Appendix C Noise Analysis

Appendices

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Fundamentals of Noise

NOISE

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

Noise Descriptors

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

- **Sound.** A disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.

- **Noise.** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.

- **Decibel (dB).** A unitless measure of sound, expressed on a logarithmic scale and with respect to a defined reference sound pressure. The standard reference pressure is 20 micropascals (20 μPa).

- **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 that approximates the frequency response of the human ear.

- **Equivalent Continuous Noise Level (L_{eq}); also called the Energy-Equivalent Noise Level.** The value of an equivalent, steady sound level which, in a stated time period (often over an hour) and at a stated location, has the same A-weighted sound energy as the time-varying sound. Thus, the L_{eq} metric is a single numerical value that represents the equivalent amount of variable sound energy received by a receptor over the specified duration.

- **Statistical Sound Level (L_n).** The sound level that is exceeded "n" percent of time during a given sample period. For example, the L_{50} level is the statistical indicator of the time-varying noise signal that is exceeded 50 percent of the time (during each sampling period); that is, half of the sampling time, the changing noise levels are above this value and half of the time they are below it. This is called the "median sound level." The L_{10} level, likewise, is the value that is exceeded 10 percent of the time (i.e., near the maximum) and this is often known as the "intrusive sound level." The L_{90} is the sound level exceeded 90 percent of the time and is often considered the "effective background level" or "residual noise level."

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

Characteristics of Sound

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

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

Amplitude

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

Table 1 Noise Perceptibility

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

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

Frequency

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

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

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

Duration

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

Because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law and many local jurisdictions use an adjusted 24-hour noise descriptor called the Community Noise Equivalent Level (CNEL) or Day-Night Noise Level (L_{dn}). The CNEL descriptor requires that an artificial increment (or "penalty") of 5 dBA be added to the actual noise level for the hours from 7:00 PM to 10:00

PM and 10 dBA for the hours from 10:00 PM to 7:00 AM. The L_{dn} descriptor uses the same methodology except that there is no artificial increment added to the hours between 7:00 PM and 10:00 PM. Both descriptors give roughly the same 24-hour level, with the CNEL being only slightly more restrictive (i.e., higher). The CNEL or L_{dn} metrics are commonly applied to the assessment of roadway and airport-related noise sources.

Sound Propagation

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

Psychological and Physiological Effects of Noise

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

Table 2 Typical Noise Levels

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

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

Vibration Fundamentals

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

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

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

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

Table 3 Human Reaction to Typical Vibration Levels

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

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

LOCAL REGULATIONS AND STANDARDS

Noise

Policies in this section protect residents, businesses, and visitors from noise hazards by establishing exterior and interior noise standards. Higher exterior noise standards are allowed for residential infill projects and mixed-use developments, as long as the interior noise standard is maintained. Mixed-use projects will be required to mitigate for on-site noise sources to ensure compatibility of uses. These policies also require construction noise impacts to be mitigated and require the reduction of noise from vehicles and aircrafts to protect residents, businesses, and visitors.

Existing noise contours for major sources in Sacramento, which include motor vehicles on roadways, aircraft at Sacramento International Airport and Executive Airport, light rail and heavy rail are shown in Appendix D. Future noise contours for roadways, based on projected development under the 2030 General Plan, are also shown in Appendix D.

Photograph courtesy of Michael Zwahlen

GOAL EC 3.1

Noise Reduction. Minimize noise impacts on human activity to ensure the health and safety of the community.

Policies

EC 3.1.1 **Exterior Noise Standards.** The City shall require noise mitigation for all development where the projected exterior noise levels exceed those shown in Table EC 1, to the extent feasible. *(RDR)*

Table EC 1 Exterior Noise Compatibility Standards for Various Land Uses

Land Use Type	*Highest Level of Noise Exposure That Is Regarded as "Normally Acceptable"[a] (L_{dn}[b] or CNEL[c])*
Residential—Low Density Single Family, Duplex, Mobile Homes	60 dBA[d,e]
Residential—Multi-family	65 dBA
Urban Residential Infill[f] and Mixed-Use Projects[g]	70 dBA
Transient Lodging—Motels, Hotels	65 dBA
Schools, Libraries, Churches, Hospitals, Nursing Homes	70 dBA
Auditoriums, Concert Halls, Amphitheaters	Mitigation based on site-specific study
Sports Arena, Outdoor Spectator Sports	Mitigation based on site-specific study
Playgrounds, Neighborhood Parks	70 dBA
Golf Courses, Riding Stables, Water Recreation, Cemeteries	75 dBA
Office Buildings—Business, Commercial and Professional	70 dBA
Industrial, Manufacturing, Utilities, Agriculture	75 dBA

SOURCE: Governor's Office of Planning and Research, *State of California General Plan Guidelines 2003*, October 2003

a. As defined in the *Guidelines*, "Normally Acceptable" means that the "specified land use is satisfactory, based upon the assumption that any building involved is of normal conventional construction, without any special noise insulation requirements."

b. L_{dn} or Day Night Average Level is an average 24-hour noise measurement that factors in day and night noise levels.

c. CNEL or Community Noise Equivalent Level measurements are a weighted average of sound levels gathered throughout a 24-hour period.

d. dBA or A-weighted decibel scale is a measurement of noise levels.

e. The exterior noise standard for the residential area west of McClellan Airport known as McClellan Heights/Parker Homes is 65 dBA.

f. With land use designations of Central Business District, Urban Neighborhood (Low, Medium, or High) Urban Center (Low or High), Urban Corridor (Low or High).

g. All mixed-use projects located anywhere in the City of Sacramento.

EC 3.1.2 **Exterior Incremental Noise Standards.** The City shall require noise mitigation for all development that increases existing noise levels by more than the allowable increment shown in Table EC 2, to the extent feasible. *(RDR)*

Table EC 2 Exterior Incremental Noise Impact Standards for Noise-Sensitive Uses (dBA)

Residences and buildings where people normally sleep[a]		*Institutional land uses with primarily daytime and evening uses*[b]	
Existing L_{dn}	*Allowable Noise Increment*	*Existing Peak Hour L_{eq}*	*Allowable Noise Increment*
45	8	45	12
50	5	50	9
55	3	55	6
60	2	60	5
65	1	65	3
70	1	70	3
75	0	75	1
80	0	80	0

SOURCE: Federal Transit Administration, *Transit Noise Impact and Vibration Assessment*, May 2006

a. This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.

b. This category includes schools, libraries, theaters, and churches where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material.

EC 3.1.3 **Interior Noise Standards.** The City shall require new development to include noise mitigation to assure acceptable interior noise levels appropriate to the land use type: 45 dBA L_{dn} for residential, transient lodgings, hospitals, nursing homes and other uses where people normally sleep; and 45 dBA L_{eq} (peak hour) for office buildings and similar uses. *(RDR)*

EC 3.1.4 **Interior Noise Review for Multiple, Loud Short-Term Events.** In cases where new development is proposed in areas subject to frequent, high-noise events (such as aircraft over-flights, or train and truck pass-bys), the City shall evaluate noise impacts on any sensitive receptors from such events when considering whether to approve the development proposal, taking into account potential for sleep disturbance, undue annoyance, and interruption in conversation, to ensure that the proposed development is compatible within the context of its surroundings. *(RDR)*

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Community Noise Equivalent Level (CNEL). *An L_{dn} with an additional 5 dBA "penalty" for the evening hours between 7:00 P.M. and 10:00 P.M. This is essentially a measure of ambient noise.*

Day-Night Average Noise Level (L_{dn}). *A 24-hour average L_{eq} with a 10 dBA "penalty" added to noise levels during the hours of 10:00 P.M. to 7:00 A.M. to account for increased sensitivity that people tend to have to nighttime noise. Because of this penalty, the L_{dn} would always be higher than its corresponding 24-hour L_{eq} (e.g., a constant 60 dBA noise over 24 hours would have a 60 dBA L_{eq}, but a 66.4 dBA L_{dn}).*

dBA. *Measurement unit for "a-weighted decibels," which are commonly used for measuring environmental and industrial noise and the potential hearing damage associated noise health effects.*

Equivalent Energy Noise Level (L_{eq}). *Constant noise level that would deliver the same acoustic energy to the ear of a listener as the actual time-varying noise would deliver over the same exposure time. No "penalties" are added to any noise levels during the exposure time; L_{eq} would be the same regardless of the time of day during which the noise occurs.*

Sound Exposure Level or Single Event Level (SEL). *A descriptor used to characterize the severity of short-duration sound events. SEL is the time-averaged, constant intensity, A-weighted sound level over a one-second reference time that would produce the same sound exposure as the actual time-varying sound over the actual exposure time. In practice, SEL is usually applied in situations were there are multiple sound events, each one having its own characteristic SEL.*

EC 3.1.5 **Interior Vibration Standards.** The City shall require construction projects anticipated to generate a significant amount of vibration to ensure acceptable interior vibration levels at nearby residential and commercial uses based on the current City or Federal Transit Administration (FTA) criteria. *(RDR)*

See ERC 2, Parks and Recreation, for additional policies on parks and recreation.

EC 3.1.6 **Vibration Screening Distances.** The City shall require new residential and commercial projects located adjacent to major freeways, hard rail lines, or light rail lines to follow the FTA screening distance criteria. *(RDR)*

EC 3.1.7 **Vibration.** The City shall require an assessment of the damage potential of vibration-induced construction activities, highways, and rail lines in close proximity to historic buildings and archaeological sites and require all feasible mitigation measures be implemented to ensure no damage would occur. *(RDR)*

EC 3.1.8 **Operational Noise.** The City shall require mixed-use, commercial, and industrial projects to mitigate operational noise impacts to adjoining sensitive uses when operational noise thresholds are exceeded. *(RDR)*

See LU 4, Neighborhoods, and M 4, Roadways, for additional policies on residential streets, connectivity, and roadways.

EC 3.1.9 **Compatibility with Park and Recreation Uses.** The City shall limit the hours of operation for parks and active recreation areas in residential areas to minimize disturbance to residences. *(RDR/SO)*

EC 3.1.10 **Construction Noise.** The City shall require development projects subject to discretionary approval to assess potential construction noise impacts on nearby sensitive uses and to minimize impacts on these uses, to the extent feasible. *(RDR)*

EC 3.1.11 **Alternatives to Sound Walls.** The City shall encourage the use of design strategies and other noise reduction methods along transportation corridors in lieu of sound walls to mitigate noise impacts and enhance aesthetics. *(RDR)*

EC 3.1.12 **Residential Streets.** The City shall discourage widening streets or converting streets to one-way in residential areas where the resulting increased traffic volumes would raise ambient noise levels. *(MPSP/SO)*

EC 3.1.13 **Vehicle Purchase.** The City shall purchase vehicles and equipment with low noise generation and maintain them to minimize noise. *(SO)*

GOAL EC 3.2

Airport Noise. Minimize exposure to high noise levels in areas of the city affected by Mather, Executive, McClellan, and Sacramento International Airports.

See LU 8, Public/Quasi-Public and Special Uses and M 8, Aviation, for additional policies related to airports and aviation.

Policies

EC 3.2.1 **Land Use Compatibility.** The City shall limit residential development within the 65 dBA CNEL airport noise contour, or in accordance with plans prepared by the Airport Land Use Commission, and shall only approve noise-compatible land uses. *(RDR)*

EC 3.2.2 **Hazardous Noise Protection.** The City shall discourage outdoor activities or uses in areas outside the 70 dBA CNEL airport noise contour where people could be exposed to hazardous noise levels. *(RDR)*

EC 3.2.3 **Cooperative Noise Reduction.** The City shall work with the Sacramento County Airport Systems (SCAS) to monitor aircraft noise, implement noise-reducing operation measures (i.e., Fly Quiet, Fly Neighborly programs), and promote pilot awareness of noise sensitive land uses. *(IGC)*

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Sacramento, California City Code

Title 8 HEALTH AND SAFETY

Chapter 8.68 NOISE CONTROL

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Article I. General Provisions

8.68.010 Legislative findings.

A. Excessive, unnecessary or offensive noise within the city is detrimental to the public health, safety, welfare and the peace and quiet of the inhabitants of the city and therefore is declared a public nuisance; and

B. Every person in the city is entitled to live in an environment free from excessive, unnecessary or offensive noise levels; and

C. The establishment of maximum permissible noise levels will further the public health, safety, welfare and peace and quiet of county inhabitants. (Prior code § 66.01.101)

8.68.020 Declaration of policy.

It is declared to be the policy and purpose of this chapter to assess complaints of noises alleged to exceed the ambient noise levels. Further, it is declared to be the policy to contain sound levels in the city at their present levels with the ultimate goal of reducing such levels, when and where feasible and without causing undue burdens, to meet the noise standards set forth in this chapter. (Prior code § 66.01.102)

8.68.030 Liberal construction.

This chapter shall be liberally construed so as to effectuate its purposes. (Prior code § 66.01.103)

8.68.040 Definitions.

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

“Agricultural property” means a parcel of property used in part or whole for agricultural purposes.

“Ambient noise level” means the all-encompassing noise 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.

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

“Decibel” or “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 (10) times the logarithm to the base of ten (10) of this ratio.

“Emergency work” means the use of any machinery, equipment, vehicle, manpower or other activity in an effort to protect, maintain, provide or restore safe conditions in the community or for citizenry, or work by private or public utilities when restoring utility service.

“Hertz” means a unit of measurement of frequency, numerically equal to cycles per second.

“Impulsive noise” means a noise characterized by brief excursions of sound pressures whose peak levels are very much greater than the ambient noise level, such as might be produced by the impact of a pile driver, punch press or a drop hammer, typically with one second or less duration.

“Noise level” means the “A” weighed sound pressure level in decibels obtained by using a sound level meter at slow response with a reference pressure of twenty (20) microPascals. The unit of measurement shall be designated as dBA.

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

“Portable gasoline-powered blower” means any portable power equipment that is powered by a gasoline engine and commonly used in landscape or property maintenance to blow, disperse, or redistribute dust, dirt, leaves, grass clippings, cuttings, and trimmings from trees and shrubs or other debris on sidewalks, driveways, lawns, or other surfaces.

“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, and other than nonconforming residential uses within C-4, M-1, M-2, M-1-S, and M-2-S zones.

“Simple tone noise” or “pure tone noise” means a noise characterized by the presence of a predominant frequency or frequencies such as might be produced by whistle or hum.

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

"Sound pressure level" means a sound pressure level of a sound, in decibels, as defined in ANSI Standards 51.2-1962 and 51.13-1921; that is, twenty (20) times the logarithm to the base ten (10) of the ratio of the pressure of the sound to a reference pressure, which reference pressure shall be 0.0002 dynes per square centimeter. (Prior code § 66.01.105)

8.68.050 Sound level measurement (general).

A. Any noise level measurements made pursuant to the provisions of this chapter shall be performed using a sound level meter as defined in Section 8.68.040 of this chapter.

B. The location selected for measuring exterior noise levels shall be at any point on the receiver's affected property. In the case of interior noise measurements, the windows shall be in normal seasonal configuration and the measurement shall be made at a point at least four feet from the wall, ceiling or floor nearest the affected occupied area. (Prior code § 66.01.106)

Article II. Noise Standards

8.68.060 Exterior noise standards.

A. The following noise standards unless otherwise specifically indicated in this article shall apply to all agricultural and residential properties.

1. From seven a.m. to ten p.m. the exterior noise standard shall be fifty-five (55) dBA.

2. From ten p.m. to seven a.m. the exterior noise standard shall be fifty (50) dBA.

B. It is unlawful for any person at any location to create any noise which causes the noise levels when measured on agricultural or residential property to exceed for the duration of time set forth following, the specified exterior noise standards in any one hour by:

	Cumulative Duration of the Intrusive Sound	Allowance Decibels
1.	Cumulative period of 30 minutes per hour	0
2.	Cumulative period of 15 minutes per hour	+5
3.	Cumulative period of 5 minutes per hour	+10

	Cumulative Duration of the Intrusive Sound	Allowance Decibels
4.	Cumulative period of 1 minute per hour	+15
5.	Level not to be exceeded for any time per hour	+20

C. Each of the noise limits specified in subsection B of this section shall be reduced by five dBA for impulsive or simple tone noises, or for noises consisting of speech or music.

D. If the ambient noise level exceeds that permitted by any of the first four noise limit categories specified in subsection B of this section, the allowable noise limit shall be increased in five dBA increments in each category to encompass the ambient noise level. If the ambient noise level exceeds the fifth noise level category, the maximum ambient noise level shall be the noise limit for that category. (Prior code § 66.02.201)

8.68.070 Interior noise standards.

A. In any apartment, condominium, townhouse, duplex or multiple dwelling unit it is unlawful for any person to create any noise from inside his or her unit that causes the noise level when measured in a neighboring unit during the periods ten p.m. to seven a.m. to exceed:

1. Forty-five (45) dBA for a cumulative period of more than five minutes in any hour;

2. Fifty (50) dBA for a cumulative period of more than one minute in any hour;

3. Fifty-five (55) dBA for any period of time.

B. If the ambient noise level exceeds that permitted by any of the noise level categories specified in subsection A of this section, the allowable noise limit shall be increased in five dBA increments in each category to encompass the ambient noise level. (Prior code § 66.02.202)

8.68.080 Exemptions.

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

A. School bands, school athletic and school entertainment events. School entertainment events shall not include events sponsored by student organizations;

B. Activities conducted on parks and public playgrounds, provided such parks and public playgrounds are owned and operated by a public entity;

C. Any mechanical device, apparatus or equipment related to or connected with emergency activities or emergency work;

D. Noise sources due to the erection (including excavation), demolition, alteration or repair of any building or structure between the hours of seven a.m. and six p.m., on Monday, Tuesday, Wednesday, Thursday, Friday and Saturday, and between nine a.m. and six p.m. on Sunday; provided, however, that the operation of an internal combustion engine shall not be exempt pursuant to this subsection if such engine is not equipped with suitable exhaust and intake silencers which are in good working order. The director of building inspections, may permit work to be done during the hours not exempt by this subsection in the case of urgent necessity and in the interest of public health and welfare for a period not to exceed three days. Application for this exemption may be made in conjunction with the application for the work permit or during progress of the work;

E. Noise sources associated with agricultural operations provided such operations take place between the hours of six a.m. and eight p.m.; provided, however, that the operation of an internal combustion engine shall not be exempt pursuant to this subsection if such engine is not equipped with suitable exhaust and intake silencers which are in good working order;

F. Any mechanical device, apparatus or equipment which are utilized for the protection or salvage of agricultural crops during period of adverse weather conditions or when the use of mobile noise sources is necessary for pest control; provided, however, that the operation of an internal combustion engine shall not be exempt pursuant to this subsection if such engine is not equipped with suitable exhaust and intake silencers which are in good working order;

G. Noise sources associated with maintenance of street trees and residential area property provided said activities take place between the hours of seven a.m. and six p.m.;

H. Tree and park maintenance activities conducted by the city department of parks and community services; provided, however, that use of portable gasoline-powered blowers within two hundred (200) feet of residential property shall comply with the requirements of Section 8.68.150 of this chapter;

I. Any activity to the extent provisions of Chapter 65 of Title 42 of the United States Code, and Articles 3 and 3.5 of Chapter 4 of Division 9 of the Public Utilities Code of the state of California preempt local control of noise regulations and land use regulations related to noise control of airports and their surrounding geographical areas, any noise source associated with the construction, development, manufacture, maintenance, testing or operation of any aircraft engine, or of any weapons system or subsystems which are owned, operated or under the jurisdiction of the United States, any other activity to the extent regulation thereof has been preempted by state or federal law or regulation;

J. Any noise sources associated with the maintenance and operation of aircraft or airports which are owned or operated by the United States. (Ord. 2010-021 § 10; prior code § 66.02.203)

8.68.090 Pre-existing industrial or commercial facilities—Transition period.

A. Any industrial or commercial facility in existence prior to the effective date of this chapter shall be allowed a one year period commencing on said date within which to comply with this chapter.

B. During said one year period all such facilities shall make reasonable efforts to be in compliance and to reduce noise which exceeds the standards specified in this chapter. Commencing at the end of one year after the effective date of this chapter, any such facility shall be subject to all applicable requirements of this chapter.

C. If any facility which is not in compliance by the end of said one year period applies for a variance pursuant to Section 8.68.260 of this chapter, in deciding whether to grant a variance the hearing board shall take into account the extent to which the applicant has endeavored to reduce noise during said one year period to meet the standards specified in this chapter.

D. This section applies only to a commercial or industrial facility already in existence or for which the work of improvement had commenced prior to the effective date of this chapter.

E. As used in this section “industrial facility” means any building, structure, factory, plant, premises or portion thereof used for manufacturing or industrial purposes and “commercial facility” means any building, structure, premise or portion thereof used for wholesale or retail commercial purposes. (Prior code § 66.02.204)

8.68.100 Schools, hospitals and churches.

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 standards specified in Section 8.68.060 of this chapter or to create any noise which unreasonably interferes with the use of such institution or unreasonably disturbs or annoys patients in the hospital. In any disputed case, interfering noise which is ten (10) dBA or more, greater than the ambient noise level at the building, shall be deemed excessive and unlawful. (Prior code § 66.02.205)

8.68.110 Residential pumps, fans and air conditioners.

A. It is unlawful for any person to operate any residential fans, air conditioners, stationary pumps, stationary cooling towers, stationary compressors, similar mechanical device or any combination thereof installed after the effective date of this chapter in any manner so as to create any noise which would cause the maximum noise level to exceed:

1. Sixty (60) dBA at any point at least one foot inside the property line of the affected residential or agricultural property and three to five feet above ground level;

2. Fifty-five (55) dBA in the center of a neighboring patio three to five feet above ground level;

3. Fifty-five (55) dBA outside of the neighboring living area window nearest the equipment location, measurements shall be taken with the microphone not more than three feet from the window opening but at least three feet from any other surface.

B. Equipment installed five years after the effective date of this chapter must comply with a maximum limit of fifty-five (55) dBA at any point at least one foot inside the property line of the affected residential or agricultural property and three to five feet above ground level.

C. Equipment installed before the effective date of this chapter must comply with a limit of sixty-five (65) dBA maximum sound level, at any point at least one foot inside the property line of the affected agricultural or residential property and three to five feet above ground level after the effective date of this chapter. (Prior code § 66.02.206)

8.68.120 Off-road vehicles.

It is unlawful for any person to operate any motorcycle or recreational off-road vehicle on or off a public road in such a manner that the noise level exceeds the exterior noise standards specified in Section 8.68.060 of this chapter. (Prior code § 66.02.207)

8.68.130 Waste disposal vehicles.

It is unlawful for any person authorized to engage in waste disposal service or garbage collection to operate any truck-mounted waste or garbage loading and/or composting equipment or similar mechanical device in any manner so as to create any noise exceeding the following level, when measured at a distance of fifty (50) feet from the equipment or any agricultural or residential property.

A. New equipment purchased or leased on or after a date six months from the effective date of this chapter shall not exceed a noise level of eighty (80) dBA.

B. New equipment purchased or leased on or after forty-two (42) months from the effective date of this chapter shall not exceed a noise level of seventy-five (75) dBA.

C. Present equipment shall not exceed a noise level of eighty (80) dBA on or after five years from the effective date of this chapter.

The provisions of this section shall not abridge or conflict with the powers of the state over motor vehicle control. (Prior code § 66.02.208)

8.68.140 Recovery of police officer cost for multiple responses to large parties or gatherings.

A. When a large party or gathering occurs at a premises and a police officer at the scene determines that there is a threat to the public peace, health, safety or general welfare, the person(s) in charge of the premises and the person(s) responsible for the event, or if any of those persons are minors, then the parent(s) or guardian(s) of those minors will be held jointly and severally liable for the cost of providing police personnel on special security assignment over and above the services normally provided by the department to respond to such events. The police personnel utilized during a second response after the first warning to control the threat to the public peace, health, safety or general welfare shall be deemed to be on special security assignment over and above the services normally provided. The costs of such special security assignment may include minor damages to city property and/or injuries to city personnel.

B. The fee charged will not be in excess of five hundred dollars ($500.00) for a single incident. No fee shall be assessed unless a written warning has been issued by police personnel during the first response. The city reserves its legal options to elect any other legal remedies when said costs or damage exceed five hundred dollars ($500.00).

C. The expense of services provided by special security assignment officers shall be charged against the person liable for the expenses under this section. The charge constitutes a debt of that person to the city, and is collectible by said city in the same manner as in the case of an obligation under a contract, express or implied. (Prior code § 66.02.209)

8.68.150 Findings.

A. Outdoor recreational activities involving amplified sound, including, but not limited to, athletic events, sporting events, entertainment events and concerts, may create excessive noise which is detrimental to the public health, safety, welfare and the peace and quiet of the inhabitants of the city and its environs.

B. Prevailing weather conditions within the city, including temperature inversions, cause the sounds of outdoor activities to bounce in varying directions and reach varying residential locations at different times, sometimes close to the source of sound and sometimes farther away, sometimes in one direction from the sound source and sometimes in another direction. These conditions are particularly acute during the months of September and October.

C. The city's existing noise regulations, which require extended off-site measurements of the sound rather than measurements at its source, are very cumbersome and expensive to enforce, especially in connection with outdoor recreational activities.

D. Studies by the environmental health division of the Sacramento County environmental management department conclude that imposing a volume limit of ninety-six (96) dba l_{eq} measured at the sound booth or other reasonable location within one hundred fifty (150) feet of the source of amplified sound at an outdoor activity is generally equivalent to the limits already imposed by the city's noise regulations which measure sound levels off-site, in that it is substantially likely that sound levels in excess of ninety-six (96) dba l_{eq} will result in many violations of provisions of this chapter, while sound levels of ninety-six (96) dba leq or lower are likely to result in few such violations.

E. Limiting sound levels of outdoor activities to ninety-six (96) dba l_{eq} and requiring amplified sound not to be used at outdoor activities after ten p.m. on Sunday through Thursday, and after eleven p.m. at other times, is necessary to protect the public health, safety, welfare and the peace and quiet of the inhabitants of the city and its environs.

F. A sound level of ninety-six (96) dba is as loud as or louder than a refuse truck three feet from the listener, a jet plane taking off one thousand (1000) feet from the listener, or a train horn one hundred (100) feet from the listener.

G. Limiting sound levels at the source is content neutral. It helps to avoid the problem of complaints being received, and therefore measurements being made and enforcement undertaken, only in connection with certain kinds of activities, or certain kinds of music, which some people may consider objectionable and not other kinds of activities or music which may be just as loud.

H. A variance procedure can be devised to raise the sound limit or modify the time restrictions upon a showing that a facility, because of its design, location or other characteristics, is capable of handling higher sound levels or later activities without substantially increasing the likelihood that violations of the other provisions of this chapter will occur. (Prior code § 66.02.210)

8.68.160 Outdoor recreational activities.

A. It is unlawful for any person to conduct, or permit to be conducted on its property, any outdoor recreational activity, including, but not limited to, athletic events, sporting events, entertainment events and concerts at which amplified noise, amplified music, or amplified sound exceeding the following levels is created: ninety-six (96) dba leq during the months of September and October; ninety-eight (98) dba leq during the months of November through August. The noise, music or sound shall be measured at the sound booth or other reasonable location which is not more than one hundred fifty (150) feet from the source. Every person conducting, or permitting to be conducted, on its property, any outdoor recreational activity shall, upon request, permit the chief of the environmental health division, Sacramento environmental management department, or the chief's designee, to place a sound level monitor (with or without an accompanying staff member) at a location described in this subsection to monitor sound levels.

B. Time Limits.

1. Sunday through Thursday. Except as provided in subsection (B)(2) of this section, the amplified sound associated with the outdoor activities described in subsection A of this section shall commence not earlier than nine a.m. and shall be terminated no later than ten p.m. on Sunday, Monday, Tuesday, Wednesday and Thursday.

2. Friday, Saturday and the Day Before Specified Holidays. The amplified sound associated with the outdoor activities described in subsection A of this section shall commence not earlier than nine a.m. and shall be terminated no later than eleven p.m. on Friday, Saturday and the day before the specified holidays listed below. For purposes of this provision, the specified holidays are the holidays specified in Government Code Sections 6700 and 6701, as those sections may be amended from time to time. (Prior code § 66.02.211)

8.68.170 Deviation from the sound limits, time limits and place of sound measurement requirements of Section 8.68.160—Planning and design commission approval.

In addition to the special condition permits authorized by section 8.68.250 and the variances authorized by section 8.68.260 of this chapter, the operator of any outdoor activity may seek approval to deviate from any or all of the following: (a) the maximum sound limits, (b) the time limits, or (c) the requirement for the place of sound measurement as set forth in section 8.68.160, on the grounds that due to the nature or design of the operator's facility or its location, it is capable of handling a higher sound level or amplified sound ending at a later time without substantially increasing the likelihood that violations of any other standards set forth in this chapter will occur. As part of the application, the applicant shall submit a report of the sound-related characteristics of the facility prepared by an acoustical engineer, and shall pay an application fee set by resolution of the city council.

A. Applications Filed after July 1, 1995. Applications filed after July 1, 1995 shall be heard and decided pursuant to the following procedures:

1. Applications. An application to deviate from the foregoing requirements of section 8.68.160 which is filed after July 1, 1995 shall be heard and decided by the planning and design commission, and shall be subject to the general requirements applicable to applications for planning and design commission conditional use permits as set forth in chapter 17.808.

2. Hearing Procedure. A public hearing shall be held by the planning and design commission. Notice of the public hearing shall be given in the same manner as notice is given of a hearing on a planning and design commission conditional use permit. Notice of the hearing shall also be given by publication in at least one newspaper of general circulation at least ten days prior to the date of the hearing.

3. Approval. The planning and design commission may approve an application to deviate from the maximum sound limit, time limits, or place of sound measurement requirements if it finds that, due to the nature, design or location of the operator's facility, it is capable of handling a higher sound level or an amplified sound ending at a later time or having the sound measured at a different location without substantially increasing the likelihood that violations of any other standards set forth in this chapter will occur and that approval of the application will not be detrimental to the public health, safety or welfare as it relates to noise. The planning and design commission may impose such conditions as may be necessary to carry out the intent and purpose of this chapter and to protect the public health, safety or welfare as it relates to noise. The planning and design commission shall adopt findings and render its decision in the same manner that it decides applications for conditional use permits.

4. Appeal. Any person dissatisfied with the decision of the planning and design commission on an application to deviate from the maximum sound limit, time limits or place of sound measurement requirements of section 8.68.160 may appeal that decision to the city council by filing a notice of appeal with the city clerk pursuant to section 1.24.010. Any appeal shall be filed within ten days of the date of the planning and design commission decision. The city clerk shall thereafter notice the matter for hearing before the city council by publishing notice of the hearing on the appeal in at least one newspaper of general circulation at least seven days prior to the hearing and by sending written notice by mail to appellant(s) and the applicant at least seven days prior to the date of the hearing of the appeal.

5. Modification or Revocation of Approval of Deviation. An approval to deviate from the requirements of section 8.68.160 shall be subject to modification or revocation by the planning and design commission in the same manner as a conditional use permit pursuant to the provisions of chapter 17.808.

B. Applications Filed on or Before July 1, 1995. An application to deviate from the requirements of section 8.68.160 filed on or before July 1, 1995 shall be heard and decided by the city manager pursuant to the following procedures:

1. Procedure. No public hearing by the city manager shall be required. The city manager may approve an application to deviate from the maximum sound limit, time limits, or place of sound measurement requirements if the manager finds that, due to the nature, design or location of the operator's facility, it is capable of handling a higher sound level or an amplified sound ending at a later time or having the sound measured at a different location without substantially increasing the likelihood that violations of any other standards set forth in this chapter will occur and that approval of the application will not be detrimental to the public health, safety or welfare as it relates to noise. The city manager may impose such conditions as may be necessary to carry out the intent and purpose of this chapter and to protect the public health, safety or welfare as it relates to noise.

2. Notice. After the city manager's decision on the application, the city manager shall provide written notice by mail to all owners of real property shown on the latest equalized assessment roll within a radius of 300 feet of the real property which is the subject of the application. In lieu of the assessment roll, the city manager may utilize records of the county assessor or tax collector which contains more recent information than the assessment roll. The notice shall advise the owners of the nature of the deviation sought and the decision of the city manager and of the owner's right to appeal the decision of the city manager to the city council within ten days of the date of the notice. The city manager shall also publish notice of the decision in at least one newspaper of general circulation.

3. Appeal. Any person dissatisfied with the decision of the city manager on an application to deviate from the maximum sound limit, time limits or place of sound measurement requirements of section 8.68.160 may appeal that decision to the city council by filing a notice of appeal with the city clerk pursuant to section 1.24.010. Any appeal shall be filed within ten days of the date of the city manager's decision. The city clerk shall thereafter notice the matter for hearing before the city council by publishing notice of the hearing on the appeal in at least one newspaper of general circulation at least seven days prior to the hearing and by sending written notice by mail to appellant(s) and the applicant at least seven days prior to the date of the hearing of the appeal.

4. Modification or Revocation of Approval of Deviation. An approval to deviate from the requirements of section 8.68.160 shall be subject to modification or revocation by the planning and design commission in the same manner as a conditional use permit pursuant to the provisions of chapter 17.808. (Ord. 2013-0021 § 19; Ord. 2012-004 § 23; prior code § 66.02.212)

8.68.180 Portable gasoline-powered blowers.

A. It is unlawful for any person to operate any portable gasoline-powered blower on residential property or within two hundred (200) feet of residential property, except between the hours of nine a.m. and six p.m. Monday through Saturday and between the hours of ten a.m. and four p.m. on Sunday.

B. It is unlawful for any person to operate any portable gasoline-powered blower on residential property or within two hundred (200) feet of residential property during the hours permitted by subsection A of this section if the blower creates noise exceeding the following specified levels measured at a distance of fifty (50) feet from the blower:

1. Blowers purchased or otherwise acquired between May 15, 1992, and November 15, 1995, shall not exceed seventy (70) dba.

2. Blowers purchased or otherwise acquired after November 15, 1995, shall not exceed sixty-five (65) dba.

3. Blowers in use on or before the effective date of the ordinance codified in this chapter or purchased or otherwise acquired before May 15, 1992, shall not exceed seventy (70) dba after November 15, 1993. (Prior code § 66.02.213)

Article III. General Noise Regulations

8.68.190 General noise regulations.

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

The standards which may be considered in determining whether a violation of the provisions of this section exists shall include, but not be limited to, the following:

A. The sound level of the objectionable noise;

B. The sound level of the ambient noise;

C. The proximity of the noise to residential sleeping facilities;

D. The nature and zoning of the area within which the noise emanates;

E. The density of the inhabitation of the area within which the noise emanates;

F. The time of day or night the noise occurs;

G. The duration of the noise and its tonal informational or musical content;

H. Whether the noise is continuous, recurrent or intermittent;

I. Whether the noise is produced by a commercial or noncommercial activity. (Prior code § 66.03.301)

8.68.200 Specific unlawful noises.

Notwithstanding any other provision of the chapter to the contrary, the following acts, among others, are declared to be loud, disturbing, and unnecessary noises in violation of this chapter, but such enumeration shall not be deemed to be exclusive, namely:

A. Motor Noises. Any noise made by the motor of any automobile, truck, tractor, motorcycle, not reasonably required in the operation thereof under the circumstances and shall include but not be limited to backfiring and motor racing.

B. Horns and Signaling Devices. The sounding of any horn or signaling device on any automobile, motorcycle, trolley coach or other vehicle on any street or public place of the city, except as a danger warning; the creation by means of any such signaling device of any unreasonably loud or harsh sound; and the sounding of any such device for an unnecessary and unreasonable period of time. The use of any signaling device except one operated by hand or electricity; the use of any horn, whistle or any other device operated by engine exhaust; and the use of any such signaling device when traffic is for any reason held up.

C. Yelling and Shouting. Yelling, shouting, hooting, whistling, singing or blowing of horns on the public streets, particularly between the hours of ten p.m. and seven a.m. or at any time or place so as to annoy or disturb the quiet, comfort, or repose of persons in any office, or in any dwelling, hotel, motel, apartment or other type of residence, or of any persons in the vicinity.

D. Pile Drivers, Hammers, Etc. The operation between the hours of ten p.m. and seven a.m. of any pile driver, steam shovel, pneumatic hammer, derrick, steam or electric hoist or other appliance, the use of which is attended by loud or unusual noise.

E. Tools. The use or operation between the hours of ten p.m. and seven a.m. of any power saw, power planer, or other powered tool or appliance or saw or hammer, or other tool, so as to disturb the quiet, comfort, or repose of persons in any dwelling, hotel, motel, apartment, or other type of residence, or of any person in the vicinity.

F. Blowers. The operating of any noise-creating blower or power fan or any internal combustion engine the operation of which causes noise due to the explosion of operating gases or fluids, unless the noise from such blower or fan is muffled and such engine is equipped with a muffler device sufficient to deaden such noise.

G. Exhausts. The discharge into the open air of the exhaust of any steam engine, stationary internal combustion engine, motor boat, or motor vehicle except through a muffler or other device which will effectively prevent loud or explosive noises therefrom.

H. Loading, Unloading—Opening Boxes. The creation of a loud and excessive noise in connection with loading or unloading any vehicle or the opening and destruction of bales, boxes, crates, and containers.

I. Hawkers, Peddlers and Vendors. The shouting and crying of peddlers, hawkers and vendors which disturbs the peace and quiet of persons in the neighborhood.

J. Drums. The use of any drum or other instrument or device for the purpose of attracting attention by creation of noise to any performance, show or sale.

K. Transportation of Metal Rails, Pillars and Columns. The transportation of rails, pillars or columns of iron, steel or other material, over and along streets and other public places upon carts, drays, cars, trucks in any manner so as to cause loud noises or to disturb the peace and quiet of persons in the vicinity thereof.

L. Animals, Birds, Fowls. The keeping of any animal, fowl, or bird which by causing frequent or long continued noise shall disturb the comfort or repose of persons in the vicinity.

M. Any noise emitted from a radio, tape player, tape recorder, record player, compact disc player or any other audible audio equipment, or television outdoors on or in any publicly owned property or place, including, but not limited to, public parks, when such noise is audible to a person of normal hearing sensitivity one hundred (100) feet from said radio, tape player, tape recorder, record player, compact disc player or any other audible audio equipment, or television.

1. Notwithstanding any other provision of this chapter, no notice to appear shall be issued or criminal complaint shall be filed for a violation of this subsection M unless the offending party is first given a verbal or written notification of violation by any peace officer or other person charged with enforcing this subsection M and a reasonable opportunity to correct said violation.

2. Notwithstanding any other provision of this code, any person violating this subsection M shall be guilty of an infraction and upon conviction thereof, shall be fined in accordance with the provisions of Section 36900 (b) of the California Government Code.

This subsection M shall not apply to any act prohibited by Section 10.12.090 of this code or to broadcasting from any vehicle as defined and regulated by Sections 10.60.010 through 10.60.090 of this code, to the use of radios, tape players, tape recorders, record players, compact disc players or any other audible audio equipment, or televisions in the course of an assembly for which a permit has been issued pursuant to Sections 12.72.160 through 12.72.180 of this code or to a parade as defined and regulated by Sections 12.48.010 through 12.48.080 of this code, or to the use of radios, tape players, tape recorders, record players, compact disc players or any other audible audio equipment, or televisions regulated by Section 12.44.210 of this code. This subsection M shall apply notwithstanding the provisions of subsection B of Section 8.68.080 of this chapter.

As used in this subsection M, “person of normal hearing sensitivity” means a person who has a hearing threshold level of between zero and twenty-five (25) decibels HL averaged over the frequencies five hundred (500), one thousand (1000) and two thousand (2000) hertz. (Ord. 2003-011 § 1; prior code § 66.03.302)

8.68.210 Railroad locomotive whistles.

Except in cases of emergency or imminent danger, no person shall blow any railroad locomotive whistle within the city. (Prior code § 66.03.303)

Article IV. Administrative Procedures

8.68.220 Administration.

Except for the enforcement of Section 8.68.200 of this chapter which shall be the responsibility of the chief of police, and except for the enforcement of Section 8.68.060 of this chapter which shall be the responsibility of the director of public works and the director of utilities in addition to any other person authorized to enforce that section, the administration of this chapter is vested in the Sacramento City/county health officer. The health officer shall be responsible for:

A. Employing individuals trained in acoustical engineering or an equivalent field to assist the health officer in the administration of this chapter;

B. Training field inspectors;

C. Procuring measuring instruments and training inspectors in their calibration and operation;

D. Conducting a public education program in all aspects of noise control;

E. Coordinating the noise control program with other governmental agencies. (Ord. 2002-004 § 9, 2002; prior code § 66.04.401)

8.68.230 Noise control program—Recommendations.

At least every third year following the effective date of this chapter, the health officer shall evaluate the effectiveness of the noise control program and shall make recommendations to the city council for its improvement. (Prior code § 66.04.402)

8.68.240 Rules and standards.

Within one year after the effective date of this chapter, the health officer with the advice and assistance of other appropriate governmental agencies, shall investigate and recommend to the city council the following:

A. Rules and procedures to be used in measuring noise;

B. Noise standards for motor vehicle operation within the city. However, nothing within this chapter shall be deemed to abridge or conflict with the powers of the state over motor vehicle control;

C. Noise standards governing the construction, repair or demolition of a structure including streets and other thoroughfares;

D. Recommendations, if appropriate, for the establishment of sound levels standards for nonresidentially zoned areas within the city. (Prior code § 66.04.403)

8.68.250 Special condition permits.

Notwithstanding any provision of this chapter, the zoning administrator may grant special condition permits for a period not exceeding three days when the general purpose and intent of this chapter can be carried out by the granting of the special condition permit, provided, however, that no permit shall be issued for any activity which violates a provision of Section 8.68.080(E) of this chapter. Said special condition permits may be renewed for periods not exceeding three days at the discretion of the zoning administrator. (Prior code § 66.04.404)

8.68.260 Variance procedure.

A. The owner or operator of a noise source that violates any of the provisions of this chapter may file an application for a variance from the provisions of this chapter. The application shall set forth all actions taken to comply with this chapter, the reasons why immediate compliance cannot be achieved, a proposed method for achieving compliance, and a proposed time schedule for its accomplishment. If the applicant determines that compliance cannot be feasibly achieved at all, the application shall also set forth the reasons for such determination, the actions that have been taken to comply with this chapter, a proposed method for complying as nearly as is feasible, and a proposed time schedule for its accomplishment. The application shall be accompanied by a fee in the amount established by resolution of the city council. 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.

B. Except as provided in subsections C and D of this section, relating to required findings, terms and conditions of granting a variance, and factors to take into consideration, the application for a variance under this section shall be accepted and processed and a decision on the application shall be made in the same manner and subject to the same procedures and requirements as a zoning administrator variance under section 17.808.210 of this code.

C. After the public hearing, the decision-maker may grant a variance if it finds, after full consideration of all of the facts, that strict compliance with the requirements of this chapter will cause practical difficulties, unnecessary hardship, or unreasonable expense. A variance may be for a limited period and may be subject to any terms, conditions, and requirements as the decision-maker deems reasonable to achieve maximum compliance with the provisions of this chapter. The terms, conditions and requirements may include, but shall not be limited to, limitations on noise levels and operating hours.

D. Each variance shall set forth the approved method of achieving maximum compliance and a time schedule for its accomplishment. The decision-maker 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. (Ord. 2013-0021 § 20; Ord. 2009-042 § 1; prior code § 66.04.405)

8.68.270 Appeals.

The decision of the zoning administrator on a variance under this chapter shall be subject to appeal as provided in chapter 17.812. (Ord. 2013-0021 § 21; Ord. 2011-044 § 18; prior code § 66.04.407)

8.68.280 Violations.

A. Upon the receipt of a complaint from any person, the chief of police, the health officer or their duly authorized representatives may investigate and assess whether the alleged noise levels exceed the noise standards set forth in this chapter. If such officers have reason to believe that any provision(s) of this chapter has been violated, they may cause written notice to be served upon the alleged violator. Such notice shall specify the provision(s) of this chapter alleged to have been violated and the facts alleged to constitute a violation, including dBA readings noted and the time and place of their detection and may include an order that corrective action be taken within a specified time. If corrective action is not taken within such specified time or any extension thereof approved by the health officer, upon conviction the violation shall constitute a misdemeanor. Each such violation committed or permitted to continue shall constitute a separate offense and shall be punishable as such.

B. Notwithstanding any contrary provision of this code, each fifteen (15) minute period that a violation of Section 8.68.060 occurs shall constitute a separate violation. The administrative penalty for each violation of Section 8.68.060 shall be one thousand dollars ($1,000.00). (Ord. 2005-083 § 1; Ord. 2002-004 § 10; prior code § 66.04.408)

8.68.290 Other remedies.

A. Provisions of this chapter are to be construed as an added remedy of abatement of the public nuisance declared and not in conflict or derogation of any other action, proceedings or remedies provided by law.

B. Any violation of the provisions of this chapter shall be, and the same is declared to be unlawful and a public nuisance, and the duly constituted authorities of the city shall, upon order of the city council, immediately commence actions or proceedings for the abatement or enjoinment thereof in the manner provided by law and shall take such steps and shall apply to such court or courts as may have jurisdiction to grant such relief as will abate such nuisance. (Prior code § 66.04.409)

Contact:

City Clerk: 916-808-7200

CONSTRUCTION NOISE MODELING

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 12/16/2022
Case Description: SCUS-03

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Architectural Coating	Residential	60.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	50.0	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
Compressor (air)	77.7	73.7	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	77.7	73.7	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: 12/16/2022
Case Description: SCUS-03

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Phase 2 Building Construction	Residential	60.0	55.0	50.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Front End Loader	No	40		79.1	50.0	0.0
Generator	No	50		80.6	50.0	0.0
Tractor	No	40	84.0		50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Front End Loader	79.1	75.1	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	80.6	77.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84.0	80.0	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	84.0	82.8	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: 12/16/2022
Case Description: SCUS-03

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Phase 1 Asphalt Paving	Residential	60.0	55.0	50.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Concrete Mixer Truck	No	40	78.8	50.0		0.0
Tractor	No	40	84.0	50.0		0.0
Pavement Scarafier	No	20	89.5	50.0		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
Concrete Mixer Truck	78.8	74.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84.0	80.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pavement Scarafier	89.5	82.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	89.5	84.9	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: 12/16/2022
Case Description: SCUS-03

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Phase 1 Demolition	Residential	60.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	50.0	0.0
Dozer	No	40		81.7	50.0	0.0
Tractor	No	40	84.0		50.0	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
Concrete Saw	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
Dozer	81.7	77.7	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	84.0	80.0	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	89.6	85.3	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: 12/16/2022
Case Description: SCUS-03

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Phase 1 Rough Grading	Residential	60.0	55.0	50.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Grader	No	40	85.0	50.0		0.0
Dozer	No	40	81.7	50.0		0.0
Tractor	No	40	84.0	50.0		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
Grader	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	81.7	77.7	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	84.0	80.0	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	85.0	84.6	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: 12/16/2022
Case Description: SCUS-03

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Phase 1 Site Preparation	Residential	60.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	50.0	0.0
Tractor	No	40	84.0		50.0	0.0
Front End Loader	No	40		79.1	50.0	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
Dozer	81.7	77.7	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	84.0	80.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	79.1	75.1	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	84.0	82.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

SCUS-03 - Construction Noise Modeling Attenuation Calculations

Levels in dBA Leq

Phase	RCNM Reference Noise Level	Receptor to North	Receptor to East	Receptor to South	Receptor to West
Distance in feet	*50*	*315*	*230*	*280*	*600*
Phase 1 Demolition	85.0	69.0	71.7	70.0	63.4
Phase 1 Site Prep	83.0	67.0	69.7	68.0	61.4
Phase 1 Grading	85.0	69.0	71.7	70.0	63.4
Distance in feet	*50*	*135*	*72*	*95*	*490*
Phase 2 Building Construction	83.0	74.4	79.8	77.4	63.2
Architectural Coating	74.0	65.4	70.8	68.4	54.2
Distance in feet	*50*	*80*	*50*	*75*	*570*
Phase 1 Paving	85.0	80.9	85.0	81.5	63.9

Attenuation calculated through Inverse Square Law: Lp(R2) = Lp(R1) - 20Log(R2/R1)

SCUS-03 - Vibration Damage Attenuation Calculations

		Levels, PPV (in/sec)			
	Vibration Reference Level	**Residences to North**	**Residences to East**	**Residences to South**	**Residences to West**
Distance in feet	**at *25 feet***	*60*	*55*	*100*	*65*
Vibratory Roller	0.21	0.056	0.064	0.026	0.050
Static Roller	0.05	0.013	0.015	0.006	0.012
Large Bulldozer	0.089	0.024	0.027	0.011	0.021
Loaded Trucks	0.076	0.020	0.023	0.010	0.018
Jackhammer	0.035	0.009	0.011	0.004	0.008
Small Bulldozer	0.003	0.001	0.001	0.000	0.001

SCUS-03 - Vibration Annoyance Attenuation Calculations

		Levels in VdB			
Equipment	**Vibration @ 25 ft**	**Residence to North**	**Residence to East**	**Residence to South**	**Residence to West**
Distance in feet		*325*	*465*	*375*	*450*
Vibratory Roller	94.0	60.6	55.9	58.7	56.3
Large Bulldozer	87.0	53.6	48.9	51.7	49.3
Loaded Trucks	86.0	52.6	47.9	50.7	48.3
Jackhammer	79.0	45.6	40.9	43.7	41.3
Small Bulldozer	58.0	24.6	19.9	22.7	20.3

STATIONARY NOISE MODELING

SCUS-03 - Stationary Noise Attenuation Calculations

	Reference Levels, Distances, and
	Soccer Fields
Reference Distance in feet	*15*
Reference Levels, dBA Leq	60
Distance and Direction to	60 to S
Distance Only	60

	Soccer Fields
	ttenuated Noise Leve
Attenuated Levels at Receptors	48

Attenuation calculated through Inverse Square Law: Lp(R2) = Lp(R1) - 20Log(R2/R1)

SCUS-03 - Stationary Noise Modeling Attenuation Calculations

Source	HVAC Reference Level	Receptor to North
Distance in feet	*3*	*95*
HVAC, dBA Leq	72.0	42

Rail Modeling

Noise Model Based on Federal Transit Adminstration General Transit Noise Assessment
Developed for Chicago Create Project

Case: SCUS-03 Exilsitng Conditions

RESULTS			
Noise Source	**Leq - 1-hr (dB)**		
All Sources	43		
Source 1	40		
Source 2	39		
Source 3	32		
Source 4	0		
Source 5	0		
Source 6	0		
Source 7	0		
Source 8	0		

Enter noise receiver land use category below.

LAND USE CATEGORY	
Noise receiver land use category (1, 2 or 3)	3

Enter data for up to 8 noise sources below - see reference list for source numbers.

NOISE SOURCE PARAMETERS						
Parameter	**Source 1**		**Source 2**		**Source 3**	
Source Num.	Freight Locomotive	9	Freight Cars	10	RRT/LRT	4
Distance (source to receiver)	distance (ft)	1080	distance (ft)	1080	distance (ft)	1080
Noisiest Hour of	speed (mph)	40	speed (mph)	40	speed (mph)	40
Activity During	trains/hour	0.5	trains/hour	0.5	trains/hour	8.3
Sensitive Hours	locos/train	4	length of cars (ft) / train	3250	cars/train	2
		0		0		0
		0		0		0
		0		0		0
Wheel Flats?		0.00%	% of cars w/ wheel flats	0.00%	% of cars w/ wheel flats	0.00%
Jointed Track?	Y/N	n	Y/N	n	Y/N	n
Embedded Track?	Y/N	n	Y/N	n	Y/N	n
Aerial Structure?	Y/N	n	Y/N	n	Y/N	n
Barrier Present?	Y/N	n	Y/N	n	Y/N	n
Intervening Rows of of Buildings	number of rows	1	number of rows	1	number of rows	1

Source 4		Source 5	
	0		

Source 6		Source 7		Source 8	

CALCULATIONS	
Term	**Sou 1**
SELref	97.0
C1 - Coef	10.0
C1 - Denom	40.0
C1 - Day Num	40.00
C1 - Night Num	20.00
C1 - Day	0.0
C1 - Night	-3.0
C2 - Coef	10.0
C2 - Denom	1.0
C2 - Day Num	0.50
C2 - Night Num	0.01
C2 - Day	-3.0
C2 - Night	-20.0
C3 - Coef	10.0
C3 - Denom	1.0
C3 - Day Num	4.00
C3 - Night Num	1.00
C3 - Day	6.0
C3 - Night	0.0
Leq50ft - Day	64.4
Leq50ft - Night	38.4
Ldn50ft	62.4
Dist Coef	15.0
Adj. Dist	-20.0
Adj. Wheel Flats	0.0
Adj. Jointed	0
Adj. Embed	0

Sou 2	Sou 3	Sou 4	Sou 5	Sou 6	Sou 7	Sou 8
100.0	82.0	0.0	0.0	0.0	0.0	0.0
20.0	20.0	0.0	0.0	0.0	0.0	0.0
40.0	50.0	0.0	0.0	0.0	0.0	0.0
40.00	40.00	0.00	0.00	0.00	0.00	0.00
20.00	20.00	0.00	0.00	0.00	0.00	0.00
0.0	-1.9	0.0	0.0	0.0	0.0	0.0
-6.0	-8.0	0.0	0.0	0.0	0.0	0.0
10.0	10.0	0.0	0.0	0.0	0.0	0.0
1.0	1.0	0.0	0.0	0.0	0.0	0.0
0.50	8.30	0.00	0.00	0.00	0.00	0.00
0.01	0.01	0.00	0.00	0.00	0.00	0.00
-3.0	9.2	0.0	0.0	0.0	0.0	0.0
-20.0	-20.0	0.0	0.0	0.0	0.0	0.0
10.0	10.0	0.0	0.0	0.0	0.0	0.0
2000.0	1.0	0.0	0.0	0.0	0.0	0.0
3250.00	2.00	0.00	0.00	0.00	0.00	0.00
40.00	1.00	0.00	0.00	0.00	0.00	0.00
2.1	3.0	0.0	0.0	0.0	0.0	0.0
-17.0	0.0	0.0	0.0	0.0	0.0	0.0
63.5	56.7	0.0	0.0	0.0	0.0	0.0
21.4	18.4	0.0	0.0	0.0	0.0	0.0
61.5	54.6	6.4	6.4	6.4	6.4	6.4
15.0	15.0	0.0	0.0	0.0	0.0	0.0
-20.0	-20.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0	0	0	0	0	0	0
0	0	0	0	0	0	0

REFERENCE DATA

Num	Desc	Ref SEL	Dist Term	Term 1 Desc
0		0	0	
1	Commuter Electric Locomotive	90	15	speed (mph)
2	Commuter Diesel Locomotive	92	15	speed (mph)
3	Commuter Rail Cars	82	15	speed (mph)
4	RRT/LRT	82	15	speed (mph)
5	AGT, Steel Wheel	80	15	speed (mph)
6	AGT, Rubber Tire	78	15	speed (mph)
7	Monorail	82	15	speed (mph)
8	Maglev	72	15	speed (mph)
9	Freight Locomotive	97	15	speed (mph)
10	Freight Cars	100	15	speed (mph)
11	Hopper Cars (empty)	104	15	speed (mph)
12	Hopper Cars (full)	100	15	speed (mph)
13	Crossover	100	25	trains/hour
14	Automobiles	73	15	speed (mph)
15	City Buses	84	15	speed (mph)
16	Commuter Buses	88	15	speed (mph)
17	Rail Yard or Shop	118	25	trains/hour
18	Layover Tracks	109	25	trains/hour
19	Bus Storage Yard	111	25	buses/hour
20	Bus Op. Facility	114	25	buses/hour
21	Bus Transit Center	101	25	buses/hour
22	Parking Garage	92	25	autos/hour
23	Park & Ride Lot	101	25	autos/hour

			Term 2				Term 3						
Denom	**Min**	**Coef**	**Desc**	**Denom**	**Min**	**Coef**	**Desc**	**Denom**	**Min**	**Coef**	**Jointed**	**Embedded**	**Aerial**
0	0	0											
50	20	10.0	trains/hour	1	0.01	10.0	locos/train	1	1	10	5.0	3.0	4.0
50	20	-10.0	trains/hour	1	0.01	10.0	locos/train	1	1	10	5.0	3.0	4.0
50	20	20.0	trains/hour	1	0.01	10.0	cars/train	1	1	10	5.0	3.0	4.0
50	20	20.0	trains/hour	1	0.01	10.0	cars/train	1	1	10	5.0	3.0	4.0
50	20	20.0	trains/hour	1	0.01	10.0	cars/train	1	1	10			
50	20	20.0	trains/hour	1	0.01	10.0	cars/train	1	1	10			
50	20	20.0	trains/hour	1	0.01	10.0	cars/train	1	1	10			
50	20	20.0	trains/hour	1	0.01	10.0	cars/train	1	1	10			4.0
40	20	10.0	trains/hour	1	0.01	10.0	locos/train	1	1	10	5.0	3.0	4.0
40	20	20.0	trains/hour	1	0.01	10.0	h of cars (ft)	2000	40	10	5.0	3.0	4.0
40	20	20.0	trains/hour	1	0.01	10.0	h of cars (ft)	2000	40	10	5.0	3.0	4.0
40	20	20.0	trains/hour	1	0.01	10.0	h of cars (ft)	2000	40	10	5.0	3.0	4.0
1	0.01	10.0	on of one trai	3600	0.01	10.0						3.0	4.0
50	30	28.1	vehicles/hou	1	0.01	10.0							
50	30	23.9	vehicles/hou	1	0.01	10.0							
50	30	14.6	vehicles/hou	1	0.01	10.0							
20	0.01	10.0											
1	0.01	10.0											
100	0.01	10.0											
200	0.01	10.0	es serviced/h	60	0.01	10.0							
20	0.01	10.0											
1000	0.01	10.0											
2000	0.01	10.0	buses/hour	24	0.01	10.0							

Barrier	Combine 1&2?
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	1.0
-5.0	0.0
-5.0	0.0
-5.0	1.0

Noise Model Based on Federal Transit Adminstration General Transit Noise Assessment
Developed for Chicago Create Project

Case: SCUS-03 Exilsitng Conditions 0

RESULTS			
Noise Source	**Ldn (dB)**	**Leq - daytime (dB)**	**Leq - nighttime (dB)**
All Sources	41	43	15
Source 1	38	40	14
Source 2	37	39	3
Source 3	30	32	-6
Source 4	0	0	0
Source 5	0	0	0
Source 6	0	0	0
Source 7	0	0	0
Source 8	0	0	0

Enter noise receiver land use category below.

LAND USE CATEGORY	
Noise receiver land use category (1, 2 or 3)	2

Enter data for up to 8 noise sources below - see reference list for source numbers.

NOISE SOURCE PARAMETERS						
Parameter	**Source 1**		**Source 2**		**Source 3**	
Source Num.	Freight Locomotive	9	Freight Cars	10	RRT/LRT	4
Distance (source to receiver)	distance (ft)	1080	distance (ft)	1080	distance (ft)	1080
Daytime Hours	speed (mph)	40	speed (mph)	40	speed (mph)	40
(7 AM - 10 PM)	trains/hour	0.5	trains/hour	0.5	trains/hour	8.3
	locos/train	4	length of cars (ft) / train	3250	cars/train	2
Nighttime Hours	speed (mph)	0	speed (mph)	40	speed (mph)	0
(10 PM - 7 AM)	trains/hour	0	trains/hour	0	trains/hour	0
	locos/train	0	length of cars (ft) / train	0	cars/train	0
Wheel Flats?		0.00%	% of cars w/ wheel flats	0.00%	% of cars w/ wheel flats	0.00%
Jointed Track?	Y/N	n	Y/N	n	Y/N	n
Embedded Track?	Y/N	n	Y/N	n	Y/N	n
Aerial Structure?	Y/N	n	Y/N	n	Y/N	n
Barrier Present?	Y/N	n	Y/N	n	Y/N	n
Intervening Rows of of Buildings	number of rows	1	number of rows	1	number of rows	1

Source 4		Source 5	
	0		

Source 6		Source 7		Source 8	

CALCULATIONS	
Term	**Sou 1**
SELref	97.0
C1 - Coef	10.0
C1 - Denom	40.0
C1 - Day Num	40.00
C1 - Night Num	20.00
C1 - Day	0.0
C1 - Night	-3.0
C2 - Coef	10.0
C2 - Denom	1.0
C2 - Day Num	0.50
C2 - Night Num	0.01
C2 - Day	-3.0
C2 - Night	-20.0
C3 - Coef	10.0
C3 - Denom	1.0
C3 - Day Num	4.00
C3 - Night Num	1.00
C3 - Day	6.0
C3 - Night	0.0
Leq50ft - Day	64.4
Leq50ft - Night	38.4
Ldn50ft	62.4
Dist Coef	15.0
Adj. Dist	-20.0
Adj. Wheel Flats	0.0
Adj. Jointed	0
Adj. Embed	0

Sou 2	Sou 3	Sou 4	Sou 5	Sou 6	Sou 7	Sou 8
100.0	82.0	0.0	0.0	0.0	0.0	0.0
20.0	20.0	0.0	0.0	0.0	0.0	0.0
40.0	50.0	0.0	0.0	0.0	0.0	0.0
40.00	40.00	0.00	0.00	0.00	0.00	0.00
40.00	20.00	0.00	0.00	0.00	0.00	0.00
0.0	-1.9	0.0	0.0	0.0	0.0	0.0
0.0	-8.0	0.0	0.0	0.0	0.0	0.0
10.0	10.0	0.0	0.0	0.0	0.0	0.0
1.0	1.0	0.0	0.0	0.0	0.0	0.0
0.50	8.30	0.00	0.00	0.00	0.00	0.00
0.01	0.01	0.00	0.00	0.00	0.00	0.00
-3.0	9.2	0.0	0.0	0.0	0.0	0.0
-20.0	-20.0	0.0	0.0	0.0	0.0	0.0
10.0	10.0	0.0	0.0	0.0	0.0	0.0
2000.0	1.0	0.0	0.0	0.0	0.0	0.0
3250.00	2.00	0.00	0.00	0.00	0.00	0.00
40.00	1.00	0.00	0.00	0.00	0.00	0.00
2.1	3.0	0.0	0.0	0.0	0.0	0.0
-17.0	0.0	0.0	0.0	0.0	0.0	0.0
63.5	56.7	0.0	0.0	0.0	0.0	0.0
27.4	18.4	0.0	0.0	0.0	0.0	0.0
61.5	54.6	6.4	6.4	6.4	6.4	6.4
15.0	15.0	0.0	0.0	0.0	0.0	0.0
-20.0	-20.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0	0	0	0	0	0	0
0	0	0	0	0	0	0

REFERENCE DATA

Num	Desc	Ref SEL	Dist Term	Term 1 Desc
0		0	0	
1	Commuter Electric Locomotive	90	15	speed (mph)
2	Commuter Diesel Locomotive	92	15	speed (mph)
3	Commuter Rail Cars	82	15	speed (mph)
4	RRT/LRT	82	15	speed (mph)
5	AGT, Steel Wheel	80	15	speed (mph)
6	AGT, Rubber Tire	78	15	speed (mph)
7	Monorail	82	15	speed (mph)
8	Maglev	72	15	speed (mph)
9	Freight Locomotive	97	15	speed (mph)
10	Freight Cars	100	15	speed (mph)
11	Hopper Cars (empty)	104	15	speed (mph)
12	Hopper Cars (full)	100	15	speed (mph)
13	Crossover	100	25	trains/hour
14	Automobiles	73	15	speed (mph)
15	City Buses	84	15	speed (mph)
16	Commuter Buses	88	15	speed (mph)
17	Rail Yard or Shop	118	25	trains/hour
18	Layover Tracks	109	25	trains/hour
19	Bus Storage Yard	111	25	buses/hour
20	Bus Op. Facility	114	25	buses/hour
21	Bus Transit Center	101	25	buses/hour
22	Parking Garage	92	25	autos/hour
23	Park & Ride Lot	101	25	autos/hour

			Term 2				Term 3						
Denom	**Min**	**Coef**	**Desc**	**Denom**	**Min**	**Coef**	**Desc**	**Denom**	**Min**	**Coef**	**Jointed**	**Embedded**	**Aerial**
0	0	0											
50	20	10.0	trains/hour	1	0.01	10.0	locos/train	1	1	10	5.0	3.0	4.0
50	20	-10.0	trains/hour	1	0.01	10.0	locos/train	1	1	10	5.0	3.0	4.0
50	20	20.0	trains/hour	1	0.01	10.0	cars/train	1	1	10	5.0	3.0	4.0
50	20	20.0	trains/hour	1	0.01	10.0	cars/train	1	1	10	5.0	3.0	4.0
50	20	20.0	trains/hour	1	0.01	10.0	cars/train	1	1	10			
50	20	20.0	trains/hour	1	0.01	10.0	cars/train	1	1	10			
50	20	20.0	trains/hour	1	0.01	10.0	cars/train	1	1	10			
50	20	20.0	trains/hour	1	0.01	10.0	cars/train	1	1	10			4.0
40	20	10.0	trains/hour	1	0.01	10.0	locos/train	1	1	10	5.0	3.0	4.0
40	20	20.0	trains/hour	1	0.01	10.0	h of cars (ft)	2000	40	10	5.0	3.0	4.0
40	20	20.0	trains/hour	1	0.01	10.0	h of cars (ft)	2000	40	10	5.0	3.0	4.0
40	20	20.0	trains/hour	1	0.01	10.0	h of cars (ft)	2000	40	10	5.0	3.0	4.0
1	0.01	10.0	on of one trai	3600	0.01	10.0						3.0	4.0
50	30	28.1	vehicles/hou	1	0.01	10.0							
50	30	23.9	vehicles/hou	1	0.01	10.0							
50	30	14.6	vehicles/hou	1	0.01	10.0							
20	0.01	10.0											
1	0.01	10.0											
100	0.01	10.0											
200	0.01	10.0	es serviced/h	60	0.01	10.0							
20	0.01	10.0											
1000	0.01	10.0											
2000	0.01	10.0	buses/hour	24	0.01	10.0							

Barrier	Combine 1&2?
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	0.0
-5.0	1.0
-5.0	0.0
-5.0	0.0
-5.0	1.0