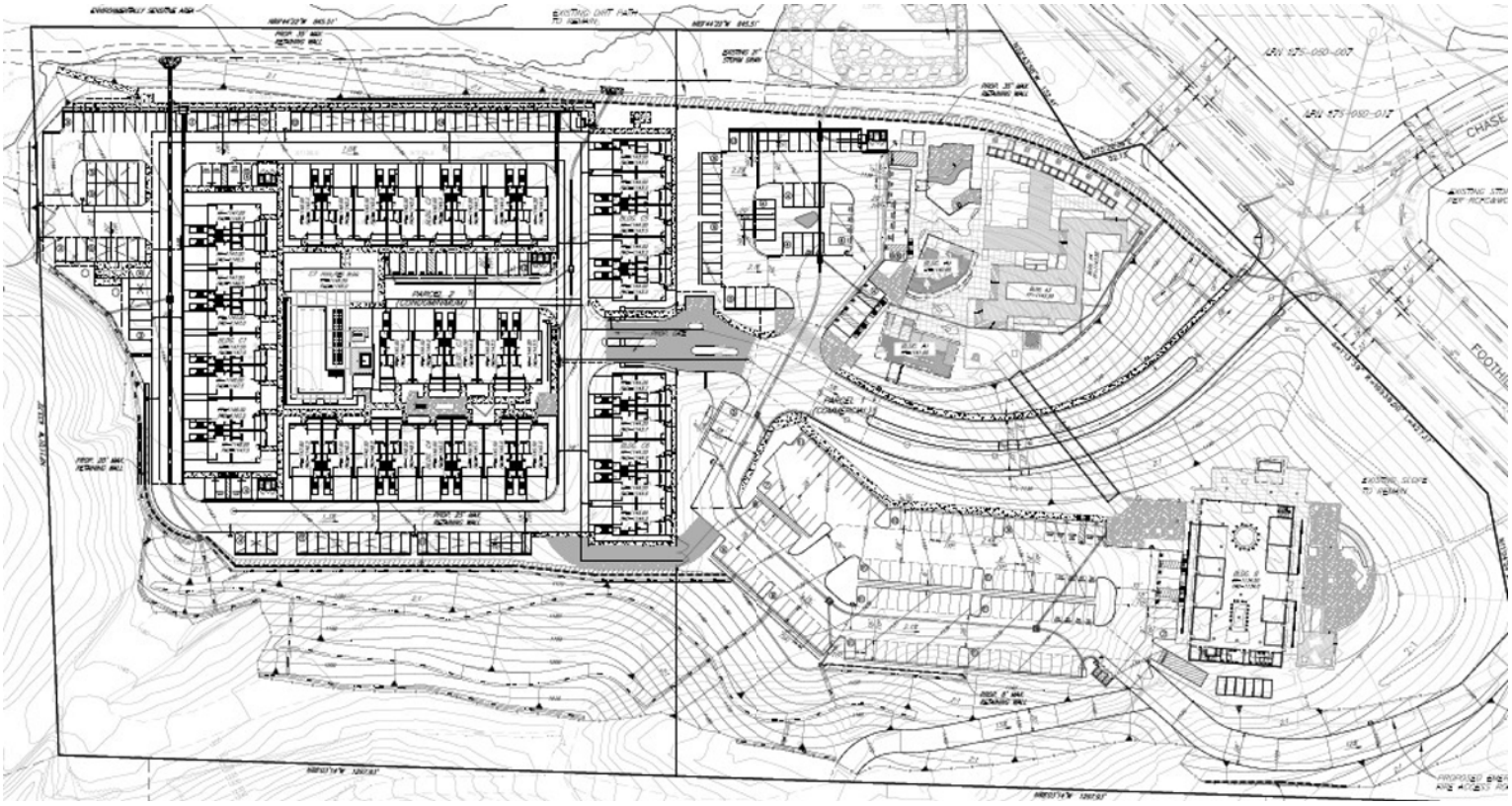
SKYLINE VILLAGE PROJECT
NOISE IMPACT STUDY
CITY OF CORONA



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NOISE IMPACT STUDY
County of Riverside, 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 Skyline Village Project (project) and provide recommendations, if necessary, to minimize any project noise impacts. The assessment was conducted within the context of the California Environmental Quality Act (CEQA) and utilizes the noise standards set forth by the applicable Federal, State, and local agencies.

The following is provided in this report:

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

1.2 Site Location

The project site is located at the southwest corner of Foothill Parkway and Chase Drive, in the City of Corona. The project site is located approximately 1,145 feet above sea level and is elevated above Foothill Parkway.

Existing land uses surrounding the proposed project site include; proposed residential uses to the north, agricultural use to the south and west, and residential uses to the east.

The nearest existing noise-sensitive land uses are considered the residential properties located approximately 300 feet east of the project site across Foothill Parkway. The nearest future residential homes proposed as part of the Skyline Heights project would be located approximately 700 feet to the northwest of the site.

The project site location map is provided in Exhibit A.

1.3 Project Description

The project would consist of constructing and operating a mixed-use commercial and residential development on approximately 17.77 acres of vacant land. The site plan used for this analysis, provided by KWC Engineers is illustrated in Exhibit B.

Project operational activities are analyzed for long-term noise impacts associated with the day to day operation of the project; including parking lot noise, mechanical HVAC equipment and conversational/outdoor dining noise. The project is not expected to have outdoor events or live music.

Project construction noise impacts are assessed at each phase of construction and include site preparation, grading, building construction, paving, and architectural coating activities.

1.4 Summary of Analysis Results

Table 1 provides a summary of the noise analysis results, per the CEQA impact criteria checklist. With the implementation of the recommended project design features, the project is not expected to result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

Table 1
CEQA Noise Impact Criteria

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

1.5 Recommended Project Design Features

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.

DF-1 All HVAC equipment and exhaust fans should be fully shielded or enclosed from the line of sight of adjacent residential uses. Shielding/parapet wall should be at least as high as the equipment.

DF-2 Truck deliveries, loading/unloading activity, and trash pick-up should be limited to daytime (7 a.m. – 10 p.m.) hours only.

DF-3 Limit engine idling time for all trucks to 5 minutes or less.

DF-4 Prior to issuance of building permits, the project proponent shall demonstrate to the City building department that the proposed building shell assembly and window assemblies will achieve exterior to interior noise reduction that will meet the State/City building code requirement of 45 dBA CNEL.

DF-5 Construction-related noise activities shall comply with the requirements set forth in the City of Corona Municipal Code Section 17.84.040.

a. Construction noise is prohibited between the hours of 8:00 p.m. to 7:00 a.m., Monday through Saturday and 6:00 p.m. to 10:00 a.m. on Sundays and federal holidays.

DF-6 No impact pile driving activities shall be allowed on the project site.

DF-7 During construction, the contractor shall ensure all construction equipment is equipped with appropriate noise attenuating devices and equipment shall be maintained so that vehicles and their loads are secured from rattling and banging. Idling equipment should be turned off when not in use.

DF-8 Locate staging area, generators and stationary construction equipment as far from the western property line, as reasonably feasible.

DF-9 Obtain a construction work permit from the City of Corona prior to starting construction.

2.0 Fundamentals of Noise

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

2.1 Sound, Noise and Acoustics

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

2.2 Frequency and Hertz

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

2.3 Sound Pressure Levels and Decibels

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

2.4 Addition of Decibels

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

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

2.5 Human Response to Changes in Noise Levels

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

2.6 Noise Descriptors

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

A-Weighted Sound Level

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

Ambient Noise Level

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

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

Community Noise Equivalent Level (CNEL)

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

Decibel (dB)

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

dB(A)

A-weighted sound level (see definition above).

Equivalent Sound Level (LEQ)

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

Habitable Room

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

L(n)

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

Noise

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

Outdoor Living Area

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

Percent Noise Levels

See L(n).

Sound Level (Noise Level)

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

Sound Level Meter

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

Single Event Noise Exposure Level (SENEL)

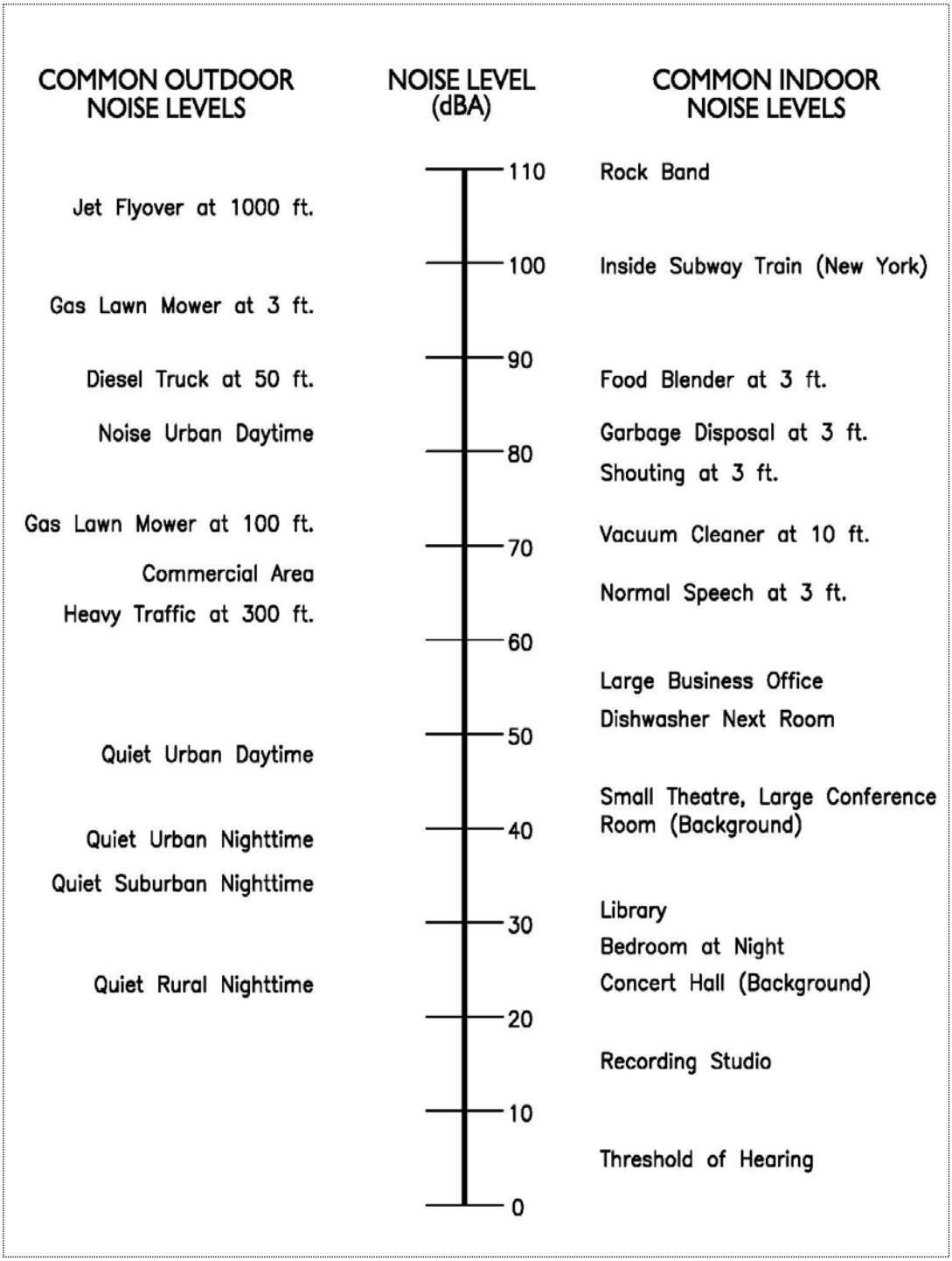
The dBA level which, if it lasted for one (1) second, would produce the same A-weighted sound energy as the actual event.

2.7 Sound Propagation

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

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

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



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

2.8 Vibration Descriptors

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

Several different methods are used to quantify vibration amplitude.

PPV

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

RMS

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

VdB

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

2.9 Vibration Perception

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

2.10 Vibration Propagation

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

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

2.11 Construction Related Vibration Level Prediction

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

Table 2
Vibration Annoyance Potential Criteria

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

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

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

Table 3
Vibration Damage Potential Threshold Criteria

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

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

Table 4
Suggested "n" Values Based on Soil Classes

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

3.0 Regulatory Setting

The proposed project is located in the County of Riverside 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 multi-family 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.

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

Thus, the interior limit is 45 dBA CNEL between dwelling units and from exterior noise sources to interior living spaces. In addition, to provide a reasonable expectation that this standard can be met under normal conditions, the design of party walls and floor/ceiling assemblies for multi-family dwelling units must be based on laboratory-tested assemblies which test at a sound transmission class of 50 STC, or better.

3.3 City of Corona Noise Regulations

The City of Corona outlines their noise regulations and standards within the City of Corona 2020-2040 General Plan Noise Element and Section 17.84.040 of the Municipal Code. Noise impacts can be identified into two types based on its sources: transportation and stationary. The noise metrics used for transportation related noise sources, such as freeways, airports and railroads are the Community Noise Equivalent Level (CNEL) which is a 24-hour time weighted average noise level. Stationary noise sources, such as industrial or construction noise, that may be intrusive to a neighboring private property, utilize the noise metrics that are defined as noise levels that cannot be exceeded for certain percentages of time.

The noise standards from the General Plan and Municipal code are provided in Appendix A.

3.3.1 City of Corona Stationary Noise Standards

The City of Corona noise standards for stationary noise sources are defined in Title 17 (Zoning), Chapter 17.84.040 of the City's municipal code. The standards vary depending on the land use of the affected property and include maximum permissible exterior and interior noise levels for four different land use categories: (1) residential; (2) "other sensitive land uses"; (3) commercial; and, (4) industrial, manufacturing, or agricultural.

The sensitive land uses surrounding the project include residential uses to the east at approximately 300 feet from the eastern property line and the proposed future residential uses to the north and west of the property.

Table 5 shows the City of Corona Stationary Noise Source Standards.

Table 5
City of Corona
Stationary Noise Source Standards

TYPE OF LAND USE	MAXIMUM ALLOWABLE NOISE LEVELS			
	Exterior Noise Level		Interior Noise Level	
	7 a.m. to 10 p.m.	10 p.m. to 7 a.m.	7 a.m. to 10 p.m.	10 p.m. to 7 a.m.
Single-, Double- and Multi- Family Residential	55 dBA	50 dBA	45 dBA	35 dBA
Other Sensitive Land Uses[1]	55 dBA	50 dBA	45 dBA	35 dBA
Commercial Uses	65 dBA	60 dBA	Not applicable	Not applicable

[1]"Sensitive land uses." Those specific land uses which have associated human activities that may be subject to stress or significant interference from noise. Sensitive land uses include single family residential, multiple family residential, churches, hospitals and similar health care institutions, convalescent homes, libraries and school classroom areas

Exterior noise:

a. The noise standard for a cumulative period of more than 30 minutes in any hour;
b. The noise standard plus 5 dB for a cumulative period of more than 15 minutes in any hour;
c. The noise standard plus 10 dB for a cumulative period of more than five minutes in any hour;
d. The noise standard plus 15 dB for a cumulative period of more than one minute in any hour; or
e. The noise standard plus 20 dB for any period of time.

Interior Noise:

a. The noise standard for a cumulative period of more than five minutes in any hour;
b. The noise standard plus 5 dB for a cumulative period of more than one minute in any hour; or
c. The noise standard plus 10 dB, or the maximum measured ambient, for any period of time.

3.3.2 City of Corona General Plan Noise/Land Use Compatibility

The City of Corona establishes planning criteria for determining a development's noise/land use compatibility based on the community noise equivalent level (CNEL). Table 6 summarizes the City's Noise/Land Use Compatibility guidelines for land uses applicable to this project:

Table 6
Noise/Land Use Compatibility Guidelines

Land Use	Noise Limit (CNEL)			
	Zone A	Zone B	Zone C	Zone D
Multiple Family Residential	Less than 60	60 – 70	70 – 75	Above 75
Commercial Office, Institution	Less than 65	65 - 75	75 - 80	Above 80
Institutional General	Less than 60	60 - 65	65 – 75	Above 75

Zone A (Clearly Compatible): Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.

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

Zone C (Normally Incompatible): 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.

Zone D (Clearly Incompatible): 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.

3.3.3 Construction Noise Regulation

Section 17.84.040(D)(2) 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, or vibration created by, construction, repair, remodeling, or grading of any real property or during authorized seismic surveys, provided said activities:

- Construction noise is prohibited between the hours of 8:00 p.m. to 7:00 a.m., Monday through Saturday and 6:00 p.m. to 10:00 a.m. on Sundays and federal holidays.

3.3.4 Thresholds of Significance

The City of Corona General Plan Technical Update Draft EIR, December 2019 established thresholds of significance used in evaluating city-wide noise impacts for the General Plan. For consistency purposes the General Plan EIR noise thresholds are utilized for evaluating project impacts under CEQA.

Construction Noise Thresholds

Construction noise impacts are addressed qualitatively based on the qualitative criteria outlined in Chapter 9.24, Loud and Unnecessary Noise, of the City's Municipal Code. In general, construction noise impacts are based on the volume of the noise, intensity of the noise, the volume and intensity of the background noise, whether the noise can be heard from a distance of 50 feet or more from the noise source, the nature and zoning of the area within which the noise emanates, the density of inhabitation of the area within which the noise emanates, the time of the day or night the noise occurs, the duration of the noise, and whether the noise is recurrent, intermittent or constant.

Stationary Noise Thresholds

The Municipal Code provides noise standards for stationary sources that would be analyzed at the project level in Section 17.84.040(C)(2), Stationary Noise Source Standards, identified in Table 5 of this report.

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 Larson Davis 712 Type 2 sound level meter was used to conduct short-term (10-minute) noise measurements and a Piccolo-II Type 2 integrating-averaging sound 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 five (5) feet above the ground for all short-term noise measurements and ten (10) feet above ground for long-term noise measurements
- Sound level meters were calibrated before and after each measurement
- Following the calibration of equipment, a windscreen was placed over the microphone

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

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

4.2 Stationary Noise Modeling

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

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

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

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

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

Sound Power and Sound Pressure Level

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

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

4.2.1 Parking Lot Noise

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

4.2.2 Outdoor Conversational Noise

Outdoor conversational noise typically includes noise from the outdoor restaurant dining area. The project is not expected to have amplified music, live bands, singing, and other performances. Outdoor conversational noise would occur near the outdoor dining area of the site and is assessed by using referenced noise levels in the SoundPLAN model.

Table 7
Referenced Outdoor Conversational Noise Levels[1]

Source[1]	Noise Levels (dBA) L_{eq}
Restaurants eating modest conversation	75.0

[1] Referenced noise levels are based of SoundPLAN.

4.2.3 HVAC Equipment Noise

To estimate noise level impacts from on-site HVAC noise sources, reference noise levels are utilized. Referenced noise levels represent similar noise sources operating under similar conditions as would be found on the project site. Table 8 indicates the referenced noise levels for on-site stationary noise sources. The noise measurement data indicates the distance the microphone was placed from the noise source and the statistical data.

Table 8
HVAC Referenced Noise Levels[1]

Source[1]	Distance from Source (feet)	Noise Levels (dBA)
		L_{eq}
HVAC Equipment	5.0	77.4

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

To estimate the future noise levels during typical operational conditions, referenced noise levels are input into SoundPLAN and projected to the nearest sensitive receptor locations. Adjusted noise levels are based on the distance of the receptor location relative to the noise source, local topography and physical barriers including buildings and sound walls. The noise levels assume that the stationary sources are operating continuously during both daytime and nighttime hours, when in reality will likely operate only intermittently throughout daily operations.

5.0 Existing Noise Environment

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

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

Using a Larson Davis 712 Type 2 sound level meter, four (4) 10-minute noise measurements were recorded at the surrounding property lines. Short term noise measurements are conducted during normal daytime hours and considered samples of typical ambient conditions. The Leq, Lmin, Lmax, L2, L8, L25, and L50, statistical data were reported over the 10-minute period. The information was utilized to define the noise characteristics for the project.

The following details and observations are provided for the short-term noise measurements. The results of the short-term (ST) measurements are presented in Table 9.

Table 9
Short-Term Noise Measurement Results[1]

Site No.	Time Started	Leq	Lmin	Lmax	L_2	L_8	L_{25}	L_{50}
ST-1	12:53 PM	49.1	37.0	72.6	50.2	49.8	46.1	43.1
ST-2	1:10 PM	43.9	36.8	69.6	44.3	40.0	38.9	38.2
ST-3	1:24 PM	50.7	39.5	64.8	61.5	55.6	47.2	42.7
ST-4	1:38 PM	54.4	37.8	70.4	62.4	59.0	53.6	49.1

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

ST-1 Measurement taken at approximately 20 feet from the residential property line to the east of the project site, approximately 185 feet from the centerline of Foothill Parkway, and approximately 300 feet from the eastern property line of the site. Ambient noise includes traffic noise from Foothill Parkway and Chase drive and dog barking.

ST-2 Measurement taken at sidewalk of the Brannan Circle. Ambient noise was minimal and included quiet neighborhood sounds.

ST-3 Measurement taken at sidewalk of the Folsom Circle. Ambient noise includes traffic noise from Foothill Parkway and a water fountain.

ST-4 Measurement taken at approximately 100 feet north of the southern property line. Ambient noise includes distant traffic noise from Foothill Parkway

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

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

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

Noise levels were measured on January 15, 2020 using a Piccolo-II Type 2 integrating-averaging sound level meter. The information was utilized to establish the noise characteristics of the existing ambient environment.

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

- Long-term noise monitoring location one (LT-1) was taken at approximately 10 feet to the southwest of the residential uses located along the Meadowcrest Circle, approximately 195 feet from the centerline of Foothill Parkway.

- Long-term noise monitoring location two (LT-2) was taken along the northern property line of the project and approximately 600 feet from the centerline of Foothill Parkway.

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 10 and 11. Appendix B includes photographs, field sheets and measured noise data.

Table 10
24 Noise Measurement Results LT-1[1]

Time	Leq (dBA)	Time	Leq (dBA)
12:00 AM	44.8	12:00 PM	48.5
1:00 AM	43.2	1:00 PM	51.3
2:00 AM	42.7	2:00 PM	52.3
3:00 AM	48.3	3:00 PM	52.8
4:00 AM	56.5	4:00 PM	52.7
5:00 AM	58.4	5:00 PM	54.7
6:00 AM	59.4	6:00 PM	53.4
7:00 AM	55.5	7:00 PM	55.2
8:00 AM	52.1	8:00 PM	54.2
9:00 AM	52.3	9:00 PM	52.2
10:00 AM	49.0	10:00 PM	48.5
11:00 AM	50.6	11:00 PM	45.9
24-Hour CNEL			**60.5**

[1] LT-1 was taken at approximately 10 feet to the southwest of the backyard of the residential homes located at along the Meadowcrest Circle. LT-1 was recorded on 01/15/2020.

Table 11
24 Noise Measurement Results, LT-2[1]

Time	Leq (dBA)	Time	Leq (dBA)
12:00 AM	43.1	12:00 PM	48.5
1:00 AM	42.5	1:00 PM	50.0
2:00 AM	44.1	2:00 PM	52.3
3:00 AM	44.6	3:00 PM	51.4
4:00 AM	50	4:00 PM	52.1
5:00 AM	50.9	5:00 PM	56.3
6:00 AM	53.0	6:00 PM	51.4
7:00 AM	51.8	7:00 PM	51.9
8:00 AM	50.4	8:00 PM	50.5
9:00 AM	49.5	9:00 PM	49.8
10:00 AM	47.6	10:00 PM	47.3
11:00 AM	52.2	11:00 PM	44.8
24-Hour CNEL			**55.7**

[1] LT-2 was taken along the northern property line of the project and approximately 600 feet from the centerline of Foothill Parkway. LT-2 was recorded on 01/15/2020.

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 as a result of operational activities. The main sources of operational noise generated by the project would include on-site activities from vehicular traffic noise circulating within the parking lot noise, mechanical HVAC equipment and conversational/outdoor dining noise. Noise level impacts are compared to the City of Corona noise standards.

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

6.1 Stationary Source Noise Impacts

On-site stationary noise impacts are assessed at all adjacent property lines surrounding the project site. Existing land uses surrounding the proposed project site include; proposed residential uses to the north and west, agricultural use to the south and west, and residential uses to the east.

Project operational activities are analyzed for long-term noise impacts associated with the day-to-day operation of the project; including parking lot noise, mechanical HVAC equipment and conversational/outdoor dining noise to the nearest adjacent property lines. SoundPLAN calculation worksheets are shown in Appendix C.

Daytime Stationary Source Noise Impacts

The results of the daytime noise impact analysis are shown in the Tables 12 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 daytime noise standard for the surrounding noise sensitive residential land uses is established to be 55 dBA from 7:00 a.m. to 10:00 p.m.

Based on the results of this analysis, noise levels generated by the project are not expected to exceed the City's daytime noise standards at the adjacent property lines. The change in existing noise levels as a result of the project would range from approximately 0.0 dBA to 3.5 dBA during daytime hours and noise levels would not exceed 55 dBA at any noise sensitive receptor.

Nighttime Stationary Source Noise Impacts

The results of the nighttime noise impact analysis are shown in the Tables 13 and are graphically illustrated on Exhibit F.

The nighttime noise analysis considers all project noise sources operating simultaneously during nighttime (10 p.m. to 7:00 a.m.) hours.

The noise standard for all noise sensitive residential uses surrounding the project site 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 City's nighttime noise standards at the adjacent property lines. The change in existing nighttime noise levels as a result of the project would range from approximately 0.0 dBA to 3.5 dBA during nighttime hours.

Recommended Project Design Features

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.

DF-1 All HVAC equipment and exhaust fans should be fully shielded or enclosed from the line of sight of adjacent residential uses. Shielding/parapet wall should be at least as high as the equipment.

DF-2 Truck deliveries, loading/unloading activity, and trash pick-up should be limited to daytime (7 a.m. – 10 p.m.) hours only.

DF-3 Limit engine idling time for all trucks to 5 minutes or less.

DF-4 Prior to issuance of building permits, the project proponent shall demonstrate to the City building department that the proposed building shell assembly and window assemblies will achieve exterior to interior noise reduction that will meet the State/City building code requirement of 45 dBA CNEL.

TABLE 12
Skyline Village Project
Daytime Noise Impact Analysis (dBA)

Receptor	Location	Daytime Exterior Noise Level dBA						
		Project Noise Contribution (Leq)	City of Corona Noise Level Criteria (Leq)	Noise Level Exceeds Standard (?)	Existing Ambient Measurement (Leq)[1]	Combined Noise Level Existing Plus Project (Leq)	Change in Noise Level as a Result of Project (dBA)	Significant Imapact (?)
Receiver at PL-1	East	37.6	55.0	No	48.5	48.8	0.3	No
Receiver at PL-2	East	36.8		No	48.5	48.8	0.3	No
Receiver at PL-3	East	35.6		No	48.5	48.7	0.2	No
Receiver at PL-4	East	29.9		No	48.5	48.6	0.1	No
Receiver at PL-5	North	48.2		No	47.3	50.8	3.5	No
Receiver at PL-6	South	25.8		No	50.7	50.7	0.0	No
Receiver at PL-7	South	28.2		No	54.4	54.4	0.0	No

TABLE 13
Skyline Village Project
Nighttime Noise Impact Analysis (dBA)

Receptor	Location	Nighttime Exterior Noise Level dBA						
		Project Noise Contribution (Leq)	City of Corona Noise Level Criteria (Leq)	Noise Level Exceeds Standard (?)	Existing Ambient Measurement (Leq)[1]	Combined Noise Level Existing Plus Project (Leq)	Change in Noise Level as a Result of Project (dBA)	Significant Imapact (?)
Receiver at PL-1	East	37.4	50.0	No	42.7	43.8	1.1	No
Receiver at PL-2	East	36.5		No	42.7	43.6	0.9	No
Receiver at PL-3	East	35.2		No	42.7	43.4	0.7	No
Receiver at PL-4	East	29.8		No	42.7	42.9	0.2	No
Receiver at PL-5	North	43.5		No	42.5	46.0	3.5	No
Receiver at PL-6	South	25.7		No	45.7	45.7	0.0	No
Receiver at PL-7	South	28.1		No	49.4	49.4	0.0	No

7.0 Construction Noise and Vibration Impacts

Temporary construction noise and vibration impacts have been assessed from the project site to the surrounding existing noise sensitive residential 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 17.84.040(D)(2) of the City's municipal code states that construction noise shall be prohibited between the hours of 8:00 p.m. to 7:00 a.m., Monday through Saturday and 6:00 p.m. to 10:00 a.m. on Sundays and federal holidays.

Construction phasing and equipment usage assumptions are referenced from the Skyline Village Project Air Quality and Greenhouse Gas Analysis, City of Corona, prepared by RK, January 2020.

7.1 Typical Construction Noise Levels

Table 14 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 14
Typical Construction Noise Levels[1]

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

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

7.2 Construction Noise Impact Analysis

This assessment analyzes potential noise impacts during all expected phases of construction, including; site preparation, grading, building construction, paving, and architectural coating. Noise levels are calculated based on an average distance of equipment over an 8-hour period to the nearest adjacent property.

The project's estimated construction noise levels have been calculated using the Federal Highway Administration Roadway Construction Noise Model Version 1.1. Tables 15 show the noise level impacts to the nearest existing residential property lines. Construction noise calculation worksheets are provided in Appendix E.

Table 15
Project Construction Noise Levels – Residential Uses to the East

Phase	Equipment	Quantity	Equipment Noise Level at 300 ft (dBA Leq)	Combined Noise Level (dBA Leq)
Site Preparation	Rubber Tired Dozers	3	62.1	72.1
	Tractors/Loaders/Backhoes	4	64.5	
Grading	Excavators	2	61.2	72.7
	Graders	1	65.5	
	Rubber Tired Dozers	1	62.1	
	Scrappers	2	64.0	
	Tractors/Loaders/Backhoes	2	64.5	
Building Construction	Cranes	1	57.0	70.7
	Forklifts	3	55.5	
	Generator Sets	1	62.1	
	Tractors/Loaders/Backhoes	3	64.5	
	Welders	1	54.5	
Paving	Pavers	2	58.6	69.8
	Paving Equipment	2	57.4	
	Rollers	2	57.4	
Architectural Coating	Air Compressors	1	58.1	58.1

As shown in Table 15, the worst-case construction phase noise levels would be approximately 72.7 dBA at the nearest adjacent residential properties.

Since the City's municipal code prohibits construction noise during evening and nighttime hours or anytime on Sundays and public holidays, the construction noise impact is considered to be less than significant.

7.3 Construction Vibration Impact Analysis

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 at approximately 300 feet from the east property line. All structures surrounding the project site are considered "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 site preparation, loading trucks during grading and excavation, and vibratory rollers during paving.

The construction vibration assessment utilizes the referenced vibration levels and methodology set-forth within the Caltrans Transportation and Construction Induced Vibration Guidance Manual.

Table 16 shows the referenced vibration levels.

Table 16
Typical Construction Vibration Levels[1]

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

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

Table 17 shows the project's construction-related vibration analysis at the nearest structures to the project construction area. Construction impacts are assessed from the closest area on the project site to the nearest adjacent structure.

Table 17
Construction Vibration Impact Analysis

Construction Activity	Distance to Nearest Structure (ft)	Duration	Calculated Vibration Level - PPV (in/sec)	Damage Potential Level	Annoyance Criteria Level
Small Bulldozer	300	Continuous/Frequent	0.000	No Impact	Barely Perceptible
Large Bulldozer	300	Continuous/Frequent	0.006	No Impact	Barely Perceptible
Vibratory Roller	300	Continuous/Frequent	0.014	No Impact	Barely Perceptible
Loaded Trucks	300	Continuous/Frequent	0.005	No Impact	Barely Perceptible

As shown in Table 17, project related construction activity is not expected to cause any damage potential to the nearest structures. The annoyance potential of vibration from construction activities would range from "barely perceptible".

Construction vibration calculation worksheets are shown in Appendix D.

7.4 Construction Project Design Features

In order to help ensure the project complies with the applicable City of Corona noise standards during construction, the following project design features are recommended.

DF-5 Construction-related noise activities shall comply with the requirements set forth in the City of Corona Municipal Code Section 17.84.040.

a. Construction noise is prohibited between the hours of 8:00 p.m. to 7:00 a.m., Monday through Saturday and 6:00 p.m. to 10:00 a.m. on Sundays and federal holidays.

DF-6 No impact pile driving activities shall be allowed on the project site.

DF-7 During construction, the contractor shall ensure all construction equipment is equipped with appropriate noise attenuating devices and equipment shall be maintained so that vehicles and their loads are secured from rattling and banging. Idling equipment should be turned off when not in use.

DF-8 Locate staging area, generators and stationary construction equipment as far from the western property line, as reasonably feasible.

DF-9 Obtain a construction work permit from the City of Corona prior to starting construction.

Exhibits

Exhibit A

Location Map

N

Site Plan

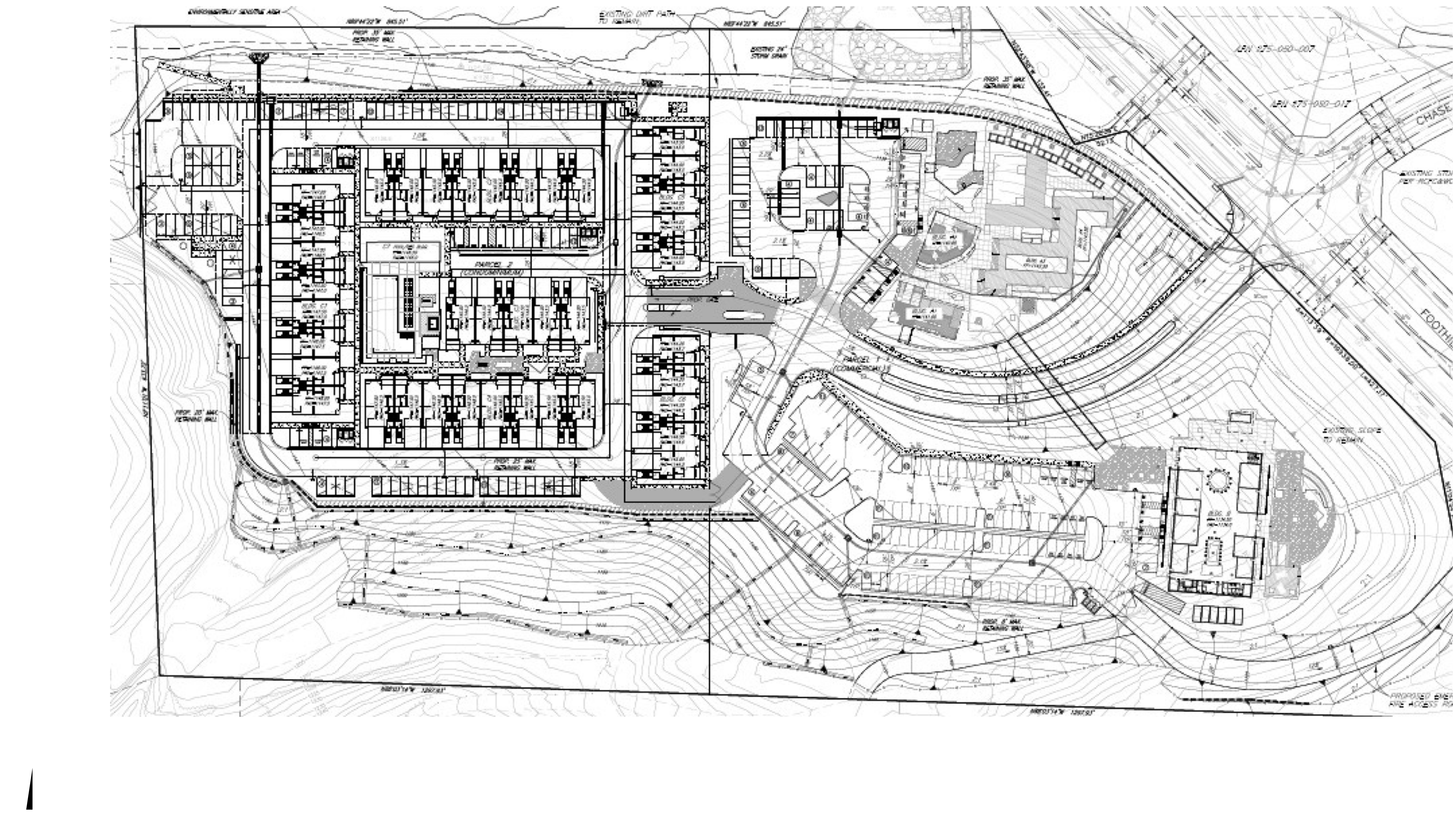


Exhibit C

Noise Monitoring Locations

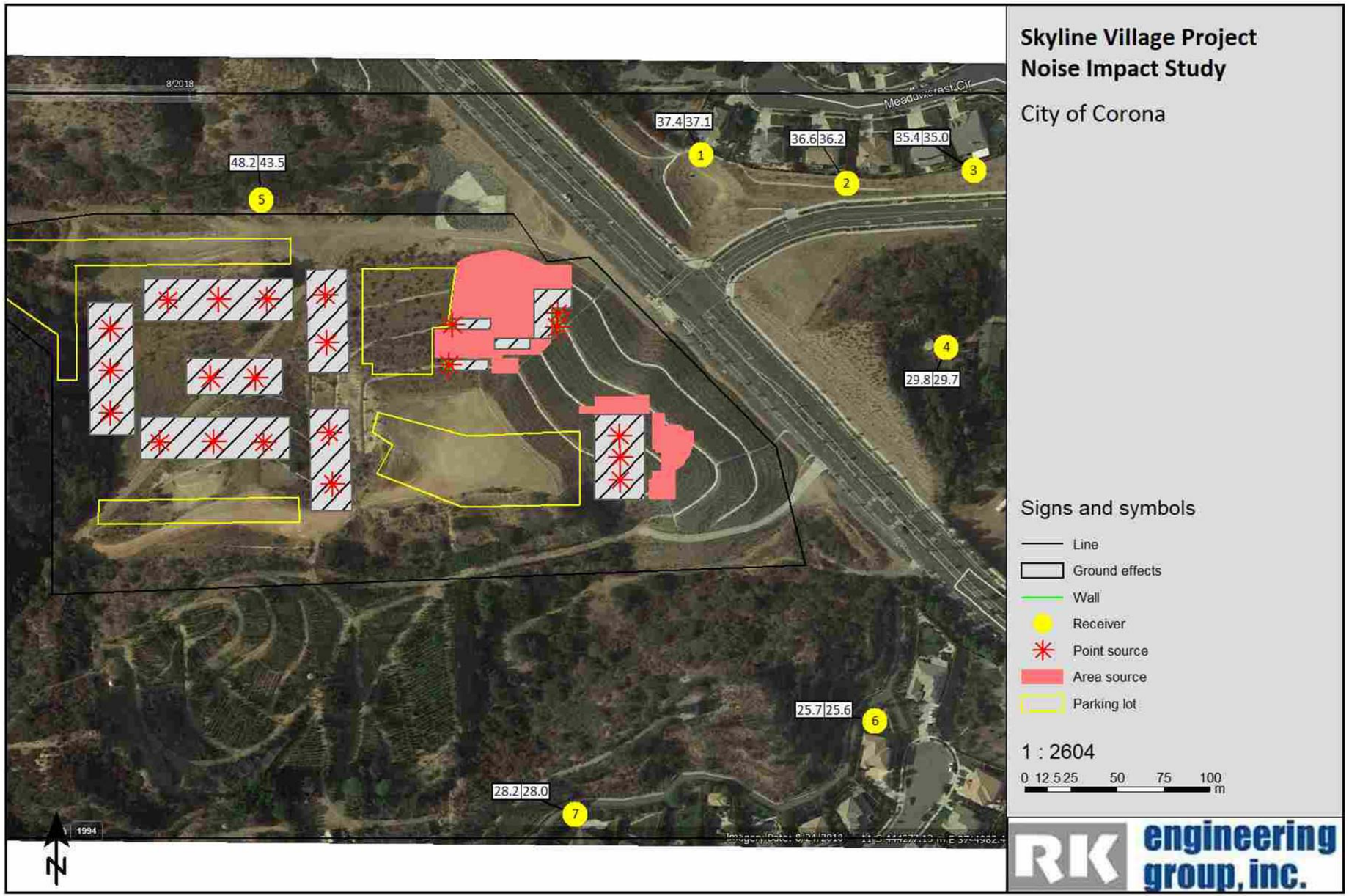
Legend:

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

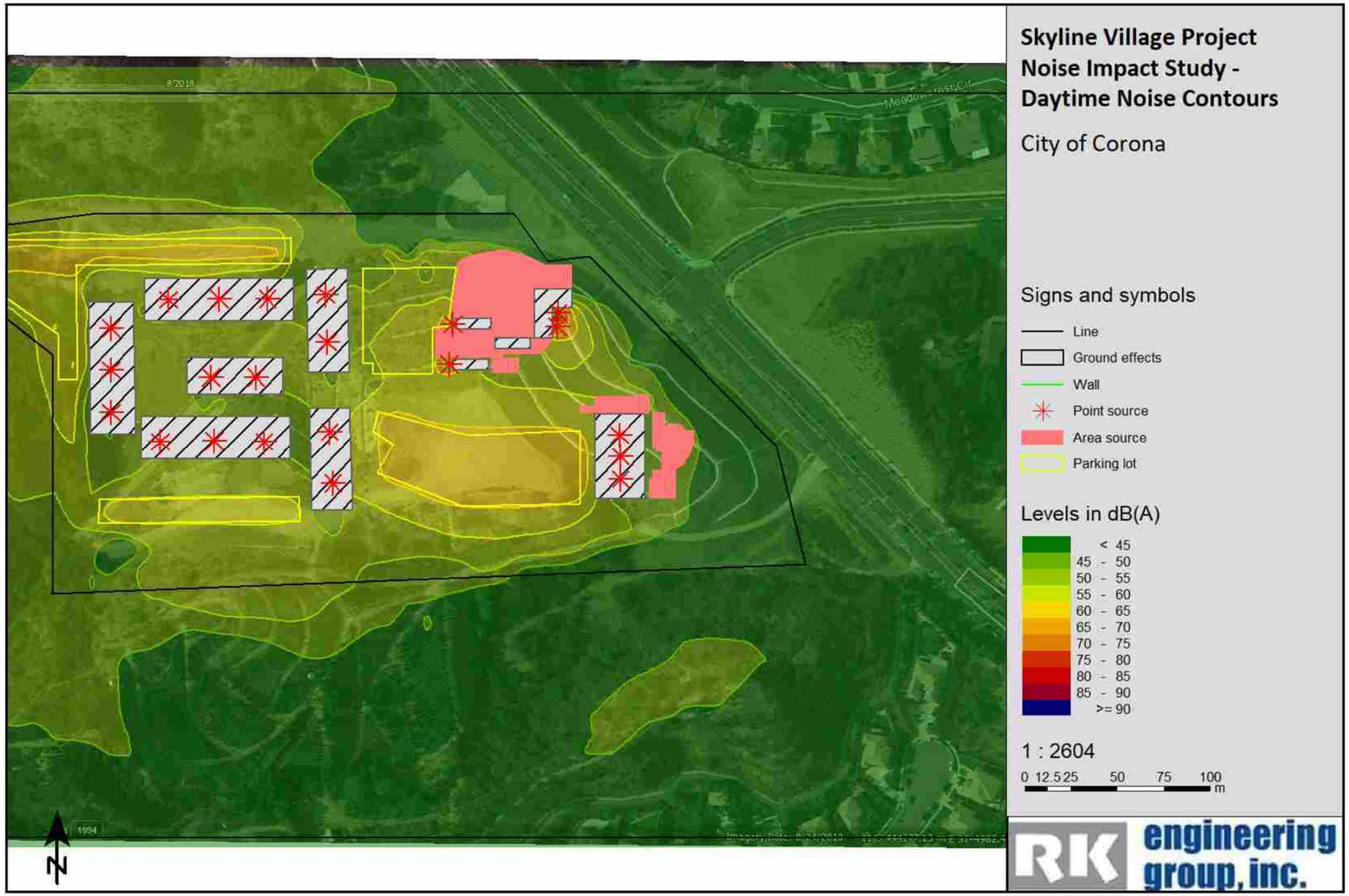
LT-1 = Long Term (24-Hr) Noise Monitoring Location

N

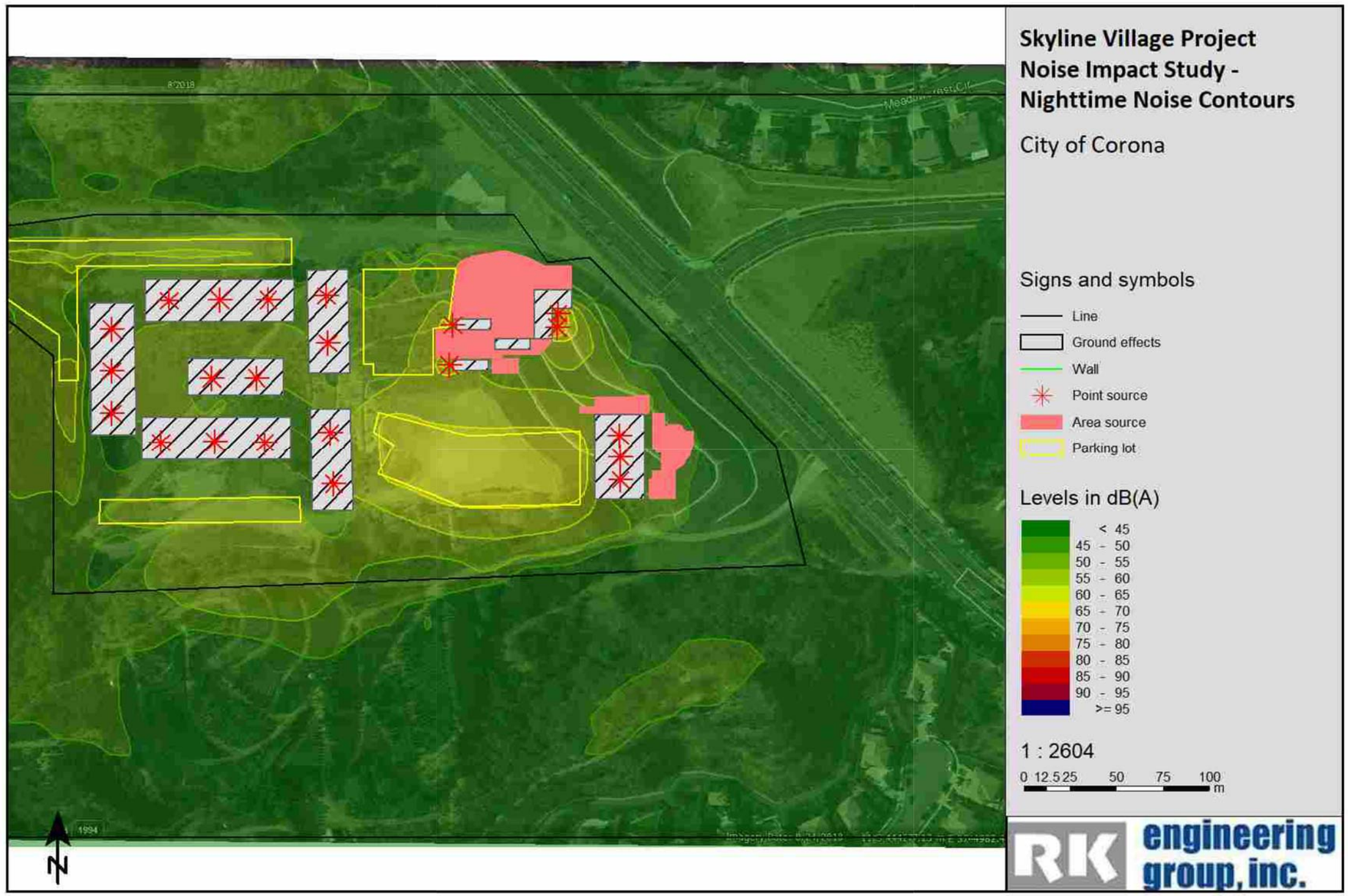
SoundPLAN Project Noise Level Results



Project Noise Level Contours - Daytime



Project Noise Level Contours - Nighttime



Appendices

Appendix A

City of Corona
General Plan and Municipal Code Noise Standards

Noise

INTRODUCTION

Noise and vibration are a constant presence in the everyday life of a modern suburban community. Although a certain level of noise and vibration is considered acceptable, excessive noise or vibration interferes with the quality of life in residential neighborhoods; detracts from commerce; and adversely affects sensitive areas or land uses, such as schools and medical settings. Corona, like many other suburban cities, is affected by the noise environment seeks to limit its impact where possible.

Consistent with its vision, the City of Corona's efforts to protect residents and business from excessive noise are guided by the following statement.

Corona is committed to protecting residents, businesses, and visitors from unacceptable levels of noise and vibration that detract from the quality of life. The City will seek to ensure that neighborhoods offer a quiet and peaceful environment, that commercial and industrial sectors operate within acceptable noise levels appropriate for their environment, and that sensitive land uses are protected from noise sources and levels that detract from quality of life.

The noise element strives to preserve the quality of life by protecting the community from the obtrusive impacts of noise- and vibration-generating uses such as traffic, construction, airplanes, and industrial uses, as well as other sources within Corona.

Scope of Element

The authority for general plans to address noise is codified in the California Government Code § 65302(f), which requires that a general plan include: A noise element that shall identify and appraise noise problems in the community. The noise element shall analyze and quantify, to the extent practicable, as determined by the legislative body, current and projected noise levels for all of the following sources:

- Highways and freeways.
- Primary arterials and major local streets.
- Passenger and freight railroad operations and ground rapid transit systems.
- Commercial, general aviation, and helicopter operations; aircraft overflights; and all other facilities and maintenance functions related to airport operation.
- Local industrial plants, including but not limited to railroad classification yards.
- Other ground stationary noise sources, including military installations, identified by local agencies as contributing to the community noise environment.

The intent of the noise element is to establish a pattern of land uses that minimizes the exposure of community residents to excessive noise. This includes maintaining the areas deemed acceptable in terms of noise exposure and requiring appropriate land use controls in areas exposed to excessive noise. This noise element also addresses the issue of vibration and its impact on sensitive land uses.

Related Plans

Several federal, state, and local agencies have adopted legislation and plans intended to minimize exposure of people to sources of loud noise. The noise element is a guideline for compliance with these standards, which include:

- **Transportation-Related Standards**. The City must abide by a number of federal and state regulations related to transportation noise, specifically airports and transportation projects. These are articulated by the federal aviation administration, federal transit administration, federal railroad administration, and Caltrans.
- **Housing and Development**. The US Department of Housing and Urban Development, California Administrative Code, Title 24 of the Health and Safety Code, and other portions of state law address noise standards in residential developments and other nontransportation land uses.
- **Local Standards**. The Corona Municipal Code has set noise performance standards for transportation and stationary noise sources. Transportation noise sources include freeways, airports, and railroads. Stationary noise sources include industrial and mechanical equipment. The code also has vibration performance standards.

The next section provides context for each noise hazard in Corona, followed by goals and policies to achieve the general plan vision.

NOISE CONTEXT

Noise and vibration surround us; they are a constant presence in everyday urban life. To some, noise is welcome when it occurs in a playground, a business district, or other social setting. In other cases, excessive noise can interfere with community or personal quality of life and affect physical health, psychological stability, social cohesion, property values, and economic productivity. The purpose of the noise element in a general plan is to ensure that a community limits the exposure to excessive noise and vibration levels in sensitive areas and at sensitive times of day.

Noise is often defined as annoying or unwanted sound. Health studies have shown that excessive noise can cause adverse psychological and physiological effects on humans. Though sound levels can be easily measured, the variability in subjective and physical responses to sound complicates the analysis of its impact on people. The ear, the hearing mechanism of humans and most animals, receives these sound pressure waves and converts them to neurological impulses, which are transmitted to the brain for interpretation. The interpretation by the auditory system and the brain depends on the characteristics of the sound and on the characteristics of the person hearing it.

Another topic related to noise is vibration. Although less frequent and often accompanied by noise, vibration can also be disturbing. Vibration is an oscillating motion that is transmitted in waves through the earth or solid objects. Groundborne vibration can be due to various explosions, construction activities, or railway and transit movement. Especially for local planning areas where sensitive uses exist or are planned, OPR recommends that groundborne vibration be included in the noise element. This ensures greater consistency with the CEQA Environmental Review Checklist (Cal. Code Regs., Title 14, § 15000 et seq., Appendix G).

Surface mining operations meet vibration standards as conditions of their permits.

Noise and Vibration Terminology

The concept and application of noise and vibration to comprehensive planning and development are difficult to understand without standard definitions that are used in the field of noise and vibration as well as in this section.

Noise and Vibration Terms

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

Noise: Sound that is loud, unpleasant, unexpected, or otherwise undesirable. This typically refers to the volume of noise and whether it interferes with other activities.

Ambient Noise: The composite of noise from all sources near and far. The ambient noise level constitutes the normal or existing level of environmental noise at a given location.

Intrusive Noise: Noise that intrudes over ambient noise at a given location. The relative intrusiveness of a sound depends on its amplitude, duration, frequency, and time of occurrence; tonal or informational content; and the prevailing noise level.

Decibel (dB): A unitless measure of sound on a logarithmic scale. Decibels may also be "A-weighted" (dBA), which de-emphasizes the very low and very high frequencies similar to the human ear and is correlated with subjective reactions to noise.

Leq: Equivalent energy level. The maximum root-mean-square noise level during a measurement period. Leq is typically computed over 1-, 8-, and 24-hour sample periods. Leq can also be measured as equivalent continuous noise, which is the mean of the noise level, energy averaged over time.

CNEL: Community Noise Equivalent Level. The energy-average of the A-weighted sound levels during a 24-hour period, with 5 dB added from 7:00 p.m. to 10:00 p.m., and 10 dB added from 10:00 p.m. to 7:00 a.m.

Note: For general community/environmental noise, CNEL and Ldn values rarely differ by more than 1 dB. As a matter of practice, Ldn and CNEL values are equivalent and generally interchangeable.

Ldn: Day-Night Average Level. The average equivalent A-weighted sound level during a 24-hour period, with 10 decibels added from 10 p.m. to 7 a.m.

For general community/environmental noise, CNEL and Ldn values rarely differ by more than 1 dB. As a matter of practice, Ldn and CNEL values are equivalent and generally interchangeable.

Noise Contours: Lines drawn about a noise source indicating the distance to various levels of noise exposure.

Vibration: Vibration is an oscillating motion in the earth. Like noise, vibration is transmitted in waves, but in this case through the earth or solid objects. It is generally felt rather than heard.

Peak Particle Velocity (PPV). The peak rate of speed at which soil particles move (e.g., inches per second) due to ground vibration.

TRANSPORTATION NOISE

In Corona, the primary sources of noise and vibration are related to the prevalence of its transportation infrastructure throughout the community. In addition, as the community is framed by surrounding hills and canyons, Corona's natural topography also increases the degree to which noise and vibration are felt.

Aircraft

The Corona Municipal Airport is a general aviation airport that experiences up to 50,000 annual operations per year. The majority of flights are for recreational purposes only. Because the airport generally serves small aircraft and is in the Prado Flood Control Basin, a half mile from the nearest residential neighborhoods, it is not a substantial source of noise, and noise from the airport does not affect much of the city. As shown in Figure N-2, the noise contours for the airport extend largely within open space areas within the Prado Basin and surrounding industrial uses.

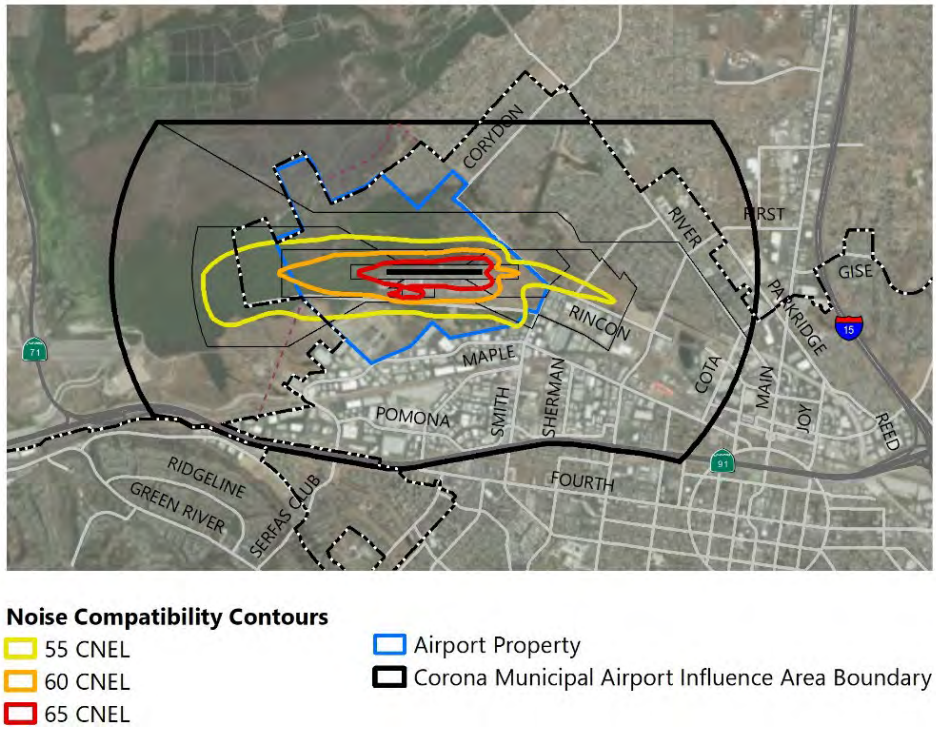


Figure N-1 Corona Municipal Airport Noise Contours

The California Code of Regulations Title 21, Subchapter 6, Airport Noise Standards, establishes 65 dBA CNEL as the acceptable level of aircraft noise for persons living in the vicinity of airports. Noise-sensitive land uses in locations where the aircraft exterior noise level exceeds 65 dBA CNEL are generally incompatible, unless an aviation easement has been acquired or the residence is a high-rise apartment or condominium that achieves an interior CNEL of 45 dBA or less in all habitable rooms. The Corona Municipal Code has a similar noise standard in the airport influence area.

Freeways and Arterials

The major sources of noise and vibration in the community are freeways. Both the SR-91 and I-15 bisect the community and are two of the most heavily traveled freeways in California. Hundreds of thousands of trucks and autos traverse these freeways. Corona has highly used arterial roadways that carry a significant volume of vehicles—Ontario Avenue, Magnolia Avenue, Sixth Street, Main Street, and other arterials. Vibration levels are higher and more noticeable along freeways and local truck routes due to the volume of heavy trucks using these routes.

Figure N-2, Existing Transportation Noise Levels, and Figure N-3, Future Transportation Noise Levels, show noise contours from major transportation infrastructure. Noise modeling did not take into account sound walls or other shielding features that would attenuate traffic noise, and thus provides a conservative estimate of the areas actually adversely affected by noise. Generally, the area within the 60 CNEL contour is where residential, lodging, noise and land use compatibility may be a concern. Areas where proposed future development could exceed standards in the land use noise compatibility matrix are required to conduct a detailed acoustical study to determine design features or mitigation to reduce noise and vibration to acceptable levels.

Railroad Lines

The Burlington Northern Santa Fe Railroad (BNSF) operates rail lines that traverse Corona carrying freight trains. This line is also shared by both the Metrolink Commuter Rail and Amtrak Passenger Rail. Train noise is a significant source of noise due to its magnitude and the associated vibration effects. Train noise incorporates the sounds of the locomotive engine, wheel-on-rail noise, and whistles near crossings. About 50 freight trains and 25 Metrolink and Amtrak trains use this rail corridor daily. The number of trains passing through Corona is forecast to double by the year 2040.

Railroad lines typically produce noise levels in excess of 65 CNEL, which is the maximum exterior noise level allowed in areas with sensitive uses, such as housing. in areas nearest the railroad tracks. The 65 dBA CNEL rail noise contour extends 600 feet in both directions from the mainline and 750 feet within ¼ mile of crossings (due to horn sounding) under existing conditions and is projected to extend 1,050 feet from the rail line at buildout of the general plan. While the railroad is generally located in industrial zones, main lines also run adjacent to some residential areas.

Stationary sources of noise include common building or home mechanical equipment, such as air conditioners, ventilation systems, or pool pumps, and industrial facilities, such as manufacturing plants, power plants, or processing plants. Industry in Corona and near the Corona city limits also includes a wide variety of noise sources, such as light manufacturing, truck transportation–related businesses, and heavy manufacturing. Surface mining operations in eastern Corona also produce significant noise. Mining operations, which are one of the largest stationary sources of noise, are regulated pursuant to development agreement and local mining permit.

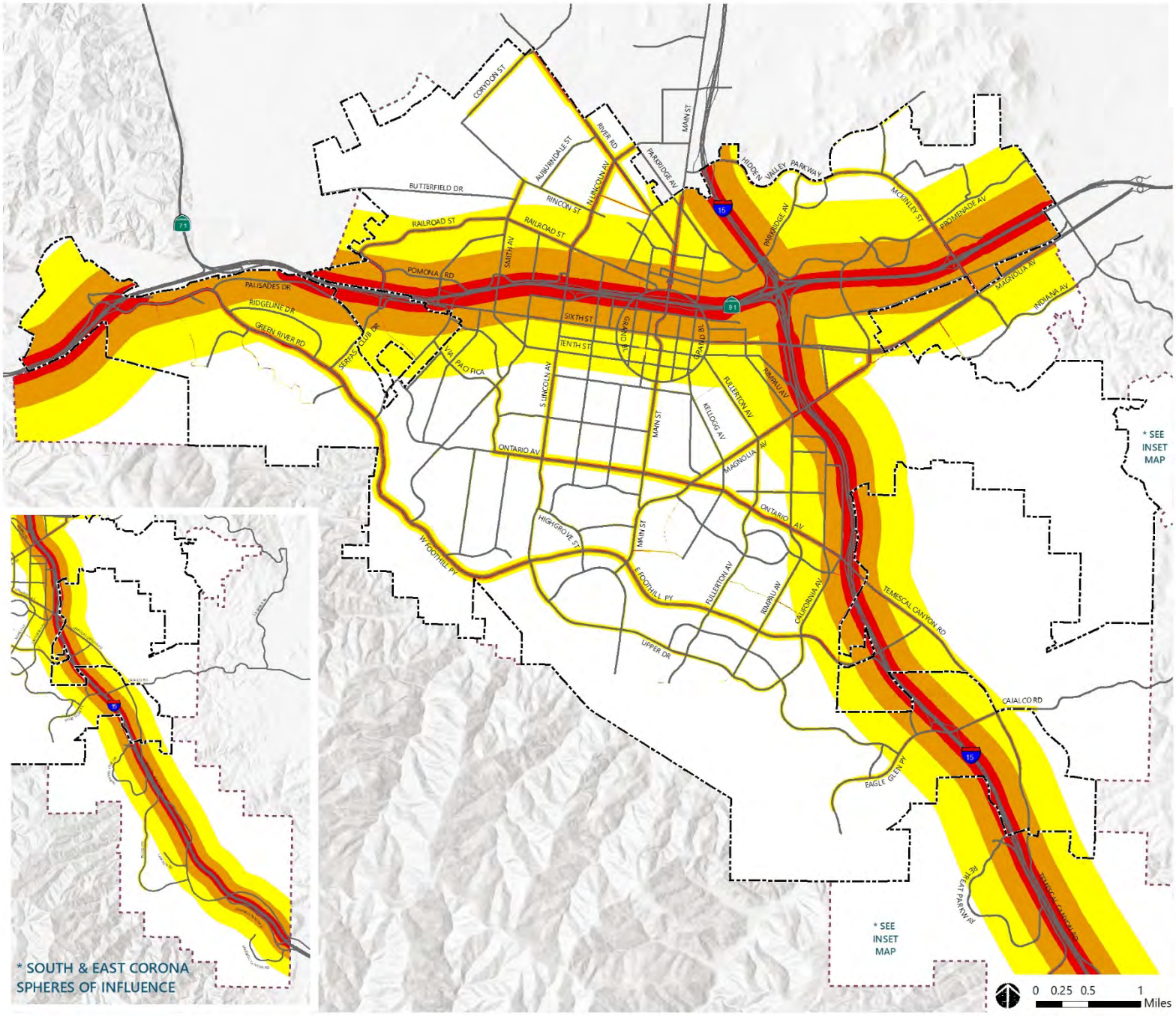


Figure N-2
Existing Transportation Noise

Legend

- 70 CNEL
- 65 CNEL
- 60 CNEL
- City Boundary
- Sphere of Influence Areas

Source: PlaceWorks 2018

CORONA General Plan

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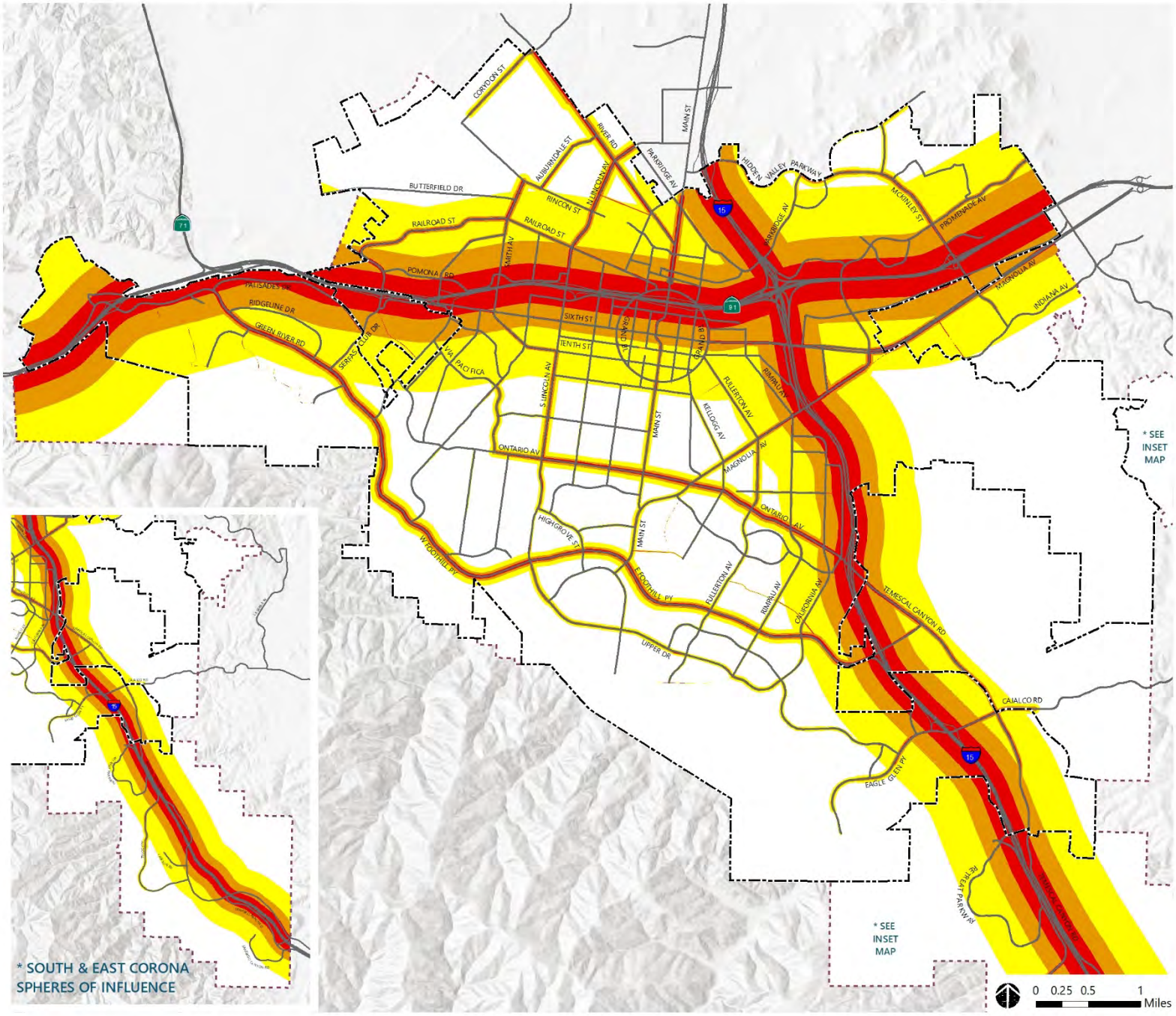

Figure N-3
Future Transportation Noise Levels

Legend

- 70 CNEL
- 65 CNEL
- 60 CNEL
- City Boundary
- Sphere of Influence Areas

Source: PlaceWorks 2018

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Minimizing Transportation-Related Noise

Transportation is the largest contributor to the noise environment in Corona. The most efficient and effective means of controlling noise from transportation systems is to reduce noise at the source. However, the City has no direct control over noise produced by trucks, cars, and trains because state and federal regulations preempt local laws. Therefore, City noise policy focuses on reducing the impacts on people from transportation noise along freeways, roadways, and rail corridors or incorporating measures that either prevent or mitigate those impacts.

Site Planning and Building Design

While transportation noise is the most frequently cited source of noise, much can be done at the building design level to mitigate impacts. Site planning, landscaping, topography and the design and construction of noise barriers are the most common and effective method of alleviating noise impacts. Setbacks and buffers can also reduce noise levels. Noise-attenuating barriers can and will be incorporated into new development projects to reduce noise exposure where needed. The effectiveness of the barrier depends upon: 1) the relative height and materials of the barrier; 2) the noise source; 3) the affected area; and 4) the horizontal distance between the barrier and the affected area. Notable reductions in tire noise have been achieved with implementation of special paving materials, such as rubberized asphalt or open-grade asphalt concrete overlays. Although this noise reduction would be sufficient to avoid the predicted noise increase due to traffic in some cases, the potential up-front and ongoing maintenance costs are such that the cost versus benefits ratio may not be feasible and reasonable.

Freeway Noise Attenuation Strategies

Freeway noise associated with traffic along the SR-91 and I-15 has been mitigated in certain areas with sound walls along both sides of freeways. The SR-15 upgrade project includes elements to shield freeway noise, particularly along areas of the freeways adjoining residential areas. Where needed, the City will continue to pursue mitigation with Caltrans for remaining areas not addressed by freeway enhancement projects. Future improvements to the freeway, including the SR-71 flyover, may also require noise mitigation measures to protect residents from excessive noise from the freeways.

Railroad Noise Mitigation

Mitigating rail noise represents one of the key noise reduction challenges in Corona. Eliminating all at-grade crossings for existing railways would significantly reduce noise impacts and address road/rail traffic conflicts, particularly along highly traveled routes. However, this solution involves costs that are likely beyond the collective resources of the City, federal agencies, and railroad owners/operators. Until such financial resources are secured, City efforts will focus on minimizing excessive noise levels associated with train horns (e.g., Quiet Zones), prioritizing grade separations, and implementing other noise reduction programs to reduce adverse impacts of noise.

The following goals and policies are intended to reduce noise impacts where possible and maintain a reasonable quiet environment for people to live and work in Corona.

GOAL N-1

Protect residents, visitors, and noise-sensitive land uses from the adverse human health and environmental impacts created by excessive noise levels from transportation sources by requiring proactive mitigation.

Policies

N-1.1 Reduce noise impacts from transportation noise sources through the design and daily operation of arterial road improvements, enforcement of state motor vehicle noise standards, and other measures consistent with funding capabilities.

- Require site design features and structural building enhancements in the development of residential and other "noise sensitive" land uses that are to be located adjacent to major roads or railroads.
- Encourage enforcement of state motor vehicle noise standards through coordination with the California Highway Patrol and the Corona Police Department.
- Ensure that the Zoning Ordinance, Circulation Element, and Land Use Element of the General Plan fully integrate the policies adopted as part of the Noise Element.

N-1.2 Minimize the rise of vehicle noise from roadways through route location, sensitive roadway design, regulation of traffic volumes and speeds, and working with Caltrans in highway improvements.

N-1.3 Encourage Caltrans to install and maintain mitigation (e.g., noise walls) and/or landscaping elements along highways that are adjacent to existing residential subdivisions or other noise-sensitive areas in order to reduce adverse noise impacts.

N-1.4 Require municipal vehicles and noise-generating mechanical equipment purchased or used by the City to comply with noise performance standards consistent with the latest available noise reduction technology to the extent practicable and cost-effective.

N-1.5 Require new nonresidential development that attracts noise-generating vehicles (e.g., high volumes of traffic, trucking) to design and configure onsite ingress and egress points to divert traffic away from "noise sensitive" land uses, to the greatest extent practicable.

NOISE AND LAND USE PLANNING

Primary noise sources in the city will not go away. To limit exposure to intrusive noise levels, the federal government, the State of California, and local governments have established standards and ordinances to define acceptable noise levels for certain land uses. As part of the 2004 General Plan, the City adopted exterior land use/noise compatibility guidelines for evaluating land use planning proposals (Table N-1).

Table N-1 Noise Levels and Land Use Compatibility Guidelines

Land Use Categories		Community Noise Equivalent Level (CNEL)						
Categories	**Uses**	**<55**	**60**	**65**	**70**	**75**	**80>**	
Residential	Single Family, Duplex	A	A	B	B	D	D	D
	Multiple Family	A	A	B	B	C	D	D
	Hotel, Motel Lodging	A	A	B	C	C	D	D
Commercial Regional, District	Commercial Retail, Bank, Restaurant, Movie Theatre	A	A	B	B	C	C	D
Commercial Regional, Village District, Special	Commercial Retail, Bank, Restaurant, Movie Theatre	A	A	A	A	B	B	C
Commercial Office, Institution	Office Building, R&D, Professional Offices, City Office Building	A	A	A	B	B	C	D
Rec. Institutional Civic Center	Amphitheatre, Concert Auditorium, Meeting Hall	B	B	C	C	D	D	D
Commercial Recreation	Amusement Park, Miniature Golf, Sports Club, Equestrian Center	A	A	A	B	B	D	D
Commercial, General, Special, Industrial, and Institutional	Auto Service Station, Auto Dealer, Manu-facturing, Warehousing, Wholesale, Utilities	A	A	A	A	B	B	B
Institutional General	Hospital, Church, Library, Schools' Classroom	A	A	B	C	C	D	D
Open Space	Local, Community, and Regional Parks	A	A	A	B	C	D	D
Open Space	Golf Course, Cemetery, Nature Centers Wildlife Reserves and Habitat	A	A	A	A	B	C	C

Zone A: Clearly Compatible: Specified land use is satisfactory, based on the assumption that any buildings involved are of conventional construction without any special noise insulation requirements.
Zone B: Normally Compatible: New construction should be undertaken only after detailed analysis of the noise reduction requirements and needed noise insulation features are determined. Conventional construction, with closed windows and fresh air supply or air conditioning, will normally suffice.
Zone C: Normally Incompatible: 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.
Zone D: Clearly Incompatible: New development should generally not be undertaken.

GOAL N-2

Prevent and mitigate the adverse impacts of excessive ambient noise exposure, including vibration on residents, employees, visitors, and "noise sensitive" land uses.

Policies

N-2.1 Consider noise and vibration levels in land use planning decisions to prevent future noise and vibration and land use incompatibilities. Considerations may include, but not necessarily be limited to, standards that specify acceptable noise limits for various land uses, noise reduction features, acoustical design in new construction, and enforcement of the California Standards Building Code provisions for indoor and outdoor noise levels.

N-2.2 Require that in areas where existing or future ambient noise levels exceed an exterior noise level of 65 dBA CNEL, all development of new housing, health care facilities, schools, libraries, religious facilities, and other "noise sensitive" uses shall include site design, building enhancements, buffering, and/or mitigation to reduce noise exposure to within acceptable limits.

N-2.3 Require new industrial and new commercial land uses or the major expansion of such uses to demonstrate that ambient noise levels will not exceed an exterior noise level of 65 dBA CNEL on areas containing "noise sensitive" land uses as depicted in Table N-1, N-2, and N-3.

N-2.4 Require development in all areas where the existing or future ambient noise level exceeds 65 dBA CNEL to conduct an acoustical analysis and incorporate special design measures in their construction to reduce interior noise levels to the 45 dBA CNEL level as depicted on Table N-1, N-2, and N-3.

N-2.5 Encourage existing "noise sensitive uses," including schools, libraries, health care facilities, and residential uses, in areas where existing or future noise levels exceed 65 dBA CNEL to incorporate fences, walls, landscaping, and/or other noise buffers and barriers, where appropriate and feasible.

N-2.6 Require development that generates increased traffic and substantial increases in ambient noise levels adjacent to noise sensitive land uses to provide appropriate mitigation measures in accordance with the acceptable limits of the City Noise Ordinance.

N-2.7 Require construction activities that occur in close proximity to existing "noise sensitive" uses, including schools, libraries, health care facilities, and residential uses, to limit the hours and days of operation in accordance with the City Noise Ordinance.

SPECIFIC LAND USE STANDARDS

In addition to land use compatibility standards, the Corona Municipal Code sets forth interior and exterior noise limits for individual land uses (Table N-2) and performance standards for industrial and commercial land uses as well (Table N-3)

Table N-2 Interior and Exterior Noise Standards

Land Use Categories		Average CNEL	
Categories	**Uses**	**Interior[1]**	**Exterior[2]**
Residential	Single Family, Duplex, Multiple Family	45[3]	65
	Mobile Home	NA	65[4]
Commercial; Industrial; and Institutional	Hotel, Motel, Transient Lodging	45	65[5]
	Commercial Retail, Bank, Restaurant; Sports Club	55	NA
	Office Building, Research and Develop. Professional Offices, City Offices	50	NA
	Amphitheatre, Concert Hall Auditorium, Meeting Hall	45	NA
	Gymnasium (Multipurpose)	50	NA
	Manufacturing, Warehousing, Wholesale, Utilities	65	NA
	Movie Theatres	45	NA
Institutional	Hospital, Schools' classroom	45	65
	Church, Library	45	NA
	Parks	NA	65

Notes:
1. Indoor environment excluding bathrooms, toilets, closets, corridors.
2. Outdoor environment limited to: private yard of single family, multi-family private patio or balcony that is served by a means of exit from inside, mobile home park, hospital patio, park's picnic area, school's playground, and hotel and motel recreation area.
3. Noise level requirement with closed windows. Mechanical ventilating system or other means of natural ventilation shall be provided as of Chapter 12, Section 1205 of UBC.
4. Exterior noise level should be such that interior noise level will not exceed 45 CNEL.
5. Except those areas affected by aircraft noise.

Table N-3 Stationary Noise Sources: Performance Standards

	Exterior Noise		Interior Noise	
Land Use Categories	**7am–10pm**	**10 pm–7am**	**7am–10pm**	**10 pm–7am**
Residential Land Uses	55 dBA	50 dBA	45 dBA	35 dBA
Other Sensitive Land Uses	55 dBA	50 dBA	45 dBA	35 dBA
Commercial Uses	65 dBA	60 dBA	N/A	N/A
Industrial, Manufacturing, Agricultural	75 dBA	70 dBA	N/A	N/A
See Municipal Code for exceptions and detailed clarifications				

GOAL N-3

Discourage the spillover or encroachment of unacceptable noise levels from mixed use, commercial, and industrial land uses on to noise sensitive land uses.

Policies

N-3.1 Provide for the reduction in noise impacts from commercial and industrial operations as controlled and enforced through the City Noise Ordinance.

N-3.2 Incorporate noise reducing designs into new or remodeled commercial and industrial projects. Measures should include, but not be limited, to:

- Sound barriers in front of HVAC units and other similar outdoor mechanical equipment.
- Increase setbacks and buffering of parking areas and primary on-site access drives from adjacent residential areas and other sensitive uses to the maximum extent feasible with walls, fences, berms, and/or adequate landscaping.
- Require vehicle access to commercial or industrial land uses abutting existing or planned residential areas be located at the maximum practical distance from residential areas.
- Orient loading and unloading ramps and drop off zones away from noise sensitive land uses.

N-3.3 Require the design of residential and nonresidential parking structures used on-site and adjacent to noise sensitive land uses incorporate noise reducing features to minimize vehicular noise from encroaching outside the structure.

N-3.4 Require that restaurants/bars implement operational measures to control the activities of their patrons on-site and within a reasonable distance from the establishment in order to minimize potential noise-related impacts on adjacent residential neighborhoods.

N-3.5 Require mixed-use structures incorporating commercial or institutional and residential uses, or industrial uses adjacent to noise and vibration sensitive uses minimize, through design and construction technology, the transfer or transmission of noise and vibration from the commercial, institutional, or industrial use to the residential land use.

N-3.6 Require nighttime land uses having amplified noise devices to be located in areas of the city that are not directly adjacent to existing and planned "noise-sensitive" land uses.

GOAL N-4

Minimize noise impacts created by railroad transit and airport operations and flight patterns on residential areas and other "noise sensitive" land use areas.

Policies

N-4.1 Work closely with the Burlington Northern Santa Fe Railroad operators to install and maintain noise mitigation features where operations impact existing and planned residential areas or other "noise-sensitive" areas.

N-4.2 Support the establishment of train operation restrictions (Quiet Zones) to reduce the noise levels of blaring horns in residential areas and adverse impacts on other "noise-sensitive" areas.

N-4.3 Require that development of new housing, health care facilities, schools, libraries, religious facilities, and other "noise sensitive" land uses near the railroad line include buffering and/or construction mitigation measures to reduce noise exposure to levels within acceptable limits.

N-4.4 Restrict development of land uses within the 65 dBA CNEL contour of the Corona Municipal Airport to industrial, agricultural, or other open space activities; require that all development in the vicinity of the Airport comply with the noise standards in the Airport Master Plan.

N-4.5 Work closely with the Corona Municipal Airport and operators on-site to ensure that the airport's operations do not exceed noise levels specified in the municipal code, generate adverse noise conditions in the City of Corona that are not allowed in the Airport Master Plan, nor exceed noise levels in the countywide airport land use compatibility policies.

Print

Corona Municipal Code

17.84.040 Noise.

(A) **Purpose and intent**.

(1) The purpose of this section is to regulate noise and vibration in the interest of the public health, safety and general welfare. The city finds that certain noise levels and vibrations are detrimental to the public health, safety and general welfare and that the primary sources of noise in the city are freeways, highways, manufacturing uses, railroads, the airport and construction noise. The noise element of the General Plan contains the city's policies regarding noise and identifies noise contours for existing and future roadways and the Corona Municipal Airport, which are implemented by this chapter. The General Plan noise element shall govern all noise standards and policies.

(2) In order to control unnecessary, excessive and annoying noise and vibration in the city, it is hereby declared to be the policy of the city to prohibit such noise and vibration generated from or by all sources as specified in this chapter. It shall be the policy of the city to maintain quiet in those areas which exhibit low noise levels and to implement programs to reduce noise in those areas within the city where noise levels are above acceptable values. It is the intent of the city to minimize noise impacts to adjacent land uses pursuant to the standards identified herein.

(B) **Definitions**. Terms found in this chapter shall be defined as follows. Additional definitions are found in the noise element of the General Plan.

(1) "**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-weighted filter network is designed to simulate the response of the human ear. The A-weighted sound level is expressed by the symbol dBA.

(2) "**Ambient noise**." The composite of noise from all existing sources near and far. The ambient noise level constitutes the normal or existing level of environmental noise at a given location, excluding any alleged offensive noise.

(3) "**Cumulative period**." An additive period of time composed of individual time segments which may be continuous or interrupted.

(4) "**Community noise equivalent level (CNEL)**." The average equivalent A-weighted sound level during a 24 hour day, obtained after addition of five decibels to sound levels between 7:00 p.m. and 10:00 p.m. and the addition of ten decibels to sound levels between 10:00 p.m. and 7:00 a.m.

(5) "**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 micropascals.

(6) "**Impulsive noise**." A noise of short duration, usually less than one second, and of high intensity, with an abrupt onset and rapid decay.

(7) "**Noise study**." An acoustical analysis performed by a qualified noise engineer which determines the potential noise impacts of a roadway, land use or operation of equipment. The noise study will generate noise contours and recommend mitigation for noise impacts which exceed the city's noise standards.

(8) "**Sensitive land uses**." Those specific land uses which have associated human activities that may be subject to stress or significant interference from noise. Sensitive land uses include single family residential, multiple family residential, churches, hospitals and similar health care institutions, convalescent homes, libraries and school classroom areas.

(9) "**Simple tone noise**." A noise characterized by a predominant frequency or frequencies so that other frequencies cannot be readily distinguished. When measured, a simple tone noise shall exist if the one-third octave band sound pressure levels in the band with the tone exceeds the arithmetic average of the sound pressure levels of the two continuous one-third octave bands as follows: 5 dB for frequencies of 500 hertz or above or by 15 dB for frequencies less than or equal to 125 hertz.

(10) "**Sound attenuation device**." An enclosure, blanket, vault, box, wall, fence, panel, baffle, coating, material, silencer, or other appurtenance, mechanism, or device intended to reduce the noise level of mechanical equipment.

(C) **Noise standards**.

(1) The noise ordinance identifies two separate types of noise sources: transportation and stationary. Transportation related noise sources, such as freeways, airports and railroads, are identified within this chapter and are mainly for the planning stages of project development. The noise metrics used for this noise type is the Community Noise Equivalent Level (CNEL) which is a 24 hour time weighted average noise level. The other type of noise standard is for stationary noise sources, such as industrial or construction noise, that may be intrusive to a neighboring private property. The noise metric used for stationary sources is defined as noise levels that cannot be exceeded for certain percentages of time. The noise standards shown in Table 1 are for regulating the impact of stationary noise sources to a neighboring private property. Standards for transportation related noise are found in Table 2.

(2) Stationary noise sources.

TABLE 1
STATIONARY NOISE SOURCE STANDARDS

TYPE OF LAND USE	MAXIMUM ALLOWABLE NOISE LEVELS			
	Exterior Noise Level		Interior Noise Level	
	7 a.m. to 10 p.m.	10 p.m. to 7 a.m.	7 a.m. to 10 p.m.	10 p.m. to 7 a.m.
Single-, Double- and Multi- Family Residential	55 dBA	50 dBA	45 dBA	35 dBA
Other Sensitive Land Uses	55 dBA	50 dBA	45 dBA	35 dBA
Commercial Uses	65 dBA	60 dBA	Not applicable	Not applicable
Industrial, Manufacturing or Agricultural	75 dBA	70 dBA	Not applicable	Not applicable

(a) Each of the noise limits specified here shall be reduced by 5 dBA for impulse or simple tone noises; provided, however, that if the ambient noise level exceeds the resulting standards, the ambient shall be the standard.

(b) If the measurement location is on the boundary between two different zones, the lower noise level standard applicable to the zone shall apply.

(c) If the intruding noise is continuous and cannot be reasonably discontinued or stopped for a time period whereby the ambient noise level can be determined, the measured noise level obtained while the source is in operation shall be compared directly to the allowable noise level standards as specified respective to the measurement location's designated land use and for the time of the day the noise level is measured. The reasonableness of temporarily discontinuing the noise generation by an intruding noise source shall be determined by the Code Enforcement Officer for the purpose of establishing the existing ambient noise level at the measurement location.

(d) Exterior noise:

1. It shall be unlawful for any person, entity or operation at any location within the incorporated area of the city to create any noise, or to allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person, which causes the noise level when measured on any other property to exceed:

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

b. The noise standard plus 5 dB for a cumulative period of more than 15 minutes in any hour;

c. The noise standard plus 10 dB for a cumulative period of more than five minutes in any hour;

d. The noise standard plus 15 dB for a cumulative period of more than one minute in any hour; or

e. The noise standard plus 20 dB for any period of time.

2. In the event the ambient noise level exceeds any of the first four noise limit categories above, the cumulative period applicable to the category shall be increased to reflect the ambient noise level. In the event the ambient noise level exceeds the fifth noise category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level.

(e) Interior noise. It shall be unlawful for any person at any location within the incorporated area of the city to create any noise or to allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such a person which causes the noise level when measured within any other residential dwelling unit or sensitive land use to exceed:

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

2. The noise standard plus 5 dB for a cumulative period of more than one minute in any hour; or

3. The noise standard plus 10 dB, or the maximum measured ambient, for any period of time.

(3) Transportation noise sources.

TABLE 2 TRANSPORTATION NOISE SOURCE STANDARDS		
TYPE OF LAND USE	**EXTERIOR NOISE LEVEL**	**INTERIOR NOISE LEVEL**

	(Private Outdoor Living Areas)	
Residential (Roadway)	65 CNEL	45 CNEL
Residential (Airport)	65 CNEL	45 CNEL
Other sensitive land uses (Roadway)	65 CNEL	45 CNEL
Other sensitive land uses (Airport)	65 CNEL	45 CNEL
Hotels/Motels (Roadway)	65 CNEL	45 CNEL
Hotels/Motels (Airport)	65 CNEL	45 CNEL

(a) **Roadway noise**. A noise study shall be performed prior to the construction of new master planned roads, roadway improvements, rail lines and/or prior to the construction of residential or sensitive land uses adjacent to existing or master planned roads or railways. The noise study shall identify the existing and future noise contours for the roadway and propose mitigation measures to reduce the noise impacts to a maximum of 65 dBA CNEL in the private outdoor living area of residences and to a maximum interior noise level of 45 dBA CNEL for residential and sensitive land uses, as shown in Table 2.

(b) **Airport noise**. Sensitive land uses, site-built homes and institutional uses are prohibited in airport noise contours above 65 dBA CNEL. All subdivisions within two miles of the Corona Municipal Airport or within the 65 dBA CNEL contour shall show and record an avigation easement for the benefit of the airport. The avigation easement shall provide notification to potential buyers and occupants of the presence of the easement and the potential for over flights and aircraft noise.

(D) **Special provisions**.

(1) **Mechanical equipment in residential zones.** Upon application for a building permit to install mechanical equipment, such as air conditioner and pool equipment, in a residential zone, the equipment shall be setback at least ten feet from an adjoining property line except where a five foot high block sound wall is maintained extending a distance of two feet on each side of such equipment and situated either between such equipment and the property line or on said property line. Exception: Mechanical equipment in residential zones shall be permitted closer than ten feet from an adjoining property line without a five foot high block sound wall when sound attenuation devices approved by the Building Official are installed. The noise level with sound attenuation devices installed shall comply with the limits and conditions specified in § 17.84.040(C)(2) when measured from any adjoining property. The approved sound attenuation devices shall be maintained and any approvals shall not be construed to permit violations of this code.

(2) **Construction noise**. Construction noise is prohibited between the hours of 8:00 p.m. to 7:00 a.m., Monday through Saturday and 6:00 p.m. to 10:00 a.m. on Sundays and federal holidays. Construction noise is defined as noise which is disturbing, excessive or offensive and constitutes a nuisance involving discomfort or annoyance to persons of normal sensitivity residing in the area, which is generated by the use of any tools, machinery or equipment used in connection with construction operations.

(3) **Noise devices**. In accordance with Chapter 9.24, no loudspeaker, bells, gongs, buzzers, mechanical equipment or other sounds, attention-attracting or communication device associated with any use adjacent to residential or sensitive land uses shall be discernible beyond the boundary line of the parcel, except fire protection devices, burglar alarms and church bells. Noise generated by these sources shall be enforced by the Police Department.

(4) **Noisy animals**. Noise generated by animals shall be regulated by the Police Department in accordance with Chapter 6.11.

(E) **Exemptions**. The following activities shall be exempt from these noise standards:

(1) Special events pursuant to an approved special use permit. Noise impacts shall be evaluated and conditioned as part of the special use permit;

(2) Filming pursuant to a film permit. Noise impacts shall be evaluated and conditioned as part of the film permit;

(3) Activities conducted on public parks, public playgrounds and public or private school grounds, including school athletic and entertainment events that are conducted under the sanction of the school or which a license or permit has been duly issued pursuant to any provision of city code;

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

(5) Any activity too the extent regulation thereof has been preempted by state or federal law;

(6) Repairs to and replacement of mechanical equipment in residential zones installed by permit prior to May 20, 1993 shall be exempt from the requirements in division (D) of this section;

(7) Noise variances granted pursuant to subsection (H)(1) below;

(8) Short-term, non-continuous operations associated with government and public utility facilities that are necessary to maintain the delivery of services for the benefit of public health and safety.

(F) **Noise level measurements**. All noise shall be measured in accordance with the following standards. Measurements shall be taken of the ambient noise level and any alleged offensive noise. If the measurement location is on the boundary of two different noise zones, the lower noise level standard shall apply.

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

(2) **Ambient noise**. A measurement of the ambient noise level shall be taken according to the procedures in this chapter. If the ambient noise level exceeds the standard, the ambient level shall be the standard. If an alleged intruding noise source is continuous and cannot be reasonably discontinued or stopped for a time period whereby the ambient noise level can be determined, the measured noise level obtained while the alleged intruding noise source is in operation shall be compared directly to the applicable noise level standard.

(G) **Noise studies required**. As referenced in division (C) of this section, there are essentially two different types of noise sources that have been identified in Corona and each has its own noise metrics as well as its own required noise studies. The noise metrics used for transportation related noise sources is the CNEL which is a 24 hour time weighted average noise level. The noise metrics used for stationary sources are defined as noise levels that cannot be exceeded for certain percentages of time.

(1) **Predevelopment noise studies**. A predevelopment noise study is performed prior to development and is designed to project future noise levels and recommend mitigation measures to be implemented in project development. All noise studies shall be prepared by a registered noise engineer as approved by the city. Noise studies will be required for the construction of master planned roadways, for development adjacent to master planned roadways, when a noise

generating use, such as a factory, is proposed in proximity to residential uses and when residential uses are proposed in proximity to an existing noise source. The need for a noise study will be determined at development plan review. Predevelopment noise studies shall project future noise levels based on proposed uses, traffic volumes and other relevant future conditions. Existing and projected noise shall be evaluated pursuant to the noise standards within this chapter and the noise element of the General Plan. Mitigation measures shall be proposed to bring noise levels into compliance with these standards. Mitigation measures may consist of walls, berms, setbacks, landscaping, building materials, construction methods and any other means whereby noise can be reduced to the maximum amounts within this chapter.

(2) **Studies of existing stationary noise**. At times it will be necessary to study the noise generated by an existing source, either due to alleged violations of the noise ordinance or for monitoring purposes. These noise studies shall be prepared by a registered noise engineer as approved by the city in accordance with the standards in Table 1.

(H) **Noise variance**.

(1) The owner or operator of a noise or vibration source which violates any of the provisions of this chapter may file an application with the Community Development Department for a variance from the provisions thereof wherein said owner or operator shall set forth all actions taken to comply with the provisions, the reasons why immediate compliance cannot be achieved, a proposed method of achieving compliance and a proposed time schedule for its accomplishment. The application shall be accompanied by a fee as determined by City Council resolution. A separate application shall be filed for each noise source; provided, however, that several fixed sources on a single property may be combined into one application. An application for a variance shall remain subject to prosecution under the terms of this chapter until a variance is granted.

(2) The Board of Zoning Adjustment shall evaluate all applications for variance from the requirements of this chapter and may grant the 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 this chapter. The 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 following:

(a) The magnitude of the nuisance caused by the offensive noise;

(b) The uses of property within the area of impingement by the noise;

(c) The time factors related to study, design, financing and construction of remedial work;

(d) The economic factors related to age and useful life of the equipment;

(e) The general public interest, welfare and safety.

(3) Any variance granted by the Board shall be by resolution and shall be transmitted to the Code Enforcement Officer for enforcement. Any violation of the terms of the variance shall be unlawful and enforced pursuant to division (I) of this section.

(I) **Enforcement**.

(1) It shall be unlawful for any person at any location within the City of Corona to create any exterior noise or to allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person, which causes the noise level when measured according to this chapter to exceed the maximum allowable noise levels in Table 1 of § 17.84.040(C).

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

(3) Any person violating any provision of this chapter shall be deemed guilty of a misdemeanor.

(4) The operation or maintenance of any device, instrument, vehicle or machinery in violation of any noise standard identified in this chapter is declared to be a public nuisance and may be abated pursuant to the nuisance abatement procedure in Chapter 8.32 of this code.

(5) Pursuant to § 1.08.020(A) of this code, each person shall be deemed guilty of a separate offense for each and every day during any portion of which any violation of any provision of this chapter is committed, continued or permitted by such person and shall be punished accordingly.

(`78 Code, § 17.84.040.) (Ord. 3277 §§ 4, 5, 2018; Ord. 3188 § 3, 2015; Ord. 2372 § 2, 1999; Ord. 2161 § 1 (part), 1993.)

Appendix B

Field Data and Photos

Field Sheet

Project:	Skyline Village Project	**Engineer:** B. Estrada	**Date:** 1/8/2020
			JN: 2459-2019-02
Measurement Address:		**City:**	**Site No.:** 1
Chase Drive / Foothill Parkway		Corona	

Sound Level Meter:
LD-712
Serial # A0520

Calibrator:
LD-250 250
Serial # 1322

Calibration Record:

	Input, dB/	Reading, dB/	Offset, dB/	Time
Before	114.0	114.0	27.9	12:52 PM
After				
Calibrated at				

Notes:

Temp:	61
Windspeed:	4' MPH
Direction:	WSW'
Skies:	Sunny
Camera:	
Photo Nos.	

Meter Settings:

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

Notes:

Measurement Type:
Long-term ____
Short-term X

		Start Time	Stop Time	Leq	Lmin	Lmax	L2	L8	L25	L50
Locations	1	12:53 PM	1:03 PM	49.1	37.0	72.6	50.2	49.8	46.1	43.1
		Measurement taken at approximately 20 feet from the residential property line to the east of the project site approximately 300 feet from the eastern property line. Ambient noise includes traffic noise from Foothill Parkway and Chase drive and dog barking.								
	2	1:10 PM	1:20 PM	43.9	36.8	69.6	44.3	40.0	38.9	38.2
		Measurement taken at sidewalk of the Brannan Circle. Ambient noise includes traffic noise from Foothill Parkway and a water fountain.								
	3	1:24 PM	1:34 PM	50.7	39.5	64.8	61.5	55.6	47.2	42.7
		Measurement taken at sidewalk of the Folson Circle. Ambient noise includes traffic noise from Foothill Parkway and water fountain.								
	4	1:38 PM	1:48 PM	54.4	37.8	70.4	62.4	59.0	53.6	49.1
		Measurement taken at approximately 100 feet north of the southern property line. Ambient noise includes distant traffic noise from Foothill Parkway.								
	5									

RK engineering group, inc.

Field Sheet - ST1 Location Photos

Project: Skyline Village Project	**Engineer:** D. Shivaiah	**Date:**	1/7/2020
		JN:	2459-2019-02
Measurement Address: Chase Drive / Foothill Parkway	**City:** Corona	**Site No.:**	1

RK engineering group, inc.

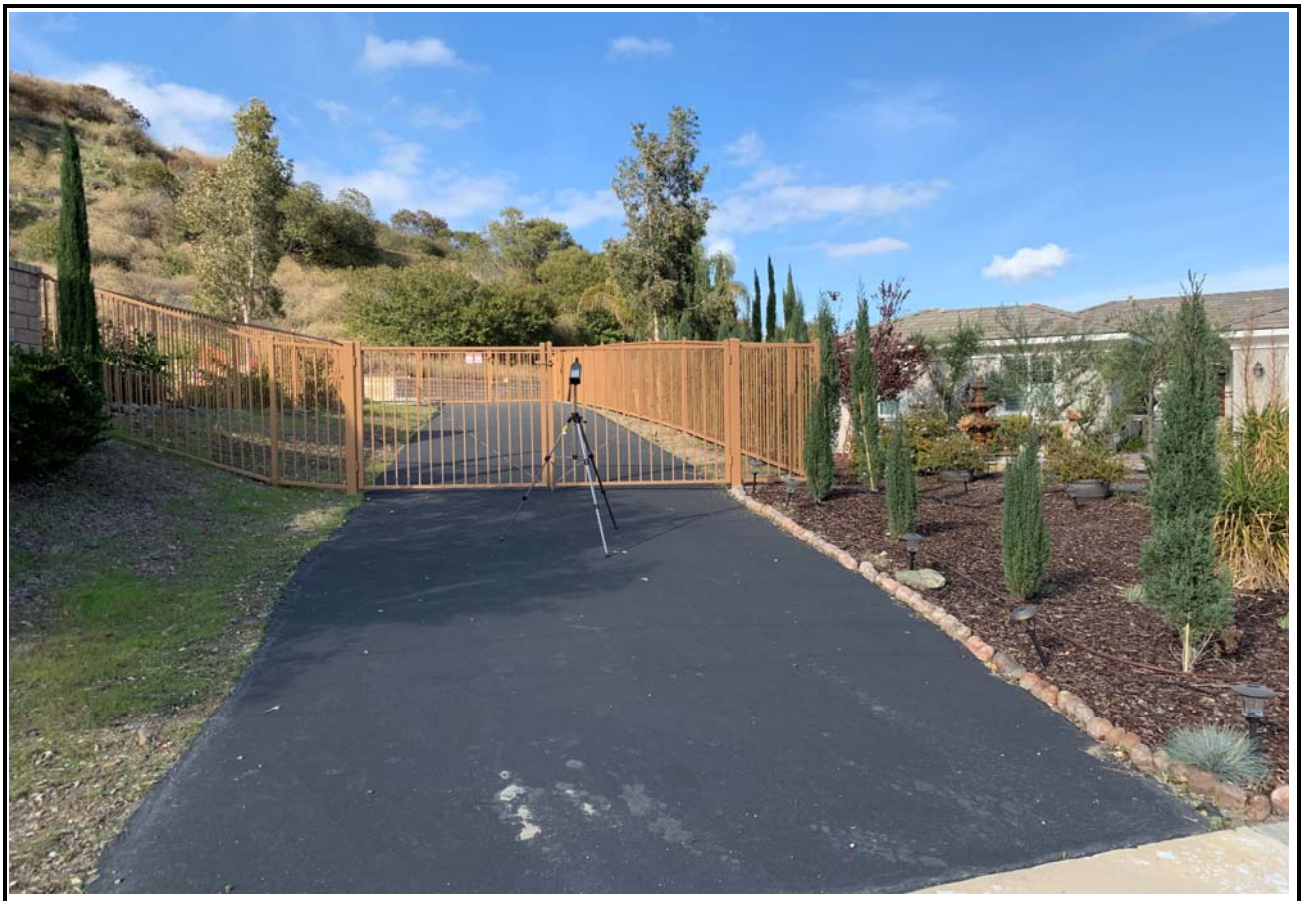
Field Sheet - ST2 Location Photos

Project: Skyline Village Project	**Engineer:** D. Shivaiah	**Date:**	1/7/2020
		JN:	2459-2019-02
Measurement Address: Brannan Circle	**City:** Corona	**Site No.:**	2

RK engineering group, inc.

Field Sheet - ST3 Location Photos

Project: Skyline Village Project	**Engineer:** D. Shivaiah	**Date:**	1/7/2020
		JN:	2459-2019-02
Measurement Address: Folson Circle	**City:** Corona	**Site No.:**	3



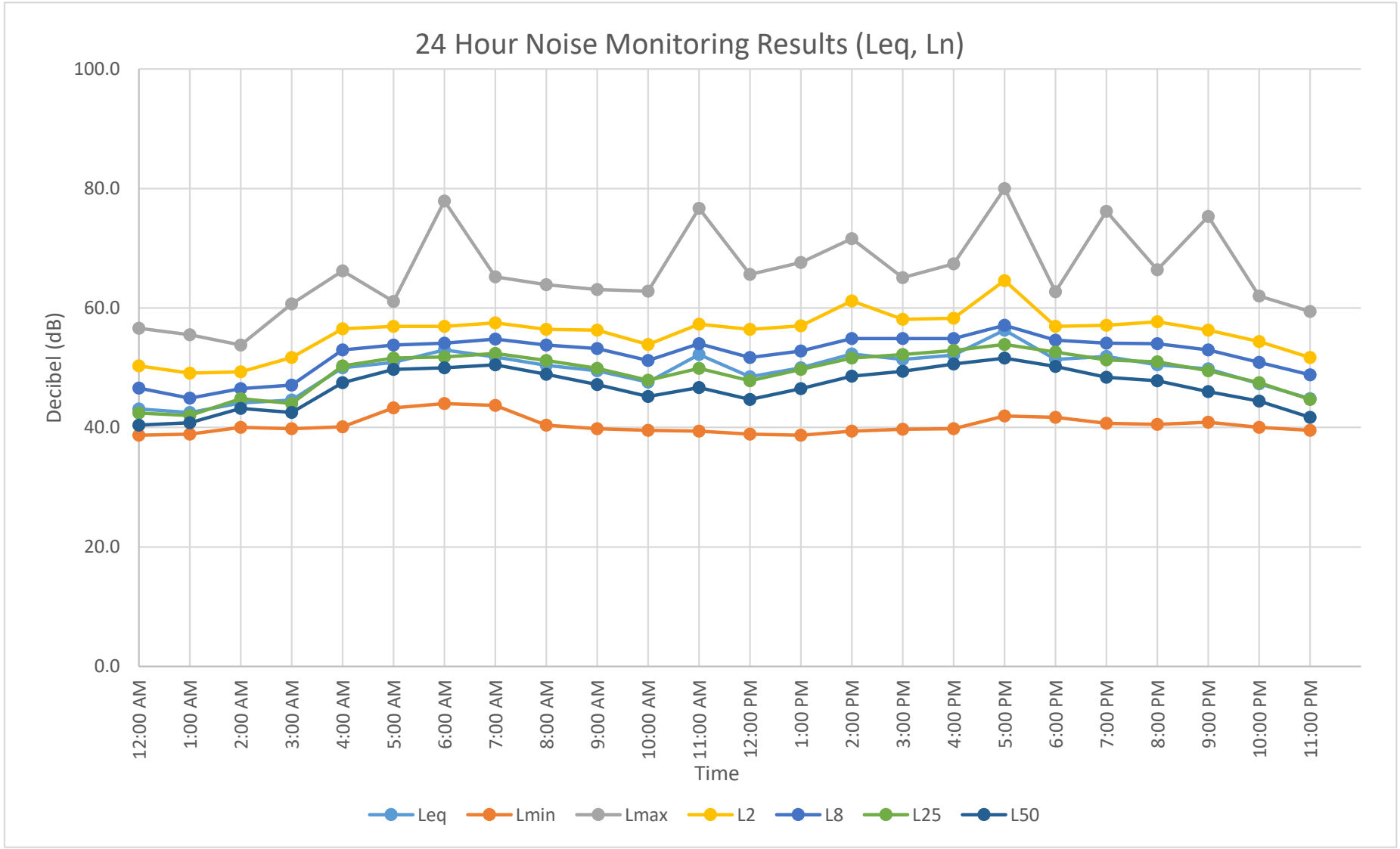
RK engineering group, inc.

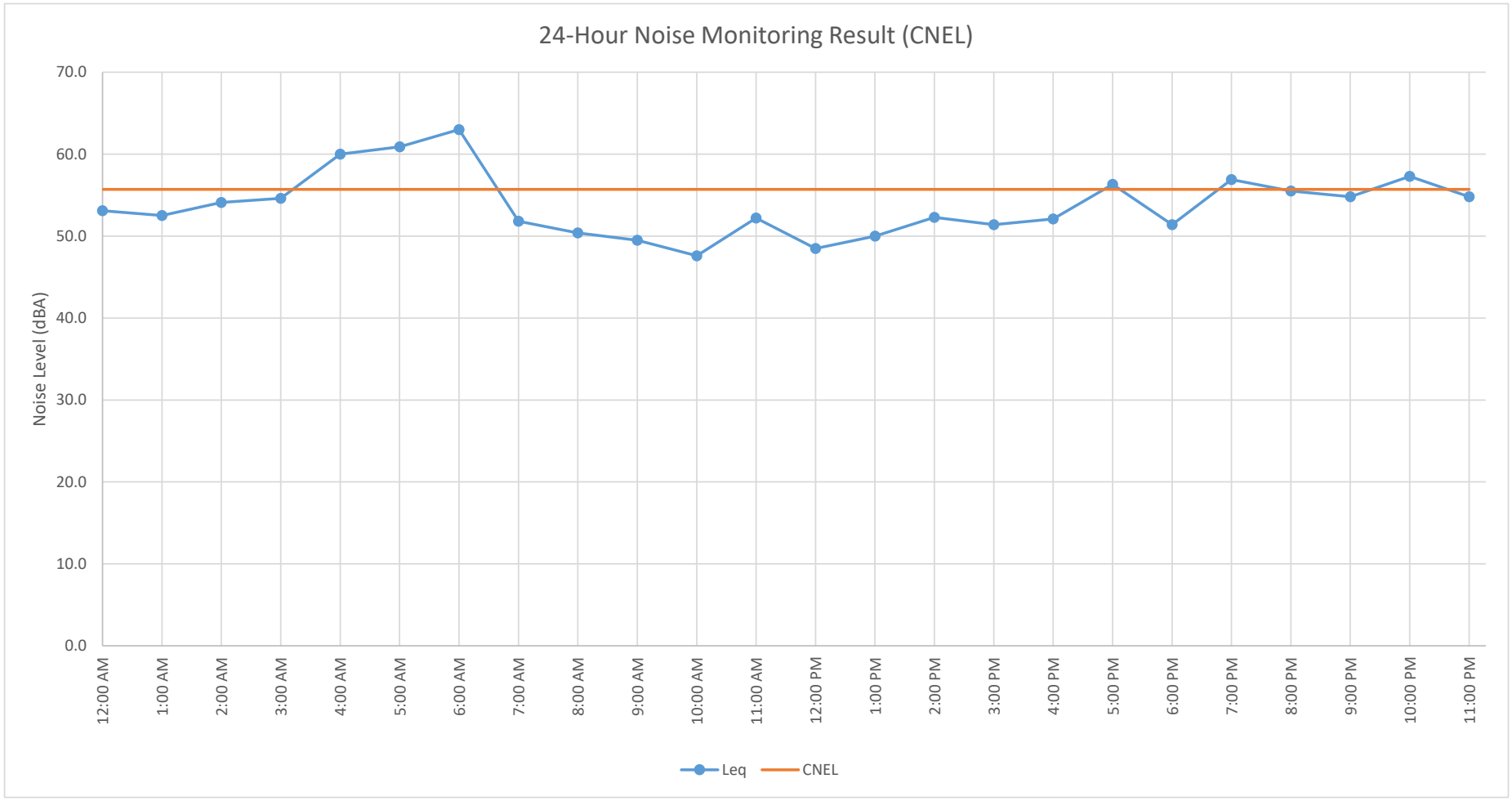
Field Sheet - ST4 Location Photos

Project: Skyline Village Project	**Engineer:** D. Shivaiah	**Date:**	1/7/2020
		JN:	2459-2019-02
Measurement Address: Chase Drive / Foothill Parkway	**City:** Corona	**Site No.:**	4

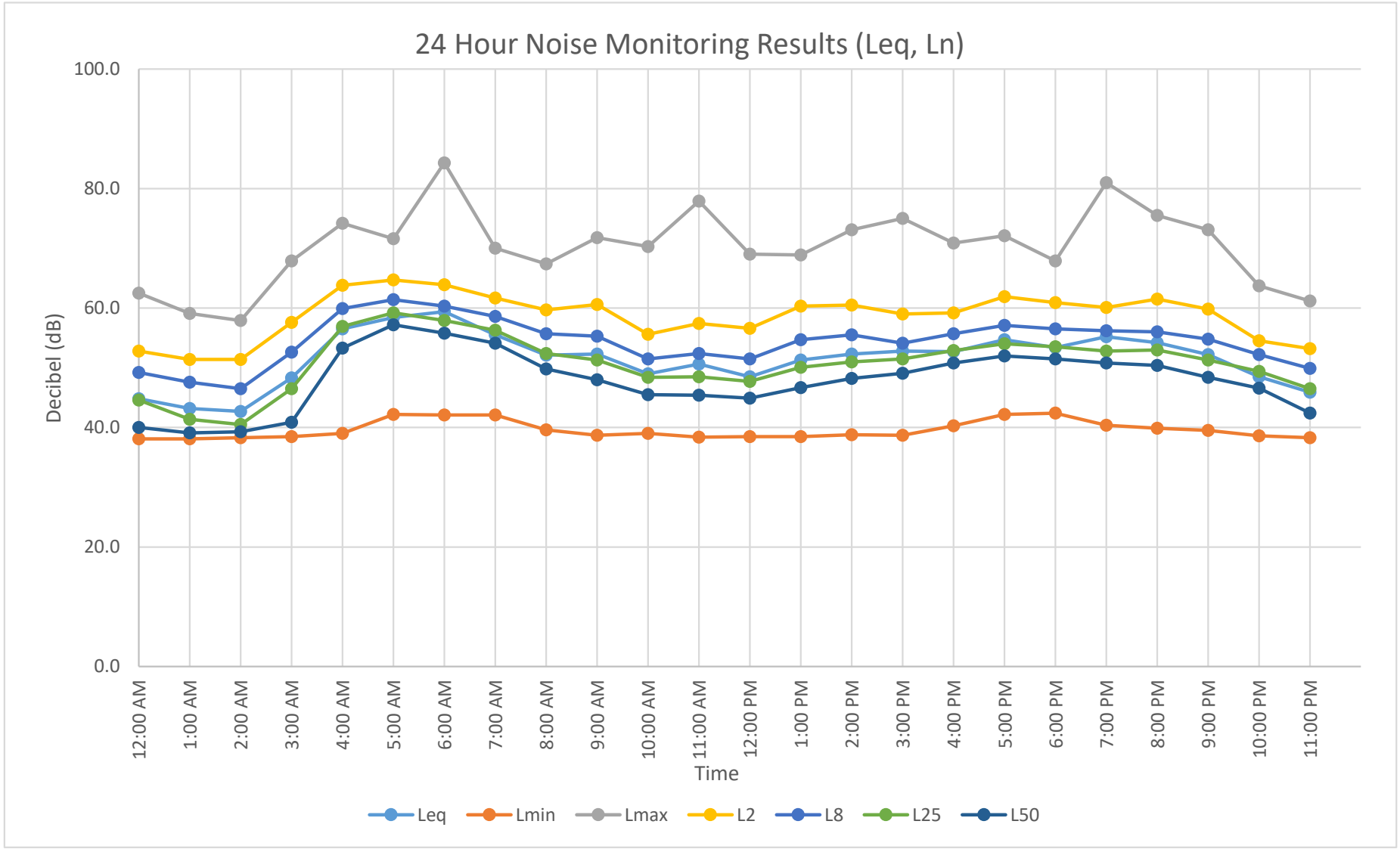
RK engineering group, inc.

PROJECT:	Skyline Village Noise Impact Study					JOB #:	2459-2019-02
NOISE METER	Piccolo II SLM, 24-Hour Measurement					DATE:	16-Jan-20
LOCATION:	PROPERTY LINE TO THE NORTH					BY:	D. Shivaiah
Time	Leq	Lmin	Lmax	L2	L8	L25	L50
12:00 AM	43.1	38.7	56.6	50.3	46.6	42.4	40.4
1:00 AM	42.5	38.9	55.5	49.1	44.9	42	40.8
2:00 AM	44.1	40	53.8	49.3	46.5	44.8	43.2
3:00 AM	44.6	39.8	60.7	51.7	47.1	44	42.5
4:00 AM	50	40.1	66.2	56.5	53	50.3	47.5
5:00 AM	50.9	43.3	61.1	56.9	53.8	51.6	49.7
6:00 AM	53	44	77.9	56.9	54.1	51.8	50
7:00 AM	51.8	43.7	65.2	57.5	54.8	52.4	50.5
8:00 AM	50.4	40.4	63.9	56.4	53.8	51.2	48.9
9:00 AM	49.5	39.8	63.1	56.3	53.2	49.9	47.2
10:00 AM	47.6	39.5	62.8	53.9	51.2	47.9	45.2
11:00 AM	52.2	39.4	76.7	57.3	54	49.9	46.7
12:00 PM	48.5	38.9	65.6	56.4	51.7	47.8	44.7
1:00 PM	50	38.7	67.6	57	52.8	49.7	46.5
2:00 PM	52.3	39.4	71.6	61.2	54.9	51.6	48.6
3:00 PM	51.4	39.7	65.1	58.1	54.9	52.2	49.4
4:00 PM	52.1	39.8	67.4	58.3	54.9	52.9	50.6
5:00 PM	56.3	41.9	80	64.6	57.1	53.9	51.6
6:00 PM	51.4	41.7	62.7	56.9	54.6	52.6	50.2
7:00 PM	51.9	40.7	76.2	57.1	54.1	51.3	48.4
8:00 PM	50.5	40.5	66.4	57.7	54	51	47.8
9:00 PM	49.8	40.9	75.3	56.3	53	49.5	46
10:00 PM	47.3	40	62	54.4	50.9	47.5	44.4
11:00 PM	44.8	39.5	59.4	51.7	48.8	44.7	41.7
Daytime	51.4	38.7	80.0	58.4	54.0	51.1	48.4
Nighttime	48.3	38.7	77.9	54.0	50.7	48.1	46.1


24 Hour Noise Monitoring Results (Leq, Ln)
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
8:00 PM
9:00 PM
10:00 PM
11:00 PM
Time
Leq
Lmin
Lmax
L2
L8
L25
L50


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

PROJECT:	Skyline Village Noise Impact Study					JOB #:	2459-2019-02
NOISE METER	Piccolo II SLM, 24-Hour Measurement					DATE:	16-Jan-20
LOCATION:	Residential Property to the East					BY:	D. Shivaiah
Time	Leq	Lmin	Lmax	L2	L8	L25	L50
12:00 AM	44.8	38.1	62.5	52.8	49.2	44.6	40.0
1:00 AM	43.2	38.1	59.1	51.4	47.6	41.4	39.1
2:00 AM	42.7	38.3	57.9	51.4	46.5	40.5	39.3
3:00 AM	48.3	38.5	67.9	57.6	52.6	46.5	40.9
4:00 AM	56.5	39	74.2	63.8	59.9	56.9	53.3
5:00 AM	58.4	42.2	71.6	64.7	61.4	59.2	57.2
6:00 AM	59.4	42.1	84.3	63.9	60.3	57.9	55.8
7:00 AM	55.5	42.1	70	61.7	58.6	56.3	54.1
8:00 AM	52.1	39.6	67.4	59.7	55.7	52.4	49.8
9:00 AM	52.3	38.7	71.8	60.6	55.3	51.3	48
10:00 AM	49	39	70.3	55.6	51.5	48.4	45.5
11:00 AM	50.6	38.4	77.9	57.4	52.4	48.5	45.4
12:00 PM	48.5	38.5	69	56.6	51.5	47.7	44.9
1:00 PM	51.3	38.5	68.9	60.3	54.7	50.1	46.7
2:00 PM	52.3	38.8	73.1	60.5	55.5	51	48.2
3:00 PM	52.8	38.7	75	59	54.1	51.5	49.1
4:00 PM	52.7	40.3	70.9	59.2	55.7	52.9	50.8
5:00 PM	54.7	42.2	72.1	61.9	57.1	54	52
6:00 PM	53.4	42.4	67.9	60.9	56.5	53.5	51.5
7:00 PM	55.2	40.4	81	60.1	56.2	52.8	50.8
8:00 PM	54.2	39.9	75.5	61.5	56	53	50.4
9:00 PM	52.2	39.5	73.1	59.8	54.8	51.3	48.4
10:00 PM	48.5	38.6	63.7	54.5	52.2	49.4	46.6
11:00 PM	45.9	38.3	61.2	53.2	49.9	46.5	42.4
Daytime	52.7	38.4	81.0	59.8	55.3	52.1	49.6
Nighttime	54.4	38.1	84.3	60.5	56.9	54.2	51.7


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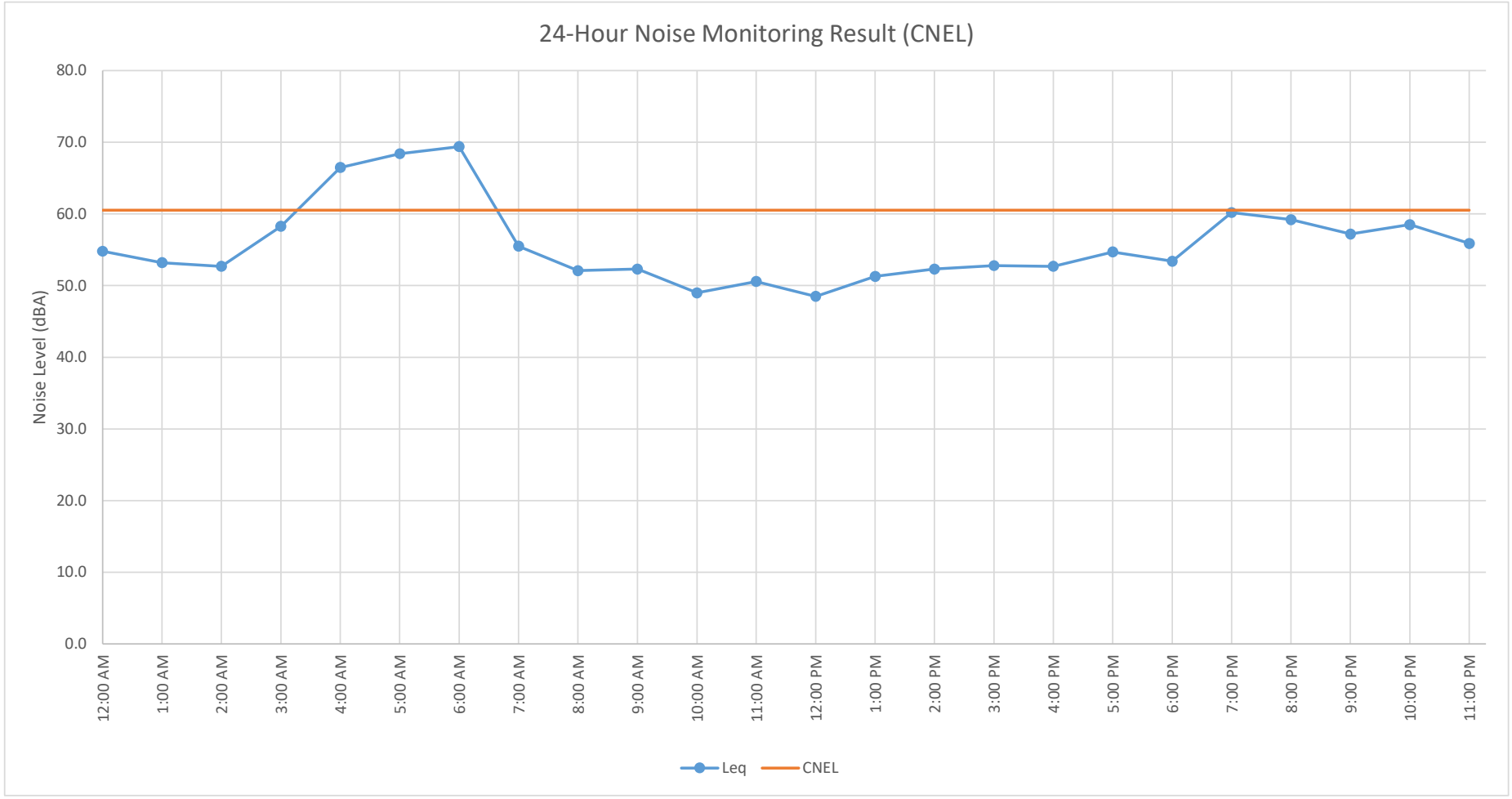
10:00 PM
11:00 PM
Time
Leq
Lmin
Lmax
L2
L8
L25
L50


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

Appendix C

SoundPLAN Worksheets

Noise emissions of industry sources

Source name	Reference	Level		Frequency spectrum [dB(A)]	Corrections		
				500	Cwall	CI	CT
			dB(A)	Hz	dB	dB	dB
HVAC	Lw/unit	Day	92.6		-	-	-
		Night	92.6		-	-	-
	Lw/unit	Day	92.6		-	-	-
		Night	92.6		-	-	-
	Lw/unit	Day	92.6		-	-	-
		Night	92.6		-	-	-
	Lw/unit	Day	92.6		-	-	-
		Night	92.6		-	-	-
	Lw/unit	Day	92.6		-	-	-
		Night	92.6		-	-	-
	Lw/unit	Day	92.6		-	-	-
		Night	92.6		-	-	-
	Lw/unit	Day	92.6		-	-	-
		Night	92.6		-	-	-
	Lw/unit	Day	92.6		-	-	-
		Night	92.6		-	-	-
	Lw/unit	Day	92.6		-	-	-
		Night	92.6		-	-	-
	Lw/unit	Day	92.6		-	-	-
		Night	92.6		-	-	-
	Lw/unit	Day	92.6		-	-	-
		Night	92.6		-	-	-
	Lw/unit	Day	92.6		-	-	-
		Night	92.6		-	-	-
	Lw/unit	Day	92.6		-	-	-
		Night	92.6		-	-	-
	Lw/unit	Day	92.6		-	-	-
		Night	92.6		-	-	-
	Lw/unit	Day	92.6		-	-	-
		Night	92.6		-	-	-
	Lw/unit	Day	92.6		-	-	-
		Night	92.6		-	-	-
	Lw/unit	Day	92.6		-	-	-
		Night	92.6		-	-	-
	Lw/unit	Day	92.6		-	-	-
		Night	92.6		-	-	-
	Lw/unit	Day	92.6		-	-	-
		Night	92.6		-	-	-
	Lw/unit	Day	92.6		-	-	-
		Night	92.6		-	-	-
	Lw/unit	Day	92.6		-	-	-
		Night	92.6		-	-	-
	Lw/unit	Day	92.6		-	-	-
		Night	92.6		-	-	-
Conversational Noise-1	Lw/unit	Day	75.0	75.0	-	-	-
		Night	75.0	75.0	-	-	-
Conversational Noise-2	Lw/unit	Day	75.0	75.0	-	-	-
		Night	75.0	75.0	-	-	-
Conversational Noise-3	Lw/unit	Day	75.0	75.0	-	-	-
		Night	75.0	75.0	-	-	-

Noise emissions of parking lot traffic

Name	Parking lot type	Size	Movements per hour		Road surface	Separated method	Lw,ref
			Day	Night			dB(A)
Food Court	Visitors and staff	135 Parking bays	1.289	1.295	Asphaltic driving lanes	no	89.6
Commercial Parking Lot	Visitors and staff	58 Parking bays	0.131	0.000	Asphaltic driving lanes	no	84.9
Residential Parking Lot-1	Visitors and staff	75 Parking bays	1.385	0.295	Asphaltic driving lanes	no	86.3
Residential Parking Lot-2	Visitors and staff	26 Parking bays	1.385	0.295	Asphaltic driving lanes	no	80.2

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	Receiver to the East-1	-	GF	-	-	41.7	41.6	37.4	37.1	-4.3	-4.5	-	-
2	Receiver to the East-2	-	GF	-	-	41.2	41.1	36.6	36.2	-4.7	-4.9	-	-
3	Receiver to the East-3	-	GF	-	-	40.4	40.3	35.4	35.0	-5.0	-5.3	-	-
4	Receiver to the East-4	-	GF	-	-	31.7	31.7	29.8	29.7	-1.9	-2.0	-	-
5	Receiver to the North-1	-	GF	-	-	49.5	46.6	48.2	43.5	-1.3	-3.1	-	-
6	Receiver to the South-1	-	GF	-	-	28.2	28.1	25.7	25.6	-2.4	-2.5	-	-
7	Receiver to the South-2	-	GF	-	-	30.3	30.2	28.2	28.0	-2.1	-2.2	-	-

Contribution levels of the receivers

Source name		Level w/o NP Day	Level w/o NP Night	Level w NP Day	Level w NP Night
		dB(A)		dB(A)	
Receiver to the East-1	GF	41.7	41.6	37.4	37.1
Commercial Parking Lot		18.1	-	18.1	-
Conversational Noise-1		15.1	15.1	15.1	15.1
Conversational Noise-2		18.2	18.2	18.2	18.2
Conversational Noise-3		16.9	16.9	16.9	16.9
Food Court		30.1	30.2	30.1	30.1
HVAC		16.8	16.8	14.5	14.5
HVAC		23.2	23.2	20.0	20.0
HVAC		17.8	17.8	15.2	15.2
HVAC		21.0	21.0	18.8	18.8
HVAC		19.0	19.0	16.0	16.0
HVAC		22.1	22.1	19.5	19.5
HVAC		22.2	22.2	18.1	18.1
HVAC		22.9	22.9	21.2	21.2
HVAC		25.6	25.6	21.4	21.4
HVAC		29.2	29.2	25.2	25.2
HVAC		24.2	24.2	21.1	21.1
HVAC		29.1	29.1	21.8	21.8
HVAC		16.0	16.0	16.0	16.0
HVAC		31.0	31.0	23.3	23.3
HVAC		33.6	33.6	28.7	28.7
HVAC		19.5	19.5	17.9	17.9
HVAC		25.2	25.2	22.0	22.0
HVAC		18.5	18.5	15.6	15.6
HVAC		19.1	19.1	17.3	17.3
HVAC		16.9	16.9	21.5	21.5
HVAC		37.4	37.4	30.0	30.0
HVAC		22.5	22.5	22.5	22.5
Residential Parking Lot-1		24.5	17.8	24.5	17.8
Residential Parking Lot-2		8.3	1.6	8.2	1.5
Receiver to the East-2	GF	41.2	41.1	36.6	36.2
Commercial Parking Lot		18.9	-	18.9	-
Conversational Noise-1		13.5	13.5	13.5	13.5
Conversational Noise-2		17.3	17.3	17.3	17.3
Conversational Noise-3		16.0	16.0	16.0	16.0
Food Court		30.3	30.3	30.3	30.3
HVAC		20.0	20.0	14.6	14.6
HVAC		24.9	24.9	19.2	19.2
HVAC		22.1	22.1	16.1	16.1
HVAC		20.4	20.4	16.9	16.9
HVAC		21.1	21.1	15.0	15.0
HVAC		24.7	24.7	20.1	20.1
HVAC		22.7	22.7	16.2	16.2
HVAC		25.1	25.1	18.7	18.7
HVAC		27.9	27.9	20.9	20.9
HVAC		30.0	30.0	24.1	24.1
HVAC		24.9	24.9	20.4	20.4
HVAC		30.8	30.8	23.3	23.3
HVAC		13.8	13.8	13.8	13.8
HVAC		31.0	31.0	23.6	23.6
HVAC		32.0	32.0	24.4	24.4
HVAC		24.2	24.2	20.0	20.0
HVAC		27.7	27.7	21.9	21.9
HVAC		17.6	17.6	14.6	14.6
HVAC		18.8	18.8	15.8	15.8
HVAC		13.9	13.9	17.6	17.6
HVAC		34.3	34.3	27.1	27.1
HVAC		25.4	25.4	25.2	25.2
Residential Parking Lot-1		25.7	19.0	25.7	19.0
Residential Parking Lot-2		8.1	1.4	8.0	1.3
Receiver to the East-3	GF	40.4	40.3	35.4	35.0
Commercial Parking Lot		17.8	-	17.8	-
Conversational Noise-1		10.8	10.8	10.8	10.8

Contribution levels of the receivers

Source name		Level w/o NP		Level w NP	
		Day	Night	Day	Night
		dB(A)		dB(A)	
Conversational Noise-2		14.6	14.6	14.6	14.6
Conversational Noise-3		13.7	13.7	13.7	13.7
Food Court		29.0	29.0	29.0	29.0
HVAC		19.6	19.6	13.3	13.3
HVAC		24.8	24.8	18.4	18.4
HVAC		22.8	22.8	15.6	15.6
HVAC		22.8	22.8	17.3	17.3
HVAC		22.7	22.7	14.5	14.5
HVAC		22.0	22.0	17.8	17.8
HVAC		23.0	23.0	15.3	15.3
HVAC		25.2	25.2	17.5	17.5
HVAC		27.2	27.2	20.1	20.1
HVAC		30.2	30.2	25.5	25.5
HVAC		26.5	26.5	20.1	20.1
HVAC		30.2	30.2	22.2	22.2
HVAC		11.8	11.8	11.8	11.8
HVAC		30.3	30.3	22.5	22.5
HVAC		30.5	30.5	22.3	22.3
HVAC		25.4	25.4	19.7	19.7
HVAC		27.3	27.3	20.8	20.8
HVAC		19.1	19.1	14.7	14.7
HVAC		21.7	21.7	16.7	16.7
HVAC		11.6	11.6	15.5	15.5
HVAC		31.6	31.6	24.5	24.5
HVAC		24.5	24.5	23.4	23.4
Residential Parking Lot-1		24.5	17.8	24.5	17.8
Residential Parking Lot-2		7.6	0.9	7.6	0.8
Receiver to the East-4	GF	31.7	31.7	29.8	29.7
Commercial Parking Lot		8.2	-	8.4	-
Conversational Noise-1		-1.0	-1.0	-0.9	-0.9
Conversational Noise-2		5.4	5.4	5.4	5.4
Conversational Noise-3		9.7	9.7	9.7	9.7
Food Court		21.4	21.4	21.3	21.3
HVAC		10.7	10.7	9.8	9.8
HVAC		15.0	15.0	11.4	11.4
HVAC		11.4	11.4	9.8	9.8
HVAC		13.3	13.3	11.8	11.8
HVAC		11.9	11.9	9.7	9.7
HVAC		13.1	13.1	12.1	12.1
HVAC		14.7	14.7	10.2	10.2
HVAC		12.6	12.6	11.3	11.3
HVAC		13.9	13.9	12.4	12.4
HVAC		16.8	16.8	15.7	15.7
HVAC		14.3	14.3	13.3	13.3
HVAC		23.3	23.3	20.5	20.5
HVAC		11.0	11.0	14.3	14.3
HVAC		23.1	23.1	20.5	20.5
HVAC		22.8	22.8	20.3	20.3
HVAC		14.7	14.7	12.4	12.4
HVAC		14.2	14.2	13.3	13.3
HVAC		11.8	11.8	10.0	10.0
HVAC		12.5	12.5	10.9	10.9
HVAC		10.9	10.9	14.2	14.2
HVAC		18.3	18.3	19.5	19.5
HVAC		24.1	24.1	18.6	18.6
Residential Parking Lot-1		12.8	6.1	12.8	6.0
Residential Parking Lot-2		5.8	-0.9	5.7	-1.0
Receiver to the North-1	GF	49.5	46.6	48.2	43.5
Commercial Parking Lot		26.4	-	26.4	-
Conversational Noise-1		15.7	15.7	15.6	15.6
Conversational Noise-2		7.0	7.0	7.0	7.0
Conversational Noise-3		-2.5	-2.5	-2.6	-2.6
Food Court		25.4	25.5	25.2	25.3

Contribution levels of the receivers

Source name		Level w/o NP		Level w NP	
		Day	Night	Day	Night
		dB(A)		dB(A)	
HVAC		19.9	19.9	19.4	19.4
HVAC		37.6	37.6	32.4	32.4
HVAC		27.4	27.4	21.8	21.8
HVAC		21.8	21.8	18.5	18.5
HVAC		27.5	27.5	25.2	25.2
HVAC		29.8	29.8	26.6	26.6
HVAC		36.1	36.1	29.6	29.6
HVAC		30.1	30.1	24.7	24.7
HVAC		38.1	38.1	32.7	32.7
HVAC		35.5	35.5	30.8	30.8
HVAC		24.5	24.5	19.1	19.1
HVAC		25.5	25.5	21.5	21.5
HVAC		24.2	24.2	20.2	20.2
HVAC		26.5	26.5	21.8	21.8
HVAC		27.0	27.0	22.3	22.3
HVAC		20.0	20.0	19.0	19.0
HVAC		33.2	33.2	28.0	28.0
HVAC		19.1	19.1	18.1	18.1
HVAC		26.2	26.2	22.1	22.1
HVAC		37.2	37.2	28.5	28.5
HVAC		22.4	22.4	26.0	26.0
HVAC		19.7	19.7	23.8	23.8
Residential Parking Lot-1		47.5	40.7	47.5	40.7
Residential Parking Lot-2		12.9	6.2	12.6	5.9
Receiver to the South-1	GF	28.2	28.1	25.7	25.6
Commercial Parking Lot		5.1	-	5.1	-
Conversational Noise-1		-7.6	-7.6	-7.7	-7.7
Conversational Noise-2		-4.7	-4.7	-4.7	-4.7
Conversational Noise-3		0.8	0.8	0.8	0.8
Food Court		21.6	21.6	21.6	21.6
HVAC		10.8	10.8	5.8	5.8
HVAC		12.8	12.8	6.3	6.3
HVAC		10.6	10.6	5.6	5.6
HVAC		12.7	12.7	7.7	7.7
HVAC		6.8	6.8	5.4	5.4
HVAC		9.2	9.2	7.2	7.2
HVAC		8.7	8.7	5.8	5.8
HVAC		8.0	8.0	6.7	6.7
HVAC		13.4	13.4	6.8	6.8
HVAC		14.8	14.8	10.1	10.1
HVAC		9.9	9.9	8.5	8.5
HVAC		19.7	19.7	14.6	14.6
HVAC		9.5	9.5	9.5	9.5
HVAC		17.9	17.9	14.4	14.4
HVAC		16.9	16.9	14.2	14.2
HVAC		13.9	13.9	8.9	8.9
HVAC		14.9	14.9	10.4	10.4
HVAC		11.5	11.5	6.5	6.5
HVAC		12.1	12.1	7.1	7.1
HVAC		9.1	9.1	9.1	9.1
HVAC		11.3	11.3	10.5	10.5
HVAC		13.9	13.9	13.2	13.2
Residential Parking Lot-1		8.3	1.6	8.3	1.6
Residential Parking Lot-2		2.9	-3.8	2.9	-3.8
Receiver to the South-2	GF	30.3	30.2	28.2	28.0
Commercial Parking Lot		6.8	-	6.9	-
Conversational Noise-1		-4.1	-4.1	-4.3	-4.3
Conversational Noise-2		-3.6	-3.6	-3.6	-3.6
Conversational Noise-3		-3.6	-3.6	-3.6	-3.6
Food Court		22.8	22.8	22.8	22.8
HVAC		10.7	10.7	9.9	9.9
HVAC		15.6	15.6	11.2	11.2
HVAC		11.0	11.0	10.0	10.0

Contribution levels of the receivers

Source name	Level w/o NP		Level w NP	
	Day	Night	Day	Night
	dB(A)		dB(A)	
HVAC	14.1	14.1	13.4	13.4
HVAC	11.2	11.2	10.0	10.0
HVAC	16.4	16.4	12.6	12.6
HVAC	14.6	14.6	10.5	10.5
HVAC	13.0	13.0	12.0	12.0
HVAC	13.6	13.6	11.8	11.8
HVAC	13.7	13.7	11.8	11.8
HVAC	15.7	15.7	14.3	14.3
HVAC	21.0	21.0	15.5	15.5
HVAC	17.1	17.1	13.8	13.8
HVAC	20.5	20.5	14.9	14.9
HVAC	20.0	20.0	14.4	14.4
HVAC	18.6	18.6	15.1	15.1
HVAC	14.4	14.4	12.7	12.7
HVAC	11.4	11.4	10.7	10.7
HVAC	12.5	12.5	11.9	11.9
HVAC	11.0	11.0	13.1	13.1
HVAC	11.6	11.6	13.9	13.9
HVAC	14.3	14.3	15.0	15.0
Residential Parking Lot-1	11.3	4.6	11.3	4.6
Residential Parking Lot-2	7.1	0.4	7.1	0.4

Skyline Village Project
Noise Impact Study

City of Corona

Signs and symbols

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

1 : 2604

0 12.5 25 50 75 100 m

RK engineering group, inc.

Skyline Village Project
Noise Impact Study - Daytime Noise Contours

City of Corona

Signs and symbols

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

Levels in dB(A)

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

1 : 2604

0 12.5 25 50 75 100 m

RK engineering group, inc.

Skyline Village Project
Noise Impact Study - Nighttime Noise Contours

City of Corona

Signs and symbols

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

Levels in dB(A)

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

1 : 2604

0 12.5 25 50 75 100 m

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RK engineering group, inc.

Appendix D

Construction Noise and Vibration Worksheets

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat ########
Case Descr Skyline Village Project

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Site Prepar	Residential	80	80	80

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	300	0
Tractor	No	40	84		300	0
Dozer	No	40		81.7	300	0
Dozer	No	40		81.7	300	0
Tractor	No	40	84		300	0
Tractor	No	40	84		300	0
Tractor	No	40	84		300	0

Results

	Calculated (dBA)		Noise Limits (dBA)					
			Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer	66.1	62.1	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	68.4	64.5	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	66.1	62.1	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	66.1	62.1	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	68.4	64.5	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	68.4	64.5	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	68.4	64.5	N/A	N/A	N/A	N/A	N/A	N/A
Total	68.4	72.1	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat ########
Case Descr Skyline Village Project

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Grading	Residential	80	80	80

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	300	0
Grader	No	40	85		300	0
Dozer	No	40		81.7	300	0
Scraper	No	40		83.6	300	0
Tractor	No	40	84		300	0
Excavator	No	40		80.7	300	0
Scraper	No	40		83.6	300	0
Tractor	No	40	84		300	0

Results

	Calculated (dBA)		Noise Limits (dBA)					
			Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Excavator	65.1	61.2	N/A	N/A	N/A	N/A	N/A	N/A
Grader	69.4	65.5	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	66.1	62.1	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	68	64	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	68.4	64.5	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	65.1	61.2	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	68	64	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	68.4	64.5	N/A	N/A	N/A	N/A	N/A	N/A
Total	69.4	72.7	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat ########
Case Descr Skyline Village Project

---- Receptor #1 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Building Co	Residential	80	80	80

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	300	0
Pickup Truck	No	40		75	300	0
Generator	No	50		80.6	300	0
Tractor	No	40	84		300	0
Welder / Torch	No	40		74	300	0
Pickup Truck	No	40		75	300	0
Pickup Truck	No	40		75	300	0
Tractor	No	40	84		300	0
Tractor	No	40	84		300	0

Results

	Calculated (dBA)		Noise Limits (dBA)					
			Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Crane	65	57	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	59.4	55.5	N/A	N/A	N/A	N/A	N/A	N/A
Generator	65.1	62.1	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	68.4	64.5	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch	58.4	54.5	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	59.4	55.5	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	59.4	55.5	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	68.4	64.5	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	68.4	64.5	N/A	N/A	N/A	N/A	N/A	N/A
Total	68.4	70.7	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat ########
Case Descr Skyline Village Project

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Paving	Residential	80	80	80

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	300	0
Roller	No	20		80	300	0
Roller	No	20		80	300	0
Paver	No	50		77.2	300	0
Roller	No	20		80	300	0
Roller	No	20		80	300	0
Pickup Truck	No	40		75	300	0
Tractor	No	40	84		300	0
Tractor	No	40	84		300	0

	Calculated (dBA)		Results Noise Limits (dBA)					
			Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Paver	61.7	58.6	N/A	N/A	N/A	N/A	N/A	N/A
Roller	64.4	57.4	N/A	N/A	N/A	N/A	N/A	N/A
Roller	64.4	57.4	N/A	N/A	N/A	N/A	N/A	N/A
Paver	61.7	58.6	N/A	N/A	N/A	N/A	N/A	N/A
Roller	64.4	57.4	N/A	N/A	N/A	N/A	N/A	N/A
Roller	64.4	57.4	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	59.4	55.5	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	68.4	64.5	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	68.4	64.5	N/A	N/A	N/A	N/A	N/A	N/A
Total	68.4	69.8	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat ########
Case Descr Skyline Village Project

		Baselines (dBA)		---- Receptor #1 ----
Description	Land Use	Daytime	Evening	Night
Architectur	Residential	80	80	80

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	300	0

	Calculated (dBA)		Results Noise Limits (dBA)					
			Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Compressor (air)	62.1	58.1	N/A	N/A	N/A	N/A	N/A	N/A
Total	62.1	58.1	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

VIBRATION IMPACTS FROM CONSTRUCTION AND OPERATIONS

PROJECT:	Skyline Village Project	JOB #:	2459-2019-02
ACTIVITY:	Small Bulldozer	DATE:	23-Jan-20
LOCATION:	Nearest Structure	ENGINEER:	D. Shivaiah

VIBRATION INPUT/OUTPUT DATA

OTHER CONSTRUCTION EQUIPMENT

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

PPV =	**0.000 in/sec**

Equipment Type =	6	Small Bulldozer
PPV_{ref} =	0.003	Reference PPV at 25 ft.
D =	300.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

EQUIPMENT PPV REFERENCE LEVELS

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

VIBRATION IMPACTS FROM CONSTRUCTION AND OPERATIONS

PROJECT:	Skyline Village Project	JOB #:	2459-2019-02
ACTIVITY:	Large Bulldozer	DATE:	23-Jan-20
LOCATION:	Nearest Structure	ENGINEER:	D. Shivaiah

VIBRATION INPUT/OUTPUT DATA

OTHER CONSTRUCTION EQUIPMENT

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

PPV =	**0.006 in/sec**

Equipment Type =	2	Large Bulldozer
PPV_{ref} =	0.089	Reference PPV at 25 ft.
D =	300.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

EQUIPMENT PPV REFERENCE LEVELS

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

VIBRATION IMPACTS FROM CONSTRUCTION AND OPERATIONS

PROJECT:	Skyline Village Project	JOB #:	2459-2019-02
ACTIVITY:	Vibratory Roller	DATE:	23-Jan-20
LOCATION:	Nearest Structure	ENGINEER:	D. Shivaiah

VIBRATION INPUT/OUTPUT DATA

OTHER CONSTRUCTION EQUIPMENT

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

PPV =	**0.014 in/sec**

Equipment Type =	1	Vibratory Roller
PPV_{ref} =	0.210	Reference PPV at 25 ft.
D =	300.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

EQUIPMENT PPV REFERENCE LEVELS

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

VIBRATION IMPACTS FROM CONSTRUCTION AND OPERATIONS

PROJECT:	Skyline Village Project	JOB #:	2459-2019-02
ACTIVITY:	Loaded Trucks	DATE:	23-Jan-20
LOCATION:	Nearest Structure	ENGINEER:	D. Shivaiah

VIBRATION INPUT/OUTPUT DATA

OTHER CONSTRUCTION EQUIPMENT

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

PPV =	**0.005 in/sec**

Equipment Type =	4	Loaded Trucks
PPV_{ref} =	0.076	Reference PPV at 25 ft.
D =	300.00	Distance from Equipment to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground

EQUIPMENT PPV REFERENCE LEVELS

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

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: dense compacted sand, dry consolidated clay, consolidated glacial till, some exposed rock.	1.1
IV	Hard, component rock: bedrock, freshly exposed hard rock.	1.0

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

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

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.

Source: Caltrans Transportation and Construction-Induced Vibration Guidance Manual, June 2004