Appendix E Noise Background and Modeling Data

Appendix

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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

ELEMENT F
NOISE

GOAL: Contribute to a healthy and safe environment by minimizing noise impacts.

Description of Noise Element

Noise, as defined in this element, is generally unwanted sound which is considered unpleasant and bothersome. Unwanted noise can affect people both physically and psychologically. People are usually more sensitive to noise during the evening and nighttime than during the day because of reduced activities, fewer noise emitting sources, and the need for rest. Land uses in which people are especially sensitive to noise include residential, convalescent and rest homes, hospitals, libraries, churches, and schools. This element provides guidelines for minimizing noise impacts from various sources.

The Community Noise Equivalent Level (CNEL), commonly used by California local governments, is used by Irvine to quantify community noise levels and standards. The CNEL is an average of noise levels over a twenty-four hour period. Refer to technical definitions on Page F-3.

The City's interior and exterior noise standards are shown on Table F-1. Table F-2 shows each land use category and the CNEL which is compatible with the uses in the category.

Existing Conditions

The most pervasive noise in Irvine comes from mobile noise sources such as motor vehicles, railroads, and aircraft. Three major freeways, one railroad line, and three airports expose the City to significant noise impacts. Aircraft flight tracks also impact particular areas of the City significantly. The City is also exposed to noise emanating from sources such as industrial, commercial, and construction activities.

Unwanted noise is divided into two major categories of noise sources - mobile and stationary.

1. **Mobile Noise Sources.**

   Mobile sources are transportation-related (non-fixed) including motor vehicles, railroad, and aircraft. Motor vehicle noise is characterized by a high frequency of events, short duration, and proximity to areas sensitive to noise exposure. Rail transit and aircraft operations frequently generate extremely high noise levels which are disruptive to human activity.

   a. Motor Vehicles.

      Sources of vehicular traffic noise are automobiles, buses, trucks, and motorcycles. Noise is generated by engines, exhaust systems, transmissions, fans, tires, and air movement. The noise level is relatively constant on major roads where traffic is heavy and intermittent on neighborhood streets where traffic is lighter.

      Table F-3 describes vehicular noise impacts for both the existing and buildout condition

   b. Railroads.

      Railroad noise is the result of the mechanical processes of the engine, the interaction of the wheels with the track, and use of the whistle. The amount of noise generated is dependent upon the speed of the train and the number of cars.

      Railway lines that pass through the central part of the City in an east/west direction are located on right-of-way that is owned and managed by the Orange County Transportation Authority. The railroad operation includes commuter trains and freight trains. The number of freight trains depends on economic demand. There are also spur lines located IBC (Planning Area 36), and Irvine Industrial Complex-East (Planning Area 35). The noise generated by these spur lines is insufficient to provide CNEL contours in excess of 60 dB outside the right-of-way.

   c. Aircraft.

      Aircraft noise generally affects areas within the airport vicinity during takeoffs and landings, and areas located around the flight tracks. Airborne noise sources in Irvine included aircraft operations at MCAS El Toro and helicopter

Definitions

Community Noise Equivalent Level (CNEL): The CNEL is an average of noise levels over a twenty-four (24) hour period. The measured energy equivalent level (Leq) is weighted for the hours when there is a greater sensitivity to noise. A weighting factor of 5 decibels is applied to the evening period (7 to 10 p.m.) and a weighting factor of 10 decibels is applied to the night time period (10 p.m. to 7 a.m.). The daytime Leqs between 7 a.m. and
7 p.m. are not weighted.

Decibel: dB, a numerical expression of the relative intensity of a sound as it is heard by the human ear.

dBA: The "A-weighted" scale for measuring sound in decibels, it weighs or reduces the effects of low and high frequencies in order to simulate human hearing. Every increase of 10 dBA doubles the perceived loudness although the noise is actually ten times more intense.

Leq: The energy equivalent level, defined as the average sound level on the basis of sound energy. The Leq is a "dosage" type measure and is the basis for the descriptors used in current standards, such as the 24- hour Community Noise Equivalent Level (CNEL) used by the State of California.

Standards

Interior and Exterior Noise Standards: Table F-1 identifies the maximum interior and exterior noise levels for each land uses category. The standards assume the incorporation of California State Law requirements into all projects.

Land Use Noise Compatibility Table F-2 identifies the compatibility of proposed projects and future noise levels. The diagram is used in evaluating new development projects, including General Plan amendments, zone changes, tentative maps, conditional use permits and master plans.

Single Event Noise Standard: The maximum interior noise levels of the loudest 10% of single noise events [Lmax(10)] for noise sensitive land uses within the 60 CNEL of aircraft and railroad noise sources shall not exceed 65 dBA between 7 a.m. and 7 p.m nor 55 dBA between 7 p.m. and 7 a.m. for typical occupancy. (Note: The samples for single event noise measurement must include representative aircraft operation.)

operations at MCAS Tustin; and, currently include civil air operations at John Wayne Airport.

MCAS El Toro: The major aircraft noise source in Irvine was MCAS El Toro, which was located in Planning

Area 51. The most recent noise study for MCAS El Toro was adopted in 1981 by the Marine Corps as part of the Air Installation Compatible Use Zone (AICUZ) Study.

The noise levels were based on noise characteristics of aircraft as measured by the military, and annual operations data (number and type of aircraft movements, and flight tracks), according to the Marine Corps' records. The final position of the computed CNEL contours was verified by several site specific studies outside of Irvine. Field measurements will occur in conjunction with sensitive land uses to assess impacts of aircraft noise together with other noise sources (e.g. vehicular).

MCAS El Toro was closed in July, 1999. In its place, the County of Orange has proposed a commercial airport, which will likely have an impact on aircraft noise as well as vehicular noise. The City of Irvine actively opposes a commercial airport.

The El Toro Reuse Planning Authority which consists of the cities of Irvine, Mission Viejo, Laguna Hills, Lake Forest, Laguna Beach, Dana Point and Laguna Niguel, has prepared the Millennium Plan for the reuse of El Toro. The Millennium Plan consists of a mix of nonaviation land uses which may have different vehicular and stationary noise levels than currently associated with military activities at MCAS El Toro.

MCAS Tustin: The noise from helicopter operations at MCAS Tustin also affected the City. The City formerly used the AICUZ noise contour map as depicted in the 1983 Master Plan, for MCAS Tustin, for the assessment of the helicopter noise impacts.

MCAS Tustin was closed in 1999. This eliminated aircraft noise but the land uses that could be developed in its place may increase vehicular and stationary noise.

John Wayne Airport: The John Wayne Airport noise contour map, prepared annually by the Noise Abatement Center of John Wayne Airport, is used for the assessment of aircraft noise impacts. Annual updates of the original 1980 John Wayne Airport noise contour map, are used for planning analysis.

Figure F- 1 illustrates the former noise contours for the now closed MCAS Tustin and the existing noise contours for John Wayne Airport.

2. Stationary Noise Sources.

Stationary noise sources are the noise sources in the community such as industrial and mechanical equipment, which are often referred to as "fixed sources." Industrial noise generated by processing and operation is usually of long duration at relatively low frequencies.

Construction sources generate high noise levels for extended periods of time. Examples include: rock crushers; mechanical electric equipment such as air conditioners or refrigeration units; various power tools such as lawn mowers or leaf blowers; construction activities; commercial or industrial activities such as car wash facilities; animal noise; and human-related activities such as loud parties, loud music, radio, T.V., or children playing.

The City's Noise Ordinance establishes the maximum permissible noise level which may intrude into a neighbor's property. The Ordinance (adopted in 1975 and revised in 1984) establishes noise level standards for various land use categories being affected by stationary noise sources. The ordinance regulates the timing of construction activities and includes special provisions for sensitive land uses.

Trends

1. Mobile Noise Sources.

a. Motor Vehicles.

Motor vehicle noise will continue to be significant. Irvine will also be impacted by through traffic from yet-to-be-developed areas to the south, east and west. An increased use of convenient mass transit systems may contribute to noise reduction. Future motor vehicle noise is shown in Figure F- 3.

b. Railroads.

It is expected that over the years there will be an increase in railroad traffic especially as commuter trains are added along the Los Angeles-San Diego (LOSSAN) corridor. Future railroad noise is shown in Table F-3.

c. Aircraft.

It is expected that over the years noise impacts to the City from aircraft operations at John Wayne Airport will not increase because of agreements restricting the number of flights, hours of noise, and aggregate noise. Based on the State Airport Noise Regulation (Title 21), John Wayne Airport (as a civil airport) is required to reduce the airport noise impact on existing communities.

2. Stationary Noise Sources.

As the City develops further, it is expected that stationary noise levels will increase. However, noise impacts can be mitigated by use of control measures and enforcement of the Noise Ordinance in the development process.

Identification of Issues

1. **How can the City ensure that residents are not exposed to excess mobile noise levels?**
2. **How can the City ensure that residents are not exposed to excess stationary noise levels?**
3. **How can these regulations be coordinated to provide a healthy noise environment?**
4. **How can public awareness in this area be increased?**

Response to Issues

The following objectives and policies have been formulated as a policy response to the identified noise issues.

OBJECTIVE F-1: MOBILE NOISE

Ensure that City residents are not exposed to mobile noise levels in excess of the CNEL Interior and Exterior Noise Standards (Table F-1), and Single Event Noise Standard.

The following policies support Objective F-1:

Policy (a): Require all plans submitted for development review to show the Noise Element existing noise contours, future noise contours and aircraft noise contours.

Policy (b): Prohibit residential development within the 65 CNEL of aircraft noise contours.

Policy (c): Ensure that all proposed development projects are compatible with the existing and projected noise level by using the Land Use Noise Compatibility Matrix (Table F-2).

Policy (d): Require noise studies to be prepared in accordance with the City's environmental review procedure for all projects that are not "clearly compatible" with the future noise level at the site.

Policy (e): Require noise studies to use the future motor vehicle noise reduction of 1.9 dBA in identifying future noise levels of streets.

Policy (f): Require noise studies to identify all the mitigation measures necessary to reduce noise levels to meet the CNEL standard (Table F-1) and Single Event Noise Standard.

Policy (g): Require compliance with Single Event Noise Standard for noise sensitive land uses within the 60 CNEL of aircraft and railroad noise contours.

Policy (h): Require conditional use permits for noise sensitive land uses such as hospitals, libraries, churches, and schools to mitigate noise-related impacts.

Policy (i): Update highway/railroad noise levels (Table F-3) every five years and/or whenever the City's Irvine Traffic Analysis Model (ITAM) has been significantly changed.

Policy (j): Ensure that any proposal to update aircraft noise contours used by the City of Irvine for planing analysis is submitted, prior to adoption by the City, to the Airport Land Use Commission

Policy (k): Incorporate the following types of noise mitigation measures in the design of new highways and streets: alignment, barriers, lateral separation, and vertical profile.

Policy (l): Examine the existing and projected future noise environment when considering amendments to the City's circulation system.

Policy (m): Reduce noise impacts from mobile sources by encouraging use of alternative modes of transportation

Policy (n): Reduce railroad noise impacts to new development by incorporating measures for mitigating noise levels to meet the City's noise standards.

Policy (o): Participate in cooperative efforts with Orange County Transit Authority to fund and construct grade separations, where feasible, through residential areas of the City, giving consideration to all potential funding sources.

OBJECTIVE F-2: STATIONARY NOISE

Ensure that City residents are not exposed to stationary noise levels in excess of the City Noise Ordinance standards.

The following policies support Objective F-2:

Policy (a): Require any new construction to meet the City Noise Ordinance standards as a condition of building permit approval.

Policy (b): Require developers to depict, on any appropriate development application review (zone change, subdivisions, conditional use permit, site plan, and building plans), any potential noise sources known at the time of submittal and mitigation measures that ensure these noise sources meet the City Noise Ordinance standards. Such sources include, but are not limited to, the following:

- Truck pickup and loading areas.
- Mechanical and electrical equipment such as air conditioning, swimming pool pumps and filters, and spa pumps.
- Exterior nuisances such as speaker boxes and outdoor public address systems.

Policy (c): Condition subdivision approval of the projects adjacent to any developed/occupied uses by requiring the developer to submit a construction-related noise mitigation plan to the Director of Community Development for review and approval prior to issuance of grading permits. The plan must depict the location of construction equipment and how the noise from this equipment will be mitigated during construction of the project, through the use of such methods as following:

- Temporary noise attenuation fences.
- Preferential location of equipment.
- Use of current technology and noise suppression equipment.

OBJECTIVE F-3: NOISE ABATEMENT

Achieve maximum efficiency in noise abatement efforts through intergovernmental coordination and public information programs.

The following policies support Objective F-3:

Policy (a): Coordinate efforts to reduce noise impacts with appropriate public and government agencies.

Policy (b): Monitor federal and state legislation and programs which will reduce noise in Irvine.

Policy (c): Use police power to enforce the appropriate noise standards in the state's motor vehicle code and other state and federal legislation for mobile noise sources.

Policy (d): Encourage appropriate agencies to maximize the use of noise reducing equipment in the City.

Policy (e): Seek the cooperation of aircraft regulatory agencies in the modification and selection of flight paths which will reduce noise impacts on residential and other noise sensitive areas.

Policy (f): Monitor and update, as needed, the City Noise Ordinance so that it will continue to be effective in restricting noise from stationary sources.

Policy (g): Disseminate public information regarding City noise regulations and programs, the health effects of high noise levels, and means of mitigating such levels.

TABLE F-1

INTERIOR AND EXTERIOR NOISE STANDARDS
ENERGY AVERAGE (CNEL)

LAND USE CATEGORIES		ENERGY AVERAGE (CNEL)	
CATEGORIES	**USES**	**INTERIOR[1]**	**EXTERIOR[2]**
RESIDENTIAL	Single-Family Multiple-Family	45[3] 55[4]	65[7]
	Mobile Home	_____	65[5]
COMMERCIAL/ INDUSTRIAL	Hotel, motel, transient lodging	45	65[6]
	Commercial, retail, bank, restaurant	55	_____
	Office building, professional office, research & development	50	_____
	Amphitheater, concert hall, auditorium, meeting hall	45	_____
	Gymnasium (Multipurpose)	50	_____
	Health clubs	55	_____
	Manufacturing, warehousing, wholesale, utilities	65	_____
	Movie theater	45	_____
INSTITUTIONAL	Hospital, school classroom	45	65
	Church, library	45	_____
OPEN SPACE	Parks	_____	65

Interpretation:

1. Interior environment excludes bathrooms, toilets, closets, and corridors.
2. Outdoor environment limited to private yard of single-family or multi-family residences private patio which is accessed by a means of exit from inside the unit; mobile home park; hospital patio; park picnic area; school playground; and hotel and motel recreation area.
3. Noise level requirement with closed windows. Mechanical ventilating system or other means of natural ventilation shall be provided pursuant to Appendix Chapter 12, Section 1208 of UBC.
4. Noise level requirement with open windows, if they are used to meet natural ventilation requirement.
5. Exterior noise level shall be such that interior noise level will not exceed 45 CNEL.
6. Except those areas affected by aircraft noise.
7. Multi-family developments with balconies that do not meet the 65 CNEL are required to provide occupancy disclosure notices to all future tenants regarding potential noise impacts.

TABLE F-2

LAND USE NOISE COMPATIBILITY

LAND USE CATEGORIES		ENERGY AVERAGE (CNEL)						
Categories	Uses	<	55	60	65	70	75	80>
RESIDENTIAL	Single-Family	A	A	B	B	C	D	D
RESIDENTIAL	Mobile Home	A	A	B	C	C	D	D
COMMERCIAL Regional	Hotel, Motel, Transient Lodging	A	A	B	B	C	C	D
COMMERCIAL Regional Community	Commercial retail, Bank, Restaurant, Movie theater	A	A	A	A	B	B	C
COMMERCIAL Community INDUSTRIAL & INSTITUTIONAL	Office building, Research & development Professional office, City office building	A	A	A	B	B	C	D
COMMERCIAL Recreation INSTITUTIONAL General	Amphitheater, Concert hall Auditorium, Meeting hall	B	B	C	C	D	D	D
COMMERCIAL Recreation	Children's amusement park, Miniature golf, Go-cart track, Health club, Equestrian center	A	A	A	B	B	D	D
COMMERCIAL Community INDUSTRIAL General	Automobile service station, Auto dealer, Manufacturing, Warehousing, Wholesale, Utilities	A	A	A	A	B	B	B
INSTITUTIONAL General	Hospital, Church, Library, School classrooms	A	A	B	C	C	D	D
OPEN SPACE	Parks	A	A	A	B	C	D	D
OPEN SPACE	Golf courses, Nature centers, Cemeteries, Wildlife reserves, Wildlife habitat	A	A	A	A	B	C	C
AGRICULTURAL	Agriculture	A	A	A	A	A	A	A

Interpretation

Zone A Clearly Compatible	Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.
Zone B Normally Compatible	New construction or development should be undertaken only after detailed analysis of the noise reduction requirements are made and needed noise insulation features in the design are determined. Conventional construction, with closed windows and fresh air supply systems or air conditioning, will normally suffice.
Zone C Normally Incompatible	New construction or development should normally be discouraged. If new construction or development does proceed, a detailed analysis or noise reduction requirements must be made and needed noise insulation features must be included in the design
Zone D Clearly Incompatible	New construction or development should generally not be undertaken.

Noise Mitigation Measure Definitions

Alignment: In the context of highway noise assessment, the three-dimensional position of the road.

Barriers: Any solid material that shields a receiver from a given source of noise. Types of barriers include walls, berms, hills and intervening structures. Most often, the term "noise barrier" refers specifically to sound walls or berms intentionally placed in such a way as to re-direct noise away from receiver locations (e.g., sound walls along a highway).

Lateral separation: The horizontal distance between the road and a receiver. With new roadway construction, there is sometimes the flexibility to position the alignment within the right of way in such a way as to maximize the lateral separation (or buffer) between the road (noise source) and the nearest receivers (e.g., residences).

Vertical Profile: The path of a roadway in the vertical direction. Roadways can be designed to be below-grade (depressed), above-grade (elevated), or at-grade relative to areas adjacent to the road. Generally, traffic noise levels along depressed roadways are substantially lower than those along roadways that are at grade. Elevated roadways also reduce traffic noise (relative to at-grade conditions) but only within the first few hundred feet of the road.

RELATED OBJECTIVE NUMBERS

The following objectives are related to the Noise Element:

Land Use Element - A-6
Circulation Element - B-2, B-7
Housing Element - C-2
Public Facilities and Services Element - G-1
Integrated Waste Management Element – H-2
Conservation and Open Space Element - L-6
Growth Management Element – M-3

Table F-3
VEHICULAR TRAFFIC NOISE LEVEL AND NOISE CONTOUR COMPARISON

Roadway Segment	*Existing Conditions*		*2020 Buildout Condition*	
	CNEL Noise Level (@ 100 ft from ctrline)	Distance to 65 CNEL Noise Contour (in feet)	CNEL Noise Level (@ 100 ft from ctrline)	Distance to 65 CNEL Noise Contour (in feet)
Alton Parkway				
Barranca/Muirlands Blvd. to Jeronimo Rd.	71.4	267	72.0	293
Jeronimo Road/Toledo Way	70.7	240	70.5	233
Toledo Way/Irvine Boulevard	66.9	134	70.0	215
Irvine Boulevard/North City Limits	- -	- -	71.0	251
SR 55/Red Hill Avenue	61.3	57	69.3	193
Red Hill Avenue/Von Karman Avenue	66.8	132	70.2	222
Von Karman Avenue/Jamboree Road	66.3	122	70.7	240
Jamboree Road/Harvard Avenue	67.4	145	71.5	271
Harvard Avenue/Culver Drive	68.9	182	69.6	203
Culver Drive/West Yale Loop	67.7	151	69.0	185
West Yale Loop/Lake Road	68.0	158	68.7	176
Lake Road/Creek Road	69.0	185	69.4	196
Creek Road/East Yale Loop	68.3	166	69.5	200
East Yale Loop/Jeffrey Road	68.2	163	69.6	203
Jeffrey Road/Sand Canyon Avenue	68.9	182	72.3	307
Sand Canyon/Future Laguna Canyon Rd.	69.4	196	71.9	288
Future (Link)/SR 133	69.4	196	71.0	251
SR 133/Irvine Center Drive	68.6	174	70.2	222
I-5/West Technology Drive	69.1	188	72.2	302
Future Rockfield to Barranca/Muirlands	72.8	331	70.9	247
Barranca Parkway/Muirlands Boulevard				
Red Hill Avenue/Von Karman Avenue	69.6	203	72.4	311
Von Karman Avenue/Jamboree Road	69.2	191	73.1	347
Jamboree Road/Harvard Avenue	67.8	154	70.9	247
Harvard Avenue/Culver Drive	68.9	182	69.5	200
Culver Drive/West Yale Loop	67.7	151	68.3	166

Table F-3
VEHICULAR TRAFFIC NOISE LEVEL AND NOISE CONTOUR COMPARISON

Roadway Segment	*Existing Conditions*		*2020 Buildout Condition*	
	CNEL Noise Level (@ 100 ft from ctrline)	Distance to 65 CNEL Noise Contour (in feet)	CNEL Noise Level (@ 100 ft from ctrline)	Distance to 65 CNEL Noise Contour (in feet)
West Yale Loop/Lake Road	67.3	142	68.2	163
Lake Road/Creek Road	67.3	142	68.0	158
Creek Road/East Yale Loop	66.7	130	67.6	149
East Yale Loop/Jeffrey Road	66.5	126	68.8	179
Jeffrey Road/Future	- -	- -	69.5	200
Future/Sand Canyon Avenue	- -	- -	69.2	191
Sand Canyon/Future Laguna Canyon Rd.	61.7	60	71.0	251
Future (Link)/SR 133	61.7	60	69.7	206
SR 133/Irvine Center Drive	66.3	122	69.7	206
Irvine Center Drive/I-5	67.2	140	70.7	240
I-5 Freeway/Alton Parkway	69.4	196	69.8	209
Alton Parkway/Bake Parkway	69.2	191	66.4	124
(Continued on the next page)				
Bison Avenue				
MacArthur Boulevard/Newport Coast Drive	- -	- -	69.1	188
Newport Coast Drive/California Avenue	59.0	40	65.8	113
Bonita Canyon Drive				
Newport Coast Drive/Culver Drive	65.5	108	71.1	255
Culver Drive/Sunnyhill	60.2	48	66.6	128
Bryan Avenue				
Culver Drive/Westwood	65.4	106	66.0	117
Westwood/Yale Avenue	63.0	74	66.0	117
Yale Avenue/Eastwood	62.1	64	65.5	108
Eastwood/Jeffrey Road	62.1	64	65.5	108
California Avenue				
University Drive/Bison Avenue	62.7	70	66.8	132

Table F-3
VEHICULAR TRAFFIC NOISE LEVEL AND NOISE CONTOUR COMPARISON

Roadway Segment	*Existing Conditions*		*2020 Buildout Condition*	
	CNEL Noise Level (@ 100 ft from ctrline)	Distance to 65 CNEL Noise Contour (in feet)	CNEL Noise Level (@ 100 ft from ctrline)	Distance to 65 CNEL Noise Contour (in feet)
Bison Avenue/Palo Verde Road	- -	- -	62.3	66
Palo Verde Road/Campus Drive	- -	- -	65.8	113
Campus Drive/Harvard Avenue	61.1	55	65.7	111
Campus Drive				
MacArthur Blvd./Von Karman Ave.	65.5	108	67.6	149
Von Karman Ave./Jamboree Road	65.1	102	66.6	128
Jamboree Road/University Drive	68.4	169	69.2	191
University Drive/Culver Drive	67.3	142	70.3	226
Culver Drive/Turtle Rock Drive	66.9	134	68.9	182
Creek Road				
Barranca Parkway/Alton Parkway	58.2	35	68.3	166
Culver Drive				
Irvine Boulevard/Bryan Avenue	65.3	105	70.3	226
Bryan Avenue to I-5/Trabuco Road	70.3	226	71.4	267
I-5/Trabuco Road to Walnut Avenue	69.2	191	72.0	293
Walnut Avenue/Irvine Center Drive	71.4	267	71.5	271
Irvine Center Drive/Warner Avenue	71.9	288	72.7	326
Warner Avenue/Barranca Parkway	71.6	275	72.2	302
Barranca Parkway/Alton Parkway	70.9	247	72.1	297
Alton Parkway/Main Street	71.5	271	72.2	302
Main Street/San Diego Freeway (I-405)	71.6	275	71.9	288
San Diego Freeway (I-405)/Michelson Dr.	70.5	233	72.0	293
Michelson Drive/University Drive	70.1	219	71.8	284
University Drive/Harvard Avenue	68.8	179	71.3	263
Harvard Avenue/Campus Drive	67.5	147	70.2	222
Campus Drive/Bonita Canyon Drive	62.9	72	70.3	226

(Continued on the next page)

Table F-3
VEHICULAR TRAFFIC NOISE LEVEL AND NOISE CONTOUR COMPARISON

Roadway Segment	*Existing Conditions*		*2020 Buildout Condition*	
	CNEL Noise Level (@ 100 ft from ctrline)	Distance to 65 CNEL Noise Contour (in feet)	CNEL Noise Level (@ 100 ft from ctrline)	Distance to 65 CNEL Noise Contour (in feet)
East Yale Loop				
Yale Avenue/Barranca Parkway	65.4	106	63.4	78
Barranca Parkway/Alton Parkway	64.6	94	64.2	88
Alton Parkway/West Yale Loop	65.8	113	66.1	118
Ford Road				
MacArthur Boulevard/San Miguel Drive	66.5	126	65.5	108
San Miguel Drive/Newport Coast Drive	- -	- -	68.2	163
Harvard Avenue				
Walnut Avenue/Irvine Center Drive	64.2	88	66.1	118
Irvine Center Drive/Warner Avenue	66.9	134	65.2	103
Warner Avenue/Barranca Parkway	66.8	132	65.9	115
Barranca Parkway/Alton Parkway	66.5	126	64.4	91
Alton Parkway/Main Street	66.7	130	69.7	206
Main Street/Michelson Drive	66.7	130	70.4	229
Michelson Drive/University Drive	67.0	136	67.5	147
University Drive/California Avenue	65.1	102	68.0	158
Irvine Center Drive				
Harvard Avenue/Culver Drive	68.6	174	71.2	259
Culver Drive/Yale Avenue	69.4	196	71.6	275
Yale Avenue/Jeffrey Road	68.1	161	71.4	267
Jeffrey Road/Future	69.6	203	71.2	259
Future/Sand Canyon Avenue	69.8	209	71.1	255
Sand Canyon Avenue/Barranca Parkway	69.1	188	73.5	369
Barranca Parkway/Alton Parkway	67.2	140	71.9	288
Alton Parkway/San Diego Freeway (I-405)	70.7	240	70.6	236

Table F-3
VEHICULAR TRAFFIC NOISE LEVEL AND NOISE CONTOUR COMPARISON

Roadway Segment	*Existing Conditions* CNEL Noise Level (@ 100 ft from ctrline)	*Existing Conditions* Distance to 65 CNEL Noise Contour (in feet)	*2020 Buildout Condition* CNEL Noise Level (@ 100 ft from ctrline)	*2020 Buildout Condition* Distance to 65 CNEL Noise Contour (in feet)
Future/Bake Parkway	73.3	358	74.4	423
Irvine Boulevard				
Culver Drive/Yale Avenue	70.5	233	72.4	311
Yale Avenue/Jeffrey Road	70.3	226	71.7	280
West of Alton Parkway	70.5	233	71.2	259
Alton Parkway/Bake Parkway	70.1	219	68.8	179
Jamboree Road				
San Diego Freeway (I-405)/Michelson Dr.	72.6	321	73.7	380
Michelson Drive/Campus Drive	72.1	297	72.5	316
Santa Ana Freeway (I-5)/Walnut Avenue	72.0	293	73.4	363
Walnut Avenue/Railroad Tracks	71.9	288	76.8	612
(Continued on the next page)				
Jamboree Road (Continued)				
Warner Avenue/Barranca Parkway	71.5	271	76.9	621
Barranca Parkway/Alton Parkway	69.6	203	73.9	392
Alton Parkway/Main Street	71.4	267	73.2	352
Main Street/San Diego Freeway (I-405)	72.4	311	73.1	347
Jeffrey Road/University Drive				
Irvine Boulevard/Bryan Avenue	68.6	174	69.5	200
Trabuco Road/Santa Ana Freeway (I-5)	69.4	196	69.7	206
Santa Ana Freeway (I-5)/Walnut Avenue	69.4	196	70.1	219
Walnut Avenue/Irvine Center Drive	70.1	219	72.1	297
Irvine Center Drive/Barranca Parkway	70.7	240	71.9	288
Barranca Parkway/Alton Parkway	69.3	193	71.5	271
Alton Parkway/San Diego Freeway (I-405)	71.7	280	73.2	352
San Diego Freeway (I-405)/Michelson Dr.	71.3	263	70.7	240

Table F-3
VEHICULAR TRAFFIC NOISE LEVEL AND NOISE CONTOUR COMPARISON

Roadway Segment	*Existing Conditions*		*2020 Buildout Condition*	
	CNEL Noise Level (@ 100 ft from ctrline)	Distance to 65 CNEL Noise Contour (in feet)	CNEL Noise Level (@ 100 ft from ctrline)	Distance to 65 CNEL Noise Contour (in feet)
Michelson Drive/Ridgeline Drive	69.7	206	71.7	280
Ridgeline Drive/Yale Avenue	68.4	169	68.7	176
Yale Avenue/Culver Drive	70.0	215	70.1	219
Culver Drive/Harvard Avenue	69.0	185	71.3	263
Harvard Avenue/Campus Drive	69.3	193	72.8	331
Campus Drive/MacArthur Boulevard	68.5	171	72.7	326
Jeronimo Road				
Alton Parkway/Bake Parkway	66.1	118	67.7	151
Laguna Canyon Road				
Barranca Parkway/Alton Parkway	62.7	70	69.0	185
Alton Parkway/Laguna Freeway (SR 133)	62.7	70	71.5	271
Laguna Freeway (SR 133)/Lake Forest Dr.	- -	- -	69.0	185
Laguna Freeway (SR 133)/Bake Parkway	- -	- -	74.2	411
Laguna Freeway (SR 133)				
Santa Ana Freeway (I-5)/Barranca Parkway	69.6	203	77.9	724
San Diego Fwy (I-405)/Laguna Canyon Rd.	71.2	259	76.0	541
Lake Forest Drive				
Laguna Canyon Road/Future Bake Parkway	- -	- -	70.6	236
Future Bake Parkway/East City Limits	- -	- -	71.8	284
Lake Road				
Barranca Parkway/Alton Parkway	61.9	62	71.5	271
MacArthur Boulevard				
Costa Mesa Freeway (SR 55)/Red Hill Ave.	70.4	229	72.2	302
Red Hill Avenue/Main Street	68.9	182	73.2	352
(Continued on the next page)				
MacArthur Boulevard (Continued)				

Table F-3
VEHICULAR TRAFFIC NOISE LEVEL AND NOISE CONTOUR COMPARISON

Roadway Segment	*Existing Conditions*		*2020 Buildout Condition*	
	CNEL Noise Level (@ 100 ft from ctrline)	Distance to 65 CNEL Noise Contour (in feet)	CNEL Noise Level (@ 100 ft from ctrline)	Distance to 65 CNEL Noise Contour (in feet)
Main Street/San Diego Freeway (I-405)	71.6	275	74.4	423
San Diego Freeway (I-405)/Michelson Dr.	70.1	219	71.7	280
Michelson Drive/Campus Drive	69.8	209	75.1	471
Jamboree Road/University Drive	68.4	169	75.1	471
University Drive/Newport Coast Drive	73.9	392	72.8	331
Newport Coast Drive/Bison Avenue	74.4	423	73.9	392
Bison Avenue/Ford Road	74.5	430	74.0	398
Main Street				
SR 55/Red Hill Avenue	67.0	136	71.5	271
Red Hill Avenue/MacArthur Boulevard	67.7	151	71.5	271
MacArthur Blvd./Von Karman Avenue	69.2	191	71.6	275
Von Karman Avenue/Jamboree Road	68.1	161	71.7	280
Jamboree Road/Harvard Avenue	67.1	138	69.2	191
Harvard Avenue/Culver Drive	66.1	118	67.5	147
Culver Drive/West Yale Loop	65.0	100	64.4	91
Michelson Drive				
MacArthur Blvd./Von Karman Avenue	66.3	122	65.1	102
Von Karman Avenue/Jamboree Road	65.4	106	68.0	158
Jamboree Road/Harvard Avenue	66.7	130	71.8	284
Harvard Avenue/Culver Drive	66.1	118	69.1	188
Culver Drive/West Yale Loop	63.1	75	63.1	75
Yale Avenue/University Drive	62.3	66	63.2	76
Sand Canyon Ave./Laguna Canyon Road	- -	- -	63.1	75
Red Hill Avenue				
Barranca Parkway/Alton Parkway	69.5	200	72.6	321
Alton Parkway/MacArthur Boulevard	70.7	240	72.8	331
MacArthur Boulevard/Main Street	66.8	132	69.2	191
Main Street/San Diego Freeway (I-405)	67.4	145	72.0	293
Ridgeline Drive				
University Drive/Turtle Rock Drive	66.9	134	66.6	128

Table F-3
VEHICULAR TRAFFIC NOISE LEVEL AND NOISE CONTOUR COMPARISON

Roadway Segment	*Existing Conditions*		*2020 Buildout Condition*	
	CNEL Noise Level (@ 100 ft from ctrline)	Distance to 65 CNEL Noise Contour (in feet)	CNEL Noise Level (@ 100 ft from ctrline)	Distance to 65 CNEL Noise Contour (in feet)
Rockfield Boulevard				
Alton Parkway/Thomas	- -	- -	65.4	106
Thomas/Bake Parkway	60.9	53	65.4	106
Bake Parkway/East City Limits	68.7	176	70.7	240
Sand Canyon Avenue				
North of Marine Way	66.9	134	68.6	174
Prop. Laguna Canyon Fwy/Irvine Center Dr.	65.0	100	68.5	171
Irvine Center Drive/Barranca Parkway	66.4	124	68.6	174
Barranca Parkway/Alton Parkway	66.2	120	68.8	179
Alton Parkway/San Diego Freeway (I-405)	66.8	132	72.0	293
San Diego Fwy (I-405)/Fut. Michelson Dr.	- -	- -	67.4	145
(Continued on the next page)				
Trabuco Road				
Culver Drive/Yale Avenue	67.8	154	68.1	161
Yale East to City Limit	64.0	86	67.9	156
Toledo Way				
Alton Parkway/Bake Parkway	66.1	118	65.0	100
Turtle Rock Drive				
Campus Drive/Ridgeline Drive	63.2	76	62.6	69
Ridgeline Drive/Sunnyhill	63.2	76	61.1	55
Sunnyhill/California Avenue	64.6	94	65.3	105
Von Karman Avenue				
Barranca Parkway/Alton Parkway	66.0	117	72.4	311
Alton Parkway/Main Street	66.9	134	69.0	185
Main Street/Michelson Drive	66.5	126	71.8	284
Michelson Drive/Campus Drive	66.0	117	68.9	182
Walnut Avenue				

Table F-3
VEHICULAR TRAFFIC NOISE LEVEL AND NOISE CONTOUR COMPARISON

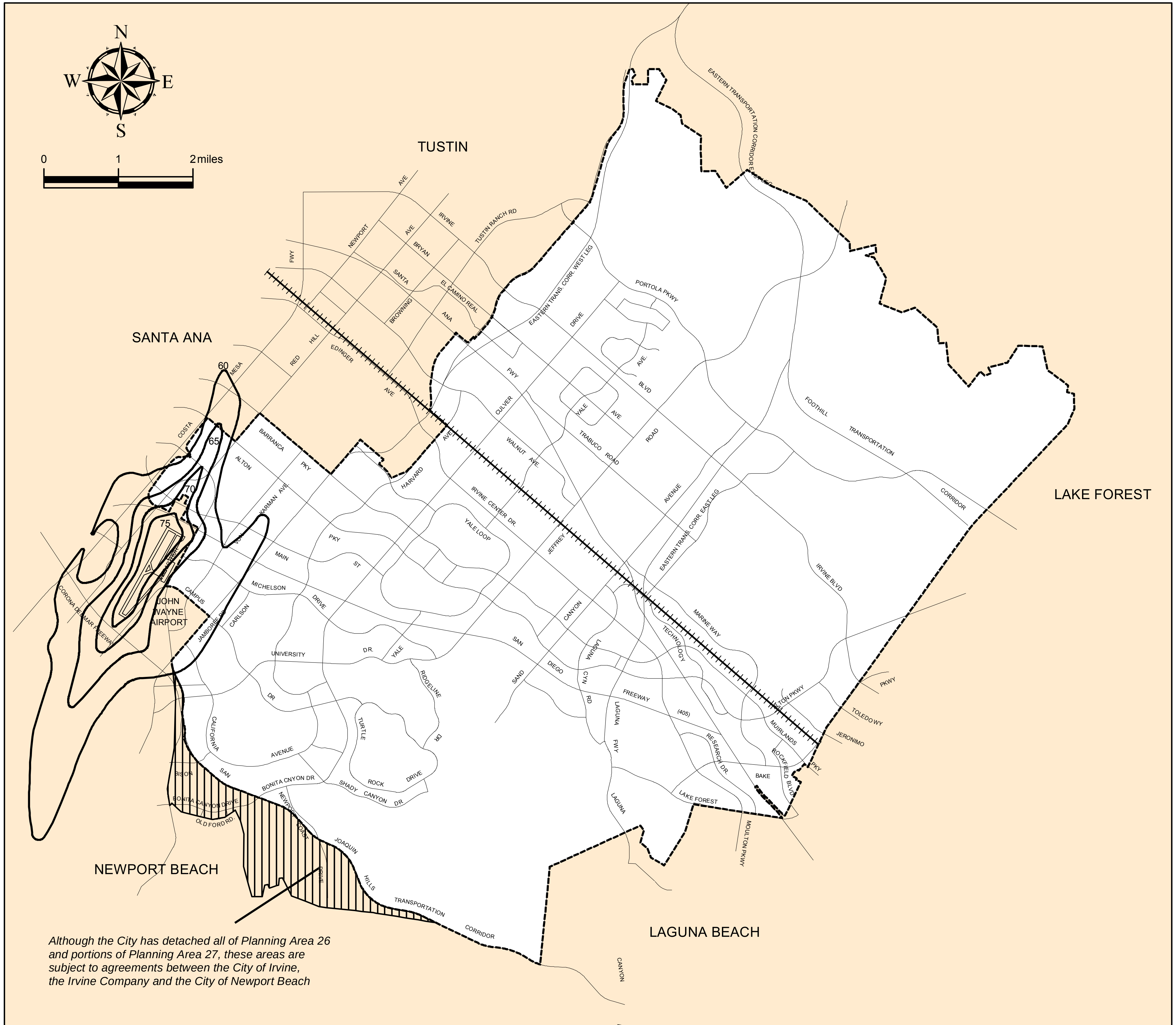
Roadway Segment	*Existing Conditions* CNEL Noise Level (@ 100 ft from ctrline)	*Existing Conditions* Distance to 65 CNEL Noise Contour (in feet)	*2020 Buildout Condition* CNEL Noise Level (@ 100 ft from ctrline)	*2020 Buildout Condition* Distance to 65 CNEL Noise Contour (in feet)
Myford Road/Jamboree Road	66.6	128	71.4	267
Jamboree Road/Harvard Avenue	65.6	110	70.8	244
Harvard Avenue/Culver Drive	66.0	117	68.2	163
Culver Drive/Yale Avenue	66.6	128	68.4	169
Yale Avenue/Jeffrey Road	64.9	98	67.1	138
Warner Avenue				
Jamboree Road/Harvard Avenue	58.2	35	64.3	90
Harvard Avenue/Culver Drive	- -	- -	63.9	84
Culver Drive/Yale Avenue	61.7	60	64.5	93
West Yale Loop				
East Yale Loop/Main Street	66.4	124	66.9	134
Main Street/Alton Parkway	64.4	91	65.8	113
Alton Parkway/Barranca Parkway	62.5	68	63.0	74
Barranca Parkway/Warner Avenue	63.7	82	62.7	70
Warner Avenue/Yale Avenue	64.5	93	62.7	70
Yale Avenue				
North of Irvine Boulevard	64.8	97	65.2	103
Irvine Boulevard/Bryan Avenue	64.0	86	64.0	86
Bryan Avenue to I-5/Trabuco Road	65.1	102	65.1	102
I-5/Trabuco Road to Walnut Avenue	64.1	87	64.1	87
Walnut Avenue/Irvine Center Drive	66.1	118	64.4	91
Irvine Center Drive/Yale Loop	63.4	78	64.1	87
Yale Loop/Michelson Drive	- -	- -	62.9	72
Michelson Drive/University Drive	55.6	24	59.5	43
(Continued on the next page)				
I-405 (San Diego Freeway)				
SR-55/MacArthur Boulevard	74.8	450	76.1	550
MacArthur Boulevard/Jamboree Road	74.8	450	76.3	567

Table F-3
VEHICULAR TRAFFIC NOISE LEVEL AND NOISE CONTOUR COMPARISON

Roadway Segment	*Existing Conditions* CNEL Noise Level (@ 100 ft from ctrline)	*Existing Conditions* Distance to 65 CNEL Noise Contour (in feet)	*2020 Buildout Condition* CNEL Noise Level (@ 100 ft from ctrline)	*2020 Buildout Condition* Distance to 65 CNEL Noise Contour (in feet)
Jamboree Road/Culver Drive	74.8	450	76.0	541
Culver Drive/Jeffrey Road	74.3	417	76.0	541
Jeffrey Road/Sand Canyon Avenue	73.8	386	75.9	533
Sand Canyon Avenue/SR-133	73.8	386	75.6	509
SR-133/Irvine Center Drive	73.2	352	73.7	380
Irvine Center Drive/I-5	72.5	316	72.9	336
I-5 (Santa Ana Freeway)				
Jamboree Road/Culver Drive	72.7	326	77.1	641
Culver Drive/Jeffrey Road	72.7	326	76.8	612
Jeffrey Road/Sand Canyon Avenue	72.8	331	76.9	621
Sand Canyon Avenue/SR-133	72.8	331	76.3	567
SR-133/Alton Parkway	72.6	321	76.1	550
Alton Parkway/I-405	72.1	297	75.8	525
I-405/Lake Forest Drive	75.0	464	76.2	558
SR-55 (Costa Mesa Freeway)				
I-405/MacArthur Boulevard	73.9	392	not available	

Note: (--) denotes undeveloped roadway. Traffic estimates from City of Irvine were used as inputs to the model.

SOURCE: Environmental Science Associates, 1996.



City of Irvine General Plan

Figure F-1

AIRCRAFT NOISE

LEGEND

City Sphere of Influence

Aircraft Noise Contours expressed as CNEL (Community Noise Equivalent Level)

* This exhibit depicts the existing noise contours for John Wayne airport

CHAPTER 2. - NOISE

Footnotes:
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Editor's note— *Prior to amendment by Ord. No. 84-18, adopted Sept. 11, 1984, the provisions of this chapter derived from Ord. No. 136, §§ 2—13, adopted March 25, 1975.*

Sec. 6-8-201. - Declaration of policy.

The City Council has adopted the following regulations in order to control unnecessary, excessive and annoying noise in the City of Irvine. The provisions of this chapter are applicable to nontransportation-related stationary noise sources.

(Code 1976, § VI.K-301; Ord. No. 84-18, 9-11-84)

Sec. 6-8-202. - Definitions.

The following definitions are provided to clarify words, phrases and terms used in this chapter.

Ambient noise level: 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: An additive period of time composed of individual time segments which may be continuous or interrupted.

Decibel (dB): A unit of noise measurement indicating the loudness of sound, based on logarithmic (base 10) scale.

Emergency work: Any mechanical device, apparatus or equipment which is used, employed or performed in an effort to protect, provide or restore safe conditions in the community or for the citizenry, or work by private or public utilities when restoring utility service.

Grading: Any excavating or filling of earth material or any combination thereof conducted to prepare a site for construction or the placement of the improvements thereon.

Impact noises: The noise produced by the collision of one mass in motion with a second mass which may be either in motion or at rest.

Noise level: The "A" weighted sound pressure level in decibels obtained by using a sound level meter. The "A" weighted discriminates against the lower and higher frequencies according to a relationship with the sensitivity of the human ear. The unit of measurement is designated as dB(A).

Predominant tone noise: A noise characterized by a predominant frequency or frequencies so that other frequencies cannot be readily distinguished.

Stationary noise source: The source which is often referred to as "fixed source" (non-transportation-related) including, but not limited to, mechanical electric equipment, various power tools, construction, commercial, industrial and agricultural activity and animal noise.

(Code 1976, § VI.K-302; Ord. No. 84-18, 9-11-84)

Sec. 6-8-203. - Noise level measurement criteria.

Any noise level measurements made pursuant to the provisions of this chapter shall be performed using a sound level meter. The location selected for measuring exterior noise levels shall be anywhere on the affected property. The interior noise measurement shall be made at a point in the affected unit at least four feet from the wall, ceiling or floor nearest the noise source.

(Code 1976, § VI.K-303; Ord. No. 84-18, 9-11-84)

Sec. 6-8-204. - General provision.

A. *Designated noise zones.* The properties hereinafter described, whether within or without the City, are hereby assigned to the following noise zones:
   1. *Noise zone 1:* All hospitals, libraries, churches, schools and residential properties.
   2. *Noise zone 2:* All professional office and public institutional properties.
   3. *Noise zone 3:* All commercial properties excluding professional office properties.
   4. *Noise zone 4:* All industrial properties.

B. *Exterior and interior noise standards.*
   1. The following noise standards, unless otherwise specifically indicated, shall apply to all property within a designated noise zone.

NOISE STANDARDS
dB(A)

Noise Levels for a Period Not Exceeding (minutes/hour)

	Noise Zone	Time Period	30	15	5	1	0 (anytime)
1	Exterior	7:00 a.m.—10:00 p.m.	55	60	65 [1]	70	75
		10:00 p.m.—7:00 a.m.	50	55	60	65 [1]	70
	Interior	7:00 a.m.—10:00 p.m.	—	—	55	60	65
		10:00 p.m.—7:00 a.m.	—	—	45	50	55
2	Exterior	Any time	55	60	65	70	75
	Interior	Any time	—	—	55	60	65
3	Exterior	Any time	60	65	70	75	80
	Interior	Any time	—	—	55	60	65
4	Exterior	Any time	70	75	80	85	90
	Interior	Any time	—	—	55	60	65

1. This standard does not apply to multifamily residence private balconies. Multifamily developments with balconies that do not meet the 65 CNEL are required to provide occupancy disclosure notices to all future tenants regarding potential noise impacts.
2. It shall be unlawful for any person at any location within the City to create any noise or to allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person which causes the noise level when measured on any property within designated noise zones either within or without the City to exceed the applicable noise standard.
3. Each of the noise standards specified above shall be reduced by five dB(A) for impact, or predominant tone noise or for noises consisting of speech or music.
4.

In the event that the noise source and the affected property are within different noise zones, the noise standards of the affected property shall apply.

(Code 1976, § VI.K-304; Ord. No. 84-18, 9-11-84; Ord. No. 05-06, § 2, 2-22-05)

Sec. 6-8-205. - Special provisions.

A. Construction activities and agricultural operations may occur between 7:00 a.m. and 7:00 p.m. Mondays through Fridays, and 9:00 a.m. and 6:00 p.m. on Saturdays. No construction activities shall be permitted outside of these hours or on Sundays and federal holidays, except Columbus Day, unless a temporary waiver is granted by the Chief Building Official or his or her authorized representative. Trucks, vehicles, and equipment that are making or are involved with material deliveries, loading, or transfer of materials, equipment service, maintenance of any devices or appurtenances for or within any construction project in the City shall not be operated or driven on City streets outside of these hours or on Sundays and federal holidays unless a temporary waiver is granted by the City. Any waiver granted shall take impact upon the community into consideration. No construction activity and agricultural operations will be permitted outside of these hours except in emergencies including maintenance work on the City rights-of-way that might be required.

Deliveries to or pickups from any commercial property sharing a property line with any residential property may occur between 7:00 a.m. and 10:00 p.m. daily. No deliveries to or pickups from any such properties shall occur outside of these hours.

B. Maintenance of real property operations may exceed the noise standards between 7:00 a.m. and 7:00 p.m. on any day except Sundays, or between 9:00 a.m. and 6:00 p.m. on Sundays or a federal holiday.

C. The use of leaf blowers shall be regulated as follows:

1. *Definition of leaf blower.* Leaf blowers are defined as portable power equipment that is powered by fuel or electricity and used in any landscape maintenance, construction, property repair, or property maintenance for the purpose of blowing, dispersing or redistributing dust, dirt, leaves, grass clippings, cuttings and trimmings from trees and shrubs or other debris.
2. *Limitations on use.*
   a. All leaf blowers shall be equipped with a permanently installed limiter that restricts the individual equipment motor performance to half throttle speed or less, and will produce not more than 70 decibels dB(A) measured at the midpoint of a wall area 20 feet long and 10 feet high and at a horizontal distance 50 feet away from the midpoint of the wall, or not more than 76 dB(A) at a horizontal distance of 25 feet using a sound level meter set at level A.
   b. Each individual leaf blower shall be tested and certified for use by the City of Irvine or its designated representative. Each individual leaf blower shall bear the label of required approval in a visible location on the equipment prior to use and at all times during use. A fee for the City to recover all costs connected with equipment approvals shall be charged in an amount set by City resolution.
   c. The use of leaf blowers is prohibited except between the hours of 8:00 a.m. and 5:00 p.m. Monday through Friday and between 9:00 a.m. and 5:00 p.m. on Saturday.
   d. Leaf blower operations shall not cause dirt, dust, debris, leaves, grass clippings, cuttings or trimmings from trees or shrubs to be blown or deposited on any adjacent or other parcel of land, lot, or public right-of-way/property other than the parcel, land, or lot upon which the leaf blower is being operated. Deposits of dirt, dust, leaves, grass clippings, debris, cuttings or trimmings from trees or shrubs shall be removed and disposed of in a sanitary manner which will prevent dispersement by wind, vandalism or similar means within six hours of deposit by the user or property occupant.
   e. Leaf blowers shall not be operated within a horizontal distance of 10 feet of any operable window, door, or mechanical air intake opening or duct.
   f. No person using leaf blowers shall exceed noise limitations set by Section 6-8-204 of the City Code of Ordinances.
3. *Education.*
   a. Each person operating an individual leaf blower is required to complete not less than one training session of content and time approved by the City of Irvine Administrative Authority prior to operation of leaf blower equipment. Training and qualification shall be required for certification at least every two years for each individual equipment user.
   b. The equipment operator shall carry certification of the training and qualification at all times during equipment use and make it available upon demand. Failure to abide by the use requirements contained in this Code and/or the certification training provided will be cause for the City of Irvine to revoke such certification.
   c. *Exception:* An individual residential property occupant operating a single leaf blower himself or herself in a manner confined to his or her own property shall be excepted from the education requirements set forth by this subsection.
4. *Fees.* A fee for the City to recover all costs connected with training, testing, certification and enforcement shall be charged in an amount established by resolution of the City Council, which may be amended from time-to-time.

D. The following activities shall be exempted from the provision of this chapter:

1. School bands, school athletic and school entertainment events, provided said events are conducted on school property or authorized by special permit from the City.
2. Activities otherwise lawfully conducted on public parks, public playgrounds and public or private school grounds.
3. Any mechanical device, apparatus or equipment which is utilized for emergency work, pest control, and protection or harvest of agricultural crops during periods of potential or actual frost damage or other adverse weather conditions.
4. Any activity or equipment to the extent that design regulation thereby has been preempted by State or federal law.

The Chief Building Official or his or her duly authorized representative and City police shall enforce where necessary the provisions of this chapter. No person shall interfere with, oppose or resist any authorized person charged with the enforcement of this chapter when such person is engaged in the performance of his or her duty.

(Code 1976, § VI.K-305; Ord. No. 84-18, 9-11-84; Ord. No. 88-11, §§ 1, 2, 5-24-88; Ord. No. 90-2, § 1, 2-13-90; Ord. No. 90-7, § 1, 4-10-90; Ord. No. 05-16, § 2, 7-12-05)

Sec. 6-8-206. - Reserved.

Sec. 6-8-207. - Enforcement.

The Chief Building Official or his or her duly authorized representative shall enforce the provisions of this chapter. No person shall interfere with, oppose or resist any authorized person charged with the enforcement of this chapter while such person is engaged in the performance of his or her duty.

(Code 1976, § VI.K-306; Ord. No. 84-18, 9-11-84)

Sec. 6-8-208. - Waiver procedure.

A. The owner or operator of a noise source which violates any of the provisions of this chapter may apply for temporary waiver with the Chief Building Official. Any waiver granted shall take impact upon the community into consideration and state why immediate compliance cannot be achieved, a proposed method of achieving compliance, and a proposed time schedule for its accomplishment. Said application shall be accompanied by a fee as listed in the City Council resolution for variances where deemed appropriate and necessary by the City administrative authority.

B. A separate application shall be filed for each noise source; provided, however, that several sources under common ownership or several sources on a single property may be combined into one application.

C. An applicant for a waiver shall remain subject to prosecution under the terms of this chapter until a waiver is granted.

D. Within 60 days of receipt of an appeal, the City Council shall either affirm, modify or reverse the decision of the Chief Building Official at a duly notified public hearing.

(Code 1976, § VI.K-307; Ord. No. 84-18, 9-11-84; Ord. No. 90-7, § 2, 4-10-90)

Sec. 6-8-209. - Appeals.

A. The decision of the Chief Building Official on waiver applications may be appealed to the City Council. Appeals shall be filed with the City Clerk and shall be accompanied by a letter stating the reason for the appeal.

B. An appeal shall be accompanied by a deposit/fee as established by resolution, which shall be on an annual basis by City Council resolution.

C. An appeal shall be filed within 15 days of the decision of the Chief Building Official.

D. Within 60 days of receipt of an appeal, the City Council shall either affirm, modify or reverse the decision of the Chief Building Official at a duly notified public hearing.

(Code 1976, § VI.K-308; Ord. No. 84-18, 9-11-84)

CONSTRUCTION NOISE MODELING

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/31/2023
Case Description: COI-55

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Architectural Coating	Residential	55.0	50.0	45.0

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

	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)	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: 10/31/2023
Case Description: COI-55

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Building Construction	Residential	55.0	50.0	45.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16	80.6	50.0	0.0	
Front End Loader	No	40	79.1	50.0	0.0	
Tractor	No	40	84.0	50.0	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	80.6	72.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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
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	81.8	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: 10/31/2023
Case Description: COI-55

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Building Demolition	Residential	55.0	50.0	45.0

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
Excavator	No	40		80.7	50.0	0.0
Dozer	No	40		81.7	50.0	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	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
Excavator	80.7	76.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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
Total	89.6	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: 10/31/2023
Case Description: COI-55

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Finishing and Landscaping	Residential	55.0	50.0	45.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Excavator	No	40	80.7	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
Excavator	80.7	76.7	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	80.7	76.7	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: 10/31/2023
Case Description: COI-55

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Grading	Residential	55.0	50.0	45.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85.0		50.0	0.0
Tractor	No	40	84.0		50.0	0.0
Dozer	No	40		81.7	50.0	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
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
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
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
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: 10/31/2023
Case Description: COI-55

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Paving	Residential	55.0	50.0	45.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Pavement Scarafier	No	20	89.5	50.0		0.0
Paver	No	50	77.2	50.0		0.0
Roller	No	20	80.0	50.0		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
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
Paver	77.2	74.2	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	80.0	73.0	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	89.5	83.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/31/2023
Case Description: COI-55

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Site Preparation	Residential	55.0	50.0	45.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	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

	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
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

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/31/2023
Case Description: COI-55

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Utilities Trenching	Residential	55.0	50.0	45.0

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
Tractor	No	40	84.0		50.0	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	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
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	84.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

COI-55 - 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*	*1200*	*1100*	*1250*	*925*
Demolition	85.0	57.4	58.2	57.0	59.7
Site Prep	83.0	55.4	56.2	55.0	57.7
Grading	85.0	57.4	58.2	57.0	59.7
Distance in feet	*50*	*1075*	*730*	*425*	*555*
Building Construction	82.0	55.4	58.7	63.4	61.1
Architectural Coating	74.0	47.4	50.7	55.4	53.1
Distance in feet	*50*	*560*	*1350*	*585*	*200*
Paving	84.0	63.0	55.4	62.6	72.0
Distance in feet	*50*	*100*	*250*	*100*	*100*
Finish/Landscaping	77.0	71.0	63.0	71.0	71.0
Utilities Trenching	85.0	79.0	71.0	79.0	79.0

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

Stationary Noise	Reference Noise Level	Receptor to the West
Distance in feet	*100*	*875*
Pickleball	70.0	42.4

COI-55 - Vibration Damage Attenuation Calculations

Levels, PPV (in/sec)

Distance in feet	**Vibration Reference Level at *25 feet***	**Receptor to North** *75*	**Receptor to East** *265*	**Receptor to South** *125*	**Receptor to West** *100*
Vibratory Roller	0.21	0.040	0.006	0.019	0.026
Static Roller	0.05	0.010	0.001	0.004	0.006
Large Bulldozer	0.089	0.017	0.003	0.008	0.011
Caisson Drilling	0.089	0.017	0.003	0.008	0.011
Loaded Trucks	0.076	0.015	0.002	0.007	0.010
Jackhammer	0.035	0.007	0.001	0.003	0.004
Small Bulldozer	0.003	0.001	0.000	0.000	0.000

COI-55- Vibration Annoyance Attenuation Calculations

Levels in VdB

Equipment *Distance in feet*	Vibration @ 25 ft	Receptor to North *75*	Receptor to East *265*	Receptor to South *125*	Receptor to West *100*
Vibratory Roller	94.0	79.7	63.2	73.0	75.9
Static Roller	82.0	67.7	51.2	61.0	63.9
Large Bulldozer	87.0	72.7	56.2	66.0	68.9
Caisson Drilling	87.0	72.7	56.2	66.0	68.9
Loaded Trucks	86.0	71.7	55.2	65.0	67.9
Jackhammer	79.0	64.7	48.2	58.0	60.9
Small Bulldozer	58.0	43.7	27.2	37.0	39.9