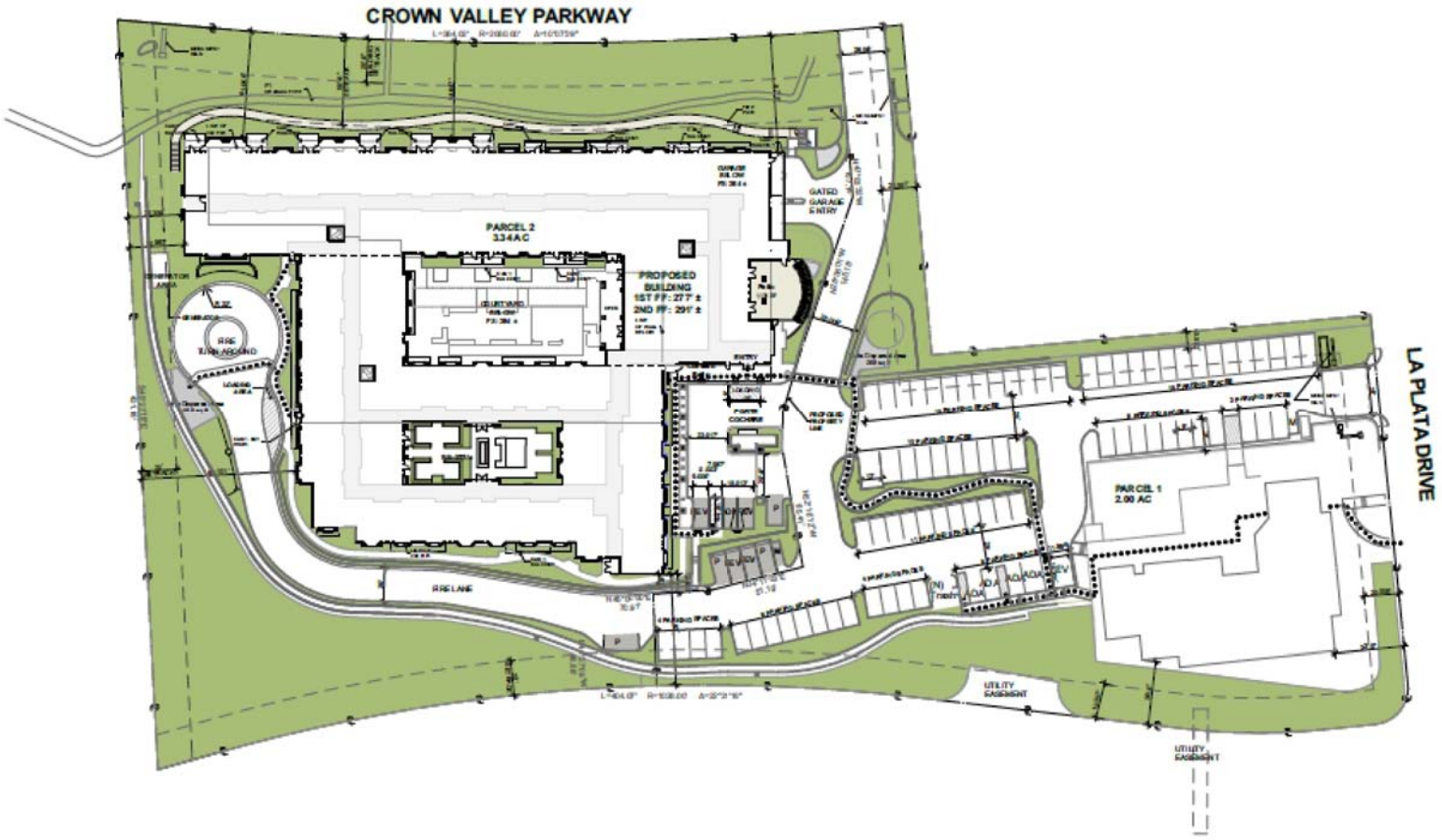
LAGUNA NIGUEL SENIOR LIVING CENTER & GRACE CHURCH REMODEL
NOISE IMPACT STUDY
City of Laguna Niguel, California



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City of Laguna Niguel, California

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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 Laguna Niguel Senior Living Center and Grace Church Remodel (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
- Summary of recommended mitigation measures and project design features to reduce noise level impacts.

1.2 Site Location

The project site is located near the south corner of the Crown Valley Parkway and La Plata Drive, in the City of Laguna Niguel. The project site is located approximately 288 feet above sea level and the topography generally slopes downward from east to west, with the western edge of the property located above the grade of the adjacent roadway, Crown Valley Parkway. The project site is located at the rear of the existing Grace Church site.

Several existing noise-sensitive land uses are present surrounding the project site, including;

- Residential uses located approximately 112 feet to the south from the nearest proposed building façade of the project site.

- Residential uses located approximately 148 feet to the east from the nearest proposed building façade of the project site.

- The Childtime Day Care located 75 feet to the north from the nearest proposed building façade of the project site.

- Residential uses located at approximately 285 feet to the east from the project property line across the Crown Valley Roadway.

The City of Laguna Niguel General Plan Land Use Map and Zoning Map designate the project site as PI – Public/Institutional.

The project site location map is provided in Exhibit A.

1.3 Project Description

The project consists of subdividing the existing Grace Church property to allow for the construction and operation of a two-story senior assisted living and memory care facility with a total of 108 units and 110 beds. The total building area is approximately 106,046 square feet and will include a subterranean parking garage.

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	Metric
Senior Assisted Living	108	Units

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 and HVAC equipment. The project is proposing to shield all HVAC equipment from the line of sight of the adjacent sensitive receptors.

The proposed project is expected to displace an existing building on-site which served as a K-8 private school. The project would not result in new or expanded operations of the existing church or generate additional noise sources, beyond existing conditions, at the church facility.

1.4 Summary of Analysis Results

Table 2 provides a summary of the noise analysis results, per the CEQA Guidelines, Appendix G: Environmental Checklist Form.

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

The following discussion is provided to help summarize the project impacts analyzed in this technical study pertaining to the CEQA noise impact criteria.

a) *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?*

Section 6.0 (Tables 15 and 16) summarize the results of the operational noise impact analysis. Operational noise consists of permanent noise sources occurring over the life of the project. The operation of the project is not expected to result in generation of a substantial 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.

Section 7.0 (Table 21) summarizes the results of the construction noise impact analysis. Construction noise is considered to be the main source of temporary noise

generated by the project. The City of Laguna Niguel exempts construction noise from the provisions of the Noise Control Ordinance, provided it occurs during permissible hours of the day. Additionally, as shown in Table 21, the project is not expected to exceed the FTA 1-hour General Assessment construction noise criteria. As a result, the temporary noise impacts during construction are considered to be less than significant.

b) *Generation of excessive groundborne vibration or groundborne noise levels?*

Section 7.3 (Table 23) summarizes the results of the construction vibration impact analysis. The project is not expected to generate excessive groundbourne vibration or groundbourne noise levels. The damage potential to any nearby structure is considered to have "no impact". The impact is considered less than significant.

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?*

The project is not located within the vicinity of a private air strip or airport land use plan, or within two miles of a public airport or public use airport. The nearest airport to the site is John Wayne Airport, located approximately 13.5 miles away.

1.5 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 All mechanical equipment, including rooftop HVAC units and emergency generators will be fully shielded from line of sight of any adjacent residential property.

DF-2 Delivery, loading/unloading activity, and trash pick-up hours shall be limited to daytime (7 a.m. – 10 p.m.) hours only. Signage will be posted in the designated loading areas to enforce the hour restrictions.

DF-3 Engine idling time for all delivery vehicles and moving trucks shall be limited to 5 minutes or less. Signage will be posted in the designated loading areas to enforce the idling restrictions.

DF-4 Prior to the issuance of building permits, the project will demonstrate compliance with the California Title 24 Sound Transmissions requirements for exterior walls, roofs and common separating assemblies (e.g. floor/ceiling assemblies and demising walls).

a. Walls, partitions and floor-ceiling assemblies separating sleeping units from each other or from public or service areas shall have a sound transmission class (STC) of not less than 50, or not less than 45 if field tested.

b. Floor-ceiling assemblies between sleeping units shall have an impact insulation class (IIC) rating of not less than 50, or not less than 45 if field tested.

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

Construction Design Features

DF-5 Construction-related noise activities should 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.

DF-6 The project should post signage in a readily visible location along the frontage of the project site that indicates 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.

DF-7 The project should provide temporary noise barrier shielding adjacent to the Childtime Day Care to shield the adjacent sensitive receptor from the areas with active construction noise. The temporary barrier should be at least eight (8) 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 solid face area and include sound absorptive material or blankets which can be installed in multiple layers for improved noise insulation. The temporary barrier shall be installed at top of slope.

DF-8 The project should 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.

DF-9 No impact pile driving activities should be performed during the construction process.

2.0 Fundamentals of Noise

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

2.1 Sound, Noise, and Acoustics

The sound is a disturbance created by a moving or vibrating source and is capable of being detected by the hearing organs. The 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 its 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 as 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 3dB 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[1]

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 weighing is typically reported in terms of A-weighted decibel (dBA). Typically, the human ear can barely perceive the change in the 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. 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] Technical Noise Supplement to the Traffic Noise Analysis Protocol, September 2013.

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 in 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...".

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. The 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.

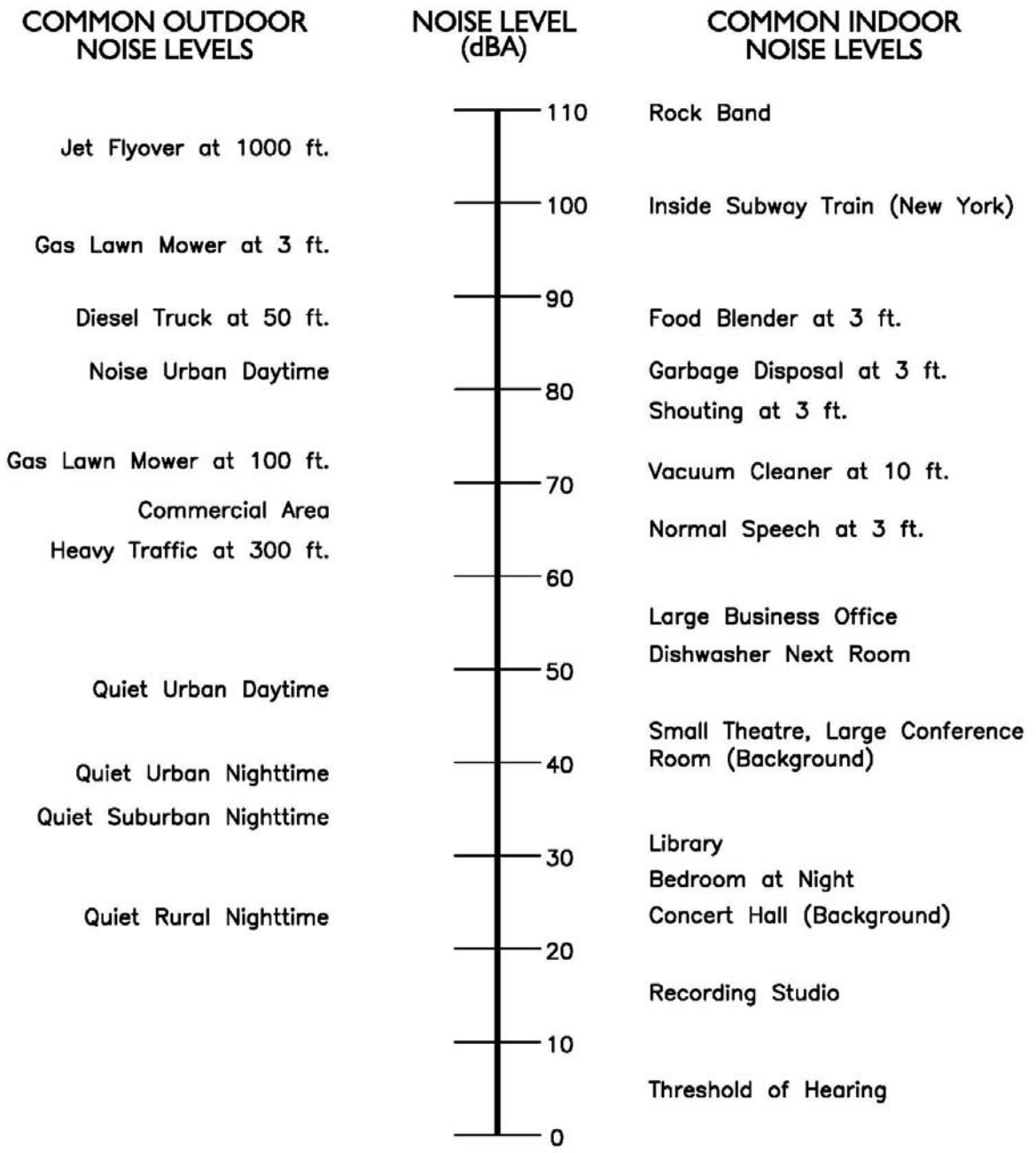
As noise propagates from the source, it is affected by the ground and atmosphere. Noise models use the hard site (reflective surfaces) and soft site (absorptive surfaces) to help calculate predicted noise levels. Hard site conditions assume no excessive ground absorption between the noise source and 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 4.5 dB per doubling of distance for a line source and 6.0 dB per doubling of distance for a point source.

Research has demonstrated that atmospheric conditions can have a significant effect on noise levels when noise receivers are located 200 feet and greater from a noise source. Wind, temperature, air humidity, and turbulence can further impact how far sound can travel.

Figure 1 shows typical sound levels from indoor and outdoor noise sources.

Figure 1[2]

TYPICAL SOUND LEVELS FROM
INDOOR AND OUTDOOR NOISE SOURCES



[2] Technical Noise Supplement to the Traffic Noise Analysis Protocol, September 2013.

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.

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[3]

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 Vibration Guidance Manual, April 2020, in the table below provide general guidelines as to the maximum vibration limits for when vibration becomes potentially annoying.

[3] Caltrans Transportation and Construction Vibration Guidance Manual, April 2020

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 Vibration Guidance Manual, April 2020 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 Vibration Guidance Manual, April 2020 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 City of Laguna Niguel 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.

Noise insulation design standards for residences have been established by the State of California Uniform Building Code (UBC) Chapter 12, Division II and by the Title 24 noise insulation standards of the California Administrative Code. The City is required by the State Housing Law to adopt these State codes as minimum performance standards. The City may enact stricter noise standards throughout the city or on a case-by-case basis if deemed necessary. In brief, the Title 24 noise standards require the following for multi-family dwellings:

1. 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.

2. 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.

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

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

3.3 City of Laguna Niguel Noise Regulations

The project is required to comply with the noise standards and thresholds established in the City of Laguna Niguel Municipal Code Division 6 – Noise Control and City of Laguna Niguel General Plan Chapter 6 - Noise.

3.3.1 Laguna Niguel General Plan Noise Element

The City of Laguna Niguel describes the adopted polices for noise/land use compatibility in the General Plan Noise Element. Noise compatibility is reviewed to determine the project's compatible with the surrounding land uses. The City's Noise Element is provided in Appendix A.

Table 6 shows the normally acceptable community noise exposure levels (CNEL) for land uses proposed on the project site.

Table 6
Laguna Niguel Land Use Compatibility for Community Noise Exposure

Project Land Use Categories	Normally Acceptable (CNEL)	Normally Unacceptable (CNEL)	Conditionally Acceptable (CNEL)	Clearly Unacceptable (CNEL)
Residential – Multiple Family	<65 dBA	60 - 70 dBA	70-75 dBA	>75 dBA

Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.

Conditionally Acceptable: New construction or development should be undertaken only after detailed analysis of the noise reduction requirements are made and needed noise insulation features in the design are determined. Conventional construction, with closed windows and fresh air supply systems or air conditioning, will normally suffice. The outdoor environment will seem noisy.

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

Clearly Unacceptable: New construction or development should generally not be undertaken. Construction costs to make the indoor environment acceptable would be prohibitive and the outdoor environment would not be usable.

3.3.2 City of Laguna Niguel Municipal Code Noise Standards

The City of Laguna Niguel 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 7 shows the exterior noise standards from the City of Laguna Niguel Municipal Code, Division 6, Noise Control, Section 6-6-5, Exterior Noise Standards for the project site and surrounding residential land uses.

Table 7
City of Laguna Niguel
Municipal Code Noise Standards

Time Period	Exterior Residential Noise Standard	Interior Residential Noise Standard
7:00 AM – 10:00 PM	55 dB (A)	55 dB (A)
10:00 PM – 7:00 AM	50 dB (A)	45 dB (A)

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 5 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.

3.3.3 Construction Noise Regulation

Section 6-6-7 (5) of the City'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 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 approximately (5) feet above the 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
- 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.

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, 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 Equipment Noise

The project is proposing to use CARRIER 48VG-A/48VG-E Air Conditioner units. In order to determine the future noise levels from a/c units, RK requested the specification sheet from the applicant and obtained the referenced noise level of the proposed a/c units. Table 8 indicates the referenced noise levels for on-site stationary noise sources. The manufacture spec sheet is shown in Appendix C.

Table 8
HVAC Referenced Noise Levels

Source	Noise Levels (dBA)
	L_W
HVAC Equipment[1]	77.0

[1] Sound Rating of a 30-ton unit.

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 HVAC 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 9 indicates the roadway parameters utilized for this study.

Table 9
Roadway Parameters

Roadway	Segment	Class.	Lanes	Speed Limit	Future Traffic Volume	Site
Crown Valley Parkway	West of La Plata Drive	Major Arterial	6	45	56,300	Hard

[1] ADT = Average Daily Traffic. ADT volumes are referenced from Laguna Niguel Circulation Plan, Table C-1 A.

Table 10 indicates the vehicle distribution and truck mix utilized for all roadways in this study area.

Table 10
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 107 feet from the centerline of Crown Valley Parkway 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 100 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 100 feet from the property line, noise levels are averaged over an 8-hour period for purposes of assessing impacts.

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)

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.

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

To determine the existing noise level environment, RK conducted four (4) 24-hour noise measurements at the project study area.

Noise levels were measured on March 17, 2021 and March 18, 2021 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 approximately 260 feet from the northern property line and approximately 160 feet from the centerline of the Crown Valley Parkway.

- Long-term noise monitoring location two (LT-2) was taken approximately 100 feet from the southern property line and approximately 55 feet from the eastern property line.

- Long-term noise monitoring location three (LT-3) was taken along the Church parking lot, approximately 240 feet from La Plata Drive.

- Long-term noise monitoring location four (LT-4) was taken approximately 20 feet from the centerline of La Plata Drive, near the Church entrance.

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 11, 12, 13 and 14. Appendix B includes photographs, field sheets and measured noise data.

Table 11
24 Noise Measurement Results LT-1[1]

Time	Leq (dBA)	Time	Leq (dBA)
12:00 AM	54.4	12:00 PM	68.1
1:00 AM	52.5	1:00 PM	66.8
2:00 AM	55.3	2:00 PM	66.4
3:00 AM	51.3	3:00 PM	66.9
4:00 AM	55.7	4:00 PM	67.3
5:00 AM	60.9	5:00 PM	66.7
6:00 AM	63.7	6:00 PM	65.9
7:00 AM	67.4	7:00 PM	65.0
8:00 AM	67.5	8:00 PM	63.5
9:00 AM	66.3	9:00 PM	62.5
10:00 AM	67.5	10:00 PM	60.7
11:00 AM	66.1	11:00 PM	57.8
24-Hour CNEL			**67.9**

[1] LT-1 was taken approximately 260 feet from the northern property line and approximately 160 feet from the centerline of the Crown Valley Parkway. LT-1 was recorded on 03/17/2021.

Table 12
24 Noise Measurement Results, LT-2[1]

Time	Leq (dBA)	Time	Leq (dBA)
12:00 AM	40.5	12:00 PM	47.7
1:00 AM	38.6	1:00 PM	47.3
2:00 AM	39.4	2:00 PM	49.1
3:00 AM	37.3	3:00 PM	48.3
4:00 AM	45.2	4:00 PM	48.0
5:00 AM	46.4	5:00 PM	48.1
6:00 AM	50.6	6:00 PM	48.6
7:00 AM	52.4	7:00 PM	47.9
8:00 AM	52.0	8:00 PM	47.8
9:00 AM	51.3	9:00 PM	47.1
10:00 AM	50.4	10:00 PM	45.0
11:00 AM	49.5	11:00 PM	44.0
24-Hour CNEL			**52.7**

[1] LT-2 was taken approximately 100 feet from the southern property line and approximately 55 feet from the eastern property line. LT-2 was recorded on 03/17/2021.

Table 13
24 Noise Measurement Results LT-3[1]

Time	Leq (dBA)	Time	Leq (dBA)
12:00 AM	41.9	12:00 PM	49.3
1:00 AM	41.3	1:00 PM	48.4
2:00 AM	39.4	2:00 PM	48.4
3:00 AM	42.0	3:00 PM	50.8
4:00 AM	42.1	4:00 PM	49.5
5:00 AM	44.8	5:00 PM	49.9
6:00 AM	48.2	6:00 PM	49.3
7:00 AM	51.2	7:00 PM	48.9
8:00 AM	54.3	8:00 PM	47.1
9:00 AM	49.7	9:00 PM	46.5
10:00 AM	51.2	10:00 PM	45.2
11:00 AM	50.5	11:00 PM	43.3
24-Hour CNEL			**52.3**

[1] LT-3 was taken along the Church parking lot, approximately 240 feet from La Plata Drive. LT-3 was recorded on 03/18/2021.

Table 14
24 Noise Measurement Results, LT-4[1]

Time	Leq (dBA)	Time	Leq (dBA)
12:00 AM	49.0	12:00 PM	64.1
1:00 AM	50.9	1:00 PM	66.7
2:00 AM	49.8	2:00 PM	64.2
3:00 AM	54.8	3:00 PM	64.7
4:00 AM	51.5	4:00 PM	64.0
5:00 AM	55.0	5:00 PM	65.4
6:00 AM	61.8	6:00 PM	64.5
7:00 AM	70.4	7:00 PM	70.2
8:00 AM	65.9	8:00 PM	62.5
9:00 AM	64.2	9:00 PM	59.6
10:00 AM	64.8	10:00 PM	57.7
11:00 AM	65.5	11:00 PM	54.7
24-Hour CNEL			**67.1**

[1] LT-4 was taken approximately 20 feet from the centerline of La Plata Drive, near the Church entrance. LT-4 was recorded on 03/18/2021.

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 and HVAC equipment noise. Noise level impacts are compared to the City of Laguna Niguel 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.

The change in the ambient noise environment as a result of the project is also analyzed. The City of Laguna Niguel does not have established thresholds of significance for changes in the ambient environment for CEQA analysis purposes. However, a change of 3 to 5 dB is commonly used in the industry as an indicator of a potential impact. Typically, the human ear can barely perceive a change in noise of 3 dB and a 5 dB change is considered readily perceptible. For purposes of this analysis, the following thresholds of significance have been utilized;

A significant impact is considered to occur when either of the following conditions is met;

a) The combined noise level (existing plus project conditions) is above the City's noise standard (established in the municipal code) and the increase in noise from the project is more than 3 dBA, or

b) The combined noise level (existing plus project conditions) is below the City's standard (established in the municipal code) and the increase in noise from the project is more than 5 dBA.

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 and HVAC equipment noise.

Parking lot noise would occur from vehicle engine idling and exhaust, doors slamming, people talking, and the occasional horn honking. The project is expected to take access from Crown Valley Parkway and La Plata Drive and the parking lot noise would occur on the northern and eastern side of the project site. It should be noted that the project will consist of a subterranean parking garage that will shield most of the parking lot activities on the site. However, the noise analysis still considers potential impacts from all vehicular movements coming in and out the site and circulating on in the parking lot.

HVAC equipment will be located on the roof of each building. All rooftop HVAC equipment will be shielded from the line of sight of the adjacent uses within roof wells.

Stationary noise analysis worksheets are provided in Appendix D.

Daytime Stationary Source Noise Impacts

The results of the daytime noise impact analysis are shown in the Tables 15 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 City's daytime noise standards at the adjacent property lines.

Nighttime Stationary Source Noise Impacts

The results of the nighttime noise impact analysis are shown in the Tables 16 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.

TABLE 15

Daytime Noise Impact Analysis (dBA)

Receptor	Location	Daytime Exterior Noise Levels (dBA)						
		Project Noise Contribution (Leq)	City of Laguna Niguel Noise Level Criteria (Leq)	Noise Level Exceeds Standard (?)	Existing Hourly Ambient Measurement (Leq)[1]	Combined Noise Level (Existing Plus Project) (Leq)	Increase in Noise from Project (Leq)	Significant Impact
Receiver at PL-1	East	37.7	55.0	No	47.1	47.6	0.5	No
Receiver at PL-2	North	38.9		No	46.5	47.2	0.7	No
Receiver at PL-3	South	36.4		No	47.1	47.5	0.4	No
Receiver at PL-4	West	31.2		No	62.5	62.5	0.0	No

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

[2] A significant impact is considered to occur when either of the following conditions is met;
a) the combined noise level (existing plus project conditions) is above the City's Noise Level Criteria and the increase in noise from the project is more than 3 dBA, OR
b) the combined noise level (existing plus project conditions) is below the City's Noise Level Criteria and the increase in noise from the project is more than 5 dBA.

TABLE 16

Daytime Noise Impact Analysis (dBA)

Receptor	Location	Nighttime Exterior Noise Levels (dBA)						
		Project Noise Contribution (Leq)	City of Laguna Niguel Noise Level Criteria (Leq)	Noise Level Exceeds Standard (?)	Existing Hourly Ambient Measurement (Leq)[1]	Combined Noise Level (Existing Plus Project) (Leq)	Increase in Noise from Project (Leq)	Significant Impact
Receiver at PL-1	East	37.6	50.0	No	37.3	40.5	3.2	No
Receiver at PL-2	North	38.2		No	39.4	41.9	2.5	No
Receiver at PL-3	South	36.4		No	37.3	39.9	2.6	No
Receiver at PL-4	West	30.9		No	51.3	51.3	0.0	No

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

[2] A significant impact is considered to occur when either of the following conditions is met;
a) the combined noise level (existing plus project conditions) is above the City's Noise Level Criteria and the increase in noise from the project is more than 3 dBA, OR
b) the combined noise level (existing plus project conditions) is below the City's Noise Level Criteria and the increase in noise from the project is more than 5 dBA.

6.2 Emergency Generator Noise

The proposed project would also include an emergency generator that is designed to provide emergency lighting for the hallway and common areas of the project during blackouts. The project is proposing to use a GENERAC Protector QS Series generator and in order to determine the future noise levels from generator, RK requested the specification sheet from the applicant and obtained the referenced noise level of the proposed generator unit and is expected to be 70 dB(A) at 23 feet distance. The manufacture spec sheet is shown in Appendix C.

The emergency generator system is not expected operate on a day-to-day basis and would only be employed under emergency circumstances. The generator system will be shielded behind a wall and from the line of sight of adjacent residential properties.

The generator is expected to be located near the southerly property line, at the end of the fire lane roundabout and approximately 75 feet from the nearest sensitive residential homes. Based on the analysis provided in Appendix D, the noise level from the proposed generator is expected to be approximately 39.7 dBA at the nearest sensitive residential land use.

Per Section 6-6-7 (4) of the Laguna Niguel Municipal Code, any mechanical device, apparatus or equipment used, related to, or connected with emergency machinery, vehicles or work shall be exempted from the provisions of the Noise Control requirements.

6.3 Future Exterior Roadway Noise Analysis

Traffic noise along Crown Valley Parkway is the primary source of ambient noise impacting the project site. Traffic noise is analyzed to determine the project's noise/land use compatibility setting and to determine future noise levels to habitable exterior and interior areas on the project site. This section of the analysis does not necessarily apply 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.

The estimated future traffic noise levels at the project site for the year 2035 and is based on the City of Laguna Niguel General Plan. Table 17 shows the estimated future traffic noise levels at the project site and the noise/land use compatibly rating based on the City of Laguna Niguel General Plan.

Table 17
Exterior Traffic Noise Levels

Roadway Segment	Floor	Exterior Noise Levels @ Patios (dBA CNEL)[1]	City of Laguna Niguel Noise Standards[2]	Exterior Noise Levels @ Patios (with Shielding)[3]
Crown Valley Parkway	1st	72.0	70	64.5
	2nd	71.8	70	63.3

[1] Exterior noise levels represent noise levels at 107 feet from the subject roadway.
[2] The project falls under an institution land use category/
[3] Noise shielding includes recommended 5-foot high patio walls.

Based on the City of Laguna Niguel General Plan Noise/Land Use Compatibility Guidelines, the project site has the potential to experience noise levels that fall within the normally unacceptable range (70-75 CNEL) and outdoor areas must be shielded.

In order to reduce traffic noise impacts, five (5) foot noise barrier wall should be provided to shield all habitable patio/balcony areas fronting along Crown Valley Parkway. With the installation of a 5-foot wall, exterior patio/balcony noise levels of the first row of units along Crown Valley Parkway will fall within the conditionally acceptable land use compatibility limits (>65 dBA CNEL).

The designed noise screening will only be accomplished if the barrier's weight is at least 3.5 pounds per square foot of face area without decorative cutouts or line-of-site openings between the shielded areas and the project site. All gaps (except for weep holes) should be filled with grout or caulking to avoid flanking.

Noise control barrier may be constructed using one, or any combination of the following materials:

- Masonry block;
- Stucco veneer over wood framing (or foam core), or 1-inch thick tongue and groove wood of sufficient weight per square foot;
- Transparent glass (3/8 inch thick), acrylic, polycarbonate, or other transparent material with sufficient weight per square foot.

6.4 Preliminary Interior Noise Analysis

A preliminary interior noise analysis has been prepared for the sensitive receptor locations (i.e. first rows residential dwelling units) using a typical "windows open" and "windows closed" condition. A "windows open" condition assumes 12 dBA of noise attenuation from the exterior noise level. A "windows closed" condition" assumes 20 dBA of noise attenuation from the exterior noise level.

Table 18 indicates the interior noise levels for the residential uses on the project site.

Table 18
Preliminary Interior Noise Impact Analysis

Receptor Location	Exterior Noise Level at Building Facade (CNEL)	Interior Noise Standard (CNEL)	Required Building Shell Noise Reduction (CNEL)	Interior Noise Level with Standard California Construction Windows (STC ≥ 25)		STC Rating for Windows Facing Subject Roadway
				"Windows Open" [1]	"Windows Closed" [2]	
First Floor Building Façade	72.0	45.0	27.0	60.0	52.0	32.0
Second Floor Building Façade	71.8	45.0	26.8	59.8	51.8	32.0

[1] A minimum of 12 dBA noise reduction is assumed with the "windows open" condition.
[2] A minimum of 20 dBA noise reduction is assumed with the "windows closed" condition.

As shown in Table 18, the project is expected to require a "windows closed" condition and upgraded STC rated windows to meet the City/State interior noise standard of 45 dBA. To accommodate a windows closed conditions, all units shall be equipped with adequate fresh air ventilation, per the requirements of the California Uniform Building Code (UBC).

Prior to issuance of building permits, the project proponent should demonstrate to the City building department that the proposed building shell and window assemblies will achieve exterior to interior noise reduction necessary to meet the State of California and City of Laguna Niguel requirements.

Furthermore, the project shall comply with California Title 24 insulation building requirements for multi-family dwelling units for common separating assemblies (e.g. floor/ceiling assemblies and demising walls).

6.5 Recommended Design Features

The following project design features will help ensure the project's operational noise levels do not adversely impact the adjacent noise sensitive land uses. Design features are expected to be included as part of the project and are not considered mitigation under CEQA:

Operational Design Features

DF-1 All mechanical equipment, including rooftop HVAC units and emergency generators will be fully shielded from line of sight of any adjacent residential property.

DF-2 Delivery, loading/unloading activity, and trash pick-up hours shall be limited to daytime (7 a.m. – 10 p.m.) hours only. Signage will be posted in the designated loading areas to enforce the hour restrictions.

DF-3 Engine idling time for all delivery vehicles and moving trucks shall be limited to 5 minutes or less. Signage will be posted in the designated loading areas to enforce the idling restrictions.

DF-4 Prior to the issuance of building permits, the project will demonstrate compliance with the California Title 24 Sound Transmissions requirements for exterior walls, roofs and common separating assemblies (e.g. floor/ceiling assemblies and demising walls).

a. Walls, partitions and floor-ceiling assemblies separating sleeping units from each other or from public or service areas shall have a sound transmission class (STC) of not less than 50, or not less than 45 if field tested.

b. Floor-ceiling assemblies between sleeping units shall have an impact insulation class (IIC) rating of not less than 50, or not less than 45 if field tested.

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

6.6 Laguna Niguel General Plan Noise Element Consistency Analysis

The City of Laguna Niguel has established several goals, polices, and action items within the General Plan to help protect noise sensitive land uses in the community. To help ensure the project adheres to the General Plan, a consistency analysis has been provided.

Table 19 provides a summary of the consistency analysis for the project.

Table 19
Laguna Niguel Noise Element Consistency Analysis

Noise Element Goals		Project Features	Consistent (Yes/No)
Goal 1	Establishment of exterior and interior noise environments for land uses that will protect citizens from excessive noise.	The project is expected to comply with the exterior and interior noise levels standards in the City of Laguna Niguel. The project will provide shielding for patios facing Crown Valley to ensure habitable exterior areas are below the City's standards. The project will also ensure all habitable interior areas meet the State of California and City requirements for interior noise insulation. The project is expected to require a "windows closed" condition and upgraded STC rated windows to meet the City/State interior noise standards.	Yes
Goal 2	Land use planning that provides for the separation of significant noise generators from sensitive receptor areas.	The project is not considered a major source of noise; such as an industrial use, high volume roadway or airport. The noise analysis shows that project noise levels will be within the allowable limits at adjacent noise sensitive land uses, and the project will not significantly affect existing ambient conditions.	Yes
Goal 3	Promote the control of noise between land uses.	The project will comply with the City's Noise Ordinance during both construction and operations. Operational noise levels generated by the project are shown to be below the City's daytime and nighttime noise standards at all adjacent land uses. Several mitigation measures are recommended to help reduce construction noise impacts.	Yes
Goal 4	The control of noise from significant noise generators in the community.	The project will comply with the City's noise ordinance during construction. Several mitigation measures are recommended to help reduce construction noise impacts.	Yes
Goal 5	The consideration of noise issues in the planning process.	The project has completed a noise impact study to review impacts to/from the project site and the existing and future noise environment. Mitigation measures and recommendations are provided to help ensure project impacts are less than significant.	Yes

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 6-6-7 (5) of the City's Municipal Code states that the following activities shall be exempted from the provisions of the Noise Control Ordinance;

- 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 City'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 (2018) General Assessment 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 90 dBA Leq for an 1-hour average time period. In compliance with the City's Municipal Code, it is assumed construction would not occur during the noise-sensitive nighttime hours.

7.1 Typical Construction Noise Levels

Table 20 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 20
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; demolition, site preparation, grading, building construction, paving, and architectural coating. Noise levels are calculated based on the FTA General Assessment criteria an average distance (center of site) of equipment over a 1-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 21 show the noise level impacts at 100 feet. Construction noise calculation worksheets are provided in Appendix E.

Table 21
Project Construction Noise Levels – at 100 feet.

Phase	Equipment	Quantity	Equipment Noise Level at 100ft (dBA Leq)	Combined Noise Level (dBA Leq)
Demolition	Concrete/Industrial Saws	1	76.6	80.4
	Excavators	3	70.7	
	Rubber Tired Dozers	2	71.7	
Grading	Excavators	2	70.7	81.3
	Graders	1	75.0	
	Rubber Tired Dozers	1	71.7	
	Tractors/Loaders/Backhoes	3	74.0	
Building Construction	Cranes	1	66.6	80.3
	Forklifts	3	65.0	
	Generator Sets	1	71.6	
	Tractors/Loaders/Backhoes	3	74.0	
	Welders	1	64.0	
Paving	Pavers	2	68.2	75.2
	Paving Equipment	2	67.0	
	Rollers	2	67.0	
Architectural Coating	Air Compressors	1	67.7	67.7
Worst Case Construction Phase Noise Level - Leq (dBA)				81.3
FTA Construction Noise Criteria (General Assessment: 1-Hour Leq)				90.0
Noise level exceeds FTA criteria?				NO

As shown in Table 21, project construction noise levels are expected to be below the FTA's recommended threshold of significance for adverse community reaction at the adjacent residential. As a result, the temporary construction noise impacts are considered less than significant.

7.3 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 Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, September 2018. 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 Manual, Federal Transit Administration, September 2018.

Table 23 shows the project's construction-related vibration analysis at the nearest structures to the project construction area. Construction vibration impacts are assessed from the closest construction area on the project site to the nearest adjacent daycare center building façade at approximately 95 feet.

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	95	Continuous/Frequent	0.020	No Impact	Barely Perceptible
Vibratory Roller	95	Continuous/Frequent	0.048	No Impact	Distinctly Perceptible
Loaded Trucks	95	Continuous/Frequent	0.018	No Impact	Barely Perceptible
Caisson Drilling	95	Continuous/Frequent	0.020	No Impact	Barely Perceptible

As shown in Table 23, project related construction activity is not expected to cause any potential damage to the nearest structures. Construction vibration calculation worksheets are shown in Appendix E

7.4 Recommended Construction Design Features

The following recommended construction design features include standard requirements, best practices and recognized design guidelines for reducing noise levels during construction. Design features are assumed to be part of the conditions of the project and integrated into its design. Project design features are not typically considered mitigation under CEQA.

Construction Design Features

DF-5 Construction-related noise activities should 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.

DF-6 The project should post signage in a readily visible location along the frontage of the project site that indicates 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.

DF-7 The project should provide temporary noise barrier shielding adjacent to the Childtime Day Care to shield the adjacent sensitive receptor from the areas with active construction noise. The temporary barrier should be at least eight (8) 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 solid face area and include sound absorptive material or blankets which can be installed in multiple layers for improved noise insulation. The temporary barrier shall be installed at top of slope.

DF-8 The project should 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.

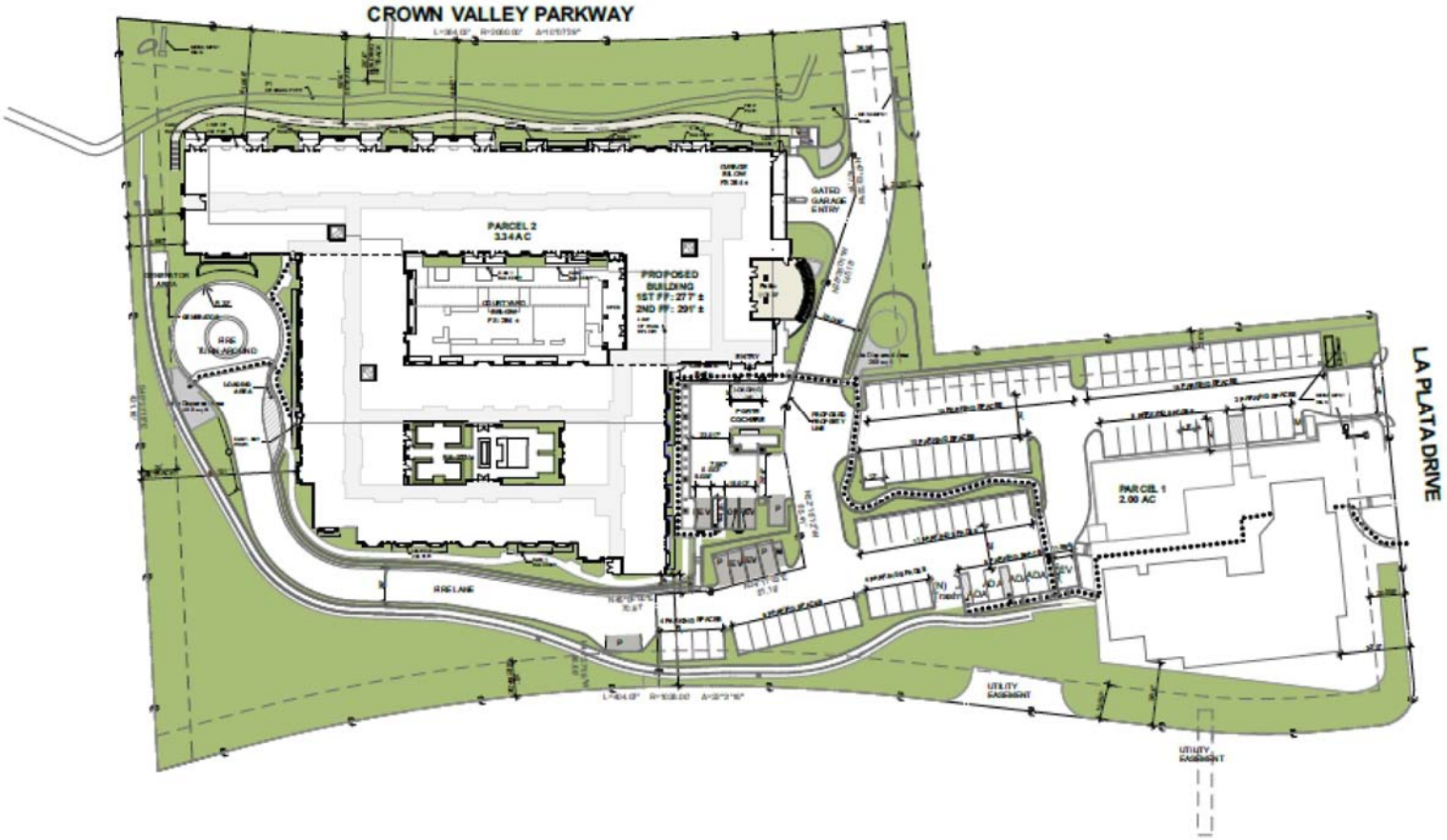
DF-9 No impact pile driving activities should be performed during the construction process.

Exhibits

Exhibit A
Location Map

N

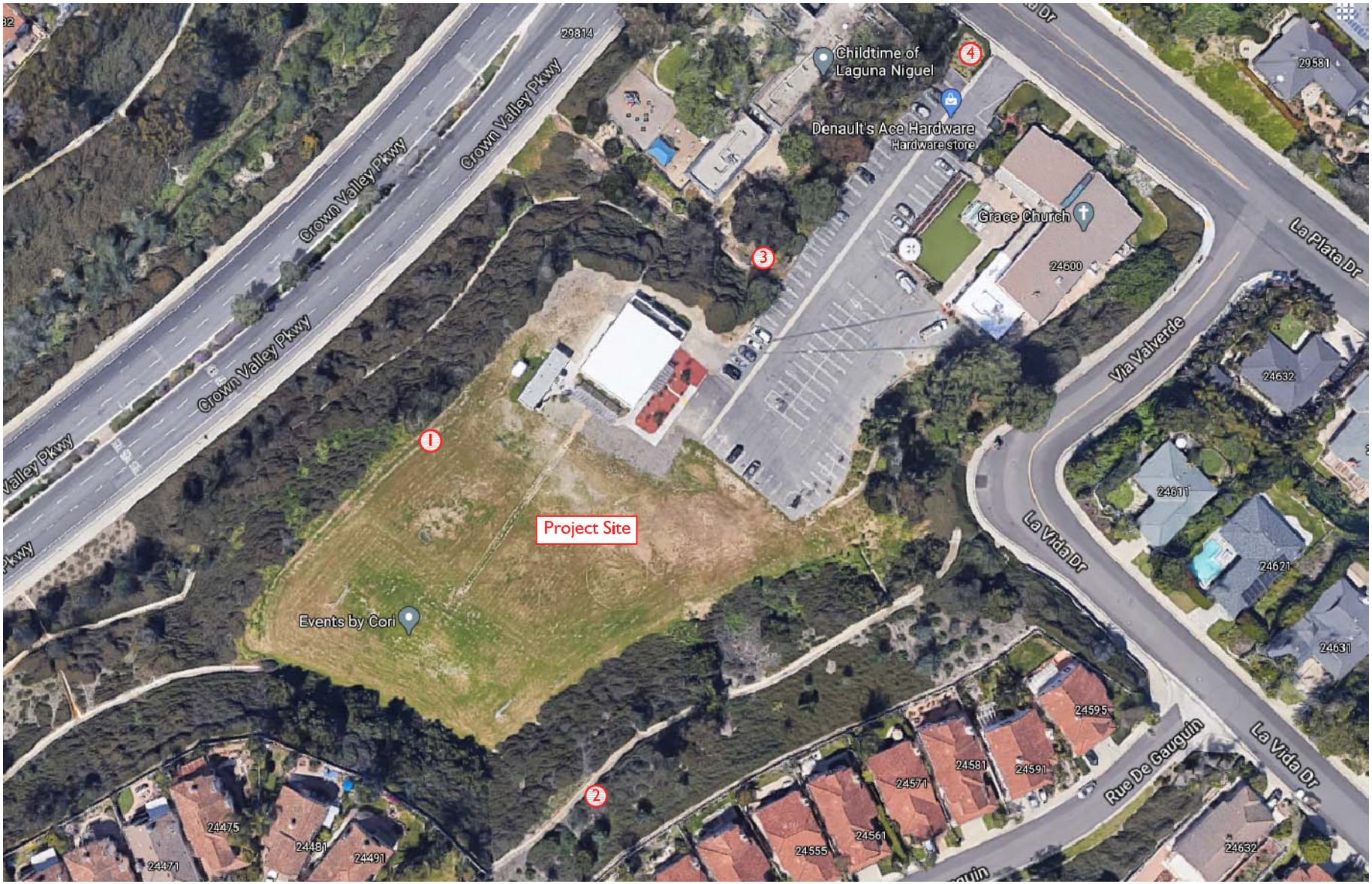
Exhibit B
Site Plan



N

Exhibit C

Noise Monitoring Locations



Legend:

(1) = 24-Hour Sound Level Measurement (SLM) Locations

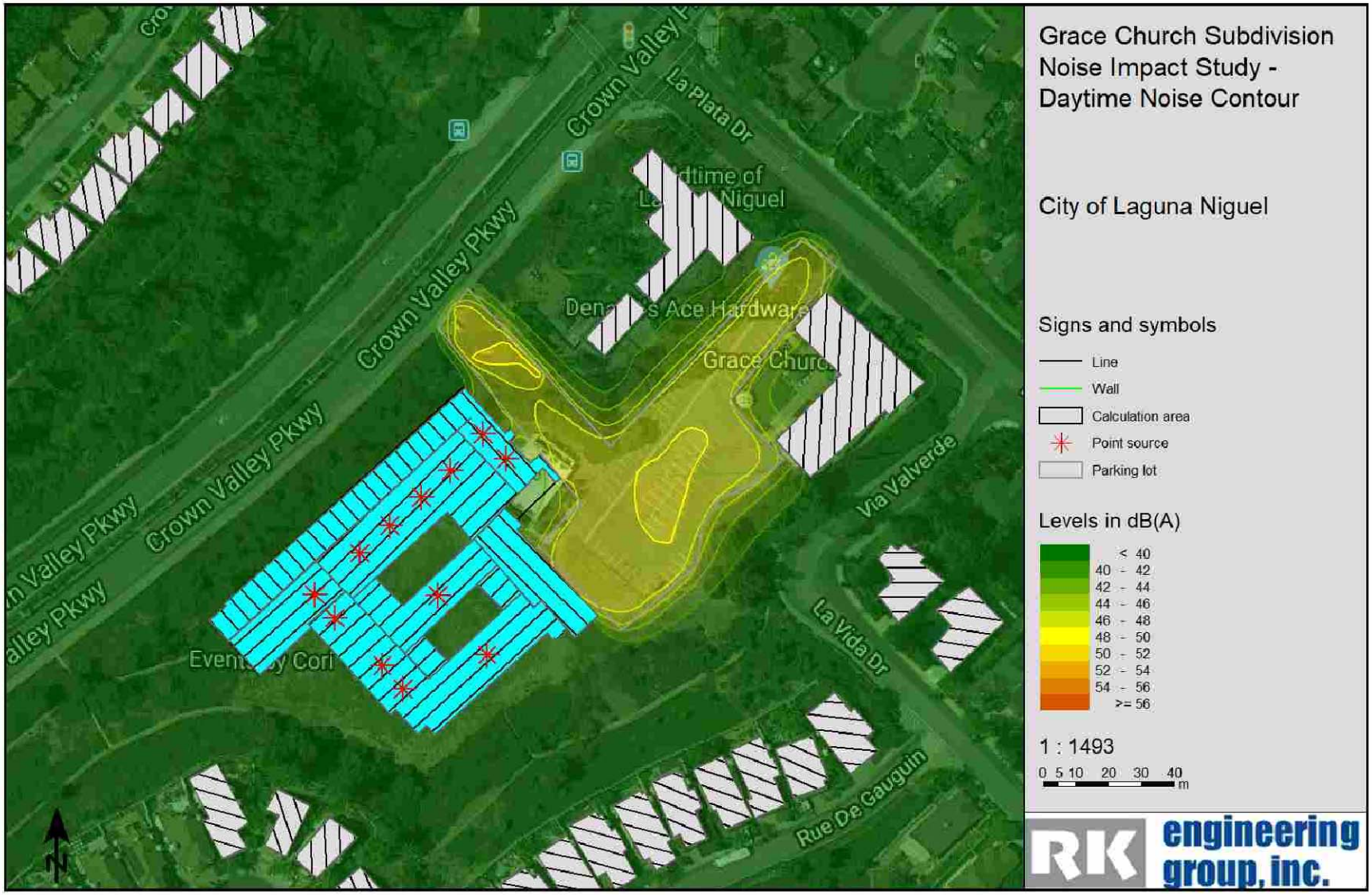
= Project Site

N

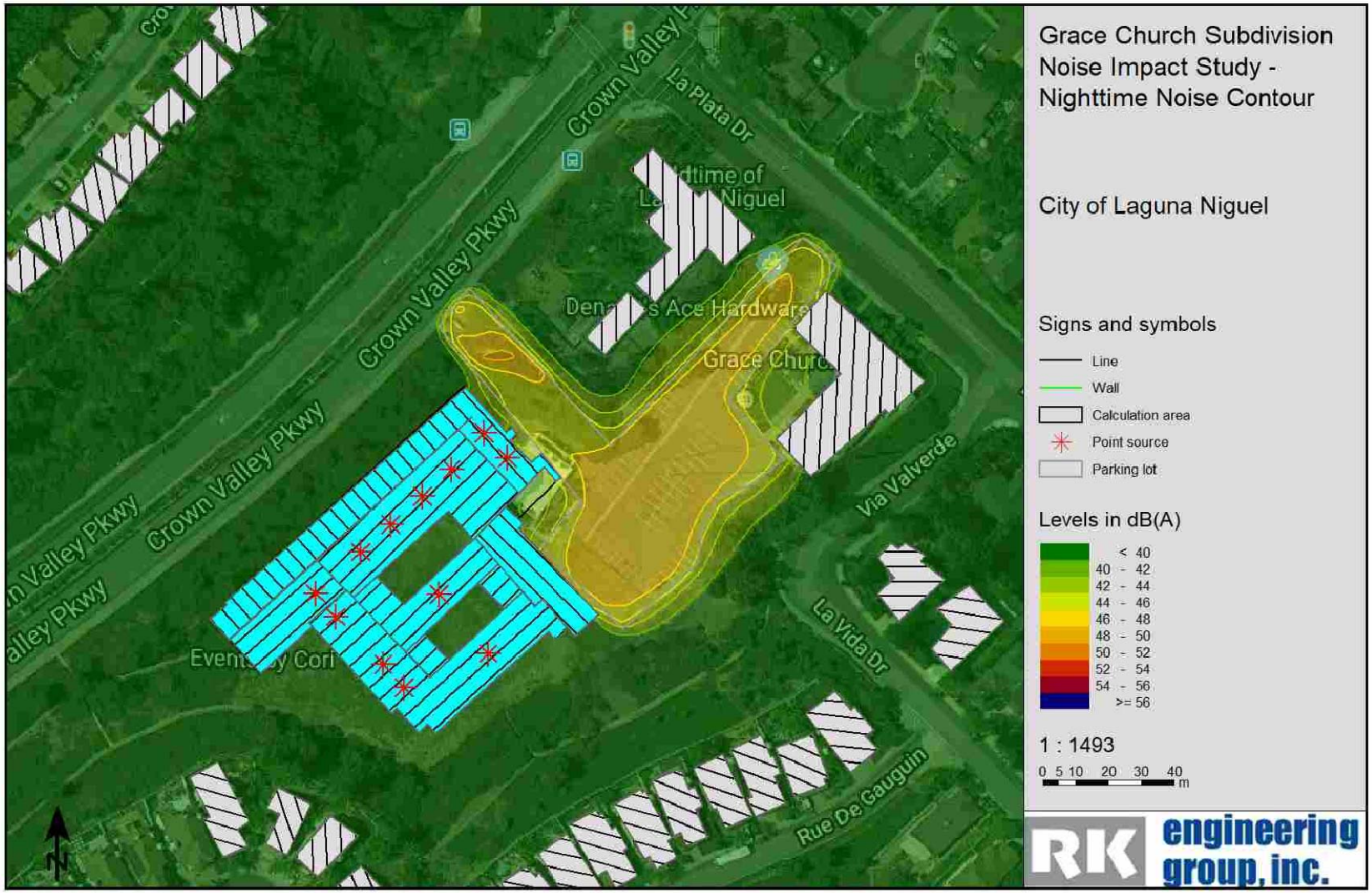
Exhibit D

SoundPLAN Project Noise Level Results

Project Noise Level Contours - Daytime



Project Noise Level Contours - Nighttime



Appendices

Appendix A

City of Laguna Niguel
General Plan Noise Element and
Municipal Code Noise Control

Division 6 - NOISE CONTROL

Article 1.	General Provisions, §§ 6-6-1—6-6-15

Footnotes:
*--- (**1**) ---*
***Cross reference—** Noisy animals, § 10-1-48; creating disturbance by vehicle, § 11-8-48.*

ARTICLE 1. - GENERAL PROVISIONS

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

In order to control unnecessary, excessive and annoying sounds emanating from the city, it is hereby declared to be the policy of the city 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. 90-11, § 4, 3-6-90)

Sec. 6-6-2. - Definitions.

The following words, terms and phrases, when used in this article, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

Ambient noise level means the all-encompassing noise level associated with a given environment, being a composite of sounds from all sources, excluding the alleged offensive noise, at the location and approximate time at which a comparison with the alleged offensive noise is to be made.

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

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

Dwelling unit means 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 means 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 means 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 means any excavating or filling of earth material, or any combination thereof, conducted at a site to prepare the site for construction or other improvements thereon.

Impact noise means 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 means any noise source other than a fixed noise source.

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

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

Residential property means a parcel of real property which is developed and used either in part or in whole for residential purposes, other than transient uses such as hotels and motels.

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

Sound level meter means an instrument meeting American National Standard Institute 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, means 20 times the logarithm to the base 10 of the ratio of the pressure of the sound to a reference pressure, which reference pressure shall be explicitly stated.

(Ord. No. 90-11, § 4, 3-6-90)

Cross reference— Definitions generally, § 1-1-18.

Sec. 6-6-3. - Noise level measurement equipment.

Any noise level measurements made pursuant to the provisions of this article shall be performed using a sound level meter.

(Ord. No. 90-11, § 4, 3-6-90)

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

The entire territory of the city is hereby designated as Noise Zone 1.

(Ord. No. 90-11, § 4, 3-6-90)

Sec. 6-6-5. - 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.

If the alleged offensive noise consists entirely of impact noise, simple tone noise, speech or music, or any combination thereof, each of the noise levels specified in the table in this subsection shall be reduced by five dB(A).

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

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

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

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

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

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

(c) If the ambient noise level exceeds any of the first four noise limit categories in subsection (b) of this section, the cumulative period applicable to such category shall be increased to reflect the ambient noise level. If the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under such category shall be increased to reflect the maximum ambient noise level.

(Ord. No. 90-11, § 4, 3-6-90)

Sec. 6-6-6. - 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.

If the alleged offensive noise consists entirely of impact noise, simple tone noise, speech or music, or any combination thereof, each of the noise levels specified in the table in this subsection shall be reduced by five dB(A).

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

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

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

or

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

(c) If the ambient noise level exceeds either of the first two noise limit categories in subsection (b) of this section, the cumulative period applicable to the category shall be increased to reflect such ambient noise level. If the ambient noise level exceeds the third noise limit category, the maximum allowable noise level under the category shall be increased to reflect the maximum ambient noise level.

(Ord. No. 90-11, § 4, 3-6-90)

Sec. 6-6-7. - Exemptions from article.

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

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

(2) Outdoor gatherings, public dances and shows, provided such events are conducted pursuant to a license issued by the city pursuant to title 5.

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

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

(5) Noise sources associated with construction, repair, remodeling or grading of any real property, provided such 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.

(6) 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.

(7) 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 at any time on Sunday or a federal holiday.

(8) 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.

(9) Noise sources associated with the maintenance of real property, provided such 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.

(10) Any activity to the extent regulation thereof has been preempted by state or federal law.

(11) Noise sources associated with the construction, repair or maintenance of any public street, or the construction, installation, repair or maintenance of any facilities owned by or operated by the city or a utility, including, but not limited to, water, sewer, electricity, gas, storm drain, traffic control, telephone and cable television, provided the director of public works determines that an unusual or unique condition exists and that all other reasonable alternatives are not feasible for the construction, repair or maintenance to take place between 7:00 a.m. and 8:00 p.m. on weekdays, including Saturdays.

Unusual and unique conditions for which there are no reasonable feasible alternatives include, but are not limited to, the following:

a. Construction, repair or maintenance of a public street that would have an adverse impact on the flow of traffic on that street if such construction, repair or maintenance took place between 7:00 a.m. and 8:00 p.m. on weekdays, including Saturdays.
b. Construction, installation, maintenance or repair of water, sewer, electricity, gas, storm drain, traffic control, telephone or cable television lines and appurtenant facilities when there would be less interference with the use of such utilities and facilities by members of the public at night than during normal working hours.
c. Sewer line repairs when there would be minimal flow in the line at night.
d. Construction, repair or maintenance of facilities over existing public streets, such as power lines and bridges.
e. Construction, repair or maintenance of a public street that requires that the street be closed in both directions.
f. Construction, repair or maintenance of a public street that is at or near a freeway, especially if the state department of transportation requires that such work be done at night.

(Ord. No. 90-11, § 4, 3-6-90; Ord. No. 2007-149, § 2, 10-16-07)

Sec. 6-6-8. - Creation of noise near schools, hospitals and churches.

It shall be unlawful for any person to create any noise which causes the noise level at any school, hospital or church while the school, hospital or church is in use to exceed the noise limits as specified in section 6-6-5 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 separate locations within one-tenth mile of the institution indicating the presence of a school, church or hospital.

(Ord. No. 90-11, § 4, 3-6-90)

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

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

(Ord. No. 90-11, § 4, 3-6-90)

Cross reference— Highways, right-of-way and vehicles, tit. 7; creating disturbance by vehicle, § 11-8-48.

Sec. 6-6-9. - Air conditioning and refrigeration equipment.

During the five-year period following the effective date of this article, the noise standards enumerated in sections 6-6-5 and 6-6-6 shall be increased eight 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. 90-11, § 4, 3-6-90)

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

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 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. 90-11, § 4, 3-6-90)

Sec. 6-6-11. - Enforcement of article.

(a) The chief of police and his duly authorized representatives are directed to enforce the provisions of this article. The chief of police and his duly authorized representatives are authorized, pursuant to penal code § 836.5, to arrest any person without a warrant where they have reasonable cause to believe that such person has committed a misdemeanor in their presence.

(b) 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. 90-11, § 4, 3-6-90; Ord. No. 96-92, § 5, 8-20-96)

Sec. 6-6-12. - Variance procedure.

(a) The owner or operator of a noise source which violates any of the provisions of this article may file an application with the chief of police for a variance from the provisions of this article, wherein the owner or operator shall set forth all actions taken to comply with such provisions, the reasons why immediate compliance cannot be achieved, and a proposed method of achieving compliance and a proposed time schedule for its accomplishment. The application shall be accompanied by a fee in the amount of $75.00. A separate application shall be filed for each noise source; provided, however, that several mobile sources under common ownership, or several fixed sources on a single property, may be combined into one application. Upon receipt of the application and fee, the chief of police shall refer it, with his recommendation thereon, within 30 days, to the noise variance board for action thereon in accordance with the provisions of this article.

(b) An applicant for a variance shall remain subject to prosecution under the terms of this article until a variance is granted.

(Ord. No. 90-11, § 4, 3-6-90; Ord. No. 96-92, § 6, 8-20-96)

Sec. 6-6-13. - Noise variance board.

(a) There is hereby created a noise variance board consisting of five members. Two of the members shall be professional engineers, one of whom shall have demonstrated knowledge and experience in the field of

acoustics, and one of whom shall be a registered mechanical engineer. One member shall be a physician licensed in this state, qualified in the field of physiological effects of noise. One member shall be a representative of business and industry. One member shall be a representative of the general public.

(b) The noise variance board shall evaluate all applications for variance from the requirements of this article and may grant such variances with respect to time for compliance, subject to such terms, conditions and requirements as it may deem reasonable to achieve maximum compliance with the provisions of article. Such terms, conditions and requirements may include but shall not be limited to limitations on noise levels and operating hours. Each such variance shall set forth in detail the approved method of achieving maximum compliance and a time schedule for its accomplishment. In its determinations, the board shall consider the magnitude of nuisance caused by the offensive noise; the uses of property within the area of impingement by the noise; the time factors related to study, design, financing and construction of remedial work; the economic factors related to age and useful life of equipment; and the general public interest and welfare. Any variance granted by the board shall be by resolution and shall be transmitted to the health officer for enforcement. Any violation of the terms of the variance shall be unlawful.

(c) Members of the variance board shall be appointed by and shall serve at the pleasure of the city council. The board shall adopt reasonable rules and regulations for its own procedures in carrying out its functions under the provisions of this article.

(d) Three members shall constitute a quorum and at least three affirmative votes shall be required in support of any action.

(e) The chief of police or his appointed representative shall be a nonvoting ex officio member of the variance board, and shall act as secretary of the board.

(f) Meetings of the noise variance board shall be held at the call of the secretary and at such times and locations as the board shall determine. All such meetings shall be open to the public.

(g) Traveling and other expenses incurred by each board member in the performance of his official duties shall be reimbursed at a rate determined by resolution of the city council.

(Ord. No. 90-11, § 4, 3-6-90; Ord. No. 96-92, § 7, 8-20-96)

Cross reference— Commissions, boards and committees, § 2-3-1 et seq.

Sec. 6-6-14. - Appeal of decisions of variance board.

(a) Within 15 days following the decision of the noise variance board on an application, the applicant, chief of police or any member of the city council may appeal the decision to the city council by filing a notice of appeal with the secretary of the variance board. In the case of an appeal by the applicant for a variance, the notice of appeal shall be accompanied by a fee to be computed by the secretary on the basis of the estimated cost of preparing the materials required to be forwarded to the city council as discussed in this section. If the actual cost of such preparation differs from the estimated cost, appropriate payments shall be made either to or by the secretary.

(b) Within 15 days following receipt of a notice of appeal and the appeal fee, the secretary of the variance board shall forward to the city council copies of the application for variance, the recommendation of the chief of police, the notice of appeal, and all evidence concerning the application received by the variance board and its decision thereon. In addition, any person may file with the city council written arguments supporting or

attacking the decision and the city council may in its discretion hear oral arguments thereon. The city clerk shall mail to the applicant a notice of the date set for hearing of the appeal. The notice shall be mailed at least ten days prior to the hearing date.

(c) Within 60 days following its receipt of the notice of appeal, the city council shall either affirm, modify or reverse the decision of the variance board. Such decision shall be based upon the city council's evaluation of the matters submitted to the city council in light of the powers conferred on the variance board and the factors to be considered, both as enumerated in sections 6-6-12 and 6-6-13.

(Ord. No. 90-11, § 4, 3-6-90; Ord. No. 96-92, § 8, 8-20-96)

Sec. 6-6-15. - Violation of article.

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 in this article, and shall not affect the enforceability of any other applicable provisions of law.

(Ord. No. 90-11, § 4, 3-6-90)

General Plan for the City of Laguna Niguel

Chapter 6 - Noise

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Chapter Six

NOISE

I. INTRODUCTION

Noise has long been an accepted part of modern civilization and the urbanization process. The general background level of noise, however, seems to be rising as modern transportation systems develop and human dependence upon machines rises. As society becomes highly mobile and mechanization continues to increase, so does the need for a better understanding of the effects of noise exposure in the environment.

The planning process has not traditionally been concerned with noise. In many instances, noise problems were identified only after the noise sources were allowed to establish in a community. It is now evident that these situations could have been avoided by considering noise generators and noise sensitive receptors as part of the comprehensive planning process.

II. CONSISTENCY WITH STATE PLANNING LAW

The Noise Element of the General Plan is a mandatory component pursuant to State law (California Planning and Zoning Law, Section 65302(f)). It must recognize the guidelines adopted by the California Office of Noise Control pursuant to Section 46050.1 of the Health and Safety Code. More importantly, the Noise Element should provide a systematic approach to: (1) the measurement and modeling of noise; (2) the establishment of noise standards; (3) the control of major noise sources; and (4) community planning for the regulation of noise. It is a guide used to identify and mitigate noise problems. The Noise Element establishes uniformity between City policy and programs undertaken to control and abate environmental noise. It also serves as a guideline for compliance with the State's noise insulation standards.

The Government Code and Office of Noise Control require that certain major noise sources and areas containing noise sensitive land uses be identified and quantified by preparing generalized noise exposure contours for current and projected levels of activity within the Community. Contours may be prepared in terms of either the Community Noise Equivalent (CNEL) or the Day-Night Average Level (Ldn) which are both descriptors of total noise exposure at a given location for an annual average day.

It is intended that the noise exposure information developed for the Noise Element be incorporated into the General Plan to serve as a basis for achieving land use compatibility with respect to noise through the long range planning and project review processes. It is also intended that noise exposure information be used to provide baseline information and noise source identification for use in formulating modifications to and enforcement of the local noise control ordinance.

III. RELATED PLANS AND PROGRAMS

There are a number of plans and programs related to the regulation of noise in Laguna Niguel. These programs are implemented at the federal, state and local levels of government.

At the federal level, three agencies have an effect on Laguna Niguel's noise environment. They are the Environmental Protection Agency (EPA), the Department of Defense and the Department of Transportation. In addition, the Department of Housing and Urban Development and the Federal Housing Administration establish standards for projects which receive their financial support.

The EPA has historically been a leader in national noise abatement efforts. They have been assisting other federal agencies, states, and local jurisdictions in the development of noise abatement programs.

The Department of Defense (DOD) operates two facilities in Orange County: the Marine Corps Air Station (MCAS) at El Toro and the one at Tustin. These bases, especially MCAS El Toro, have a significant noise impact on Laguna Niguel. In order to preserve the air station's mission as well as to protect surrounding communities, the Department of Defense established the Air Installations Compatible Use Zones (AICUZ) Program. The purpose of the AICUZ is to ensure compatible development in high-noise exposure areas, minimize public exposure to potential safety hazards associated with aircraft operations, and to protect the operational capability of the air installation. The Navy prepares a recommended AICUZ for each of its Naval or Marine Corps installations and submits its recommendations on zoning and land use to the local government for consideration. Presently, the 1981 AICUZ Study is implemented in Orange County. The 1981 AICUZ Study is expected to be updated in 1993.

The Department of Transportation is involved in noise setting standards and safety regulations for civil aviation, railroads, transit facilities and vehicles, and those freeways in the Interstate System. Other agencies under the Department of Transportation involved with the regulation of transportation related noise include: 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 State regulates noise emissions from motor vehicles, freeways and arterial roadways as it affects classrooms, and has set noise insulation standards for residential dwellings, hotels and motels. The State also has established noise impact boundaries around airports, and set noise planning standards for land use compatibility.

Local jurisdictions share responsibility of maintaining the health and welfare of their residents. This responsibility is largely implemented through land use planning and control. Since Laguna Niguel was primarily developed under the jurisdiction of the County of Orange, the County Noise Element, Land Use/Noise Compatibility Manual and the Noise Ordinance were used to determine land use compatibility with regards to noise sources. The City of Laguna Niguel has adopted its own Noise Ordinance to control local sources of noise. The Ordinance is largely based on the County Noise Ordinance.

IV. LAND USE COMPATIBILITY

The State Office of Noise Control has developed a Noise/Land Use Compatibility Matrix showing noise standards for various land use categories. The compatibility matrix is intended to provide guidelines for the development of municipal noise elements. Depending on the ambient environment of a particular community, these basic guidelines may be tailored to reflect existing noise and land use characteristics. The Noise Compatibility Matrix defines noise in terms of a community noise equivalent level (CNEL) expressed in decibel units (dB or dBA) that measure sound intensity. The CNEL measurement accounts for various noise levels which occur over a 24-hour period. Noise levels occurring during evening and nighttime hours are weighted more heavily than daytime noise in recognition of increased sensitivity to sound during these hours. A complete glossary of technical terms used in this Element is provided in Appendix A.

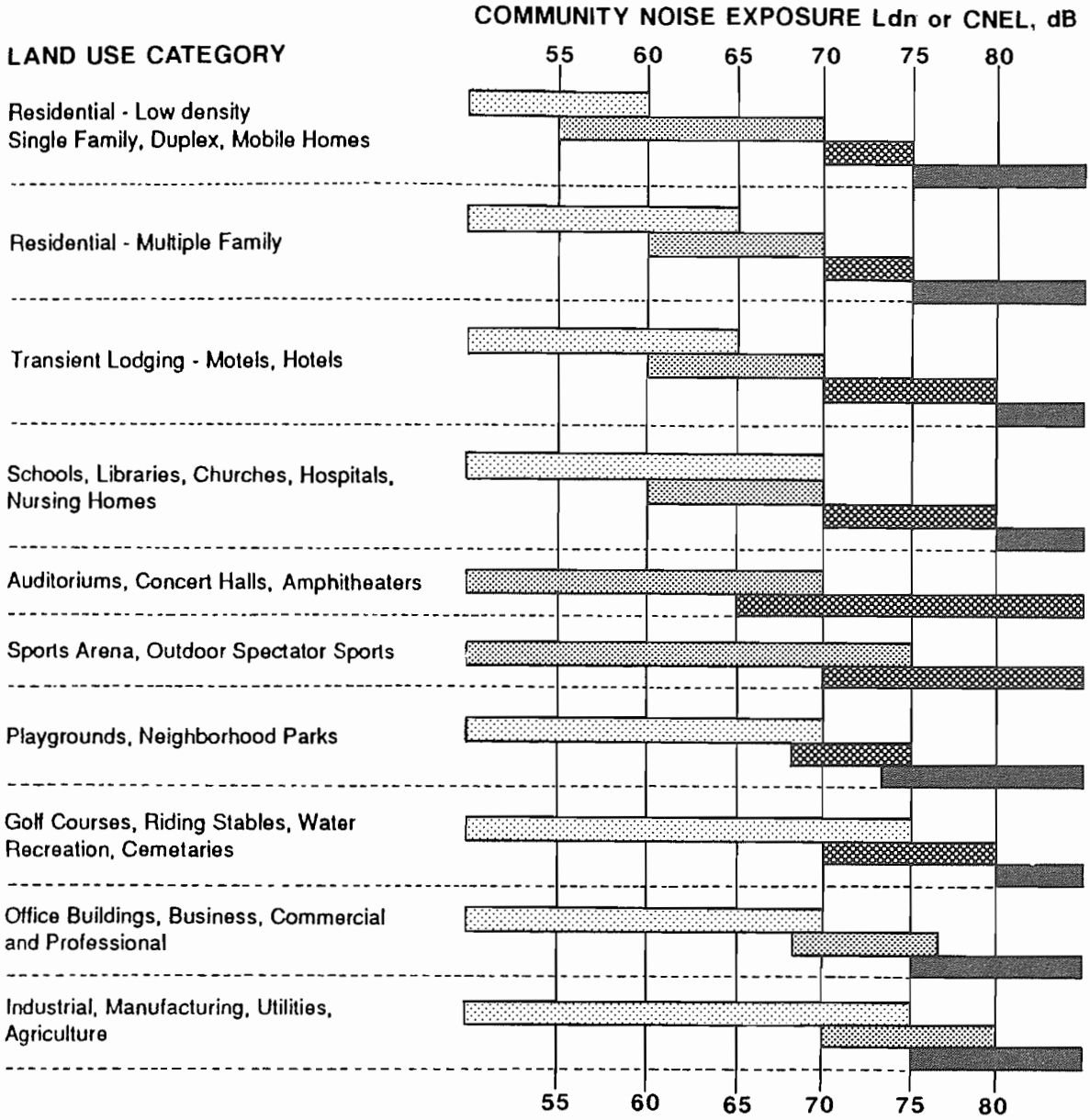
The Land Use Compatibility shown on Figure N-1 reflects the compatibility and the acceptable limits of noise for various existing and proposed land uses in Laguna Niguel. The matrix will be used as a guideline by the City to determine the compatibility of land uses within a certain noise environment. Standards for both sensitive and non-sensitive land uses are provided.

Land uses deemed noise sensitive by the State include schools, hospitals, rest homes, long-term care and mental care facilities. Many jurisdictions consider residential uses particularly noise sensitive because families and individuals expect to use time in the home for rest and relaxation, and noise can interfere with those activities. Some variability in standards for noise sensitivity may apply to different densities of residential development, and single family uses are frequently considered the most sensitive. Jurisdictions may identify other uses as noise sensitive such as churches, libraries, day care centers, hospitals, and parks.

A. Noise Insulation Standards

California noise insulation standards were officially adopted by the California Commission of Housing and Community Development in 1974 and became effective on August 22, 1974. On November 14, 1988, the Building Standards Commission approved revisions to these standards (Title 24, Part 2, California Code of Regulations). The ruling states that "Interior noise levels attributable to exterior sources shall not exceed 45 dB in any habitable room. The noise metric shall be either Ldn or CNEL, consistent with the noise element of the local general plan." Additionally, the commission specifies that residential buildings or structures to be located within exterior CNEL (or Ldn) contours of 60 dB or greater of an existing or adopted freeway, expressway, parkway, major street, thoroughfare, rail line, rapid transit line, or industrial noise source shall require an acoustical analysis showing that the building has been designed to limit intruding noise to an interior CNEL (or Ldn) of 45 dB.

Land Use Compatibility for Community Noise Exposure



LEGEND

Normally Acceptable
Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable
New construction or development should be undertaken only after a detailed analysis of the noise reduction requiremtnts is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice. Outdoor environment will seem noisy.

Normally Unacceptable
New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made with needed noise insulation features included in the design. Outdoor areas must be shielded.

Clearly Unacceptable
New construction or development should generally not be undertaken. Construction costs to make the indoor environment acceptable would be prohibitive and the outdoor environment would not be usable.

SOURCE: CALIFORNIA OFFICE OF NOISE CONTROl

B. Community Noise

The most effective method to control community noise impacts from non-transportation noise sources is through application of a Community Noise Ordinance. Presently, the City of Laguna Niguel adopted a Noise Ordinance which is largely based on the County of Orange Noise Ordinance. This Ordinance is considered to be one of the most effective noise ordinances in California and is used by many jurisdictions in Orange County.

V. EXISTING NOISE ENVIRONMENT

A. Ambient Noise Measurements

As prerequisite to an effective noise control program, a community must be cognizant of the location and extent of local noise problems: namely major noise source locations, noise sensitive receptor locations and current levels of exposure. These data can then be utilized to focus noise control and abatement efforts where they are most needed. In some cases, the control of noise sources will be beyond the City's jurisdiction. However, by recognizing these limitations, more effective land use strategies can be developed.

Ten to fifteen minute noise measurements were taken during a typical week day at sixteen locations throughout the City of Laguna Niguel. Criteria for site selection included geographical distribution, land uses suspected of noisy activities, proximity to transportation facilities and sensitive receptor locations. Sites were chosen at worst-case noise locations throughout the City. The primary purpose of noise monitoring was to determine an existing profile for the study area that could be used for estimating the level of current and future noise impact.

Measurements represent motor vehicle noise emanating from Interstate 5, the local master planned roadway network and aircraft associated with MCAS El Toro. Sensitive receptor locations monitored include: single family and multi-family residential units, existing and proposed school sites, proposed senior center site, a childcare center, and the library. Noise levels were monitored during the peak traffic hour to represent maximum noise levels, or during off-peak conditions and then modified to reflect peak traffic conditions.

Table N-1 provides noise measurement data and site descriptions for the sixteen monitoring locations. As shown therein, noise levels exceeded the 60 dBA criteria (established for locating sensitive land uses) in all but three locations. Noise levels exceeded the 65 dBA criteria (for prohibiting residential development without adequate mitigation) at five of the sixteen locations. Four of these locations are noise sensitive receptors.

Table N-1
Ambient Noise Levels

Location	Measured Leq	Adjusted Leq	Day	Time	Land Use[1]	Description
1	75.4	75.4	11/6	4:30 p.m.	COM/ IND	Laguna Plaza between Camino Capistrano and Interstate 5
2	65.4	64.7	11/5	4:30 p.m.	SC	Proposed senior center site at the corner of Moulton Parkway and Aliso Creek
3	66.0	65.8	11/5	4:05 p.m.	S	Proposed school site at the corner of Niguel Heights and Alise Creek
4	67.3	67.3	11/6	4:10 p.m.	SFD	Single-family residence at the corner of Caballo and Paseo de Colinas
5	61.9	62.3	11/6	6:20 p.m.	SFD	Single-family residence at the corner of Highlands and Ridgeview
6	64.2	64.2	11/6	5:30 p.m.	SFD	Single-family residence on Paseo De Ocasa adjacent to Golden Lantern
7	60.4	60.4	11/6	5:00 p.m.	SFD	Single-family residence at the corner of Golden Lantern and Via Pasada
8	60.5	60.6	11/5	3:25 p.m.	S	Classroom building of Niguel Hills Middle School along Paseo de Colinas
9	68.0	68.0	11/5	5:15 p.m.	CC	Fenced playground of childcare center at the corner of La Plata and Crown Valley.
10	61.0	61.0	11/6	6:00 p.m.	OS	Crown Valley Community Park playing field adjacent to Crown Valley Parkway
11	67.4	67.5	10/30	4:30 p.m.	LIB	Crown Valley Library at 6 feet above grade
12	59.8	59.7	10/30	4:50 p.m.	SFD	Single-family residence at corner of Niguel & Paseo del Campo
13	61.8	61.8	10/30	5:05 p.m.	MFD	Multi-family residence on Chandon near corner of Marina Hills and St. Germain
14	59.2	59.2	10/30	4:10 p.m.	SFD	Single-family residence at corner of Pacific Island Drive & Talavera
15	55.9	55.9	10/30	5:25 p.m.	SFD	Single-family residence at corner of Ponders End and Beacon Hill
16	60.9	60.9	10/30	3:00 p.m.	S	Proposed school site at corner of Bear Brand and Camino del Avion

1 COM - Commercial; IND - Industrial; OS - Open Space; LIB - Library; SFD - Single Family Dwelling; MFD - Multiple Family Dwelling; CC - Child Care Facility; SC - Senior Center; S - School

Noise Measurements were recorded at eight residential sites. Noise levels exceeded 60 dBA at five of these sites. The highest noise measurement recorded at a residential site was 67.3 dBA.

In addition, 24-hour noise measurements were taken at four single family residences along Golden Lantern to develop improved baseline noise data for that area. Table N-2 provides noise measurement data for those four locations.

Table N-2
24-Hour Noise Measurements

Location	CNEL	Day	Land Use	Description
1	65.8	6/2-6/3	SFD	Golden Lantern between Crown Valley Parkway and Colinas
2	67.7	6/2-6/3	SFD	Golden Lantern between Colinas and Via de Anza
3	63.7	6/3-6/4	SFD	Golden Lantern between Crown Valley Parkway and Colinas
4	67.3	6/3-6/4	SFD	Golden Lantern between Crown Valley Parkway and Colinas

SFD = Single Family Dwelling

B. Significant Noise Sources

Two types of noise sources are considered in a community noise inventory: stationary sources and mobile sources. Stationary sources of noise include industrial and construction activities, farming equipment operations, shooting ranges, boating areas, air conditioning/ refrigeration units, drag strips, concert halls, loud whistles or bells, outdoor sporting events, loud radio, stereo or television usage, power tools, lawn mowers, home appliances and barking dogs. Mobile noise sources are typically transportation-related and include aircraft, trains, boats, automobiles, trucks, buses, motorcycles, and off-road vehicles.

There are a limited amount of stationary noise sources in Laguna Niguel. Most of the City's noisy industrial uses are located in the northeastern end of the City, away from residential uses. The most frequent stationary source of noise would be associated with construction activity. However, construction related noise is typically localized and temporary. Most of stationary sources of noise in the City are not considered a problem and are typically accepted as part of the ambient or background noise level.

Motor vehicles in the City are the dominant source of continous noise. Interstate 5, Crown Valley Parkway, Paseo de Colinas and Moulton Parkway/Golden Lantern carry appreciable volumes of commuter traffic. Land uses adjacent to these and other master planned roadways are potentially impacted by motor vehicle noise.

Other transportation facilities in the City that contribute to community noise levels include the Atchison Topeka and Santa Fe Railroad line and the United Marine Corps Air Station El Toro. The various sources of existing transportation noise generators are discussed separately in the following sections.

Roadways and Motor Vehicles

The City of Laguna Niguel is bisected by a number of arterial roadways. Interstate 5, the largest transportation corridor in the area, is located along the northeastern edge of the City. The major and primary north-south roadways in Laguna Niguel are Alicia Parkway, La Paz Road, Moulton Parkway/Golden Lantern, Niguel Road and Crown Valley Parkway. The

primary east-west roadways are; Paseo de Colinas, Marina Hills Drive, Camino del Avion and Aliso Creek Road.

The highway traffic noise prediction model developed by the Federal Highway Administration (RD-77-108) was used to evaluate existing noise conditions in Laguna Niguel. This model utilizes various parameters including the traffic volume, vehicle mix and speed, and roadway geometry, to compute typical equivalent noise levels during daytime, evening and nighttime hours. The resultant noise levels are then weighted and summed over 24 hourly periods to determine the daily Ldn value. Noise contours are derived through a series of computerized iterations to provide the 60, 65, and 70 CNEL locations. These contour locations can be used as a planning tool to locate noise sensitive receptors away from major noise generators. Figure N-2 depicts the existing CNEL contours. The 60 and 65 CNEL contours extend farthest fom the roadway centerline along Crown Valley Parkway, and Moulton Parkway/Golden Lantern due to higher traffic volumes. Residential uses along these roadways have outdoor living areas that may be impacted with noise levels between 60 and 65 dBA CNEL. Projected increases in traffic along these roadways will extend the 60 and 65 CNEL further into these residential areas. Table N-3 reflects the CNEL range at 100 feet from the centerline for major roadways in the City.

Table N-3
Existing CNEL Range at 100 Feet from Centerline

Roadways	CNEL Range
Pacific Island Drive	58.2 - 61.8
Highlands	53.9 - 54.3
Alicia Parkway	62.5 - 63.0
Niguel Road	57.9 - 65.4
La Paz Road	61.8 - 66.5
Golden Lantern	66.2 - 67.9
Moulton Parkway	65.4 - 66.0
Paseo de Colinas	57.9 - 65.0
Pacific Park	50.8 - 61.2
Aliso Creek	60.7 - 65.0
Rancho Niguel	55.2 - 61.2
Crown Valley Parkway	65.8 - 68.5
Marina Hills	62.2 - 62.6
Camino del Avion	61.3 - 64.5
Cabot Road	49.5 - 61.8

Airport and Aircraft

MCAS El Toro is currently one of the largest Marine air station facilities in the western United States. The Air Station is located within Orange County, approximately 7 miles from the City of Laguna Niguel. Both fixed-wing aircraft and helicopters are flown at El Toro. However, as a noise source, fixed-wing jets are the greatest contributor of aircraft noise in the City. Table N-4 summarizes the total annual jet operations by aircraft type.

Existing Roadway Noise Contours

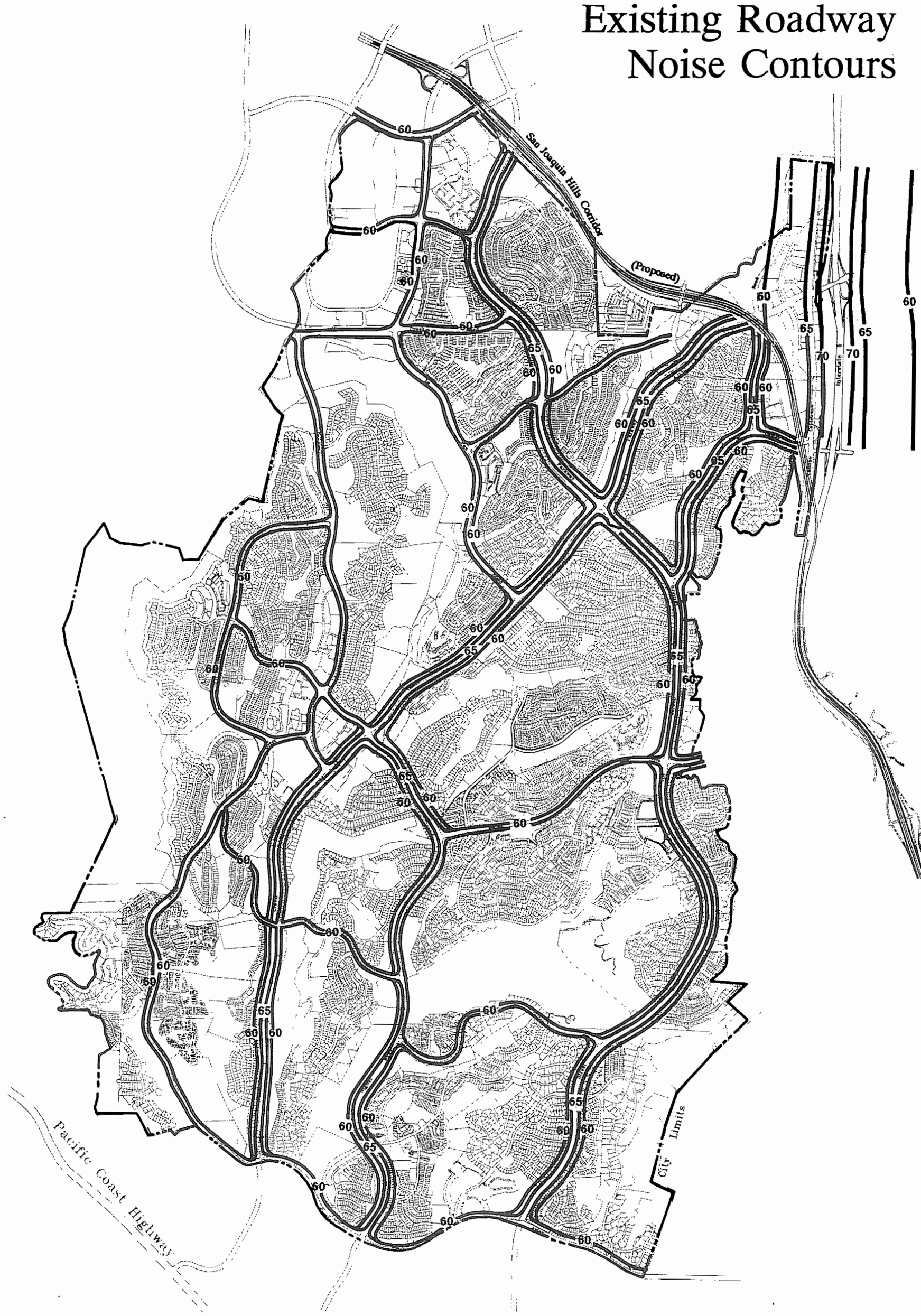


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Table N-4
Projected MCAS El Toro Annual Jet Operations by Aircraft Type

Aircraft	Departures	Arrivals	Patterns[1]	Totals
F-18	20,068	20,068	21,790	**61,926**
Heavy Jet	385	385	0	**770**
Other Jet	839	839	813	**2,491**

1. Patterns include overhead break, Field Carrier Landing Practice, and touch-and-go. One ground loop is counted as one pattern.

The F-18 is the dominant aircraft type at MCAS El Toro, both in terms of numbers of operations and noise produced. Runways 07L/R and 34R are the runways used over 90 percent of the time by F-18's for departures and arrivals, respectively. As shown in Figure N-3, these arrival and departure flight paths are located directly over Laguna Niguel. Some of the flight paths used by other MCAS aircraft also overfly Laguna Niguel.

Three patterns were used for noise contour modelling: Touch and Go's, Field Carrier Landing Practice (FCLP)--daytime, and FCLP--night. Each pattern consists of a short, 300 foot ground roll, use of military power to climb to pattern altitude, power cut back and turn to downwind, and a descending turn to final. Each pattern has a different pattern altitude from mean sea level (MSL):

Touch and Go	1,500 feet MSL
FCLP--Daytime	900 feet MSL
FCLP--Nighttime	1,200 feet MSL

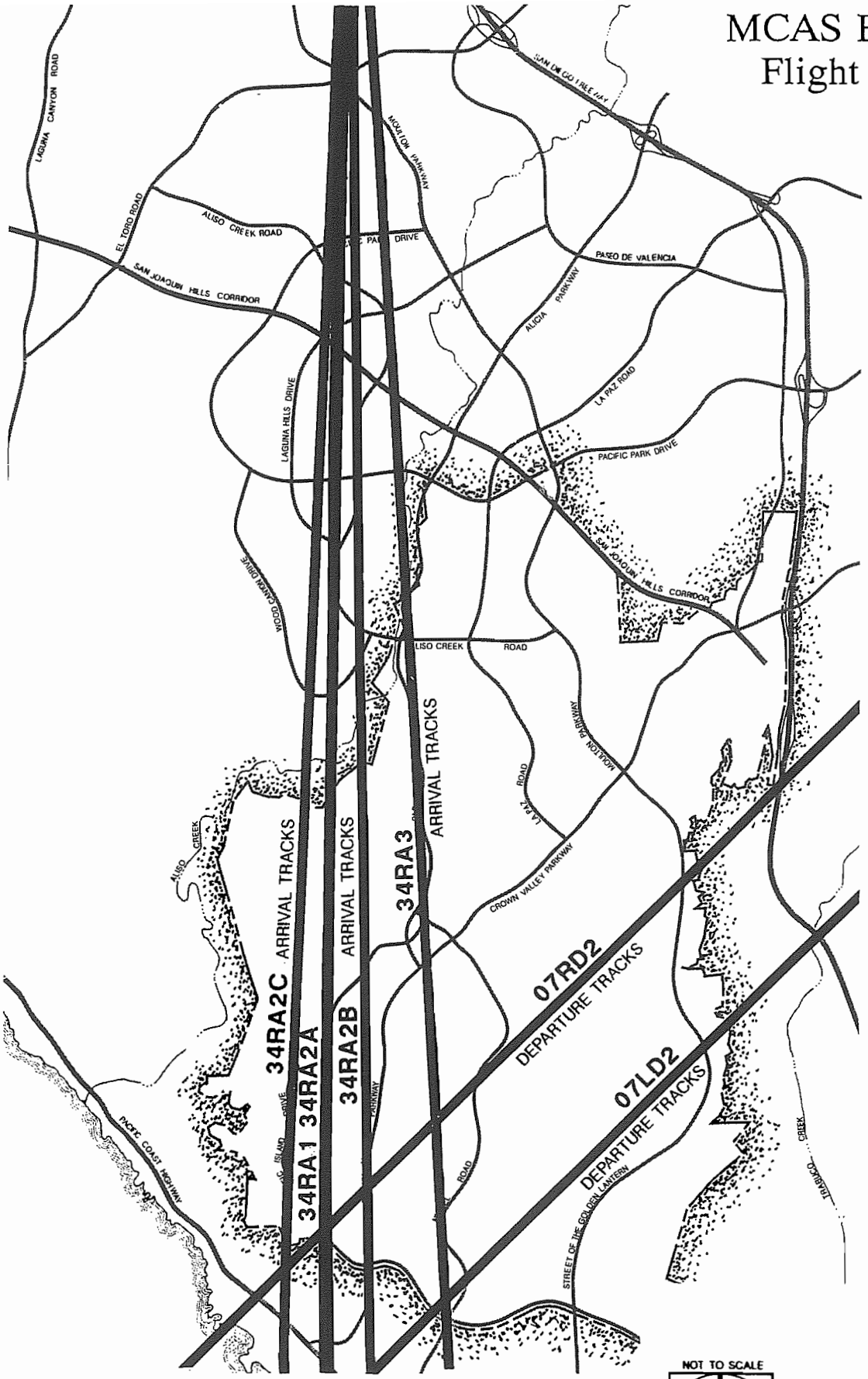
Figure N-4 depicts the 1981 AICUZ Noise Contours from MCAS El Toro. This figure indicates that the 60 dB CNEL extends through the northwestern part of the City parallel with the arrival of flight tracts. Several residential uses located in this area are subject to overhead aircraft noise. However, most of the residential uses have been provided with mitigation to achieve the required indoor noise standard of 45 dB CNEL. The 65 dB CNEL is located outside the City.

Figure N-4 does not reflect any noise contours along the departure flight tracts that extend through the southwestern portion of the City. The aircraft is flying at a height of at least 9,000 feet along the departure tract. At this height the noise that can be heard from the aircraft is minimal.

Railroad and Trains

One rail line runs through the City of Laguna Niguel, paralleling the Interstate 5 Freeway. The Atchison Topeka and Santa Fe (AT & SF) line passes through the eastern edge of the City on its path from Los Angeles to San Diego, carrying both freight and passenger trains. The freight train carries cargo from Fullerton. The San Diego run passenger train is AMTRAK which supports the local commuter network, stopping in Anaheim, Santa Ana, Irvine, San Juan Capistrano, San Clemente, and Oceanside. Table N-5 provides a breakdown of the rail operations that occur along these two lines.

MCAS El Toro
Flight Tracks



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MCAS El Toro Projected Noise Contours

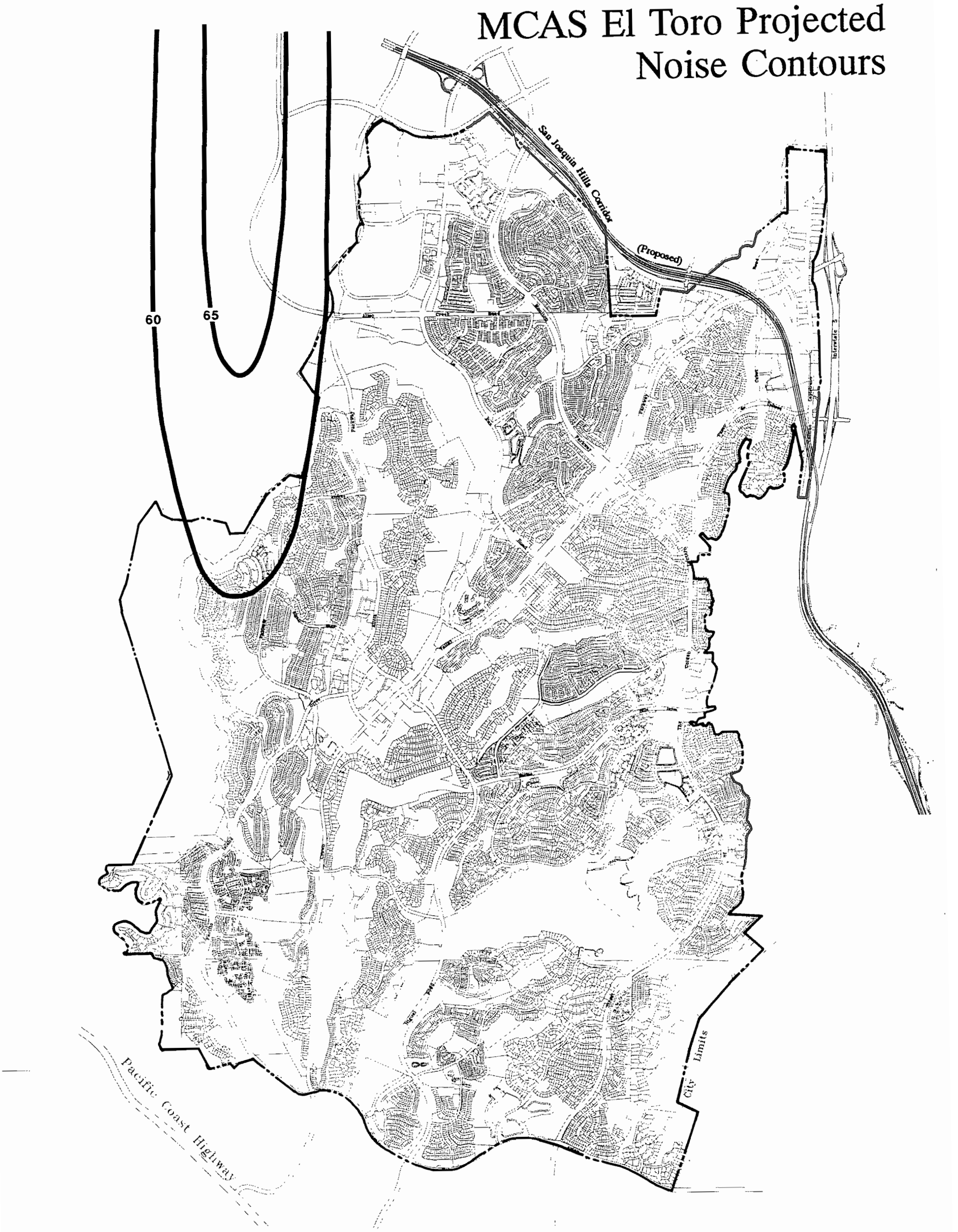

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Table N-5
Railroad Operational Data
(1991 Operations)

Railway Segment	No. of Trains/Day	Train Length (Feet)	Distribution Day/Evening/Night	Speed
AT&SF Freight	2	5,500	50%/50%/0%	55 mph
AMTRAK	14	620	71%/14%/14%	90 mph

The noise exposure contours along the railway tracks were interpreted with the Wyle Laboratories train noise methodology model. The contours were determined from the number and type of trains using the line, the magnitude and duration of each train pass, and the time of day the operation occurs. The noise contours at 100, 200, 400 and 800 feet from each of these railway lines is reflected in Table N-6.

Table N-6
Train Noise Contours

Railway Line	Noise Level (Ldn) at			
	100 feet	200 feet	400 feet	800 feet
AT&SF Freight	63.3	59.3	54.3	49.3
AMTRAK	65.4	61.4	56.4	51.4

As shown in Table N-6, the AMTRAK trains create the largest noise contours of the two trains operating in the City. However, the closest noise-sensitive land use in the area is located approximately 400 feet west of the railroad line. At this distance the CNEL would be less than 57 dB CNEL. Thus, no significant noise impacts to sensitive land uses are projected to occur from train operations.

VI. SENSITIVE RECEPTORS

The City of Laguna Niguel has a number of noise sensitive land uses. These uses include: residential areas, school sites, child care areas, library, parks and a senior center site. Figure N-5 depicts the locations of schools and other sensitive noise receptors that are located within areas that are affected with noise levels of at least 60 dB CNEL.

Many of the residential uses in Laguna Niguel are within neighborhood enclaves. These areas are typically located away from major transportation corridors. However, there are residential areas that have rear and front yards adjacent to arterial roadways. Some of these areas are impacted with traffic noise that is in excess of City standards.

There are five existing and six proposed school sites in Laguna Niguel. The majority of the school sites are located or planned along major arterials and are, therefore, impacted by traffic noise.

Four public park sites, Crown Valley Community Park, Hidden Hills Park, Marina Hills Park and Rancho Niguel Park are located along major arterials. These park sites are impacted by noise levels in excess of 65 dB CNEL. The remaining park sites in the City are situated along secondary or collector roadways. These areas are not subject to high levels of traffic-related noise.

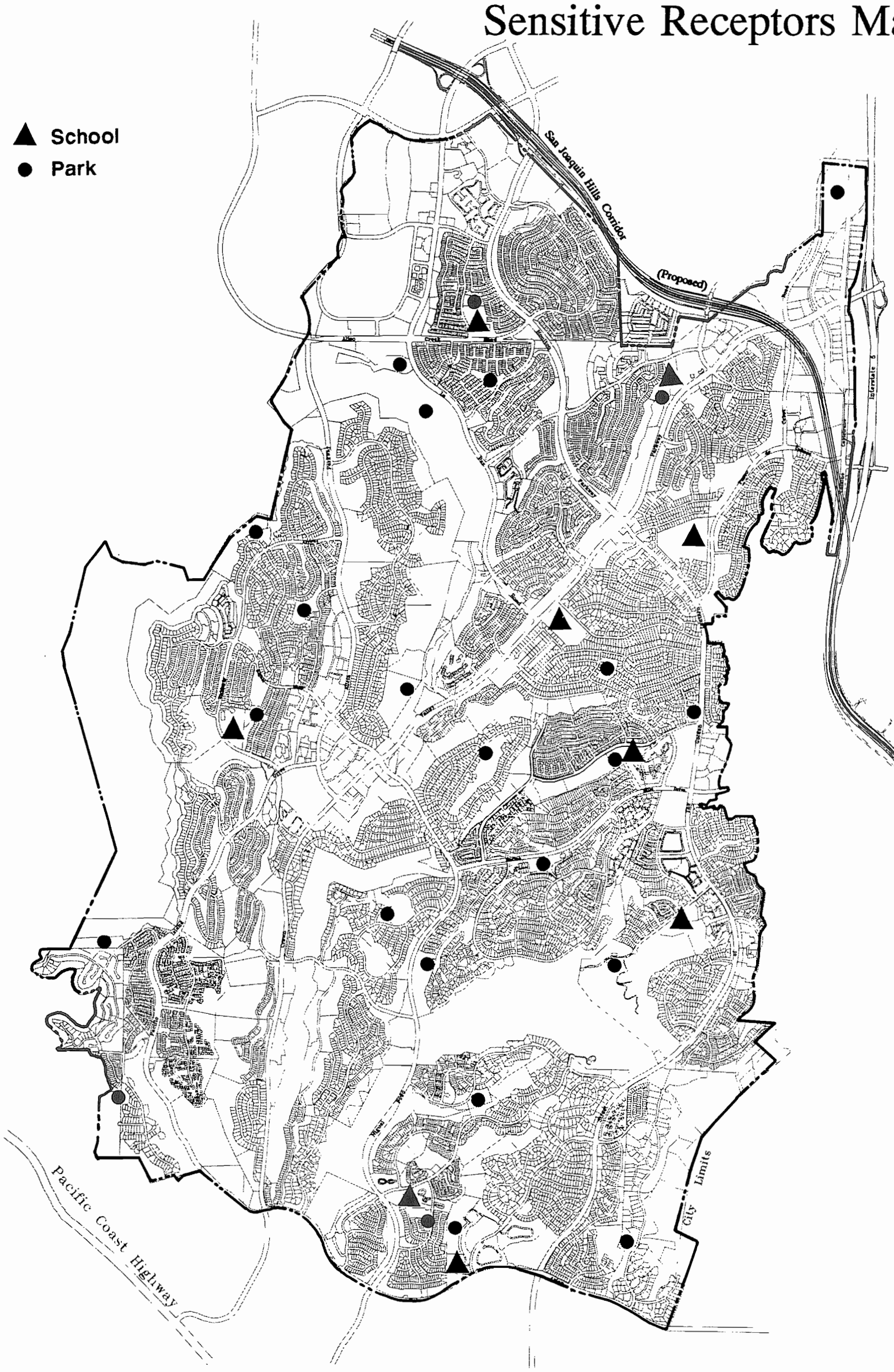
Other noise sensitive land uses located along major transportation corridors include proposed senior center site at the corner of Moulton Parkway and Aliso Creek Road, and a childcare center and Crown Valley Library on Crown Valley Parkway. Portions of both of these sites are above 65 dB CNEL.

The planned alignments of the San Joaquin Hills Transportation Corridor and Moulton Parkway will be future sources of traffic noise. Both of these transportation facilities will affect noise-sensitive land uses within the immediate vicinity. The implementation of site specific sound attenuation measures would ensure that these transportation facilities do not exceed the exterior and interior noise standards for nearby residential uses. Laguna Niguel should coordinate closely with the County of Orange to ensure that the San Joaquin Hills Transportation Corridor and Moulton Parkway are in compliance with City noise standards. Additional information regarding the San Joaquin Hills Corridor and Moulton Parkway is presented on pages 22 and 23 of this Element.

Overhead aircraft flights from El Toro are expected to occur in the future and may change with the operational mission of the air base. Noise-sensitive land uses in the City will continue to be affected by aircraft operations.

Sensitive Receptors Map

▲ School
● Park



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VII. FUTURE NOISE ENVIRONMENT

The major source of future noise will come from automobiles and trucks traveling on existing and proposed roadways and transportation corridors in the City. Other future sources of noise include overhead aircraft from MCAS El Toro and from rail traffic on the AT&SF Railroad. Future sources of noise should be considered during the planning process.

A. Major Roadways

Future unattenuated noise levels along roadways are shown in Figure N-6. Noise levels are mapped using contour lines indicating a specific noise level that there is no shielding from existing barriers or topography from traffic noise is assumed.

As shown on Table N-7, most of the roadways in Laguna Niguel are projected to have noise levels that are below 65 CNEL at 100 feet from the centerline. However, segments of Alicia Parkway, Niguel Road, La Paz Road, Golden Lantern, Moulton Parkway, Pacific Park Drive, Aliso Creek, Crown Valley Parkway, Marina Hills Drive, Paseo de Colinas, Cabot Road and Greenfield Drive would all experience noise levels of 65 CNEL at 100 feet from the centerline. Compared to existing CNELs, most of the roadways will experience less than a 3 dBA increase over existing noise levels, the level that is discernable by adjacent receptors. Roadways with the largest decibel increase include portions of Pacific Island Drive, Highlands Avenue, Moulton Parkway, Golden Lantern, Pacific Park Drive, Avila Road, Aliso Creek Road, and Camino del Avion. The increases associated with these roadways are primarily related to the amount of new development occurring in the area. Traffic noise along the roadways could be mitigated to adequate levels with a combination of landscaped barriers, sound walls and architectural sound attenuation measures.

Figure N-6 depicts the projected CNEL contours for major roadways in Laguna Niguel. The 65 CNEL contour extends furthest into adjacent land uses along Moulton Parkway, Golden Lantern and Crown Valley Parkway. This results from relatively high daily traffic volumes and high vehicle speeds along these roadways.

Along Moulton Parkway, the 65 CNEL extends between 165 feet and 190 feet from the centerline. However, landscaped barriers and sound attenuation walls are generally present to help mitigate traffic noise levels. In some areas, existing noise attenuation features would not adequately reduce future noise levels. Portions of the large undeveloped County Village Parcel located on the east side of Moulton Parkway between Aliso Creek road and Pacific Park Drive could be impacted by noise levels of 65 dBA or greater. Site specific acoustical studies and sound attenuation measures should be incorporated into the planning process for this area to ensure that adequate noise levels are achieved.

Future Roadway Noise Contours

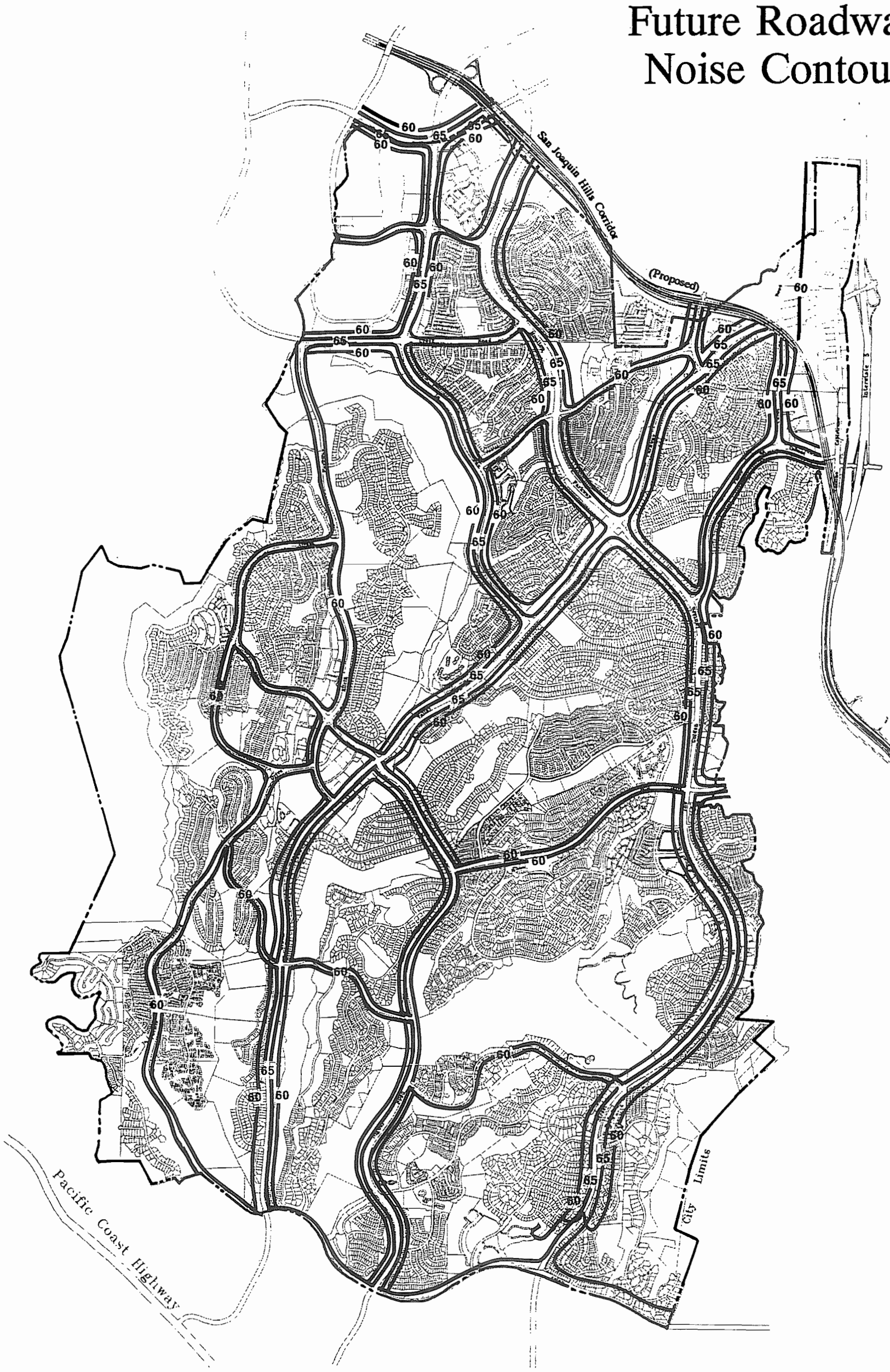

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Table N-7
Future CNEL Range at 100 Feet from Centerline

Roadways	CNEL Range
Pacific Island Drive	59.2 - 62.2
Highlands	53.9 - 58.0
Alicia Parkway	64.2 - 65.6
Niguel Road	56.9 - 66.4
La Paz Road	64.0 - 68.3
Street of the Golden Lantern	68.7 - 70.0
Moulton Parkway	68.3 - 68.8
Pacific Park Drive	68.5 - 69.0
Aliso Creek	64.0 - 66.0
Rancho Niguel	57.0 - 66.0
Crown Valley Parkway	67.1 - 69.6
Marina Hills Drive	63.7 - 66.7
Camino del Avion	64.4 - 66.4
Paseo de Colinas	59.0 - 65.6
Cabot Road	63.7 - 65.2

The 65 CNEL extends along Golden Lantern between 180 feet and 215 feet from the centerline. There are many residential uses along Golden Lantern that could be affected by traffic noise. Landscaped barriers and sound attenuation walls should help mitigate traffic noise; however, without site specific studies that consider existing noise barriers and local topography, it is not possible to accurately project the future noise environment of residential uses. Many of the outdoor living areas of residences that are adjacent to the roadway are affected by noise levels above 65 CNEL and those noise levels are projected to increase.

The 65 CNEL extends between 140 feet and 200 feet from the centerline of Crown Valley Parkway. However, most of the residential uses are sufficiently setback to mitigate noise levels to acceptable levels. In conjunction with the setbacks, sound attenuation measures have been incorporated into the construction of many residential uses.

Laguna Niguel has little control of transportation noise at the source. State and federal agencies have the responsibility to control vehicle emission noise levels. The most effective method the City has to mitigate traffic noise is through effective site planning and the construction of noise barriers. Proposed development should consider future traffic noise during the planning process. Mitigation measures should be incorporated into development projects, when necessary, to ensure that adequate noise levels are achieved.

B. Moulton Parkway/Street of the Golden Lantern

The proposed improvements would consist of six lanes through most of Laguna Niguel. Additional right-of-way may be needed to accommodate the construction of the six lanes. Almost the entire length of the street in the City will extend through residential areas. Further information regarding the alignment of the street is presented in the Circulation Element.

The future traffic volumes projected along Moulton Parkway/Golden Lantern indicate that several existing and future residential uses could be impacted by noise levels above 65 CNEL. The improvements to Moulton Parkway and Golden Lantern would result in greater traffic volumes at higher speeds with a related increase in noise levels. Many of the noise impacts associated with the improvements could potentially be mitigated through the construction of noise barriers at the top of slopes (rather than adjacent to the roadways) and the incorporation of architectural sound attenuation measures into existing residences. Laguna Niguel will closely coordinate with the County of Orange on the planning and environmental documentation for the Moulton Parkway/Street of the Golden Lantern improvements to ensure that adequate noise attenuation is provided for residents in the area.

C. San Joaquin Hills Transportation Corridor

The San Joaquin Hills Transportation Corridor (Corridor) is a future 19 mile multi-modal transportation corridor that will extend from the City of Newport Beach to the City of San Juan Capistrano connecting Interstate 5 to the existing State Route 73 freeway. Approximately 5.5 miles of the Corridor is located within or adjacent to Laguna Niguel. The Corridor will primarily extend through areas within the City that contain non-sensitive land uses. However, a few residential areas will be close to the Corridor.

The Corridor consists of three to five general purpose travel lanes in each direction (depending on the reach of the Corridor). One auxiliary lane in each direction for traffic merging on and off. The corridor alignment will include steep grades where required. A 64-foot median is provided to accommodate one high occupancy vehicle lane in each direction. There are three interchanges proposed just north of the City's boundary. The first interchange is planned on Moulton Parkway near Pacific Park Drive, the second interchange is on La Paz Road north of Pacific Park Drive, and the final interchange is located at Greenfield Drive near Crown Valley Parkway. A more detailed description and cross-section view of the corridor is provided in the Laguna Niguel Circulation Element.

The San Joaquin Hills Transportation Corridor EIR/EIS recorded post-2010 noise levels at eight different locations in Laguna Niguel. Existing noise measurements were taken at locations adjacent to or within the immediate vicinity of the corridor. The analysis indicates that of the eight locations measured, seven would be impacted from noise in excess of 67 dBA Leq. The Federal Department of Transportation and the California Department of Transportation (CALTRANS) both use 67 Leq as the maximum allowable noise level for residential uses. This standard closely corresponds to the County of

Orange's residential standard of 65 dB CNEL. The EIR/EIS requires that a series of barriers ranging from 8 to 16 feet be provided to mitigate noise impacts to acceptable levels.

Figure N-7 identifies the locations within and adjacent to the City, where noise measurements were recorded and where noise barriers are proposed. Table N-8 indicates the projected noise levels before mitigation, the recommended noise barrier heights and the projected noise levels after mitigation. The precise location and description of each mitigation measure is provided in the San Joaquin Hills Transportation Corridor Environmental Impact Report.

Table N-8 indicates that all of the residential sites, except for Site 5, can be mitigated to 67 dBA Leq. Site 5 is situated within in a predominantly single family residential area. Eight houses in the area would be impacted with noise in excess of 67 dBA Leq. An eighteen foot barrier would be needed to break the line of sight of the corridor. The height of this barrier is not feasible, and it would still not provide sufficient mitigation. The EIR/EIS requires that a barrier be provided at the property line.

The height of the barrier is to be determined during the preliminary design of the corridor, subject to approval of the property owners.

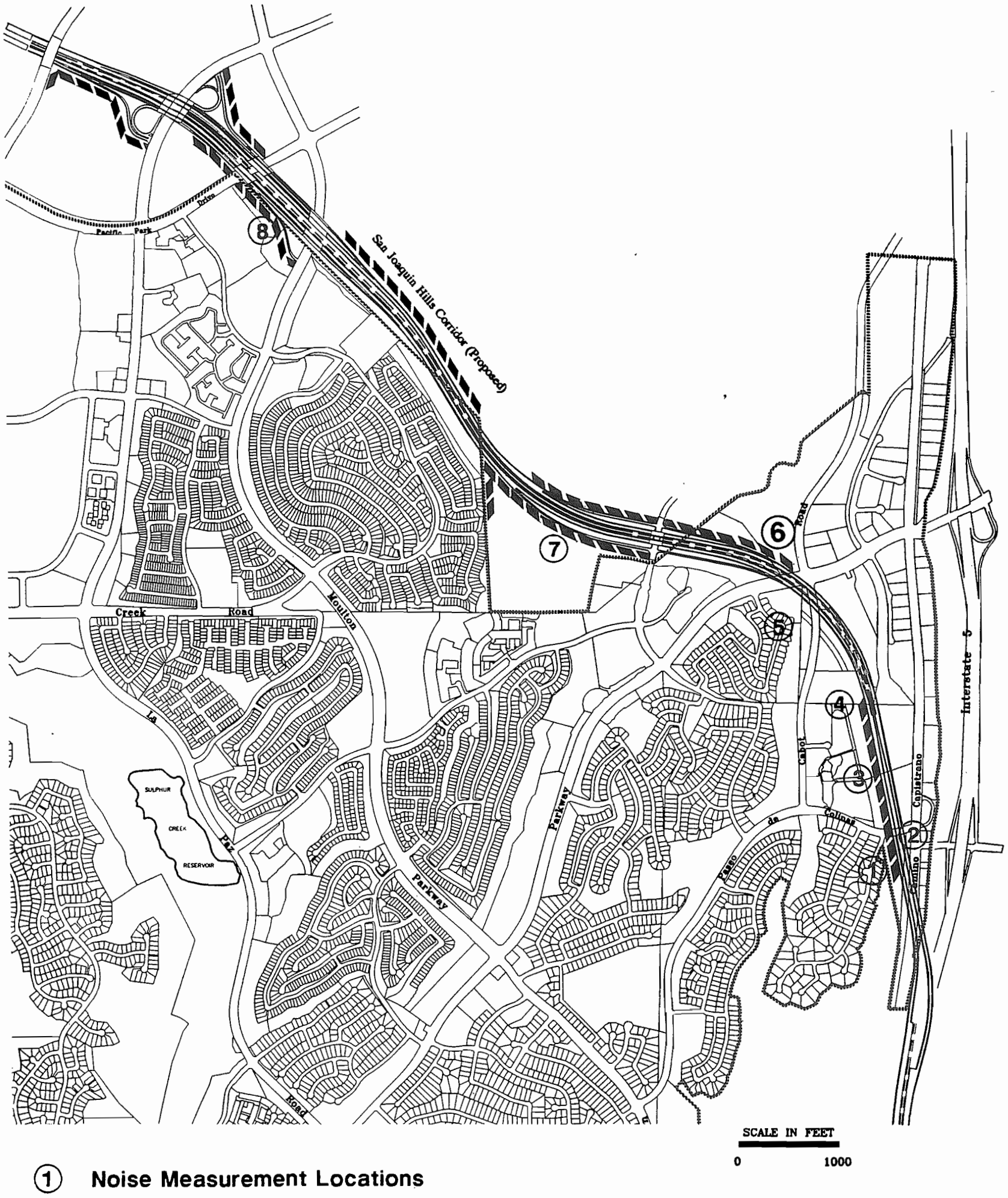
No mitigation is proposed at Site 2. This site is flood control property and designated open space. No noise sensitive land uses would be impacted.

Table N-8
Projected SJHTC Noise Levels
and Recommended Mitigation

Site	Land Use	Projected Leq Noise Level Without Mitigation	Recommended Barrier Heights	Projected Leq Noise Level With Mitigation
1	Residential	74 dBA	6′	66 dBA
2	Open Space	73 dBA	No mitigation required	73 dBA
3	Residential	68 dBA	10′	63 dBA
4	Residential	65 dBA	16′	60 dBA
5	Residential	69 dBA	Unknown	*
6	Open Space	71 dBA	10′	65 dBA
7	Residential	72 dBA	8′	66 dBA
8	Residential	73 dBA	8′	59 dBA

* Subject of Future Study.

Noise Measurement Locations and Recommended Mitigation



① Noise Measurement Locations

Noise Barrier Wall

SOURCE: San Joaquin Hills Transportation Corridor EIR/EIS

D. Airport and Aircraft

The 1981 AICUZ Noise Contours are shown on Figure N-4. At this time there are no projected noise contours to reflect the future operations of USMC El Toro. The 1981 AICUZ noise contours are expected to be revised during the next AICUZ update in 1993. Future flight operations at USMC El Toro will involve greater use of the F-18 Fighter Jet. However, it is anticipated that noise contours through Laguna Niguel will not significantly change.

E. Railroad and Trains

The projected level of railroad activity in the City is expected to increase. The most significant increase will most likely be the number of AMTRAK trips along the existing AT&SF line. Local transportation and air quality agencies are promoting train travel for commuters who are currently traveling along I-5. This, combined with the natural population growth in southern Orange County, should increase the demand for AMTRAK trips.

The level of freight activity in the City is not expected to increase significantly in the future according to representatives from AT&SF. However, rail traffic will respond to market demand and may increase or decrease depending on future industrial development along the line. At this time railroad officials are unable to project the frequency of future rail activity.

Given the distance between the railroad line and noise-sensitive land uses, the increased train activity could potentially effect existing and future land uses in the area. A site-specific noise analysis should be required for any future noise-sensitive uses proposed in the immediate area of the railroad line.

VIII. GOALS, POLICIES AND ACTIONS

Goal 1 **Establishment of exterior and interior noise environments for land uses that will protect citizens from excessive noise.**

Intent It is the intent of this section to provide noise standards for land uses in Laguna Niguel. These standards ensure the compatibility of land uses with their existing and future noise environments.

Policy 1.1 Discourage noise sensitive land uses in noisy exterior environments unless measures can be implemented to reduce exterior and interior noise to acceptable levels. Alternatively, encourage less sensitive uses in areas adjacent to major noise generators but require appropriate interior working environments.

Action

1.1.1 Incorporate measures into all development projects to attenuate exterior/interior noise levels to acceptable levels. The City's noise standards for land use compatibility are provided in Table N-9. These standards shall be adhered to and implemented during the review of all proposed development projects.

Table N-9
Land Use with Noise Standards

Land Use	Interior Standard	Exterior Standard
Residential Detached Residential Attached	45	65
Neighborhood Commercial Community Commercial	--	70
Professional Office	50	70
Community Commercial/ Professional Office	--	70
Industrial/Business Park	55[1]	75
Professional Office/Industrial/Business Park Industrial/Business Park/Professional Office/Community Commercial	--	75
Public/Institutional Public Institutional/Professional Office	50	70
Schools	50[2]	65[2]
Parks and Recreation	--	70

Notes: 1. Where quiet is a basis for use.
2. In interior or exterior Classroom Areas during school operating hours.

Goal 2 **Land use planning that provides for the separation of significant noise generators from sensitive receptor areas.**

Intent The separation of noise generators from sensitive receptors will result in an exterior environment that requires minimal mitigation to meet acceptable noise levels. Proper planning will ensure that sensitive receptors are not impacted by noise hazards by locating these land uses distant from each other. Noise hazard areas will be considered to include locations within the 65 CNEL contour of master planned roadways, railroad corridors, aircraft flight paths, and industrial facilities.

Policy 2.1 Locate noise tolerant land uses in areas currently impacted by noise, such as adjacent to master planned roadways or within the contours of the United States Marine Corps Air Station at El Toro.

Policy 2.2 Ensure that current noise hazard areas in the City are identified, quantified, and mapped in a form that is available to decision makers.

Action

2.2.1 Require a revision to the noise contour map with every General Plan Update.

Policy 2.3 Utilize the information from the noise contour map in the General Plan in the development review process to ensure that noise sensitive land uses are not located near major stationary noise sources.

Policy 2.4 Minimize noise conflicts between land uses and the circulation network.

Action

2.4.1 Consider noise mitigation measures in the design of all future streets and highways and when improvements occur along existing highway segments. Measures will emphasize the establishment of buffers between roadways and adjoining noise sensitive areas.

Goal 3 **Promote the control of noise between land uses.**

Intent Exterior and interior noise standards determine the design and location of land uses. There is also the opportunity to control noise between land uses through the implementation of the City's Noise Ordinance. The Noise Ordinance discusses general community noise levels that "unreasonably disrupt the peace and quiet" of the community. Standards are provided in the Ordinance that

establish maximum noise levels during specific time periods when the uses are most sensitive to noise.

Policy 3.1 Limit the maximum permitted noise levels which cross property lines and impact adjacent land uses.

Action

3.1.1 Implement the City's Noise Ordinance to regulate noise for various land use categories and for sensitive time periods.

Goal 4 The control of noise from significant noise generators in the community.

Intent Noise can be controlled in three areas: 1) at the source with muffling techniques; 2) at the receptor through the use of architectural treatments, walls and landscaping; or 3) along the noise path with the insertion of sound barriers. The most effective means of reducing noise is by controlling it at its source. The intent of this goal is to reduce noise in the community through source-related controls.

Policy 4.1 Regulate noise from construction activities.

Action

4.1.1 Enforce the Noise Ordinance for all non-emergency construction operations.

Goal 5 The consideration of noise issues in the planning process.

Intent Noise issues should always be considered during the planning process so that needed measures are incorporated in design and location of land uses. In addition, the economic impact of noise attenuation measures can then be incurred by the property developer and not future owners who may not anticipate noise impacts.

Policy 5.1 Evaluate potential noise conflicts for individual sites and projects.

Actions

5.1.1 During review of development applications, consider noise impact of the proposed land use on the existing and future noise environment of existing or planned contiguous uses.

5.1.2 Require proposed noise producing projects to have an acoustical engineer prepare a noise analysis with recommendations for special design measures if the project is to be located close to existing or planned noise sensitive land uses.

5.1.3 Require proposed noise sensitive projects within noise impacted areas to have acoustical studies prepared by a qualified acoustical engineer and to provide special design measures to protect noise sensitive uses from ultimate projected noise levels.

5.1.4 For projects close to master planned roadways, utilize the ultimate roadway capacity at Level-of-Service D and the posted speed limit to estimate maximum future noise impacts.

5.1.5 Discourage projects that are incapable of successfully mitigating excessive noise.

Policy 5.2 Require mitigation of all significant noise impacts as a condition of project approval.

Actions

5.2.1 Consider site design techniques as the primary means to minimize noise impacts.

- Utilize building setbacks to increase the distance between the noise source and receiver.
- Promote the placement of noise tolerant land uses such as parking lots, maintenance facilities, and utility areas between the noise source and receptor.
- Orient buildings to shield outdoor spaces from a noise source. Quiet outdoor spaces can be provided by creating a U-shaped development which faces away from the roadway or by clustering land uses.

5.2.2 Require developers to consider alternative architectural layouts as a means of meeting noise reduction requirements.

- Place bedrooms on the side of the house facing away from major roadways. The use of noise tolerant rooms such as garages, bathrooms and kitchens to shield noise-sensitive areas will be encouraged.
- When bedrooms cannot be located on the side of a house away from a major roadway, require extra insulation and double-pane windows.
- Avoid balconies facing major travel routes. Development proposals including balconies in the design will need to be evaluated for potential noise impacts during the environmental review process.

APPENDIX A
GLOSSARY OF TERMS (CONT.)

Intrusive Noise: That noise which intrudes over and above the ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, time of occurrence, and tonal or informational content as well as the prevailing ambient noise level.

L10: The A-weighted sound level exceeded 10 percent of the sample time. Similarly L50, L90, 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..."

Noise Attenuation: The ability of a material, substance, or medium to reduce the noise level from one place to another or between one room or another. Noise attenuation is specified in decibels.

Noise Barrier: A structure designed to mitigate the impact generated by a noise source (.e.g., an arterial or rail line) at an adjacent noise sensitive location. Barriers should be continuous structures (without gasps) and should be constructed of a material that is impervious to noise (e.g., concrete block, stucco-on-wood, wood-on-wood, 1/4" tempered plate glass, earthen berm, or any combination of these materials).

Noise Exposure Contours: Lines drawn around a noise source indicating constant or equal level of noise exposure. CNEL and LDN are typical metrics used.

Noise Impact Area: A specific area exposed to significant levels of noise.

Noise Reduction: The ability of a material to reduce the noise level from one place to another or between one room and another. Noise reduction is specified in decibels.

Noise Referral Zones: Such zones are defined as the area within the contour defining a CNEL level of 60 decibels. It is the level at which either State or Federal laws and standards related to land use become important and, in some cases, preempted local laws and regulations. Any proposed noise sensitive development which may be impacted by a total noise environment of 60 dB CNEL or more should be evaluated on a project specific basis.

Noise Sensitive Land Use: Noise-sensitive land uses include, but are not limited to: residences, schools, libraries, hospitals, churches, hotels, motels, and outdoor recreational areas. These typify land uses where suitability is restricted by intrusive noises. Hence, they are termed "noise-sensitive." Noise-sensitivity factors include interference with speech communication, subjective judgement of noise acceptability and relative noisiness, need for freedom from noise intrusion, and sleep interference criteria.

Sound: A reaction in the ear caused by radiant energy being transmitted from a source by longitudinal pressure wave in air or some other elastic medium.

APPENDIX A
GLOSSARY OF TERMS (CONT.)

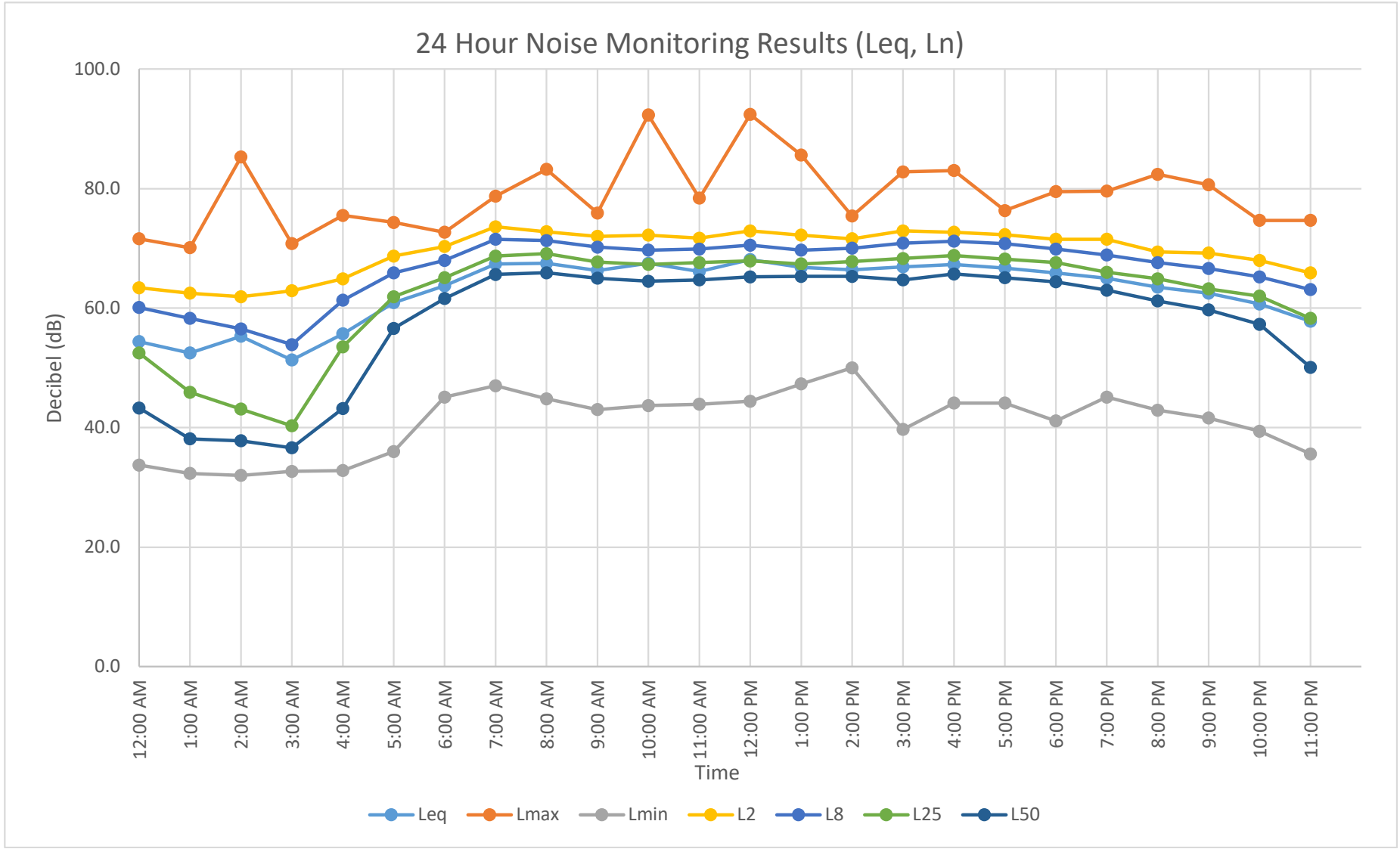
Sound Level (Noise Level): The weighted sound pressure level obtained by use of a sound level meter having a standard frequency-filter for attenuating part of the sound spectrum.

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

Appendix B

Field Data and Photos

PROJECT:	Grace Church Subdivision Noise Impact Study					JOB #:	2936-2021-01
NOISE METER	Piccolo II SLM, 24-Hour Measurement					DATE:	17-Mar-21
LOCATION:	At approximately 260 feet from the northern property line and at approximately 160 feet from the centerline of the Crown Valley Parkway.					BY:	B. Estrada
Time	Leq	Lmax	Lmin	L2	L8	L25	L50
12:00 AM	54.4	71.6	33.7	63.4	60.1	52.5	43.3
1:00 AM	52.5	70.1	32.3	62.5	58.3	45.9	38.1
2:00 AM	55.3	85.3	32	61.9	56.5	43.1	37.8
3:00 AM	51.3	70.8	32.7	62.9	53.9	40.3	36.6
4:00 AM	55.7	75.5	32.8	64.9	61.3	53.5	43.2
5:00 AM	60.9	74.3	36	68.7	65.9	61.9	56.6
6:00 AM	63.7	72.7	45.1	70.3	68	65.1	61.6
7:00 AM	67.4	78.7	47	73.6	71.5	68.7	65.6
8:00 AM	67.5	83.2	44.8	72.8	71.3	69.1	65.9
9:00 AM	66.3	75.9	43	72	70.2	67.7	65
10:00 AM	67.5	92.3	43.7	72.2	69.7	67.3	64.5
11:00 AM	66.1	78.4	43.9	71.7	69.9	67.6	64.7
12:00 PM	68.1	92.4	44.4	72.9	70.5	67.9	65.2
1:00 PM	66.8	85.6	47.3	72.2	69.7	67.4	65.3
2:00 PM	66.4	75.4	50	71.6	70	67.8	65.3
3:00 PM	66.9	82.8	39.7	72.9	70.9	68.3	64.7
4:00 PM	67.3	83	44.1	72.7	71.2	68.8	65.7
5:00 PM	66.7	76.3	44.1	72.3	70.8	68.2	65.1
6:00 PM	65.9	79.5	41.1	71.5	69.9	67.6	64.4
7:00 PM	65.0	79.6	45.1	71.5	68.9	66	63
8:00 PM	63.5	82.4	42.9	69.4	67.6	64.9	61.2
9:00 PM	62.5	80.6	41.6	69.2	66.6	63.2	59.7
10:00 PM	60.7	74.7	39.4	68	65.2	62	57.3
11:00 PM	57.8	74.7	35.6	65.9	63.1	58.3	50.1
Daytime	66.3	92.4	39.4	71.9	69.9	67.4	64.4
Nighttime	58.4	85.3	32.0	66.1	63.0	58.7	54.1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40.0
20.0
0.0
Decibel (dB)
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2:00 AM
3:00 AM
4:00 AM
5:00 AM
6:00 AM
7:00 AM
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9:00 AM
10:00 AM
11:00 AM
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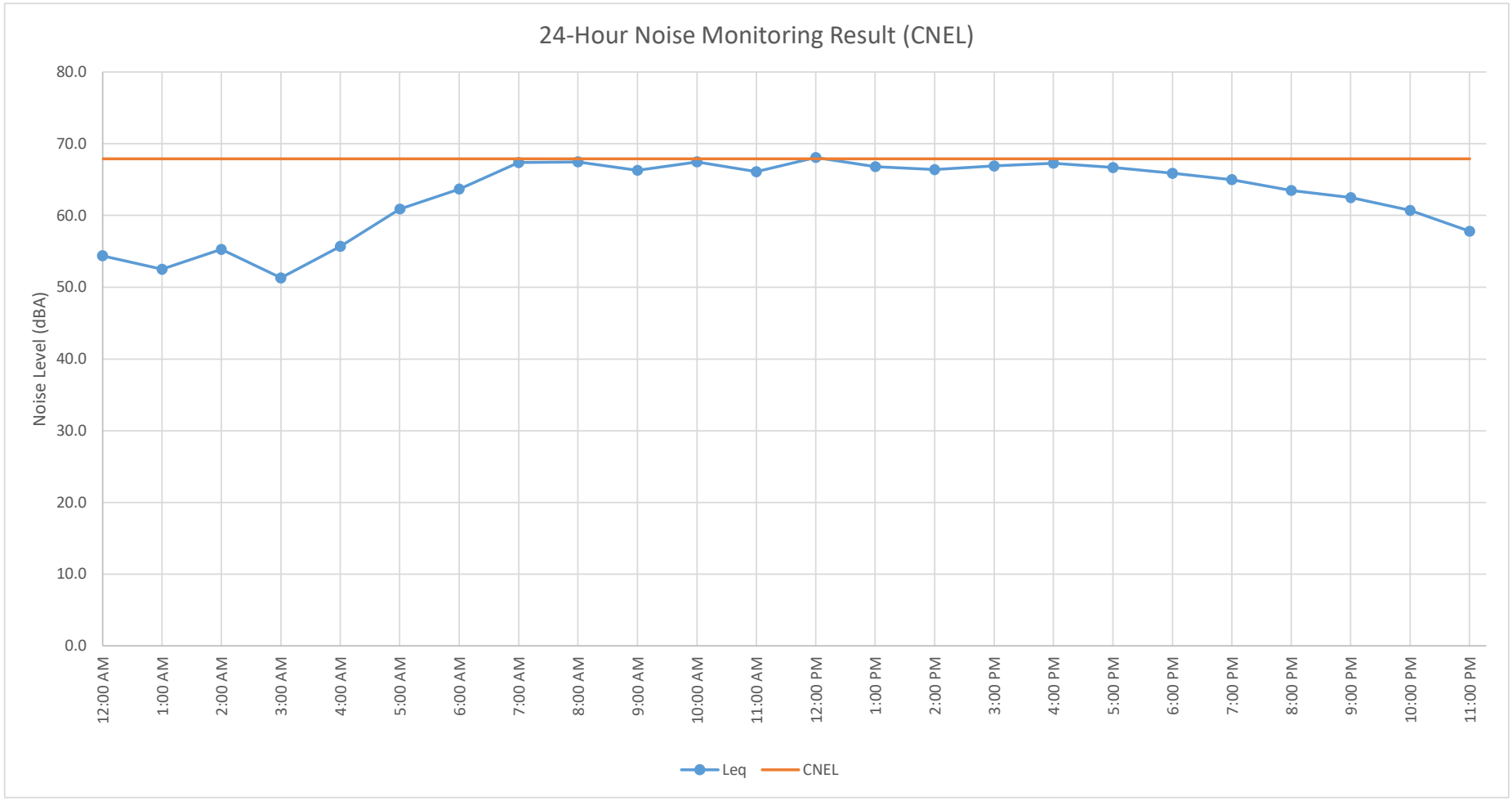
Leq
Lmax
Lmin
L2
L8
L25
L50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Noise Level (dBA)
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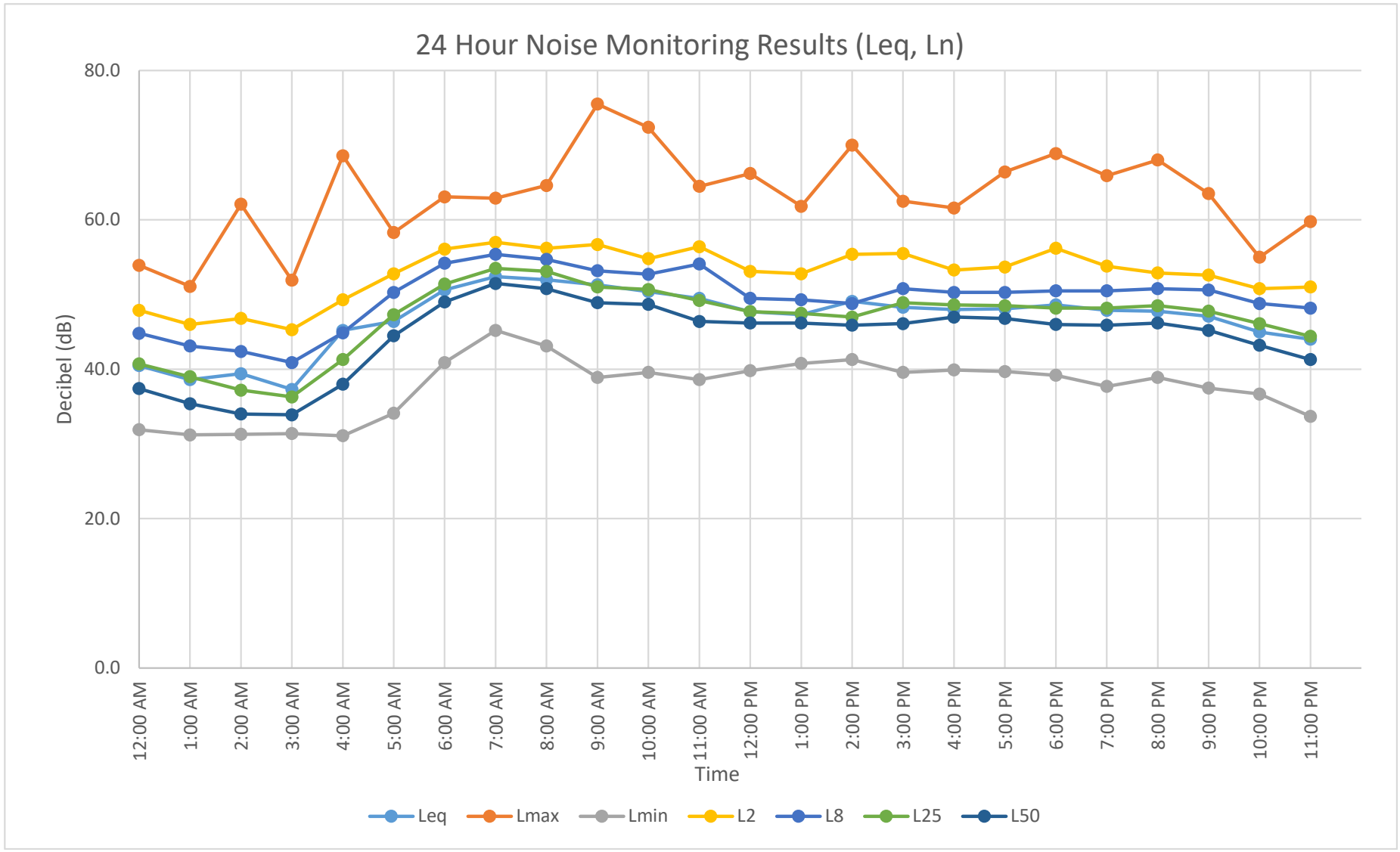
7:00 PM
8:00 PM
9:00 PM
10:00 PM
11:00 PM
Leq
CNEL

Field Sheet - ST1 Location Photos

Project:	Grace Church Subdivision Noise Impact Study	**Engineer:**	B. Estrada	**Date:**	05/17/2021 & 05/18/2021
				JN:	2936-2021-01
Measurement Address:		**City:**		**Site No.:**	1
Laguna Niguel and La Plata Drive			Laguna Niguel		

RK engineering group, inc.

PROJECT:	Grace Church Subdivision Noise Impact Study					JOB #:	2936-2021-01
NOISE METER	Piccolo II SLM, 24-Hour Measurement					DATE:	17-Mar-21
LOCATION:	At approximately 100 feet from the southern property line and at approximately 55 feet from the eastern property line.					BY:	B. Estrada
Time	Leq	Lmax	Lmin	L2	L8	L25	L50
12:00 AM	40.5	53.9	31.9	47.9	44.8	40.7	37.4
1:00 AM	38.6	51.1	31.2	46.0	43.1	39.0	35.4
2:00 AM	39.4	62.1	31.3	46.8	42.4	37.2	34.0
3:00 AM	37.3	51.9	31.4	45.3	40.9	36.3	33.9
4:00 AM	45.2	68.6	31.1	49.3	44.9	41.3	38.0
5:00 AM	46.4	58.3	34.1	52.8	50.3	47.3	44.5
6:00 AM	50.6	63.1	40.9	56.1	54.2	51.4	49.0
7:00 AM	52.4	62.9	45.2	57.0	55.4	53.5	51.5
8:00 AM	52.0	64.6	43.1	56.2	54.7	53.1	50.8
9:00 AM	51.3	75.5	38.9	56.7	53.2	51.0	48.9
10:00 AM	50.4	72.4	39.6	54.8	52.7	50.7	48.7
11:00 AM	49.5	64.5	38.6	56.4	54.1	49.2	46.4
12:00 PM	47.7	66.2	39.8	53.1	49.5	47.7	46.2
1:00 PM	47.3	61.8	40.8	52.8	49.3	47.5	46.2
2:00 PM	49.1	70.0	41.3	55.4	48.8	47.0	45.9
3:00 PM	48.3	62.5	39.6	55.5	50.8	48.9	46.1
4:00 PM	48.0	61.6	39.9	53.3	50.3	48.6	47.0
5:00 PM	48.1	66.4	39.7	53.7	50.3	48.5	46.8
6:00 PM	48.6	68.9	39.2	56.2	50.5	48.2	46.0
7:00 PM	47.9	65.9	37.7	53.8	50.5	48.2	45.9
8:00 PM	47.8	68.0	38.9	52.9	50.8	48.5	46.2
9:00 PM	47.1	63.5	37.5	52.6	50.6	47.8	45.2
10:00 PM	45.0	55.0	36.7	50.8	48.8	46.1	43.2
11:00 PM	44.0	59.8	33.7	51.0	48.2	44.4	41.3
Daytime	49.2	75.5	36.7	54.8	51.8	49.6	47.5
Nighttime	44.9	68.6	31.1	50.9	48.4	45.2	42.5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Decibel (dB)
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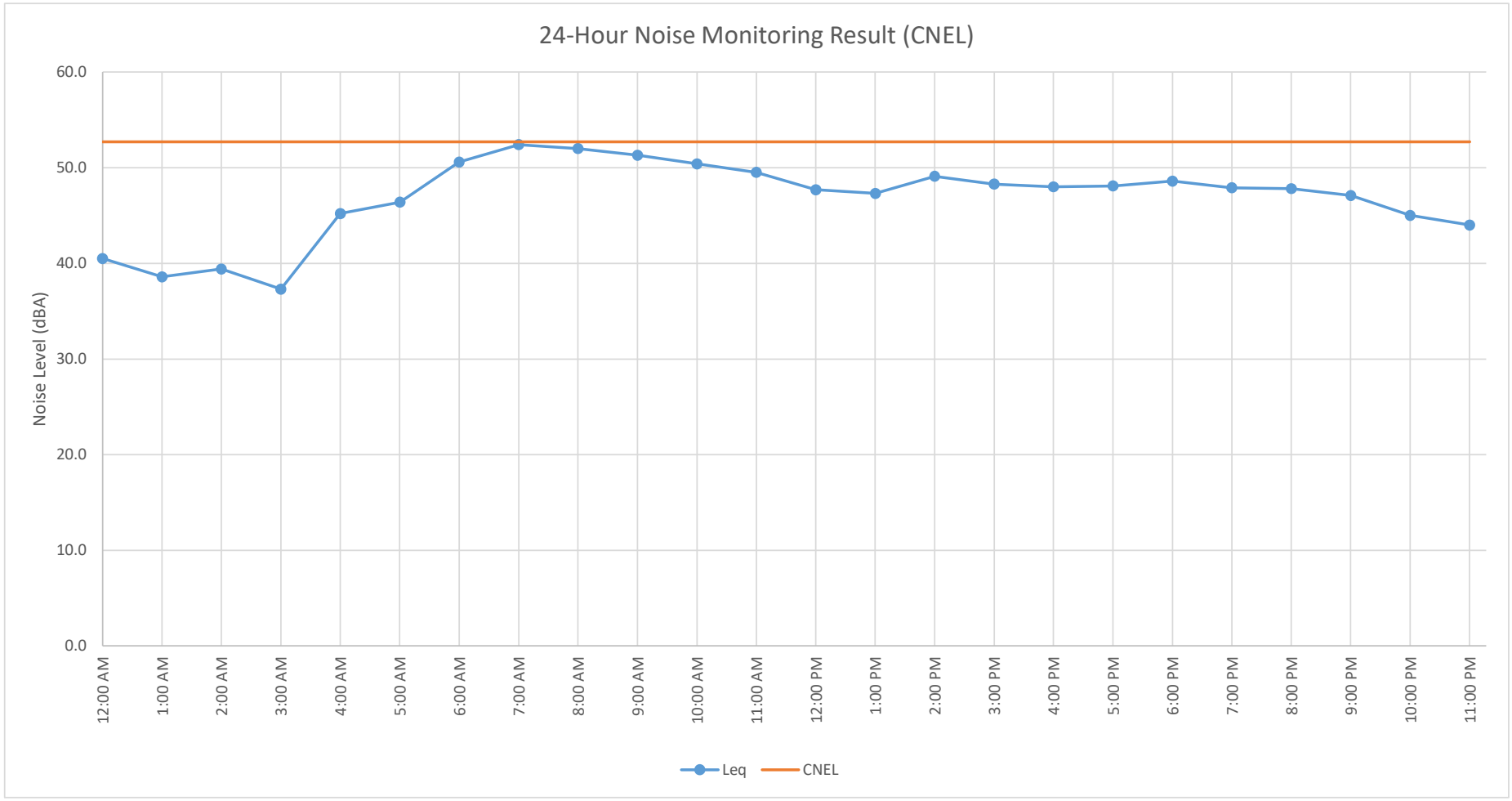
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Noise Level (dBA)
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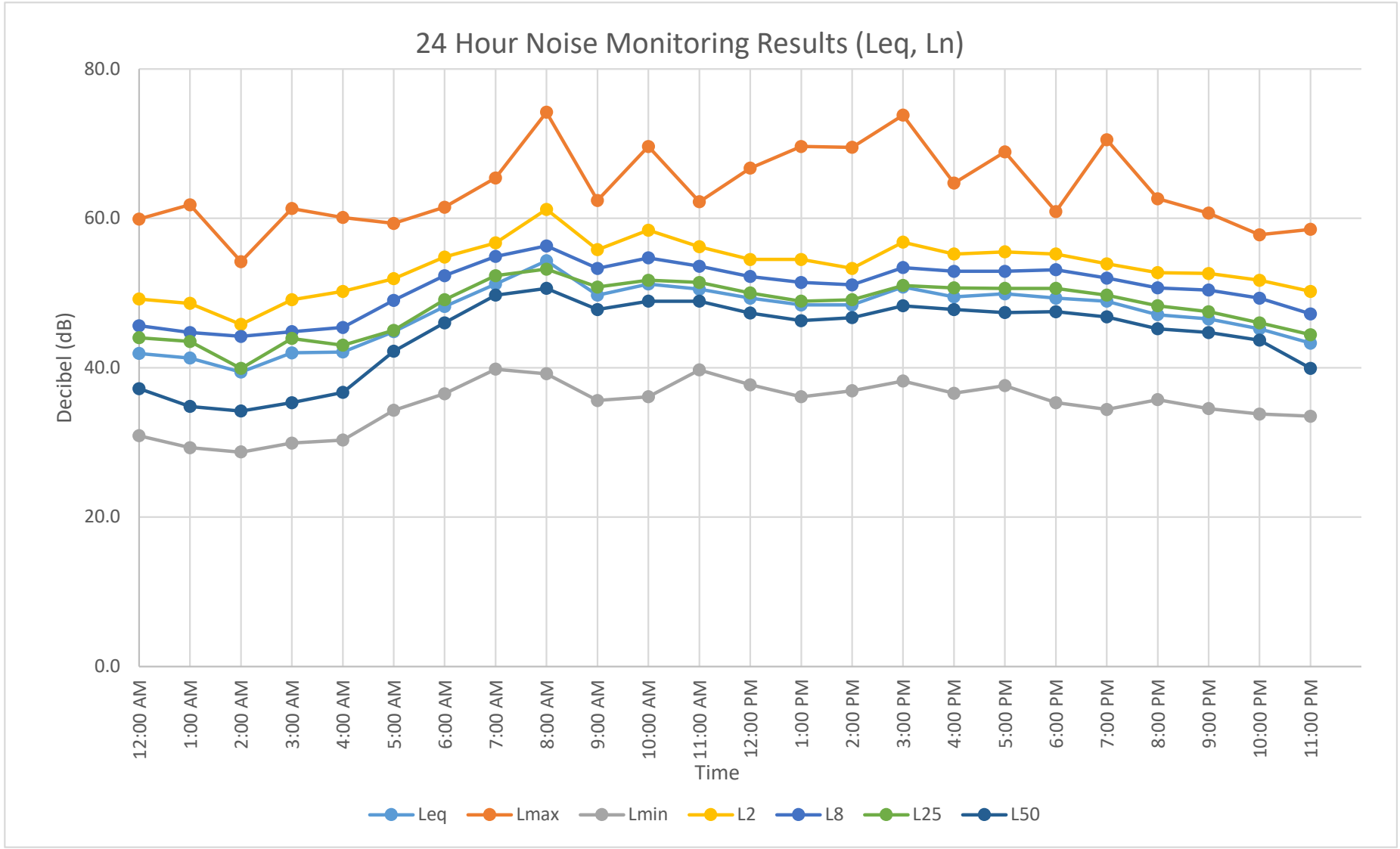
Leq
CNEL

Field Sheet - ST3 Location Photos

Project:	Grace Church Subdivision Noise Impact Study	**Engineer:** B. Estrada	**Date:** 05/17/2021 & 05/18/2021 **JN:** 2936-2021-01
Measurement Address: Laguna Niguel and La Plata Drive		**City:** Laguna Niguel	**Site No.:** 3

RK engineering group, inc.

PROJECT:	Grace Church Subdivision Noise Impact Study					JOB #:	2936-2021-01
NOISE METER	Piccolo II SLM, 24-Hour Measurement					DATE:	18-Mar-21
LOCATION:	Along the Church Parking Lot at approximately 240 ft from the La Plata Drive					BY:	B. Estrada
Time	Leq	Lmax	Lmin	L2	L8	L25	L50
12:00 AM	41.9	59.9	30.9	49.2	45.6	44.0	37.2
1:00 AM	41.3	61.8	29.3	48.6	44.7	43.5	34.8
2:00 AM	39.4	54.2	28.7	45.8	44.2	39.9	34.2
3:00 AM	42.0	61.3	29.9	49.1	44.8	43.9	35.3
4:00 AM	42.1	60.1	30.3	50.2	45.4	43	36.7
5:00 AM	44.8	59.3	34.3	51.9	49	45	42.2
6:00 AM	48.2	61.5	36.5	54.8	52.3	49.1	46
7:00 AM	51.2	65.4	39.8	56.7	54.9	52.3	49.7
8:00 AM	54.3	74.2	39.2	61.2	56.3	53.2	50.6
9:00 AM	49.7	62.4	35.6	55.8	53.3	50.8	47.8
10:00 AM	51.2	69.6	36.1	58.4	54.7	51.7	48.9
11:00 AM	50.5	62.2	39.7	56.2	53.6	51.4	48.9
12:00 PM	49.3	66.7	37.7	54.5	52.2	50	47.3
1:00 PM	48.4	69.6	36.1	54.5	51.4	48.9	46.3
2:00 PM	48.4	69.5	36.9	53.3	51.1	49.1	46.7
3:00 PM	50.8	73.8	38.2	56.8	53.4	51	48.3
4:00 PM	49.5	64.7	36.6	55.2	52.9	50.7	47.8
5:00 PM	49.9	68.9	37.6	55.5	52.9	50.6	47.4
6:00 PM	49.3	60.9	35.3	55.2	53.1	50.6	47.5
7:00 PM	48.9	70.5	34.4	53.9	52	49.7	46.8
8:00 PM	47.1	62.6	35.7	52.7	50.7	48.3	45.2
9:00 PM	46.5	60.7	34.5	52.6	50.4	47.5	44.7
10:00 PM	45.2	57.8	33.8	51.7	49.3	46	43.7
11:00 PM	43.3	58.5	33.5	50.2	47.2	44.4	39.9
Daytime	49.9	74.2	33.8	56.0	53.0	50.4	47.7
Nighttime	43.7	61.8	28.7	50.7	47.6	44.8	40.3


24 Hour Noise Monitoring Results (Leq, Ln)
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40.0
20.0
0.0
Decibel (dB)
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2:00 AM
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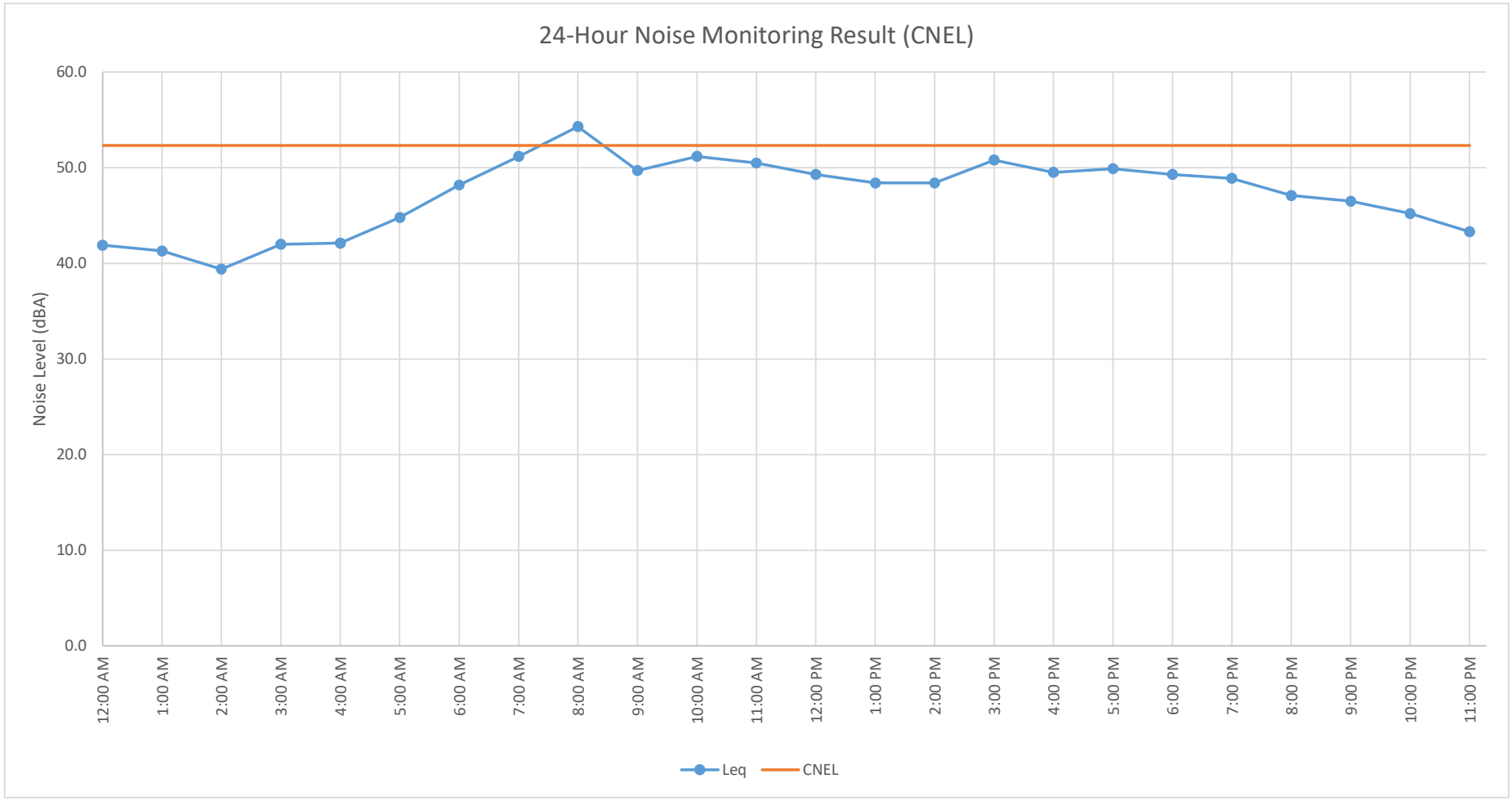
L50


24-Hour Noise Monitoring Result (CNEL)
Noise Level (dBA)
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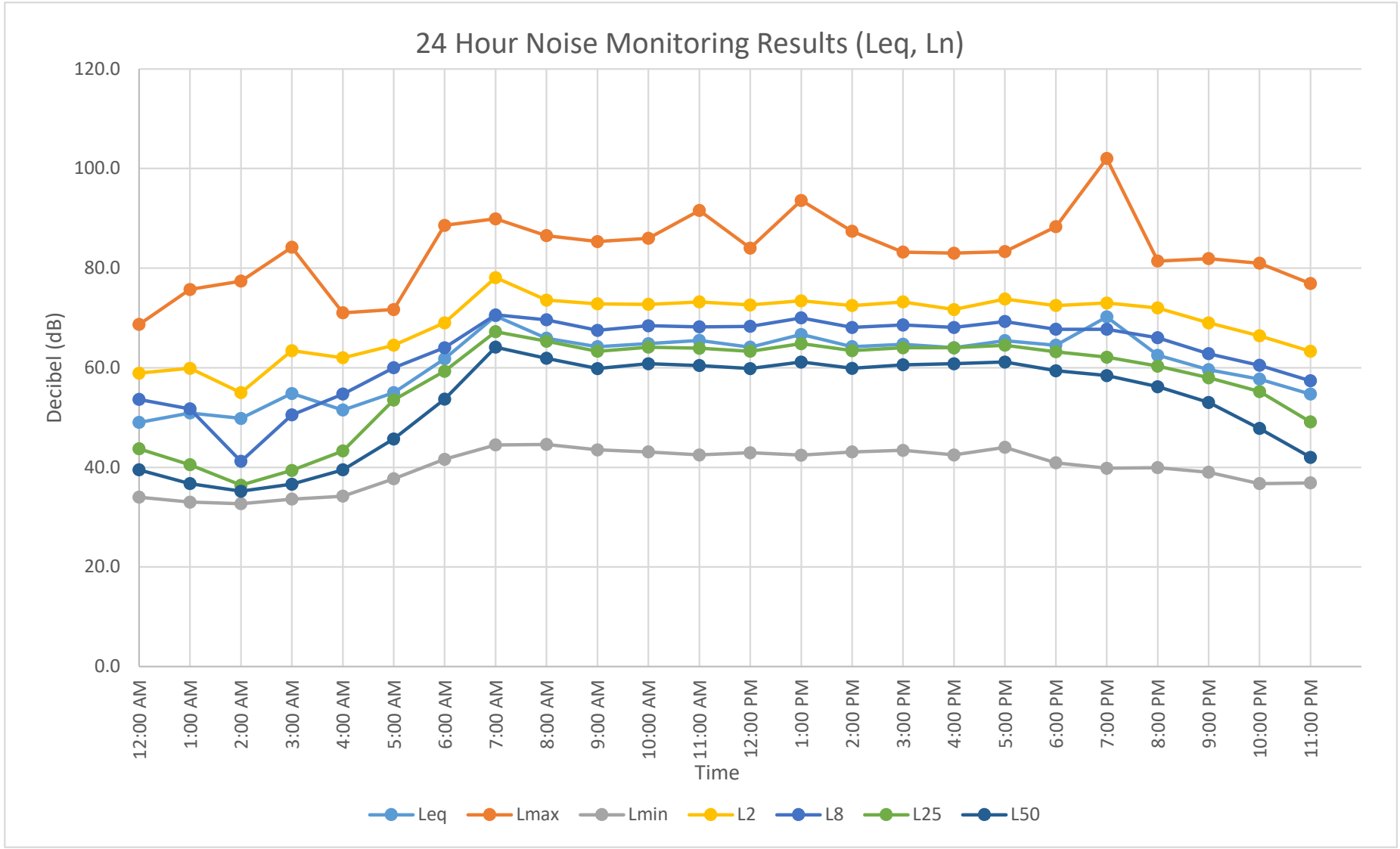
Leq
CNEL

Field Sheet - ST2 Location Photos

Project:	Grace Church Subdivision Noise Impact Study	**Engineer:** B. Estrada	**Date:** 05/17/2021 & 05/18/2021 **JN:** 2936-2021-01
Measurement Address:		**City:**	**Site No.:**
Laguna Niguel and La Plata Drive		Laguna Niguel	2

RK engineering group, inc.

PROJECT:	Grace Church Subdivision Noise Impact Study					JOB #:	2936-2021-01
NOISE METER	Piccolo II SLM, 24-Hour Measurement					DATE:	18-Mar-21
LOCATION:	Along La Plata Drive roadway at approximately 20 feet					BY:	B. Estrada
Time	Leq	Lmax	Lmin	L2	L8	L25	L50
12:00 AM	49.0	68.7	34.0	58.9	53.6	43.7	39.5
1:00 AM	50.9	75.7	33.0	59.9	51.7	40.5	36.7
2:00 AM	49.8	77.4	32.7	55.0	41.2	36.4	35.2
3:00 AM	54.8	84.2	33.6	63.4	50.5	39.4	36.6
4:00 AM	51.5	71.0	34.2	62.0	54.7	43.3	39.5
5:00 AM	55.0	71.7	37.7	64.5	60.0	53.5	45.7
6:00 AM	61.8	88.6	41.6	69.0	64.0	59.3	53.7
7:00 AM	70.4	89.9	44.5	78.1	70.6	67.2	64.1
8:00 AM	65.9	86.5	44.6	73.6	69.6	65.3	61.9
9:00 AM	64.2	85.3	43.5	72.8	67.5	63.3	59.8
10:00 AM	64.8	86.0	43.1	72.7	68.4	64.1	60.8
11:00 AM	65.5	91.6	42.5	73.2	68.2	63.9	60.4
12:00 PM	64.1	84.0	42.9	72.6	68.3	63.3	59.8
1:00 PM	66.7	93.6	42.4	73.4	70.0	64.8	61.1
2:00 PM	64.2	87.4	43.1	72.5	68.1	63.4	59.9
3:00 PM	64.7	83.2	43.4	73.2	68.6	64.0	60.6
4:00 PM	64.0	83.0	42.5	71.7	68.1	64.0	60.8
5:00 PM	65.4	83.3	44.0	73.8	69.3	64.5	61.1
6:00 PM	64.5	88.3	40.9	72.5	67.7	63.2	59.4
7:00 PM	70.2	102.0	39.8	73.0	67.7	62.1	58.4
8:00 PM	62.5	81.4	39.9	72.0	66.0	60.3	56.2
9:00 PM	59.6	81.9	39.0	69.0	62.8	58.0	53.0
10:00 PM	57.7	81.0	36.7	66.4	60.5	55.2	47.8
11:00 PM	54.7	76.9	36.9	63.3	57.4	49.1	42.0
Daytime	65.7	102.0	36.7	73.1	68.1	63.6	60.1
Nighttime	55.5	88.6	32.7	63.7	57.8	51.9	46.0


24 Hour Noise Monitoring Results (Leq, Ln)
120.0
100.0
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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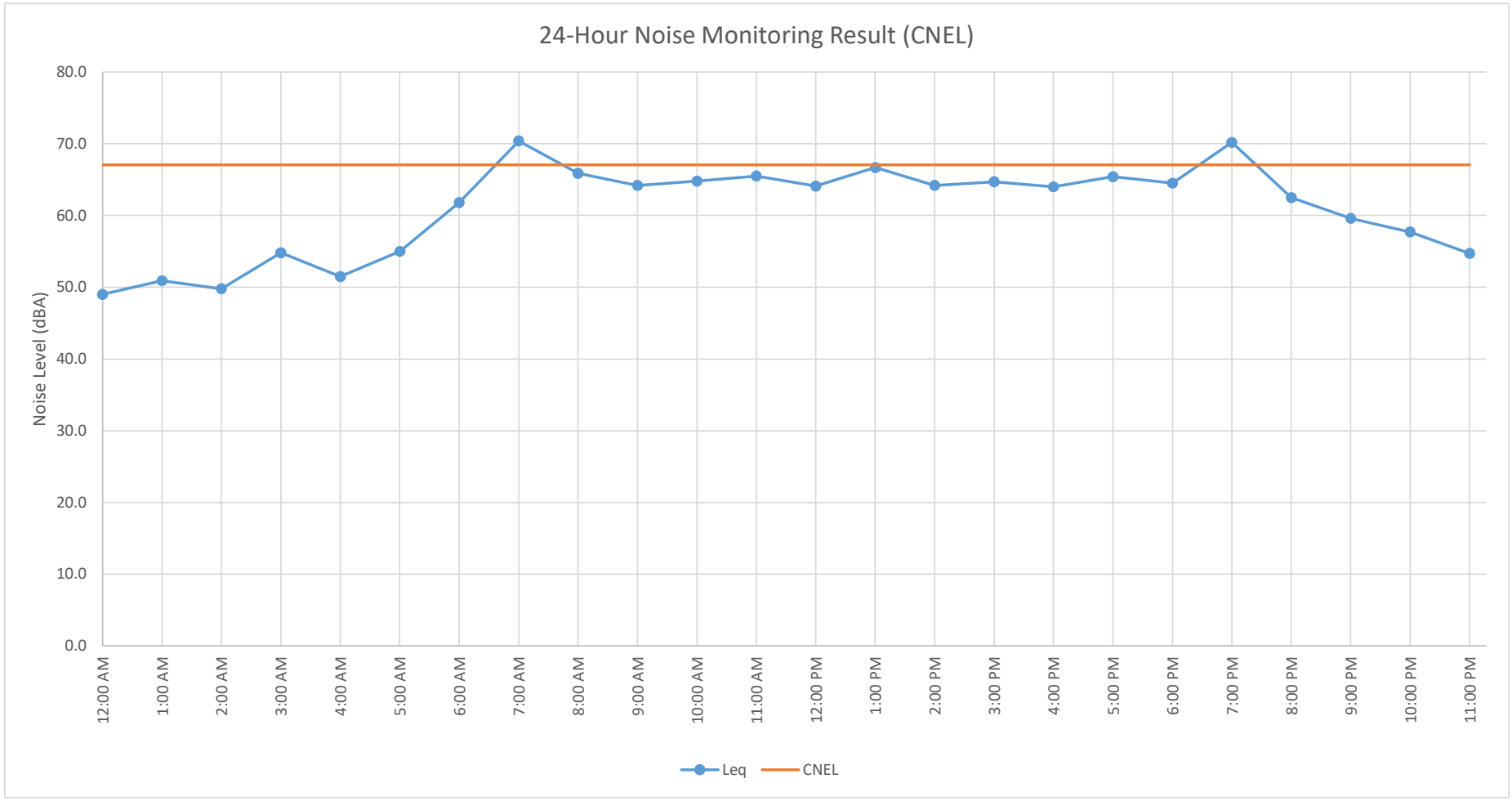
9:00 PM
10:00 PM
11:00 PM
Time
Leq
Lmax
Lmin
L2
L8
L25
L50


24-Hour Noise Monitoring Result (CNEL)
Noise Level (dBA)
80.0
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

Field Sheet - ST3 Location Photos

Project:	Grace Church Subdivision Noise Impact Study	**Engineer:**	B. Estrada	**Date:**	05/17/2021 & 05/18/2021
				JN:	2936-2021-01
Measurement Address:		**City:**		**Site No.:**	4
Laguna Niguel and La Plata Drive			Laguna Niguel		

RK engineering group, inc.

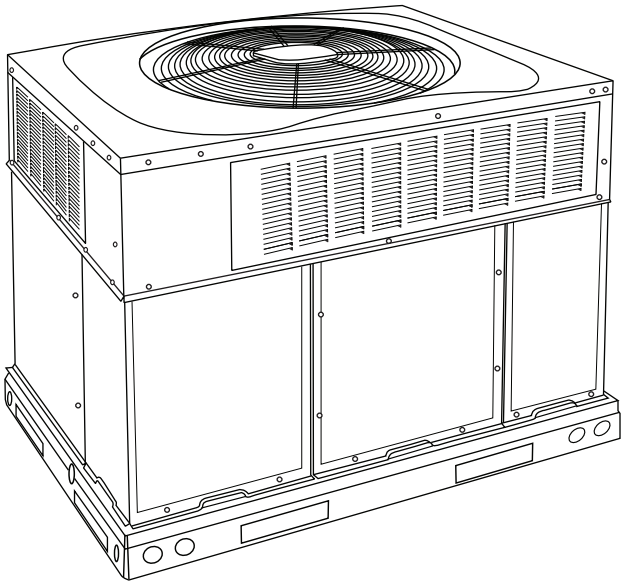
Appendix C

HVAC & Emergency Generator
Specification Sheet

48VG−A and 48VG−E
Performance™ 16 SEER 2−Stage Packaged Air Conditioner and Gas Furnace System with Puron® (R−410A) Refrigerant
Single and Three Phase
2 to 5 Nominal Tons (Sizes 24−60)

Carrier
turn to the experts

Product Data



A09033

Fig. 1 - Unit 48VG

Single-Packaged Products with Energy-Saving Features and Puron® refrigerant.

- 15.0 to 16.0 SEER
- 12.0 - 12.5 EER
- 81% AFUE (Single phase models)
- Meets Energy Star requirements
- Direct Spark Ignition
- Factory-Installed TXV
- Multi-speed ECM Blower Motor-Standard
- Sound Levels as low as 72dBA
- Two Stage Cooling
- Two Stage Heating (208/230 VAC models)
- Dehumidification Feature
- Cabinet air leakage of 2.0% or less at .5 in. W.C. when tested in accordance with ASHRAE standard 193. (Low leak FIOP models only.)

FEATURES/BENEFITS

One-piece heating and cooling units with low sound levels, easy installation, low maintenance, and dependable performance.

Puron Refrigerant is Carrier's unique refrigerant designed to help protect the environment. Puron is an HFC refrigerant which does not contain chlorine that can harm the ozone layer. Puron refrigerant is in service in millions of systems proving highly reliable, environmentally sound performance.

Easy Installation

Factory-assembled package is a compact, fully self-contained, combination gas heating/electric cooling unit that is prewired, pre-piped, and pre-charged for minimum installation expense. These units are available in a variety of standard and optional heating/cooling size combinations with voltage options to meet residential and light commercial requirements. Units are lightweight and install easily on a rooftop or at ground level. The high tech composite base eliminates rust problems associated with ground level applications.

Innovative Unit Base Design

On the inside a high-tech composite material will not rust and incorporates a sloped drain pan which improves drainage and helps inhibit mold, algae and bacterial growth. On the outside metal base rails provide added stability as well as easier handling and rigging.

Convertible duct configuration

Unit is designed for use in either downflow or horizontal applications. Each unit is converted from horizontal to downflow and includes two horizontal duct covers. Downflow operation is provided in the field to allow vertical ductwork connections. The basepan seals on the bottom openings to ensure a positive seal in the vertical airflow mode.

Efficient operation

High-efficiency design offers SEER (Seasonal Energy Efficiency Ratios) of 15.0 to 16.0, 12.0 to 12.5 EER, and AFUE (Annual Fuel Utilization Efficiency) ratings as high as 81%.

Energy-saving, direct spark ignition saves gas by operating only when the room thermostat calls for heating. Standard units are furnished with natural gas controls. A low-cost field installed kit for propane conversion is available for all units.

Low NOx units are designed for California installations and meet 40 ng/J NOx emissions. Can be installed in air quality management districts with a 40 ng/J NOx emissions requirement.

Durable, dependable components

Compressors have two stages of cooling and are designed for high efficiency. Each compressor is hermetically sealed against contamination to help promote longer life and dependable operation. Each compressor also has vibration isolation to provide quieter operation. All compressors have internal high pressure and overcurrent protection.

Monoport inshot burners produce precise air-to-gas mixture, which provides for clean and efficient combustion. The large monoport on the inshot (or injection type) burners seldom, if ever, requires cleaning. All gas furnace components are accessible in one compartment.

Turbo-tubular™ heat exchangers are constructed of aluminized steel for corrosion resistance and optimum heat transfer for improved efficiency. The tubular design permits hot gases to make multiple passes across the path of the supply air.

In addition, dimples located on the heat exchanger walls force the hot gases to stay in close contact with the walls, improving heat transfer.

Stainless steel heat exchanger available as factory installed option.

Multi-speed ECM Blower Motor is standard on all models.

High Efficiency 2-Speed Inducer Motor on single phase models.

Direct-drive PSC (Permanent Split Capacitor) condenser-fan motors are designed to help reduce energy consumption and provide for cooing operation down to 40°F (4.4°C) outdoor temperature. Motormaster® II low ambient kit is available as a field-installed accessory.

Thermostatic Expansion Valve - A hard shutoff, balance port TXV maintains a constant superheat at the evaporator exit (cooling cycle) resulting in higher overall system efficiency.

Refrigerant system is designed to provide dependability. Liquid filter driers are used to promote clean, unrestricted operation. Each unit leaves the factory with a full refrigerant charge. Refrigerant service connections make checking operating pressures easier.

High and Low Pressure Switches provide added reliability for the compressor.

Indoor and Outdoor coils are computer-designed for optimum heat transfer and efficiency. The indoor coil is fabricated from copper tube and aluminum fins and is located inside the unit for protection against damage. The outdoor coil is internally mounted on the top tier of the unit.

Low sound ratings ensure a quiet indoor and outdoor environment with sound ratings as low as 72dBA.

Dehumidification Feature

This unit has independent fan speeds for low stage cooling and high stage cooling. In addition, 208/230 VAC models have the field-selectable capability to run an enhanced dehumidification ('DHUM') speed on high stage cooling (as low as 320CFM per ton). Coupled with the improved dehumidification associated with low stage cooling, the DHUM speed allows for a complete dehumidification solution independent of cooling stage. 208/230 VAC models also have independent fan speeds for low stage gas heating and high stage gas heating. The dehumidification control must open the control circuit on humidity rise above the dehumidification set point.

Heating

- Reliable direct spark ignition system
- Inducer motors with ball bearings
- Low stage heating delivers 65% of high-stage capacity (208/230 VAC models)

Easy to service cabinets provide easy 3-panel accessibility to serviceable components during maintenance and installation. The basepan with integrated drain pan provides easy ground level installation with mounting pad. A nesting feature ensures a positive basepan to roof curb seal when the unit is roof mounted. A convenient 3/4-in. (19.05 mm) wide perimeter flange makes frame mounting on a rooftop easy.

Standard horizontal metal duct covers with insulation come with the unit and cover the horizontal duct openings. These can be left in place if the units are converted to downflow.

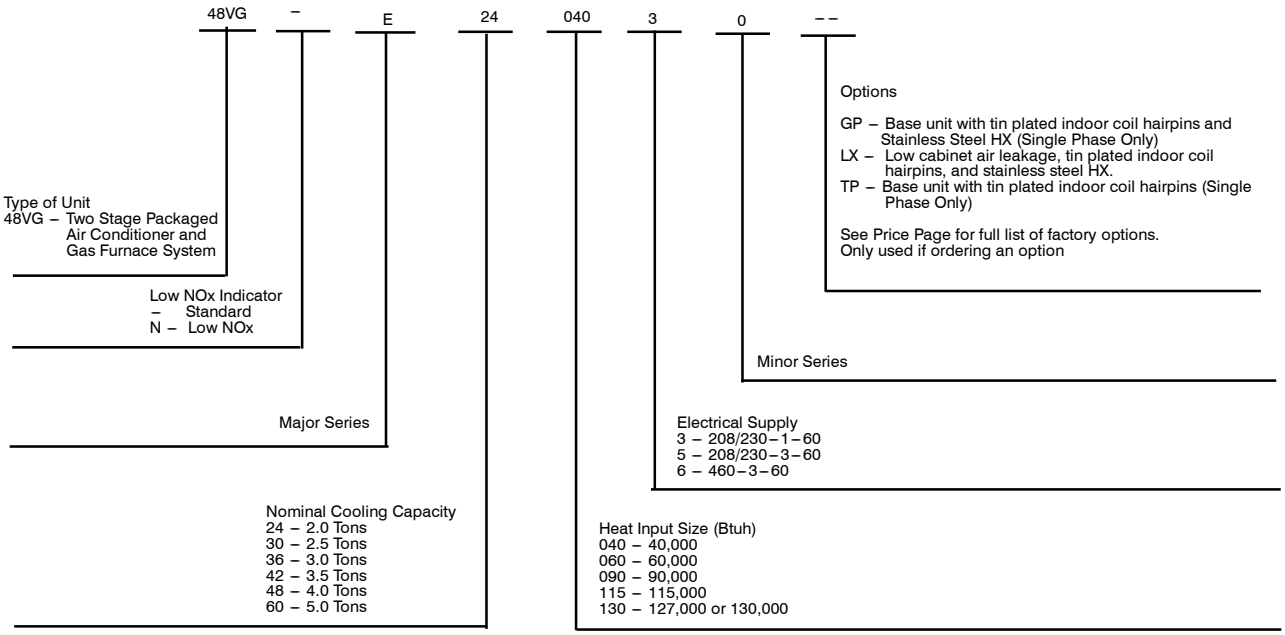
Integrated Gas Control (IGC) board provides safe and efficient control of heating and simplifies trouble-shooting through its built-in diagnostic function.

Cabinets are constructed of heavyduty, phosphated, zinc-coated prepainted steel capable of withstanding 500 hours in salt spray. Interior surfaces of the evaporator/heat exchanger compartment are insulated with foil-faced insulation, which keeps the conditioned air from being affected by the outdoor ambient temperature and provides improved indoor air quality. (Conforms to American Society of Heating, Refrigeration and Air Conditioning Engineers 62.2.) The sloped drain pan minimizes standing water in the drain. An external drain is provided.

Louvered grille provides hail and vandalism protection for the coil.

TABLE OF CONTENTS

MODEL NUMBER NOMENCLATURE



ASHRAE 90.1 COMPLIANT

GAS-FIRED c UL us LISTED

c UL us LISTED

AHRI CERTIFIED www.ahridirectory.org

Use of the AHRI Certified TM Mark indicates a manufacturer's participation in the program For verification of certification for individual products, go to www.ahridirectory.org.

ENERGY STAR

For California Residents:
For installation in SCAQMD only: This furnace does not meet the SCAQMD Rule 1111 14ng/J NOx emission limit, and thus is subject to a mitigation fee of up to $450. This furnace is not eligible for the Clean Air Furnace Rebate Program: *www.CleanAirFurnaceRebate.com.*

AHRI* CAPACITIES

Cooling Capacities and Efficiencies

Unit Size	Nominal Tons	Standard CFM (High / Low Stage)	Net Cooling Capacities - Btuh (High Stage)	EER @A**	SEER†
24	2	800 / 600	23000	12.0	15.0
30	2-1/2	1000 / 750	29000	12.0	15.0
36	3	1200 / 900	35400	12.5	16.0
42	3-1/2	1400 / 1050	42000	12.5	16.0
48	4	1600 / 1200	47500	12.3	16.0
60	5	1750 / 1200	57000	12.3	16.0

LEGEND
dB–Sound Levels (decibels)
db—Dry Bulb
SEER—Seasonal Energy Efficiency Ratio
wb—Wet Bulb
COP–Coefficient of Performance
* Air Conditioning, Heating & Refrigeration Institute.
**At "A" conditions–80°F (26.7°C) indoor db/67°F (19.4°C) indoor wb & 95°F (35°C) outdoor db.
† Rated in accordance with U.S. Government DOE Department of Energy) test procedures and/or AHRI Standards 210/240.

Notes:
1. Ratings are net values, reflecting the effects of circulating fan heat. Ratings are based on:
Cooling Standard: 80°F (26.7°C) db, 67°F wb (19.4°C) indoor entering–air temperature and 95°F db (35°C) outdoor entering–air temperature.
2. Before purchasing this appliance, read important energy cost and efficiency information available from AHRIdirectory.org.

Heating Capacities and Efficiencies

208/230 VAC Models Single Phase

UNIT SIZE	HEATING INPUT (BTUH) HIGH/LOW	OUTPUT CAPACITY (BTUH) HIGH / LOW	TEMPERATURE RISE RANGE HIGH °F (°C)	TEMPERATURE RISE RANGE LOW °F (°C)	AFUE (%)
24040 30040	40,000 / 26,000	33,000 / 22,000	25-55 (14-31)	25-55 (14-31)	81.0
24060 30060 36060 42060	60,000 / 39,000	49,000 / 32,000	25-55 (14-31)	25-55 (14-31)	81.0
36090 42090 48090 60090	90,000 / 58,500	74,000 / 48,000	35-65 (19-36)	35-65 (19-36)	81.0
48115 60115	115,000 / 75,000	94,000 / 62,000	30-60 (17-33)	30-60 (17-33)	81.0
48130 60130	127,000 / 84,500	104,000 / 70,000	35-65 (19-36)	35-65 (19-36)	81.0

LEGEND
AFUE – Annual Fuel Utilization Efficiency
NOTE: Before purchasing this appliance, read important energy cost and efficiency information available from AHRIdirectory.org.

208/230 VAC Models 3-Phase

UNIT SIZE	HEATING INPUT (BTUH) HIGH/LOW	OUTPUT CAPACITY (BTUH) HIGH / LOW	TEMPERATURE RISE RANGE HIGH °F (°C)	TEMPERATURE RISE RANGE LOW °F (°C)	AFUE (%)
24040 30040	40,000 / 26,000	32,000 / 21,000	20-50 (11-28)	15-45 (8-25)	78.0
24060 30060 36060 42060	60,000 / 39,000	49,000 / 31,000	25-55 (14-31)	25-55 (14-31)	78.6
36090 42090 48090 60090	90,000 / 58,500	74,000 / 47,000	35-65 (19-36)	35-65 (19-36)	79.2
48115 60115	115,000 / 75,000	93,000 / 61,000	30-60 (17-33)	30-60 (17-33)	80.1
48130 60130	130,000 / 84,500	103,000 / 68,000	35-65 (19-36)	35-65 (19-36)	80.0

LEGEND
AFUE – Annual Fuel Utilization Efficiency
NOTE: Before purchasing this appliance, read important energy cost and efficiency information available from AHRIdirectory.org.

460V Models

UNIT SIZE	HEATING INPUT (Btuh)	OUTPUT CAPACITY (Btuh)	TEMPERATURE RISE RANGE °F (°C)	AFUE (%)
36060 **42060**	60,000	47,000 47,000	25-55 (13.9-30.6)	78.5 78.5
36090 **42090** **48090** **60090**	90,000	73,000	35-65 (19.4-36.1)	80.4
48115 **60115**	115,000	93,000	30-60 (16.7-33.3)	80.3
48130 **60130**	130,000	103,000	35-65 (19.4-36.1)	78.9

LEGEND
AFUE—Annual Fuel Utilization Efficiency
NOTE: Before purchasing this appliance, read important energy cost and efficiency information available from AHRIdirectory.org.

A-Weighted Sound Power Level (dBA)

Unit Size	Sound Ratings (dBA)	TYPICAL OCTAVE BAND SPECTRUM (dBA without tone adjustment)						
		125	250	500	1000	2000	4000	8000
24	73	60.0	62.5	68.5	68.5	64.0	60.0	53.0
30	77	57.5	67.0	73.5	72.0	67.0	61.0	52.5
36	73	62.5	65.5	67.5	68.0	65.5	60.0	52.5
42	73	60.5	63.5	68.0	68.0	66.0	60.5	53.0
48	72	60.0	63.5	66.0	67.0	63.5	58.5	49.5
60	75	69.0	67.0	69.0	68.0	65.0	61.5	54.0

NOTE: Tested in accordance with AHRI Standard 270−1995 (not listed in AHRI).

PHYSICAL DATA

UNIT SIZE	24040	24060	30040	30060	36060	36090	42060	42090
NOMINAL CAPACITY (ton)	2	2	2−1/2	2−1/2	3	3	3−1/2	3−1/2
SHIPPING WEIGHT** lb.	352	352	359	359	455	455	455	455
SHIPPING WEIGHT** (kg)	160	160	163	163	206	206	206	206
COMPRESSORS	2−Stage Scroll							
Quantity	1							
REFRIGERANT (R−410A)								
Quantity lb.	6.4	6.4	8.3	8.3	8.1	8.1	8.7	8.7
Quantity (kg)	2.9	2.9	3.8	3.8	3.7	3.7	3.9	3.9
REFRIGERANT METERING DEVICE	TXV							
OUTDOOR COIL								
Rows...Fins/in.	1..21	1...21	2...21	2...21	2...21	2...21	2...21	2...21
Face Area (sq ft)	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6
OUTDOOR FAN								
Nominal CFM	2500	2500	2700	2700	3000	3000	3000	3000
Diameter in.	24	24	24	24	26	26	26	26
Diameter (mm)	609.6	609.6	609.6	609.6	600.4	600.4	660.4	660.4
Motor Hp (Rpm)	1/10 (810)	1/10 (810)	1/5 (810)	1/5 (810)	1/5 (810)	1/5 (810)	1/5 (810	1/5 (810)
INDOOR COIL								
Rows...Fins/in.	3...17	3...17	3...17	3...17	3...17	3...17	3...17	3...17
Face Area (sq ft)	3.7	3.7	3.7	3.7	4.7	4.7	4.7	4.7
INDOOR BLOWER								
Nominal Low Stage Cooling Airflow (Cfm)	600	600	750	750	900	900	1050	1050
Nominal High Stage Cooling Airflow (Cfm)	800	800	1000	1000	1200	1200	1400	1400
Size in.	10x10	10x10	10x10	10x10	11x10	11x10	11x10	11x10
Size (mm.)	254x254	254x254	254x254	254x254	279.4x254	279.4x254	279.4x254	279.4x254
Motor HP (RPM)	1/2 (1050)	1/2 (1050)	1/2 (1050)	1/2 (1050)	3/4 (1000)	3/4 (1000)	3/4 (1075)	3/4 (1075)
FURNACE SECTION*								
Burner Orifice No. (Qty...Drill Size)					208/230 VAC Models		208/230 VAC Models	
Natural Gas (Factory Installed)	2...44	3...44	2...44	3...44	3...44	3…38	3...44	3...38
Propane Gas	2...55	3...55	2...55	3...55	3...55 460 VAC Models 2…38 2…53	3…53	3...55 460 VAC Models 2…38 2…53	3...53
HIGH-PRESSURE SWITCH (psig) Cut-out Reset (Auto)	650 +/- 15 420 +/- 25							
LOSS-OF-CHARGE / LOW-PRESSURE SWITCH (psig) cut-out Reset (auto)	50 +/- 7 95 +/- 7							
DUCT RETURN−AIR FILTERS†‡ Throwaway Size in. (mm)	20x20x1 508x508x25	20x24x1 508x610x25			24x30x1 610x762x25			

*Based on altitude of 0 to 2000 ft (0−610 m).

† Required filter sizes shown are based on the larger of the AHRI (Air Conditioning Heating and Refrigeration Institute) rated cooling airflow or the heating airflow velocity of 300 ft/minute for throwaway type. Air filter pressure drop for non−standard filters must not exceed 0.08 IN. W.C.

‡ If using accessory filter rack refer to the filter rack installation instructions for correct filter sizes and quantity.

GENERAC

22 • 27 • 32 • 38 • 48 kW

operating data

ENGINE COOLING

	22 kW	27 kW	32 & 38 kW	48 kW
Air flow (inlet air including alternator and combustion air in cfm/cmm)	2400/68	2400/68	2200/62.3	4350/123.2
System coolant capacity (gal/liters)	2.5/9.5	2.5/9.5	2.5/9.5	3/11.4
Heat rejection to coolant (BTU per hr/MJ per hr)	99,000/104.5	105,000/110.8	145,000/153	186,000/196.2
Maximum operation air temperature on radiator (°C/°F)	60/150			
Maximum ambient temperature (°C/°F)	50/140			

COMBUSTION REQUIREMENTS

Flow at rated power (cfm/cmm)	68/1.9	68/1.9	106/3	163/4.6

SOUND EMISSIONS

Sound output in dB(A) at 23 ft (7 m) with generator in exercise mode*	61	61	58	63
Sound output in dB(A) at 23 ft (7 m) with generator operating at normal load*	70	70	64	68

*Sound levels are taken from the front of the generator. Sound levels taken from other sides of the generator may be higher depending on installation parameters.

EXHAUST

Exhaust flow at rated output (cfm/cmm)	165/4.7	180/5.1	300/8.5	414/11.7
Exhaust temperature at muffler outlet (°C/°F)	482/900	538/1000	579/1075	552/1025

ENGINE PARAMETERS

Rated Synchronous rpm	1800

POWER ADJUSTMENT FOR AMBIENT CONDITIONS

Temperature Deration ..... 3% for every 10 °C above 25 °C or 1.65% for every 10 °F above 77 °F
Altitude Deration (22, 27 & 48 kW) ..... 1% for every 100 m above 183 m or 3% for every 1000 ft above 600 ft
Altitude Deration (32 & 38 kW) ..... 1% for every 100 m above 915 m or 3% for every 1000 ft above 3000 ft

CONTROLLER FEATURES

Two-Line Plain Text LCD Display ..... Simple user interface for ease of operation.
Mode Switch: Auto ..... Automatic Start on Utility failure. 7 day exerciser
Off ..... Stops unit. Power is removed. Control and charger still operate.
Manual ..... Start with starter control, unit stays on. If utility fails, transfer to load takes place.
Programmable start delay between 10-30 seconds ..... 10 sec standard
Engine Start Sequence ..... Cyclic cranking: 16 sec on, 7 rest (90 sec maximum duration)
Engine Warm-up ..... 5 sec
Engine Cool-Down ..... 1 min
Starter Lock-out ..... Starter cannot re-engage until 5 sec after engine has stopped.
Smart Battery Charger ..... Standard
Automatic Voltage Regulation with Over and Under Voltage Protection ..... Standard
Automatic Low Oil Pressure Shutdown ..... Standard
Overspeed Shutdown ..... Standard, 72 Hz
High Temperature Shutdown ..... Standard
Overcrank Protection ..... Standard
Safety Fused ..... Standard
Failure to Transfer Protection ..... Standard
Low Battery Protection ..... Standard
50 Event Run Log ..... Standard
Future Set Capable Exerciser ..... Standard
Incorrect Wiring Protection ..... Standard
Internal Fault Protection ..... Standard
Common External Fault Capability ..... Standard
Governor Failure Protection ..... Standard

Appendix D

Stationary Noise Analysis Results

Noise emissions of industry sources

Source name	Reference	Level		Corrections		
		Day	Night	Cwall	CI	CT
		dB(A)	dB(A)	dB	dB	dB
HVAC-2	Lw/unit	77.0	77.0	-	-	-
HVAC-2	Lw/unit	77.0	77.0	-	-	-
HVAC-3	Lw/unit	77.0	77.0	-	-	-
HVAC-4	Lw/unit	77.0	77.0	-	-	-
HVAC-5	Lw/unit	77.0	77.0	-	-	-
HVAC-6	Lw/unit	77.0	77.0	-	-	-
HVAC-7	Lw/unit	77.0	77.0	-	-	-
HVAC-8	Lw/unit	77.0	77.0	-	-	-
HVAC-9	Lw/unit	77.0	77.0	-	-	-
HVAC-10	Lw/unit	77.0	77.0	-	-	-
HVAC-11	Lw/unit	77.0	77.0	-	-	-
HVAC-12	Lw/unit	77.0	77.0	-	-	-

Noise emissions of parking lot traffic

Name	Parking lot type	Size	Movements per hour		Road surface	Separated method	Lw,ref
			Day	Night			dB(A)
Driveway and Parking Lot Noise	Visitors and staff	65 Parking bays	0.200	0.170	Asphaltic driving lanes	no	85.5

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 at the East	-	GF	-	-	40.2	40.2	37.7	37.6	-2.5	-2.6	-	-
2	Receptor at the North	-	GF	-	-	39.6	39.0	38.9	38.2	-0.7	-0.8	-	-
3	Receptor at the South	-	GF	-	-	40.7	40.7	36.4	36.4	-4.3	-4.3	-	-
4	Receptor at the West	-	GF	-	-	34.3	34.2	31.2	30.9	-3.2	-3.3	-	-

Contribution levels of the receivers

Source name		Traffic lane	Level w/o NP Day	Level w/o NP Night	Level w NP Day	Level w NP Night
			dB(A)		dB(A)	
Receptor at the East	GF		40.2	40.2	37.7	37.6
Driveway and Parking Lot Noise		-	29.4	28.7	29.4	28.7
HVAC-2		-	22.9	22.9	20.1	20.1
HVAC-2		-	21.7	21.7	22.8	22.8
HVAC-3		-	29.1	29.1	29.1	29.1
HVAC-4		-	28.6	28.6	28.5	28.5
HVAC-5		-	30.5	30.5	30.5	30.5
HVAC-6		-	31.7	31.7	26.2	26.2
HVAC-7		-	28.3	28.3	22.0	22.0
HVAC-8		-	27.8	27.8	22.6	22.6
HVAC-9		-	27.6	27.6	21.8	21.8
HVAC-10		-	22.7	22.7	21.7	21.7
HVAC-11		-	30.2	30.2	24.9	24.9
HVAC-12		-	33.3	33.3	28.4	28.4
Receptor at the North	GF		39.6	39.0	38.9	38.2
Driveway and Parking Lot Noise		-	38.7	38.0	38.7	38.0
HVAC-2		-	29.8	29.8	22.0	22.0
HVAC-2		-	26.6	26.6	20.9	20.9
HVAC-3		-	6.8	6.8	6.0	6.0
HVAC-4		-	2.6	2.6	4.6	4.6
HVAC-5		-	2.7	2.7	5.2	5.2
HVAC-6		-	4.3	4.3	5.2	5.2
HVAC-7		-	14.6	14.6	8.1	8.1
HVAC-8		-	16.7	16.7	10.7	10.7
HVAC-9		-	16.6	16.6	9.3	9.3
HVAC-10		-	18.1	18.1	10.9	10.9
HVAC-11		-	15.5	15.5	10.0	10.0
HVAC-12		-	12.6	12.6	8.8	8.8
Receptor at the South	GF		40.7	40.7	36.4	36.4
Driveway and Parking Lot Noise		-	14.8	14.1	15.0	14.3
HVAC-2		-	21.4	21.4	15.2	15.2
HVAC-2		-	19.3	19.3	13.5	13.5
HVAC-3		-	32.3	32.3	32.3	32.3
HVAC-4		-	33.4	33.4	27.3	27.3
HVAC-5		-	33.1	33.1	27.6	27.6
HVAC-6		-	33.6	33.6	27.7	27.7
HVAC-7		-	27.1	27.1	19.6	19.6
HVAC-8		-	26.5	26.5	20.9	20.9
HVAC-9		-	25.1	25.1	19.6	19.6
HVAC-10		-	22.0	22.0	19.2	19.2
HVAC-11		-	29.6	29.6	21.7	21.7
HVAC-12		-	30.1	30.1	25.2	25.2
Receptor at the West	GF		34.3	34.2	31.2	30.9
Driveway and Parking Lot Noise		-	26.6	25.9	26.6	25.9
HVAC-2		-	20.5	20.5	21.2	21.2
HVAC-2		-	21.9	21.9	15.8	15.8
HVAC-3		-	25.2	25.2	25.2	25.2
HVAC-4		-	20.8	20.8	17.5	17.5
HVAC-5		-	18.1	18.1	16.7	16.7
HVAC-6		-	16.7	16.7	13.8	13.8
HVAC-7		-	23.1	23.1	16.0	16.0
HVAC-8		-	25.8	25.8	17.0	17.0
HVAC-9		-	24.8	24.8	16.7	16.7
HVAC-10		-	25.8	25.8	17.0	17.0
HVAC-11		-	19.4	19.4	12.1	12.1
HVAC-12		-	18.5	18.5	13.7	13.7

Grace Church Subdivision
Noise Impact Study

City of Laguna Niguel

Signs and symbols

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

1 : 1493

0 5 10 20 30 40 m

RK engineering group, inc.

Grace Church Subdivision Noise Impact Study - Daytime Noise Contour

City of Laguna Niguel

Signs and symbols

- Line
- Wall
- Calculation area
- Point source
- Parking lot

Levels in dB(A)

< 40
40 - 42
42 - 44
44 - 46
46 - 48
48 - 50
50 - 52
52 - 54
54 - 56
>= 56

1 : 1493

0 5 10 20 30 40 m

RK engineering group, inc.

Grace Church Subdivision Noise Impact Study - Nighttime Noise Contour

City of Laguna Niguel

Signs and symbols

- Line
- Wall
- Calculation area
- Point source
- Parking lot

Levels in dB(A)

	< 40
	40 - 42
	42 - 44
	44 - 46
	46 - 48
	48 - 50
	50 - 52
	52 - 54
	54 - 56
	>= 56

1 : 1493

0 5 10 20 30 40 m

RK engineering group, inc.

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

PROJECT:	Grace Church Residential Project	JOB #:	2936-2021-1
SOURCE:	Generator	DATE:	14-May-21
LOCATION:	Nearest Property Line to the south	BY:	D. Shivaiah

NOISE INPUT DATA

OBS DIST=	75.0			
DT WALL=	3.0			
DT W/OB=	72.0			
HTH WALL=	6.0	********		
BARRIER =	0.0	(0=WALL,1=BERM)		
OBS HTH=	5.0			
NOISE HTH=	3.0		BARRIER+	
OBS EL =	60.0		TOPO SHIELDING =	-20.00
NOISE EL =	0.0		NOISE HTH EL=	3.0
DROP-OFF=	20.0	(20 = 6 dBA PER DOUBLING OF DISTANCE)		
COFF				

NOISE OUTPUT DATA (dBA)

	DIST (FT)	Leq	Lmax	L2	L8	L25	L50
REF LEVEL	23	70.0					
PROJ LEVEL	75	59.7	-10.3	-10.3	-10.3	-10.3	-10.3
SHIELDING	75	-20.0	-20.0	-20.0	-20.0	-20.0	-20.0
ADJ LEVEL	75	***39.7***	***-30.3***	***-30.3***	***-30.3***	***-30.3***	***-30.3***

NOISE LEVEL REDUCTION DUE TO DISTANCE = -10.2666685

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

PROJECT: Grace Church Subdivision Noise Impact Study
ROADWAY: Crown Valley Parkway West of La Plata Drive
LOCATION: Centerline to 1st Floor Building Façade

JOB #: 2936-2021-01
DATE: 9-Aug-21
ENGINEER: D. Shivaiah

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	56,300	
SPEED =	45	
PK HR % =	10	
NEAR LANE/FAR LANE DIST :	75	
ROAD ELEVATION =	0.0	
GRADE =	0.0	%
PK HR VOL =	5,630	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		107
DIST C/L TO WALL =		102
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		5
PAD ELEVATION =		37.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

HTH WALL=	5.0	
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	107.95	- -
MEDIUM TRUCKS	4.0	107.18	- -
HEAVY TRUCKS	8.0	105.76	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	71.5	69.6	67.8	61.8	70.4	71.0
MEDIUM TRUCKS	62.6	61.0	54.7	53.1	61.6	61.8
HEAVY TRUCKS	63.2	61.8	52.7	54.0	62.3	62.5
NOISE LEVELS (dBA)	72.5	70.7	68.2	62.9	71.5	72.0

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	63.9	62.0	60.2	54.2	62.8	63.4
MEDIUM TRUCKS	55.2	53.6	47.3	45.7	54.2	54.4
HEAVY TRUCKS	56.1	54.7	45.6	46.9	55.2	55.4
NOISE LEVELS (dBA)	65.0	63.2	60.6	55.4	64.0	64.5

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	170	537	1697	5367
LDN	151	477	1508	4769

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

PROJECT: Grace Church Subdivision Noise Impact Study
ROADWAY: Crown Valley Parkway West of La Plate Drive
LOCATION: Centerline to 2nd Floor Building Façade

JOB #: 2936-2021-01
DATE: 9-Aug-21
ENGINEER: D. Shivaiah

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	56,300	
SPEED =	45	
PK HR % =	10	
NEAR LANE/FAR LANE DIST :	75	
ROAD ELEVATION =	0.0	
GRADE =	0.0	%
PK HR VOL =	5,630	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		107
DIST C/L TO WALL =		102
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		5
PAD ELEVATION =		50.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

HTH WALL=	5.0	
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	113.66	- -
MEDIUM TRUCKS	4.0	112.70	- -
HEAVY TRUCKS	8.0	110.86	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	71.3	69.4	67.6	61.5	70.2	70.8
MEDIUM TRUCKS	62.3	60.8	54.5	52.9	61.4	61.6
HEAVY TRUCKS	63.0	61.6	52.5	53.8	62.1	62.2
NOISE LEVELS (dBA)	72.3	70.5	67.9	62.7	71.3	71.8

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	62.7	60.8	59.0	52.9	61.6	62.2
MEDIUM TRUCKS	53.9	52.4	46.1	44.5	53.0	53.2
HEAVY TRUCKS	54.9	53.5	44.4	45.7	54.0	54.1
NOISE LEVELS (dBA)	63.8	62.0	59.4	54.2	62.7	63.3

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	161	510	1613	5100
LDN	143	453	1433	4532

Appendix E

Construction and Vibration
Results Sheet

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/24/2021
Case Description: Grace Church Subdivision Noise Impact Study

		Baselines (dBA)		---- Receptor #1 ----
Description	Land Use	Daytime	Evening	Night
Demolition	Residential	65	55	50

			Equipment			
	Impact		Spec Lmax	Actual Lmax	Receptor Distance	Estimated Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Concrete Saw	No	20		89.6	100	0
Excavator	No	40		80.7	100	0
Dozer	No	40		81.7	100	0
Excavator	No	40		80.7	100	0
Excavator	No	40		80.7	100	0
Dozer	No	40		81.7	100	0

Results

		Calculated (dBA)	
Equipment		*Lmax	Leq
Concrete Saw		83.6	76.6
Excavator		74.7	70.7
Dozer		75.6	71.7
Excavator		74.7	70.7
Excavator		74.7	70.7
Dozer		75.6	71.7
	Total	83.6	80.4

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/24/2021
Case Description: Grace Church Subdivision Noise Impact Study

		Baselines (dBA)		---- Receptor #1 ----
Description	Land Use	Daytime	Evening	Night
Site Preparation	Residential	65	55	50

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	100	0
Tractor	No	40	84		100	0
Dozer	No	40		81.7	100	0
Dozer	No	40		81.7	100	0
Tractor	No	40	84		100	0
Tractor	No	40	84		100	0
Tractor	No	40	84		100	0

Results

		Calculated (dBA)	
Equipment		*Lmax	Leq
Dozer		75.6	71.7
Tractor		78	74
Dozer		75.6	71.7
Dozer		75.6	71.7
Tractor		78	74
Tractor		78	74
Tractor		78	74
	Total	78	81.6

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/24/2021
Case Description: Grace Church Subdivision Noise Impact Study

				---- Receptor #1 ----			
		Baselines (dBA)					
Description	Land Use	Daytime	Evening	Night			
Grading	Residential	65	55	50			

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Excavator	No	40		80.7	100	0
Grader	No	40	85		100	0
Dozer	No	40		81.7	100	0
Tractor	No	40	84		100	0
Tractor	No	40	84		100	0
Tractor	No	40	84		100	0

Results

		Calculated (dBA)	
Equipment		*Lmax	Leq
Excavator		74.7	70.7
Grader		79	75
Dozer		75.6	71.7
Tractor		78	74
Tractor		78	74
Tractor		78	74
	Total	79	81.3

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/24/2021
Case Description: Grace Church Subdivision Noise Impact Study

		Baselines (dBA)		---- Receptor #1 ----
Description	Land Use	Daytime	Evening	Night
Building Construction	Residential	65	55	50

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	100	0
Pickup Truck	No	40		75	100	0
Generator	No	50		80.6	100	0
Tractor	No	40	84		100	0
Welder / Torch	No	40		74	100	0
Pickup Truck	No	40		75	100	0
Pickup Truck	No	40		75	100	0
Tractor	No	40	84		100	0
Tractor	No	40	84		100	0

Results

		Calculated (dBA)	
Equipment		*Lmax	Leq
Crane		74.5	66.6
Pickup Truck		69	65
Generator		74.6	71.6
Tractor		78	74
Welder / Torch		68	64
Pickup Truck		69	65
Pickup Truck		69	65
Tractor		78	74
Tractor		78	74
	Total	78	80.3

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/24/2021
Case Description: Grace Church Subdivision Noise Impact Study

		Baselines (dBA)		---- Receptor #1 ----
Description	Land Use	Daytime	Evening	Night
Paving	Residential	65	55	50

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	100	0
Roller	No	20		80	100	0
Roller	No	20		80	100	0
Paver	No	50		77.2	100	0
Roller	No	20		80	100	0
Roller	No	20		80	100	0

Results

		Calculated (dBA)	
Equipment		*Lmax	Leq
Paver		71.2	68.2
Roller		74	67
Roller		74	67
Paver		71.2	68.2
Roller		74	67
Roller		74	67
	Total	74	75.2

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/24/2021
Case Description: Grace Church Subdivision Noise Impact Study

				---- Receptor #1 ----
		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Architectural Coating	Residential	65	55	50

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Compressor (air)	No	40		77.7	100	0

		Results	
		Calculated (dBA)	
Equipment		*Lmax	Leq
Compressor (air)		71.6	67.7
	Total	71.6	67.7

*Calculated Lmax is the Loudest value.

VIBRATION IMPACTS FROM CONSTRUCTION AND OPERATIONS

PROJECT:	Vibration Study	JOB #:	2936-2021-01
ACTIVITY:	Grace Church Redevelopment	DATE:	10-May-21
LOCATION:	Receptor at 95 feet	ENGINEER:	Darshan Shivaiah

VIBRATION INPUT/OUTPUT DATA

OTHER CONSTRUCTION EQUIPMENT

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

PPV =	**0.020 in/sec**

Equipment Type =	2	Large Bulldozer
PPV_{ref} =	0.089	Reference PPV at 25 ft.
D =	95.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

EQUIPMENT PPV REFERENCE LEVELS

Type	Equipment	Reference PPV at 25 ft. (in/sec)
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 #:	2936-2021-01
ACTIVITY:	Grace Church Redevelopment	DATE:	10-May-21
LOCATION:	Receptor at 95 feet	ENGINEER:	Darshan Shivaiah

VIBRATION INPUT/OUTPUT DATA

OTHER CONSTRUCTION EQUIPMENT

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

PPV =	**0.048 in/sec**

Equipment Type =	1	Vibratory Roller
PPV_{ref} =	0.210	Reference PPV at 25 ft.
D =	95.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

EQUIPMENT PPV REFERENCE LEVELS

Type	Equipment	Reference PPV at 25 ft. (in/sec)
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 #:	2936-2021-01
ACTIVITY:	Grace Church Redevelopment	DATE:	10-May-21
LOCATION:	Receptor at 95 feet	ENGINEER:	Darshan Shivaiah

VIBRATION INPUT/OUTPUT DATA

OTHER CONSTRUCTION EQUIPMENT

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

PPV =	**0.018 in/sec**

Equipment Type =	4	Loaded Trucks
PPV_{ref} =	0.076	Reference PPV at 25 ft.
D =	95.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

EQUIPMENT PPV REFERENCE LEVELS

Type	Equipment	Reference PPV at 25 ft. (in/sec)
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 #:	2936-2021-01
ACTIVITY:	Grace Church Redevelopment	DATE:	10-May-21
LOCATION:	Receptor at 95 feet	ENGINEER:	Darshan Shivaiah

VIBRATION INPUT/OUTPUT DATA

OTHER CONSTRUCTION EQUIPMENT

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

PPV =	**0.020 in/sec**

Equipment Type =	3	Caisson Drilling
PPV_{ref} =	0.089	Reference PPV at 25 ft.
D =	95.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

EQUIPMENT PPV REFERENCE LEVELS

Type	Equipment	Reference PPV at 25 ft. (in/sec)
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

Appendix F

Roadway Noise Analysis

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

PROJECT: Grace Church Subdivision Noise Impact Study
ROADWAY: Crown Valley Parkway West of La Plate Drive
LOCATION: Centerline to 1st Floor Building Façade

JOB #: 2936-2021-01
DATE: 4-May-21
ENGINEER: D. Shivaiah

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	56,300
SPEED =	45
PK HR % =	10
NEAR LANE/FAR LANE DIST	75
ROAD ELEVATION =	0.0
GRADE =	0.0 %
PK HR VOL =	5,630

RECEIVER INPUT DATA

RECEIVER DISTANCE =		107
DIST C/L TO WALL =		107
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		0
PAD ELEVATION =		37.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

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	107.90	- -
MEDIUM TRUCKS	4.0	107.18	- -
HEAVY TRUCKS	8.0	105.82	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	71.5	69.6	67.8	61.8	70.4	71.0
MEDIUM TRUCKS	62.6	61.0	54.7	53.1	61.6	61.8
HEAVY TRUCKS	63.2	61.8	52.7	54.0	62.3	62.5
NOISE LEVELS (dBA)	72.5	70.7	68.2	62.9	71.5	72.0

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	71.5	69.6	67.8	61.8	70.4	71.0
MEDIUM TRUCKS	62.6	61.0	54.7	53.1	61.6	61.8
HEAVY TRUCKS	63.2	61.8	52.7	54.0	62.3	62.5
NOISE LEVELS (dBA)	72.5	70.7	68.2	62.9	71.5	72.0

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	170	537	1698	5368
LDN	151	477	1508	4770

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

PROJECT:	Grace Church Subdivision Noise Impact Study	JOB #:	2936-2021-01
ROADWAY:	Crown Valley Parkway West of La Plate Drive	DATE:	4-May-21
LOCATION:	Centerline to 2nd Floor Building Façade	ENGINEER:	D. Shivaiah

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	56,300	
SPEED =	45	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	75	
ROAD ELEVATION =	0.0	
GRADE =	0.0	%
PK HR VOL =	5,630	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		107
DIST C/L TO WALL =		107
RECEIVER HEIGHT =		18.0
WALL DISTANCE FROM RECEIVER =		0
PAD ELEVATION =		37.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

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	113.37	- -
MEDIUM TRUCKS	4.0	112.44	- -
HEAVY TRUCKS	8.0	110.69	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	71.3	69.4	67.6	61.6	70.2	70.8
MEDIUM TRUCKS	62.3	60.8	54.5	52.9	61.4	61.6
HEAVY TRUCKS	63.0	61.6	52.5	53.8	62.1	62.3
NOISE LEVELS (dBA)	72.3	70.5	67.9	62.7	71.3	71.8

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	71.3	69.4	67.6	61.6	70.2	70.8
MEDIUM TRUCKS	62.3	60.8	54.5	52.9	61.4	61.6
HEAVY TRUCKS	63.0	61.6	52.5	53.8	62.1	62.3
NOISE LEVELS (dBA)	72.3	70.5	67.9	62.7	71.3	71.8

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	162	511	1617	5113
LDN	144	454	1437	4543