.), but with closed windows and fresh air supply systems or air conditioning in order to maintain a comfortable living environment.

Noise standards applicable to those sources not preempted from local control (i.e., not from traffic on public streets, airplanes, trains, etc.) are contained in Section 9.04 of the La Mirada Municipal Code. Section 9.04.010 of the Code, based upon the definition of nuisance in the State Health and Safety Code, defines noise nuisance as follows:

- 9.04.010 (b)(4) No construction activities making “unnecessary” noise from 8 p.m. to 7 a.m. the next day, and all day on Sunday.

**Figure 1 Noise Compatibility Guidelines
(La Mirada General Plan)**

Land Use Category	Community Noise Equivalent Level (CNEL) or Day-Night Level (Ldn), dB						
	55	60	65	70	75	80	85
Residential- Low-Density Single-Family, Duplex, Mobile Homes			Diagonal	Diagonal	Diagonal	Diagonal	Diagonal
Residential- Multi-Family			Diagonal	Diagonal	Diagonal	Diagonal	Diagonal
Commercial- Motels, Hotels, Transient Lodging			Diagonal	Diagonal	Diagonal	Diagonal	Diagonal
Schools, Libraries, Churches, Hospitals, Nursing Homes			Diagonal	Diagonal	Diagonal	Diagonal	Diagonal
Amphitheaters, Concert Hall, Auditorium, Meeting Hall	Diagonal	Diagonal	Diagonal	Diagonal	Diagonal	Diagonal	Diagonal
Sports Arenas, Outdoor Spectator Sports	Diagonal	Diagonal	Diagonal	Diagonal	Diagonal	Diagonal	Diagonal
Playgrounds, Neighborhood Parks				Diagonal	Diagonal	Diagonal	Diagonal
Golf Courses, Riding Stables, Water Rec., Cemeteries				Diagonal	Diagonal	Diagonal	Diagonal
Office Buildings, Business, Commercial, Professional, and Mixed-Use Developments			Diagonal	Diagonal	Diagonal	Diagonal	Diagonal
Industrial, Manufacturing Utilities, Agriculture				Diagonal	Diagonal	Diagonal	Diagonal
Freeway Adjacent Commercial, Office, and Industrial Uses.				Diagonal	Diagonal	Diagonal	Diagonal

Nature of the noise environment where the CNEL or Ldn level is:

Below 55 dB
Relatively quiet suburban or urban areas, no arterial streets within 1 block, no freeways within 1/4 mile.

55-65 dB
Most somewhat noisy urban areas, near but not directly adjacent to high volumes of traffic.

65-75 dB
Very noisy urban areas near arterials, freeways or airports.

75+ dB
Extremely noisy urban areas adjacent to freeways or under airport traffic patterns. Hearing damage with constant exposure outdoors.

 **Normally Acceptable**

Specific land use is satisfactory, based on the assumption that any building is of normal conventional construction, without any special

 **Conditionally Acceptable**

New construction or development should be undertaken only after a detailed analysis of noise reduction requirements is made and needed noise insulation features included in design. Conventional construction, but with closed windows and fresh air supply systems

 **Normally Unacceptable**

New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of noise reduction requirements must be made and needed noise insulation features included in design.

 **Clearly Unacceptable**

New construction or development should generally not be undertaken.

BASELINE NOISE LEVELS

A noise study was conducted by Giroux & Associates on Monday, May 5, 2015. A short term noise reading was made along La Mirada Blvd in the project vicinity. The measurement result is shown.

Short-Term Noise Measurements (dB[A])

Time	Leq	Lmax	Lmin	L₁₀	L₃₃	L₅₀	L₉₀
13:45-14:00	65	73	48	68	65	63	54

The meter was placed to reflect existing traffic noise levels from La Mirada Boulevard. The observed noise level was 65 Leq at 50 feet from the roadway centerline. Monitoring experience has shown that 24-hour weighted CNELs are typically 2-3 dB higher than mid-afternoon Leq readings shown above which would translate to 67-68 dB CNEL at 50 feet from centerline.

As this is slightly higher than the recommended compatibility standard for residential uses, noise mitigation in the form of increased setback or shielding is likely necessary for usable residential outdoor space (yards, decks, patios, etc.) directly adjacent to La Mirada Boulevard. Exterior building façade noise levels of near 70 dB CNEL require 25 dB of structural attenuation to achieve the Building Code interior standard of 45 dB CNEL. With the mandatory use of dual-paned windows, such reduction is readily attainable as long as window closure is an option. Accordingly, this report provides an evaluation of noise reduction measures to ensure that the proposed project residential noise exposures are within recommended compatibility guidelines.

NOISE IMPACTS

NOISE SIGNIFICANCE CRITERIA

Noise impacts are considered significant if they result in:

- a. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.
- c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
- d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

STANDARDS OF SIGNIFICANCE

Noise impacts are considered significant if they expose persons to levels in excess of standards established in local general plans or noise ordinances. The exterior noise standard for the City of La Mirada residential uses is 65 dBA CNEL in usable outdoor space such as backyards, decks, patios, etc. If required, attenuation through setback and project perimeter barriers is anticipated to be used to reduce traffic noise to the 65 dBA CNEL goal. However, an inability to achieve this goal through the application of reasonably available mitigation measures would be considered a significant impact.

Impacts may also be significant if they create either a substantial permanent or temporary increase. The term "substantial" is not quantified in CEQA guidelines. In most environmental analyses, "substantial" is taken to mean a level that is clearly perceptible to humans. In practice, this is at least a +3 dB increase. Some agencies, such as Caltrans, require substantial increases to be +10 dB or more if noise standards are not exceeded by the increase. For purposes of this analysis, a +3 dB increase is considered a substantial increase. The following noise impacts due to project-related traffic would be considered significant:

1. If construction activities were to audibly intrude into adjacent uses south and east of the site.
2. If project traffic noise were to cause an increase by a perceptible amount (+3 dB CNEL) or expose receivers to levels exceeding city compatibility noise standards.
3. If future build-out noise levels were to expose La Mirada sensitive receivers to levels exceeding compatibility standards of 65 dB CNEL exterior at any outdoor uses or 45 dB CNEL interior noise levels in any habitable space.

CONSTRUCTION NOISE SIGNIFICANCE

The La Mirada Noise Ordinance regulates construction noise by a prohibition against making “unnecessary” noise from construction during noise-sensitive weekday hours and all day on Sundays.

CONSTRUCTION NOISE IMPACTS

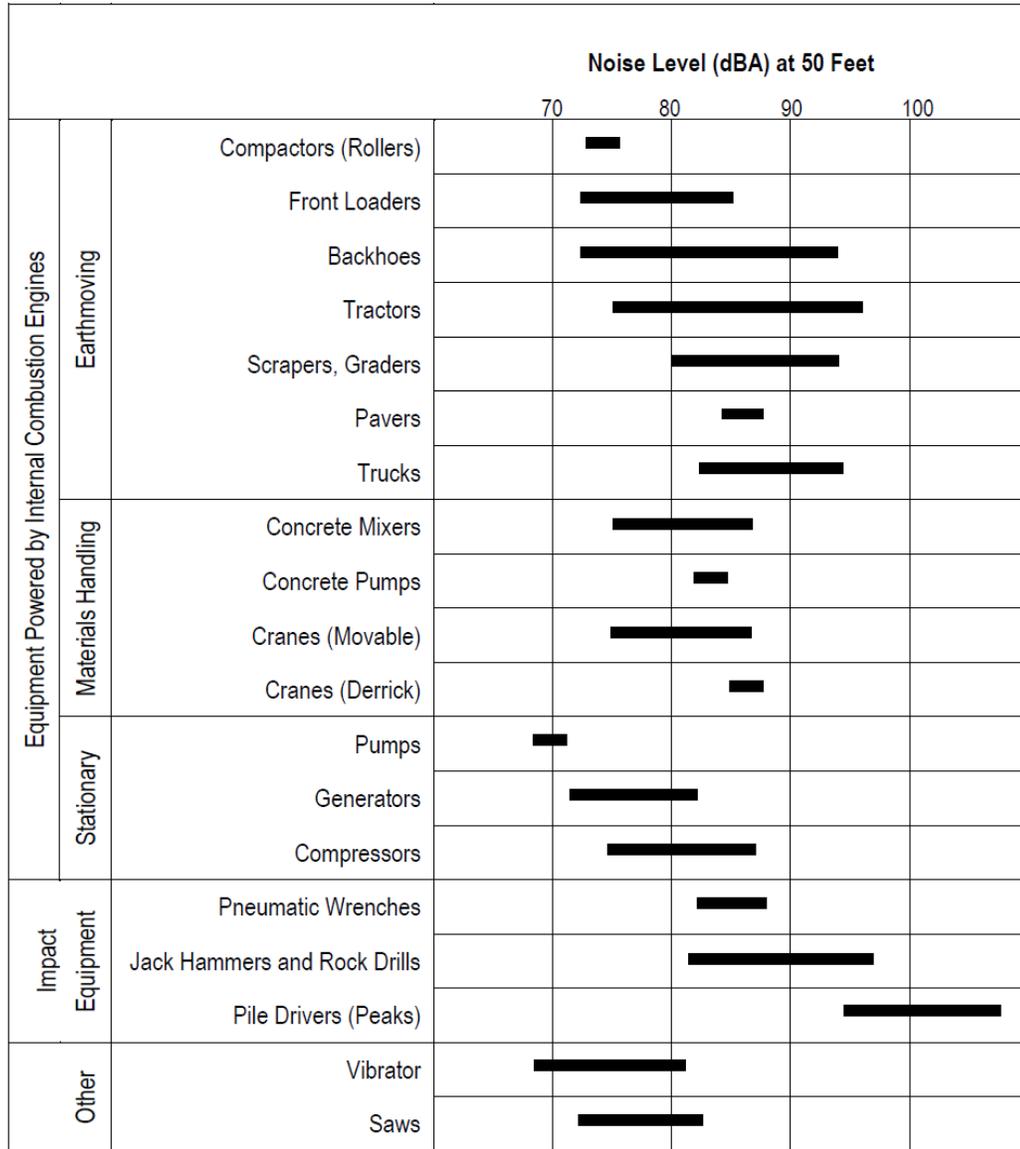
Temporary construction noise impacts vary markedly because the noise strength of construction equipment ranges widely as a function of the equipment used and its activity level. Short-term construction noise impacts tend to occur in discrete phases dominated by large, earth-moving equipment sources. Construction activities are treated separately in various community noise ordinances because they do not represent a chronic, permanent noise source.

Demolition and construction noise impacts vary markedly because the noise strength of construction equipment ranges widely as a function of the equipment used which changes during the course of the project. Construction noise tends to occur in discrete phases dominated initially by demolition and/or earth-moving sources and later for finish construction. Figure 2 shows the typical range of construction activity noise generation as a function of equipment used in various building phases. The earth-moving sources are seen to be the noisiest with equipment noise ranging up to about 90 dB(A) at 50 feet from the source. Spherically radiating point sources of noise emissions are atmospherically attenuated by a factor of 6 dB per doubling of distance, or about 20 dB in 500 feet of propagation. The loudest earth-moving noise sources may therefore sometimes be detectable above the local background beyond 1,000 feet from the construction area. An impact radius of 1,000 feet or more pre-supposes a clear line-of-sight and no other machinery or equipment noise that would mask project construction noise. With buildings and other barriers to interrupt line-of-sight conditions, the potential “noise envelope” around individual construction sites is reduced. Construction noise impacts are, therefore, somewhat less than that predicted under idealized input conditions.

As discussed, the City’s Municipal Code Section 9.04.010 prohibits construction on Sunday and on any other day between 8:00 p.m. and 7:00 a.m. The Municipal Code Section 21.70.080 states that noise associated with construction is exempt from the noise standards if the allowable hours be limited to the daytime. The limitation of construction activities to the hours of 7:00 a.m. and 8:00 p.m. would be effective since it would prohibit construction noise during the hours when people normally sleep and would prohibit construction noise during the early morning and evening when people are typically within their home and more sensitive to noise effects. In addition, noise levels would be temporary and intermittent and comply with time of day requirements. Although construction noise impacts may be noticeable at the adjacent residences and viewed as a temporary nuisance, impacts would be less than significant.

Figure 2

Typical Construction Equipment Noise Generation Levels



Source: EPA PB 206717, Environmental Protection Agency, December 31, 1971, "Noise from Construction Equipment and Operations."

CONSTRUCTION ACTIVITY VIBRATION

Typical background vibration levels in residential areas are usually 50 VdB or lower, and are below the threshold of human perception. Perceptible vibration levels inside residences are typically attributed to the operation of heating and air conditioning systems, door slams or street traffic. Construction activities and street traffic are some of the most common external sources of vibration that can be perceptible inside residences.

Construction activities generate ground-borne vibration when heavy equipment travels over unpaved surfaces or when it is engaged in soil movement. The effects of ground-borne vibration include discernable movement of building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. Vibration related problems generally occur due to resonances in the structural components of a building because structures amplify groundborne vibration. Within the “soft” sedimentary surfaces of much of Southern California, ground vibration is quickly damped out. Groundborne vibration is almost never annoying to people who are outdoors (FTA 2006).

Groundborne vibrations from construction activities rarely reach levels that can damage structures. Because vibration is typically not an issue, very few jurisdictions have adopted vibration significance thresholds. Vibration thresholds have been adopted for major public works construction projects, but these relate mostly to structural protection (cracking foundations or stucco) rather than to human annoyance.

Vibration is most commonly expressed in terms of the root mean square (RMS) velocity of a vibrating object. RMS velocities are expressed in units of vibration decibels. The range of vibration decibels (VdB) is as follows:

65 VdB	-	threshold of human perception
72 VdB	-	annoyance due to frequent events
80 VdB	-	annoyance due to infrequent events
94-98 VdB	-	minor cosmetic damage

To determine potential impacts of the project’s construction activities, estimates of vibration levels induced by the construction equipment at various distances are presented in Table 1.

Table 1
Approximate Vibration Levels Induced by Construction Equipment

Equipment	25 feet	50 feet	75 feet	100 feet
Large Bulldozer	87	81	78	75
Loaded Truck	86	80	77	74
Jackhammer	79	73	70	67
Small Bulldozer	58	52	49	46

* (FTA Transit Noise & Vibration Assessment, Chapter 12, Construction, 2006)

The on-site construction equipment that will create the maximum potential vibration is a large bulldozer. The stated vibration source level in the FTA Handbook for such equipment is 81 VdBA at 50 feet from the source. With typical vibrational energy spreading loss, the vibration annoyance standard is met at 56 feet. Effects of vibration perception such as rattling windows could only occur at the nearest residential structures, though vibration resulting from project construction would not exceed cosmetic damage thresholds.

A drainage ditch runs between the project site and the nearest homes. Bulldozers (generally larger than 350 HP) will not likely be capable of operating directly at the shared property line with the perimeter homes. Should fine grading occur at the residential property line it would likely be performed with small bulldozers which are seen above to have 30 VdB less vibration potential. Construction activity vibration impacts are judged as less-than-significant.

PROJECT-RELATED VEHICULAR NOISE IMPACTS

The proposed 28 apartment project uses would generate 186 daily trips using trip generation information from the project traffic study. Existing traffic on La Mirada Blvd adjacent to the site is approximately 22,200 vehicles per day. The addition of a maximum of 186 trips would only increase traffic noise by +0.1 dB at 50 feet from roadway centerline. This impact is much less than the +3 dB CNEL significance threshold and therefore project related traffic is considered to be less than significant.

ON-SITE NOISE EXPOSURE

The project site is exposed to traffic noise from La Mirada Boulevard. Noise measurements demonstrated a CNEL of 67-68 dB CNEL at 50 feet from the La Mirada Boulevard centerline. At 50 feet from the La Mirada centerline, the calculated noise levels based on the traffic volume is 69 dB CNEL for a travel speed of 35 mph and 70 dB CNEL for an average travel speed of 40 mph. For this analysis the higher value of 70 dB CNEL was used as the noise loading.

The project is 70 feet from the La Mirada Centerline. Attenuation due to separation distance alone would be 1.5 dB for a resultant noise loading of 68.5 dB. If the project includes patios or balconies facing La Mirada Boulevard the exterior noise level could exceed the 65 dB CNEL goal for usable outdoor space. Several mitigation options are available:

- If common areas are available interior to the site then recreational space would have noise levels well within the 65 dB CNEL goal. Most jurisdictions do not require noise protection for individual recreational space if noise-protected common space meets the minimum recreational area requirement for the project.
- If balconies or decks facing La Mirada Boulevard are considered to be required to meet minimum outdoor recreational space, noise protection may need to be considered. A transparent noise shield for these units along any balcony or deck facing La Mirada Boulevard would reduce noise by at least 5 dB and provide compatibility compliance.

Because a shield must break the line-of-sight between the receiver and noise source, there is no simple mitigation measure to only reduce noise levels by the needed 3.5 dB. A 5.0 foot plexi-glass wall along the will reduce noise levels well below 65 dB CNEL. Because the future noise loading is only marginally in exceedance of the 65 dB CNEL goal, it is recommended that common space interior to the project site be considered adequate recreational use such that mitigation of individual units would not be required.

In addition to meeting the exterior noise compatibility standard the residences must also be able to achieve the 45 dB CNEL interior noise threshold. The closest building façade is approximately 70 feet from the roadway centerline. The noise loading at the closest building façade is 68.5 dB CNEL such that a 23.5 dB noise reduction would be needed

For typical wood-framed construction with stucco and gypsum board wall assemblies, the exterior to interior noise level reduction is as follows:

- Partly open windows – 12 dB
- Closed single-paned windows – 20 dB
- Closed dual-paned windows – 30 dB

Use of dual-paned windows is required by the California Building Code (CBC) for energy conservation in new residential construction.

Interior standards will be met as long as residents have the option to close their windows. Where window closure is needed to shut out noise, supplemental ventilation is required by the CBC with some specified gradation of fresh air. Central air conditioning or a fresh air inlet on a whole house fan would meet this requirement.

SUMMARY AND MITIGATION

Noise from temporary construction activities is exempt from noise ordinances as long as the construction activities are between the hours of 7 a.m. and 8 p.m., Monday through Saturday, with no activity on Sundays or federal holidays. In addition the following construction practices are recommended:

- Stockpiling and staging activities must be located as far as practicable from dwellings.
- All mobile equipment shall have properly operating and maintained mufflers.

Vibration levels from heavy equipment may be noticeable at times at the nearest residences, but will not cause any structural damage.

The project noise impact study indicates a less-than-significant noise impact from project-related traffic on project vicinity receptors. Project-related traffic will not make substantially worse any existing violations.

If balconies or decks on residential perimeter units along La Mirada Boulevard frontage are planned, traffic noise may exceed compatibility standards for outdoor recreational space. In order to create outdoor space that achieves 65 dB CNEL at these units, one of the following measures can be implemented:

- Consider private usable space in a shared common location within the proposed project site, such as a pool or common area as adequate to meet the 65 dB CNEL standard; or
- Equip possible residential patios or balconies facing La Mirada Boulevard with transparent glass or plastic shields that reduce noise. Shields would need to be 5 feet tall and fill the entire roadway frontage.

Habitable interior space will be adequately noise protected to achieve 45 dB with only the ability to close windows at perimeter units adjacent to La Mirada Blvd. Where window closure is needed for policy compliance, supplemental fresh air ventilation will be provided at rates specified in the California Building Code.