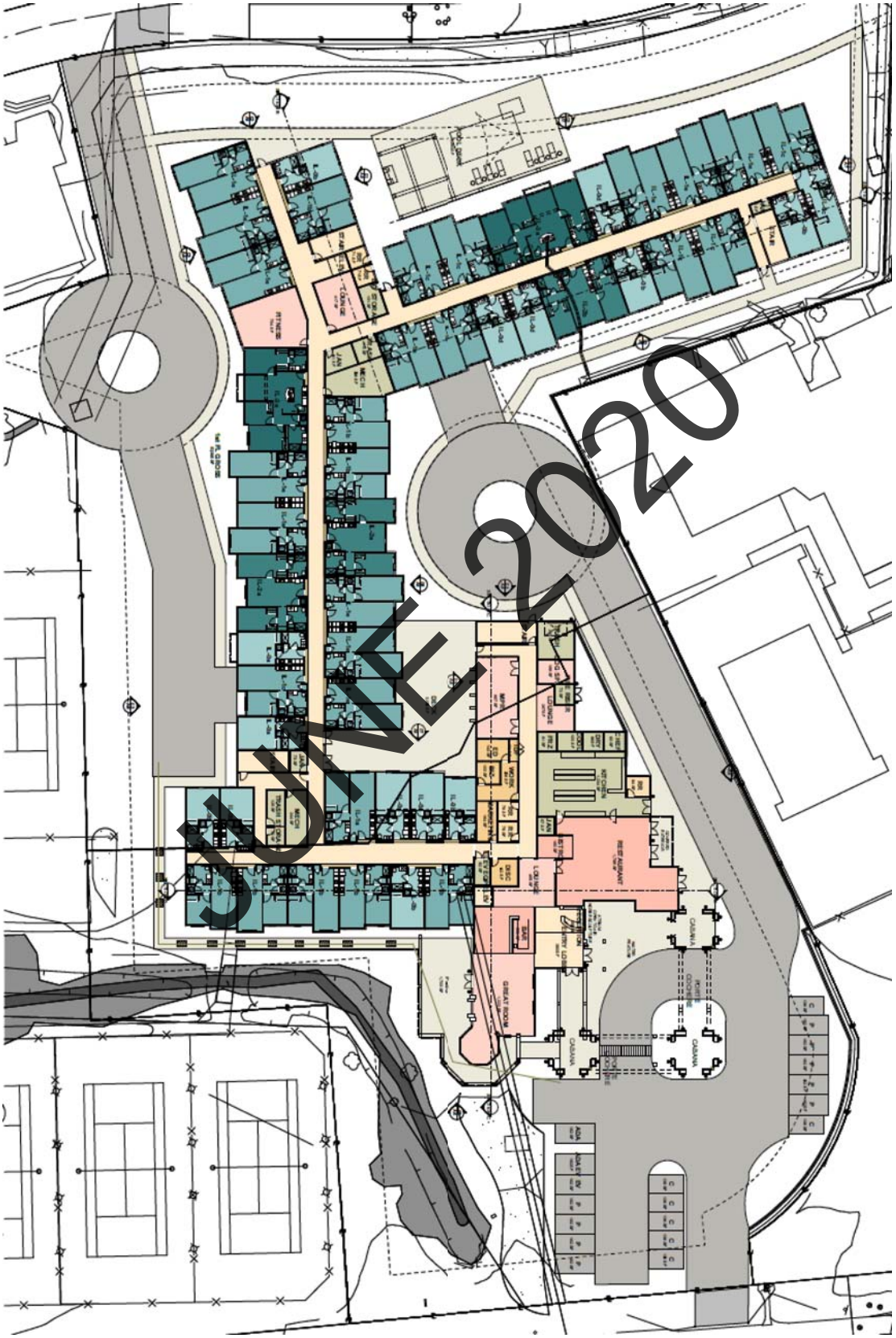
LEGACY AT COTO
NOISE IMPACT STUDY
County of Orange, California



RK engineering group, inc.

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NOISE IMPACT STUDY
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1.0 Introduction

1.1 Purpose of Analysis and Study Objectives

The purpose of this report is to evaluate the potential noise impacts from the proposed Legacy at Coto (formerly Coto de Caza California Grand Village) Project (project) and provide recommendations, if necessary, to minimize any project noise impacts. The assessment was conducted within the context of the California Environmental Quality Act (CEQA) and utilizes the noise standards set forth by the applicable Federal, State, and local agencies.

The following is provided in this report:

- A description of the study area and the proposed project
- Information regarding the fundamentals of noise
- Identification of the regulatory setting and applicable noise standards
- Analysis of the existing noise environment
- Analysis of the project's operational noise impact to adjacent receptors
- Analysis of the project's construction noise and vibration impact to adjacent sensitive receptors
- Analysis of the project's construction noise and vibration impacts to adjacent sensitive receptors
- Summary of recommended mitigation measures and project design features to reduce noise level impacts.

1.2 Site Location

The project site is located within the Coto de Caza Planned Community in the unincorporated County of Orange. The project site is located approximately 870 feet above sea level and the topography generally slopes downward from north to south, with the southern edge of the property located below the grade of the adjacent roadway, Avenida La Caza.

The nearest noise-sensitive land uses are considered the adjacent residential uses located to the west and south of the site, and the Coto de Caza Valley County Club located adjacent to the site to the east.

The project site location map is provided in Exhibit A.

1.3 Project Description

The project would consist of the demolishing and reuse of the existing Vic Braden Tennis College site and the construction and operation of a 110 unit luxury residential project for active independent living seniors on approximately 4.0 acres of land. The site plan used for this analysis, provided by IRWIN PARTNERS ARCHITECTS is illustrated in Exhibit B.

Table 1 lists the proposed land uses for the project site.

Table 1
Land Use Summary

Land Use	Quantity[1]	Metric
Senior Independent Living	110	Unit

This report analyzes the short-term noise impacts associated with construction activities and long-term noise impacts associated with the day to day operation of the project; including parking lot noise, HVAC equipment, pool equipment, exhaust vent noise and the outdoor patio area of the Legacy club bistro. The Legacy club bistro would be open to residents of the project and those within walking distance of the facility only. The bistro is not expected to add any additional traffic to the project site or adjacent roadways.

The proposed luxury residential project for active independent living seniors is conditionally permitted under the County's General Plan and the Coto de Caza Specific Plan subject to approval of a conditional use permit and site development permit.

1.4 Summary of Analysis Results

Table 2 provides a summary of the noise analysis results, per the CEQA impact criteria checklist. With the implementation of the recommended mitigation measures, the project is not expected to result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

Table 2
CEQA Noise Impact Criteria

Noise Impact Criteria	Potentially Significant	Potentially Significant Unless Mitigated	Less Than Significant Impact	No Impact
Would the project result in?				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?		X		
b) Generation of excessive groundborne vibration or groundborne noise levels?			X	
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?				X

1.5 Recommended Mitigations Measures (MM)

The following recommended mitigation measures are provided to help ensure the project's construction and operational noise levels do not adversely impact the adjacent noise sensitive land uses:

Operational Mitigation Measures

MM-1 All rooftop mounted HVAC equipment shall be fully shielded or enclosed from the line of sight of adjacent residential uses. Shielding/parapet wall should be at least as high as the equipment and not less than 6 feet tall.

MM-2 All pool/spa equipment and mechanical pumps shall be fully shielded from line of sight of any adjacent residential property or on-site residential unit or enclosed within an equipment room.

MM-3 The project access on Via Alondra shall be restricted to emergency access only. All vehicles accessing the site, including trucks associated with deliveries and trash pick-up shall access the project site via Avenida La Caza.

MM-4 No truck loading/unloading activities or idling shall be allowed on the Via Alondra emergency access drive aisle near the northwest corner of the site.

MM-5 Delivery, loading/unloading activity, and trash pick-up hours shall be limited to daytime (7 a.m. – 10 p.m.) hours only. Signage should be posted in the designated loading areas to enforce the hour restrictions.

MM-6 Limit engine idling time for all delivery vehicles and moving trucks to 5 minutes or less. Signage should be posted in the designated loading areas to enforce the idling restrictions.

Construction Mitigation Measures

MM-7 Obtain a construction work permit from the County of Orange prior to starting construction.

MM-8 The project shall notify all residential uses located within 500 feet of the construction site regarding the construction schedule for the proposed project and a sign shall also be posted in a readily visible location at the project site. All notices and signs shall indicate the dates and duration of construction activities, as well as provide a telephone number where residents can enquire about the construction process and register complaints to a designated construction noise disturbance coordinator.

MM-9 The project shall provide temporary noise barrier shielding along all property lines of the project site to shield adjacent sensitive receptors from construction noise.

The temporary barrier should be at least twelve (12) feet high and installed at the first phase of construction and prior to performing any demolition, excavation or grading activities. The temporary noise barrier wall should present a sold face area and include sound absorptive material or blankets which can be installed in multiple layers for improved noise insulation.

MM-10 The project shall ensure all contractors implement construction best management practices to reduce construction noise levels. Best management practices would include the following:

- All construction equipment shall be equipped with muffles and other suitable noise attenuation devices (e.g., engine shields).

- Grading and construction contractors shall use quieter equipment as opposed to noisier equipment (such as rubber-tired equipment rather than track equipment), to the maximum extent feasible.

- If feasible, electric hook-ups shall be provided to avoid the use of generators. If electric service is determined to be infeasible for the site, only whisper-quiet generators shall be used (i.e., inverter generators capable of providing variable load.

- Use electric air compressors and similar power tools rather than diesel equipment, where feasible.

- Locate staging area, generators and stationary construction equipment as far from the adjacent residential homes as feasible.

- Construction-related equipment, including heavy-duty equipment, motor vehicles, and portable equipment, shall be turned off when not in use for more than 5 minutes.

MM-11 The project shall implement a noise monitoring program during construction. The monitoring program shall report the continuous daily construction noise levels along the project's west property line and south of Avenida La Caza near the adjacent residential homes. Noise monitoring should be performed at ground level and behind the noise barrier wall. The monitoring program shall notify construction management personnel when noise levels approach the upper limits of the 8-hour Leq exceedance threshold (80 dBA). Construction activity should cease prior to noise levels exceeding the 8-hour threshold.

MM-12 All construction traffic and personnel shall use Avenida La Caza to access the site. No construction traffic or staging shall be allowed on Via Alondra.

MM-13 No impact pile driving activities shall be permitted on the project site during construction. If impact pile driving is required, a follow-up noise and vibration impact assessment shall be conducted prior to start of any pile driving activity.

1.6 Recommended Project Design Features (DF)

The following recommended project design features include standard rules and requirements, best practices and recognized design guidelines for reducing noise levels. Design features are assumed to be part of the conditions of the project and integrated into its design.

Operational Design Features

DF-1 The project will be required to incorporate building construction techniques that achieve the minimum interior noise standard of 45 dBA CNEL for all residential units.

DF-2 The project shall comply with California Title 24 building insulation requirements for exterior walls, roofs and common separating assemblies (e.g. floor/ceiling assemblies and demising walls), which shall be reviewed by the City prior to issuance of a building permit. A final acoustical study may be required to demonstrate compliance with building code standards.

a. Party wall and floor-ceiling assembly designs must provide a minimum STC of 50, based on lab tests. Field tested assemblies must provide a minimum noise isolation class (NIC) of 45.

b. Floor-ceiling assembly designs must provide for a minimum impact insulation class (IIC) of 50, based on lab tests. Field tested assemblies must provide a minimum FIIC of 45.

c. Entry doors from interior corridors must provide an STC of 26 or more.

d. Penetrations or openings in sound rated assemblies must be treated to maintain required ratings.

e. Interior noise levels due to exterior sources must not exceed a community noise equivalent level (CNEL) or a day-night level (LDN) of 45 dBA, in any habitable room.

DF-3 For proper acoustical performance, all exterior windows, doors, and sliding glass doors shall have a positive seal and leaks/cracks must be kept to a minimum.

Construction Design Features

DF-7 Construction-related noise activities shall comply with the requirements set forth in the County of Orange Municipal Code Section 4-6-7.

a. Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities do not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a Federal holiday.

2.0 Fundamentals of Noise

This section of the report provides basic information about noise and presents some of the terms used within the report.

2.1 Sound, Noise and Acoustics

Sound is a disturbance created by a moving or vibrating source and is capable of being detected by the hearing organs. Sound may be thought of as mechanical energy of a moving object transmitted by pressure waves through a medium to a human ear. For traffic, or stationary noise, the medium of concern is air. *Noise* is defined as sound that is loud, unpleasant, unexpected, or unwanted.

2.2 Frequency and Hertz

A continuous sound is described by its *frequency* (pitch) and its *amplitude* (loudness). Frequency relates to the number of pressure oscillations per second. Low-frequency sounds are low in pitch (bass sounding) and high-frequency sounds are high in pitch (squeak). These oscillations per second (cycles) are commonly referred to as Hertz (Hz). The human ear can hear from the bass pitch starting out at 20 Hz all the way to the high pitch of 20,000 Hz.

2.3 Sound Pressure Levels and Decibels

The *amplitude* of a sound determines it loudness. The loudness of sound increases or decreases, as the amplitude increases or decreases. Sound pressure amplitude is measured in units of micro-Newton per square inch meter (N/m2), also called micro-Pascal (μPa). One μPa is approximately one hundred billionths (0.00000000001) of normal atmospheric pressure. Sound pressure level (SPL or L_p) is used to describe in logarithmic units the ratio of actual sound pressures to a reference pressure squared. These units are called decibels and abbreviated dB.

2.4 Addition of Decibels

Because decibels are on a logarithmic scale, sound pressure levels cannot be added or subtracted by simple plus or minus addition. When two (2) sounds of equal SPL are combined, they will produce an SPL 3 dB greater than the original single SPL. In other words, sound energy must be doubled to produce a 3 dB increase.

If two (2) sounds differ by approximately 10 dB the higher sound level is the predominant sound.

2.5 Human Response to Changes in Noise Levels

In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz, (A-weighted scale) and it perceives a sound within that range as being more intense than a sound with a higher or lower frequency with the same magnitude. For purposes of this report as well as with most environmental documents, the A-scale weighting is typically reported in terms of A-weighted decibel (dBA). Typically, the human ear can barely perceive the change in noise level of 3 dB. A change in 5 dB is readily perceptible, and a change in 10 dB is perceived as being twice or half as loud[1]. As previously discussed, a doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy (e.g. doubling the volume of traffic on a highway), would result in a barely perceptible change in sound level.

2.6 Noise Descriptors

Noise in our daily environment fluctuates over time. Some noise levels occur in regular patterns, others are random. Some noise levels are constant, while others are sporadic. Noise descriptors were created to describe the different time-varying noise levels. Following are the most commonly used noise descriptors along with brief definitions.

A-Weighted Sound Level

The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear. A numerical method of rating human judgment of loudness.

Ambient Noise Level

The composite of noise from all sources, near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

[1] Source: U.S. DOT Federal Highway Administration. Dec. 2011. Highway Traffic Noise: Analysis and Abatement Guidance.

Community Noise Equivalent Level (CNEL)

The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five (5) decibels to sound levels in the evening from 7:00 to 10:00 PM and after addition of ten (10) decibels to sound levels in the night before 7:00 AM and after 10:00 PM.

Decibel (dB)

A unit for measuring the amplitude of a sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micro-pascals.

dB(A)

A-weighted sound level (see definition above).

Equivalent Sound Level (LEQ)

The sound level corresponding to a steady noise level over a given sample period with the same amount of acoustic energy as the actual time varying noise level. The energy average noise level during the sample period.

Habitable Room

Any room meeting the requirements of the Uniform Building Code or other applicable regulations which is intended to be used for sleeping, living, cooking or dining purposes, excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting corridors, laundries, unfinished attics, foyers, storage spaces, cellars, utility rooms, and similar spaces.

L(n)

The A-weighted sound level exceeded during a certain percentage of the sample time. For example, L10 is the sound level exceeded 10 percent of the sample time. Similarly L50, L90 and L99, etc.

Noise

Any unwanted sound or sound which is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying. The State Noise Control Act defines noise as "...excessive undesirable sound...".

Outdoor Living Area

Outdoor spaces that are associated with residential land uses typically used for passive recreational activities or other noise-sensitive uses. Such spaces include patio areas, barbecue areas, jacuzzi areas, etc. associated with residential uses; outdoor patient recovery or resting areas associated with hospitals, convalescent hospitals, or rest homes; outdoor areas associated with places of worship which have a significant role in services or other noise-sensitive activities; and outdoor school facilities routinely used for educational purposes which may be adversely impacted by noise. Outdoor areas usually not included in this definition are: front yard areas, driveways, greenbelts, maintenance areas and storage areas associated with residential land uses; exterior areas at hospitals that are not used for patient activities; outdoor areas associated with places of worship and principally used for short-term social gatherings; and, outdoor areas associated with school facilities that are not typically associated with educational uses prone to adverse noise impacts (for example, school play yard areas).

Percent Noise Levels

See L(n).

Sound Level (Noise Level)

The weighted sound pressure level obtained by use of a sound level meter having a standard frequency-filter for attenuating part of the sound spectrum.

Sound Level Meter

An instrument, including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement and determination of noise and sound levels.

Single Event Noise Exposure Level (SENEL)

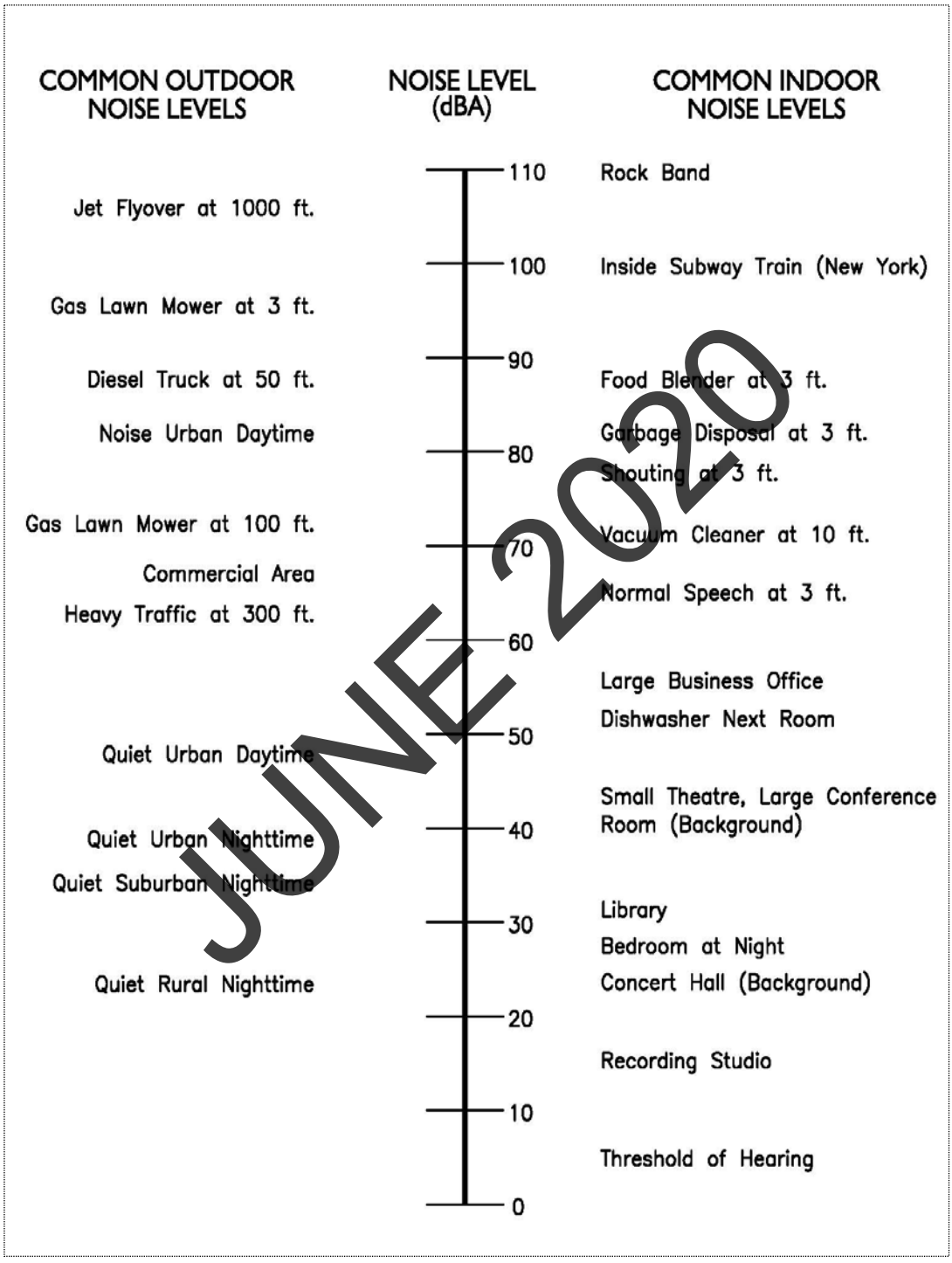
The dBA level which, if it lasted for one (1) second, would produce the same A-weighted sound energy as the actual event.

2.7 Sound Propagation

As sound propagates from a source it spreads geometrically. Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates at a rate of 6 dB per doubling of distance. The movement of vehicles down a roadway makes the source of the sound appear to propagate from a line (i.e., line source) rather than a point source. This line source results in the noise propagating from a roadway in a cylindrical spreading versus a spherical spreading that results from a point source. The sound level attenuates for a line source at a rate of 3 dB per doubling of distance.

As noise propagates from the source, it is affected by the ground and atmosphere. Noise models use hard site (reflective surfaces) and soft site (absorptive surfaces) to help calculate predicted noise levels. Hard site conditions assume no excessive ground absorption between the noise source and the receiver. Soft site conditions such as grass, soft dirt or landscaping attenuate noise at an additional rate of 1.5 dB per doubling of distance. When added to the geometric spreading, the excess ground attenuation results in an overall noise attenuation of 3 dB per doubling of distance for a line source and 6.0 dB per doubling of distance for a point source.

Figure 1
Typical Sound Levels from Indoor and Outdoor Noise Sources[2]



[2] Source: AASHSTO. 1993. Guide on Evaluation and Abatement of Traffic Noise

2.8 Vibration Descriptors

Ground-borne vibrations consist of rapidly fluctuating motions within the ground that have an average motion of zero. The effects of ground-borne vibrations typically only cause a nuisance to people, but at extreme vibration levels, damage to buildings may occur. Although ground-borne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable. Ground-borne noise is an effect of ground-borne vibration and only exists indoors since it is produced from noise radiated from the motion of the walls and floors of a room and may also consist of the rattling of windows or dishes on shelves.

Several different methods are used to quantify vibration amplitude.

PPV

Known as the peak particle velocity (PPV) which is the maximum instantaneous peak in vibration velocity, typically given in inches per second.

RMS

Known as the root mean squared (RMS) can be used to denote vibration amplitude.

VdB

A commonly used abbreviation to describe the vibration level (VdB) for a vibration source.

2.9 Vibration Perception

Typically, developed areas are continuously affected by vibration velocities of 50 VdB or lower. These continuous vibrations are not noticeable to humans whose threshold of perception is around 65 VdB. Outdoor sources that may produce perceptible vibrations are usually caused by construction equipment, steel-wheeled trains, and traffic on rough roads, while smooth roads rarely produce perceptible ground-borne noise or vibration. To counter the effects of ground-borne vibration, the Federal Transit Administration (FTA) has published guidance relative to vibration impacts. According to the FTA, fragile buildings can be exposed to ground-borne vibration levels of 0.3 inches per second without experiencing structural damage.

2.10 Vibration Propagation

There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wavefront, similar to ripples produced by throwing a rock into a pool of water. P-waves, or compression waves, are body waves that carry their energy along an expanding spherical wavefront. The particle motion in these waves is longitudinal (i.e., in a "push-pull" fashion). P-waves are analogous to airborne sound waves. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wavefront. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the vibration energy decreases in a logarithmic nature and the vibration levels typically decrease by 6 VdB per doubling of the distance from the vibration source. As stated above, this drop-off rate can vary greatly depending on the soil but has been shown to be effective enough for screening purposes, in order to identify potential vibration impacts that may need to be studied through actual field tests.

2.11 Construction Related Vibration Level Prediction

Operational activities are separated into two different categories. The vibration can be transient or continuous in nature. Each category can result in varying degrees of ground vibration, depending on the equipment used on the site. Operation of equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Buildings in the vicinity of the project area site respond to these vibrations with varying results ranging from no perceptible effects at the low levels to slight damage at the highest levels. The thresholds from Caltrans Transportation and Construction Induced Vibration Guidance Manual in the table below provide general guidelines as to the maximum vibration limits for when vibration becomes potentially annoying.

Table 3
Vibration Annoyance Potential Criteria

Human Response	PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.90	0.10
Severe	2.00	0.40

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

The Caltrans Transportation and Construction Induced Vibration Guidance Manual provides general thresholds and guidelines as to the vibration damage potential from vibratory impacts. The table below provides general vibration damage potential thresholds:

Table 4
Vibration Damage Potential Threshold Criteria

Structure and Condition	PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings ruin ancient monuments	0.12	0.08
Fragile buildings	0.20	0.10
Historic and some old buildings	0.50	0.25
Older residential structures	0.50	0.30
New residential structures	1.00	0.50
Modern industrial/commercial buildings	2.00	0.50

Soil conditions have an impact on how vibration propagates through the ground. The Caltrans Transportation and Construction Induced Vibration Guidance Manual provides suggested "n" values based on soil class. The table below outlines the manual's suggested values and description.

Table 5
Suggested "n" Values Based on Soil Classes

Soil Class	Description of Soil Material	Suggested Value of "n"
I	Weak or soft soils: loose soils, dry or partially saturated peat and muck, mud, loose beach sand, and dune sand.	1.4
II	Most sands, sandy clays, silty clays, gravel, silts, weathered rock.	1.3
III	Hard soils: densely compacted sand, dry consolidated clay, consolidated glacial till, some exposed rock.	1.1
IV	Hard, component rock: bedrock, freshly exposed hard rock.	1.0

3.0 Regulatory Setting

The proposed project is located in the County of Orange and noise regulations are addressed through the various federal, state, and local government agencies. The agencies responsible for regulating noise are discussed below.

3.1 Federal Regulations

The adverse impact of noise was officially recognized by the federal government in the Noise Control Act of 1972, which serves three (3) purposes:

- Publicize noise emission standards for interstate commerce
- Assist state and local abatement efforts
- Promote noise education and research

The Federal Office of Noise Abatement and Control (ONAC) was originally tasked with implementing the Noise Control Act. However, it was eventually eliminated leaving other federal agencies and committees to develop noise policies and programs. Some examples of these agencies are as follows: The Department of Transportation (DOT) assumed a significant role in noise control through its various agencies. The Federal Aviation Agency (FAA) is responsible to regulate noise from aircraft and airports. The Federal Highway Administration (FHWA) is responsible to regulate noise from the interstate highway system. The Occupational Safety and Health Administration (OSHA) is responsible for the prohibition of excessive noise exposure to workers.

The Federal government and the State advocate that local jurisdiction use their land use regulatory authority to arrange new development in such a way that "noise sensitive" uses are either prohibited from being constructed adjacent to a highway or, or alternatively that the developments are planned and constructed in such a manner that potential noise impacts are minimized.

Since the Federal government and the State have preempted the setting of standards for noise levels that can be emitted by the transportation source, the City is restricted to regulating the noise generated by the transportation system through nuisance abatement ordinances and land use planning.

3.2 State Regulations

Established in 1973, the California Department of Health Services Office of Noise Control (ONC) was instrumental in developing regularity tools to control and abate noise for use by local agencies. One significant model is the "Land Use Compatibility for Community Noise Environments Matrix." The matrix allows the local jurisdiction to clearly delineate compatibility of sensitive uses with various incremental levels of noise.

The State of California has established noise insulation standards as outlined in Title 24 and the Uniform Building Code (UBC) which in some cases requires acoustical analyses to outline exterior noise levels and to ensure interior noise levels do not exceed the interior threshold. The State mandates that the legislative body of each county and city adopt a noise element as part of its comprehensive general plan. The local noise element must recognize the land use compatibility guidelines published by the State Department of Health Services. The guidelines rank noise land use compatibility in terms of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable.

3.3 County of Orange Noise Regulations

The project is required to comply with the noise standards and thresholds established in the County of Orange Municipal Code.

The County of Orange follows the State of California (CA) Office of Planning and Research (OPR) Noise and Land Use Compatibility Guidelines (Guidelines) for recommended interior and exterior noise level standards. The Guidelines help identify and prevent the creation of incompatible land uses due to noise. The noise standards from the General Plan and Municipal code are provided in Appendix A.

3.3.1 County of Orange Municipal Code Noise Standards

The County of Orange Municipal Code Noise Ordinance, requires that a project shall not create loud, unnecessary, or unusual noise that disturbs the peace or quiet of any neighborhood, or that causes discomfort or annoyance to any person of normal sensitiveness. Noise standards are defined in Division 6 Noise Control of the Municipal Code and are applicable to the project site and surrounding noise sensitive uses.

Table 6 shows the exterior noise standards from the County of Orange Municipal Code Division 6 Noise Control Section 4-6-5 Exterior Noise Standards for the project site and surrounding residential land uses.

Table 6
County of Orange Municipal Code Exterior Noise Standards

Exterior Residential Noise Standard	Time Period
55 dB (A)	7:00 AM – 10:00 PM
50 dB (A)	10:00 PM – 7:00 AM

It shall be unlawful for any person at any location to create any noise, or to allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, when the foregoing causes the noise level:

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

3.3.2 Construction Noise Regulation

Section 4-6-7 of the County's municipal code states that the following activities shall be exempted from the provisions of the noise code;

- Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities do not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a Federal holiday.

4.0 Study Method and Procedures

The following section describes the measurement procedures, measurement locations, and noise modeling procedures and assumptions used in the noise analysis.

4.1 Measurement Procedures and Criteria

Noise measurements are taken to determine the existing noise levels. A noise receiver or receptor is any location in the noise analysis in which noise might produce an impact. The following criteria are used to select measurement locations and receptors:

- Locations expected to receive the highest noise impacts, such as the first row of houses
- Locations that are acoustically representative and equivalent of the area of concern
- Human land usage
- Sites clear of major obstruction and contamination

RK conducted the sound level measurements in accordance with Caltrans technical noise specifications. All measurement equipment meets American National Standards Institute (ANSI) specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA).

A Piccolo-II Type 2 integrating-averaging level meter was used to conduct both short-term (10-minute) noise measurements and long-term (24-hour) noise measurements at the project site and property boundaries.

The Leq, Lmin, Lmax, L2, L8, L25, and L50 statistical data were recorded over the measurement time period intervals and the information was utilized to define the noise characteristics for the project. The following gives a brief description of the Caltrans Technical Noise Supplement procedures for sound level measurements:

- Microphones for sound level meters were placed five (5) feet above the ground for all short-term noise measurements and five (5) feet above ground for long-term noise measurements
- Sound level meters were calibrated before and after each measurement
- Following the calibration of equipment, a windscreen was placed over the microphone
- Frequency weighting was set on "A" and slow response

- Results of the short-term noise measurements were recorded on field data sheets
- During any short-term noise measurements, any noise contaminations such as barking dogs, local traffic, lawn mowers, or aircraft fly-overs were noted
- Temperature and sky conditions were observed and documented

Appendix B includes photos, field sheets, and measured noise data.

4.2 Stationary Noise Modeling

On-site stationary noise sources were analyzed using SoundPLAN™ noise modeling software. SoundPLAN™ is a standards-based program that incorporates more than twenty national and international noise modeling guidelines. This project consists of parking lot noise and stationary noise sources which are classified under industrial sources.

Projected noise levels from SoundPLAN™ are based on the following key parameters:

- Developing three-dimensional noise models of the project,
- Predicting the project noise levels at the selected community locations and
- Comparing the predicted noise with the existing community ambient noise levels at the receptor locations.

The sides of the buildings, walls, etc. were modeled as reflective surfaces and also as diffractive bodies. The noise sources are shown as red spheres (point sources) and red surfaces (area sources). A light blue line outlines the perimeter of each operation. The surrounding roads are displayed as grey surfaces.

Most of the ground within the project site and adjacent areas are covered with paved surfaces and field grass and will be run as a hard site to be conservative (Ground Factor=0). The Effective Flow Resistivity for field grass is SoundPLAN default. The elevation profile for the project site is derived from Google Earth and all the receptors are placed at 5 foot above the ground level.

Sound Power and Sound Pressure Level

Sound power level is the acoustic energy emitted by a source which produces a sound pressure level at some distance. While the sound power level of a source is fixed, the sound pressure level depends upon the distance from the source and the acoustic characteristics of the area in which it is located.

SoundPLAN requires that the source noise level be input using sound power level and which must be back calculated based on a measured sound pressure level. The sound power level is calculated using SoundPLAN software by calibrating the source noise level to equal the sound pressure level at an equal distance from the source in which the referenced measurement was taken.

4.2.1 Parking Lot Noise

Parking lot noise would occur from vehicles and trucks entering and exiting the site, idling, exhaust, loading and delivery activities, doors slamming, tires screeching, people talking, and the occasional horn honking. Parking lot noise would occur throughout the site and is assessed by using referenced noise levels in the SoundPLAN model. Parking lot noise is based on the type of vehicle and number of movements per hour. Referenced noise levels for parking lot activities are based on the SoundPLAN™ standard *Parkplatzlärmstudie 2007*. Key inputs for parking lot noise include size of area source, number of movements per hour, type of vehicles, and number of parking spaces within each lot.

4.2.2 HVAC, Pool Equipment and Exhaust Fan Equipment Noise

To estimate noise level impacts from on-site HVAC and Exhaust Fan noise sources, reference noise levels are utilized. Referenced noise levels represent similar noise sources operating under similar conditions as would be found on the project site. Table 7 indicates the referenced noise levels for on-site stationary noise sources. The noise measurement data indicates the distance the microphone was placed from the noise source and the statistical data.

Table 7
HVAC Referenced Noise Levels[1]

Source[1]	Distance from Source (feet)	Noise Levels (dBA) L_{eq}
HVAC Equipment	5.0	77.4
Pool/Spa Equipment	3.0	68.0
Exhaust Fan	3.0	63.9

[1] Referenced noise levels measured by RK over a 10-minute period.

To estimate the future noise levels during typical operational conditions, referenced noise levels are input into SoundPLAN and projected to the nearest sensitive receptor locations.

Adjusted noise levels are based on the distance of the receptor location relative to the noise source, local topography and physical barriers including buildings and sound walls.

The noise levels assume that the stationary sources are operating continuously during both daytime and nighttime hours, when in reality will likely operate only intermittently throughout daily operations.

4.3 Traffic Noise Modeling

Traffic noise from vehicular traffic was projected using a version of the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108). The FHWA model arrives at the predicted noise level through a series of adjustments to the key input parameters. The following outlines the key adjustments made to the computer model for the roadway inputs:

- Roadway classification – (e.g. freeway, major arterial, arterial, secondary, collector, etc),
- Roadway Active Width – (distance between the center of the outer most travel lanes on each side of the roadway)
- Average Daily Traffic (ADT) Volumes, Travel Speeds, Percentages of automobiles, medium trucks, and heavy trucks
- Roadway grade and angle of view
- Site Conditions (e.g. soft vs. hard)
- Percentage of total ADT which flows each hour throughout a 24-hour period

The following outlines key adjustments to the computer model for the project site parameter inputs:

- Vertical and horizontal distances (Sensitive receptor distance from noise source)
- Noise barrier vertical and horizontal distances (Noise barrier distance from sound source and receptor).
- Traffic noise source spectra
- Topography

Table 8 indicates the roadway parameters utilized for this study.

Table 8
Roadway Parameters

Roadway	Segment	Class.	Lanes	Speed Limit	Existing ADT[1]	Existing Plus Project	Site
Avenida La Caza	Via Pajaro to Via Pajaro	Local	2	25	600	1,000	Soft

[1] ADT = Average Daily Traffic. ADT volumes are referenced from the Legacy Club Traffic Impact Analysis.

Table 9 indicates the vehicle distribution and truck mix utilized for all roadways in this study area.

Table 9
Vehicle Distribution (Truck Mix)[1]

Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	77.5	12.9	9.6	97.42
Medium Trucks	84.8	4.9	10.3	1.84
Heavy Trucks	86.5	2.7	10.8	0.74

[1] Vehicle percentages consistent with typical Orange County Traffic Data.

RK projected traffic noise levels to 50 feet from the centerline of Avenida La Caza Roadway.

4.4 Construction Noise Modeling

The construction noise analysis utilizes the Federal Highway Administration (FHWA) Roadway Construction Noise Model, together with several key construction parameters. Key inputs include distance to the sensitive receiver, equipment usage, and baseline parameters for the project site. This study evaluates the potential exterior noise impacts during each phase of construction. Noise levels were projected at an average distance of 50 feet for equipment operating over an 8-hour period from to the nearest sensitive receptor property line. While some construction noise activity may occur closer than 50 feet from the property line, noise levels are averaged over an 8-hour period for purposes of assessing impacts.

- Construction phasing and equipment usage assumptions are referenced from the California Grand Village Senior Living AQ Analysis, Orange County, 2020.

4.5 Construction Vibration Modeling

The construction vibration assessment is based on the methodology set-forth within the Caltrans Transportation and Construction Induced Vibration Guidance Manual. The vibration impacts from vibratory rollers and compactors, heavy truck loading and bulldozer activity is analyzed. All vibratory activity is analyzed as a continuous and/or frequent event and is required to comply with the applicable guidance thresholds criteria. It is expected that vibration levels will be highest during paving phase. No impact pile driving is expected as part of this project.

Vibratory impacts were calculated from the site area property line to the closest sensitive receptors and structures using the reference vibration levels, soil conditions and the reference equation *PPV= PPV ref (25/D)^n (in/sec)* (from Caltrans Manual) where:

PPV = reference measurement at 25 feet from vibration source
D = distance from equipment to property line
n= vibration attenuation rate through ground (n=1.0 was utilized for this study)

Table 10 shows the Caltrans Vibration Damage Potential Threshold Criteria.

Table 10
Guideline Vibration Damage Potential Threshold Criteria

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins ancient monuments	0.12	0.08
Fragile buildings	0.20	0.10
Historic and some old buildings	0.50	0.25
Older residential structures	0.50	0.30
New residential structures	1.00	0.50
Modern industrial/commercial buildings	2.00	0.50

Table 11 shows the Caltrans Vibration Annoyance Potential Threshold Criteria.

Table 11
Guideline Vibration Annoyance Potential Criteria

Human Response	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.90	0.10
Severe	2.00	0.40

5.0 Existing Noise Environment

The existing noise environment for the project site and surrounding areas has been established based on noise measurement data collected by RK. Noise measurement data indicates that the ambient noise consist of just environmental noise includes noise from leaves rustling and chirping birds, very minimal traffic noise propagating from the adjacent roadways, as well as activities from the surrounding properties are the main sources of ambient noise at the project site and surrounding area.

5.1 Short-Term (10-Minute) Noise Measurement Results

Using a Piccolo-II Type 2 integrating-averaging sound level meter, four (4) 10-minute noise measurements were recorded at the surrounding property lines. Short term noise measurements are conducted during normal daytime hours and considered samples of typical ambient conditions. The Leq, Lmin, Lmax, L2, L8, L25, and L50, statistical data were reported over the 10-minute period. The information was utilized to define the noise characteristics for the project.

The following details and observations are provided for the short-term noise measurements. The results of the short-term (ST) measurements are presented in Table 12.

Table 12
Short-Term Noise Measurement Results[1]

Site No.	Time Started	Leq	Lmin	Lmax	L_2	L_8	L_{25}	L_{50}
ST-1	10:39 AM	45.6	40.3	63.9	50.3	47.2	45.4	43.9
ST-2	10:55 AM	45.2	39.1	64.9	51.5	47.5	45.1	43.5
ST-3	11:20 AM	43.6	37.5	66.3	48.7	44.5	42.4	41.2
ST-4	11:39 AM	46.1	37.7	73.1	49.8	42.3	40.3	39.0

[1] Noise measurements conducted for 10-minute intervals during normal daytime conditions.

ST-1 Measurement taken at the eastern property line at approximately 5 feet from the property line. Ambient Noise includes traffic noise from Ave La Caza, noise from tennis court and birds chirping.

ST-2 Measurement taken at eastern tennis court at approximately 5 feet from the fence at approximately 90 feet from the eastern property line. Ambient Noise includes traffic noise from Ave La Caza, noise from tennis court and birds chirping.

ST-3 Measurement taken at the tennis court at approximately 60 feet from the eastern property line and at approximately 90 feet from the northern property line. Ambient Noise includes noise from tennis court and landscape maintenance.

ST-4 Measurement taken at the western tennis court at approximately 5 feet from the fence at approximately 130 feet from the northern property line. Ambient Noise includes traffic noise from Via Alondra and parking noise.

Exhibit C shows the noise measurement locations. Appendix B includes photos, field sheets, and measured noise data.

5.2 Long-Term (24-Hour) Noise Measurement Results

To determine the existing noise level environment, RK conducted two (2) 24-hour noise measurements at the project study area.

Noise levels were measured on January 8, 2020 using a Piccolo-II Type 2 integrating-averaging sound level meter. The information was utilized to establish the noise characteristics of the existing ambient environment.

The noise monitoring locations were selected based on the proximity and location to adjacent sensitive receptors. Exhibit C graphically illustrates the location of the long-term measurements.

- Long-term noise monitoring location one (LT-1) was taken along the tennis court at approximately 60 feet from the western property line and at approximately 90 feet from the northern property line.

- Long-term noise monitoring location two (LT-2) was taken along the southern tennis court at approximately 100 feet from the Avenida La Caza road.

Long term noise monitoring locations represent the existing noise levels near the adjacent noise sensitive land uses. Long-term noise measurement results are summarized in Tables 13 and 14. Appendix B includes photographs, field sheets and measured noise data.

Table 13
24 Noise Measurement Results LT-1[1]

Time	Leq (dBA)	Time	Leq (dBA)
12:00 AM	41.7	12:00 PM	43.0
1:00 AM	38.8	1:00 PM	42.3
2:00 AM	39.8	2:00 PM	42.8
3:00 AM	38.9	3:00 PM	48.0
4:00 AM	38.7	4:00 PM	52.1
5:00 AM	40.6	5:00 PM	43.5
6:00 AM	43.5	6:00 PM	42.6
7:00 AM	45.8	7:00 PM	40.7
8:00 AM	45.8	8:00 PM	39.7
9:00 AM	50.1	9:00 PM	40.4
10:00 AM	44.3	10:00 PM	39.4
11:00 AM	43.1	11:00 PM	40.4
24-Hour CNEL			**48.4**

[1] LT-1 was taken along the tennis court at approximately 60 feet from the western property line and at approximately 90 feet from the northern property line. LT-1 was recorded on 01/08/2020.

Table 14
24 Noise Measurement Results, LT-2[1]

Time	Leq (dBA)	Time	Leq (dBA)
12:00 AM	39.2	12:00 PM	44.5
1:00 AM	38.8	1:00 PM	43.8
2:00 AM	40.0	2:00 PM	43.8
3:00 AM	39.1	3:00 PM	46.7
4:00 AM	38.6	4:00 PM	44.8
5:00 AM	40.5	5:00 PM	43.3
6:00 AM	44.0	6:00 PM	42.2
7:00 AM	44.8	7:00 PM	40.8
8:00 AM	48.4	8:00 PM	39.8
9:00 AM	59.3	9:00 PM	39.9
10:00 AM	50.7	10:00 PM	39.3
11:00 AM	44.9	11:00 PM	40.5
24-Hour CNEL			**49.9**

[1] LT-2 was taken along the southern tennis court at approximately 100 feet from the Avenida La Caza road. LT-2 was recorded on 01/08/2020.

5.3 Existing Traffic Noise Levels

Table 15 shows the modeled existing traffic related CNEL noise levels calculated at 50 feet from the centerline of roadway segments adjacent to the site. The distances to the 55, 60, 65, and 70 dBA CNEL noise contours are also shown. The noise levels were calculated using traffic volumes presented from the *Legacy Club Traffic Impact Analysis*.

The traffic noise levels do not take into account the effect of any noise barriers or topography that may reduce traffic noise levels. The existing roadway noise levels provide a baseline of the existing traffic noise environment.

Table 15
Existing Traffic Noise Level Result

Roadway[1]	Segment	CNEL at 50ft. (dBA)	Distance to Contour (Ft)[2]			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Avenida La Caza	Via Pajaro to Via Pajaro	48.4	2	4	9	18

[1] Noise levels calculated from centerline of subject roadway.
[2] Refer to Appendix E for projected noise level calculations.

6.0 Operational Noise Impacts

This assessment analyzes the anticipated noise levels generated by the project and impacts caused by changes to the ambient environment. The main sources of noise generated by the project would include on-site operational activities from vehicular traffic noise circulating within the parking lot, HVAC equipment, pool equipment and exhaust vent noise. Noise level impacts are compared to the County of Orange noise standards.

The project must demonstrate that noise levels generated by the project site would not be in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

6.1 Stationary Source Noise Impacts

On-site stationary noise impacts are assessed at all adjacent property lines surrounding the project site. Project operational activities are analyzed for long-term noise impacts associated with the day to day operation of the project; including parking lot noise, HVAC equipment, pool equipment noise and exhaust vent noise.

Parking lot noise would occur from vehicle engine idling and exhaust, doors slamming, tires screeching, people talking, and the occasional horn honking. The project is strictly expected to take access only from Avenida La Caza and the parking lot noise would occur on the southern and eastern side of the project site and is conservatively assessed from the first parking space to southern residential properties; approximately 100 feet away.

HVAC equipment will be located on the roof of each building. The closest rooftop HVAC units should be located at least 160 feet away from the nearest property line to the west. All rooftop HVAC equipment are fully shielded or enclosed from the line of sight of the adjacent uses. Shielding/parapet wall is expected to be as high as six (6) foot height.

Pool equipment is expected to be located at the north of the site near the pool area. Noise from pool equipment includes operational noise from pool/spa pump, filter and heater equipment (mechanical equipment) on the site.

Exhaust vent for the kitchen is expected to be located on the southeastern side of the building. The kitchen vent should be located at approximately at least 300 away feet from the southern residential property and 90 feet away from eastern property line.

Daytime Stationary Source Noise Impacts

The results of the daytime noise impact analysis are shown in the Tables 16 and are graphically illustrated on Exhibit E.

The noise analysis considers all project noise sources operating simultaneously during daytime (7 a.m. to 10 p.m.) hours at the nearest adjacent property lines.

The noise standard for all surrounding land uses is established to be 55 dBA from 7:00 a.m. to 10:00 p.m. Noise levels generated by the project are not expected to exceed the County's daytime noise standards at the adjacent property lines.

The change in existing ambient daytime noise levels as a result of the project would be range from approximately 4.4 dBA to 9.5 dBA during daytime hours.

Nighttime Stationary Source Noise Impacts

The results of the nighttime noise impact analysis are shown in the Tables 17 and are graphically illustrated on Exhibit F.

The noise analysis considers all project noise sources operating simultaneously with the exception of exhaust vent and pool equipment noise during nighttime (10 p.m. to 7:00 a.m.) hours at the nearest adjacent property lines.

The noise standard for all surrounding land uses is established to be 50 dBA from 10:00 p.m. to 7:00 a.m. Noise levels generated by the project are not expected to exceed the County's nighttime noise standards at the adjacent property lines.

The change in existing ambient nighttime noise levels as a result of the project would be range from approximately 4.2 dBA to 9.0 dBA during daytime hours.

TABLE 16

Coto de Caza California Grand Village
Daytime Noise Impact Analysis (dBA)

Receptor	Location	Daytime Exterior Noise Level dBA[1]					
		Existing Hourly Ambient Measurement (Leq)[1]	Project Noise Contribution (Leq)	Combined Noise Level Existing Plus Project (Leq)	Change in Noise Level as a Result of Project (dBA)	County of Orange Noise Level Criteria (Leq)	Noise Level Exceeds Standard (?)
Receiver at PL-1	East	39.3	48.3	48.8	9.5	55.0	No
Receiver at PL-2	Northwest	39.4	45.0	46.1	6.7		No
Receiver at PL-3	South	39.3	41.7	43.7	4.4		No
Receiver at PL-4	West	39.4	44.9	46.0	6.6		No

[1] The lowest measured average Leq is been used as a conservative calculation.

TABLE 17

Coto de Caza California Grand Village
Nighttime Noise Impact Analysis (dBA)

Receptor	Location	Daytime Exterior Noise Level dBA[1]					
		Existing Hourly Ambient Measurement (Leq)[1]	Project Noise Contribution (Leq)	Combined Noise Level Existing Plus Project (Leq)	Change in Noise Level as a Result of Project (dBA)	County of Orange Noise Level Criteria (Leq)	Noise Level Exceeds Standard (?)
Receiver at PL-1	East	38.6	47.0	47.6	9.0	50.0	No
Receiver at PL-2	Northwest	38.7	45.0	45.9	7.2		No
Receiver at PL-3	South	38.6	40.8	42.8	4.2		No
Receiver at PL-4	West	38.7	44.9	46.8	7.1		No

[1] The lowest measured average Leq is been used as a conservative calculation.

6.2 Future Traffic Source Noise

The potential off-site noise impacts caused by the increase in vehicular traffic from the operation of the proposed project on the nearby roadways were calculated for direct and cumulative project conditions.

Table 18
Future Traffic Noise Level

Roadway	Segment	CNEL at 50 Feet (dBA)			Does Project Generate a Significant Impact?
		Existing	Existing Plus Project	Change in Roadway Noise Level as a Result of Project	
Avenida La Caza	Via Pajaro to Via Pajaro	48.4	50.6	2.2	No

As shown in Table 18, the project site and surrounding residential areas adjacent to roadways currently experience traffic related noise levels within the 60 dBA CNEL limit for residential areas. The project is expected to increase the existing roadway noise level to 50.6 CNEL. The change in the traffic noise level on Avenida La Caza is expected to be less than significant. Therefore, the project will not cause a significant change in the existing traffic noise level at the surrounding residentials homes at 50 feet from the centerline of the roadway.

6.3 Noise/Land Use Compatibility

The project's noise/land use compatibility setting is reviewed to determine future noise levels to habitable exterior and interior areas on the project site. This section of the analysis is intended to satisfy the County of Orange General Plan Noise Element Objectives and Policies which helps ensure resident's quality of life is not affected adversely by high noise levels. The project's noise/land use compatibility is not necessarily applicable to CEQA, as recent court rulings have indicated that CEQA is primarily concerned with the project's impact of the environment, not the environment's impact on a project.

Based on the existing measured 24-hour CNEL noise levels, the project site is currently experiencing noise levels ranging from 48.4 to 49.9 dBA. The project site would experience noise levels well below the recommended 65 dBA compatibility limit for residential uses. Therefore, the project is considered compatible with the existing site and surrounding uses and no additional analysis would be required to demonstrate compliance with the interior noise standards.

6.4 Recommended Mitigation Measures

The following recommended mitigation measures are provided to help ensure the project's construction and operational noise levels do not adversely impact the adjacent noise sensitive land uses:

Operational Mitigation Measures

MM-1 All rooftop mounted HVAC equipment shall be fully shielded or enclosed from the line of sight of adjacent residential uses. Shielding/parapet wall should be at least as high as the equipment and not less than 6 feet tall.

MM-2 All pool/spa equipment and mechanical pumps shall be fully shielded from line of sight of any adjacent residential property or on-site residential unit or enclosed within an equipment room.

MM-3 The project access on Via Alondra shall be restricted to emergency access only. All vehicles accessing the site, including trucks associated with deliveries and trash pick-up shall access the project site via Avenida La Caza.

MM-4 No truck loading/unloading activities or idling shall be allowed on the Via Alondra emergency access drive aisle near the northwest corner of the site.

MM-5 Delivery, loading/unloading activity, and trash pick-up hours shall be limited to daytime (7 a.m. – 10 p.m.) hours only. Signage should be posted in the designated loading areas to enforce the hour restrictions.

MM-6 Limit engine idling time for all delivery vehicles and moving trucks to 5 minutes or less. Signage should be posted in the designated loading areas to enforce the idling restrictions.

7.0 Construction Noise and Vibration Impacts

Temporary construction noise and vibration impacts have been assessed from the project site to the surrounding adjacent land uses. The degree of construction noise will vary depending on the type of construction activity taking place and the location of the activity relative to the surrounding properties.

Section 4-6-7 of the County's municipal code states that the following activities shall be exempted from the provisions of the noise code;

- Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities do not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a Federal holiday.

Although construction activity is exempt from the noise standards in the County's Municipal Code, CEQA requires that potential noise impacts still be evaluated for significance. For purposes of this analysis, the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment (2006) criteria will be used. The FTA provides reasonable criteria for assessing construction noise impacts based on the potential for adverse community reaction. For residential uses, the daytime noise threshold is 80 dBA Leq for an 8-hour period. In compliance with the County's Municipal Code, it is assumed construction would not occur during the noise-sensitive nighttime hours.

Construction phasing and equipment usage assumptions are referenced from:

- *California Grand Village Senior Living Air Quality Analysis, County of Orange, 2020.*

7.1 Typical Construction Noise Levels

Table 19 shows typical construction noise levels compiled by the Environmental Protection Agency (EPA) for common type construction equipment. Typical construction noise levels are used to estimate potential project construction noise levels at the adjacent sensitive receptors.

Table 19
Typical Construction Noise Levels[1]

Type	Noise Levels (dBA) at 50 Feet
Earth Moving	
Compactors (Rollers)	73 - 76
Front Loaders	73 - 84
Backhoes	73 - 92
Tractors	75 - 95
Scrapers, Graders	78 - 92
Pavers	85 - 87
Trucks	81 - 94
Materials Handling	
Concrete Mixers	72 - 87
Concrete Pumps	81 - 83
Cranes (Movable)	72 - 86
Cranes (Derrick)	85 - 87
Stationary	
Pumps	68 - 71
Generators	71 - 83
Compressors	75 - 86
Impact Equipment	
Pneumatic Wrenches	82 - 87
Jack Hammers, Rock Drills	80 - 99
Pile Drivers (Peak)	95-105
Other	
Vibrators	68 - 82
Saws	71 - 82

[1] Referenced Noise Levels from the Environmental Protection Agency (EPA)

7.2 Construction Noise Impact Analysis

This assessment analyzes potential noise impacts during all expected phases of construction, including; site preparation, grading, building construction, paving, and architectural coating. Noise levels are calculated based on an average distance of equipment over an 8-hour period to the nearest adjacent property. The project's estimated construction noise levels have been calculated using the Federal Highway Administration Roadway Construction Noise Model Version 1.1. Tables 20 show the noise level impacts to

the eastern (residential) property lines. Construction noise calculation worksheets are provided in Appendix E.

Table 20
Project Construction Noise Levels – Residential Uses to the West

Phase	Equipment	Quantity	Equipment Noise Level at 50ft (dBA Leq)	Combined Noise Level (dBA Leq)
Demolition	Concrete/Industrial Saws	1	74.8	84.6
	Excavators	3	76.7	
	Rubber Tired Dozers	2	77.7	
Grading	Excavators	2	76.7	87.6
	Graders	1	81	
	Rubber Tired Dozers	1	77.7	
	Tractors/Loaders/Backhoes	3	80	
Building Construction	Cranes	1	72.6	86.3
	Forklifts	3	71.0	
	Generator Sets	1	77.6	
	Tractors/Loaders/Backhoes	3	80.0	
	Welders	1	70.0	
Paving	Cement and Mortar Mixers	2	74.8	84.3
	Pavers	1	74.2	
	Paving Equipment	2	73.0	
	Rollers	2	73.0	
	Tractors/Loaders/Backhoes	1	80.0	
Architectural Coating	Air Compressors	1	73.7	73.7
Worst Case Construction Phase Noise Level - Leq (dBA) - **Unmitigated**				87.6
FTA Construction Noise Criteria (Detailed Assessment: 8-Hour Leq)				80
Worst Case Construction Phase Noise Level - Leq (dBA) - **Mitigated**				77.0
Noise level exceeds FTA criteria?				NO

As shown in Table 20, project construction noise levels are expected to be below the recommended 8-hour construction noise threshold provided by the FTA for adverse community reaction at the adjacent residential, taking into account the mitigation

measures mentioned below. However, the project construction would still generate noise levels in exceedance of ambient conditions at the adjacent residential land uses.

As a result, several mitigation measures are recommended to reduce construction noise impacts to the surrounding sensitive land uses:

Construction Mitigation Measures

MM-7 Obtain a construction work permit from the County of Orange prior to starting construction.

MM-8 The project shall notify all residential uses located within 500 feet of the construction site regarding the construction schedule for the proposed project and a sign shall also be posted in a readily visible location at the project site. All notices and signs shall indicate the dates and duration of construction activities, as well as provide a telephone number where residents can enquire about the construction process and register complaints to a designated construction noise disturbance coordinator.

MM-9 The project shall provide temporary noise barrier shielding along all property lines of the project site to shield adjacent sensitive receptors from construction noise.

The temporary barrier should be at least twelve (12) feet high and installed at the first phase of construction and prior to performing any demolition, excavation or grading activities. The temporary noise barrier wall should present a sold face area and include sound absorptive material or blankets which can be installed in multiple layers for improved noise insulation.

MM-10 The project shall ensure all contractors implement construction best management practices to reduce construction noise levels. Best management practices would include the following:

- All construction equipment shall be equipped with muffles and other suitable noise attenuation devices (e.g., engine shields).
- Grading and construction contractors shall use quieter equipment as opposed to noisier equipment (such as rubber-tired equipment rather than track equipment), to the maximum extent feasible.

- If feasible, electric hook-ups shall be provided to avoid the use of generators. If electric service is determined to be infeasible for the site, only whisper-quiet generators shall be used (i.e., inverter generators capable of providing variable load.

- Use electric air compressors and similar power tools rather than diesel equipment, where feasible.

- Locate staging area, generators and stationary construction equipment as far from the adjacent residential homes as feasible.

- Construction-related equipment, including heavy-duty equipment, motor vehicles, and portable equipment, shall be turned off when not in use for more than 5 minutes.

MM-11 The project shall implement a noise monitoring program during construction. The monitoring program shall report the continuous daily construction noise levels along the project's west property line and south of Avenida La Caza near the adjacent residential homes. Noise monitoring should be performed at ground level and behind the noise barrier wall. The monitoring program shall notify construction management personnel when noise levels approach the upper limits of the 8-hour Leq exceedance threshold (80 dBA). Construction activity should cease prior to noise levels exceeding the 8-hour threshold.

MM-12 All construction traffic and personnel shall use Avenida La Caza to access the site. No construction traffic or staging shall be allowed on Via Alondra.

MM-13 No impact pile driving activities shall be permitted on the project site during construction. If impact pile driving is required, a follow-up noise and vibration impact assessment shall be conducted prior to start of any pile driving activity.

7.3 Construction Noise – On-Road Trucks

The project is expected to export a total of 5,043 tons of debris during the demolition and export 800 cubic yards of earthwork material during the grading phases of construction. As a result, roadway noise impacts may occur from heavy truck traffic strictly utilizing Avenida La Caza roadway to haul material to and from the site.

The noise impact from the increased truck traffic on the local circulation system is analyzed and based on the Orange County noise/land use compatibility CNEL noise levels. Table 21 shows the results of the Construction Noise Roadway Impact Analysis.

Table 21
Construction Noise Roadway Impact Analysis

Roadway[2]	Segment	CNEL at 50 Feet (dBA)			Orange County Residential CNEL Noise Limit	Noise Level Exceeds Standard?
		Existing Conditions	Existing plus Project Conditions	Change as a Result of Project		
Avenida La Caza	Via Pajaro to Via Pajaro	48.4	60.5	12.1	65	No

As shown in Table 21, construction truck traffic is expected be to be within noise/land use compatibility limit of 65 dB CNEL for the residential uses along Avenida la Caza roadway.

The change in existing roadway noise levels as a result of the construction traffic would be approximately 12.1 dBA. Noise levels generated by the project construction traffic are not expected to exceed the County's 65 dBA CNEL noise/land use compatibility noise standards at the residential uses along Avenida la Caza.

7.4 Construction Vibration

To determine the vibratory impacts during construction, reference construction equipment vibration levels were utilized and then extrapolated to the façade of the nearest adjacent structures. The nearest sensitive receptors are the residential structures located adjacent to the western property line. All structures surrounding the project site are "new residential structures". No historical or fragile buildings are known to be located within the vicinity of the site.

The construction of the proposed project is not expected to require the use of substantial vibration inducing equipment or activities, such as pile drivers or blasting. The main sources of vibration impacts during construction of the project would be the operation of equipment such as bulldozer activity during demolition, loading trucks during grading and excavation, and vibratory rollers during paving. The construction vibration assessment utilizes the referenced vibration levels and methodology set-forth within the Caltrans Transportation and Construction Induced Vibration Guidance Manual. Table 22 shows the referenced vibration levels.

Table 22
Typical Construction Vibration Levels[1]

Equipment	Peak Particle Velocity (PPV) (inches/second) at 25 feet	Approximate Vibration Level (LV) at 25 feet
Piledriver (impact)	1.518 (upper range)	112
	0.644 (typical)	104
Piledriver (sonic)	0.734 upper range	105
	0.170 typical	93
Clam shovel drop (slurry wall)	0.202	94
Hydromill	0.008 in soil	66
(slurry wall)	0.017 in rock	75
Vibratory Roller	0.210	94
Hoe Ram	0.089	87
Large bulldozer	0.089	87
Caisson drill	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

[1] Transit Noise and Vibration Impact Assessment, Federal Transit Administration, May 2006.

Table 23 shows the project's construction-related vibration analysis at the nearest structures to the project construction area. Construction impacts are assessed from the closest area on the project site to the nearest adjacent structure.

Table 23
Construction Vibration Impact Analysis

Construction Activity	Distance to Nearest Structure (ft)	Duration	Calculated Vibration Level - PPV (in/sec)	Damage Potential Level	Annoyance Criteria Level
Large Bulldozer	25	Continuous/Frequent	0.089	Extremely Fragile Buildings, Ruins Ancient Monuments	Distinctly Perceptible
Vibratory Roller	25	Continuous/Frequent	0.210	Fragile Buildings	Strongly Perceptible
Loaded Trucks	25	Continuous/Frequent	0.076	No Impacts	Distinctly Perceptible
Caisson Drilling	25	Continuous/Frequent	0.089	Extremely Fragile Buildings, Ruins Ancient Monuments	Distinctly Perceptible

As shown in Table 23, project related construction activity is not expected to cause any potential damage to the nearest structures. The annoyance potential of vibration from construction activities would range from "distinctly perceptible" to "strongly perceptible".

MM-14 No impact pile driving activities shall be permitted on the project site during construction. If impact pile driving is required, a follow-up noise and vibration impact assessment shall be conducted and vibration monitoring program should be performed, prior to start of any pile driving activity.

Construction vibration calculation worksheets are shown in Appendix C.

7.4 Construction Project Design Features

The following project design features will be implemented during construction to help ensure compliance with the required noise standards in the County.

DF-7 Construction-related noise activities shall comply with the requirements set forth in the County of Orange Municipal Code Section 4-6-7.

a. Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities do not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a Federal holiday.

8.0 References

The following references were used in the preparing this analysis.

- AASHSTO. 1993. Guide on Evaluation and Abatement of Traffic Noise.
  Website:
  https://www.fhwa.dot.gov/environMent/noise/regulations_and_guidance/analysis_and_abatement_guidance/polguide05.cfm
- Caltrans. 1998. Technical Noise Supplement (TeNS), A Technical Supplement to the Traffic Noise Analysis Protocol.
  Website:https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/f0008617-traffic-noise-protocol-oct1998-a11y.pdf
- Caltrans Transportation and Construction Induced Vibration Guidance Manual
  Website: http://website.dot.ca.gov/env/noise/docs/tcvgm-sep2013.pdf
- County of Orange General Plan 2005- Noise Element.
  Website: https://www.ocgov.com/civicax/filebank/blobdload.aspx?blobid=8616
- County of Orange Municipal Code- Ordinance No. 19-002, adopted March 12, 2019 – Division 6 – Noise Control.
  Website:
  https://library.municode.com/ca/orange_county/codes/code_of_ordinances?nodeId=TIT4HESAANRE_DIV6NOCO_ART1GEPR_S4-6-6INNOST
- Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment (2006).
  Website:
  https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/FTA_Noise_and_Vibration_Manual.pdf
- Federal Highway Administration Roadway Construction Noise.
  Website:
  https://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook00.cfm
- SoundPlan Essential Manual:
  Website:http://en.soundplan.eu/english/soundplan-acoustics/soundplan-essential/soundplan-essential-in-detail/
- U.S. DOT Federal Highway Administration. Dec. 2011. Highway Traffic Noise: Analysis and Abatement Guidance.
  Website:
  https://www.fhwa.dot.gov/environment/noise/regulations_and_guidance/analysis_and_abatement_guidance/revguidance.pdf

Exhibits

JUNE 2020

Exhibit A
Location Map

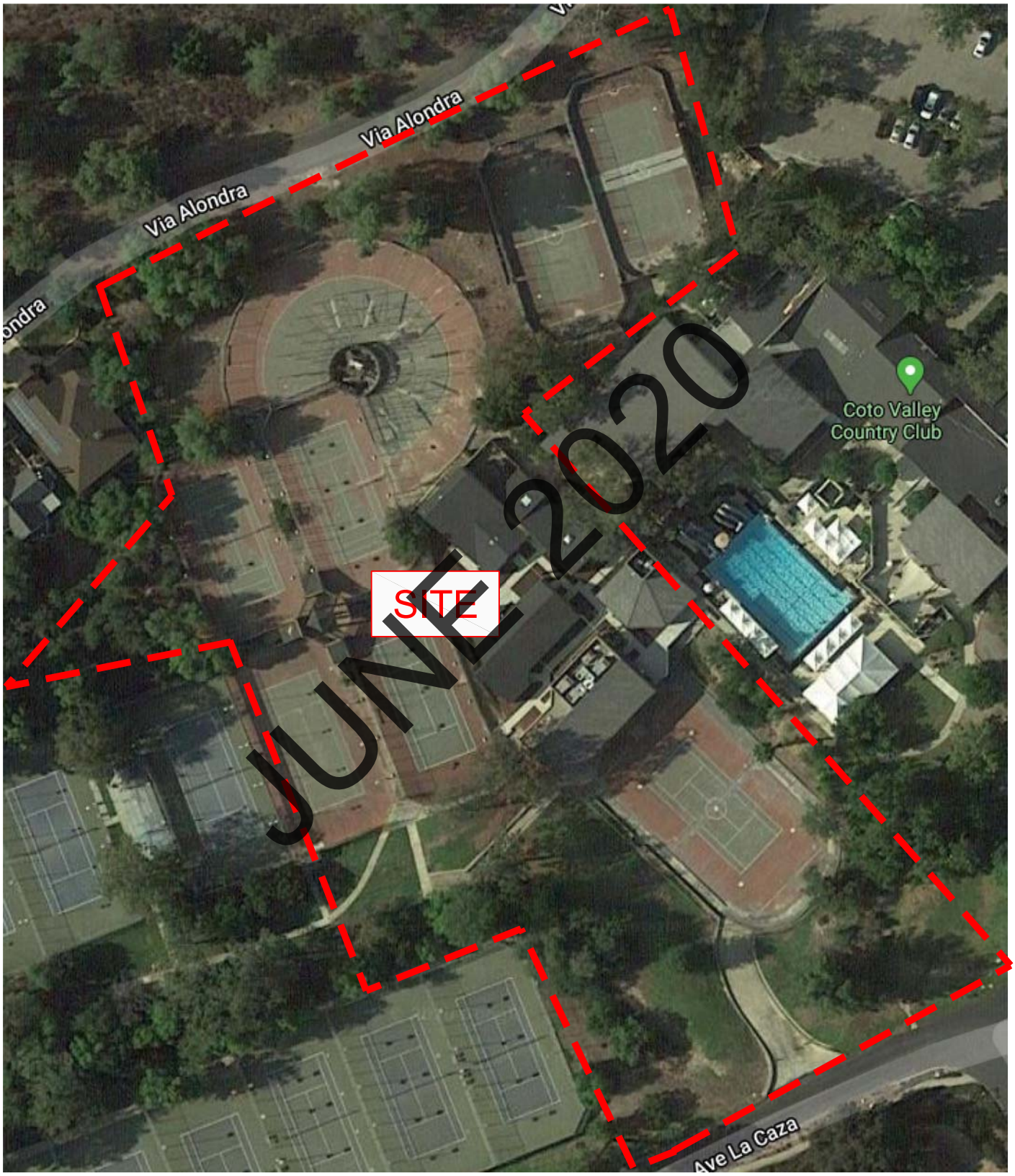
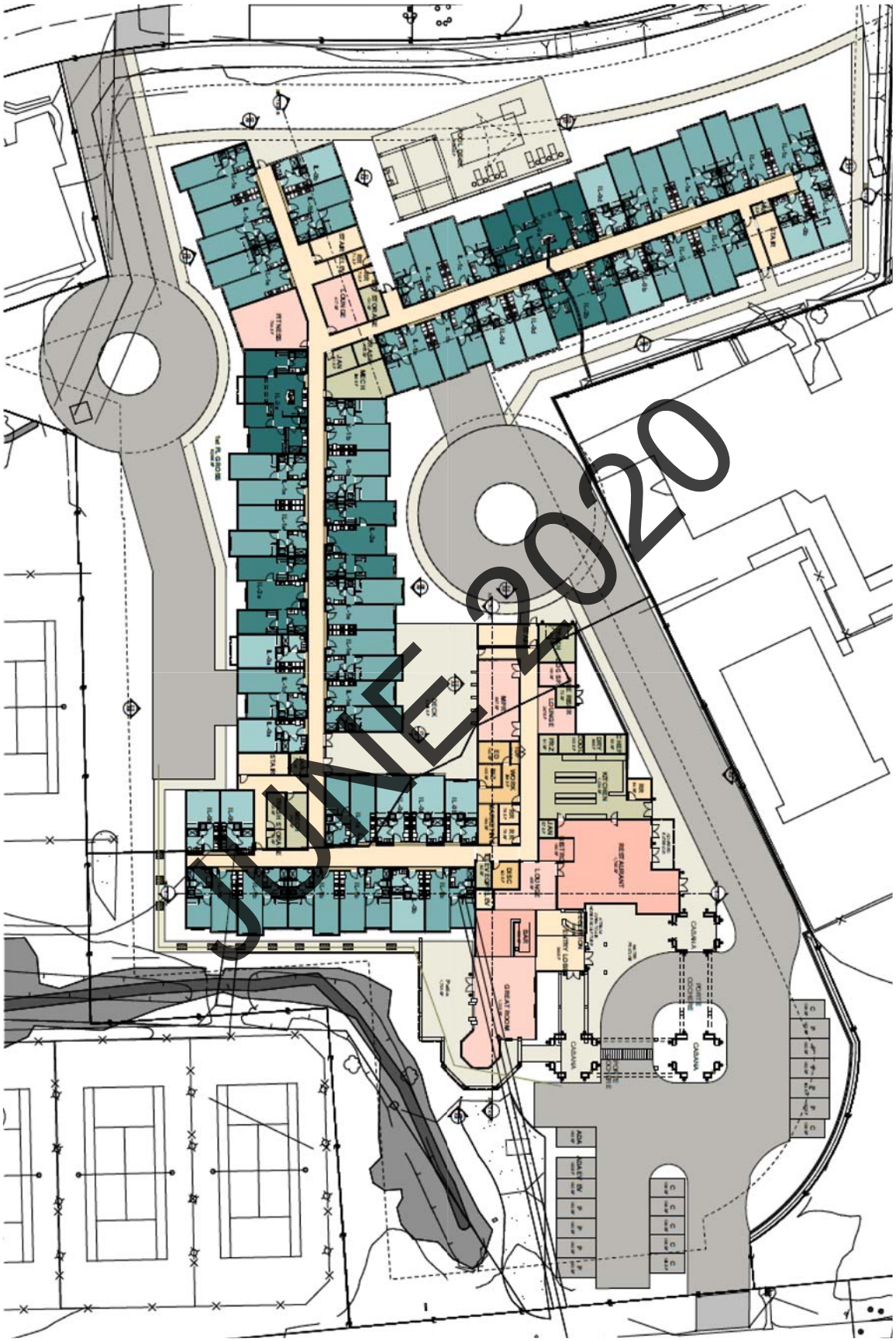


Exhibit B
Site Plan



N

Monitoring Locations

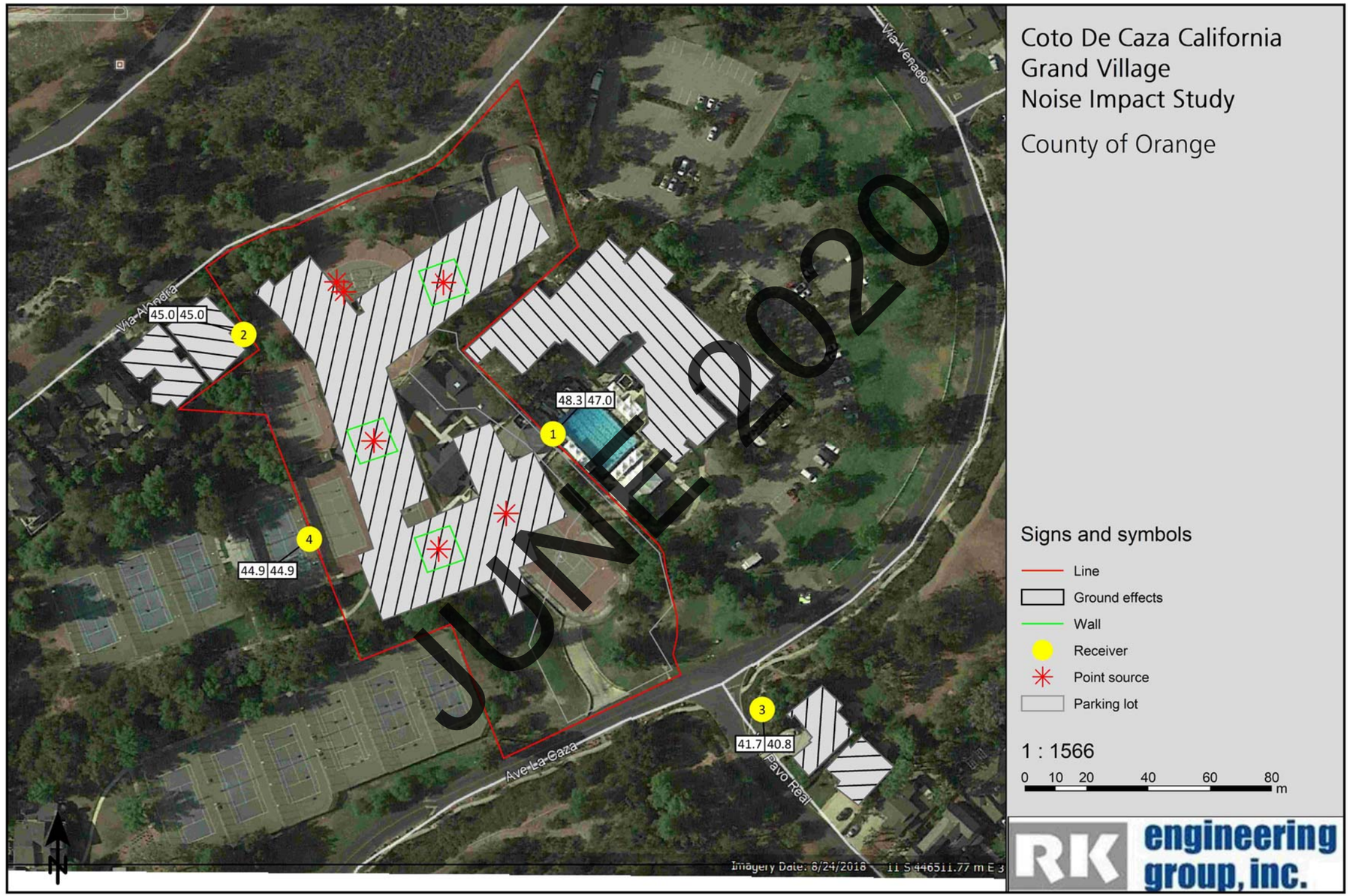
Legend:

1 = Short Term (10-min) Noise Monitoring Location

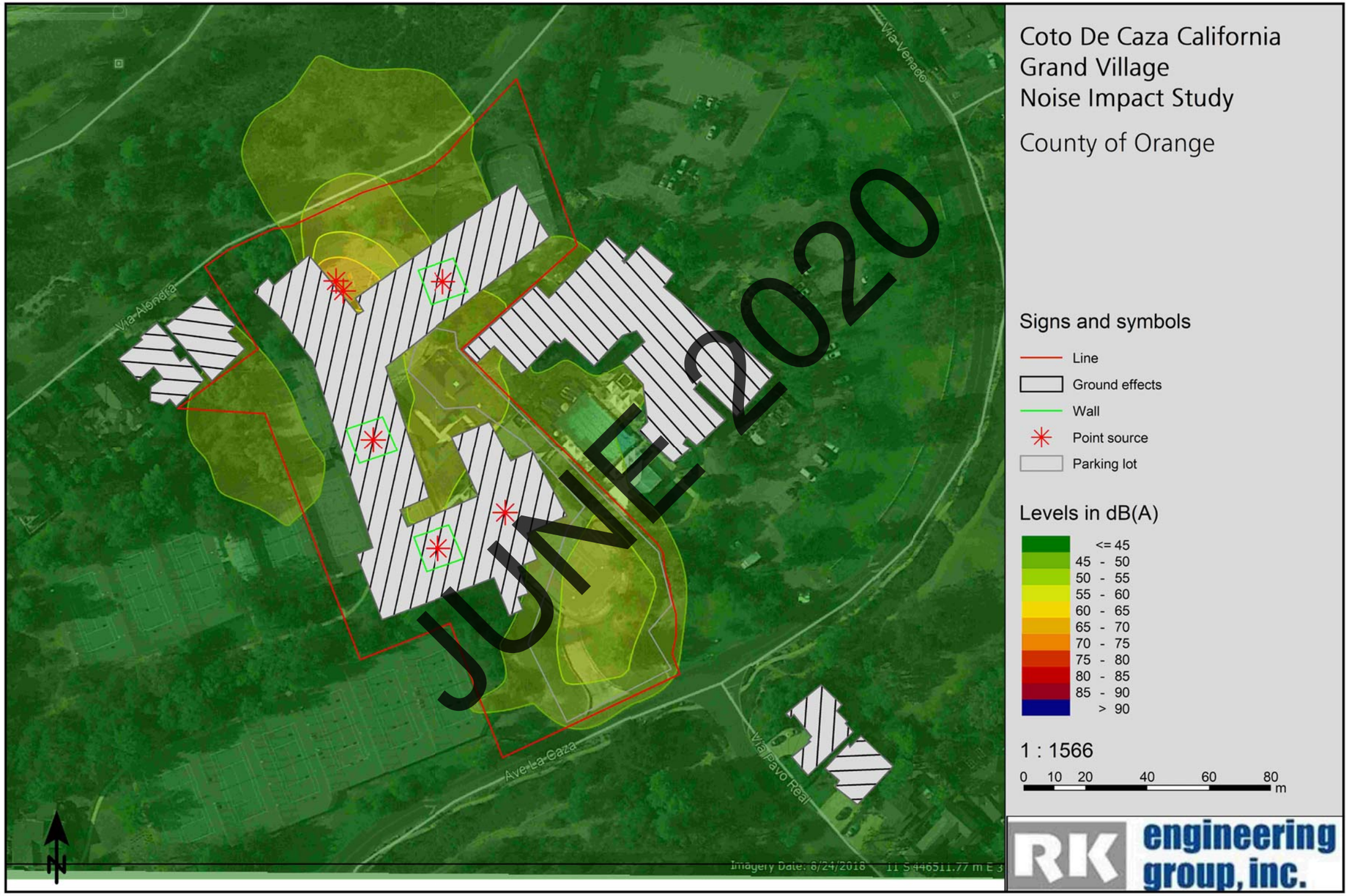
LT-1 = Short Term (10-min) Noise Monitoring Location

N

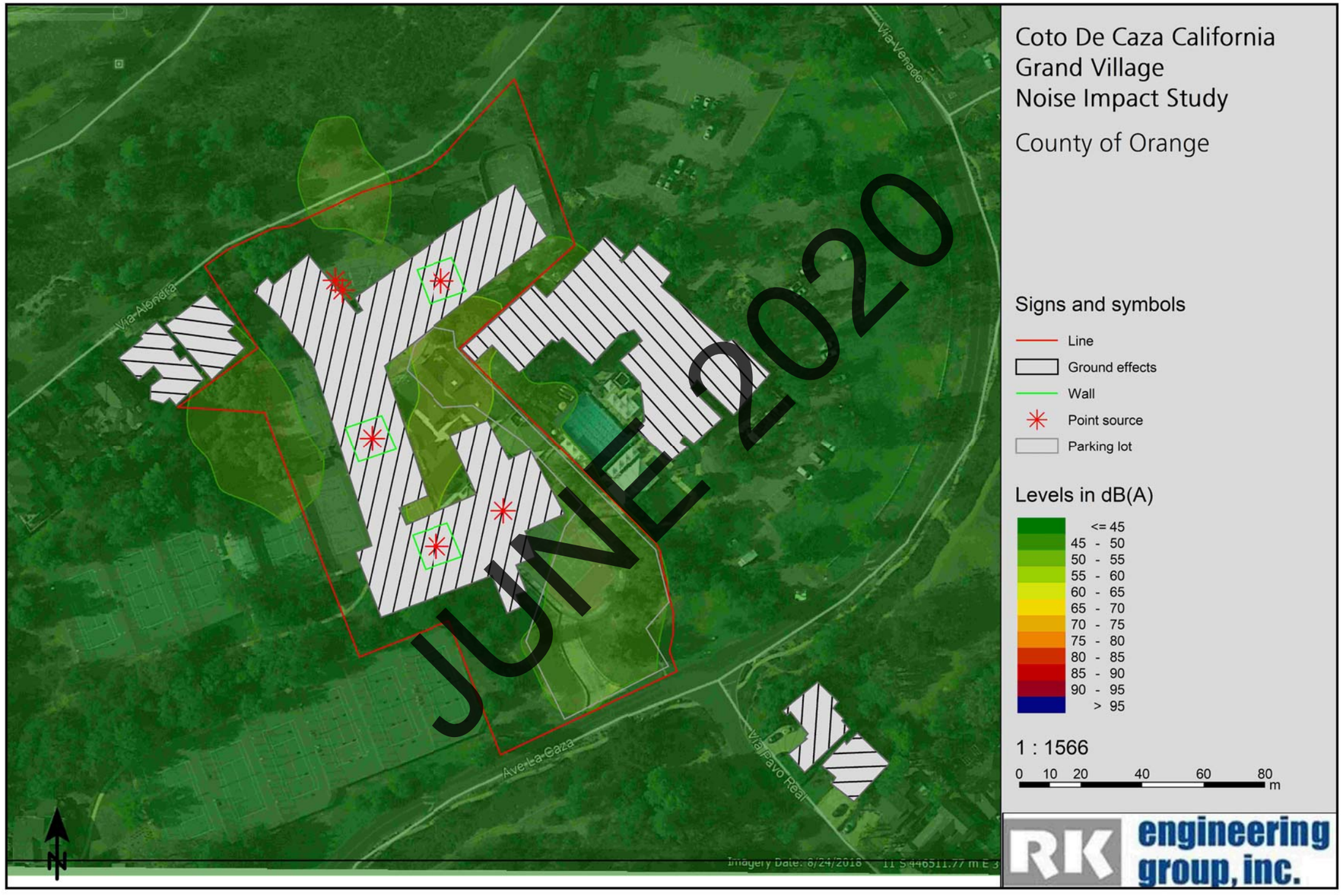
SoundPLAN Project Noise Level Results



Project Noise Level Contours - Daytime



Project Noise Level Contours - Nighttime



Appendices

JUNE 2020

Appendix A

County of Orange
General Plan Noise Element and
Municipal Code Noise Control

VIII. NOISE ELEMENT

OVERVIEW

The Noise Element, which is a mandatory component of the General Plan, contains information that relates to the noise environment in the unincorporated sections of Orange County. The Noise Element text is divided into the following sections:

- Overview
- Relationship to other Elements
- Relation to Federal, State and Local Agency Plans and Programs
- The Nature of Sound
- Existing Noise Environment
- Estimates of Affected Population
- Analysis of Future Conditions
- Objectives and Policies

Specifically, this Noise Elements responds to the requirements of Section 65302 (f) of the California Government Code. In so doing, the guidance provided by the State in "Guidelines for the Preparation and content of Noise Elements of the General Plan" (January 1976) has been adhered to.

The policies which relate to managing the County's noise environment are found in the Objectives and Policies section of this

Element. They reflect a series of decisions by elected officials based in part on studies that incorporate increasingly sophisticated measurements and analyses. In total, they provide a means of relating the broad goals and patterns depicted in the General Plan to the County's project-specific responsibilities.

Definitions for a number of key terms related to the measurement and evaluation of noise are contained in Appendix VIII-1 of the General Plan Appendices. The terms are arranged in alphabetical order in one location to allow for greater clarity and brevity in the Noise Element text itself.

The scope of the Element includes the unincorporated portions of the County of Orange. The purpose of the Noise Element is to provide a statement of public policy and a decision framework for the maintenance of a quiet environment. The Noise Element identifies the sources of noise, analyzes the extent of the noise intrusion, and estimates its potential impact upon the County. This identification process in turn provides the basis for goals, policies, and implementation programs designed to preserve, where possible, a quiet environment in the County of Orange.

The objectives achieved by the development of the Noise Element are:

- Identification in quantitative, numerical terms, of existing and projected noise levels, noise sources, and noise-sensitive land uses in the County.
- Direction for implementation programs which may be used to achieve and maintain a desirable noise environment.

RELATIONSHIP TO OTHER ELEMENTS

The broad, noise-related goal of the County of Orange is to:

Protect the health, safety, and general welfare of County residents by reducing noise levels and establishing compatible land uses in noise-impacted areas.

This goal promotes the amelioration of noise impacts by both reducing the noise produced by various sources and by guiding land uses so they are compatible with existing (or projected) long-term average noise levels.

While this goal has a high priority, it must be achieved while maintaining internal consistency among the other elements of the General Plan as required by state law. Therefore, the Noise Element does not replace nor supersede any of the other General Plan elements; instead, the Element addresses, amplifies, and supports other elements as they relate to noise issues. The Land Use and Noise Elements are strongly interrelated. The Noise Element identifies land uses which are considered sensitive to noise and contains guidelines for achieving compatibility between land use and community noise levels. This

information is intended to provide guidance in land use decisions including the general distribution, location, and intensity of land uses.

A significant relationship also exists between the Transportation and Noise Elements. Because transportation systems are a major source of noise, their location, capacity, and design often determine the extent of noise impacts on surrounding land uses. Once commitment is made on transportation systems, land uses should be examined to identify compatibility with predicted noise levels generated by that system. The Noise Element relates to the Transportation Element through proposed policies for design, location, and fiscal considerations in the construction of new facilities.

The Housing Element is indirectly affected by the Noise Element through the Land Use Element. Residences are identified as some of the most noise-sensitive uses. The Noise Element suggests location and design considerations for housing as well as attenuation measures to reduce interior noise levels. Land that is considered marginal for residential use because of existing or projected noise impacts may provide an opportunity for residential use through careful design. Such design considerations include measures to insure that interior and exterior noise levels are satisfactorily attenuated to meet County standards.

The Noise Element is also closely related to the Resources Element, since noise can adversely affect the enjoyment of quiet activities in open space. Conversely, open space can be employed to buffer noise-sensitive land uses through separation and extension landscaping.

RELATIONSHIP TO FEDERAL, STATE AND LOCAL AGENCY PLANS AND PROGRAMS

The purpose of this section is to provide a general overview as to the noise-related roles and responsibilities of different levels of government as they relate to environmental noise.

At the federal level, there are three separate agencies which have a significant impact on Orange County's noise environment. They are the Environmental Protection Agency (EPA), the Department of Defense and the Department of Transportation (DOT). In addition, the Department of Housing and Urban Development and the Federal Housing Administration establish standards for projects which receive their financial support.

The stated role for EPA has been to provide leadership in the national noise abatement effort. While not as extensive as it was during the 1970s, a key aspect of this effort has been sponsorship of scientific studies of the relationships between noise levels and human response. Another key role of EPA has been in assisting other federal agencies, states, and local jurisdictions in taking steps to ensure as healthy an environment as is

COMMON NOISE SOURCE LEVELS

40 dBA: quiet residential area

55-70 dBA: dishwasher

75-80 dBA: flush toilet

90 dBA: truck

110 dBA: busy video arcade

feasible.

The Department of Defense (DOD), in conjunction with the State of California National Guard Bureau, operates an air installation at Los Alamitos. Noise effects from operations at Los Alamitos are not significant on unincorporated areas, however.

The Department of Transportation is significant in that its operating agencies are involved in setting standards and safety regulations for civil aviation, railroads, transit facilities and vehicles, and those freeways that are a part of the Interstate System. These agencies are the Federal Aviation Administration, the Federal Railway Administration, the Urban Mass Transportation Administration, and the Federal Highway Administration.
The State of California is responsible for establishing regulations for noise control where not preempted by the federal government. The federal government has largely pre-empted control of noise from aircraft, railroads, and federal highways. The State regulates noise levels of motor vehicles, motorcycles, motor boats, and freeway noise as it affects classrooms, and has set noise insulation standards for multi-family dwellings, hotels, and motels. The State also has established noise impact boundaries around airports, and noise planning standards.

Of particular importance are the State requirement for the preparation of each local jurisdiction's noise element (California Government Code, Section 65302(f)), noise insulation standards (California Administrative Code, Title 25) and the noise standards related to airports and their environs (Title 21). The State, through CALTRANS and the California Transportation Commission, also exerts significant influence on the noise environment through the financing,

construction, and maintenance of the State highway system.

Local jurisdictions share the responsibility of maintaining the health and welfare of their residents. This responsibility is discharged largely through land use planning and control. The normal approach taken at the local level is a preventative one in which care is taken to avoid the development of neighboring uses that are inconsistent. Retroactive action to correct an inconsistent pattern is generally limited to voluntary programs in which land owners are encouraged to take steps to reduce the noise impact on their property.

The County of Orange has an additional role in that it is the owner/operator of John Wayne Airport. In this role, the County can influence the noise environment, although only insofar as its actions are in accord with federal and state regulations.

THE NATURE OF SOUND

For the purpose of this Noise Element, sound may be described as a disturbance in the pressure of the air. Sound waves propagate in a predictable manner from a source to a receiver or observer.

A person listening to a sound converts the minuscule pressure variations to signals that may be interpreted in various ways depending on the person's individual perception of the sound. Sounds are often described by qualitative terms such as annoying or pleasant, loud or soft, noisy or quiet, or high-frequency or low-frequency.

Qualitative judgments of a sound may generally be quantified by measurements of three primary quantities; amplitude, frequency, and temporal pattern or duration.

1) **Amplitude in decibels (dB):**[1] The strength of a sound depends on the pressure exerted by the sound waves. The greater the pressure, the louder the sound.

2) **Frequency, or pitch, in Hertz (Hz):** High frequency sounds are produced by rapidly vibrating objects and low frequency sounds by slowly vibrating objects.

3) **Temporal pattern or duration:** The pattern and length of time associated within a sound.

A sound pressure level of zero decibels corresponds, approximately, to the faintest sound perceptible, on the average, by persons with excellent hearing.

Human judgments of the noisiness of a sound depend on the overall level of the sound, the distribution of sound pressure level with frequency and the duration of the sound (or series of sounds).

COMMON NOISE SOURCE LEVELS

130 dBA: percussion section at symphony

150 dBA: firecracker

180 dBA: rocket launching from pad

[1]NOTE: words or phrases that are defined in the General Plan Appendices, APPENDIX VIII-1, DEFINITIONS AND ACRONYMS, are underlined the first time they occur in this Chapter.

As a result of extensive laboratory experiments and experience in the United States and in other countries, it has been found that use of a frequency-weighted sound pressure level provides measurements that correlate well with judgments of the noisiness or annoyance of a sound. That frequency weighting is, by international agreement, called the A-frequency weighting or A-weighting. A-weighting reduces the amplitude of the low frequency components of a sound relative to the mid- and high-frequency components.

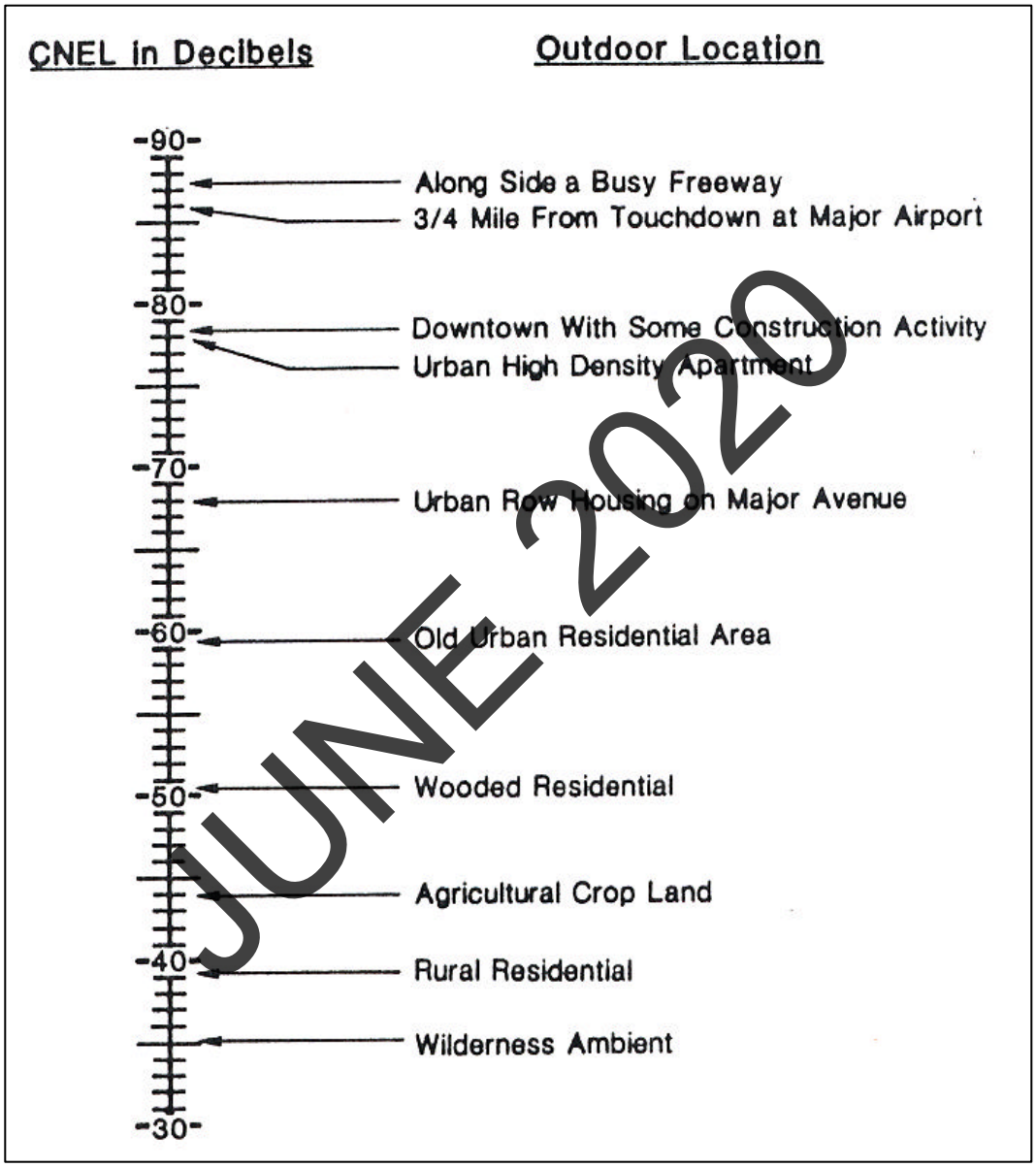
For the purpose of assuring compatibility between the long-term outdoor noise level and projected, or actual, land uses, the measures of noise level referred to in this Noise Element are either the A-weighted Community Noise Equivalent Level (CNEL), in decibels, or a time-average equivalent sound level, also in decibels.

Everyday sounds normally range from 30 decibels (very quiet) to 100 decibels (very loud). Figure VIII-1 shows Community Noise Equivalent Levels from a variety of noise sources. The values range from 35 decibels in the quiet of a wilderness to approximately 85 decibels in noisy environments.

The transmission of sound involves three components: source, transmission path, and receiver. These sound components are not independent, but are subject to interaction. For example, a person (source) will raise his voice if he is aware that his listener (receiver) is hard of hearing.

To reduce the noise level inside a dwelling from the effects of a high-noise source -

FIGURE VIII-1.



Examples of Outdoor Community Noise Equivalent Levels
Measured at Various Locations

Based on: U.S. Environmental Protection Agency, "Protective Noise Levels, Condensed Version of the EPA Levels Document,"1978, Figure 4.

traffic on a road, for example - either the source can be modified (by adding sound-absorbing material inside the engine compartment) or the transmission path can be adjusted by taking such measures as installing a wall or berm or providing structural modifications such as double-glazed windows and well-sealed doors in the dwelling.

The documented effects of excessive noise on people range from annoyance and inconvenience to temporary or permanent hearing loss. But, as the Environmental Protection Agency[2] notes, the problems associated with noise are much more widespread:

> Except for the serious problem of hearing loss, there is no human illness known to be directly caused by noise. But throughout dozens of studies, noise has been clearly identified as an important cause of physical and psychological stress, and stress has been directly linked with many of our most common health problems. Thus, noise can be associated with many of these disabilities and diseases, which include heart disease, high blood pressure, headaches, fatigue, and irritability.
>
> Noise is also suspected to interfere with children's learning and with normal development. Noise is reported to have triggered extremely hostile behavior among persons presumably suffering from emotional illness. It is suspected to lower our resistance, in some cases, to the onset of infection and disease.

In view of the limitation on our state of knowledge concerning noise and the variability of human response to noise, the inaction of community noise programs is a difficult process. The search for meaningful standards must distinguish between what is

[2]EPA, NOISE: A Health Problem, August 1978, page 23.

merely interesting information and what is truly useful knowledge for the protection of the community welfare.

A number of factors affect the measurement and control of noise sources. There are thousands of permanent stationary noise sources and several hundred thousand mobile noise sources within nearly any area.

Transmission characteristics of sound are directly affected by the size, shape, and density of the thousands of barriers, structures, and topographical features in the county. Complicating the transmission paths is the fact that localized meteorological conditions may distort the sound wave in unpredictable ways.

For these reasons, the Noise Element is concerned with the major predictable sound sources such as airplanes, highways, and railroads as well as certain stationary sources. Considerations of the distortions of sound by natural and man-made features were only generally considered in the evaluation and mapping of the noise impacted areas in the context of this Element.

It is for these reasons that elsewhere in this document "worst case" assumptions have been made. Thus, there are noise levels at which a detailed acoustical analysis on a project-specific basis is required. In general, this occurs if there is any question about the noise impacts associated with a development proposal. (See Noise Referral Zones section in this chapter.)

THE EXISTING NOISE ENVIRONMENT

Noise is generated by numerous sources which are found near places where people both live and work. Of particular concern are those sources generating noise levels above the prevailing background noise level.

The most common mobile noise sources in the County are transportation- related (automobiles, trucks, motorcycles, railroads, and aircraft). Motor vehicle noise is of concern because it is characterized by a high number of individual events, which often create a sustained noise level, and because of its proximity to areas sensitive to noise exposure. Rail and aircraft operations, though infrequent, may generate extremely high noise levels that can be disruptive to human activity. Aircraft noise appears to produce the greatest community anti-noise response, although the duration of the noise from a single airplane is much less, for example, than that from a freight train.

"Noise proves nothing. Often a hen who has merely laid on egg cackles as if she had laid an asteroid."
Mark Twain

In February 1985, the Board of Supervisors adopted the John Wayne Airport Master Plan (AMP) and the Santa Ana Heights Land Use Compatibility Program (LUCP).

The Airport Master Plan includes an ultimate limit of 73 average daily departures (ADDs) for most commercial jet operations. In preparing the LUCP, a projected 65-decibel CNEL noise contour reflecting expected future flight level and a reasonable mix of aircraft types was utilized.

This contour referred to as the Project Case and depicted in EIR 508 (prepared jointly for the AMP and LUCP), was approved by the Board of Supervisors as the implementation line for two noise compatibility programs: Purchase Assurance and Acoustical Insulation. It was also utilized in the preparation and Board adoption of a land use plan (Land Use Element and Community Profile amendments) for unincorporated areas of Santa Ana Heights.

This contour line remains fixed as to location until modified by a Noise Element Amendment. Consideration of a future revision to the Project Case Contour would probably occur subsequent to full implementation of Phase II of the JWA Master Plan.

Figure VIII-2 depicts the current noise contours which surround John Wayne Airport as well as the policy implementation line. Figure VIII-2 also represents the future levels of aircraft noise because of the assumption of 72,000 operations per year established as a part of the amendment in 1979. This map also depicts the Project Case Contour for John Wayne Airport as adopted by the Santa Ana Heights Land Use Compatibility Program and the John Wayne Airport Master Plan. Precise noise

contour maps are available from RDMD which depict these two areas with the map accuracy standards that are required for project-specific evaluations.

Information in the section that follows includes typical noise contours as projected for traffic on arterial highways. Figure VIII-3 shows typical cross-sections of arterial highways, which depict how noise levels vary with distance and speed. Figure VIII-4 is a generalized view of how noise from the assumed speed and volume of traffic might be affected by topography or by man-made features. The intent is to portray typical measures which may reduce the "worst case" noise impact area. (Note: Figures VIII-3 and VIII-4 have been prepared only for illustrative purposes. They are not intended to represent noise control policy.)

Figure VIII-5 depicts conditions that were expected in the year 2000. The contours are based on assumptions related to the speed and volume of traffic that is a worst case. Heavier traffic at a lower speed or lighter traffic at a higher speed would each result in a smaller area impacted (i.e., narrower

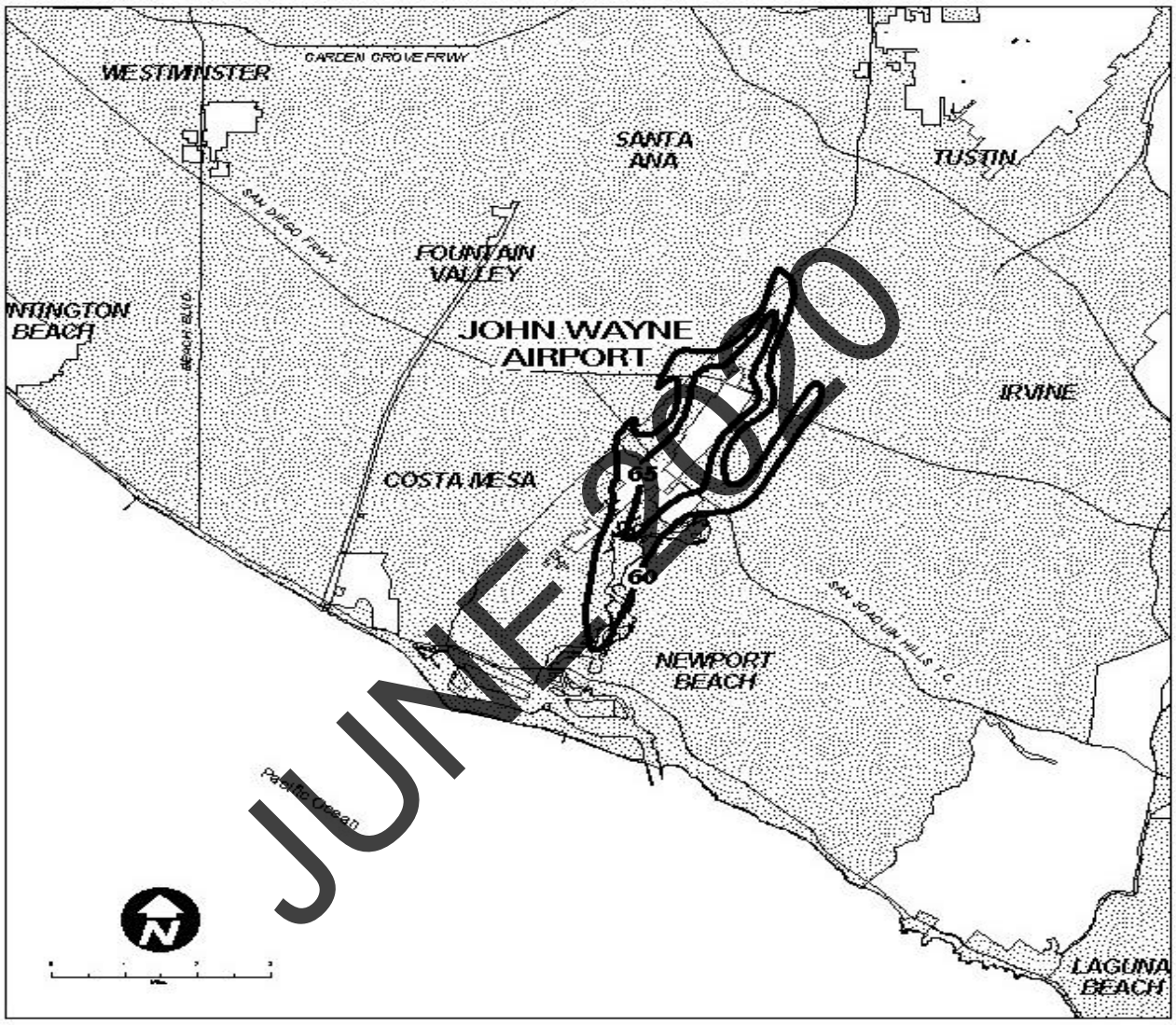
contours). Standard rights-of-way have also been assumed.

Under the assumptions, the 70-decibel CNEL contour for secondary and primary arterials falls within the right-of-way, if not within the roadway itself. These contours are not depicted on Figure VIII-5 for clarity of presentation. Their addition would not serve to depict residential areas so impacted and would only clutter the maps further.

The CNEL resulting from the noise produced by many sources is not depicted. Thus, there are separate maps for each major source. Also, only an approximation has been made in the vicinity of intersections. Community noise in such areas is a complex phenomenon and can be evaluated only by detailed measurements and analysis of the noise at a specific location of interest.

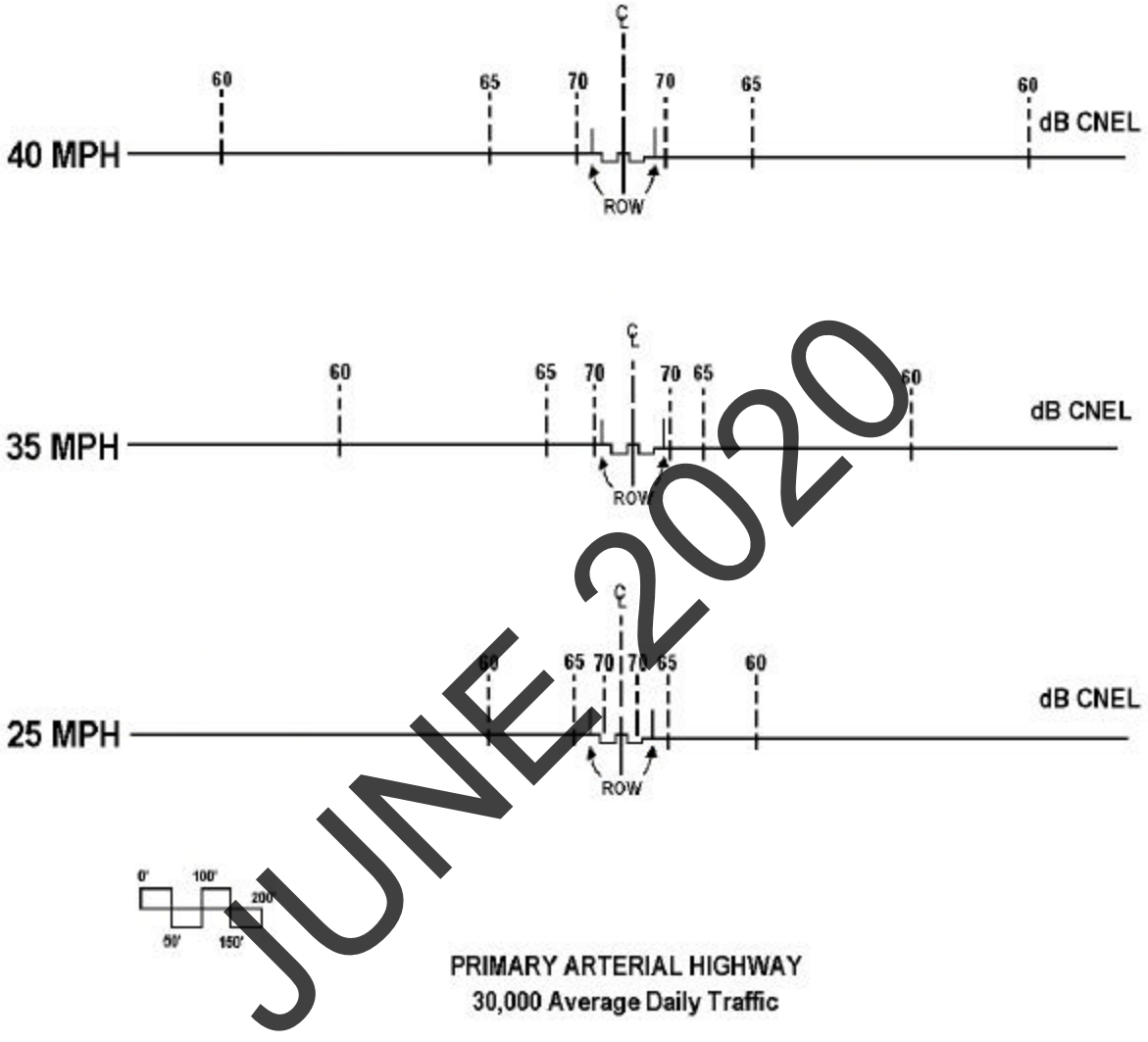
Figure VIII-6 depicts noise contours for through railroad facilities in the unincorporated parts of the County. The contours are based on only a modest increase in the level of railroad operations. At the General Plan level of detail, there is

Figure VIII-2



GENERALIZED NOISE EQUIVALENT LEVEL CONTOURS
From Air Facilities

Figure VIII-3

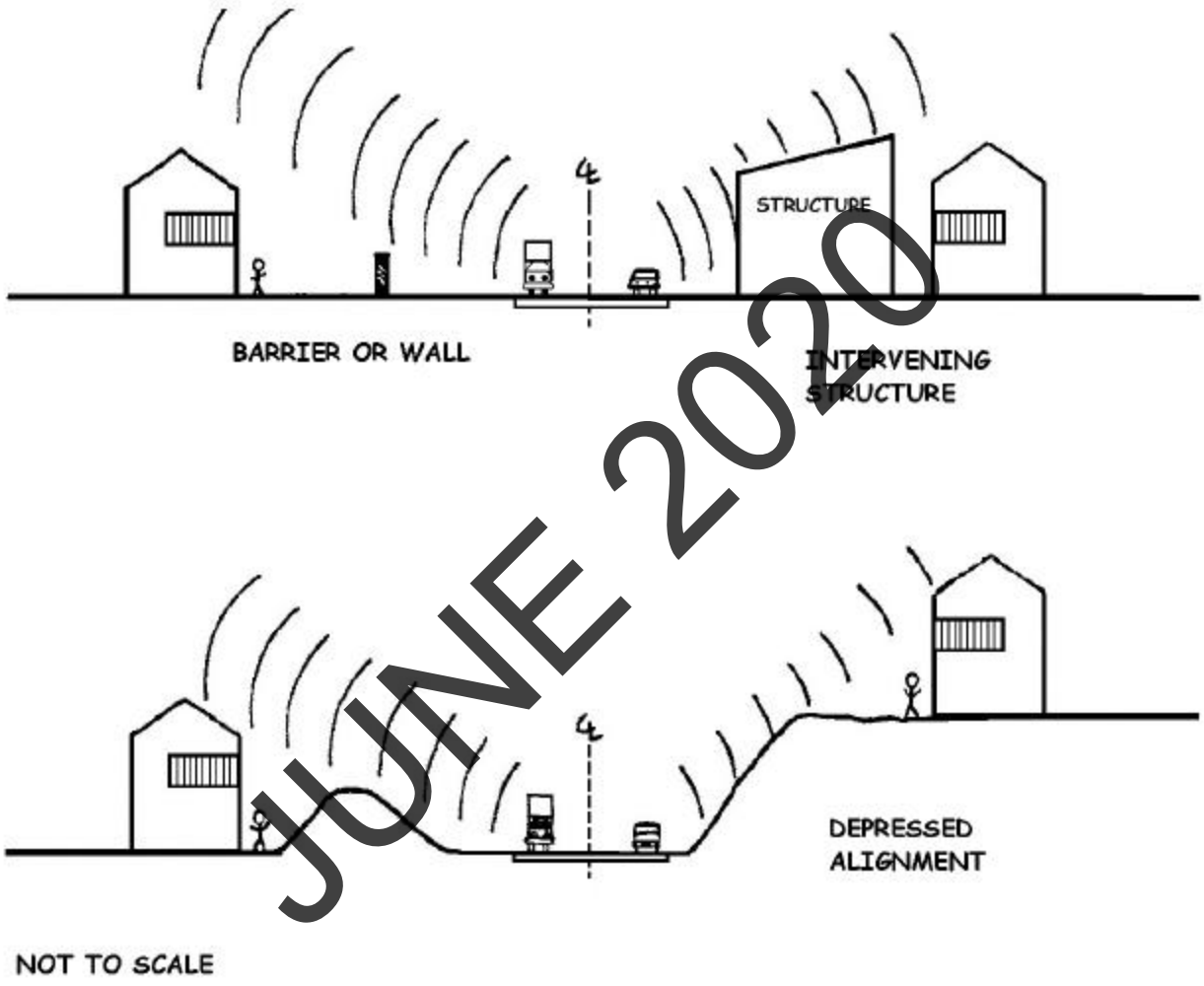


NOTES: Calculations based on hard site, flat terrain, 180' angle of view, standard County truck/auto mix, 0-2% roadway gradient, roadway at level of service C, and no contributions from other noise sources.

℄: Center Line ROW : Right-of-Way Line

EFFECT OF SPEED ON COMMUNITY NOISE EQUIVALENT LEVELS

Figure VIII-4



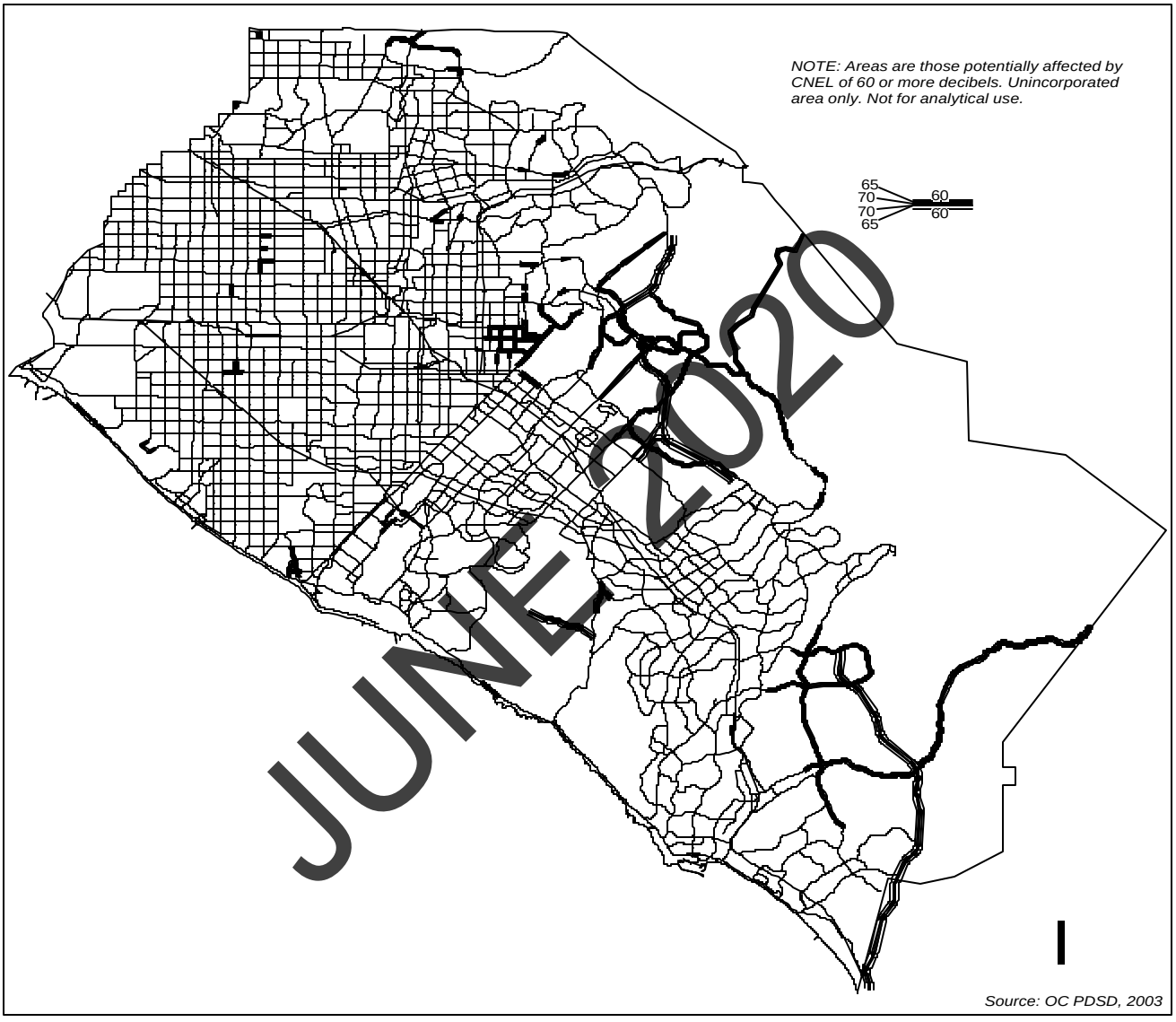
TYPICAL NOISE MITIGATION MEASURES

no real difference in the location of the contours for the years 2000 and 2025. The contours plotted represent levels of activity for the year 2000. Thus, 1980 lines would be slightly inside those shown on Figure VIII-6. The location of the contours for the year 2025 would require recalculation if there were a significant shift in rail activity. A new high-speed rail facility between Los Angeles and San Diego is not one of the assumptions underlying the Noise Element.

Other noise sources in a community include industry, construction, and people and are often referred to as "fixed" sources. Industrial noise generated by processing and operations is usually of long duration at relatively low frequencies. Construction noise sources (diesel engines, air compressors, electric motors, etc.) generate noise for extended periods of time with intermittent high noise levels.

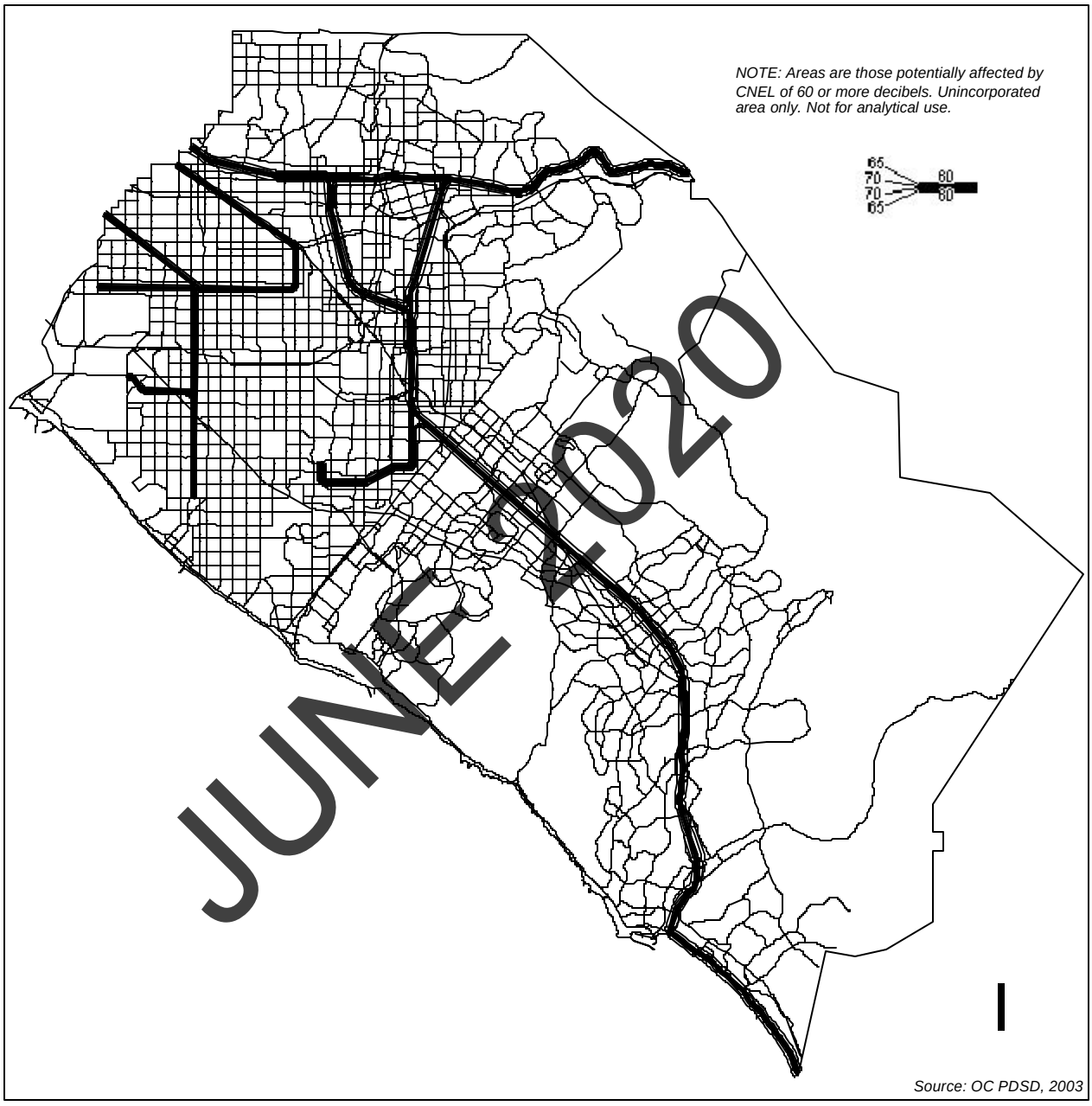
Population noise represents the noise generated by human activity in the community. Sources include air conditioners, lawn mowers, radio/stereo/television, sports arenas, schools, and other entertainment and commercial activities. In general, the control of noise from these sources is addressed in the County Noise Ordinance which is administered by the County's Health Care Agency.

Figure VIII-5



GENERALIZED COMMUNITY NOISE EQUIVALENT LEVEL CONTOURS
From Arterial Highways

Figure VIII-6



GENERALIZED COMMUNITY NOISE EQUIVALENT LEVEL CONTOURS
From Through Railroads

ESTIMATES OF AFFECTED POPULATION

Table VIII-1 contains the estimates (existing and future) of population residing in the potential noise-impacted areas. It must be stressed that these estimates are based on unmitigated situations, so that the number of people actually affected will be less dependent on mitigation measures employed.

This table is based on data from the 2000 census of Population and Housing data and from OCP- 2000 projections of dwelling units, used in conjunction with the figures previously described. Standard factors for the population per household were applied to derive the population estimates. Once again, it must be stressed that this represents a "worst case" situation.

ANALYSIS OF FUTURE CONDITIONS

By the year 2025, the horizon year of this Element, there will be more people in Orange County, more economic activity, and more traffic of all types. Increased development will lead to more transportation facilities. Overall, the County will exhibit higher population densities. All of these factors will lead to situations in which a greater number of people will reside in areas potentially subject to higher noise impacts.

For the unincorporated area of Orange County, a relatively high percentage of this development will have occurred subsequent to the adoption of land use-noise compatibility policies and standards (the Noise Element was originally adopted in 1975). As a result, more of the dwellings, offices, and other inhabited structures will have been built in accordance with the policies and standards that are contained in this Noise Element.

An estimate of the potential population residing in noise impacted areas was prepared and presented in Chapter II, Background for Planning. That estimate represents the maximum number of people likely to live in those areas. The usefulness of the estimate is for comparative, rather than absolute evaluations. The actual number of affected residents will be less (and probably significantly less), although there will be some Orange County residents who will reside in areas that are noisier than is desired. Some of the factors that may influence how many people actually will live in noisy areas are discussed in the paragraphs that follow.

TABLE VIII-1.

POPULATION POTENTIALLY AFFECTED BY COMMUNITY NOISE EQUIVALENT LEVELS

(In Thousands)

	70 decibels and higher		65 decibels and higher[1]		60 decibels and higher[2]	
SOURCE	2000	2025	2000	2025	2000	2025
Roads	4	19	18	100	51	258
Rail	*	*	3	3	4	4
Air	4	5	9	27	42	140
Composite[3]	5	20	25	120	80	37

* Less than one thousand people

Notes: [1] Includes those potentially impacted by more than 70 decibels.

[2] Includes those potentially impacted by more than 65 decibels.

[3] Composite value is not a total in that certain areas are impacted by more than one source.

Some planning constraints exist. Local jurisdictions have control over only some factors which influence the level of noise in an area. Noise compatible land use planning and the discretionary review of project applications are probably the best noise prevention and control tools available to the County. However, these mechanisms are of limited effectiveness in dealing with those instances in which a pre-existing noise-land use incompatibility exists. Unless a development proposal involving a discretionary approval is made, there are no mechanisms to ensure that corrective action will be taken.

The structure of the County's economy could change significantly. While this is a remote possibility within the time horizon of the Noise Element, such shifts are conceivable. If so, there could be new sources of community noise. Similar changes could occur in the temporal work patterns associated with the local economy. If more multiple work shifts were to occur, then the proportion of traffic occurring during the evening (7 - 10 p.m.) or night (10 p.m. - 7 a.m.) time periods may increase.

While these changes would probably have a beneficial effect on peak period traffic congestion, they could increase Community Noise Equivalent Levels due to the additional weight given to noise that occurs during the evening and nighttime periods.

Technological changes are a possibility as they relate to transportation facilities. Reductions in the noise from automobiles and trucks are certainly possible. Quieter tires or quieter engines could each lead to a significant reduction in the areas affected by noise from arterial highways. Neither of these topics is subject to local control nor are the effects of local influence very great.

As a result, the assumption made in this document is that the noise levels associated with the current vehicle fleet are the appropriate ones to use. When conclusive evidence is available that supports different assumptions, then they will be incorporated in a subsequent amendment to this Element.

A similar set of uncertainties exists as it relates to noise characteristics of future generations of aircraft, both civilian and military. Once again, the assumptions utilized here will be changed when the characteristics and utilization rates of such new aircraft are known.

Another technological change that may have an impact on the future noise environment is the role of telecommunications in the lifestyle of county residents. If there should be a significant substitution of communications for transportation, then the traffic volumes and the level of noise from arterial highways might be less than forecasted. Careful attention to and observation of changing traffic patterns will be required prior to adjusting the community noise estimates.

A final technological factor is the absolute accuracy of the estimates of future noise environments. Analytical models used to

develop estimates will be improved as new evidence becomes available. The accuracy of the data base will be improved by the acquisition of new data through various national and international efforts. When improved analytical models are available, it may be appropriate to recalculate the noise contours contained in this document.

There are fiscal constraints which affect the future noise environment as well. Attenuation measures all have a cost associated with them. Those that are to be paid for by public agencies (such as acoustical barriers along freeways or arterial highways) must compete for scarce resources with other public needs. Cost considerations are particularly critical for retroactive improvements.

Noise Referral Zones

The noise contours depicted on the maps in the Existing Noise Environment section of this Element reflect transportation noise sources (i.e., arterial highways, rail lines and airports) which are, and are expected to remain, major sources of noise in unincorporated areas of Orange County.

The contours shown on the maps indicate noise-affected areas which constitute Noise Referral Zones for purposes of this Element. Such a zone is defined as that area with a total noise environment of 60 decibels Community Noise Equivalent Level (CNEL) or more. It is the level at which either State or Federal laws and standards related to land use become important and, in some cases, supersede local laws and regulations.

Any development proposed which may be impacted by a CNEL from each noise source of 60 or more decibels will be evaluated on a project specific basis. The contour figures in the Existing Noise Environment section of this Element for railroads and arterial highways depict a "worst case" situation. As used here, "worst case" means the maximum area that might be impacted, given that:

a) No sound absorbing or attenuating effects of topography or man-made features have been considered; and

b) The contours reflect operation of the facilities at their design level (which may be greater than the current level of traffic and may be less than that generated if the facility were upgraded after adoption of this Element).

The intent of the Noise Referral Zone is to act as a triggering mechanism or flag for development proposals in areas potentially adversely affected by high noise levels. If a development proposal falls within a Noise Referral Zone, it will be subject to evaluation and review to determine whether the project is indeed within an area where the CNEL is 60 or more decibels. It is during this initial evaluation of a project that the effect of existing development, topographic features, or other such noise attenuation measures is considered, although at a very general level of detail.

Acoustical analysis reports shall be prepared in any instance where there is the possibility

COMMON NOISE SOURCE LEVELS

70 dBA: television

80-90 dBA: blender

100 dBA: wood-working class

130 dBA: jack-hammer

157 dBA: balloon pop

of unacceptable noise impacts. Thus, unless it can be shown with certainty that the project is outside the area that has a CNEL of 60 or more decibels, an acoustical analysis report will be required.

OBJECTIVES AND POLICIES

This section contains the key objectives and assumptions that have guided the development of the Noise Element. They are either explained fully or are referenced with information as to where a full explanation can be found and a unifying characteristic of all assumptions is that they are consistent with those used in other elements of the General Plan.

Objectives, Assumptions, and Definitions

A key objective of this Noise Element is to ensure that each County resident's quality of life is not affected adversely by high noise levels. Thus mitigation of noise is of paramount importance.

Noise affects all land uses. Residential uses are the most noise sensitive because of structural design, 24-hour per day duration of use and because such uses typically need, and are designed to incorporate outdoor living areas. Other noise sensitive uses include schools, hospitals, and places of worship. While mitigation of the effects of excessive noise in enclosed or interior areas are feasible (if expensive), it becomes more difficult for outdoor areas (particularly for aircraft noise sources).

In general, any development that results in a situation where there is an unacceptable level of noise in any living area (interior or exterior), must be mitigated or the project or use revised to avoid the conflict.

Aircraft noise as it affects outdoor living areas[3] is particularly critical because it is generally impracticable to provide sufficient noise control to achieve an acceptable noise environment.

Noise sensitive land uses are defined as those specific land uses that have associated indoor and/or outdoor human activities that may be subject to stress and/or significant interference from noise produced by community sound sources.

[4]"Outdoor living area" is a term used by the County of Orange to define spaces that are associated with residential land uses typically used for passive recreational activities or other noise-sensitive uses. Such spaces include patio areas, barbecue areas, jacuzzi areas, etc. associated with residential uses; outdoor patient recovery or resting areas associated with hospitals, convalescent hospitals, or rest homes; outdoor areas associated with places of worship which have a significant role in services or other educational purposes which may be adversely impacted by noise. Outdoor areas usually not included in this definition are: front yard areas, driveways, greenbelts, maintenance areas, and storage areas associated with residential land uses; exterior areas at hospitals that are not used for patient activities; outdoor areas associated with places of worship and principally used for short-term social gatherings; and outdoor areas associated with school facilities that are not typically associated with educational uses prone to adverse noise impacts (for example, school play yard areas).

Such human activity typically occurs daily for continuous periods of 24 hours or is of such a nature that noise is significantly disruptive to activities that occur for shorter periods. Specifically, noise sensitive land uses include: residences of all types, hospitals, rest homes, convalescent hospitals, places of worship, and schools.

Development in this context refers to the initial development of land from an unimproved state to the redevelopment of land in which one use is replaced by another or to a significant intensification in an existing use (e.g., replacing a single family dwelling unit with a four-plex). These types of development are the ones on which the County takes discretionary action. Table VIII-2 depicts major uses in terms of noise sensitivity.

For the purpose of complying with the Table VIII-2 criteria, the noise from all sources will be combined and rated in terms of Community Noise Equivalent Level (CNEL). For multiple noise sources, all sources can either be mathematically combined or the CNEL rating can be calculated in the following manner.

A primary, or loudest, noise source will be identified. All other sources will then be considered secondary noise sources. Secondary noise sources that are at least 10 decibels less than the primary source can be considered to have an acoustically insignificant effect on the noise level rating and therefore will not need to be included in the CNEL calculations. If the primary source requires abatement to comply with Table VIII-2 requirements, then the abated CNEL rating for the primary source will be used to determine the significance of any secondary source. For example, if the primary source is 75dB CNEL and requires abatement to 65dB CNEL, then any secondary source of 55dB CNEL or less can be considered acoustically insignificant. Therefore, a secondary source of 60dB CNEL would require abatement to a 55dB CNEL rating thereby making that acoustically insignificant.

Residential land use is the most sensitive because of the nature of activities which occur over a 24-hour period as well as the generally accepted need for, and design incorporating, outdoor living areas. An upper CNEL limit of 65 decibels was chosen above which noise is extremely annoying. Previous policy decisions by the Board of Supervisors have endorsed the 65-decibel CNEL as the critical sound-level criterion in guiding planning decisions for sensitive land uses.

"Of all noises, I think music is the least disagreeable."

Samuel Johnson

TABLE VIII-2.

COMPATIBILITY MATRIX FOR
LAND USE AND COMMUNITY NOISE EQUIVALENT LEVELS
(CNEL)

CNEL / TYPE OF USE	65+ decibels CNEL	60 to 65 decibels
Residential	3a, b, e	2a, e
Commercial	2c	2c
Employment	2c	2c
Open Space		
Local	2c	2c
Community	2c	2c
Regional	2c	2c
Educational Facilities		
Schools (K through 12)	2c, d, e	2c, d, e
Preschool, college, other	2c, d, e	2c, d, e
Places of Worship	2c, d, e	2c, d, e
Hospitals		
General	2a, c, d, e	2a, c, d, e
Convalescent	2a, c, d, e	2a, c, d, e
Group Quarters	1a, b, c, e	2a, c, e
Hotel / Motels	2a, c	2a, c
Accessory Uses		
Executive Apartments	1a, b, e	2a, e
Caretakers	1a, b, c, e	2a, c, e

Note: See Table VIII-3 for definitions of the entries in this table.

TABLE VIII-3.

EXPLANATION AND DEFINITIONS ON TABLE VIII-2

ACTION REQUIRED TO ENSURE COMPATIBILITY
BETWEEN LAND USE AND NOISE FROM EXTERNAL SOURCES

1 = Allowed if interior and exterior community noise levels can be mitigated.
2 = Allowed if interior levels can be mitigated.
3 = New residential uses are prohibited in areas within the 65-decibel CNEL contour from any airport of air station; allowed in other areas if interior and exterior community noise levels can be mitigated. The prohibition against new residential development excludes limited "infill" development within an established neighborhood.

STANDARDS REQUIRED FOR COMPATIBILITY OF LAND USE AND NOISE

a = Interior Standard: CNEL of less than 45 decibels (habitable rooms only).
b = Exterior Standard: CNEL of less than 65 decibels in outdoor living areas.
c = Interior Standard: Leq (h)=45 to 65 decibels interior noise level, depending on interior use.
d = Exterior Standard: Leq (h) of less than 65 decibels in outdoor living areas.
e = Interior Standard: As approved by the Board of Supervisors for sound events of short duration such as aircraft flyovers or individual passing railroad trains.

KEY DEFINITIONS

Habitable Room – Any room meeting the requirements of the Uniform Building Code or other applicable regulations which is intended to be used for sleeping, living, cooking or dining purposes, excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting corridors, laundries, unfinished attics, foyers, storage spaces, cellars, utility rooms and similar spaces.

Interior – Spaces that are covered and largely enclosed by walls.

Leq (h) – The A-weighted equivalent sound level averaged over a period of "h" hours. An example would be Leq (12) where the equivalent sound level is the average over a specified 12-hour period (such as 7:00 a.m. to 7:00 p.m.). Typically, time period "h" is defined to match the hours of operation of a given type of use.

Outdoor Living Area – Outdoor living area is a term used by the County of Orange to define spaces that are associated with residential land uses typically used for passive private recreational activities or other noise-sensitive uses. Such spaces include patio areas, barbecue areas, jacuzzi areas, etc. associated with residential uses; outdoor patient recovery or resting areas associated with hospitals, convalescent hospitals, or rest homes; outdoor areas associated with places of worship which have a significant role in services or other noise-sensitive activities; and outdoor school facilities routinely used for educational purposes which may be adversely impacted by noise. Outdoor areas usually not included in this definition are: front yard areas, driveways, greenbelts, maintenance areas, and storage areas associated with residential land uses; exterior areas at hospitals that are not used for patient activities; outdoor areas associated with places of worship and principally used for short-term social gatherings; and outdoor areas associated with school facilities that are not typically associated with educational uses prone to adverse noise impacts (for example, school play yard areas).

As a result of the Board of Supervisors' adoption of the Santa Ana Heights Land Use Compatibility Plan (LUCP), a projected 65-decibel CNEL noise contour was adopted for John Wayne Airport reflecting expected future flight levels and a reasonable mix of aircraft types. The policy implementation lines can only be changed as part of a Noise Element Amendment.

The County also has a regular program of monitoring noise in the vicinity of John Wayne Airport. The noise-monitoring program is used to provide supporting data to confirm applicability of the fixed policy implementation lines. The locations of other CNEL contours are plotted for both of these facilities, as well. The 60-decibel CNEL contour is the boundary of the noise referral zone. The other contours are not as important for land use planning purposes since key development policies are not based upon them.

All new residential uses, schools, places of worship, and convalescent hospitals are generally incompatible within the 65-decibel CNEL contour for any other airport or air station or for any other source of noise. These uses normally require outdoor living areas for functional or therapeutic purposes or, in the case of nearly all residential projects, to afford the full life style that is the goal of the County's General Plan. For these reasons, the ability to mitigate the effects of noise on these outdoor living areas is of paramount importance. Since it is generally impracticable to mitigate aircraft-induced noise in outdoor living areas, such uses are incompatible.

Noise sensitive uses which have no outdoor living areas may be compatible. These uses shall be considered compatible if and only if all standards contained in this Element are met.

Non-noise sensitive uses are compatible so long as interior noise levels meet the policies and standards established by this Noise Element.

Policies

Tables VIII-2 and VIII-3 were derived from the policies that are contained in narrative form in this chapter, from state requirements and standards and from other policies of the Board of Supervisors that relate to noise environments. The tables are meant to convey, in objective terms, the compatibility of, and standards for, the integration of land use planning and either calculated or measured noise environments.

Three general types of noise-impact and noise-mitigation situations can be identified and related to the noise environment. First are those situations where a new use is being proposed that is impacted by an existing noise source. "New" in this context refers both to the initial development of land from an unimproved state and to the redevelopment of land in which one use is replaced by another. This is the most

common situation and is typified by a residential tract adjacent to, and impacted by, noise from an arterial highway.

Mitigation of project noise through project design in this situation is clearly a preventative approach to assure compatibility of land use with long-term outdoor noise.

A second situation occurs when an existing use is impacted by a new or expanded source of noise. This situation is typified by general planning of a new transportation facility close enough to existing uses to have noise impacts on them or the expansion of such a facility beyond currently planned levels. Again, noise mitigation through project design is a preventative approach in that noise/land use incompatibilities are avoided. This situation is one in which the project proponent is obliged to mitigate the impacts of the new source of noise.

For the first two situations, the applicable standards are depicted on Tables VIII-2 and VIII-3. In the first situation, any project that is approved must meet the standards specified through appropriate noise mitigation measures, or the project proponent must be modified to ensure consistency with the Noise Element.
In the second situation, there must be a similar application of noise mitigation or other steps taken by the project proponent to avoid the inconsistency. In either case, the acceptable levels of noise in affected areas are as specified on Tables VIII-2 and VIII-3.

The third situation is one in which land uses and noise sources were established prior to adoption of noise policies and standards and are thus rendered incompatible "after fact." (The Noise Element's initial adoption was in 1975.) This situation is one in which existing uses are located within noise impact areas from existing sources. In most instances, these inconsistencies predate both the current knowledge of, and concern for, the deleterious effects of noise and the resulting statutes (e.g., the California Environmental Quality Act and planning laws related to local general plans).

Remedial action would be required to obtain consistency with the Noise Element's standards identified on Tables VIII-2 and VIII-3. Such action would lead to retroactive compatibility. While County policy stresses the desirability of such steps; they are voluntary on the part of individual property owners or project proponents.

- ***Major Noise Element Policies***

The policies listed below help guide the implementation of the Noise Element. They provide the link between the noise related goals of the General Plan and the programs that have been designed to accomplish the goals.

1. INTERGOVERNMENTAL COOPERATION

To cooperate with other County agencies and levels of government to bring about a comprehensive and

coordinated effort to reduce noise levels.

1.1 To recommend needed changes in Federal and State legislation which will be effective in reducing noise and can be efficiently administered.

1.2 To cooperate in efforts to develop mechanisms to assure coordination of all governmental jurisdictions in the field of noise control.

These policies involve cooperative efforts with other jurisdictions in order to achieve greater compatibility between noise and land uses. They acknowledge the regional aspects of many noise-related issues. They are implemented primarily through existing cooperative mechanisms such as Southern California Association of Governments and the County Supervisors Association of California.

2. PUBLIC INFORMATION AND NOTIFICATION

To disseminate public information regarding noise and programs to reduce noise levels and their impacts.

2.1 To provide information to the public regarding the health effects of high noise levels and means of mitigating such levels.

2.2 To provide information regarding Noise Referral Zones and noise attenuation measures to developers and the public.

2.3 To cooperate with industry to develop public information programs on noise abatement.

2.4 To require that prospective purchasers or end users of property be notified of overflight, sight and sound of routine aircraft operations by all effective means including:

a) Requiring new residential subdivisions which are located within the 60-decibel CNEL noise contour or are subject to overflight, sight and sound of aircraft operating from John Wayne Airport to have such information included in the State of California Final Subdivision Public Report.

b) Requiring that Declaration and Notification of Aircraft Noise and Environmental Impacts be recorded and available to prospective purchasers or end users of property located within the 60-decibel CNEL noise contour for any airport or air station or is subject to routine aircraft overflight.

c) Requiring an Aviation Easement across property that is within the 60-decibel CNEL noise contours for any airport or Los Alamitos air station or is subject to routine aircraft overflight.

d) Requiring the posting of noise impact notification signs in all sales offices associated with new residential development that is located within the 65-decibel CNEL contour from any airport or air station.

e) Any other appropriate means as specifically directed by the Board of Supervisors.

These policies are implemented at various stages of the development review process. The intent of this section is to utilize the most efficient means of providing appropriate noticing. Thus, some of these steps occur at the tract map stage; others at the building permit stage.

3. TRANSPORTATION SYSTEM NOISE CONTROL

To encourage the control of noise from transportation systems as the most efficient and effective means of reducing noise at the source.

3.1 To enforce noise sections of the State Motor Vehicle Code.

3.2 To encourage the State to require adequate noise suppression devices (mufflers, etc.) for all motor vehicles operated within the County.

3.3 To restrict the use of trail bikes, mini-bikes and other off-road motor vehicles in areas of the County except where designated for that purpose.

3.4 To study commercial truck movements and operations in the County and establish truck routes away from noise-sensitive areas where feasible.

3.5 To encourage development of a mass multi-modal transit system with reduced noise emission characteristics.

3.6 To review the Federal Railroad Noise Standards of 1974 for possible adoption by Orange County.

3.7 To continue the current policy of encouraging the use of noise reducing modifications to jet engines and the use of quieter jet aircraft at John Wayne Airport.

3.8 To employ noise mitigation measures in the design of new arterials consistent with funding capability and to support efforts by the State Department of Transportation for remedial acoustical protection for existing highways where needed by the County.

Since the County has little direct control over vehicle noise-level standards, cooperative efforts with state and

federal offices are important. In those instances where the County is directly involved (usage in County parks, for example), these policies are implemented through ordinances and operating procedures.

4. NOISE MONITORING AND ABATEMENT

To monitor noise levels, and adopt and enforce noise abatement programs.

4.1 To enforce the County's Noise Ordinance to prohibit or mitigate harmful and unnecessary noise within the County.

4.2 To encourage Orange County cities to adopt the County's model noise ordinance.

4.3 To develop and enforce standards in addition to those presently included in the Noise Ordinance to regulate noise from construction and maintenance activities and commercial public and industrial 1 land uses.

4.4 To consider noise reduction as a factor in the purchase of County maintenance equipment and the use of such equipment by County contractors and permittees.

4.5 To require that noise from motors, appliances, air conditioners, and other consumer products does not disturb the occupants of surrounding properties.

4.6 To continue identification of noise-producing sources, such as helicopter operations, as part of subsequent amendments to the Noise Element.

These policies are implemented jointly by the County Health Care Agency and the Resources and Development Management Department through the Noise Ordinance, and by RDMD in its procurement process for new and replacement vehicles and equipment.

5. NOISE/LAND USE PLANNING

INTEGRATION

To fully integrate noise considerations in land use planning to prevent new noise/land use conflicts.

5.1 To utilize the criteria of acceptable noise levels for various types of land uses as depicted on Tables VIII-2 and VIII-3 in the review of development proposals.

5.2 To prohibit new residential land uses within the 65-decibel CNEL contour from any airport or air station.

5.3 To limit new non-residential noise-sensitive land uses that are within a 65-decibel CNEL area from any source. Noise sensitive land uses will be permitted if, and only if, appropriate mitigation measures are included such that the standards contained in this Element and in appropriate State and Federal Codes are met. Specifically, non-residential noise-sensitive land uses include: hospitals, rest homes, convalescent hospitals, places of worship, and schools.

5.4 To stress the importance of building and design techniques in future site planning for noise reduction.

5.5 To utilize the California Noise Standards for Airports in planning for areas surrounding military as well as civilian airports.

These policies are implemented at different stages in the review of projects on which the County takes discretionary action. Tables VIII-2 and VIII-3 succinctly depict the County policies related to land uses and acceptable noise levels. The tables are the primary tools which allow RDMD to ensure integrated planning for compatibility between land uses and outdoor noise.

6. NOISE SENSITIVE LAND USES

To identify and employ mitigation measures in order to reduce the impact of noise levels and attain the standards established by the Noise Element, for both interior areas and outdoor living areas for noise sensitive land uses.

6.1 To encourage all property owners within the identified Noise Referral Zones to acoustically insulate all living quarters. This will be optional to the property owner.

6.2 To continue enforcement of Chapter 35 of the Uniform Building Code, currently adopted edition, and the California Noise Insulation Standards (Title 25 California Administrative Code).

6.3 To require that all new residential units have an interior noise level in living areas that is not greater than 45 decibels CNEL with it being understood that standard construction practices reduce the noise level by 12 decibels CNEL with the windows open and 20

"Silence is exhilarating at first-as is noise-but there is sweetness to silence outlasting exhilaration.."

Edward Hoagland

decibels CNEL with the windows closed. Higher attenuation than listed above may be claimed if adequate field monitoring or acoustical studies are provided to and approved by the County.

6.4 To require that all new residential units have an interior noise level in habitable rooms that does not exceed acceptable levels as caused by aircraft fly-overs or as caused by individual passing railroad trains.

6.5 All outdoor living areas associated with new residential uses shall be attenuated to less than 65 decibels CNEL.

6.6 To urge the use of acoustical insulation programs for schools located in the county, and where subject to County approval, to insure that new buildings for school uses meet state and local acoustical standards.

6.7 To apply noise standards as defined in the Noise Element for noise-sensitive land uses.

These policies also are reflected in Tables VIII-2 and VIII-3. They are implemented in all phases of project review.

[5] An arterial highway, as long as it is shown on the Master Plan of Arterial Highways, may exist in its ultimate form, may exist in a partial configuration, or may only be planned. Designation of the arterial highway on the plan and the traffic and noise projections which accompany this designation are, in this context, the "existing noise source."

Division 6 - NOISE CONTROL

ARTICLE 1. - GENERAL PROVISIONS

Sec. 4-6-1. - Declaration of policy.

In order to control unnecessary, excessive and annoying sounds emanating from unincorporated areas of the County, it is hereby declared to be the policy of the County to prohibit such sounds generated from all sources as specified in this article.

It is determined that certain sound levels are detrimental to the public health, welfare and safety, and contrary to public interest.

(Ord. No. 2700, § 1, 9-19-73)

Sec. 4-6-2. - Definitions.

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

Ambient noise level shall mean 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 shall mean an additive period of time composed of individual time segments which may be continuous or interrupted.

Decibel (dB) shall mean a unit which denotes the ratio between two (2) quantities which are proportional to power: the number of decibels corresponding to the ratio of two (2) amounts of power is ten (10) times the logarithm to the base ten (10) of this ratio.

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

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

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

Grading shall mean any excavating or filling of earth material, or any combination thereof, conducted at a site to prepare said site for construction or other improvements thereon.

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

Mobile noise source shall mean any noise source other than a fixed noise source.

Noise level shall mean the "A" weighted sound pressure level in decibels obtained by using a sound level meter at slow response with a reference pressure of twenty (20) micronewtons per square meter. The unit of measurement shall be designated as dB(A).

Person shall mean a person, firm, association, copartnership, joint venture, corporation or any entity, public or private in nature.

Residential property shall mean 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.

Simple tone noise shall mean a noise characterized by a predominant frequency or frequencies so that other frequencies cannot be readily distinguished.

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

Sound pressure level of a sound, in decibels, shall mean 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 explicitly stated.

(Ord. No. 2700, § 1, 9-19-73; Ord. No. 2870, § 1, 10-1-75)

Sec. 4-6-3. - Noise level measurement criteria.

Any noise level measurements made pursuant to the provisions of this article shall be performed using a sound level meter as defined in section 4-6-2.

(Ord. No. 2700, § 1, 9-19-73)

Sec. 4-6-4. - Designated noise zone.

The entire territory of Orange County, including incorporated and unincorporated territory, is hereby designated as "Noise Zone 1."

(Ord. No. 2700, § 1, 9-19-73; Ord. No. 2870, § 1, 10-1-75)

Sec. 4-6-5. - Exterior noise standards.

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

NOISE STANDARDS

Noise Zone	Noise Level	Time Period
1	55 dB(A)	7:00 a.m.—10:00 p.m.
	50 dB(A)	10:00 p.m.— 7:00 a.m.

In the event the alleged offensive noise consists entirely of impact noise, simple tone noise, speech, music, or any combination thereof, each of the above noise levels shall be reduced by five (5) dB(A).

(b) It shall be unlawful for any person at any location within the unincorporated area of the County to create any noise, or to allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, when the foregoing causes the noise level, when measured on any other residential property, either incorporated or unincorporated, to exceed:

(1) The noise standard for a cumulative period of more than thirty (30) minutes in any hour; or

(2) The noise standard plus five (5) dB(A) for a cumulative period of more than fifteen (15) minutes in any hour; or

(3) The noise standard plus ten (10) dB(A) for a cumulative period of more than five (5) minutes in any hour; or

(4) The noise standard plus fifteen (15) dB(A) for a cumulative period of more than one (1) minute in any hour; or

(5) The noise standard plus twenty (20) dB(A) for any period of time.

(c) In the event the ambient noise level exceeds any of the first four (4) noise limit categories above, the cumulative period applicable to said category shall be increased to reflect said ambient noise level. In the event the ambient noise level exceeds the fifth noise limit

category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level.

(Ord. No. 2700, § 1, 9-19-73; Ord. No. 2715, § 1, 11-13-73; Ord. No. 2870, § 1, 10-1-75)

Sec. 4-6-6. - Interior noise standards.

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

INTERIOR NOISE STANDARDS

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

In the event the alleged offensive noise consists entirely of impact noise, simple tone noise, speech, music, or any combination thereof, each of the above noise levels shall be reduced by five (5) dB(A).

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

(1) The interior noise standard for a cumulative period of more than five (5) minutes in any hour; or

(2) The interior noise standard plus five (5) db(A) for a cumulative period of more than one (1) minute in any hour; or

(3) The interior noise standard plus ten (10) db(A) for any period of time.

(c) In the event the ambient noise level exceeds either of the first two (2) noise limit categories above, the cumulative period applicable to said category shall be increased to reflect said ambient noise level. In the event the ambient noise level exceeds the third noise limit

category the maximum allowable noise level under said category shall be increased in reflect the maximum ambient noise level.

(Ord. No. 2700, § 1, 9-19-73; Ord. No. 2715, § 1, 11-13-73; Ord. No. 2870, § 1, 10-1-75)

Sec. 4-6-7. - Special provisions.

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

(a) Activities conducted on the grounds of any public or private nursery, elementary, intermediate or secondary school or college.

(b) Outdoor gatherings, public dances and shows, provided shall events are conducted pursuant to a license issued by the County of Orange pursuant to Title 5 of the Codified Ordinances of the County of Orange.

(c) Activities conducted on any park or playground, provided such park or playground is owned and operated by a public entity.

(d) Any mechanical device, apparatus or equipment used, related to or connected with emergency machinery, vehicle or work.

(e) Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities do not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a Federal holiday.

(f) All mechanical devices, apparatus or equipment which are utilized for the protection or salvage of agricultural crops during periods of potential or actual frost damage or other adverse weather conditions.

(g) Mobile noise sources associated with agricultural operations, provided such operations do not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or any time on Sunday or a Federal holiday.

(h) Mobile noise sources associated with agricultural pest control through pesticide application, provided that the application is made in accordance with restricted material permits issued by or regulations enforced by the Agricultural commissioner.

(i) Noise sources associated with the maintenance of real property, provided said activities take place between 7:00 a.m. and 8:00 p.m. on any day except Sunday or a Federal holiday, or between the hours of 9:00 a.m. and 8:00 p.m. on Sunday or a Federal holiday.

(j) Any activity to the extent regulation thereof has been preempted by State or Federal law.

(Ord. No. 2700, § 1, 9-19-73; Ord. No. 2715, § 1, 11-13-73; Ord. No. 2870, § 1, 10-1-75)

Sec. 4-6-8. - Schools, hospitals and churches; special provisions.

It shall be unlawful for any person to create any noise which causes the noise level at any school, hospital or church while the same is in use to exceed the noise limits as specified in section 4-6-5 prescribed for the assigned noise zone in which the school, hospital or church is located, or which noise level unreasonably interferes with the use of such institutions or which unreasonably disturbs or annoys patients in the hospital, provided conspicuous signs are displayed in three (3) separate locations within one-tenth of a mile of the institution indicating the presence of a school, church or hospital.

(Ord. No. 2700, § 1, 9-19-73)

Sec. 4-6-8.1. - Motor vehicle racing.

It shall be unlawful to conduct motor vehicle racing, testing, timing or similar noise-producing activities at raceways, speedways, off-road vehicle courses, drag strips or other similar places, including, but not limited to, the operation of midget race cars, drag cars, motorcycles, off-road vehicles, and specialty automobiles, between the hours of 11:30 p.m. and 8:00 a.m.

(Ord. No. 3093, § 1, 10-24-78)

Sec. 4-6-9. - Air conditioning and refrigeration; special provisions.

During the five-year period following the effective date of this article, the noise standards enumerated in sections 4-6-5 and 4-6-6 shall be increased eight (8) db(A) where the alleged offensive noise source is an air conditioning or refrigeration system or associated equipment which was installed prior to the effective date of this article.

(Ord. No. 2700, § 1, 9-19-73; Ord. No. 2715, § 1, 11-13-73)

Sec. 4-6-10. - Noise level measurement.

The location selected for measuring exterior noise levels shall be at any point on the affected property. Interior noise measurements shall be made within the affected dwelling unit. The measurement shall be made at a point at least four (4) feet from the wall, ceiling, or floor nearest the alleged offensive noise source and may be made with the windows of the affected unit open.

(Ord. No. 2700, § 1, 9-19-73; Ord. No. 2870, § 1, 10-1-75)

Sec. 4-6-11. - Manner of enforcement.

The Orange County Sheriff, the County Health Officer, the County Building Official and their duly authorized representatives are directed to enforce the provisions of this article. The Orange County Sheriff, the County Health Officer, the County Building Official and their duly authorized representatives are authorized, pursuant to Penal Code Section 836.5, to arrest any person without a warrant when they have reasonable cause to believe that such person has committed a misdemeanor in their presence.

No person shall interfere with, oppose or resist any authorized person charged with the enforcement of this article while such person is engaged in the performance of his duty.

(Ord. No. 2700, § 1, 9-19-73; Ord. No. 2715, § 1, 11-13-73; Ord. No. 3961, § 1, 4-2-96)

Secs. 4-6-12—4-6-14. - Reserved.

Editor's note— Ord. No. 04-008, § 2, adopted June 8, 2004, repealed sections 4-6-12—4-6-14 in their entirety. Former sections 4-6-12—4-6-14 pertained to the variance procedure; noise variance board; and appeals, respectively, and derived from Ord. No. 2700, § 1, adopted Sept. 19, 1973; Ord. No. 2715, § 1, adopted Nov. 13, 1973; Ord. No. 2870, § 1, adopted Oct. 1, 1975.

Sec. 4-6-15. - Violations; misdemeanors.

Any person violating any of the provisions of this article shall be deemed guilty of a misdemeanor. Each day such violation is committed or permitted to continue shall constitute a separate offense and shall be punishable as such. The provisions of this article shall not be construed as permitting conduct not prescribed herein and shall not affect the enforceability of any other applicable provisions of law.

(Ord. No. 2700, § 1, 9-19-73; Ord. No. 2715, § 1, 11-13-73)

Sec. 4-6-16. - Reserved.

Editor's note— Ord. No. 98-16, § 1, adopted December 8, 1998, amended the Code by repealing § 4-6-16 in its entirety. Former § 4-6-16 pertained to delay in implementation, and derived from Ord. No. 2700, adopted September 19, 1973; and Ord. No. 2715, adopted November 13, 1973.

Appendix B

Field Data and Photos

Field Sheet

Project:	Coto De Caza California Grand Village	**Engineer:** D. Shivaiah	**Date:** 1/8/2020
			JN: 2389-2019-01
Measurement Address:	Northwest of Avenida La Caza and Via Pavo Real.	**City:** County of Orange	**Site No.:** 1

Sound Level Meter:
LD-712
Serial # A0520

Calibration Record:

	Input, dB/	Reading, dB/	Offset, dB/	Time
Before	114.0	114.0	28.1	10:26 AM
After				

Calibrated at

Calibrator:
LD-250 250
Serial # 1322

Notes:
Temp: 52
Windspeed: 5mph
Direction: S
Skies: Partly Cloudy
Camera:
Photo Nos.

Meter Settings:
☒ A-WTD ☐ LINEAR ☒ SLOW ☐ 1/1 OCT ☒ INTERVALS ___10____ - MINUTE
☐ C-WTD ☐ IMPULSE ☐ FAST ☐ 1/3 OCT ☒ L_N PERCENTILE VALUES

Notes:

Measurement Type:
Long-term
Short-term X

		Start Time	Stop Time	Leq	Lmin	Lmax	L2	L8	L25	L50
Locations	1	10:39 AM	10:49 AM	45.6	40.3	63.9	50.3	47.2	45.4	43.9
		Measurement taken at the eastern property line at approximately 5 feet from the property line. Ambient Noise includes traffic noise from Ave La Caza, noise from tennis court and birds chirping.								
	2	10:55 AM	11:05 AM	45.2	39.1	64.9	51.5	47.5	45.1	43.5
		Measurement taken at eastern tennis court at approximately 5 feet from the fence at approximately 90 feet from the eastern property line. Ambient Noise includes traffic noise from Ave La Caza, noise from tennis court and birds chirping.								
	3	11:20 AM	11:30 AM	43.6	37.5	66.3	48.7	44.5	42.4	41.2
		Measurement taken at the tennis court at approximately 60 feet from the western property line and at approximately 90 feet from the northern property line. Ambient Noise includes noise from tennis court and landscape maintenance.								
	4	11:39 AM	11:49 AM	46.1	37.7	73.1	49.8	42.3	40.3	39
		Measurement taken at the western tennis court at approximately 5 feet from the fence at approximately 130 feet from the northern property line. Ambient Noise includes traffic noise from Via Alondra and parking noise.								
	5									

✕ = Short-term
✕ = Long-term

RK engineering group, inc.

Field Sheet - ST1 Location Photos

Project: Coto De Caza California Grand Village	**Engineer:** D. Shivaiah	**Date:**	1/8/2020
		JN:	2389-2019-01
Measurement Address: Northwest of Avenida La Caza and Via Pavo Real.	**County:** Orange	**Site No.:**	1

RK engineering group, inc.

Field Sheet - ST2 Location Photos

Project: Coto De Caza California Grand Village	**Engineer:** D. Shivaiah	**Date:**	1/8/2020
		JN:	2389-2019-01
Measurement Address: Northwest of Avenida La Caza and Via Pavo Real.	**County:** Orange	**Site No.:**	2

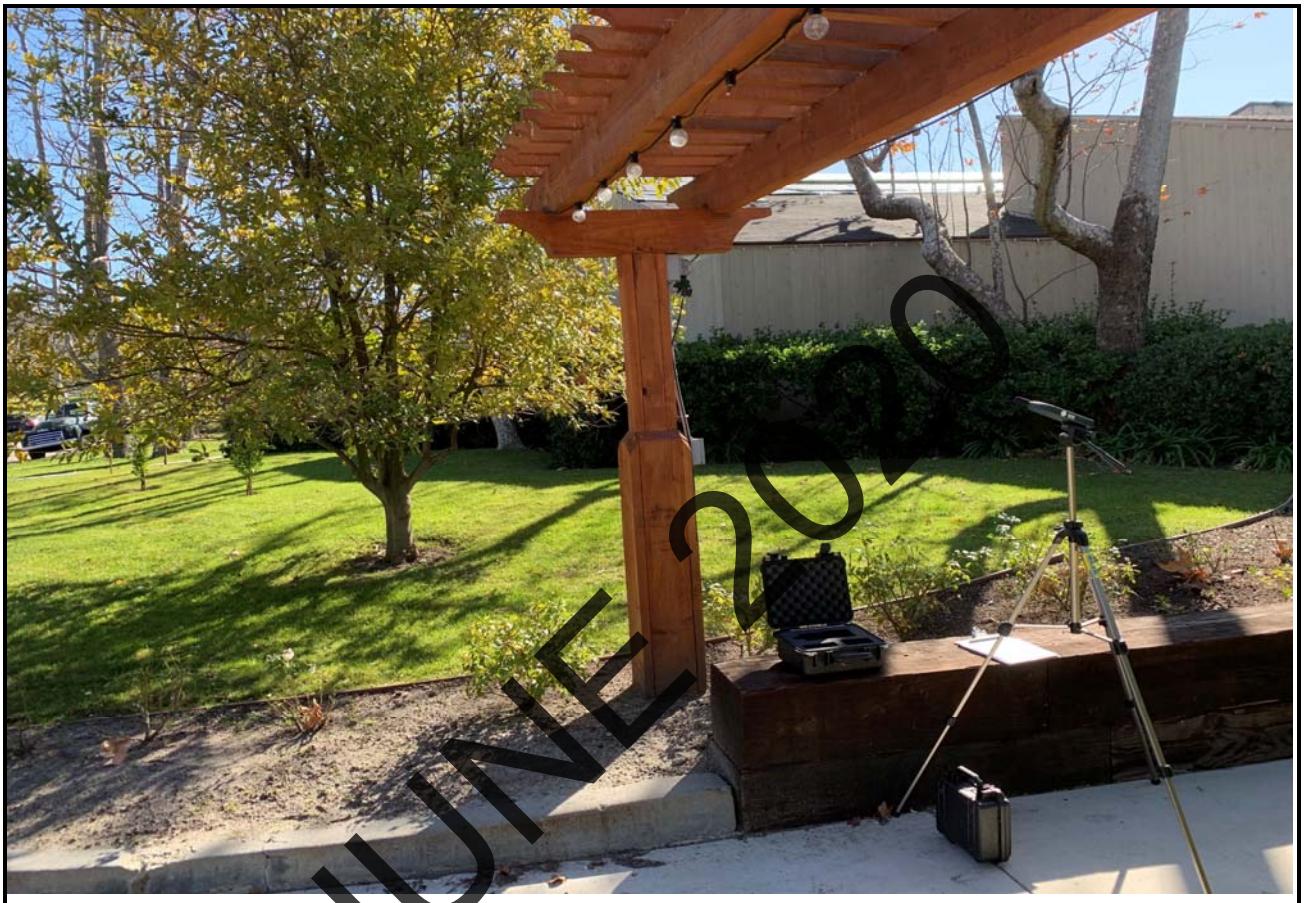
Field Sheet - ST3 Location Photos

Project: Coto De Caza California Grand Village	**Engineer:** D. Shivaiah	**Date:**	1/8/2020
		JN:	2389-2019-01
Measurement Address: Northwest of Avenida La Caza and Via Pavo Real.	**County:** Orange	**Site No.:**	3

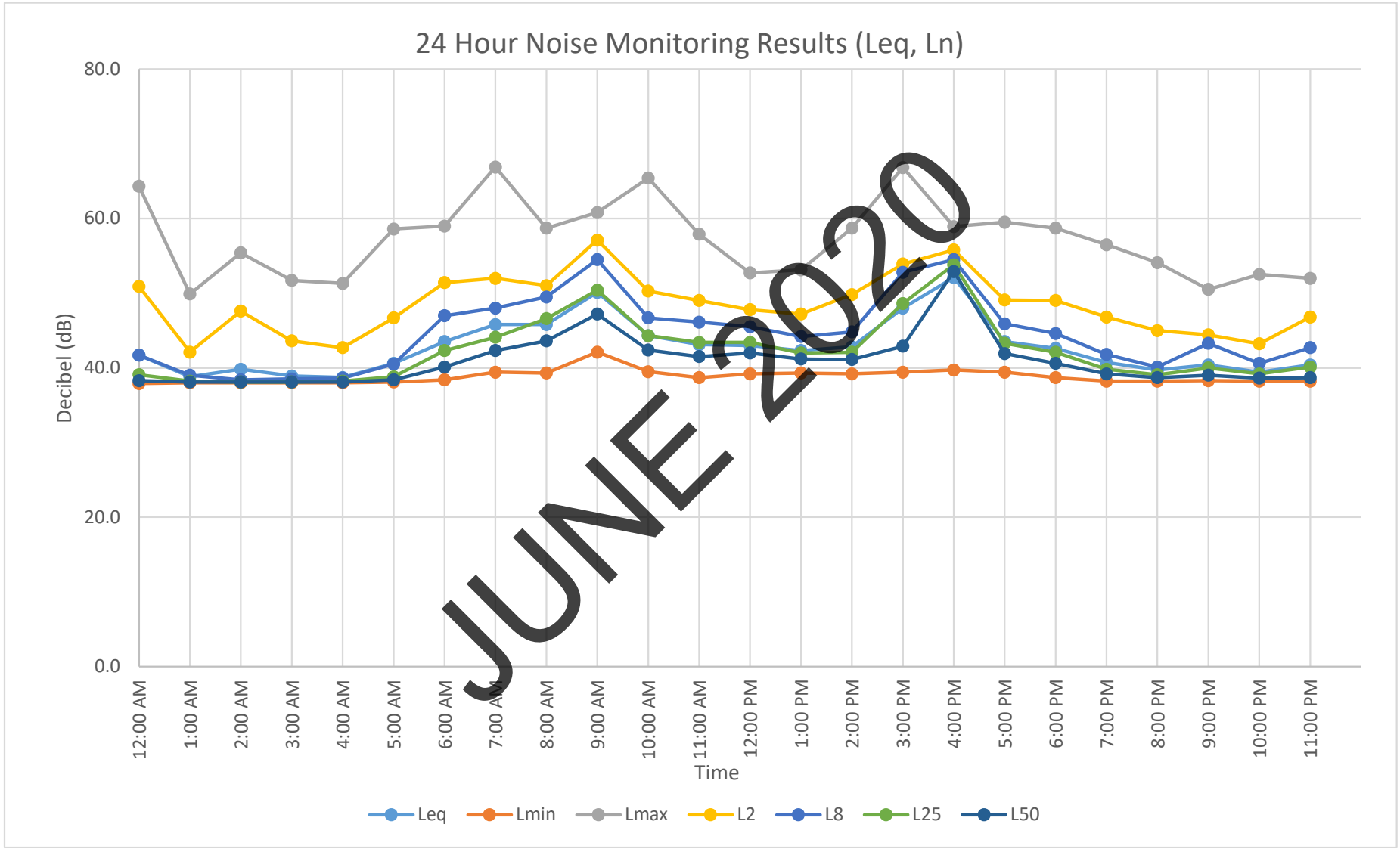
RK engineering group, inc.

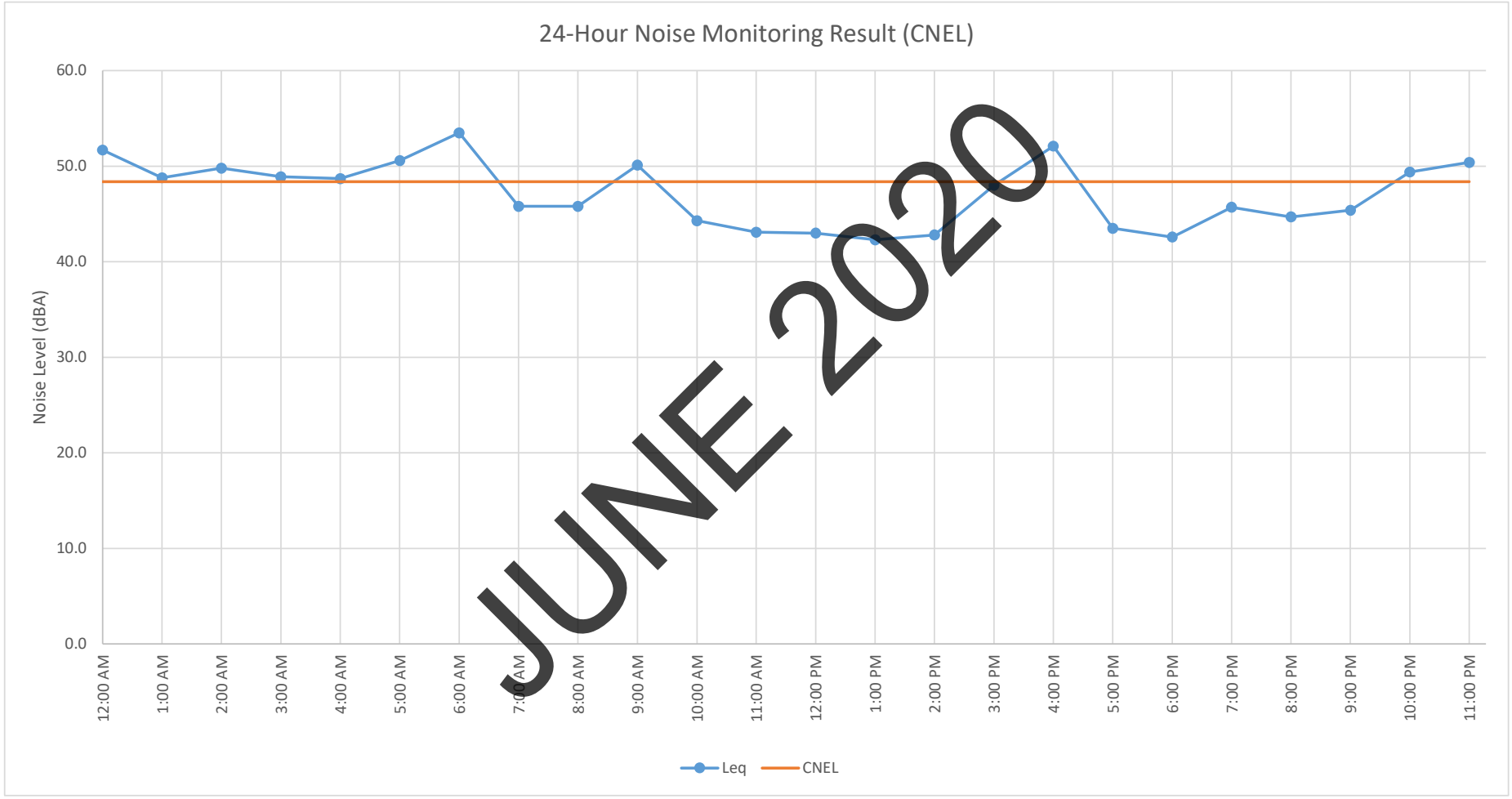
Field Sheet - ST4 Location Photos

Project: Coto De Caza California Grand Village	**Engineer:** D. Shivaiah	**Date:**	1/8/2020
		JN:	2389-2019-01
Measurement Address: Northwest of Avenida La Caza and Via Pavo Real.	**County:** Orange	**Site No.:**	4

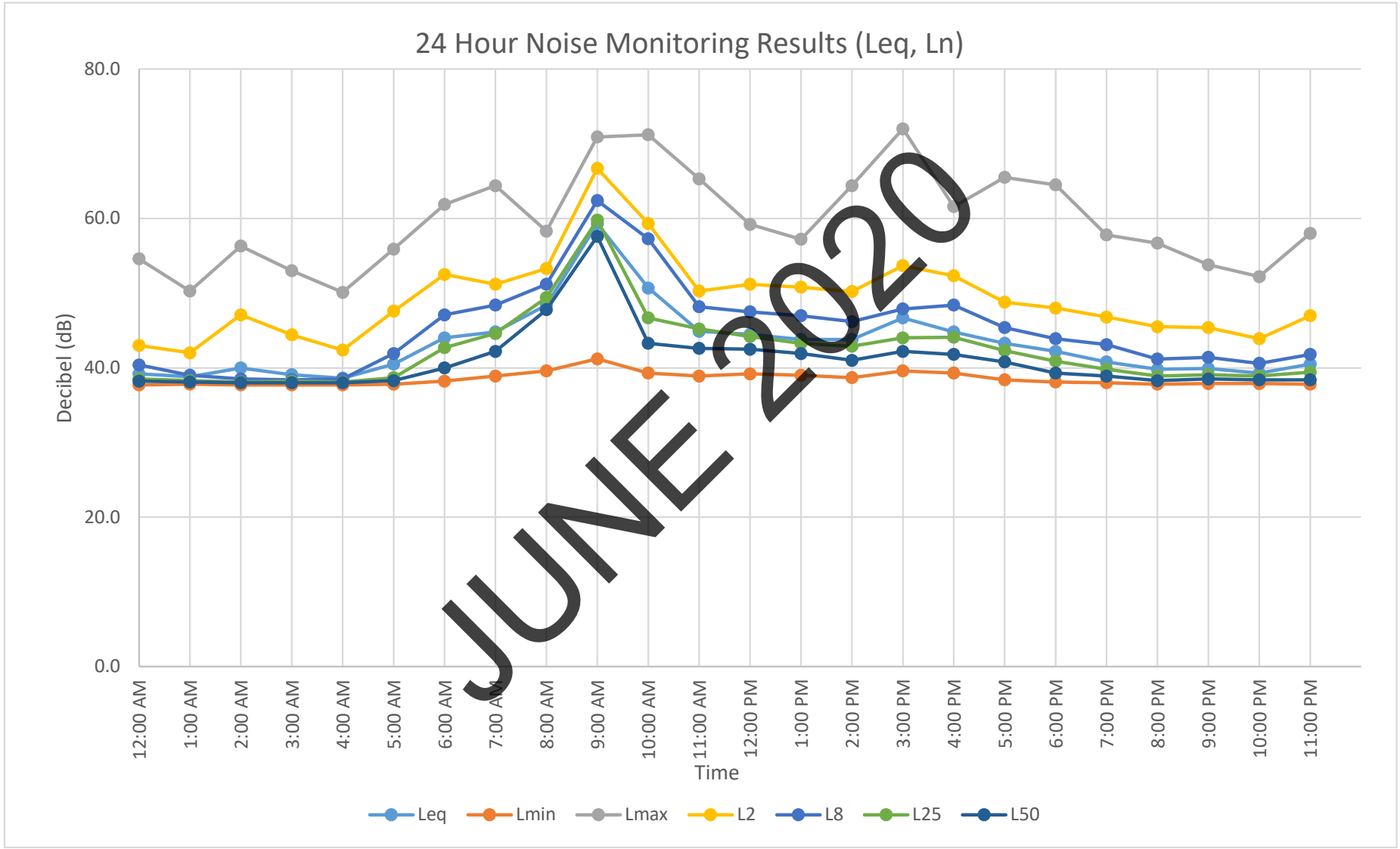


PROJECT:	Coto De Caza California Grand Village					JOB #:	2389-2019-01
NOISE METER	Piccolo II SLM, 24-Hour Measurement					DATE:	08-Jan-20
LOCATION:	Northwest Property Line					BY:	D. Shivaiah
Time	Leq	Lmin	Lmax	L2	L8	L25	L50
12:00 AM	41.7	37.9	64.3	50.9	41.7	39.1	38.3
1:00 AM	38.8	38	49.9	42.1	39	38.2	38.1
2:00 AM	39.8	38	55.4	47.6	38.4	38.1	38.1
3:00 AM	38.9	38	51.7	43.6	38.5	38.1	38.1
4:00 AM	38.7	38	51.3	42.7	38.6	38.2	38.1
5:00 AM	40.6	38.1	58.6	46.7	40.5	38.8	38.4
6:00 AM	43.5	38.4	59	51.4	47	42.3	40.1
7:00 AM	45.8	39.4	66.9	52	48	44.1	42.3
8:00 AM	45.8	39.3	58.7	51	49.5	46.6	43.6
9:00 AM	50.1	42.1	60.8	57.1	54.5	50.4	47.2
10:00 AM	44.3	39.5	65.4	50.3	46.7	44.3	42.4
11:00 AM	43.1	38.7	57.9	49	46.1	43.4	41.5
12:00 PM	43	39.2	52.7	47.8	45.5	43.4	42
1:00 PM	42.3	39.3	53.1	47.2	44.2	42	41.2
2:00 PM	42.8	39.2	58.7	49.8	44.8	42.1	41.1
3:00 PM	48	39.4	66.8	53.9	52.8	48.6	42.9
4:00 PM	52.1	39.7	58.9	55.8	54.5	53.8	52.9
5:00 PM	43.5	39.4	59.5	49.1	45.9	43.3	41.9
6:00 PM	42.6	38.7	58.7	49	44.6	42.1	40.6
7:00 PM	40.7	38.2	56.5	46.8	41.8	39.8	39.2
8:00 PM	39.7	38.2	54.1	45	40.1	39.1	38.7
9:00 PM	40.4	38.3	50.5	44.4	43.3	40	39
10:00 PM	39.4	38.2	52.5	43.2	40.6	39.2	38.6
11:00 PM	40.4	38.2	52	46.8	42.7	40.1	38.7
Daytime	45.7	38.2	66.9	51.2	48.8	46.2	44.4
Nighttime	40.6	37.9	64.3	47.7	41.9	39.4	38.5


24 Hour Noise Monitoring Results (Leq, Ln)
80.0
60.0
40.0
20.0
0.0
Decibel (dB)
12:00 AM
1:00 AM
2:00 AM
3:00 AM
4:00 AM
5:00 AM
6:00 AM
7:00 AM
8:00 AM
9:00 AM
10:00 AM
11:00 AM
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
9:00 PM
10:00 PM
11:00 PM
Time
Leq
Lmin
Lmax
L2
L8
L25
L50
JUNE 2020


24-Hour Noise Monitoring Result (CNEL)
Noise Level (dBA)
60.0
50.0
40.0
30.0
20.0
10.0
0.0
12:00 AM
1:00 AM
2:00 AM
3:00 AM
4:00 AM
5:00 AM
6:00 AM
7:00 AM
8:00 AM
9:00 AM
10:00 AM
11:00 AM
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
9:00 PM
10:00 PM
11:00 PM
Leq
CNEL
JUNE 2020

PROJECT:	Coto De Caza California Grand Village					JOB #:	2389-2019-01
NOISE METER	Piccolo II SLM, 24-Hour Measurement					DATE:	08-Jan-20
LOCATION:	Southern Property Line					BY:	D. Shivaiah
Time	Leq	Lmin	Lmax	L2	L8	L25	L50
12:00 AM	39.2	37.7	54.6	43.0	40.4	38.5	38.2
1:00 AM	38.8	37.8	50.3	42	39	38.3	38.1
2:00 AM	40	37.7	56.3	47.1	38.5	38.1	38
3:00 AM	39.1	37.7	53	44.4	38.4	38.2	38
4:00 AM	38.6	37.7	50.1	42.4	38.5	38.1	38
5:00 AM	40.5	37.8	55.9	47.6	41.9	38.7	38.3
6:00 AM	44	38.2	61.9	52.5	47.1	42.7	40
7:00 AM	44.8	38.9	64.4	51.2	48.4	44.6	42.2
8:00 AM	48.4	39.6	58.3	53.3	51.2	49.4	47.8
9:00 AM	59.3	41.2	70.9	66.7	62.4	59.8	57.6
10:00 AM	50.7	39.3	71.2	59.3	57.3	46.7	43.3
11:00 AM	44.9	38.9	65.3	50.3	48.2	45.2	42.6
12:00 PM	44.5	39.2	59.2	51.2	47.5	44.2	42.5
1:00 PM	43.8	39	57.2	50.8	47	43.3	41.9
2:00 PM	43.8	38.7	64.4	50.2	46.2	42.9	41
3:00 PM	46.7	39.6	72	53.7	47.9	44	42.2
4:00 PM	44.8	39.3	61.6	52.3	48.4	44.1	41.8
5:00 PM	43.3	38.4	65.5	48.8	45.4	42.3	40.8
6:00 PM	42.2	38.1	64.5	48	43.9	40.9	39.3
7:00 PM	40.8	38	57.8	46.8	43.1	39.8	38.9
8:00 PM	39.8	37.8	56.7	45.5	41.2	38.9	38.3
9:00 PM	39.9	37.9	53.8	45.4	41.4	39.1	38.5
10:00 PM	39.3	37.9	52.2	43.9	40.6	38.9	38.4
11:00 PM	40.5	37.8	58	47	41.8	39.4	38.4
Daytime	49.2	37.8	72.0	56.4	52.6	49.2	47.1
Nighttime	40.5	37.7	61.9	47.2	41.8	39.3	38.4


24 Hour Noise Monitoring Results (Leq, Ln)
80.0
60.0
40.0
20.0
0.0
Decibel (dB)
12:00 AM
1:00 AM
2:00 AM
3:00 AM
4:00 AM
5:00 AM
6:00 AM
7:00 AM
8:00 AM
9:00 AM
10:00 AM
11:00 AM
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
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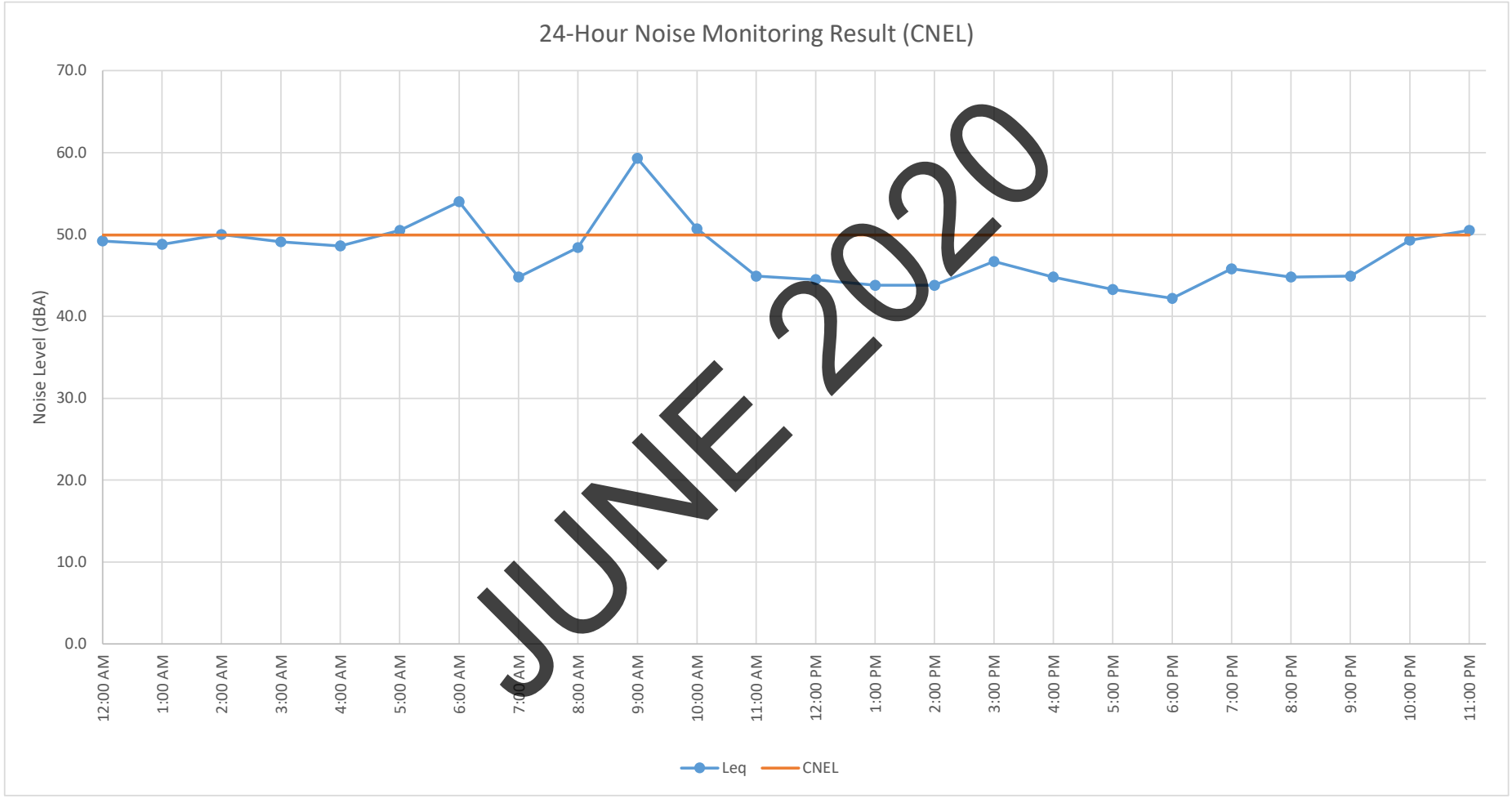
Time
Leq
Lmin
Lmax
L2
L8
L25
L50
JUNE 2020


24-Hour Noise Monitoring Result (CNEL)
Noise Level (dBA)
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
12:00 AM
1:00 AM
2:00 AM
3:00 AM
4:00 AM
5:00 AM
6:00 AM
7:00 AM
8:00 AM
9:00 AM
10:00 AM
11:00 AM
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
9:00 PM
10:00 PM
11:00 PM
Leq
CNEL
JUNE 2020

Appendix C

Noise Analysis Results
(SoundPLAN and Vibration)

Coto De Caza California Grand Village
Noise emissions of industry sources

Source name	Reference	Level		Corrections		
		Day	Night	Cwall	CI	CT
		dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
HVAC-2	Lw/unit	92.6	92.6	-	-	-
HVAC-1	Lw/unit	92.6	92.6	-	-	-
HVAC-3	Lw/unit	92.6	92.6	-	-	-
Exhaust Fan	Lw/unit	76.7	-	-	-	-
Pool Equipment-1	Lw/unit	83.0	-	-	-	-
Pool Equipment-2	Lw/unit	83.0	-	-	-	-

Coto De Caza California Grand Village
Noise emissions of parking lot traffic

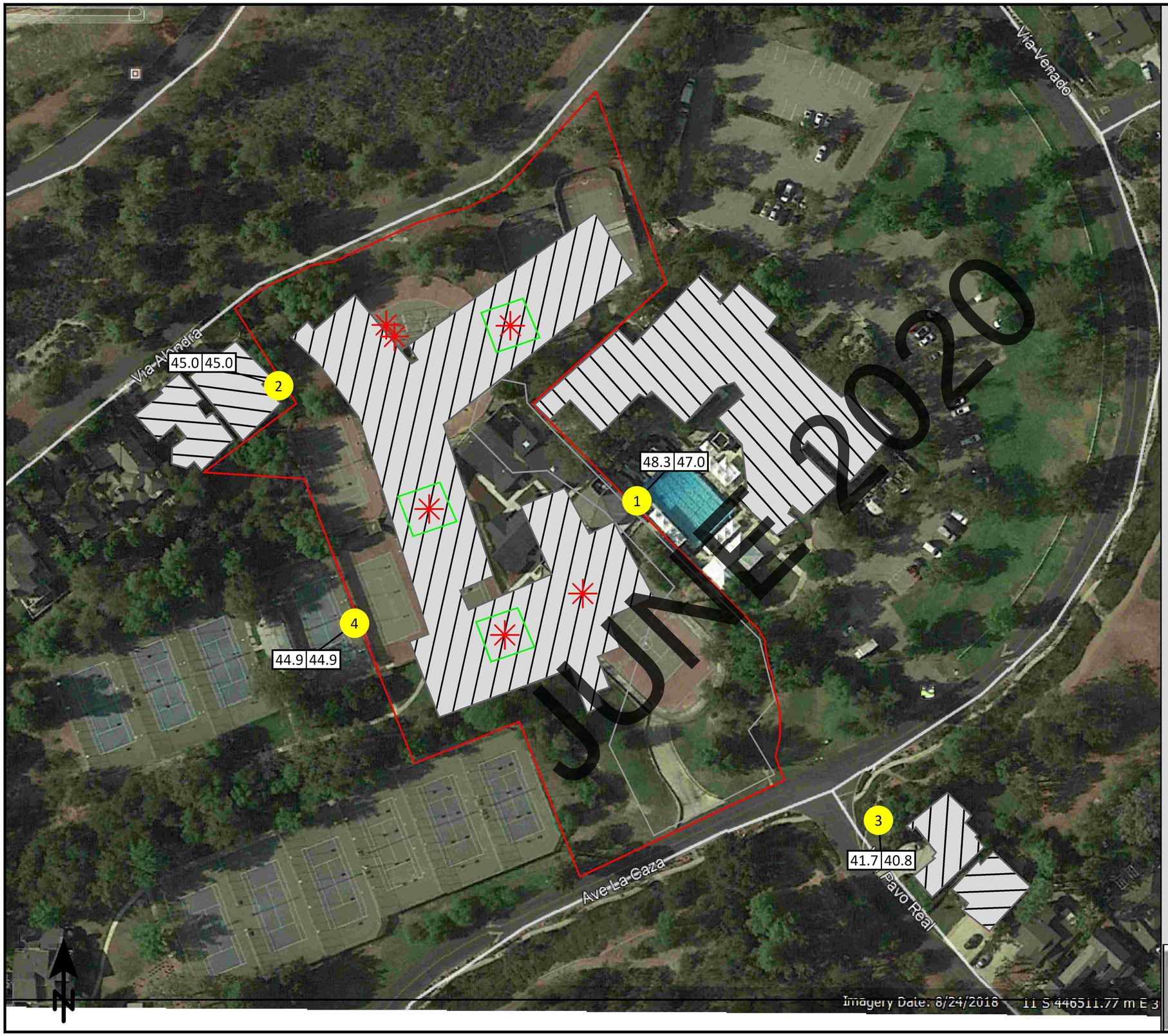
Name	Parking lot type	Low noise trolleys	Size	Movements per hour		Road surface	Separated method	Lw,ref
				Day	Night			dB(A)
Parking Lot	Visitors and staff	-	135 Parking bays	0.160	0.070	Asphaltic driving lane	no	84.0

Coto De Caza California Grand Village
Receiver list

No.	Receiver name	Building side	Floor	Limit		Level w/o NP		Level w NP		Difference		Conflict	
				Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
				dB(A)		dB(A)		dB(A)		dB		dB	
1	Receptor to the East	-	GF	-	-	50.4	49.7	48.3	47.0	-2.2	-2.7	-	-
2	Receptor to the Northwest Re	-	GF	-	-	46.1	46.1	45.0	45.0	-1.1	-1.1	-	-
3	Receptor to the South	-	GF	-	-	43.0	42.4	41.7	40.8	-1.3	-1.6	-	-
4	Receptor to the West	-	GF	-	-	47.9	47.9	44.9	44.9	-3.0	-3.0	-	-

Coto De Caza California Grand Village
Contribution levels of the receivers

Source name		Level w/o NP Day	Level w/o NP Night	Level w NP Day	Level w NP Night
		dB(A)		dB(A)	
Receptor to the East	GF	50.4	49.7	48.3	47.0
Exhaust Fan		31.4	-	31.4	-
HVAC-1		44.6	44.6	40.7	40.7
HVAC-2		45.1	45.1	42.1	42.1
HVAC-3		43.1	43.1	40.0	40.0
Parking Lot		44.4	40.8	44.4	40.9
Pool Equipment-1		16.6	-	16.6	-
Pool Equipment-2		15.9	-	15.9	-
Receptor to the Northwest Residential	GF	46.1	46.1	45.0	45.0
Exhaust Fan		18.9	-	14.3	-
HVAC-1		38.3	38.3	33.5	33.5
HVAC-2		43.2	43.2	43.2	43.2
HVAC-3		41.0	41.0	39.0	39.0
Parking Lot		15.9	12.3	15.7	12.2
Pool Equipment-1		22.5	-	22.5	-
Pool Equipment-2		21.7	-	21.7	-
Receptor to the South	GF	43.0	42.4	41.7	40.8
Exhaust Fan		23.6	-	23.6	-
HVAC-1		37.1	37.1	36.0	36.0
HVAC-2		35.6	35.6	31.9	31.9
HVAC-3		38.3	38.3	36.7	36.7
Parking Lot		36.5	32.9	36.5	32.9
Pool Equipment-1		9.1	-	9.1	-
Pool Equipment-2		8.6	-	8.6	-
Receptor to the West	GF	47.9	47.9	44.9	44.9
Exhaust Fan		21.0	-	21.0	-
HVAC-1		34.8	34.8	28.4	28.4
HVAC-2		46.2	46.2	43.9	43.9
HVAC-3		42.2	42.2	37.5	37.5
Parking Lot		17.6	14.0	17.4	13.8
Pool Equipment-1		11.6	-	11.6	-
Pool Equipment-2		15.5	-	15.5	-



Coto De Caza California
Grand Village
Noise Impact Study

County of Orange

Signs and symbols

- Line
- Ground effects
- Wall
- Receiver
- Point source
- Parking lot

1 : 1566

0 10 20 40 60 80 m

RK engineering group, inc.

Coto De Caza California
Grand Village
Noise Impact Study

County of Orange

Signs and symbols

- Line
- Ground effects
- Wall
- Point source
- Parking lot

Levels in dB(A)

<= 45	
45	- 50
50	- 55
55	- 60
60	- 65
65	- 70
70	- 75
75	- 80
80	- 85
85	- 90
> 90	

1 : 1566

0 10 20 40 60 80 m

RK engineering group, inc.

Coto De Caza California
Grand Village
Noise Impact Study

County of Orange

Signs and symbols

- Line
- Ground effects
- Wall
- Point source
- Parking lot

Levels in dB(A)

<= 45	
45	- 50
50	- 55
55	- 60
60	- 65
65	- 70
70	- 75
75	- 80
80	- 85
85	- 90
90	- 95
> 95	

1 : 1566

0 10 20 40 60 80 m

RK engineering group, inc.

Appendix D

Roadway Noise Calculation Worksheets

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

PROJECT:	Coto De Caza California Grand Village Noise Impact Study	JOB #:	2389-2019-01
ROADWAY:	Avenida La Caza (Existing Condition)	DATE:	13-Feb-20
LOCATION:	50 Feet from the Centerline	ENGINEER:	D. Shivaiah

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	600	
SPEED =	25	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	15	
ROAD ELEVATION =	0.0	
GRADE =	0.0	%
PK HR VOL =	60	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		50
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		50
PAD ELEVATION =		0.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15	
MEDIUM TRUCKS =	15	(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	15	

WALL INFORMATION

HTH WALL=	0.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9742
MEDIUM TRUCKS	0.848	0.049	0.103	0.0184
HEAVY TRUCKS	0.865	0.027	0.108	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	49.53	- -
MEDIUM TRUCKS	4.0	49.44	- -
HEAVY TRUCKS	8.0	49.53	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	46.6	44.7	42.9	36.9	45.5	46.1
MEDIUM TRUCKS	41.0	39.5	33.1	31.6	40.0	40.3
HEAVY TRUCKS	43.2	41.8	32.7	34.0	42.3	42.5
NOISE LEVELS (dBA)	49.0	47.3	43.7	39.4	48.0	48.4

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	46.6	44.7	42.9	36.9	45.5	46.1
MEDIUM TRUCKS	41.0	39.5	33.1	31.6	40.0	40.3
HEAVY TRUCKS	43.2	41.8	32.7	34.0	42.3	42.5
NOISE LEVELS (dBA)	49.0	47.3	43.7	39.4	48.0	48.4

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	2	4	8	18
LDN	2	4	8	17

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

PROJECT: Coto De Caza California Grand Village Noise Impact Study
ROADWAY: Avenida La Caza (Existing Plus Project Condition)
LOCATION: 50 Feet from the Centerline

JOB #: 2389-2019-01
DATE: 13-Feb-20
ENGINEER: D. Shivaiah

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	1,000	
SPEED =	25	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	15	
ROAD ELEVATION =	0.0	
GRADE =	0.0	%
PK HR VOL =	100	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		50
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		50
PAD ELEVATION =		0.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15	
MEDIUM TRUCKS =	15	(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	15	

WALL INFORMATION

HTH WALL=	0.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9742
MEDIUM TRUCKS	0.848	0.049	0.103	0.0184
HEAVY TRUCKS	0.865	0.027	0.108	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	49.53	- -
MEDIUM TRUCKS	4.0	49.44	- -
HEAVY TRUCKS	8.0	49.53	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	48.8	46.9	45.1	39.1	47.7	48.3
MEDIUM TRUCKS	43.2	41.7	35.4	33.8	42.3	42.5
HEAVY TRUCKS	45.4	44.0	34.9	36.2	44.6	44.7
NOISE LEVELS (dBA)	51.2	49.5	45.9	41.7	50.2	50.6

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	48.8	46.9	45.1	39.1	47.7	48.3
MEDIUM TRUCKS	43.2	41.7	35.4	33.8	42.3	42.5
HEAVY TRUCKS	45.4	44.0	34.9	36.2	44.6	44.7
NOISE LEVELS (dBA)	51.2	49.5	45.9	41.7	50.2	50.6

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	3	5	12	25
LDN	2	5	11	24

#

Appendix E

Construction Noise and Vibration Calculation Worksheets

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat ########
Case Descr Coto de Caza California Grand Village

		---- Receptor #1 ----		
		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Demolition	Residential	55	50	50

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Mixer Truck	No	40		78.8	50	0
Excavator	No	40		80.7	50	0
Dozer	No	40		81.7	50	0
Excavator	No	40		80.7	50	0
Excavator	No	40		80.7	50	0
Dozer	No	40		81.7	50	0

	Calculated (dBA)		Results Noise Limits (dBA)					
			Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Concrete Mixer Truck	78.8	74.8	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
Dozer	81.7	77.7	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
Excavator	80.7	76.7	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
Total	81.7	84.6	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat ########
Case Description:

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Grading	Residential	55	50	50

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	50	0
Grader	No	40	85		50	0
Dozer	No	40		81.7	50	0
Tractor	No	40	84		50	0
Excavator	No	40		80.7	50	0
Tractor	No	40	84		50	0
Tractor	No	40	84		50	0

Results

	Calculated (dBA)		Noise Limits (dBA)					
			Day		Evening		Night	
Equipment	*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
Grader	85	81	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
Tractor	84	80	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
Tractor	84	80	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84	80	N/A	N/A	N/A	N/A	N/A	N/A
Total	85	87.6	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat ########
Case Description:

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Grading	Residential	55	50	50

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	50	0
Grader	No	40	85		50	0
Dozer	No	40		81.7	50	0
Tractor	No	40	84		50	0
Excavator	No	40		80.7	50	0
Tractor	No	40	84		50	0
Tractor	No	40	84		50	0

Results

	Calculated (dBA)		Noise Limits (dBA)					
			Day		Evening		Night	
Equipment	*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
Grader	85	81	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
Tractor	84	80	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
Tractor	84	80	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84	80	N/A	N/A	N/A	N/A	N/A	N/A
Total	85	87.6	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat ########
Case Descr Coto de Caza California Grand Village

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Paving	Residential	55	50	50

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Mixer Truck	No	40		78.8	50	0
Paver	No	50		77.2	50	0
Roller	No	20		80	50	0
Roller	No	20		80	50	0
Tractor	No	40	84		50	0
Concrete Mixer Truck	No	40		78.8	50	0
Roller	No	20		80	50	0
Roller	No	20		80	50	0

Equipment	Calculated (dBA) *Lmax	Leq	Results Noise Limits (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax
Concrete Mixer Truck	78.8	74.8	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
Roller	80	73	N/A	N/A	N/A	N/A	N/A
Roller	80	73	N/A	N/A	N/A	N/A	N/A
Tractor	84	80	N/A	N/A	N/A	N/A	N/A
Concrete Mixer Truck	78.8	74.8	N/A	N/A	N/A	N/A	N/A
Roller	80	73	N/A	N/A	N/A	N/A	N/A
Roller	80	73	N/A	N/A	N/A	N/A	N/A
Total	84	84.3	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat ########
Case Descr Coto de Caza California Grand Village

		Baselines (dBA)		---- Receptor #1 ----
Descriptior	Land Use	Daytime	Evening	Night
Architectur	Residential	55	50	50

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	50	0

	Calculated (dBA)		Results Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Compressor (air)	77.7	73.7	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

*Calculated Lmax is the Loudest value.

NOISE BARRIER CALCULATIONS - BASED UPON FHWA - RD-77-108

PROJECT:	Coto de Caza California Grand Village	JOB #:	2389-2019-1
SOURCE:	Worst Case Construction Noise	DATE:	14-Feb-20
LOCATION:	Receptor at 50 Feet	BY:	Darshan Shivaiah

NOISE INPUT DATA

OBS DIST=	50.0			
DT WALL=	25.0			
DT W/OB=	25.0			
HTH WALL=	12.0	********		
BARRIER =	0.0	(0=WALL,1=BERM)		
OBS HTH=	5.0			
NOISE HTH=	8.0		BARRIER+	
OBS EL =	0.0		TOPO SHIELDING =	-10.60
NOISE EL =	0.0		NOISE HTH EL=	8.0
DROP-OFF=	10.0	(20 = 6 dBA PER DOUBLING OF DISTANCE)		
COFF				

NOISE OUTPUT DATA (dBA)

	DIST (FT)	Leq	Lmax	L2	L8	L25	L50
REF LEVEL	50	87.6	87.6	87.6	87.6	87.6	87.6
PROJ LEVEL	50	87.6	87.6	87.6	87.6	87.6	87.6
SHIELDING	50	-10.6	-10.6	-10.6	-10.6	-10.6	-10.6
ADJ LEVEL	50	***77.0***	***77.0***	***77.0***	***77.0***	***77.0***	***77.0***

NOISE LEVEL REDUCTION DUE TO DISTANCE = 0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

PROJECT: Coto de Caza California Grand Village
ROADWAY: Avenida La Caza
SCENARIO: Existing Condition with Hauling Trucks

JOB #: 2389-2019-01
DATE: 13-Feb-20
ENGINEER: D Shivaiah

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	1,120	
SPEED =	25	
PK HR % =	10	
NEAR LANE/FAR LANE DIST :	12	
ROAD ELEVATION =	0.0	
GRADE =	0.0	%
PK HR VOL =	112	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		50
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		50
PAD ELEVATION =		0.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15	
MEDIUM TRUCKS =	15	(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	15	

WALL INFORMATION

HTH WALL=	0.0
AMBIENT=	0.0
BARRIER =	0 (0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.7556	0.1402	0.1043	0.5223
MEDIUM TRUCKS	0.4545	0.0909	0.4545	0.0098
HEAVY TRUCKS	0.9967	0.0000	0.0033	0.4679

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	49.73	- -
MEDIUM TRUCKS	4.0	49.65	- -
HEAVY TRUCKS	8.0	49.73	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	46.6	44.5	43.3	37.2	45.6	46.3
MEDIUM TRUCKS	41.0	36.7	35.8	38.0	44.2	44.4
HEAVY TRUCKS	63.9	63.1	19.1	39.5	60.2	60.2
NOISE LEVELS (dBA)	64.0	63.1	44.0	43.1	60.5	60.5

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	46.6	44.5	43.3	37.2	45.6	46.3
MEDIUM TRUCKS	41.0	36.7	35.8	38.0	44.2	44.4
HEAVY TRUCKS	63.9	63.1	19.1	39.5	60.2	60.2
NOISE LEVELS (dBA)	64.0	63.1	44.0	43.1	60.5	60.5

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	12	25	54	116
LDN	12	25	54	116

VIBRATION IMPACTS FROM CONSTRUCTION AND OPERATIONS

PROJECT:	Vibration Study	JOB #:	2389-2019-01
ACTIVITY:	Coto de Caza California C	DATE:	13-Feb-20
LOCATION:	Residential Units to the west	ENGINEER:	Darshan Shivaiah

VIBRATION INPUT/OUTPUT DATA

OTHER CONSTRUCTION EQUIPMENT

$$PPV = PPV_{ref}(25/D)^{n} \text{ (in/sec)}$$

PPV =	**0.089 in/sec**

Equipment Type =	2	Large Bulldozer
PPV_{ref} =	0.089	Reference PPV at 25 ft.
D =	25.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

EQUIPMENT PPV REFERENCE LEVELS

Type	Equipment	Reference PPV
1	Vibratory Roller	0.210
2	Large Bulldozer	0.089
3	Caisson Drilling	0.089
4	Loaded Trucks	0.076
5	Jackhammer	0.035
6	Small Bulldozer	0.003
7	Crack and Seat	2.400

VIBRATION IMPACTS FROM CONSTRUCTION AND OPERATIONS

PROJECT:	Vibration Study	JOB #:	2389-2019-01
ACTIVITY:	Coto de Caza California G	DATE:	13-Feb-20
LOCATION:	Residential Units to the west	ENGINEER:	Darshan Shivaiah

VIBRATION INPUT/OUTPUT DATA

OTHER CONSTRUCTION EQUIPMENT

$$PPV = PPV_{ref}(25/D)^{n} \text{ (in/sec)}$$

PPV =	**0.210 in/sec**

Equipment Type =	1	Vibratory Roller
PPV_{ref} =	0.210	Reference PPV at 25 ft.
D =	25.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

EQUIPMENT PPV REFERENCE LEVELS

Type	Equipment	Reference PPV
1	Vibratory Roller	0.210
2	Large Bulldozer	0.089
3	Caisson Drilling	0.089
4	Loaded Trucks	0.076
5	Jackhammer	0.035
6	Small Bulldozer	0.003
7	Crack and Seat	2.400

VIBRATION IMPACTS FROM CONSTRUCTION AND OPERATIONS

PROJECT:	Vibration Study	JOB #:	2389-2019-01
ACTIVITY:	Coto de Caza California G	DATE:	13-Feb-20
LOCATION:	Residential Units to the west	ENGINEER:	Darshan Shivaiah

VIBRATION INPUT/OUTPUT DATA

OTHER CONSTRUCTION EQUIPMENT

$$PPV = PPV_{ref}(25/D)^{n} \text{ (in/sec)}$$

PPV =	**0.076 in/sec**

Equipment Type =	4	Loaded Trucks
PPV_{ref} =	0.076	Reference PPV at 25 ft.
D =	25.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

EQUIPMENT PPV REFERENCE LEVELS

Type	Equipment	Reference PPV
1	Vibratory Roller	0.210
2	Large Bulldozer	0.089
3	Caisson Drilling	0.089
4	Loaded Trucks	0.076
5	Jackhammer	0.035
6	Small Bulldozer	0.003
7	Crack and Seat	2.400

VIBRATION IMPACTS FROM CONSTRUCTION AND OPERATIONS

PROJECT:	Vibration Study	JOB #:	2389-2019-01
ACTIVITY:	Coto de Caza California G	DATE:	13-Feb-20
LOCATION:	Residential Units to the west	ENGINEER:	Darshan Shivaiah

VIBRATION INPUT/OUTPUT DATA

OTHER CONSTRUCTION EQUIPMENT

$$PPV = PPV_{ref}(25/D)^{n} \text{ (in/sec)}$$

PPV =	**0.089 in/sec**

Equipment Type =	3	Caisson Drilling
PPV_{ref} =	0.089	Reference PPV at 25 ft.
D =	25.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

EQUIPMENT PPV REFERENCE LEVELS

Type	Equipment	Reference PPV
1	Vibratory Roller	0.210
2	Large Bulldozer	0.089
3	Caisson Drilling	0.089
4	Loaded Trucks	0.076
5	Jackhammer	0.035
6	Small Bulldozer	0.003
7	Crack and Seat	2.400