Noise and Vibration Background and Modeling Data

NOISE BACKGROUND

Terminology and Noise Descriptors

The following are brief definitions of noise terminology.

- **Sound.** A vibratory disturbance that, 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 on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micropascals (20 μPa).

- **Vibration Decibel (VdB).** A unitless measure of vibration, expressed on a logarithmic scale and with respect to a defined reference vibration velocity. In the U.S., the standard reference velocity is 1 micro-inch per second ($1x10^{-6}$ in/sec).

- **A-Weighted Decibel (dBA).** An overall frequency-weighted sound level in decibels which approximates the frequency response of the human ear.

- **Equivalent Continuous Noise Level (Leq); 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."

- **Day-Night 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 A-weighted sound levels occurring during the period from 10 PM to 7 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 to the A-weighted sound levels occurring during the period from 7 PM to 10 PM and 10 dB added to the A-weighted sound levels occurring during the period from 10 PM to 7 AM. For general community/environmental noise, CNEL and L_{dn} values rarely differ by more than 1 dB. As a matter of practice, L_{dn} and CNEL values are interchangeable and are treated as being equivalent in this assessment.

- **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

Sound is a pressure wave transmitted through the air. When an object vibrates, it radiates part of its energy as acoustical pressure in the form of a sound wave. Sound can be described in terms of amplitude (loudness), frequency (pitch), or duration (time). The standard unit of measurement of the loudness of sound is the decibel (dB). The human hearing system is not equally sensitive to sound at all frequencies. Sound waves below 16 Hz are not heard at all and are "felt" more as a vibration. Similarly, while 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. Since the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale is usually used to relate noise to human sensitivity. The A-weighted decibel scale (dBA) performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear.

Because of the physical characteristics of noise transmission and noise 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. Typical human hearing can detect changes of approximately 3 dBA or greater under normal conditions. Changes of 1 to 3 dBA are detectable under quiet, controlled conditions and changes of less than 1 dBA are usually indiscernible. A change of 5 dBA or greater is typically noticeable to most people in an exterior environment and a change of 10 dBA is perceived as a doubling (or halving) of the noise.

Table 1 Change in Sound Pressure Level, dB

Change in Apparent Loudness	
± 3 dB	Threshold of human perceptibility
± 5 dB	Clearly noticeable change in noise level
± 10 dB	Half or twice as loud
± 20 dB	Much quieter or louder

Source: Bies and Hansen, Engineering Noise Control, 2009.

Point and Line Sources

Noise may be generated from a point source, such as a piece of construction equipment, or from a line source, such as a road containing moving vehicles. Because noise spreads in an ever-widening pattern, the given amount of noise striking an object, such as an eardrum, is reduced with distance from the source. This is known as "spreading loss." The typical spreading loss for point source noise is 6 dBA per doubling of the distance from the noise source.

A line source of noise, such as vehicles proceeding down a roadway, would also be reduced with distance, but the rate of reduction is affected by of both distance and the type of terrain over which the noise passes. Hard sites, such as developed areas with paving, reduce noise at a rate of 3 dBA per doubling of the distance while soft sites, such as undeveloped areas, open space and vegetated areas reduce noise at a rate of 4.5 dBA per doubling of the distance.[1] These represent the extremes and most areas would actually contain a combination of hard and soft elements with the noise reduction placed somewhere in between these two factors. Unfortunately, the only way to actually determine the absolute amount of attenuation that an area provides is through field measurement under operating conditions with subsequent noise level measurements conducted at varying distances from a constant noise source.

Objects that block the line of sight attenuate the noise source if the receptor is located within the "shadow" of the blockage (such as behind a sound wall). If a receptor is located behind the wall, but has a view of the source, the wall would do little to reduce the noise. Additionally, a receptor located on the same side of the wall as the noise source may experience an increase in the perceived noise level, as the wall would reflect noise back to the receptor compounding the noise.

[1] Surface type or ground cover is defined as the "hardness" or "softness" of the surrounding area. "Hard site environment" is areas with acoustically hard ground (e.g., pavement or water). Distance attenuation from a line source (i.e., roadway or railway) with a hard site environment is 3 dB per doubling of distance (dB/DD). "Soft site environment" is areas with acoustically soft ground (e.g., lawn or loose dirt or agricultural uses). Ground cover can affect the sound propagation rate by as much as an additional 1.5 dB/DD. (Note that this rate occurs only when both the noise source and the receiver are close to the ground and the terrain between the two is flat and soft.) As a result of this additional attenuation, the line-source sound levels decrease at a rate of 4.5 dB/DD at soft sites.

Noise Metrics

Several rating scales (or noise "metrics") exist to analyze adverse effects of noise, including traffic-generated noise, on a community. These scales include the equivalent noise level (Leq), the community noise equivalent level (CNEL) and the day/night noise level (Ldn). Leq is a measurement of the sound energy level averaged over a specified time period.

The CNEL noise metric is based on 24 hours of measurement. CNEL differs from Leq in that it applies a time-weighted factor designed to emphasize noise events that occur during the evening and nighttime hours (when quiet time and sleep disturbance is of particular concern). Noise occurring during the daytime period (7:00 AM to 7:00 PM) receives no penalty. Noise produced during the evening time period (7:00 to 10:00 PM) is penalized by 5 dB, while nighttime (10:00 PM to 7:00 AM) noise is penalized by 10 dB. The Ldn noise metric is similar to the CNEL metric except that the period from 7:00 to 10:00 PM receives no penalty. Both the CNEL and Ldn metrics yield approximately the same 24-hour value (within 1 dB) with the CNEL being the more restrictive (i.e., higher) of the two.[2]

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. In comparison, extended periods of noise exposure above 90 dBA would result in permanent cell damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by the feeling of pain in the ear. This is called the threshold of pain. A sound level of 160 to 165 dBA will result in dizziness or loss of equilibrium. The ambient or background noise is widespread and generally more concentrated in urban areas than in outlying, less-developed areas (see Table 2).

[2] Ldn and CNEL values rarely differ by more than 1 dB. As a matter of practice, Ldn and CNEL values are considered equivalent and are treated as such in this assessment.

Table 2 Common Sound Levels and Their Sources

Noise Source	A-Weighted Sound Level in Decibels	Noise Environments	Subjective Evaluations Relative to 70 dB
Near Jet Engine	140	Deafening	128 times as loud
Civil Defense Siren	130	Threshold of Pain	64 times as loud
Hard Rock Band	120	Threshold of Feeling	32 times as loud
Accelerating Motorcycle at a Few Feet Away	110	Very Loud	16 times as loud
Pile Driver; Noisy Urban Street/Heavy City Traffic	100	Very Loud	8 times as loud
Ambulance Siren; Food Blender	95	Very Loud	
Garbage Disposal	90	Very Loud	4 times as loud
Freight Cars; Living Room Music	85	Loud	
Pneumatic Drill; Vacuum Cleaner	80	Loud	2 times as loud
Busy Restaurant	75	Moderately Loud	
Near Freeway Auto Traffic	70	Moderately Loud	
Average Office	60	Quiet	One-half as loud
Suburban Street	55	Quiet	
Light Traffic; Soft Radio Music in Apartment	50	Quiet	One-quarter as loud
Large Transformer	45	Quiet	
Average Residence without Stereo Playing	40	Faint	One-eighth as loud
Soft Whisper	30	Faint	
Rustling Leaves	20	Very Faint	
Human Breathing	10	Very Faint	Threshold of Hearing

Source: California Department of Transportation (Caltrans) 2006, October. Traffic Noise Analysis Protocol.

Vibration

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 such as railroads or vibration-intensive stationary sources, but can also be associated with construction equipment, such as jackhammers, pile drivers, and hydraulic hammers. Vibration displacement is the distance that a point on a surface moves away from its original static position. The instantaneous speed that a point on a surface moves is described as the velocity, and the rate of change of the speed is described as the acceleration. Each of these descriptors can be used to correlate vibration to human response, building damage, and acceptable equipment vibration levels. During the construction of a building, the operation of construction equipment could cause groundborne vibration. The three main wave types of concern in the propagation of groundborne vibrations are surface or Rayleigh waves, compression or P-waves, and shear or S-waves.

- Surface or Rayleigh waves travel along the ground surface. They carry most of their energy along an expanding cylindrical wave front, similar to the ripples produced by throwing a rock into a lake. The particle motion is more or less perpendicular to the direction of propagation (known as retrograde elliptical).

- Compression or P-waves are body waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal, in a push-pull motion. P-waves are analogous to airborne sound waves.

- Shear or S-waves are also body waves, carrying their energy along an expanding spherical wave front. Unlike P-waves, however, the particle motion is transverse, or perpendicular to the direction of propagation.

The peak particle velocity (PPV) or the root mean square (RMS) velocity is usually used to describe vibration amplitudes. PPV is defined as the maximum instantaneous peak of the vibration signal and RMS is defined as the square root of the average of the squared amplitude of the signal. PPV is more appropriate for evaluating potential building damage, whereas RMS is typically more suitable for evaluating human response.

The units for PPV and RMS velocity are normally inches per second (in/sec). Often, vibration is presented and discussed in dB units to compress the range of numbers required to describe the vibration. All PPV and RMS velocity are in in/sec and all vibration levels in this study are in dB relative to 1 micro-inch per second (abbreviated as VdB). The threshold of perception is approximately 65 VdB. Typically groundborne vibration generated by manmade activities attenuates rapidly with distance from the source of the vibration. Manmade vibration problems are usually confined to short distances (500 feet or less) from the source.

Construction generally includes a wide range of activities that can generate groundborne vibration. In general, demolition of structures generates the highest vibrations. Vibratory compactors or rollers, pile drivers, and pavement breakers can generate perceptible amounts of vibration at distances within 200 feet of the vibration sources. Heavy trucks can also generate groundborne vibrations that vary, depending on vehicle type, weight, and pavement conditions. Potholes, pavement joints, discontinuities, differential settlement of pavement, etc., all increase the vibration levels from vehicles passing over a road surface. Construction vibration is normally of greater concern than vibration of normal traffic on streets and freeways with smooth pavement conditions. Trains generate substantial quantities of vibration due to their engines, steel wheels, and heavy loads.

Sensitive Receptors

Certain land uses are particularly sensitive to noise and vibration. Noise- and vibration-sensitive uses include land uses where quiet environments are necessary for enjoyment and public health and safety. Residences, schools, guest lodging, libraries, religious institutions, hospitals, nursing homes, and passive recreation areas are generally more sensitive to noise than commercial and industrial land use.

Noise Regulations and Guidelines

Compliance with State, City, and LAUSD noise requirements and guidelines is required for schools as described below.

State

California Code of Regulations, Title 24, Part 2

Current law states that every local agency enforcing building regulations, such as cities and counties, must adopt the provisions of the California Building Code (CBC) within 180 days of its publication. The publication date of the CBC is established by the California Building Standards Commission. The most recent building standard adopted by the legislature and used throughout the state is the 2016 version, often with local, more restrictive amendments that are based on local geographic, topographic, or climatic conditions.[5] The State of California's noise insulation standards are codified in the CBC. These noise standards are for new construction in California for the purposes of interior compatibility with exterior noise sources. The regulations specify that acoustical studies must be prepared when noise-sensitive structures, such as residential, schools, or hospitals, are near major transportation noises, and where such noise sources create an exterior noise level of 60 dBA CNEL or higher. Acoustical studies that accompany building plans must demonstrate that the structure has been designed to limit interior noise in habitable rooms to acceptable noise levels. For new residential buildings, schools, and hospitals, the acceptable interior noise limit for new construction is 45 dBA CNEL.

City of Cudahy

See attached.

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7.1 INTRODUCTION TO THE ELEMENT

7.1.1 SCOPE AND AUTHORITY OF THE ELEMENT

Excessive noise levels disturb and disrupt human activities and can affect the physical and psychological health of individuals. They depreciate the quality of the environment by affecting work, sleep, and recreation. The Noise Element of the Cudahy General Plan provides measures to minimize noise problems in the City. With the majority of the City devoted to residential uses, it is important that noise sources are controlled at the source, are located away from residential communities, or buffers are provided between the sources of noise and the residential development. The noise mitigation program in the Noise Element explores various noise control options and land use compatibility standard.

As mandated by the *California Government Code Section 65302(f)*, the Noise Element follows the guidelines established by the *Office of Noise Control of the State Department of Health Services*. Goals, policies, and guidelines for minimizing increases in ambient noise levels are outlined in the section that follows.

7.2 NOISE BACKGROUND REPORT

7.2.1 CHARACTERISTICS OF SOUND

Community noise levels are typically measured in terms of the A-weighted decibel (dBA). A-weighing is a frequency correction that correlates overall sound pressure levels with the frequency response of the human ear. Additional units of measurement have been developed to evaluate the longer term characteristics of sound.

One of the more common noise measurements uses statistical samples in terms of percentile noise levels. For example, the L_{10} noise level represents the noise level that is exceeded 10% of the time. The L_{50} noise level represents the median noise level half the time (noise exceeds this level and half the time noise is less than this level). The L_{90} noise level represents the background noise level experienced during 90% of the time. The equivalent noise level (Leq) is a single-number representation of the fluctuating sound level in decibels over a specified period of time.

Topography and man-made structures have very complex effects on sound transmission and on noise contours. Generally, solid barriers between a source and receiver, such as hills, berms and walls absorb and/or reflect noise resulting in a quieter environment. Where barriers or land forms do not interrupt the sound transmission path from source to receiver, the contours prove to be good estimates of average noise level. In areas where barriers or land forms interrupt the sound path, the noise contours overestimate the extent to which a noise intrudes into the community.

Community Noise Equivalent Level (CNEL) is the noise measurement that represents an average of all measured noise levels obtained over a specified period of time. The CNEL scale includes an additional 5 dB adjustment to sounds occurring in the evening (7:00 p.m. to 10 p.m.) in addition to the 10 dB adjustment to sounds occurring in the late evening and early morning hours (between 10:00 p.m. and 7:00 a.m.). Representative noise sources and sound levels are shown in Exhibit 7-1.

7.2.2 COMMUNITY NOISE SURVEY

A community noise survey was conducted as part of the Noise Element's update in 2009 to document the existing noise environment. Ten locations were selected for the surveys corresponding to the locations visited during the preparation of the previous Noise Element. The noise measurement locations are shown in Exhibit 7-2.

Noise along transportation corridors are highest along major roadway and decrease as the distance from the roadway (noise source) increases. The noise measurement results are representative samples of urban residential, commercial, and industrial areas. These noise measurement results may be used as a general guideline or indication of noise levels within the community. A summary of the noise measurements taken during a weekday afternoon are provided in Table 7-1.

Table 7-1
Noise Measurements

Site#	L^{ave}	L^{25}	L^{50}	L^{99}
1	134	101	94	88
2	123	108	103	95
3	114	102	93	81
4	132	111	106	101
5	120	107	101	90
6	118	110	106	98
7	122	117	115	110
8	126	117	114	109
9	121	110	104	99
10	110	103	101	99

Source: BlodgettJBaylosis Associates, 2009

7.2.3 MOBILE NOISE SOURCES - TRAFFIC

The City of Cudahy roadway noise contour data were generated with the Federal Highway Administration's Highway Traffic Noise Prediction Model, U.S. Department of Transportation (1978). Model input data included existing average daily traffic levels; day/evening/night percentages of autos, medium, and heavy trucks; vehicle speeds; ground attenuation factors; and roadway widths. The distance from the roadway centerline to the roadway's 60, 65 and 70 dB CNEL contours for the existing conditions (2008) are provided in Table 7-2. As indicated in Table 7-2, traffic on Atlantic Avenue is among the major generators of noise within Cudahy. The I-710 freeway also generates significant levels of traffic noise within the City.

Table 7-2
Existing Traffic Noise Contours

Roadway	70 CNEL	65 CNEL	60 CNEL	dBA Q 50'
Clara Street -	0.0	80	221	64.2
Elizabeth Street -	0.0	81	225	64.3
Santa Ana Street -	0.0	0.0	76	60.1
Wilcox Avenue -	0.0	67	172	63.1
Patata Street -	0.0	120	357	66.4
Atlantic Avenue -	0.0	95	272	65.2
Salt Lake Avenue -	0.0	74	197	63.7
Otis Avenue -	0.0	0.0	68	59.6
Long Beach Fwy*	0.0	0.0	63	59.2

Source: BlodgettJBaylosis Associates, 2009

7.2.4 MOBILE NOISE SOURCES - RAILROADS

Noise from passing trains is dependent on the number of trains, speed, type of tracks, grade crossings, track curves, crossing bells and train horns, and the type of trains. The Southern Pacific Railway Company (SPRR) currently maintains a double track adjacent to northern end of the City, with their tracks running west to east along Randolph Street. Train operations occur at all hours and change in response to customer needs. Currently, an average of 8 diesel trains run along these tracks during the daytime and nighttime periods. The Union Pacific Railroad (UPRR) tracks along Salt Lake Avenue on the western end of the Central City are used by approximately 7 trains daily.

7.2.5 MOBILE NOISE SOURCES - AIRCRAFT

The City of Cudahy is not located within the noise impact areas of nearby airports, although there are several commercial airports serving area including the Long Beach Airport and the Los Angeles International Airport in Los Angeles. Over-flights from these airports are sources of aircraft noise in the City of Cudahy.

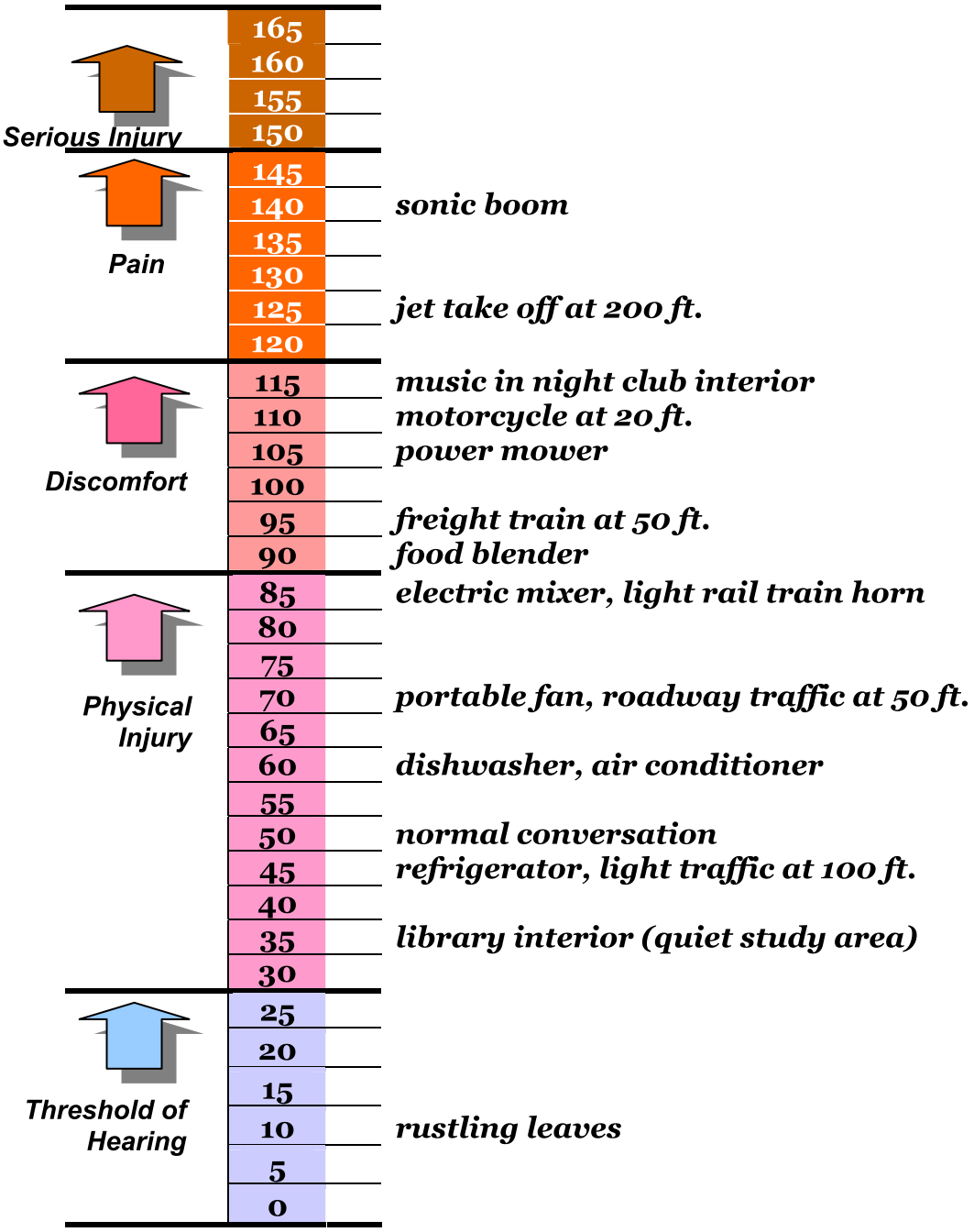

EXHIBIT 7-1
NOISE LEVELS ASSOCIATED WITH TYPICAL ACTIVITIES

SOURCE: U. S. ENVIRONMENTAL PROTECTION AGENCY

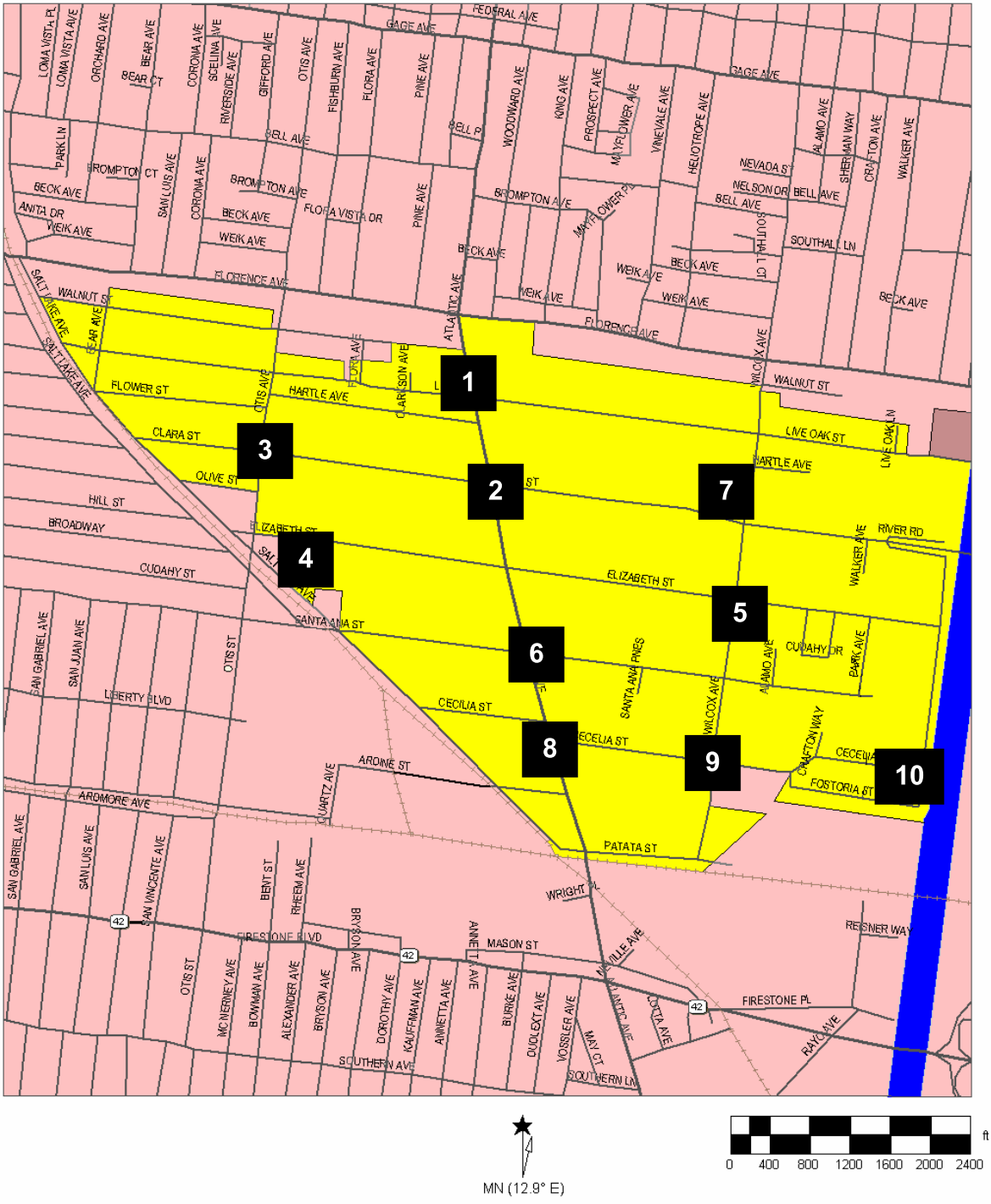

EXHIBIT 7-2
NOISE MEASUREMENT LOCATIONS

SOURCE: BLODGETT/BAYLOSIS ASSOCIATES

7.3 NOISE MITIGATION PLAN

7.3.1 NOISE GOALS AND POLICIES

The two main areas of concerns of the Noise Element are the protection of noise-sensitive land uses from excessive noise and the control of noise sources from affecting other land uses in the City. The goals and policies below were developed in recognition of existing noise sensitive uses and noise sources in the City.

Issue: Noise Sensitive Uses

Noise-sensitive land uses in the City of Cudahy include the residential areas (which cover nearly 60 percent of the land area), mobile home parks, schools, the library, and local churches. They represent users and activities that could be easily disturbed or annoyed by noise levels beyond acceptable standards. The mitigation of existing and protected noise problems will include the reduction of noise levels within these areas.

- *Noise Element Goal 1.* The City of Cudahy will prevent any increase in the established acceptable ambient levels of sound in the residential areas of the community.
- *Noise Element Policy 1.1.* The City of Cudahy will consider the inclusion of noise-impacted areas in redevelopment or other programs which would permit assistance for the residents with relocation, rehabilitation, or insulation of their structures and properties.
- *Noise Element Policy 1.2.* The City of Cudahy will consider steps to correct existing noise problem areas through the establishment of buffers and barriers or through abatement procedures.
- *Noise Element Policy 1.3.* The City of Cudahy will discourage the location of unbuffered noise sources near residential areas and schools.

Issue: Noise Sources

Noise in the City comes primarily from roadway traffic. Roadway noise levels are highest along Atlantic Avenue, Salt Lake Avenue, and the Long Beach Freeway. Train noises affect areas on the western and southern edge of Cudahy. Stationary noise sources include commercial uses on Atlantic Avenue and industrial uses on the southern portion of the City. Noise from these uses need to be controlled to reduce their impacts on adjacent uses.

- *Noise Element Goal 2.* The City of Cudahy will prohibit unnecessary noise which is detrimental to the public health and welfare and contrary to the public interest.
- *Noise Element Policy 2.1.* The City of Cudahy will evaluate the noise impacts of all land use decisions which are subject to environmental review under CEQA.
- *Noise Element Policy 2.2.* The City of Cudahy will control at their sources, any sounds which exceed accepted community noise levels.
- *Noise Element Policy 2.3.* The City of Cudahy will limit construction activities to daytime hours to reduce construction noise impacts.
- *Noise Element Policy 2.4.* The City of Cudahy will discourage truck traffic on local streets during nighttime hours.

- *Noise Element Policy 2.5.* The City of Cudahy will establish acceptable limits of noise for various land uses throughout the community.
- *Noise Element Policy 2.6.* The City of Cudahy will encourage increased acoustical design in new construction when adjacent to known sources of noise.

7.3.2 NOISE MITIGATION PLAN

Aside from the existing noise environment, noise levels at buildout of the Land Use Plan were estimated using projected traffic volumes for 2010. As with the existing noise levels, the Federal Highway Administration Noise Prediction Model was used estimate roadway noise levels along City streets. Table 7-3 provides the distance of the 65, 60 and 55 CNEL noise contours from the roadway centerline. Although the exhibit does not account for noise buffers and barriers within each development, uses in areas within the 65 CNEL contour will generally be subject to high noise levels.

Table 7-3
Future Traffic Noise Levels

Roadway Segment		Distance from Roadway Centerline to CNEL (in feet)			
		65 CNEL	60 CNEL	55 CNEL	CNEL at 50' from centerline
Clara Street -	Wilcox/LA River	0.0	150.0	472.2	63.73
	Atlantic/Wilcox	0.0	104.0	325.7	62.11
	Otis/Atlantic	0.0	82.9	258.4	61.11
Elizabeth Street -	Wilcox/LA River	0.0	0.0	71.5	55.61
	Atlantic/Wilcox	0.0	57.9	179.3	59.66
Santa Ana Street -	Wilcox/Park	0.0	0.0	103.4	57.24
	Atlantic/Wilcox	0.0	68.8	214.4	60.44
	Salt Lake/Atlantic	0.0	107.9	329.0	61.45
Wilcox Avenue -	Patata/Santa Ana	0.0	0.0	93.2	56.79
	Santa Ana/Clara	0.0	118.0	371.2	62.82
	Clara/Florence	0.0	127.2	400.5	63.15
Patata Street -	Atlantic/Wilcox	0.0	97.7	306.6	61.99
Atlantic Avenue -	Patata/Santa Ana	194.0	604.9	1,910.0	68.97
	Santa Ana/Clara	194.6	606.9	1,916.5	68.98
	Clara to Florence	168.4	522.9	1,650.3	68.33
Salt Lake Avenue -	Patata/Elizabeth	79.8	250.7	792.1	66.27
	Elizabeth/Florence	64.0	200.2	632.4	65.29
Otis Avenue -	Elizabeth/Flower	0.0	104.2	327.2	62.28
	Flower/Florence	0.0	97.3	305.2	61.97
Long Beach Freeway*	Florence/Firestone	3,549.7	11,222.4	35,484.7	80.68

The Land Use Plan recognizes the continued operations of railroad operations through the City. Several variables must be taken into account in determining actual noise levels produced by railroad operations. For the locomotive, the noise emitted by the engine is independent of the train's velocity; however, the noise output of the locomotive is highly dependent on track grade conditions. Slowing down or movement on the spur tracks will result in increased noise output emanating from braking equipment.

Car noise, attributed to wheel/rail noise, is highly dependent on speed, increasing approximately 6 dB for each doubling of train velocity. A number of other variables, primarily relating to physical track or wheel conditions, are also significant in influencing wheel/rail generated noise. These factors include the type of rails (welded or joints) 4 to 8 dBA increases; the condition of wheels on cars up to 8 dBA; the configuration of railroad right-of-way (linear vs. curved) between 10 to 15 dBA; and the grade crossings and signal controls between 6 to 8 dBA. The Southern Pacific rail line travels along the southern border of the City and does not impact any noise sensitive land uses. The greatest potential for noise impacts or noise sensitive land uses comes from the Los Angeles and Salt Lake Railroad located immediately adjacent to Salt Lake Avenue. On the average, train noise will range from between 60 to 70 dBA at fifty feet depending on the length and speed of the train.

In order to protect residents from the disruptive and health effects of excessive noise, the City shall develop a noise mitigation program. The noise mitigation program for Cudahy shall expand existing regulations relating to noise and establish standards for controlling noise sources and their impacts. This may include the provision of noise barriers (berms, walls, etc.), buffer areas or setbacks, increased insulation, blank exterior walls, double-paned windows, noise-masking sounds, mufflers, and other noise control devices and building features. Vibration that affects adjacent properties shall also be regulated. The City shall require an acoustical analysis for projects that have the potential for generating excessive noise levels or those uses which would be developed adjacent to a noise source. The study shall include existing ambient noise levels from mobile and stationary sources. It shall estimate cumulative noise levels at implementation of the project. The estimates shall be provided for both interior and exterior areas on site. Specific measures to reduce projected noise levels to acceptable standards shall be identified.

As part of the environmental review, mitigation measures shall be made conditions of approval and a monitoring program established. State standards on noise insulation shall be applied during the plan check process for new developments. For the evaluation of noise impacts, acceptable noise levels of various land uses, as established by the California Office of Noise Control, are shown in Exhibit 7-3. Compliance with the noise regulations of federal and state agencies shall be monitored by the City. They include noise standards for industrial operations, federally-funded projects, motor vehicles, airport noise, classrooms, libraries and other educational facilities, multi-family residential uses, hotels, and motels.

With most of the City developed, noise abatement can be implemented during rehabilitation or redevelopment activities, or as part of the code enforcement process. Redevelopment projects shall comply with City noise standards and, to the extent funds are available for these purposes, the Agency shall provide assistance to the residents of affected properties with relocation, rehabilitation, or insulation of their structures and properties.

The noise mitigation program shall also identify noisy activities and operations and provide guidelines to reduce disturbance on adjacent uses. Noise-generating activities will include construction equipment and activity noise, sports events, use of play areas, power mowers and leaf blowers, garbage collection and truck traffic and deliveries, false car or security alarms, large gatherings and other outdoor activities. Limitations in the hours of operation and the length of operation will contribute in large part to the reduction of noise from

these uses. Noise during the nighttime and the early morning hours are more disruptive and the regulation of activities during these times will prevent adverse noise impacts.

Land Use Categories		Community Noise Equivalent Level (in dBA, CNEL) <55 60 65 70 75 80>
Residential	Single-family, Duplex, Multiple-family	
	Mobile Homes, Mixed Use	
Commercial	Hotel, Motel, Other Lodging	
	General Commercial, Retail	
	Office	
Industrial	Business Park, Research & Development	
	Manufacturing, Warehousing	
Institutional	Hospitals, Schools, Libraries	
	Churches, Civic Uses	
Recreation and Open Space	Public Parks	
	Golf Course, Natural Habitat	
	Commercial Recreation	

	CLEARLY COMPATIBLE	Ambient noise levels are not significant enough to require special construction and/or noise mitigation.
	NORMALLY COMPATIBLE	Most land uses will not be affected by ambient noise. Some form of design measures and/or mitigation may be required for noise sensitive land uses.
	CLEARLY INCOMPATIBLE	Noise sensitive land uses should not be located in these areas unless mitigation is employed to reduce interior noise levels.
	NORMALLY INCOMPATIBLE	Noise sensitive land uses should not be located in these areas due to excessive and continuous high ambient noise.

EXHIBIT 7-3
STATE OF CALIFORNIA RECOMMENDED LAND USE COMPATIBILITY STANDARDS

SOURCE: STATE OF CALIFORNIA

CITY OF CUDAHY

MUNICIPAL

CODE

A Codification of the General Ordinances

of the City of Cudahy, California

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2015

of the effective date of the ordinance which generated the nonconformity.

(2) A legal nonconforming sign may be maintained longer than the time permitted in subsection (1) of this section pursuant to the terms of Chapter 20.24 CMC. (Ord. 587 § 20-1.2260).

Chapter 20.88

ENVIRONMENTAL PERFORMANCE STANDARDS

Sections:

20.88.010 Purpose and intent.

The following performance standards are included in the zoning code to:

(1) Ensure that residential neighborhoods and the business community in Cudahy will be free from environmental hazards of noise, vibration, dust, glare, and other negative influences; and

(2) Contribute to regional efforts to protect and enhance the environmental quality of life. (Ord. 587 § 20-1.2300).

20.88.020 Noise.

The following provisions limit unwanted and harmful emission of sound:

(1) Maximum permissible exterior sound levels by receiving land uses are:

(a) Noise standards for the various categories of land uses set forth in Table 20.88-1 shall, unless otherwise specified, apply to each property or portion of property in the community. Where two or more dissimilar land uses occur on a single property, the more restrictive noise standard shall apply;

(b) In the event of a dispute over the identification of a receiving land use, interpretation is to be made by the city;

(c) No person shall operate or cause to be operated any source of sound or noise at any location within the city, or allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, which causes the noise level to exceed the levels indicated on Table 20.88-1.

Table 20.88-1
Maximum Exterior Noise Levels

Noise Level (dBA)		
Receiving Land Use Category	**10:00 p.m. – 7:00 a.m.**	**7:00 a.m. to 10:00 p.m.**
Residential (Except Multifamily)	45	65
Multifamily Residential and Mobile Home Parks	50	65
Commercial (All "C" Zones)	60	65
Light Industrial Zones	70	70
Heavy Industrial Zones	70	70

(2) Maximum Permissible Interior Noise Levels.

(a) No person shall operate, or cause to be operated, any source of sound within a residential dwelling unit or allow the creation of noise on property owned, leased, occupied, or otherwise controlled by such person, which causes the noise level, when measured inside a neighboring receiving dwelling unit, to exceed the environmental and/or nuisance interpretation of the applicable limits shown on Table 20.88-2.

Table 20.88-2
Maximum Interior Noise Levels

Land Use Type	Time Interval	Maximum Noise Level (dBA)		
		Any time	**1 min./1 hr.**	**5 min./1 hr.**
Residential	10:00 p.m. to 7:00 a.m.	35	40	35
	7:00 a.m. to 10:00 p.m.	45	50	45

(b) If the ambient noise level inside a receiving dwelling unit exceeds permissible limits, the allowable noise exposure standard in that category shall be the measured ambient noise for a cumulative period of five minutes in any one hour, ambient plus five dBA for one minute within any one hour, and shall not exceed the ambient plus 10 dBA at any time.

(3) Methodology for calculating noise levels shall be as follows:

(a) Noise levels shall be measured by the equivalent sound level (Leq) for any hour;

(b) Nuisance noise shall be measured as a sound level not to be exceeded at any time;

(c) Sound levels by receiving land use shall be measured at the boundary or at any point within the boundary of the property affected;

(d) Fixed location public utility distribution or fixed transmission facilities located on or adjacent to a property line shall be subject to the noise level limits of this section measured at or beyond six feet from the boundary of the easement upon which the utility equipment is located;

(e) If the noise is continuous, the Leq for an hour will be represented by any lesser time period within that hour. Noise measurements of five minutes or less will thus suffice to define the noise level;

(f) If the noise is intermittent, the Leq for any hour may be represented by a time period typical of the operating cycle. Measurement of intermittent noise is to be made of at least three noisy/quiet periods. Alternatively, measurements taken at two periods of at least 15 minutes each may be used;

(g) In the event the alleged noise event, as judged by the enforcement official, contains a steady, audible sound such as a whine, screech, or hum, or contains a repetitive, impulsive noise such as hammering or riveting, the standard may be reduced by five dB at the discretion of the enforcement official;

(h) If the measured ambient noise level exceeds that permissible in Table 20.88-1, the allowable noise exposure standard shall be the ambient noise level. The ambient level shall be measured when the alleged noise violation source is not operating.

(4) The following is prohibited:

(a) No person shall unnecessarily make, continue, or cause to make or continue any noise disturbances;

(b) Sounding or permitting the sounding of any electrically amplified signal from any stationary bell, chime, siren, whistle, or similar device intended for nonemergency purposes, from any place for more than 120 seconds continually in a one-hour period, or intermittent sounding over a five-minute period in one hour;

(c) Creating or causing the creation of any sound within a noise-sensitive area, so as to exceed the maximum exterior noise levels set forth in Table 20.88-1.

(5) The following are exempt from these noise standards: warning devices necessary for the protection of public safety, including, but not limited to, police, fire, ambulance sirens, and train horns. (Ord. 587 § 20-1.2305).

20.88.030 Vibration.

No vibration shall be detectable beyond the property line of the site from which the vibration is emanating. Within industrial districts, vibration shall not exceed the standards set forth in Table 20.88-3.

Table 20.88-3
Maximum Vibration in Industrial Districts

Frequency	Vibration Displacement (inches)	
	Steady State	Impact
Under 10	.0055	.0010
10 – 19	.0044	.0008
20 – 29	.0033	.0006
30 – 39	.0002	.0004
40+	.0001	.0002

(Ord. 587 § 20-1.2310).

20.88.040 Dust and paint.

All uses, including grading, construction, and operational phases, shall be conducted in a manner so as to prevent dust emissions and paint overspray from creating hazardous or potential hazardous conditions within the site and surrounding area.

Parcels located within the soil erosion control area are required to obtain dust control permits from the building department prior to commencement of grading operations. (Ord. 587 § 20-1.2315).

20.88.050 Smoke.

Smoke emissions shall be controlled in accordance with the standards of the South Coast Air Quality Management District. (Ord. 587 § 20-1.2320).

20.88.060 Light, glare, and heat.

All on-site lighting fixtures, including parking lot lighting, security lighting, and decorative lighting, may be indirect or diffused, or, if not, shall be shielded or directed away from a residential-zoned district. Where appropriate, lighting fixtures must also comply with the Cudahy security ordinance. Welding operations shall be conducted within a fully enclosed structure, or shall be shielded from public view. (Ord. 587 § 20-1.2325).

20.88.070 Hazardous materials.

The use, handling, storage, and transportation of combustibles and explosives shall comply with

applicable provisions of the Uniform Fire Code, city regulations, and all other local, state, and federal regulations. (Ord. 587 § 20-1.2330).

20.88.080 Radioactive materials.

The use, handling, storage, and transportation of radioactive material shall comply with the provisions of the Uniform Fire Code and all other local, state, and federal regulations. (Ord. 587 § 20-1.2335).

20.88.090 Electromagnetic interference.

Uses, activities, and processes shall not cause electromagnetic interference with normal radio or television reception or with the function of other electronic equipment beyond the property lines of the site on which they are generated. (Ord. 587 § 20-1.2340).

20.88.100 Odors and gases.

(1) The emission of obnoxious odors of any kind shall not be permitted.

(2) No gas shall be emitted which is injurious to the public health, safety, or general welfare. (Ord. 587 § 20-1.2345).

20.88.110 Hours of operation.

With the exception of office and security activities, any industrial production, processing, cleaning, testing, repairing, shipping, or outdoor activities within 300 feet of a residential zone district shall be limited to the hours of 7:00 a.m. to 10:00 p.m. The community development director may approve additional hours when it can be found that such additional hours will not generate additional disturbance, or that mitigation measures will ensure compatibility with nearby residential areas. (Ord. 587 § 20-1.2350).

20.88.120 Enforcement.

Upon receipt of a complaint alleging infraction of any of the standards enumerated in this chapter, the community development director shall cause an investigation of the specific allegation to be completed. The community development director may retain the services of environmental professionals to perform studies to investigate if violations of the city standards are or have been occurring. If it is determined and documented that violations have occurred, the community development director shall refer the matter to the city attorney's office for appropriate action. Potential violations of smoke standards shall be referred to the South Coast Air Quality Management District.

The individual, firm, association, or party found to be in violation of the city standard shall bear all expenses for the investigation charged to the city. (Ord. 587 § 20-1.2355).

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 01/10/2019
Case Description: LASD1-31.1

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Site Prep	Residential	60.0	55.0	60.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	425.0	0.0
Dozer	No	40		81.7	425.0	0.0
Dozer	No	40		81.7	425.0	0.0
Tractor	No	40	84.0		425.0	0.0
Tractor	No	40	84.0		425.0	0.0
Front End Loader	No	40		79.1	425.0	0.0
Backhoe	No	40		77.6	425.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Leq	Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq	Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq
Dozer	63.1	59.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	63.1	59.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	63.1	59.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	65.4	61.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	65.4	61.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	60.5	56.5	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	59.0	55.0	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	65.4	67.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 01/10/2019
Case Description: LASD1-31.1

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Utility Trecnhing	Residential	60.0	55.0	60.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Excavator	No	40		80.7	425.0	0.0
Tractor	No	40	84.0		425.0	0.0
Drill Rig Truck	No	20		79.1	425.0	0.0

Results

	Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
	Calculated (dBA)		Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Excavator	62.1	58.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	65.4	61.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Drill Rig Truck	60.6	53.6	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	65.4	63.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 01/10/2019
Case Description: LASD1-31.1

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Utility Trecnhing	Residential	60.0	55.0	60.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Excavator	No	40		80.7	425.0	0.0
Tractor	No	40	84.0		425.0	0.0
Drill Rig Truck	No	20		79.1	425.0	0.0

Results

	Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
	Calculated (dBA)		Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Excavator	62.1	58.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	65.4	61.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Drill Rig Truck	60.6	53.6	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	65.4	63.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 01/10/2019
Case Description: LASD1-31.1

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Portable Installation	Residential	60.0	55.0	60.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16	80.6	425.0	0.0	

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Crane	62.0	54.0	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	62.0	54.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 01/10/2019
Case Description: LASD1-31.1

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Portable Removal	Residential	60.0	55.0	60.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Crane	No	16	80.6	425.0	0.0	

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Day Noise Limits (dBA) Lmax	Day Noise Limits (dBA) Leq	Evening Noise Limits (dBA) Lmax	Evening Noise Limits (dBA) Leq	Night Noise Limits (dBA) Lmax	Night Noise Limits (dBA) Leq	Day Noise Limit Exceedance (dBA) Lmax	Day Noise Limit Exceedance (dBA) Leq	Evening Noise Limit Exceedance (dBA) Lmax	Evening Noise Limit Exceedance (dBA) Leq	Night Noise Limit Exceedance (dBA) Lmax	Night Noise Limit Exceedance (dBA) Leq
Crane	62.0	54.0	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	62.0	54.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 01/10/2019
Case Description: LASD1-31.1

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Handball Court Demolition	Residential	60.0	55.0	60.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Concrete Saw	No	20	89.6	425.0	0.0	
Excavator	No	40	80.7	425.0	0.0	
Excavator	No	40	80.7	425.0	0.0	
Excavator	No	40	80.7	425.0	0.0	
Dozer	No	40	81.7	425.0	0.0	
Dozer	No	40	81.7	425.0	0.0	

Results

	Calculated (dBA)		Noise Limits (dBA)				Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Concrete Saw	71.0	64.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	62.1	58.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	62.1	58.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	62.1	58.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	63.1	59.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	63.1	59.1	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	71.0	67.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 01/10/2019
Case Description: LASD1-31.1

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Building Construction	Residential	60.0	55.0	60.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Crane	No	16	80.6	425.0	0.0	
Man Lift	No	20	74.7	425.0	0.0	
Man Lift	No	20	74.7	425.0	0.0	
Man Lift	No	20	74.7	425.0	0.0	
Generator	No	50	80.6	425.0	0.0	
Tractor	No	40	84.0	425.0	0.0	
Front End Loader	No	40	79.1	425.0	0.0	
Backhoe	No	40	77.6	425.0	0.0	
Welder / Torch	No	40	74.0	425.0	0.0	

Results

	Calculated (dBA)		Noise Limits (dBA)				Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Crane	62.0	54.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	56.1	49.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	56.1	49.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	56.1	49.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	62.0	59.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	65.4	61.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	60.5	56.5	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	59.0	55.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Welder / Torch	55.4	51.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	65.4	65.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 01/10/2019
Case Description: LASD1-31.1

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Building Construction	Residential	60.0	55.0	60.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	425.0	0.0
Man Lift	No	20		74.7	425.0	0.0
Man Lift	No	20		74.7	425.0	0.0
Man Lift	No	20		74.7	425.0	0.0
Generator	No	50		80.6	425.0	0.0
Tractor	No	40	84.0		425.0	0.0
Front End Loader	No	40		79.1	425.0	0.0
Backhoe	No	40		77.6	425.0	0.0
Welder / Torch	No	40		74.0	425.0	0.0
Drill Rig Truck	No	20		79.1	425.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Leq	Noise Limits (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq	Noise Limit Exceedance (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq
Crane	62.0	54.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	56.1	49.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	56.1	49.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	56.1	49.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	62.0	59.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	65.4	61.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	60.5	56.5	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	59.0	55.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A															
Welder / Torch	55.4	51.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A															
Drill Rig Truck	60.6	53.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A															
Total	65.4	65.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A															

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 01/10/2019
Case Description: LASD1-31.1

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Architectural Coating - Modernization	Residential	60.0	55.0	60.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	425.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)				Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Compressor (air)	59.1	55.1	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	59.1	55.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 01/10/2019
Case Description: LASD1-31.1

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Rough Grading	Residential	60.0	55.0	60.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Excavator	No	40		80.7	425.0	0.0
Grader	No	40	85.0		425.0	0.0
Dozer	No	40		81.7	425.0	0.0
Tractor	No	40	84.0		425.0	0.0
Front End Loader	No	40		79.1	425.0	0.0
Backhoe	No	40		77.6	425.0	0.0

Results

	Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
	Calculated (dBA)		Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Excavator	62.1	58.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader	66.4	62.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	63.1	59.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	65.4	61.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	60.5	56.5	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	59.0	55.0	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	66.4	67.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 01/10/2019
Case Description: LASD1-31.1

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Fine Grading	Residential	60.0	55.0	60.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Excavator	No	40		80.7	425.0	0.0
Grader	No	40	85.0		425.0	0.0
Dozer	No	40		81.7	425.0	0.0
Tractor	No	40	84.0		425.0	0.0
Front End Loader	No	40		79.1	425.0	0.0
Backhoe	No	40		77.6	425.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)				Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Excavator	62.1	61.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader	66.4	65.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	63.1	62.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	65.4	64.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	60.5	59.5	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	59.0	58.0	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	66.4	70.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 01/10/2019
Case Description: LASD1-31.1

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Paving - Kindergarten Area	Residential	60.0	55.0	60.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	425.0	0.0
Paver	No	50		77.2	425.0	0.0
Pavement Scarafier	No	20		89.5	425.0	0.0
Pavement Scarafier	No	20		89.5	425.0	0.0
Roller	No	20		80.0	425.0	0.0
Roller	No	20		80.0	425.0	0.0

Results

Equipment	Calculated (dBA) Lmax	L10	Day Lmax	L10	Evening Lmax	L10	Night Lmax	L10	Day Lmax	L10	Evening Lmax	L10	Night Lmax	L10
Paver	58.6	58.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paver	58.6	58.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pavement Scarafier	70.9	66.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pavement Scarafier	70.9	66.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	61.4	57.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	61.4	57.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	70.9	70.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A