.

NOISE IMPACT ANALYSIS

YORBA VILLAS RESIDENTIAL PROJECT

COUNTY OF SAN BERNARDINO

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ACRONYMS AND ABBREVIATIONS

ANSI	American National Standards Institute
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
cmu	concrete masonry unit
CNEL	Community Noise Equivalent Level
County	County of San Bernardino
dB	Decibel
dBA	A-weighted decibels
DOT	Department of Transportation
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
EPA	Environmental Protection Agency
Hz	Hertz
Ldn	Day-night average noise level
Leq	Equivalent sound level
Lmax	Maximum noise level
OSHA	Occupational Safety and Health Administration
PPV	Peak particle velocity
RMS	Root mean square
SEL	Single Event Level or Sound Exposure Level
STC	Sound Transmission Class
TTM	Tentative Tract Map
VdB	Vibration velocity level in decibels

1.0 INTRODUCTION

1.1 Purpose of Analysis and Study Objectives

This Noise Impact Analysis has been prepared to determine the noise impacts associated with the proposed Yorba Villas Residential project (proposed project). The following is provided in this report:

- A description of the study area and the proposed project;
- Information regarding the fundamentals of noise;
- Information regarding the fundamentals of vibration;
- A description of the local noise guidelines and standards;
- An evaluation of the current noise environment;
- An analysis of the potential short-term construction-related noise impacts from the proposed project; and
- An analysis of long-term operations-related noise impacts from the proposed project.

1.2 Site Location and Study Area

The project site is located in an unincorporated area of San Bernardino County (County). The approximately 13.35 gross acres project site is currently vacant and is bounded by rural residential to the north, Yorba Avenue and residential uses to the east, Francis Avenue and single-family homes to the south, and rural residential uses to the west. The project study area is shown in Figure 1.

Sensitive Receptors in Project Vicinity

The nearest sensitive receptor to the project site is a single-family home located as near as 15 feet to the north of the project site. There is also a single-family home located as near as 20 feet west of the project site. The nearest school is EJ Marshall Elementary School that is located as near as 0.6 mile to the southeast of the project site.

1.3 Proposed Project Description

The proposed project would consist of development of 45 single-family homes with a park and detention basin in the southeast corner of the project site. The proposed site plan is shown in Figure 2 and the proposed wall plan is shown in Figure 3.

1.4 Standard Noise Regulatory Conditions

The proposed project will be required to comply with the following regulatory conditions from the County of San Bernardino and State of California.

County of San Bernardino Municipal Code

The following lists the County of San Bernardino Municipal Code regulations that are applicable to all residential development projects in the County.

Section 83.01.080(e) Construction Noise

Section 83.01.080(e) of the Municipal Code exempts construction noise that occurs between the hours of 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays.

Section 83.01.090 Vibration

Section 83.01.090 of the Municipal Code restricts vibration from exceeding 0.2 inch-per-second peak particle velocity (PPV) at the nearest receptor. Section 83.01.090 exempts construction vibration that occurs between the hours of 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays.

State of California Rules

The following lists the State of California rules that are applicable to all commercial projects in the State.

California Vehicle Code Section 27200-27207 – On-Road Vehicle Noise

California Vehicle Code Section 27200-27207 provides noise limits for vehicles operated in California. For vehicles over 10,000 pounds noise is limited to 88 dB for vehicles manufactured before 1973, 86 dB for vehicles manufactured before 1975, 83 dB for vehicles manufactured before 1988, and 80 dB for vehicles manufactured after 1987. All measurements are based at 50 feet from the vehicle.

California Vehicle Section 38365-38380 – Off-Road Vehicle Noise

California Vehicle Code Section 38365-38380 provides noise limits for off-highway motor vehicles operated in California. 92 dBA for vehicles manufactured before 1973, 88 dBA for vehicles manufactured before 1975, 86 dBA for vehicles manufactured before 1986, and 82 dBA for vehicles manufactured after December 31, 1985. All measurements are based at 50 feet from the vehicle.

1.5 Summary of Analysis Results

The following is a summary of the proposed project's impacts with regard to the State CEQA Guidelines noise checklist questions.

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?

Less than significant impact.

Generation of excessive groundborne vibration or groundborne noise levels?

Less than significant impact.

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?

No impact.

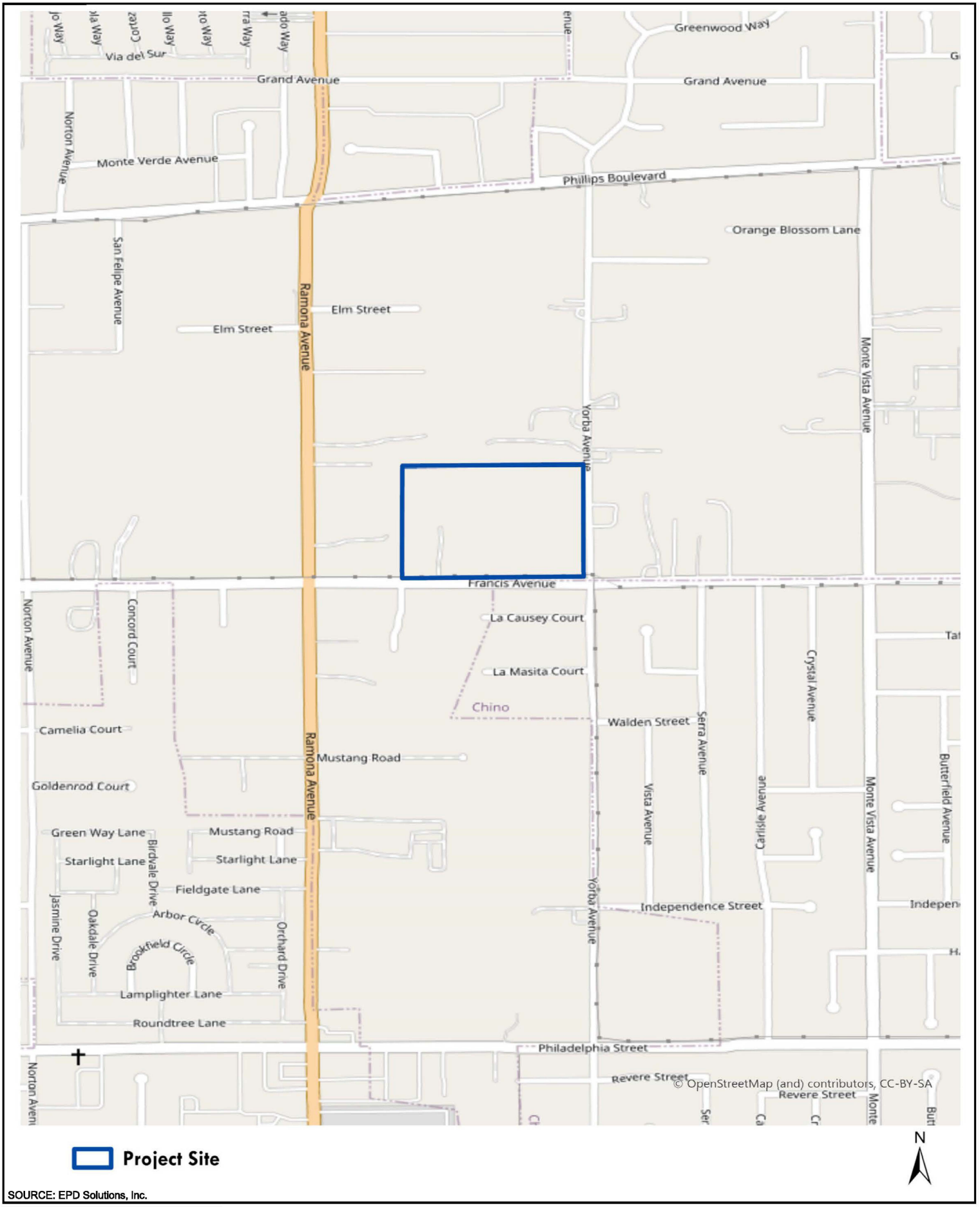
1.6 Project Design Features Incorporated into the Proposed Project

This analysis was based on implementation of the following project design features that are either already depicted on the proposed project site plan and architectural plans or are required from County and State Regulations.

Project Design Feature 1:
The project applicant shall construct all walls shown on the Proposed Fence and Wall (see Figure 3) that includes a 6-foot high concrete masonry unit (cmu) wall along the south and east sides of the project site.

1.7 Mitigation Measures for the Proposed Project

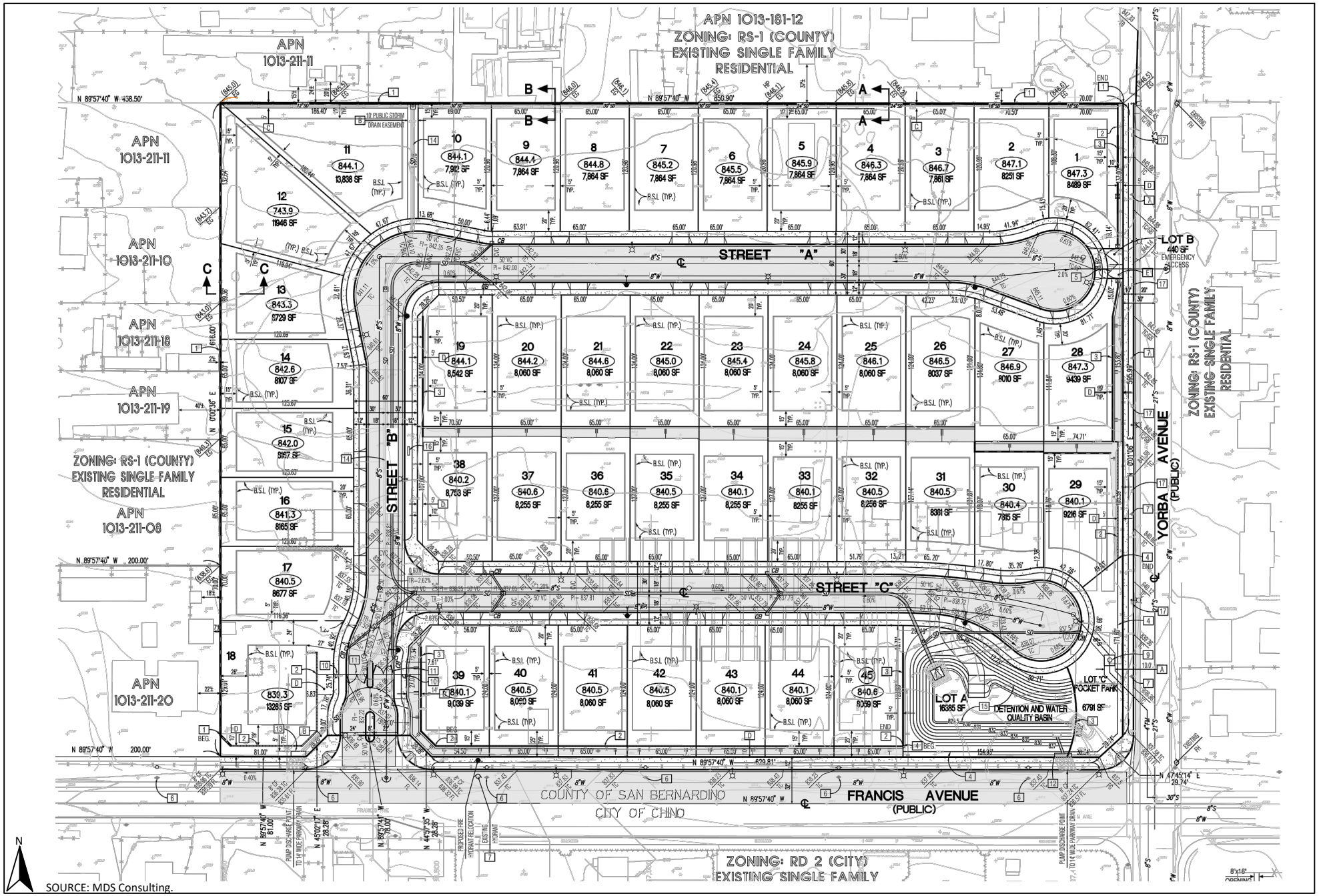
This analysis found that through adherence to the noise and vibration regulations detailed in Section 1.4 above, Project Design Features 1 detailed above in Section 1.6, were adequate to limit all noise and vibration impacts to less than significant levels. No mitigation measures are required for the proposed project with respect to noise and vibration impacts.



SOURCE: EPD Solutions, Inc.

VISTA ENVIRONMENTAL

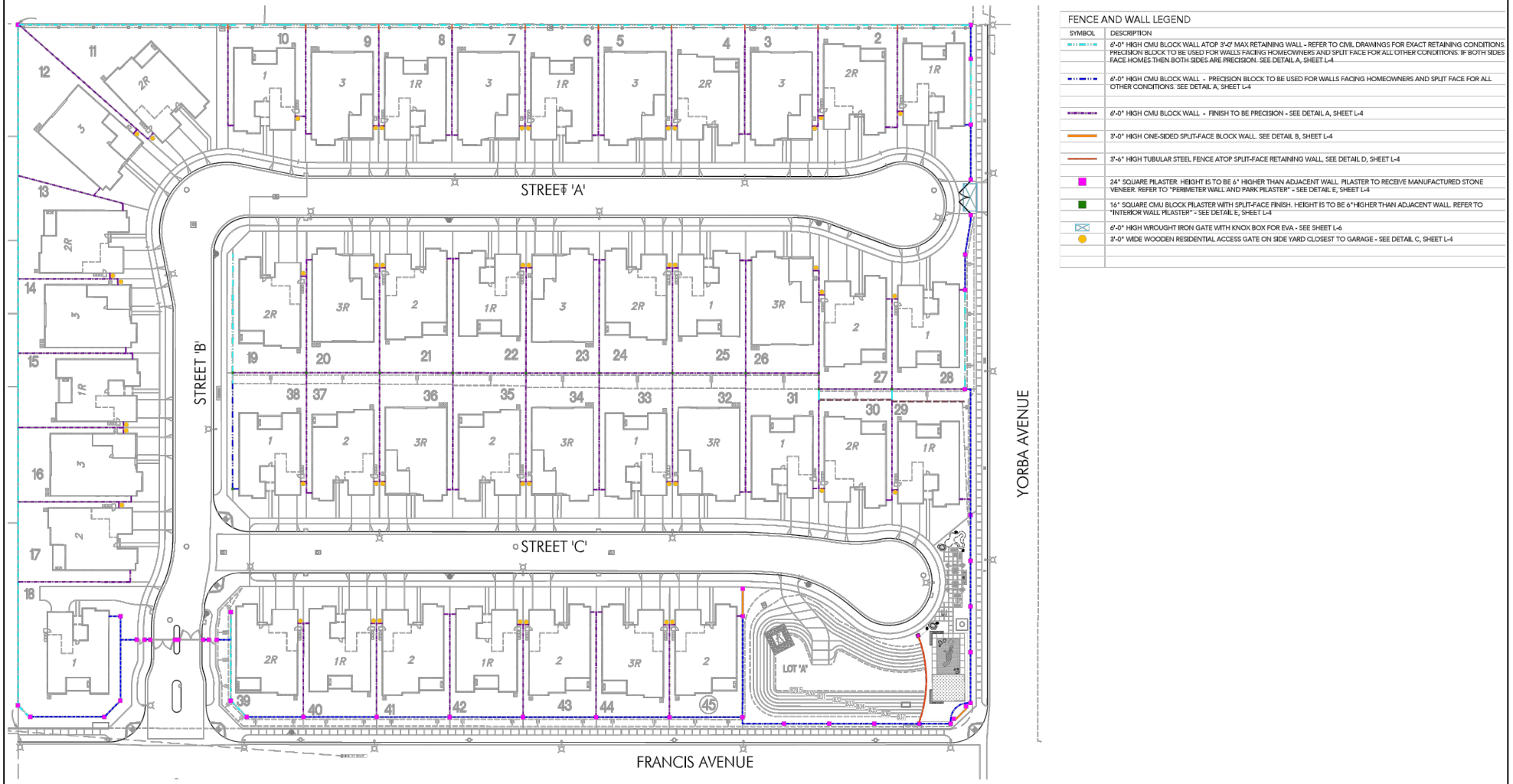
Figure 1
Project Location Map



SOURCE: MDS Consulting.

VISTA ENVIRONMENTAL

Figure 2
Proposed Site Plan



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SOURCE: Urban Arena.

VISTA ENVIRONMENTAL

Figure 3
Proposed Wall and Fence Plan

2.0 NOISE FUNDAMENTALS

Noise is defined as unwanted sound. Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm or when it has adverse effects on health. Sound is produced by the vibration of sound pressure waves in the air. Sound pressure levels are used to measure the intensity of sound and are described in terms of decibels. The decibel (dB) is a logarithmic unit which expresses the ratio of the sound pressure level being measured to a standard reference level. A-weighted decibels (dBA) approximate the subjective response of the human ear to a broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear.

2.1 Noise Descriptors

Noise Equivalent sound levels are not measured directly, but are calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (Leq) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. The worst-hour traffic Leq is the noise metric used by California Department of Transportation (Caltrans) for all traffic noise impact analyses.

The Day-Night Average Level (Ldn) is the weighted average of the intensity of a sound, with corrections for time of day, and averaged over 24 hours. The time of day corrections require the addition of ten decibels to sound levels at night between 10 p.m. and 7 a.m. While the Community Noise Equivalent Level (CNEL) is similar to the Ldn, except that it has another addition of 4.77 decibels to sound levels during the evening hours between 7 p.m. and 10 p.m. These additions are made to the sound levels at these time periods because during the evening and nighttime hours, when compared to daytime hours, there is a decrease in the ambient noise levels, which creates an increased sensitivity to sounds. For this reason the sound appears louder in the evening and nighttime hours and is weighted accordingly. The County of San Bernardino relies on the CNEL noise standard to assess transportation-related impacts on noise sensitive land uses.

2.2 Tone Noise

A pure tone noise is a noise produced at a single frequency and laboratory tests have shown that humans are more perceptible to changes in noise levels of a pure tone. For a noise source to contain a “pure tone,” there must be a significantly higher A-weighted sound energy in a given frequency band than in the neighboring bands, thereby causing the noise source to “stand out” against other noise sources. A pure tone occurs if the sound pressure level in the one-third octave band with the tone exceeds the average of the sound pressure levels of the two contiguous one-third octave bands by:

- 5 dB for center frequencies of 500 hertz (Hz) and above
- 8 dB for center frequencies between 160 and 400 Hz
- 15 dB for center frequencies of 125 Hz or less

2.3 Noise Propagation

From the noise source to the receiver, noise changes both in level and frequency spectrum. The most obvious is the decrease in noise as the distance from the source increases. The manner in which noise reduces with distance depends on whether the source is a point or line source as well as ground absorption, atmospheric effects and refraction, and shielding by natural and manmade features. Sound

from point sources, such as air conditioning condensers, radiate uniformly outward as it travels away from the source in a spherical pattern. The noise drop-off rate associated with this geometric spreading is 6 dBA per each doubling of the distance (dBA/DD) between source and receiver. Transportation noise sources such as roadways are typically analyzed as line sources, since at any given moment the receiver may be impacted by noise from multiple vehicles at various locations along the roadway. Because of the geometry of a line source, the noise drop-off rate associated with the geometric spreading of a line source is 3 dBA/DD.

2.4 Ground Absorption

The sound drop-off rate is highly dependent on the conditions of the land between the noise source and receiver. To account for this ground-effect attenuation (absorption), two types of site conditions are commonly used in traffic noise models, soft-site and hard-site conditions. Soft-site conditions account for the sound propagation loss over natural surfaces such as normal earth and ground vegetation. For point sources, a drop-off rate of 7.5 dBA/DD is typically observed over soft ground with landscaping, as compared with a 6.0 dBA/DD drop-off rate over hard ground such as asphalt, concrete, stone and very hard packed earth. For line sources a 4.5 dBA/DD is typically observed for soft-site conditions compared to the 3.0 dBA/DD drop-off rate for hard-site conditions. Caltrans research has shown that the use of soft-site conditions is more appropriate for the application of the Federal Highway Administration (FHWA) traffic noise prediction model used in this analysis.

3.0 GROUND-BORNE VIBRATION FUNDAMENTALS

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.

3.1 Vibration Descriptors

There are several different methods that are used to quantify vibration amplitude such as the maximum instantaneous peak in the vibrations velocity, which is known as the peak particle velocity (PPV) or the root mean square (rms) amplitude of the vibration velocity. Due to the typically small amplitudes of vibrations, vibration velocity is often expressed in decibels and is denoted as (L_v) and is based on the rms velocity amplitude. A commonly used abbreviation is "VdB", which in this text, is when L_v is based on the reference quantity of 1 micro inch per second.

3.2 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. Off-site 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.

3.3 Vibration Propagation

The propagation of ground-borne vibration is not as simple to model as airborne noise. This is due to the fact that noise in the air travels through a relatively uniform medium, while ground-borne vibrations travel through the earth which may contain significant geological differences. 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 wave front, 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 wave front. 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 wave front. 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.

4.0 REGULATORY SETTING

The project site is located in the County of San Bernardino. Noise regulations are addressed through the efforts of various federal, state, and local government agencies. The agencies responsible for regulating noise are discussed below.

4.1 Federal Regulations

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

- Promulgating noise emission standards for interstate commerce
- Assisting state and local abatement efforts
- Promoting noise education and research

The Federal Office of Noise Abatement and Control (ONAC) was initially tasked with implementing the Noise Control Act. However, the ONAC has since been eliminated, leaving the development of federal noise policies and programs to other federal agencies and interagency committees. For example, the Occupational Safety and Health Administration (OSHA) agency prohibits exposure of workers to excessive sound levels. The Department of Transportation (DOT) assumed a significant role in noise control through its various operating agencies. The Federal Aviation Administration (FAA) regulates noise of aircraft and airports. Surface transportation system noise is regulated by a host of agencies, including the Federal Transit Administration (FTA), which regulates transit noise, while freeways that are part of the interstate highway system are regulated by the Federal Highway Administration (FHWA). Finally, the federal government actively advocates that local jurisdictions use their land use regulatory authority to arrange new development in such a way that "noise sensitive" uses are either prohibited from being sited adjacent to a highway or, alternately that the developments are planned and constructed in such a manner that potential noise impacts are minimized.

Although the proposed project is not under the jurisdiction of the FTA, the *Transit Noise and Vibration Assessment Manual* (FTA Manual), prepared by the FTA, September 2018, is the only guidance document from a government agency that provides guidance on construction noise and recommends developing construction noise criteria on a project-specific basis that utilizes local noise ordinances if possible. However, local noise ordinances usually relates to nuisance and hours of allowed activity and sometimes specify limits in terms of maximum levels, but are generally not practical for assessing the noise impacts of a construction project. Project construction noise criteria should take into account the existing noise environment, the absolute noise levels during construction activities, the duration of the construction, and the adjacent land uses. The FTA standards are based on extensive studies by the FTA and other governmental agencies on the human effects and reaction to noise and a summary of the FTA findings for a detailed construction noise assessment are provided below in Table A.

Table A – FTA Construction Noise Criteria

Land Use	Day (dBA $Leq_{(8\text{-hour})}$)	Night (dBA $Leq_{(8\text{-hour})}$)	30-day Average (dBA Ldn)
Residential	80	70	75
Commercial	85	85	80[(1)]
Industrial	90	90	85[(1)]

Notes:

(1) Use a 24-hour $L_{eq\ (24\ hour)}$ instead of $L_{dn\ (30\ day)}$.
Source: Federal Transit Administration, 2018.

Since the federal government has preempted the setting of standards for noise levels that can be emitted by the transportation sources, the County is restricted to regulating the noise generated by the transportation system through nuisance abatement ordinances and land use planning.

4.2 State Regulations

Noise Standards

California Department of Health Services Office of Noise Control

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," which allows the local jurisdiction to clearly delineate compatibility of sensitive uses with various incremental levels of noise.

California Noise Insulation Standards

Title 24, Chapter 1, Article 4 of the California Administrative Code (California Noise Insulation Standards) requires noise insulation in new hotels, motels, apartment houses, and dwellings (other than single-family detached housing) that provides an annual average noise level of no more than 45 dBA CNEL. When such structures are located within a 60-dBA CNEL (or greater) noise contour, an acoustical analysis is required to ensure that interior levels do not exceed the 45-dBA CNEL annual threshold. In addition, Title 21, Chapter 6, Article 1 of the California Administrative Code requires that all habitable rooms, hospitals, convalescent homes, and places of worship shall have an interior CNEL of 45 dB or less due to aircraft noise.

Government Code Section 65302

Government Code Section 65302 mandates that the legislative body of each county and city in California 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.

California Vehicle Code Section 27200-27207 – On-Road Vehicle Noise

California Vehicle Code Section 27200-27207 provides noise limits for vehicles operated in California. For vehicles over 10,000 pounds noise is limited to 88 dB for vehicles manufactured before 1973, 86 dB for vehicles manufactured before 1975, 83 dB for vehicles manufactured before 1988, and 80 dB for vehicles manufactured after 1987. All measurements are based at 50 feet from the vehicle.

California Vehicle Section 38365-38380 – Off-Road Vehicle Noise

California Vehicle Code Section 38365-38380 provides noise limits for off-highway motor vehicles operated in California. 92 dBA for vehicles manufactured before 1973, 88 dBA for vehicles manufactured before 1975, 86 dBA for vehicles manufactured before 1986, and 82 dBA for vehicles manufactured after December 31, 1985. All measurements are based at 50 feet from the vehicle.

Vibration Standards

Title 14 of the California Administrative Code Section 15000 requires that all state and local agencies implement the California Environmental Quality Act (CEQA) Guidelines, which requires the analysis of exposure of persons to excessive groundborne vibration. However, no statute has been adopted by the state that quantifies the level at which excessive groundborne vibration occurs.

The *Transportation- and Construction Vibration Guidance Manual*, prepared by Caltrans, April 2020, provides practical guidance to Caltrans engineers, planners, and consultants who must address vibration issues associated with the construction, operation, and maintenance of Caltrans projects. However, this manual is also used as a reference point by many lead agencies and CEQA practitioners throughout California, as it provides numeric thresholds for vibration impacts. Thresholds are established for continuous (construction-related) and transient (transportation-related) sources of vibration, which found that the human response becomes distinctly perceptible at 0.25 inch per second PPV for transient sources and 0.04 inch per second PPV for continuous sources.

4.3 Local Regulations

The County of San Bernardino *County Policy Plan*, October 2020, and Municipal Code establishes the following applicable policies related to noise and vibration.

County Policy Plan

The following applicable goals and policies to the proposed project are from the Hazards Element of the County Policy Plan.

Goal HZ-2: Human-Generated Hazards

People and the natural environment protected from exposure to hazardous materials, excessive noise, and other human-generated hazards.

Policies

HZ-2.8 Proximity to noise generating uses. We limit or restrict new noise sensitive land uses in proximity to existing conforming noise generating uses and planned industrial areas.

HZ-2.9 Control sound at the source. We prioritize noise mitigation measures that control sound at the source before buffers, soundwalls, and other perimeter measures.

County of San Bernardino Municipal Code

The County of San Bernardino Municipal Code establishes the following applicable standards related to noise.

83.01.010 Purpose

The purpose of this of this Chapter is to establish uniform performance standards for development within the County that promotes compatibility with surrounding areas and land uses.

Performance standards are designed to mitigate the environmental impacts of existing and proposed land uses within a community. Environmental impacts include air quality, glare, heat, noise, runoff control, and waste disposal. These general performance standards are intended to protect the health and safety of businesses, nearby residents, and workers and to prevent damaging effects to surrounding properties.

83.01.080 Noise.

This Section establishes standards concerning acceptable noise levels for both noise-sensitive land uses and for noise-generating land uses.

(a) *Noise Measurement*. Noise shall be measured:

(1) At the property line of the nearest site that is occupied by, and/or zoned or designated to allow the development of noise sensitive land uses;

(2) With a sound level meter that meets the standard of the American National Standards Institute (ANSI Section S14-1979, Type 1 or Type 2);

(3) Using the "A" weighted sound pressure level scale in decibels (ref. pressure = 20 micronewtons per meter squared). The unit of measure shall be designated as dB(A).

(b) *Noise Impacted Areas***.** Areas within the County shall be designated as "noise-impacted" if exposed to existing or projected future exterior noise levels from mobile or stationary sources exceeding the standards listed in Subdivision (d) (Noise Standards for Stationary Noise Sources) and Subdivision (e) (Noise Standards for Adjacent Mobile Noise Sources), below. New development of residential or other noise-sensitive land uses shall not be allowed in noise-impacted areas unless effective mitigation measures are incorporated into the project design to reduce noise levels to these standards. Noise-sensitive land uses shall include residential uses, schools, hospitals, nursing homes, religious institutions, libraries, and similar uses.

(c) *Noise Standards for Stationary Noise Sources.*

(1) *Noise Standards.* Table 83-2 (Noise Standards for Stationary Noise Sources) describes the noise standard for emanations from a stationary noise source, as it affects adjacent properties:

Table B – County of San Bernardino Noise Standards for Stationary Noise Sources

Affected Land Uses (Receiving Noise)	7 a.m. – 10 p.m. Leq	10 p.m. – 7 p.m. Leq
Residential	55 dB(A)	45 dB(A)
Professional Services	55 dB(A)	55 dB(A)
Other Commercial	60 dB(A)	60 dB(A)
Industrial	70 dB(A)	70 dB(A)

Note:
Leq = (Equivalent Energy Level). The sound level corresponding to a steady-state sound level containing the same total energy as a time varying signal over a given sample period, typically 1, 8 or 24 hours.
dB(A) = (A-weighted Sound Pressure Level). The sound pressure level, in decibels, as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound, placing greater emphasis on those frequencies within the sensitivity range of the human ear.
Ldn = (Day-Night Noise Level). The average equivalent A-weighted sound level during a 24-hour day obtained by adding 10 decibels to the hourly noise levels measured during the night (from 10 pm to 7 am). In this way Ldn takes into account the lower tolerance of people for noise during nighttime periods.
Source: County of San Bernardino, 2020.

(2) *Noise Limit Categories.* No person shall operate or cause to be operated a source of sound at a location or allow the creation of noise on property owned, leased, occupied, or otherwise controlled by the person, which causes the noise level, when measured on another property, either incorporated or unincorporated, to exceed any one of the following:

(A) The noise standard for the receiving land use as specified in Subdivision (b) (Noise-Impacted Areas), above, for a cumulative period of more than 30 minutes in any hour.

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

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

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

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

(d) *Noise Standards for Adjacent Mobile Noise Sources.* Noise from mobile sources may affect adjacent properties adversely. When it does, the noise shall be mitigated for any new development to a level that shall not exceed the standards described in the following Table 83-3 (Table C - Noise Standards for Adjacent Mobile Noise Sources).

Table C – County of San Bernardino Noise Standards for Mobile Noise Sources

Land Use		Ldn (or CNEL) dB(A)	
Categories	**Uses**	**Interior (1)**	**Exterior (2)**
Residential	Single and multi-family, duplex, mobile homes	45	60 (3)
Commercial	Hotel, motel, transient housing	45	60 (3)
	Commercial, retail, bank, restaurant	50	N/A
	Office building, research and development, professional offices	45	65
	Amphitheater, concert hall, auditorium, movie theater	45	65
Institutional/Public	Hospital, nursing home, school classroom, religious institution, library	45	65
Open Space	Park	N/A	65

Notes:
(1) The indoor environment shall exclude bathrooms, kitchens, toilets, closets and corridors.
(2) The outdoor environment shall be limited to: Hospital/office building patios, Hotel and motel recreation areas, Mobile home parks, Multi-family private patios or balconies, Park picnic areas, Private yard of single-family dwellings, School playgrounds
(3) An exterior noise level of up to 65 dB(A) (or CNEL) shall be allowed provided exterior noise levels have been substantially mitigated through a reasonable application of the best available noise reduction technology, and interior noise exposure does not exceed 45 dB(A) (or CNEL) with windows and doors closed. Requiring that windows and doors remain closed to achieve an acceptable interior noise level shall necessitate the use of air conditioning or mechanical ventilation.
CNEL = (Community Noise Equivalent Level). The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of approximately five decibels to sound levels in the evening from 7 p.m. to 10 a.m. and 10 decibels to sound levels in the night from 10:00 p.m. to 7:00 a.m.
Source: County of San Bernardino, 2020.

(e) *Increases in Allowable Noise Levels.* If the measured ambient level exceeds any of the first four noise limit categories in Subdivision (d)(2), above, the allowable noise exposure standard shall be increased to reflect the ambient noise level. If the ambient noise level exceeds the fifth noise limit category in Subdivision (d)(2), above, the maximum allowable noise level under this category shall be increased to reflect the maximum ambient noise level.

(f) *Reductions in Allowable Noise Levels.* If the alleged offense consists entirely of impact noise or simple tone noise, each of the noise levels in Table 83-2 (Noise Standards for Stationary Noise Sources) shall be reduced by five dB(A).

(g) *Exempt Noise.* The following sources of noise shall be exempt from the regulations of this Section:

(1) Motor vehicles not under the control of the commercial or industrial use.

(2) Emergency equipment, vehicles and devices.

(3) Temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays.

(h) *Noise Standards for Other Structures.* All other structures shall sound attenuated against the combined input of all present and projected exterior noise to not exceed the criteria.

Table D – County of San Bernardino Noise Standards for Other Structures

Typical Uses	12-Hour Equivalent Sound Level (Interior) in dBA Ldn
Education, institutions, libraries, meeting facilities, etc	45
General office, reception, etc.	50
Retail stores, restaurants, etc.	55
Other areas for manufacturing, assembly, testing, warehousing, etc.	65

Source: County of San Bernardino, 2020.

In addition, the average of the maximum levels on the loudest intrusive sounds occurring during a 24-hour period shall not exceed 65 dBA interior.

83.01.090 Vibration.

(a) *Vibration Standard.* No ground vibration shall be allowed that can be felt without the aid of instruments at or beyond the lot line, nor shall any vibration be allowed which produces a particle velocity greater than or equal to two-tenths inches per second measured at or beyond the lot line.

(b) *Vibration Measurement.* Vibration velocity shall be measured with a seismograph or other instrument capable of measuring and recording displacement and frequency, particle velocity, or acceleration. Readings shall be made at points of maximum vibration along any lot line next to a parcel within a residential, commercial and industrial land use zoning district.

(c) *Exempt Vibrations.* The following sources of vibration shall be exempt from the regulations of this Section.

(1) Motor vehicles not under control of the subject use.

(2) Temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays.

5.0 EXISTING NOISE CONDITIONS

To determine the existing noise levels, noise measurements have been taken in the vicinity of the project site. The field survey noted that noise within the proposed project area is generally characterized by vehicle traffic on Francis Avenue that is adjacent to the south side of the project site and Yorba Avenue that is adjacent to the east side of the project site. The following describes the measurement procedures, measurement locations, noise measurement results, and the modeling of the existing noise environment.

5.1 Noise Measurement Equipment

The noise measurements were taken using two Extech Model 407780 Type 2 integrating sound level meters programmed in "slow" mode to record the sound pressure level at 3-second intervals for approximately 24 hours in "A" weighted form. In addition, the Leq averaged over the entire measuring time and Lmax were recorded. The sound level meters and microphones were mounted approximately six feet above the ground and were equipped with a windscreen. The sound level meters were calibrated before and after the monitoring using an Extech calibrator, Model 407766. The noise level measurement equipment meets American National Standards Institute specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA).

Noise Measurement Locations

The noise monitoring locations were selected in order to obtain noise levels on the project site. Descriptions of the noise monitoring sites are provided below in Table E and are shown in Figure 4. Appendix A includes a photo index of the study area and noise level measurement locations.

Noise Measurement Timing and Climate

The noise measurements were recorded between 1:23 p.m. on Tuesday, June 22, 2021 and 1:28 p.m. on Wednesday, June 23, 2021. At the start of the noise measurements, the sky was partly cloudy, the temperature was 91 degrees Fahrenheit, the humidity was 37 percent, barometric pressure was 28.98 inches of mercury, and the wind was blowing around five miles per hour. Overnight, the temperature dropped to 62 degrees Fahrenheit and the humidity peaked at 90 percent. At the conclusion of the noise measurements, the sky was partly cloudy, the temperature was 91 degrees Fahrenheit, the humidity was 39 percent, barometric pressure was 28.97 inches of mercury, and the wind was blowing around seven miles per hour.

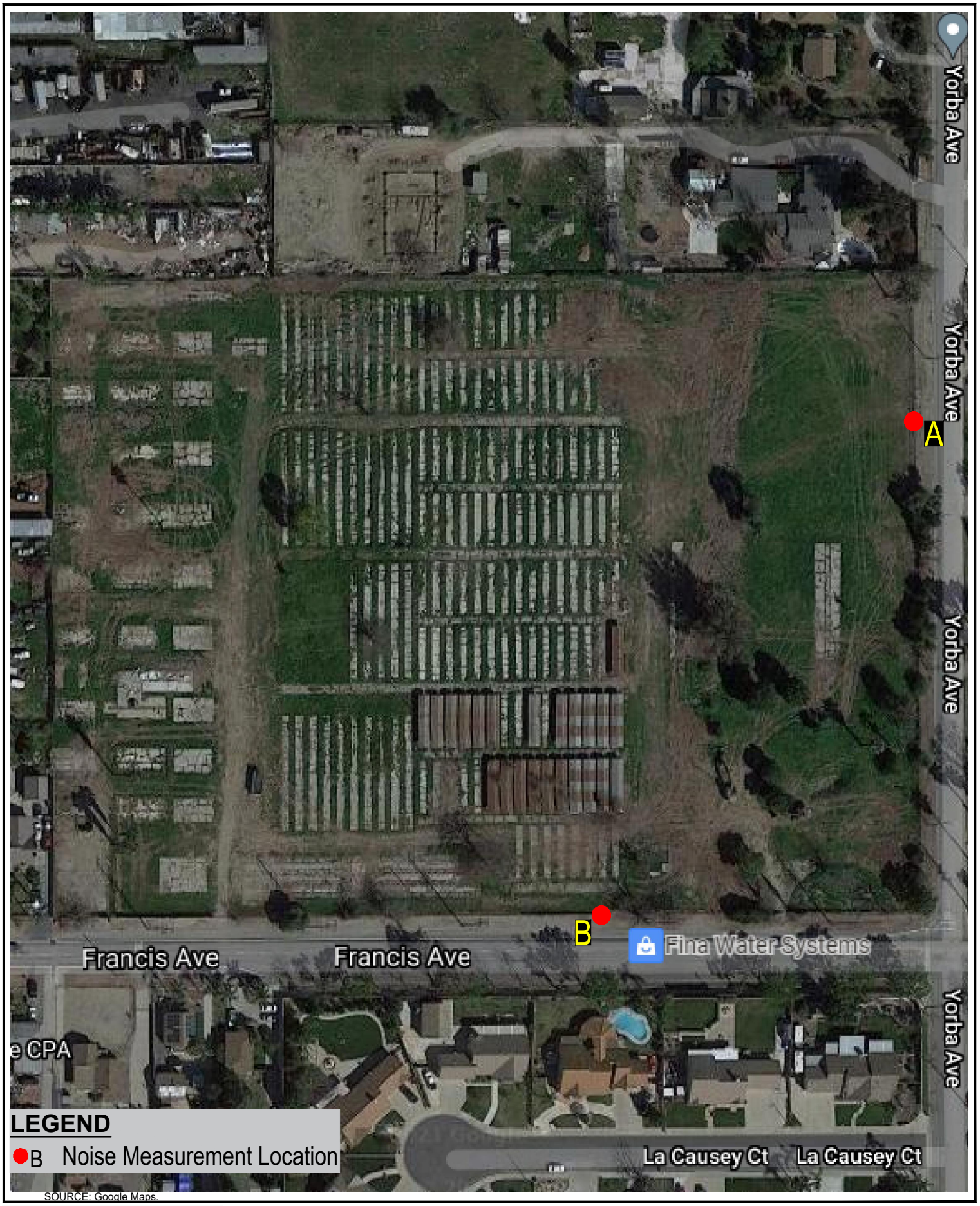
5.2 Noise Measurement Results

The results of the noise level measurements are presented in Table E. The measured sound pressure levels in dBA have been used to calculate the minimum and maximum L_{eq} averaged over 1-hour intervals. Table E also shows the L_{eq}, L_{max}, and CNEL, based on the entire measurement time. The noise monitoring data printouts are included in Appendix B. Figure 5 shows a graph of the 24-hour noise measurements.

Table E – Existing (Ambient) Noise Measurement Results

Site No.	Site Description	Average (dBA L_{eq})	Maximum (dBA L_{max})	(dBA $L_{eq\ 1\text{-}hour}$/Time) Minimum	(dBA $L_{eq\ 1\text{-}hour}$/Time) Maximum	Average (dBA CNEL)
A	Located on the project site perimeter fence, approximately 35 feet west of the Yorba Avenue centerline and 140 feet south of the northeast corner of the project site.	55.9	80.9	45.6 1:50 a.m.	60.1 3:07 p.m.	60.5
B	Located on the project site perimeter fence, approximately 35 feet north of the Francis Avenue centerline and 320 feet west of the southeast corner of the project site.	63.3	91.0	50.6 1:48 a.m.	67.8 5:25 p.m.	66.7

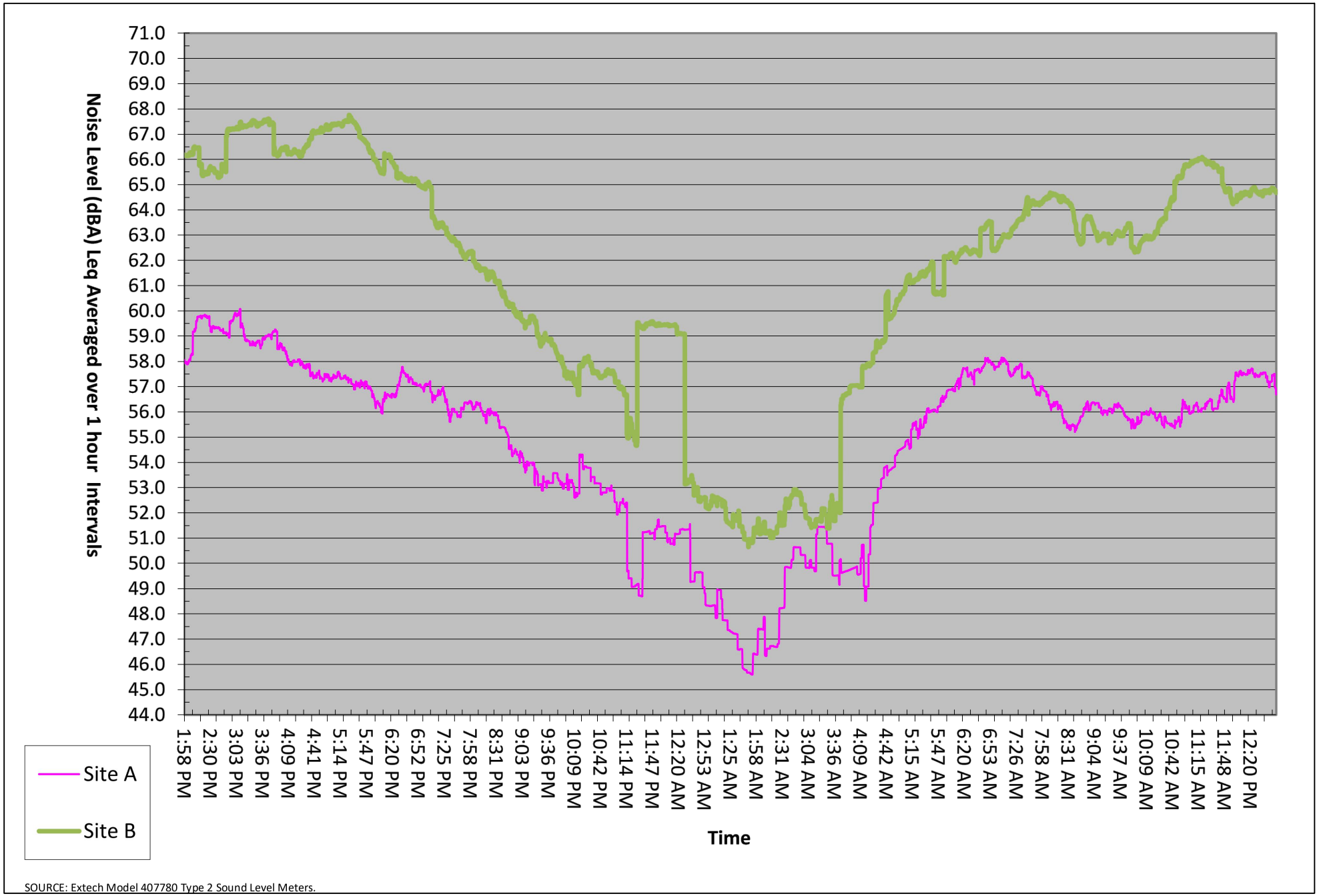
Source: Noise measurements were taken with two Extech Model 407780 Type 2 sound level meters from Tuesday, June 22, 2021 to Wednesday, June 23, 2021.



SOURCE: Google Maps.

VISTA ENVIRONMENTAL

Figure 5
Field Noise Monitoring Locations



SOURCE: Extech Model 407780 Type 2 Sound Level Meters.

VISTA ENVIRONMENTAL

Figure 5
Field Noise Measurements Graph

6.0 MODELING PARAMETERS AND ASSUMPTIONS

6.1 Construction Noise

The noise impacts from construction of the proposed project have been analyzed through use of the FHWA's Roadway Construction Noise Model (RCNM). The FHWA compiled noise measurement data regarding the noise generating characteristics of several different types of construction equipment used during the Central Artery/Tunnel project in Boston. Table F below provides a list of the construction equipment anticipated to be used for each phase of construction that was obtained from the *Air Quality, Energy, and Greenhouse Gas Impact Analysis for the Yorba Villas Residential Project* (Air Quality Analysis), prepared by EPD Solutions, Inc., March 18, 2021.

Table F – Construction Equipment Noise Emissions and Usage Factors

Equipment Description	Number of Equipment	Acoustical Use Factor[1] (percent)	Spec 721.560 Lmax at 50 feet[2] (dBA, slow[3])	Actual Measured Lmax at 50 feet[4] (dBA, slow[3])
Site Preparation				
Rubber Tired Dozers	3	40	85	82
Tractor, Loader, or Backhoes	4	40	84	N/A
Grading				
Excavators	2	40	85	81
Grader	1	40	85	83
Rubber Tired Dozer	1	40	85	82
Scrapers	2	40	85	84
Tractor, Loader, or Backhoes	2	40	85	82
Building Construction				
Crane	1	16	85	81
Forklift (Gradall)	3	40	85	83
Generator	1	50	82	81
Tractor, Loader or Backhoes	3	40	84	N/A
Welder	1	40	73	74
Paving				
Paver	2	50	85	77
Paving Equipment	2	50	85	77
Roller	2	20	85	80
Architectural Coating				
Air Compressor	1	40	80	78

Notes:
[1] Acoustical use factor is the percentage of time each piece of equipment is operational during a typical workday.
[2] Spec 721.560 is the equipment noise level utilized by the RCNM program.
[3] The "slow" response averages sound levels over 1-second increments. A "fast" response averages sound levels over 0.125-second increments.
[4] Actual Measured is the average noise level measured of each piece of equipment during the Central Artery/Tunnel project in Boston, Massachusetts primarily during the 1990s.
Source: Federal Highway Administration, 2006 and CalEEMod default equipment mix.

Table F shows the associated measured noise emissions for each piece of equipment from the RCNM model and measured percentage of typical equipment use per day. Construction noise impacts to the nearby sensitive receptors have been calculated according to the equipment noise levels and usage factors listed Table F and through use of the RCNM. For each phase of construction, all construction

equipment was analyzed based on being placed in the middle of the project site, which is based on the analysis methodology detailed in FTA Manual for a General Assessment. However, in order to provide a conservative analysis, all equipment was analyzed, instead of just the two nosiest pieces of equipment as detailed in the FTA Manual. The RCNM model printouts are provided in Appendix C.

6.2 Operations-Related Noise

FHWA Model Methodology

The proposed project would result in increases in traffic noise to the nearby roadways as well as introduce new sensitive receptors to the project site. The project impacts to the offsite roadways were analyzed through use of the FHWA Traffic Noise Prediction Model - FHWA-RD-77-108 (FHWA Model). The FHWA Model arrives at a predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). Adjustments are then made to the reference energy mean emission level to account for: the roadway active width (i.e., the distance between the center of the outermost travel lanes on each side of the roadway), the total average daily traffic (ADT) and the percentage of ADT which flows during the day, evening and night, the travel speed, the vehicle mix on the roadway, which is a percentage of the volume of automobiles, medium trucks and heavy trucks, the roadway grade, the angle of view of the observer exposed to the roadway and site conditions ("hard" or "soft" relates to the absorption of the ground, pavement or landscaping). The following section provides a discussion of the software and modeling input parameters used in this analysis and a discussion of the resultant existing noise model.

FHWA Model Traffic Noise Prediction Model Inputs

The roadway parameters used for this study are presented in Table G. The roadway classifications are based on the County's General Plan Circulation Element. The roadway speeds are based on the posted speed limits. The distance to the nearest sensitive receptor was determined by measuring the distance from the roadway centerline to the nearest residence. Since the study area is located in a suburban environment and landscaping exists along the sides of all analyzed roadways, soft site conditions were modeled.

Table G – FHWA Model Roadway Parameters

Roadway	Segment	General Plan Classification	Vehicle Speed (MPH)	Distance to Nearest Receptor[1] (feet)
Francis Avenue	West of Yorba Avenue	Secondary	35	50
Yorba Avenue	North of Francis Avenue	Local	35	55

Notes:
[1] Distance measured from nearest offsite residential structure to centerline of roadway.
Source: County of San Bernardino, 2019.

The average daily traffic (ADT) volumes for the without project conditions were obtained from *Traffic Impact Analysis Chino Residential (APN 1013-211-21 & 1013-211-22) Chino, CA* (Former Traffic Impact Analysis), prepared by Transpo Group, October 20, 2017. The ADT volumes were calculated by multiplying the PM peak hour intersection volumes by 12. Since the Former Traffic Impact Analysis analyzed a different project, the project trips were obtained from the *Yorba Villas Residential Vehicle Miles Traveled Analysis,* (VMT Memo), prepared by EPD Solutions, Inc., March 16, 2021, which found that the proposed project would generate 425 daily trips, which were added to Francis Avenue for the with project

conditions. It should be noted that the proposed project would not have any driveways onto Yorba Avenue, as such the proposed project would likely not increase the traffic on Yorba Avenue. The ADT volumes used in this analysis are shown in Table H.

Table H – Average Daily Traffic Volumes

Roadway	Segment	Average Daily Traffic Volumes			
		Existing	Existing + Project	Year 2035	Year 2035 + Project
Francis Avenue	West of Yorba Avenue	3,580	4,005	5,570	5,995
Yorba Avenue	North of Francis Avenue	780	780	900	900

Source: Transpo Group, 2017; EPD Solutions, Inc., 2021.

The vehicle mix used in the FHWA-RD-77-108 Model is shown in Table I and are based on typical vehicle mixes observed in Southern California for similar local and arterial roadways. The vehicle mix provides the hourly distribution percentages of automobiles, medium trucks, and heavy trucks for input into the FHWA model.

Table I – Roadway Vehicle Mixes

Vehicle Type	Traffic Flow Distributions			
	Day (7 a.m. to 7 p.m.)	Evening (7 p.m. to 10 p.m.)	Night (10 p.m. to 7 a.m.)	Overall
Local Vehicle Mix				
Automobiles	73.6%	13.6%	10.2%	97.4%
Medium Trucks	0.9%	0.9%	0.0%	1.8%
Heavy Trucks	0.4%	0.0%	0.4%	0.7%
Arterial Vehicle Mix				
Automobiles	69.5%	12.9%	9.6%	92.0%
Medium Trucks	1.4%	0.1%	1.5%	3.0%
Heavy Trucks	2.4%	0.1%	2.5%	5.0%

Source: Vista Environmental.

FHWA Model Source Assumptions

To assess the roadway noise generation in a uniform manner, all vehicles are analyzed at the single lane equivalent acoustic center of the roadway being analyzed. In order to determine the height above the road grade where the noise is being emitted from, each type of vehicle has been analyzed independently with autos at road grade, medium trucks at 2.3 feet above road grade, and heavy trucks at 8 feet above road grade. These elevations were determined through a noise-weighted average of the elevation of the exhaust pipe, tires and mechanical parts in the engine, which are the primary noise emitters from a vehicle.

6.3 Vibration

Construction activity can result in varying degrees of ground vibration, depending on the equipment used on the site. Operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Buildings in the vicinity of the construction site respond to these vibrations with varying results ranging from no perceptible effects at the low levels to damage at the highest levels. Table J gives approximate vibration levels for particular construction activities. The data in Table J provides a reasonable estimate for a wide range of soil conditions.

Table J – Vibration Source Levels for Construction Equipment

Equipment		Peak Particle Velocity (inches/second)	Approximate Vibration Level (L_v)at 25 feet
Pile driver (impact)	Upper range	1.518	112
	typical	0.644	104
Pile driver (sonic)	Upper range	0.734	105
	typical	0.170	93
Clam shovel drop (slurry wall)		0.202	94
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

Source: Federal Transit Administration, May 2006.

The construction-related vibration impacts have been calculated through the vibration levels shown above in Table J and through typical vibration propagation rates. The equipment assumptions were based on the equipment lists provided above in Table F.

7.0 IMPACT ANALYSIS

7.1 CEQA Thresholds of Significance

Consistent with the California Environmental Quality Act (CEQA) and the State CEQA Guidelines, a significant impact related to noise would occur if a proposed project is determined 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;
- Generation of excessive groundborne vibration or groundborne noise levels; or
- 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.

7.2 Generation of Noise Levels in Excess of Standards

The proposed project would not generate 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. The following section calculates the potential noise emissions associated with the temporary construction activities and long-term operations of the proposed project and compares the noise levels to the County standards.

Construction-Related Noise

The construction activities for the proposed project are anticipated to include site preparation and grading of the project site, building construction of the 45 single-family homes, paving of the onsite roads and driveways, and application of architectural coatings. Noise impacts from construction activities associated with the proposed project would be a function of the noise generated by construction equipment, equipment location, sensitivity of nearby land uses, and the timing and duration of the construction activities. The nearest sensitive receptor to the project site is a single-family home located as near as 15 feet to the north of the project site. There is also a single-family home located as near as 20 feet west of the project site.

Section 83.01.080(g)(3) of the County's Municipal Code allows construction noise to exceed the County noise standards provided that construction activities occur between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays. However, the County construction noise standards do not provide any limits to the noise levels that may be created from construction activities and even with adherence to the County standards, the resultant construction noise levels may result in a significant substantial temporary noise increase to the nearby residents.

In order to determine if the proposed construction activities would create a significant substantial temporary noise increase, the FTA construction noise criteria thresholds detailed above in Section 4.1 have been utilized, which shows that a significant construction noise impact would occur if construction noise exceeds 80 dBA during the daytime at any of the nearby homes.

Construction noise impacts to the nearby sensitive receptors have been calculated through use of the RCNM and the parameters and assumptions detailed in Section 6.1 of this report including Table F that shows the anticipated construction equipment per phase. The results are shown below in Table K and the RCNM printouts are provided in Appendix C.

Table K – Construction Noise Levels at the Nearest Sensitive Receptors

Construction Phase	Construction Noise Level (dBA Leq) at:	
	Nearest Home to the North[1]	Nearest Home to the West[2]
Site Preparation	71	70
Grading	72	71
Building Construction	72	71
Paving	66	65
Painting	58	57
FTA Construction Noise Threshold[4]	**80**	**80**
Exceed Thresholds?	No	No

[1] The nearest home to the north is located as near as 310 feet from the center of the project site.
[2] The nearest home to the west is located as near as 335 feet from the center of the project site.
[4] The FTA Construction noise thresholds are detailed above in Table A.
Source: RCNM, Federal Highway Administration, 2006

Table K shows that the greatest noise impacts would occur during the grading and building construction phases, with a noise level as high as 72 dBA Leq at the nearest home to the north. Table K also shows that none of the construction phases would exceed the FTA noise standard of 80 dB at the nearby homes. Therefore, through adherence to the limitation of allowable construction times provided in Section 83.01.080(g)(3) of the Municipal Code, construction-related noise levels would not exceed any standards established in the General Plan or Noise Ordinance nor would construction activities create a substantial temporary increase in ambient noise levels from construction of the proposed project. Impacts would be less than significant.

Operational-Related Noise

The proposed project would consist of the development of 45 single-family homes. Potential noise impacts associated with the operations of the proposed project would be from project-generated vehicular traffic on the nearby roadways. In addition, the proposed development would be adjacent to Francis Avenue and Yorba Avenue, which may create exterior and interior noise levels in excess of County standards at the proposed homes. The noise impacts to the nearby existing homes and proposed homes have been analyzed separately below.

Roadway Vehicular Noise Impact to Nearby Homes

Vehicle noise is a combination of the noise produced by the engine, exhaust and tires. The level of traffic noise depends on three primary factors (1) the volume of traffic, (2) the speed of traffic, and (3) the number of trucks in the flow of traffic. The proposed project does not propose any uses that would require a substantial number of truck trips and the proposed project would not alter the speed limit on any existing roadway so the proposed project's potential offsite noise impacts have been focused on the noise impacts associated with the change of volume of traffic that would occur with development of the proposed project.

The County Policy Plan Hazards Element Goal HZ-2, requires the protection of people from excessive noise exposure. However, the General Plan does not quantify what is a significant roadway noise increase. As such, the roadway noise threshold utilized in the *San Bernardino Countywide Plan Draft Environmental Impact Report* (Countywide Plan DEIR), prepared by Placeworks, June 2019, has been utilized, which details that a significant noise increase would occur when the traffic noise increases by 3 dBA CNEL.

The potential offsite traffic noise impacts created by the on-going operations of the proposed project have been analyzed through utilization of the FHWA model and parameters described above in Section 6.2 and the FHWA model traffic noise calculation spreadsheets are provided in Appendix D. The proposed project's potential offsite traffic noise impacts have been analyzed for the existing year, opening year and future year 2035 scenarios that are discussed separately below.

Existing Year Conditions

The proposed project's potential offsite traffic noise impacts have been calculated through a comparison of the Existing scenario to the Existing With Project scenario. The results of this comparison are shown in Table L.

Table L – Existing Project Traffic Noise Contributions

		dBA CNEL at Nearest Receptor[1]			Exceed +3
Roadway	Segment	Existing	Existing Plus Project	Project Contribution	dBA CNEL Threshold[2]
Francis Avenue	West of Yorba Avenue	59.2	59.7	0.5	No
Yorba Avenue	North of Francis Avenue	50.9	50.9	0.0	No

Notes:
[1] Distance to nearest sensitive receptors shown in Table G, does not take into account existing noise barriers.
[2] +3 dBA Increase Threshold obtained from Placeworks, 2019.
Source: FHWA Traffic Noise Prediction Model FHWA-RD-77-108.

Table L shows that the proposed project's permanent noise increases to the nearby homes from the generation of additional vehicular traffic would not exceed the traffic noise increase thresholds detailed above. Therefore, the proposed project would not result in a substantial permanent increase in ambient noise levels for the existing conditions. Impacts would be less than significant.

Future Year 2035 Conditions

The proposed project's potential offsite traffic noise impacts have been calculated through a comparison of the future year 2035 scenario to the future year 2035 with project scenario. The results of this comparison are shown in Table M.

Table M – Future Year 2035 Project Traffic Noise Contributions

		dBA CNEL at Nearest Receptor[1]			Exceed +3
Roadway	Segment	Year 2035	Year 2035 Plus Project	Project Contribution	dBA CNEL Threshold[2]
Francis Avenue	West of Yorba Avenue	61.1	61.4	0.3	No
Yorba Avenue	North of Francis Avenue	51.6	51.6	0.0	No

Notes:
[1] Distance to nearest sensitive receptors shown in Table G, does not take into account existing noise barriers.
[2] +3 dBA Increase Threshold obtained from Placeworks, 2019.
Source: FHWA Traffic Noise Prediction Model FHWA-RD-77-108.

Table M shows that the proposed project's permanent noise increases to the nearby homes from the generation of additional vehicular traffic would not exceed the traffic noise increase thresholds detailed above. Therefore, the proposed project would not result in a substantial permanent increase in ambient noise levels for the future year 2035 conditions. Impacts would be less than significant.

Roadway Vehicular Noise Impacts to Proposed Homes

The proposed project would consist of the development of a residential community with 45 single-family homes. Section 83.01.080(d) requires that the noise level at new residential developments do not exceed 60 dBA CNEL at the exterior of the proposed homes and 45 dBA CNEL at the interior of the proposed homes from mobile noise sources.

It is anticipated that the primary source of noise impacts to the project site will be traffic noise from Francis Avenue that is adjacent to the south side of the project site and Yorba Avenue that is adjacent to the east side of the project site. The FHWA traffic noise prediction model parameters used in this analysis are discussed above in detail in Section 6.2 and the FHWA model printouts are provided in Appendix E.

Roadway Noise Impacts to the Proposed Homes Backyards

The anticipated noise levels have been calculated for backyards that are adjacent to Yorba Avenue and Francis Avenue for representative lots and the results are shown below in Table N.

Table N – Proposed Homes Exterior Backyard Noise Levels from Nearby Roads

Building Number	Roadway	Exterior Backyard Noise Levels (dBA CNEL)		Sound Wall Height[1] (feet)
		Without Sound Wall	With Sound Wall	
1	Yorba Avenue	53	43	6.0
18	Francis Avenue	59	51	6.0
29	Yorba Avenue	53	44	6.0
40	Francis Avenue	59	51	6.0
42	Francis Avenue	59	51	6.0
45	Francis Avenue	59	51	6.0

Notes:
[1] Project Design Feature 1 is included that requires construction of a 6-foot high cmu wall between nearest homes to roadways.
Exceedance of County's 60 dBA CNEL residential exterior noise standard shown in **bold**.
Source: FHWA RD-77-108 Model.

Table N shows that the noise levels at all proposed homes backyards would be within the County's 60 dBA CNEL residential exterior noise standard for the without and with the proposed sound wall conditions. Impacts would be less than significant.

Proposed Homes Interior Roadway Noise Impacts

To assess the interior noise levels related to compliance with the 45 dBA CNEL interior noise standard, the same proposed homes analyzed for the exterior private backyard analysis were also analyzed for their interior noise levels. The exterior noise level at the façade of the first and second floors were calculated through use of the same methodology detailed above for the outdoor noise calculations (see Section 6.2 above) and the results are shown below in Table O. Table O also show the interior noise levels calculated based on the "windows open" condition, that according to *Highway Traffic Noise: Analysis and Abatement Guidance,* prepared by U.S. Department of Transportation, December, 2011, a new residential building

provides a minimum of 10 dB of noise attenuation with windows open and a minimum of 25 dB of noise attenuation with windows closed and dual-paned windows. The proposed residential structures will be required to be designed to meet the CCR Title 24, Part 6: California's Energy Efficiency Standards that require the installation of dual paned windows in the climate zone where the proposed project is located. The exterior noise level at the façade of the first floor and second floors were calculated for each analyzed unit and are shown below in Table O and the FHWA model printouts are provided in Appendix E.

Table O – Proposed Homes Interior Noise Levels from Nearby Roads

Lot Number	Roadway	Floor	Exterior Noise Level at Building Façade (dBA CNEL)	Interior Noise Levels (dBA CNEL)	
				Windows Open[1]	Windows Closed[2]
1	Yorba Avenue	1	46	36	21
		2	53	28	23
18	Francis Avenue	1	50	40	25
		2	58	33	28
29	Francis Avenue	1	45	35	20
		2	53	28	23
40	Francis Avenue	1	51	41	26
		2	59	34	29
42	Francis Avenue	1	52	42	27
		2	59	34	29
45	Francis Avenue	1	52	42	27
		2	59	34	29

Notes:
[1] Windows open interior noise levels based on 10 dBA of noise reduction.
[2] Windows closed Interior noise levels based on 25 dBA of noise reduction.
Source: FHWA RD-77-108 Model.

Table O shows that for both the "windows open" and "windows closed" conditions, the noise levels at the interior of all proposed homes would be within the County's 45 dBA CNEL residential interior noise standard. Therefore, the proposed homes would comply with the County's residential interior noise standards. Impacts would be less than significant.

Level of Significance

Less than significant impact.

7.3 Generation of Excessive Groundborne Vibration

The proposed project would not expose persons to or generation of excessive groundborne vibration or groundborne noise levels. The following section analyzes the potential vibration impacts associated with the construction and operations of the proposed project.

Construction-Related Vibration Impacts

The construction activities for the proposed project are anticipated to include site preparation and grading of the project site, building construction of the 45 single-family homes, paving of the onsite roads and driveways, and application of architectural coatings. Vibration impacts from construction activities

associated with the proposed project would typically be created from the operation of heavy off-road equipment. The nearest sensitive receptor to the project site is a single-family home located as near as 15 feet to the north of the project site

Section 83.01.090 of the County's Municipal Code restricts the creation of vibration which produces a particle velocity greater than 0.2 inch-per-second PPV. The primary source of vibration during construction would be from the operation of a bulldozer. From Table J above a large bulldozer would create a vibration level of 0.089 inch per second PPV at 25 feet. Based on typical propagation rates, the vibration level at the nearest offsite home (15 feet to north) would be 0.156 inch per second PPV. The vibration level at the nearest offsite home would be below the County's 0.2 inch per second PPV threshold. Impacts would be less than significant.

Operations-Related Vibration Impacts

The proposed project would consist of the development of 45 single-family homes. The on-going operation of the proposed project would not include the operation of any known vibration sources other than typical onsite vehicle operations for a residential development. Therefore, a less than significant vibration impact is anticipated from operation of the proposed project.

Level of Significance

Less than significant impact.

7.4 Aircraft Noise

The proposed project may expose people residing in the project area to excessive noise levels from aircraft. The nearest airport is Ontario International Airport that is located 4.5 miles east of the project site. The project site is located outside of the 60 dBA CNEL noise contours of this airport. Therefore, the proposed homes would not be exposed to excessive aircraft noise. Impacts would be less than significant.

Level of Significance

Less than significant impact.

8.0 REFERENCES

California Department of Transportation, *2016 Annual Average Daily Truck Traffic on the California State Highway System*, 2018.

California Department of Transportation (Caltrans), *Technical Noise Supplement to the Traffic Noise Analytics Protocol*, September 2013.

California Department of Transportation, *Transportation- and Construction Vibration Guidance Manual*, April 2020.

County of San Bernardino, *San Bernardino County, California Code of Ordinances,* January 28, 2020.

County of San Bernardino, *County Policy Plan,* October 2020.

EPD Solutions, Inc., *Air Quality, Energy, and Greenhouse Gas Impact Analysis for the Yorba Villas Residential Project,* March 18, 2021.

EPD Solutions, Inc., *Yorba Villas Residential Vehicle Miles Traveled Analysis,* March 16, 2021.

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

Placeworks, *Draft Environmental Impact Report San Bernardino Countywide Plan,* June 2019.

Transpo Group, *Traffic Impact Analysis Chino Residential (APN 1013-211-21 & 1013-211-22) Chino, CA,* October 20, 2017.

U.S. Department of Transportation, *FHWA Roadway Construction Noise Model User's Guide,* January, 2006.

U.S. Department of Transportation, *Highway Traffic Noise: Analysis and Abatement Guidance,* December, 2011.

APPENDIX A

Field Noise Measurements Photo Index

Noise Measurement Site A - looking north

Noise Measurement Site A - looking northeast

Noise Measurement Site A - looking east

Noise Measurement Site A - looking southeast

Noise Measurement Site A - looking south

Noise Measurement Site A - looking southwest

Noise Measurement Site A - looking west

Noise Measurement Site A - looking northwest

Noise Measurement Site B - looking north


Noise Measurement Site B - looking northeast


Noise Measurement Site B - looking east

Noise Measurement Site B - looking southeast


Noise Measurement Site B - looking south

Noise Measurement Site B - looking southwest


Noise Measurement Site B - looking west

Noise Measurement Site B - looking northwest

APPENDIX B

Field Noise Measurements Printouts

Site A - On Project Site Fence Near Yorba Ave

Date	Time=06/22/21	1:23:00 PM			
Sampling	Time=3	Weighting=A			
Record	Num= 29000	Weighting=Slow	CNEL(24hr)=	60.5	
Leq	55.9 SEL	Value=105.4	Ldn(24hr)=	60.2	
MAX	80.9	Min Leq1hr =	45.6	1:50 AM	
MIN	36.8	Max Leq1hr =	60.1	3:07 PM	

Site A - On Project Site Fence Near Yorba Ave

SPL	Time	Leq (1 hour Avg.)	Ldn	CNEL
51.5	13:23:00		51.5	51.5
68.9	13:23:03		68.9	68.9
69.1	13:23:06		69.1	69.1
67.8	13:23:09		67.8	67.8
59.6	13:23:12		59.6	59.6
55.1	13:23:15		55.1	55.1
54	13:23:18		54	54.0
61.2	13:23:21		61.2	61.2
63.2	13:23:24		63.2	63.2
68.6	13:23:27		68.6	68.6
65.6	13:23:30		65.6	65.6
66.5	13:23:33		66.5	66.5
63.9	13:23:36		63.9	63.9
68.8	13:23:39		68.8	68.8
57.5	13:23:42		57.5	57.5
55.5	13:23:45		55.5	55.5
51.5	13:23:48		51.5	51.5
52.8	13:23:51		52.8	52.8
60	13:23:54		60	60.0
57.5	13:23:57		57.5	57.5
80.9	13:24:00		80.9	80.9
63.5	13:24:03		63.5	63.5
59.4	13:24:06		59.4	59.4
62.3	13:24:09		62.3	62.3
59.3	13:24:12		59.3	59.3
61	13:24:15		61	61.0
59.9	13:24:18		59.9	59.9
63.3	13:24:21		63.3	63.3
65.1	13:24:24		65.1	65.1
61	13:24:27		61	61.0
64.6	13:24:30		64.6	64.6
68.8	13:24:33		68.8	68.8
60.6	13:24:36		60.6	60.6
63	13:24:39		63	63.0
60.7	13:24:42		60.7	60.7
58.9	13:24:45		58.9	58.9
51.2	13:24:48		51.2	51.2
48.9	13:24:51		48.9	48.9
47.4	13:24:54		47.4	47.4
45.7	13:24:57		45.7	45.7
49.4	13:25:00		49.4	49.4
49.8	13:25:03		49.8	49.8
47.6	13:25:06		47.6	47.6
47.2	13:25:09		47.2	47.2
49.2	13:25:12		49.2	49.2
47.3	13:25:15		47.3	47.3
46.8	13:25:18		46.8	46.8
54	13:25:21		54	54.0
54.7	13:25:24		54.7	54.7
50.8	13:25:27		50.8	50.8
55.6	13:25:30		55.6	55.6
53.1	13:25:33		53.1	53.1
49.4	13:25:36		49.4	49.4
47.6	13:25:39		47.6	47.6
48.2	13:25:42		48.2	48.2
52.1	13:25:45		52.1	52.1
49.1	13:25:48		49.1	49.1
48.2	13:25:51		48.2	48.2
46.7	13:25:54		46.7	46.7
50.1	13:25:57		50.1	50.1
47.9	13:26:00		47.9	47.9
47.5	13:26:03		47.5	47.5
47.3	13:26:06		47.3	47.3
47	13:26:09		47	47.0
47.4	13:26:12		47.4	47.4
47.8	13:26:15		47.8	47.8
49.6	13:26:18		49.6	49.6
48.8	13:26:21		48.8	48.8
47.4	13:26:24		47.4	47.4
47.5	13:26:27		47.5	47.5
47.2	13:26:30		47.2	47.2
45.8	13:26:33		45.8	45.8
47.3	13:26:36		47.3	47.3
46.6	13:26:39		46.6	46.6
45.9	13:26:42		45.9	45.9
47.5	13:26:45		47.5	47.5
46.2	13:26:48		46.2	46.2

Site B - On Project Site Fence Near Francis Ave

Date	Time=06/22/21	1:28:00 PM			
Sampling	Time=3	Freq Weighting=A			
Record	Num= 29000	Weighting=Slow	CNEL(24hr)=	66.7	
Leq	63.3 SEL	Value=113.2	Ldn(24hr)=	66.4	
MAX	91.0	Min Leq1hr =	50.6	1:48 AM	
MIN	40.3	Max Leq1hr =	67.8	5:25 PM	

Site B - On Project Site Fence Near Francis Ave

SPL	Time	Leq (1 hour Avg.)	Ldn	CNEL
64	13:28:00		64	64
60.7	13:28:03		60.7	60.7
69.6	13:28:06		69.6	69.6
64.6	13:28:09		64.6	64.6
66.9	13:28:12		66.9	66.9
68	13:28:15		68	68
65.5	13:28:18		65.5	65.5
66	13:28:21		66	66
63.3	13:28:24		63.3	63.3
61.7	13:28:27		61.7	61.7
60.3	13:28:30		60.3	60.3
65.3	13:28:33		65.3	65.3
56.3	13:28:36		56.3	56.3
59.7	13:28:39		59.7	59.7
64.4	13:28:42		64.4	64.4
58.7	13:28:45		58.7	58.7
67.8	13:28:48		67.8	67.8
62.4	13:28:51		62.4	62.4
69.6	13:28:54		69.6	69.6
63.9	13:28:57		63.9	63.9
68.5	13:29:00		68.5	68.5
59.8	13:29:03		59.8	59.8
65.8	13:29:06		65.8	65.8
62.4	13:29:09		62.4	62.4
58.4	13:29:12		58.4	58.4
60.5	13:29:15		60.5	60.5
67.9	13:29:18		67.9	67.9
62.4	13:29:21		62.4	62.4
60.9	13:29:24		60.9	60.9
61.1	13:29:27		61.1	61.1
67	13:29:30		67	67
56.9	13:29:33		56.9	56.9
55.9	13:29:36		55.9	55.9
50.7	13:29:39		50.7	50.7
51.6	13:29:42		51.6	51.6
60.6	13:29:45		60.6	60.6
53.6	13:29:48		53.6	53.6
50.9	13:29:51		50.9	50.9
51	13:29:54		51	51
55.4	13:29:57		55.4	55.4
52.3	13:30:00		52.3	52.3
53.2	13:30:03		53.2	53.2
53.2	13:30:06		53.2	53.2
52.8	13:30:09		52.8	52.8
62	13:30:12		62	62
67.1	13:30:15		67.1	67.1
68.9	13:30:18		68.9	68.9
64.1	13:30:21		64.1	64.1
63.4	13:30:24		63.4	63.4
61.9	13:30:27		61.9	61.9
60.5	13:30:30		60.5	60.5
65.1	13:30:33		65.1	65.1
61.5	13:30:36		61.5	61.5
65.8	13:30:39		65.8	65.8
64	13:30:42		64	64
64.2	13:30:45		64.2	64.2
64.7	13:30:48		64.7	64.7
63.7	13:30:51		63.7	63.7
56.3	13:30:54		56.3	56.3
53.1	13:30:57		53.1	53.1
54.5	13:31:00		54.5	54.5
58.9	13:31:03		58.9	58.9
66.6	13:31:06		66.6	66.6
56.4	13:31:09		56.4	56.4
51.2	13:31:12		51.2	51.2
49.2	13:31:15		49.2	49.2
49.9	13:31:18		49.9	49.9
53.7	13:31:21		53.7	53.7
51.6	13:31:24		51.6	51.6
53.6	13:31:27		53.6	53.6
51.9	13:31:30		51.9	51.9
51.3	13:31:33		51.3	51.3
54.2	13:31:36		54.2	54.2
62.9	13:31:39		62.9	62.9
67.3	13:31:42		67.3	67.3
56.6	13:31:45		56.6	56.6
55.3	13:31:48		55.3	55.3

Site A - On Project Site Fence Near Yorba Ave					Site B - On Project Site Fence Near Francis Ave				
SPL	Time	Leq (1 hour Avg.)	Ldn	CNEL	SPL	Time	Leq (1 hour Avg.)	Ldn	CNEL
48.3	13:26:51		48.3	48.3	68.9	13:31:51		68.9	68.9
46.4	13:26:54		46.4	46.4	63	13:31:54		63	63
50.8	13:26:57		50.8	50.8	55.7	13:31:57		55.7	55.7
51.3	13:27:00		51.3	51.3	55.9	13:32:00		55.9	55.9
50.8	13:27:03		50.8	50.8	65.3	13:32:03		65.3	65.3
49.7	13:27:06		49.7	49.7	70.9	13:32:06		70.9	70.9
48	13:27:09		48	48.0	64.8	13:32:09		64.8	64.8
49.1	13:27:12		49.1	49.1	57.6	13:32:12		57.6	57.6
50.4	13:27:15		50.4	50.4	51.9	13:32:15		51.9	51.9
48.7	13:27:18		48.7	48.7	52.7	13:32:18		52.7	52.7
48.2	13:27:21		48.2	48.2	60.3	13:32:21		60.3	60.3
49.7	13:27:24		49.7	49.7	61.3	13:32:24		61.3	61.3
49.4	13:27:27		49.4	49.4	60.3	13:32:27		60.3	60.3
51.2	13:27:30		51.2	51.2	53.4	13:32:30		53.4	53.4
47.7	13:27:33		47.7	47.7	57.1	13:32:33		57.1	57.1
48.8	13:27:36		48.8	48.8	52.7	13:32:36		52.7	52.7
47.5	13:27:39		47.5	47.5	63.5	13:32:39		63.5	63.5
51.2	13:27:42		51.2	51.2	61.6	13:32:42		61.6	61.6
49	13:27:45		49	49.0	53	13:32:45		53	53
49.6	13:27:48		49.6	49.6	50.4	13:32:48		50.4	50.4
47.8	13:27:51		47.8	47.8	61.4	13:32:51		61.4	61.4
49.1	13:27:54		49.1	49.1	65.2	13:32:54		65.2	65.2
49.4	13:27:57		49.4	49.4	66.8	13:32:57		66.8	66.8
49.9	13:28:00		49.9	49.9	56.3	13:33:00		56.3	56.3
49.6	13:28:03		49.6	49.6	50.9	13:33:03		50.9	50.9
48.8	13:28:06		48.8	48.8	48.6	13:33:06		48.6	48.6
54.2	13:28:09		54.2	54.2	48.2	13:33:09		48.2	48.2
72.4	13:28:12		72.4	72.4	48.2	13:33:12		48.2	48.2
58.1	13:28:15		58.1	58.1	51	13:33:15		51	51
50.1	13:28:18		50.1	50.1	48.2	13:33:18		48.2	48.2
59.4	13:28:21		59.4	59.4	56.4	13:33:21		56.4	56.4
65.1	13:28:24		65.1	65.1	52.6	13:33:24		52.6	52.6
53.7	13:28:27		53.7	53.7	56.4	13:33:27		56.4	56.4
50.1	13:28:30		50.1	50.1	50	13:33:30		50	50
49	13:28:33		49	49.0	52.3	13:33:33		52.3	52.3
48.3	13:28:36		48.3	48.3	62.4	13:33:36		62.4	62.4
48.2	13:28:39		48.2	48.2	67.4	13:33:39		67.4	67.4
46.4	13:28:42		46.4	46.4	71.2	13:33:42		71.2	71.2
47.5	13:28:45		47.5	47.5	60.7	13:33:45		60.7	60.7
46.9	13:28:48		46.9	46.9	56.3	13:33:48		56.3	56.3
47.3	13:28:51		47.3	47.3	56.8	13:33:51		56.8	56.8
46.2	13:28:54		46.2	46.2	55.4	13:33:54		55.4	55.4
47.4	13:28:57		47.4	47.4	50.9	13:33:57		50.9	50.9
47.9	13:29:00		47.9	47.9	52	13:34:00		52	52
50	13:29:03		50	50.0	52.4	13:34:03		52.4	52.4
46.7	13:29:06		46.7	46.7	51	13:34:06		51	51
46.6	13:29:09		46.6	46.6	53.3	13:34:09		53.3	53.3
46.5	13:29:12		46.5	46.5	51.8	13:34:12		51.8	51.8
48.6	13:29:15		48.6	48.6	56.1	13:34:15		56.1	56.1
51.6	13:29:18		51.6	51.6	53.3	13:34:18		53.3	53.3
68.1	13:29:21		68.1	68.1	48.7	13:34:21		48.7	48.7
58.7	13:29:24		58.7	58.7	51.7	13:34:24		51.7	51.7
50.2	13:29:27		50.2	50.2	48.9	13:34:27		48.9	48.9
47.8	13:29:30		47.8	47.8	53.6	13:34:30		53.6	53.6
48.2	13:29:33		48.2	48.2	60.6	13:34:33		60.6	60.6
47	13:29:36		47	47.0	57.7	13:34:36		57.7	57.7
46.9	13:29:39		46.9	46.9	60.4	13:34:39		60.4	60.4
46.3	13:29:42		46.3	46.3	56.1	13:34:42		56.1	56.1
47.7	13:29:45		47.7	47.7	56.9	13:34:45		56.9	56.9
46.7	13:29:48		46.7	46.7	55.7	13:34:48		55.7	55.7
48	13:29:51		48	48.0	59	13:34:51		59	59
48.2	13:29:54		48.2	48.2	50.5	13:34:54		50.5	50.5
46	13:29:57		46	46.0	50.7	13:34:57		50.7	50.7
48.1	13:30:00		48.1	48.1	49.8	13:35:00		49.8	49.8
46.6	13:30:03		46.6	46.6	50.1	13:35:03		50.1	50.1
43.8	13:30:06		43.8	43.8	51.2	13:35:06		51.2	51.2
49.2	13:30:09		49.2	49.2	52.4	13:35:09		52.4	52.4
47.1	13:30:12		47.1	47.1	50.9	13:35:12		50.9	50.9
50.4	13:30:15		50.4	50.4	50.2	13:35:15		50.2	50.2
50.4	13:30:18		50.4	50.4	50.1	13:35:18		50.1	50.1
49.4	13:30:21		49.4	49.4	54.5	13:35:21		54.5	54.5
49	13:30:24		49	49.0	64.1	13:35:24		64.1	64.1
49.4	13:30:27		49.4	49.4	69.4	13:35:27		69.4	69.4
48.5	13:30:30		48.5	48.5	58.2	13:35:30		58.2	58.2
50.3	13:30:33		50.3	50.3	59.1	13:35:33		59.1	59.1
53.5	13:30:36		53.5	53.5	70.2	13:35:36		70.2	70.2
58.6	13:30:39		58.6	58.6	60.4	13:35:39		60.4	60.4
69.4	13:30:42		69.4	69.4	60	13:35:42		60	60
56.5	13:30:45		56.5	56.5	70.7	13:35:45		70.7	70.7
50.4	13:30:48		50.4	50.4	79.6	13:35:48		79.6	79.6
51.2	13:30:51		51.2	51.2	65.8	13:35:51		65.8	65.8
66.6	13:30:54		66.6	66.6	57.3	13:35:54		57.3	57.3
62.5	13:30:57		62.5	62.5	52.7	13:35:57		52.7	52.7
50.3	13:31:00		50.3	50.3	50.7	13:36:00		50.7	50.7
45.8	13:31:03		45.8	45.8	51	13:36:03		51	51
45.4	13:31:06		45.4	45.4	50	13:36:06		50	50
43.7	13:31:09		43.7	43.7	53.5	13:36:09		53.5	53.5
45.4	13:31:12		45.4	45.4	50.2	13:36:12		50.2	50.2
44.4	13:31:15		44.4	44.4	63	13:36:15		63	63

Site A - On Project Site Fence Near Yorba Ave					Site B - On Project Site Fence Near Francis Ave				
SPL	Time	Leq (1 hour Avg.)	Ldn	CNEL	SPL	Time	Leq (1 hour Avg.)	Ldn	CNEL
44.8	13:31:18		44.8	44.8	55.3	13:36:18		55.3	55.3
44	13:31:21		44	44.0	50.5	13:36:21		50.5	50.5
44.4	13:31:24		44.4	44.4	51.1	13:36:24		51.1	51.1
44.4	13:31:27		44.4	44.4	48.6	13:36:27		48.6	48.6
46.3	13:31:30		46.3	46.3	49.5	13:36:30		49.5	49.5
44.6	13:31:33		44.6	44.6	49	13:36:33		49	49
46.1	13:31:36		46.1	46.1	49.4	13:36:36		49.4	49.4
45.6	13:31:39		45.6	45.6	55	13:36:39		55	55
46.1	13:31:42		46.1	46.1	55.7	13:36:42		55.7	55.7
45.4	13:31:45		45.4	45.4	50.7	13:36:45		50.7	50.7
46.1	13:31:48		46.1	46.1	53.6	13:36:48		53.6	53.6
47.3	13:31:51		47.3	47.3	51.7	13:36:51		51.7	51.7
48.2	13:31:54		48.2	48.2	52.7	13:36:54		52.7	52.7
51	13:31:57		51	51.0	57.9	13:36:57		57.9	57.9
46.5	13:32:00		46.5	46.5	56.5	13:37:00		56.5	56.5
48.1	13:32:03		48.1	48.1	55.8	13:37:03		55.8	55.8
49.6	13:32:06		49.6	49.6	52.8	13:37:06		52.8	52.8
47.6	13:32:09		47.6	47.6	56.4	13:37:09		56.4	56.4
49.5	13:32:12		49.5	49.5	62.4	13:37:12		62.4	62.4
50.6	13:32:15		50.6	50.6	75	13:37:15		75	75
48.8	13:32:18		48.8	48.8	64.5	13:37:18		64.5	64.5
54.8	13:32:21		54.8	54.8	65.8	13:37:21		65.8	65.8
62.2	13:32:24		62.2	62.2	69.6	13:37:24		69.6	69.6
67.2	13:32:27		67.2	67.2	57.2	13:37:27		57.2	57.2
56	13:32:30		56	56.0	54.1	13:37:30		54.1	54.1
45.7	13:32:33		45.7	45.7	60	13:37:33		60	60
44.7	13:32:36		44.7	44.7	53.6	13:37:36		53.6	53.6
48.2	13:32:39		48.2	48.2	50.6	13:37:39		50.6	50.6
46.4	13:32:42		46.4	46.4	48.6	13:37:42		48.6	48.6
45.2	13:32:45		45.2	45.2	48.5	13:37:45		48.5	48.5
43.2	13:32:48		43.2	43.2	49.4	13:37:48		49.4	49.4
43.6	13:32:51		43.6	43.6	51.2	13:37:51		51.2	51.2
45.1	13:32:54		45.1	45.1	50.2	13:37:54		50.2	50.2
40.5	13:32:57		40.5	40.5	56.8	13:37:57		56.8	56.8
43.9	13:33:00		43.9	43.9	55.2	13:38:00		55.2	55.2
41.9	13:33:03		41.9	41.9	56.5	13:38:03		56.5	56.5
42.4	13:33:06		42.4	42.4	52.4	13:38:06		52.4	52.4
40.8	13:33:09		40.8	40.8	54.5	13:38:09		54.5	54.5
43.2	13:33:12		43.2	43.2	61.1	13:38:12		61.1	61.1
43.3	13:33:15		43.3	43.3	66.2	13:38:15		66.2	66.2
42.9	13:33:18		42.9	42.9	57.8	13:38:18		57.8	57.8
46.3	13:33:21		46.3	46.3	63.8	13:38:21		63.8	63.8
46.8	13:33:24		46.8	46.8	56.6	13:38:24		56.6	56.6
61.7	13:33:27		61.7	61.7	53	13:38:27		53	53
65.6	13:33:30		65.6	65.6	58.6	13:38:30		58.6	58.6
52	13:33:33		52	52.0	68.2	13:38:33		68.2	68.2
48.4	13:33:36		48.4	48.4	62.2	13:38:36		62.2	62.2
48.5	13:33:39		48.5	48.5	57.4	13:38:39		57.4	57.4
49	13:33:42		49	49.0	55.6	13:38:42		55.6	55.6
48.3	13:33:45		48.3	48.3	55	13:38:45		55	55
44.7	13:33:48		44.7	44.7	54.5	13:38:48		54.5	54.5
43.8	13:33:51		43.8	43.8	57.5	13:38:51		57.5	57.5
42.8	13:33:54		42.8	42.8	58.2	13:38:54		58.2	58.2
42.3	13:33:57		42.3	42.3	58.2	13:38:57		58.2	58.2
41.6	13:34:00		41.6	41.6	59.4	13:39:00		59.4	59.4
42.8	13:34:03		42.8	42.8	59.4	13:39:03		59.4	59.4
42.9	13:34:06		42.9	42.9	61.4	13:39:06		61.4	61.4
42.5	13:34:09		42.5	42.5	61.3	13:39:09		61.3	61.3
46.9	13:34:12		46.9	46.9	56.3	13:39:12		56.3	56.3
60.9	13:34:15		60.9	60.9	57.5	13:39:15		57.5	57.5
69.4	13:34:18		69.4	69.4	57.8	13:39:18		57.8	57.8
55.5	13:34:21		55.5	55.5	55.7	13:39:21		55.7	55.7
45.2	13:34:24		45.2	45.2	63.1	13:39:24		63.1	63.1
42.8	13:34:27		42.8	42.8	67.6	13:39:27		67.6	67.6
45	13:34:30		45	45.0	60	13:39:30		60	60
45.4	13:34:33		45.4	45.4	55	13:39:33		55	55
48	13:34:36		48	48.0	52.6	13:39:36		52.6	52.6
45.4	13:34:39		45.4	45.4	53.1	13:39:39		53.1	53.1
43.8	13:34:42		43.8	43.8	53.8	13:39:42		53.8	53.8
42	13:34:45		42	42.0	57.8	13:39:45		57.8	57.8
42.9	13:34:48		42.9	42.9	55.7	13:39:48		55.7	55.7
42.1	13:34:51		42.1	42.1	51.6	13:39:51		51.6	51.6
41.7	13:34:54		41.7	41.7	52.5	13:39:54		52.5	52.5
42.1	13:34:57		42.1	42.1	51.1	13:39:57		51.1	51.1
43.4	13:35:00		43.4	43.4	51	13:40:00		51	51
44	13:35:03		44	44.0	53.3	13:40:03		53.3	53.3
44.9	13:35:06		44.9	44.9	51.4	13:40:06		51.4	51.4
44.5	13:35:09		44.5	44.5	52	13:40:09		52	52
47.5	13:35:12		47.5	47.5	60.5	13:40:12		60.5	60.5
44.2	13:35:15		44.2	44.2	73	13:40:15		73	73
43	13:35:18		43	43.0	67.7	13:40:18		67.7	67.7
43.4	13:35:21		43.4	43.4	67.5	13:40:21		67.5	67.5
43.4	13:35:24		43.4	43.4	55.9	13:40:24		55.9	55.9
43.8	13:35:27		43.8	43.8	51.2	13:40:27		51.2	51.2
45.4	13:35:30		45.4	45.4	51.7	13:40:30		51.7	51.7
47.3	13:35:33		47.3	47.3	56	13:40:33		56	56
47.4	13:35:36		47.4	47.4	68.3	13:40:36		68.3	68.3
46.8	13:35:39		46.8	46.8	70.2	13:40:39		70.2	70.2
46.6	13:35:42		46.6	46.6	63	13:40:42		63	63

Site A - On Project Site Fence Near Yorba Ave					Site B - On Project Site Fence Near Francis Ave				
SPL	Time	Leq (1 hour Avg.)	Ldn	CNEL	SPL	Time	Leq (1 hour Avg.)	Ldn	CNEL
44.6	13:35:45		44.6	44.6	63.6	13:40:45		63.6	63.6
45.6	13:35:48		45.6	45.6	78.4	13:40:48		78.4	78.4
46.4	13:35:51		46.4	46.4	68.9	13:40:51		68.9	68.9
45.9	13:35:54		45.9	45.9	60.1	13:40:54		60.1	60.1
44.8	13:35:57		44.8	44.8	57.6	13:40:57		57.6	57.6
45.7	13:36:00		45.7	45.7	57.3	13:41:00		57.3	57.3
45.8	13:36:03		45.8	45.8	57	13:41:03		57	57
43.6	13:36:06		43.6	43.6	57	13:41:06		57	57
42.7	13:36:09		42.7	42.7	57.3	13:41:09		57.3	57.3
42	13:36:12		42	42.0	57.6	13:41:12		57.6	57.6
41.7	13:36:15		41.7	41.7	58.5	13:41:15		58.5	58.5
41.4	13:36:18		41.4	41.4	65.5	13:41:18		65.5	65.5
41.1	13:36:21		41.1	41.1	66	13:41:21		66	66
41.6	13:36:24		41.6	41.6	58.4	13:41:24		58.4	58.4
45.2	13:36:27		45.2	45.2	56	13:41:27		56	56
42.2	13:36:30		42.2	42.2	56.4	13:41:30		56.4	56.4
42.6	13:36:33		42.6	42.6	61.6	13:41:33		61.6	61.6
44.2	13:36:36		44.2	44.2	55.6	13:41:36		55.6	55.6
44.8	13:36:39		44.8	44.8	53.6	13:41:39		53.6	53.6
43	13:36:42		43	43.0	52.4	13:41:42		52.4	52.4
44	13:36:45		44	44.0	53.4	13:41:45		53.4	53.4
43.7	13:36:48		43.7	43.7	56.9	13:41:48		56.9	56.9
44.2	13:36:51		44.2	44.2	65	13:41:51		65	65
44.9	13:36:54		44.9	44.9	63.3	13:41:54		63.3	63.3
48.3	13:36:57		48.3	48.3	67.8	13:41:57		67.8	67.8
66.6	13:37:00		66.6	66.6	73.6	13:42:00		73.6	73.6
67.8	13:37:03		67.8	67.8	64.2	13:42:03		64.2	64.2
56.4	13:37:06		56.4	56.4	56.4	13:42:06		56.4	56.4
50.2	13:37:09		50.2	50.2	53.6	13:42:09		53.6	53.6
46.8	13:37:12		46.8	46.8	55.8	13:42:12		55.8	55.8
46.2	13:37:15		46.2	46.2	59.5	13:42:15		59.5	59.5
47.2	13:37:18		47.2	47.2	60.1	13:42:18		60.1	60.1
44.5	13:37:21		44.5	44.5	55.6	13:42:21		55.6	55.6
44.4	13:37:24		44.4	44.4	51.1	13:42:24		51.1	51.1
43.3	13:37:27		43.3	43.3	49.5	13:42:27		49.5	49.5
43.1	13:37:30		43.1	43.1	48.1	13:42:30		48.1	48.1
43.4	13:37:33		43.4	43.4	47.3	13:42:33		47.3	47.3
46.1	13:37:36		46.1	46.1	48.3	13:42:36		48.3	48.3
43.9	13:37:39		43.9	43.9	48.7	13:42:39		48.7	48.7
43.1	13:37:42		43.1	43.1	47.9	13:42:42		47.9	47.9
45.1	13:37:45		45.1	45.1	50.1	13:42:45		50.1	50.1
44.3	13:37:48		44.3	44.3	49.8	13:42:48		49.8	49.8
44.4	13:37:51		44.4	44.4	52.6	13:42:51		52.6	52.6
44.4	13:37:54		44.4	44.4	52.7	13:42:54		52.7	52.7
45	13:37:57		45	45.0	50.7	13:42:57		50.7	50.7
45.4	13:38:00		45.4	45.4	55.6	13:43:00		55.6	55.6
45.9	13:38:03		45.9	45.9	66.2	13:43:03		66.2	66.2
47.4	13:38:06		47.4	47.4	70.6	13:43:06		70.6	70.6
47.7	13:38:09		47.7	47.7	70.6	13:43:09		70.6	70.6
46.3	13:38:12		46.3	46.3	58.2	13:43:12		58.2	58.2
46.4	13:38:15		46.4	46.4	49.4	13:43:15		49.4	49.4
45.3	13:38:18		45.3	45.3	48	13:43:18		48	48
47.3	13:38:21		47.3	47.3	48.6	13:43:21		48.6	48.6
45.8	13:38:24		45.8	45.8	48.3	13:43:24		48.3	48.3
45.3	13:38:27		45.3	45.3	49.8	13:43:27		49.8	49.8
45.2	13:38:30		45.2	45.2	57.9	13:43:30		57.9	57.9
44.9	13:38:33		44.9	44.9	72.7	13:43:33		72.7	72.7
45.1	13:38:36		45.1	45.1	65.6	13:43:36		65.6	65.6
45.6	13:38:39		45.6	45.6	56.7	13:43:39		56.7	56.7
47.9	13:38:42		47.9	47.9	52.2	13:43:42		52.2	52.2
48.8	13:38:45		48.8	48.8	53.1	13:43:45		53.1	53.1
55.2	13:38:48		55.2	55.2	51	13:43:48		51	51
54.7	13:38:51		54.7	54.7	53.2	13:43:51		53.2	53.2
52.2	13:38:54		52.2	52.2	57.7	13:43:54		57.7	57.7
53.2	13:38:57		53.2	53.2	69	13:43:57		69	69
54	13:39:00		54	54.0	63.9	13:44:00		63.9	63.9
53.8	13:39:03		53.8	53.8	60.5	13:44:03		60.5	60.5
54.2	13:39:06		54.2	54.2	66.6	13:44:06		66.6	66.6
59.1	13:39:09		59.1	59.1	60.5	13:44:09		60.5	60.5
52.3	13:39:12		52.3	52.3	55.7	13:44:12		55.7	55.7
56.4	13:39:15		56.4	56.4	55.2	13:44:15		55.2	55.2
51.9	13:39:18		51.9	51.9	55.4	13:44:18		55.4	55.4
52.5	13:39:21		52.5	52.5	54.8	13:44:21		54.8	54.8
51.4	13:39:24		51.4	51.4	56.8	13:44:24		56.8	56.8
47.6	13:39:27		47.6	47.6	60.9	13:44:27		60.9	60.9
47	13:39:30		47	47.0	61.9	13:44:30		61.9	61.9
46.5	13:39:33		46.5	46.5	66	13:44:33		66	66
48.5	13:39:36		48.5	48.5	69.1	13:44:36		69.1	69.1
49.8	13:39:39		49.8	49.8	69.7	13:44:39		69.7	69.7
48.5	13:39:42		48.5	48.5	65.6	13:44:42		65.6	65.6
48.6	13:39:45		48.6	48.6	68.9	13:44:45		68.9	68.9
48.4	13:39:48		48.4	48.4	62.7	13:44:48		62.7	62.7
47.5	13:39:51		47.5	47.5	57.6	13:44:51		57.6	57.6
49.2	13:39:54		49.2	49.2	54.8	13:44:54		54.8	54.8
53.5	13:39:57		53.5	53.5	58.4	13:44:57		58.4	58.4
49.1	13:40:00		49.1	49.1	57	13:45:00		57	57
50.7	13:40:03		50.7	50.7	61.3	13:45:03		61.3	61.3
50.4	13:40:06		50.4	50.4	59.8	13:45:06		59.8	59.8
48.4	13:40:09		48.4	48.4	59.6	13:45:09		59.6	59.6

Site A - On Project Site Fence Near Yorba Ave					Site B - On Project Site Fence Near Francis Ave				
SPL	Time	Leq (1 hour Avg.)	Ldn	CNEL	SPL	Time	Leq (1 hour Avg.)	Ldn	CNEL
48.8	13:40:12		48.8	48.8	60.2	13:45:12		60.2	60.2
48	13:40:15		48	48.0	62.4	13:45:15		62.4	62.4
49.1	13:40:18		49.1	49.1	64.1	13:45:18		64.1	64.1
49.8	13:40:21		49.8	49.8	72.8	13:45:21		72.8	72.8
47.1	13:40:24		47.1	47.1	62.2	13:45:24		62.2	62.2
46.4	13:40:27		46.4	46.4	57.7	13:45:27		57.7	57.7
46.9	13:40:30		46.9	46.9	66.9	13:45:30		66.9	66.9
46.8	13:40:33		46.8	46.8	69.1	13:45:33		69.1	69.1
46.6	13:40:36		46.6	46.6	60.7	13:45:36		60.7	60.7
45.7	13:40:39		45.7	45.7	70.2	13:45:39		70.2	70.2
47.7	13:40:42		47.7	47.7	70.1	13:45:42		70.1	70.1
46.4	13:40:45		46.4	46.4	62.3	13:45:45		62.3	62.3
46	13:40:48		46	46.0	69.5	13:45:48		69.5	69.5
47.1	13:40:51		47.1	47.1	59.9	13:45:51		59.9	59.9
46.8	13:40:54		46.8	46.8	55.4	13:45:54		55.4	55.4
50.6	13:40:57		50.6	50.6	54.4	13:45:57		54.4	54.4
57.6	13:41:00		57.6	57.6	60	13:46:00		60	60
62.7	13:41:03		62.7	62.7	69.4	13:46:03		69.4	69.4
56.4	13:41:06		56.4	56.4	62.9	13:46:06		62.9	62.9
48.3	13:41:09		48.3	48.3	54.3	13:46:09		54.3	54.3
47.3	13:41:12		47.3	47.3	59.3	13:46:12		59.3	59.3
53.9	13:41:15		53.9	53.9	54.5	13:46:15		54.5	54.5
71.6	13:41:18		71.6	71.6	56.6	13:46:18		56.6	56.6
58	13:41:21		58	58.0	68.6	13:46:21		68.6	68.6
49.3	13:41:24		49.3	49.3	76.4	13:46:24		76.4	76.4
45.6	13:41:27		45.6	45.6	84.4	13:46:27		84.4	84.4
45	13:41:30		45	45.0	86.4	13:46:30		86.4	86.4
47.7	13:41:33		47.7	47.7	74.7	13:46:33		74.7	74.7
47.3	13:41:36		47.3	47.3	66.9	13:46:36		66.9	66.9
46	13:41:39		46	46.0	69.8	13:46:39		69.8	69.8
47.2	13:41:42		47.2	47.2	68.4	13:46:42		68.4	68.4
46.9	13:41:45		46.9	46.9	72.2	13:46:45		72.2	72.2
47.7	13:41:48		47.7	47.7	65.9	13:46:48		65.9	65.9
46.8	13:41:51		46.8	46.8	58.2	13:46:51		58.2	58.2
48.5	13:41:54		48.5	48.5	56	13:46:54		56	56
47	13:41:57		47	47.0	57.9	13:46:57		57.9	57.9
44.2	13:42:00		44.2	44.2	57	13:47:00		57	57
45.2	13:42:03		45.2	45.2	53.5	13:47:03		53.5	53.5
44.3	13:42:06		44.3	44.3	51.8	13:47:06		51.8	51.8
43.4	13:42:09		43.4	43.4	55.5	13:47:09		55.5	55.5
45.1	13:42:12		45.1	45.1	52.8	13:47:12		52.8	52.8
44.2	13:42:15		44.2	44.2	53.5	13:47:15		53.5	53.5
43.5	13:42:18		43.5	43.5	57.1	13:47:18		57.1	57.1
44.7	13:42:21		44.7	44.7	66.8	13:47:21		66.8	66.8
44.8	13:42:24		44.8	44.8	61.3	13:47:24		61.3	61.3
44.1	13:42:27		44.1	44.1	53.3	13:47:27		53.3	53.3
44	13:42:30		44	44.0	53.7	13:47:30		53.7	53.7
44.9	13:42:33		44.9	44.9	55.5	13:47:33		55.5	55.5
44.6	13:42:36		44.6	44.6	57.7	13:47:36		57.7	57.7
46.5	13:42:39		46.5	46.5	68.6	13:47:39		68.6	68.6
47.3	13:42:42		47.3	47.3	68.2	13:47:42		68.2	68.2
49.4	13:42:45		49.4	49.4	57.8	13:47:45		57.8	57.8
44.7	13:42:48		44.7	44.7	52	13:47:48		52	52
44.1	13:42:51		44.1	44.1	52.2	13:47:51		52.2	52.2
47	13:42:54		47	47.0	51.5	13:47:54		51.5	51.5
58.4	13:42:57		58.4	58.4	53.6	13:47:57		53.6	53.6
67.1	13:43:00		67.1	67.1	52.4	13:48:00		52.4	52.4
53.2	13:43:03		53.2	53.2	51.2	13:48:03		51.2	51.2
45.1	13:43:06		45.1	45.1	56.3	13:48:06		56.3	56.3
43.2	13:43:09		43.2	43.2	55.8	13:48:09		55.8	55.8
46.4	13:43:12		46.4	46.4	54.5	13:48:12		54.5	54.5
50.1	13:43:15		50.1	50.1	54.1	13:48:15		54.1	54.1
47.8	13:43:18		47.8	47.8	54.6	13:48:18		54.6	54.6
45.7	13:43:21		45.7	45.7	54.9	13:48:21		54.9	54.9
47.6	13:43:24		47.6	47.6	54.1	13:48:24		54.1	54.1
46.4	13:43:27		46.4	46.4	54.4	13:48:27		54.4	54.4
48.1	13:43:30		48.1	48.1	53.2	13:48:30		53.2	53.2
46	13:43:33		46	46.0	51.9	13:48:33		51.9	51.9
44.8	13:43:36		44.8	44.8	50.5	13:48:36		50.5	50.5
44.2	13:43:39		44.2	44.2	52.7	13:48:39		52.7	52.7
46.1	13:43:42		46.1	46.1	53.3	13:48:42		53.3	53.3
47.1	13:43:45		47.1	47.1	53.8	13:48:45		53.8	53.8
49.8	13:43:48		49.8	49.8	52.2	13:48:48		52.2	52.2
48	13:43:51		48	48.0	57.5	13:48:51		57.5	57.5
50.5	13:43:54		50.5	50.5	70.8	13:48:54		70.8	70.8
49.2	13:43:57		49.2	49.2	63.6	13:48:57		63.6	63.6
50.6	13:44:00		50.6	50.6	56.3	13:49:00		56.3	56.3
57.7	13:44:03		57.7	57.7	55.3	13:49:03		55.3	55.3
55.7	13:44:06		55.7	55.7	55.7	13:49:06		55.7	55.7
57.7	13:44:09		57.7	57.7	57.5	13:49:09		57.5	57.5
67.9	13:44:12		67.9	67.9	56.1	13:49:12		56.1	56.1
58.6	13:44:15		58.6	58.6	62.5	13:49:15		62.5	62.5
57.3	13:44:18		57.3	57.3	57.4	13:49:18		57.4	57.4
58	13:44:21		58	58.0	57	13:49:21		57	57
54.6	13:44:24		54.6	54.6	70	13:49:24		70	70
54.4	13:44:27		54.4	54.4	67.6	13:49:27		67.6	67.6
49.6	13:44:30		49.6	49.6	64	13:49:30		64	64
52.6	13:44:33		52.6	52.6	66.3	13:49:33		66.3	66.3
48.6	13:44:36		48.6	48.6	70.3	13:49:36		70.3	70.3

Site A - On Project Site Fence Near Yorba Ave					Site B - On Project Site Fence Near Francis Ave				
SPL	Time	Leq (1 hour Avg.)	Ldn	CNEL	SPL	Time	Leq (1 hour Avg.)	Ldn	CNEL
46.8	13:44:39		46.8	46.8	77.6	13:49:39		77.6	77.6
47.8	13:44:42		47.8	47.8	82.3	13:49:42		82.3	82.3
49	13:44:45		49	49.0	80.6	13:49:45		80.6	80.6
47.1	13:44:48		47.1	47.1	71.3	13:49:48		71.3	71.3
47.4	13:44:51		47.4	47.4	69.6	13:49:51		69.6	69.6
46.4	13:44:54		46.4	46.4	75.6	13:49:54		75.6	75.6
46.8	13:44:57		46.8	46.8	71.2	13:49:57		71.2	71.2
45.6	13:45:00		45.6	45.6	62.5	13:50:00		62.5	62.5
50.2	13:45:03		50.2	50.2	71.1	13:50:03		71.1	71.1
46.2	13:45:06		46.2	46.2	69.2	13:50:06		69.2	69.2
49.7	13:45:09		49.7	49.7	60.8	13:50:09		60.8	60.8
51.9	13:45:12		51.9	51.9	55.9	13:50:12		55.9	55.9
51.3	13:45:15		51.3	51.3	56.8	13:50:15		56.8	56.8
50.9	13:45:18		50.9	50.9	65.3	13:50:18		65.3	65.3
49.4	13:45:21		49.4	49.4	66.2	13:50:21		66.2	66.2
49.2	13:45:24		49.2	49.2	58.6	13:50:24		58.6	58.6
48.1	13:45:27		48.1	48.1	61.5	13:50:27		61.5	61.5
47.6	13:45:30		47.6	47.6	62.7	13:50:30		62.7	62.7
50.8	13:45:33		50.8	50.8	68	13:50:33		68	68
49.3	13:45:36		49.3	49.3	76.3	13:50:36		76.3	76.3
49.1	13:45:39		49.1	49.1	64.4	13:50:39		64.4	64.4
46.2	13:45:42		46.2	46.2	56.2	13:50:42		56.2	56.2
50.9	13:45:45		50.9	50.9	55.6	13:50:45		55.6	55.6
57.1	13:45:48		57.1	57.1	56.5	13:50:48		56.5	56.5
52.3	13:45:51		52.3	52.3	54.8	13:50:51		54.8	54.8
53.8	13:45:54		53.8	53.8	55.8	13:50:54		55.8	55.8
46.7	13:45:57		46.7	46.7	52.6	13:50:57		52.6	52.6
46.4	13:46:00		46.4	46.4	52.7	13:51:00		52.7	52.7
48.4	13:46:03		48.4	48.4	52.2	13:51:03		52.2	52.2
49.5	13:46:06		49.5	49.5	50.9	13:51:06		50.9	50.9
48.1	13:46:09		48.1	48.1	54.1	13:51:09		54.1	54.1
48.7	13:46:12		48.7	48.7	52	13:51:12		52	52
51.1	13:46:15		51.1	51.1	49.2	13:51:15		49.2	49.2
53.2	13:46:18		53.2	53.2	51.2	13:51:18		51.2	51.2
64.5	13:46:21		64.5	64.5	52.7	13:51:21		52.7	52.7
61.8	13:46:24		61.8	61.8	68.2	13:51:24		68.2	68.2
49.9	13:46:27		49.9	49.9	71.2	13:51:27		71.2	71.2
47.3	13:46:30		47.3	47.3	61.5	13:51:30		61.5	61.5
49.8	13:46:33		49.8	49.8	65.5	13:51:33		65.5	65.5
49.1	13:46:36		49.1	49.1	68.7	13:51:36		68.7	68.7
46.3	13:46:39		46.3	46.3	69.3	13:51:39		69.3	69.3
47.3	13:46:42		47.3	47.3	58.6	13:51:42		58.6	58.6
46.7	13:46:45		46.7	46.7	51.1	13:51:45		51.1	51.1
49	13:46:48		49	49.0	52.4	13:51:48		52.4	52.4
48.8	13:46:51		48.8	48.8	52.9	13:51:51		52.9	52.9
49.3	13:46:54		49.3	49.3	56.4	13:51:54		56.4	56.4
49.1	13:46:57		49.1	49.1	51.6	13:51:57		51.6	51.6
46	13:47:00		46	46.0	54.4	13:52:00		54.4	54.4
49.5	13:47:03		49.5	49.5	58.4	13:52:03		58.4	58.4
52.3	13:47:06		52.3	52.3	67.3	13:52:06		67.3	67.3
51	13:47:09		51	51.0	69.2	13:52:09		69.2	69.2
48.9	13:47:12		48.9	48.9	62.8	13:52:12		62.8	62.8
46.7	13:47:15		46.7	46.7	67.7	13:52:15		67.7	67.7
50	13:47:18		50	50.0	69.5	13:52:18		69.5	69.5
47.7	13:47:21		47.7	47.7	68.6	13:52:21		68.6	68.6
51.6	13:47:24		51.6	51.6	57.9	13:52:24		57.9	57.9
50.2	13:47:27		50.2	50.2	54.7	13:52:27		54.7	54.7
46.8	13:47:30		46.8	46.8	54.8	13:52:30		54.8	54.8
49.7	13:47:33		49.7	49.7	53	13:52:33		53	53
48.2	13:47:36		48.2	48.2	52.8	13:52:36		52.8	52.8
49.9	13:47:39		49.9	49.9	52.3	13:52:39		52.3	52.3
47.4	13:47:42		47.4	47.4	52	13:52:42		52	52
52.5	13:47:45		52.5	52.5	50.7	13:52:45		50.7	50.7
49.8	13:47:48		49.8	49.8	50.5	13:52:48		50.5	50.5
53	13:47:51		53	53.0	55.5	13:52:51		55.5	55.5
51	13:47:54		51	51.0	65.5	13:52:54		65.5	65.5
47.8	13:47:57		47.8	47.8	68	13:52:57		68	68
49.7	13:48:00		49.7	49.7	57.4	13:53:00		57.4	57.4
48.8	13:48:03		48.8	48.8	54.8	13:53:03		54.8	54.8
49.3	13:48:06		49.3	49.3	58.4	13:53:06		58.4	58.4
49.6	13:48:09		49.6	49.6	54.8	13:53:09		54.8	54.8
48.4	13:48:12		48.4	48.4	52.8	13:53:12		52.8	52.8
48.9	13:48:15		48.9	48.9	52.7	13:53:15		52.7	52.7
49.9	13:48:18		49.9	49.9	53.9	13:53:18		53.9	53.9
60.8	13:48:21		60.8	60.8	53.4	13:53:21		53.4	53.4
65.8	13:48:24		65.8	65.8	52.2	13:53:24		52.2	52.2
53.5	13:48:27		53.5	53.5	52.6	13:53:27		52.6	52.6
60.5	13:48:30		60.5	60.5	52.9	13:53:30		52.9	52.9
68.4	13:48:33		68.4	68.4	53.5	13:53:33		53.5	53.5
68.6	13:48:36		68.6	68.6	53.1	13:53:36		53.1	53.1
56.9	13:48:39		56.9	56.9	54	13:53:39		54	54
51	13:48:42		51	51.0	54	13:53:42		54	54
48	13:48:45		48	48.0	54.2	13:53:45		54.2	54.2
49.1	13:48:48		49.1	49.1	54.1	13:53:48		54.1	54.1
49.7	13:48:51		49.7	49.7	54	13:53:51		54	54
48.7	13:48:54		48.7	48.7	53.5	13:53:54		53.5	53.5
52.2	13:48:57		52.2	52.2	54.5	13:53:57		54.5	54.5
61.6	13:49:00		61.6	61.6	54.1	13:54:00		54.1	54.1
64.2	13:49:03		64.2	64.2	54.2	13:54:03		54.2	54.2
54.2	13:49:06		54.2	54.2	59.9	13:54:06		59.9	59.9
50.1	13:49:09		50.1	50.1	72.8	13:54:09		72.8	72.8
50.2	13:49:12		50.2	50.2	71.6	13:54:12		71.6	71.6
54.1	13:49:15		54.1	54.1	73	13:54:15		73	73
58.5	13:49:18		58.5	58.5	61.9	13:54:18		61.9	61.9
53.9	13:49:21		53.9	53.9	55.4	13:54:21		55.4	55.4

Site A - On Project Site Fence Near Yorba Ave					Site B - On Project Site Fence Near Francis Ave				
SPL	Time	Leq (1 hour Avg.)	Ldn	CNEL	SPL	Time	Leq (1 hour Avg.)	Ldn	CNEL
55.4	13:49:24		55.4	55.4	52.2	13:54:24		52.2	52.2
61	13:49:27		61	61.0	54.9	13:54:27		54.9	54.9
56.7	13:49:30		56.7	56.7	56.4	13:54:30		56.4	56.4
56.5	13:49:33		56.5	56.5	55.3	13:54:33		55.3	55.3
58.8	13:49:36		58.8	58.8	56.4	13:54:36		56.4	56.4
55.4	13:49:39		55.4	55.4	54.5	13:54:39		54.5	54.5
52.1	13:49:42		52.1	52.1	55.2	13:54:42		55.2	55.2
53.6	13:49:45		53.6	53.6	53.1	13:54:45		53.1	53.1
50.2	13:49:48		50.2	50.2	53.3	13:54:48		53.3	53.3
49.5	13:49:51		49.5	49.5	56.6	13:54:51		56.6	56.6
49.3	13:49:54		49.3	49.3	64.3	13:54:54		64.3	64.3
49.1	13:49:57		49.1	49.1	68.2	13:54:57		68.2	68.2
54.5	13:50:00		54.5	54.5	64.1	13:55:00		64.1	64.1
65.8	13:50:03		65.8	65.8	70.8	13:55:03		70.8	70.8
54.7	13:50:06		54.7	54.7	72.2	13:55:06		72.2	72.2
51.7	13:50:09		51.7	51.7	76.7	13:55:09		76.7	76.7
51.1	13:50:12		51.1	51.1	67.6	13:55:12		67.6	67.6
49.4	13:50:15		49.4	49.4	57.8	13:55:15		57.8	57.8
52.2	13:50:18		52.2	52.2	53.6	13:55:18		53.6	53.6
51.6	13:50:21		51.6	51.6	54.7	13:55:21		54.7	54.7
49.6	13:50:24		49.6	49.6	58.7	13:55:24		58.7	58.7
54.1	13:50:27		54.1	54.1	66.9	13:55:27		66.9	66.9
55.4	13:50:30		55.4	55.4	65.8	13:55:30		65.8	65.8
52.8	13:50:33		52.8	52.8	59.5	13:55:33		59.5	59.5
52.4	13:50:36		52.4	52.4	52.6	13:55:36		52.6	52.6
53.7	13:50:39		53.7	53.7	55.1	13:55:39		55.1	55.1
52.7	13:50:42		52.7	52.7	54.2	13:55:42		54.2	54.2
51.4	13:50:45		51.4	51.4	57.6	13:55:45		57.6	57.6
51.7	13:50:48		51.7	51.7	57.7	13:55:48		57.7	57.7
53.4	13:50:51		53.4	53.4	59.2	13:55:51		59.2	59.2
52.8	13:50:54		52.8	52.8	57.8	13:55:54		57.8	57.8
48.9	13:50:57		48.9	48.9	52.5	13:55:57		52.5	52.5
49.3	13:51:00		49.3	49.3	54.2	13:56:00		54.2	54.2
48.9	13:51:03		48.9	48.9	54.4	13:56:03		54.4	54.4
50.3	13:51:06		50.3	50.3	58.6	13:56:06		58.6	58.6
48.8	13:51:09		48.8	48.8	58.4	13:56:09		58.4	58.4
50.5	13:51:12		50.5	50.5	63.6	13:56:12		63.6	63.6
51.3	13:51:15		51.3	51.3	73.6	13:56:15		73.6	73.6
50.5	13:51:18		50.5	50.5	68.5	13:56:18		68.5	68.5
47.7	13:51:21		47.7	47.7	60.7	13:56:21		60.7	60.7
48	13:51:24		48	48.0	58.9	13:56:24		58.9	58.9
47.1	13:51:27		47.1	47.1	56.7	13:56:27		56.7	56.7
47.5	13:51:30		47.5	47.5	54.5	13:56:30		54.5	54.5
46.3	13:51:33		46.3	46.3	54.9	13:56:33		54.9	54.9
47.7	13:51:36		47.7	47.7	59.9	13:56:36		59.9	59.9
45.8	13:51:39		45.8	45.8	72.6	13:56:39		72.6	72.6
45.7	13:51:42		45.7	45.7	69	13:56:42		69	69
46	13:51:45		46	46.0	66.5	13:56:45		66.5	66.5
45.7	13:51:48		45.7	45.7	70.9	13:56:48		70.9	70.9
46.4	13:51:51		46.4	46.4	63	13:56:51		63	63
46.8	13:51:54		46.8	46.8	58	13:56:54		58	58
45.6	13:51:57		45.6	45.6	57	13:56:57		57	57
45.4	13:52:00		45.4	45.4	58.4	13:57:00		58.4	58.4
46.6	13:52:03		46.6	46.6	60.4	13:57:03		60.4	60.4
47	13:52:06		47	47.0	73.6	13:57:06		73.6	73.6
46.5	13:52:09		46.5	46.5	64.3	13:57:09		64.3	64.3
48.2	13:52:12		48.2	48.2	70.2	13:57:12		70.2	70.2
50.2	13:52:15		50.2	50.2	64.7	13:57:15		64.7	64.7
48.8	13:52:18		48.8	48.8	60.3	13:57:18		60.3	60.3
51.2	13:52:21		51.2	51.2	65.8	13:57:21		65.8	65.8
53.3	13:52:24		53.3	53.3	69.6	13:57:24		69.6	69.6
51.2	13:52:27		51.2	51.2	63.5	13:57:27		63.5	63.5
50.4	13:52:30		50.4	50.4	59.4	13:57:30		59.4	59.4
46.6	13:52:33		46.6	46.6	59	13:57:33		59	59
46.9	13:52:36		46.9	46.9	57.6	13:57:36		57.6	57.6
48.4	13:52:39		48.4	48.4	55	13:57:39		55	55
48.4	13:52:42		48.4	48.4	53.4	13:57:42		53.4	53.4
45.9	13:52:45		45.9	45.9	54.7	13:57:45		54.7	54.7
47.4	13:52:48		47.4	47.4	54.3	13:57:48		54.3	54.3
46.8	13:52:51		46.8	46.8	55.8	13:57:51		55.8	55.8
50.2	13:52:54		50.2	50.2	55.4	13:57:54		55.4	55.4
49	13:52:57		49	49.0	64.2	13:57:57		64.2	64.2
48.2	13:53:00	58.8	48.2	48.2	68.6	13:58:00	66.2	68.6	68.6
46.6	13:53:03	58.8	46.6	46.6	58.2	13:58:03	66.2	58.2	58.2
47.6	13:53:06	58.8	47.6	47.6	64.4	13:58:06	66.2	64.4	64.4
49.6	13:53:09	58.7	49.6	49.6	70.1	13:58:09	66.2	70.1	70.1
47.9	13:53:12	58.7	47.9	47.9	58.9	13:58:12	66.2	58.9	58.9
48.2	13:53:15	58.7	48.2	48.2	63.9	13:58:15	66.2	63.9	63.9
47.6	13:53:18	58.7	47.6	47.6	74	13:58:18	66.2	74	74
49.9	13:53:21	58.7	49.9	49.9	64.3	13:58:21	66.2	64.3	64.3
52.2	13:53:24	58.7	52.2	52.2	59.6	13:58:24	66.2	59.6	59.6
59.3	13:53:27	58.7	59.3	59.3	62.2	13:58:27	66.2	62.2	62.2
67.7	13:53:30	58.7	67.7	67.7	72.4	13:58:30	66.2	72.4	72.4
59	13:53:33	58.6	59	59.0	63.4	13:58:33	66.2	63.4	63.4
59.8	13:53:36	58.6	59.8	59.8	55.9	13:58:36	66.2	55.9	55.9
59.3	13:53:39	58.6	59.3	59.3	58.1	13:58:39	66.2	58.1	58.1
67.9	13:53:42	58.6	67.9	67.9	54.9	13:58:42	66.2	54.9	54.9
53.9	13:53:45	58.6	53.9	53.9	53.6	13:58:45	66.2	53.6	53.6
47.8	13:53:48	58.7	47.8	47.8	53.8	13:58:48	66.2	53.8	53.8
47	13:53:51	58.7	47	47.0	55.7	13:58:51	66.2	55.7	55.7
49	13:53:54	58.7	49	49.0	56.2	13:58:54	66.2	56.2	56.2
50.6	13:53:57	58.7	50.6	50.6	65.9	13:58:57	66.2	65.9	65.9
48.8	13:54:00	58.7	48.8	48.8	61.9	13:59:00	66.2	61.9	61.9
55.9	13:54:03	58.1	55.9	55.9	57.8	13:59:03	66.1	57.8	57.8
71.8	13:54:06	58.1	71.8	71.8	55	13:59:06	66.1	55	55
57.8	13:54:09	58.1	57.8	57.8	53.4	13:59:09	66.1	53.4	53.4
50.4	13:54:12	58.1	50.4	50.4	53.6	13:59:12	66.1	53.6	53.6
48.1	13:54:15	58.1	48.1	48.1	53.2	13:59:15	66.1	53.2	53.2
48.5	13:54:18	58.1	48.5	48.5	56.6	13:59:18	66.1	56.6	56.6
49.7	13:54:21	58.1	49.7	49.7	55.2	13:59:21	66.1	55.2	55.2
49.6	13:54:24	58.1	49.6	49.6	57.9	13:59:24	66.2	57.9	57.9
50.2	13:54:27	58.0	50.2	50.2	64.7	13:59:27	66.2	64.7	64.7
49.3	13:54:30	58.0	49.3	49.3	66.6	13:59:30	66.2	66.6	66.6

APPENDIX C

RCNM Model Construction Noise Calculation Printouts

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 6/28/2021
Case Description: Yorba Villas Residential - Site Preparation

				---- Receptor #1 ----
		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Home to North	Residential	55.9	55.9	55.9

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	310	0
Dozer	No	40		81.7	310	0
Dozer	No	40		81.7	310	0
Tractor	No	40	84		310	0
Front End Loader	No	40		79.1	310	0
Backhoe	No	40		77.6	310	0
Tractor	No	40	84		310	0

			Results			
	Calculated (dBA)			Noise Limits (dBA)		
			Day		Evening	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer	65.8	61.8	N/A	N/A	N/A	N/A
Dozer	65.8	61.8	N/A	N/A	N/A	N/A
Dozer	65.8	61.8	N/A	N/A	N/A	N/A
Tractor	68.2	64.2	N/A	N/A	N/A	N/A
Front End Loader	63.3	59.3	N/A	N/A	N/A	N/A
Backhoe	61.7	57.7	N/A	N/A	N/A	N/A
Tractor	68.2	64.2	N/A	N/A	N/A	N/A
Total	**68**	**71**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 6/28/2021
Case Description: Yorba Villas Residential - Site Preparation

				---- Receptor #2 ----
		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Home to West	Residential	63.3	63.3	63.3

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	335	0
Dozer	No	40		81.7	335	0
Dozer	No	40		81.7	335	0
Tractor	No	40	84		335	0
Front End Loader	No	40		79.1	335	0
Backhoe	No	40		77.6	335	0
Tractor	No	40	84		335	0

			Results			
	Calculated (dBA)			Noise Limits (dBA)		
			Day		Evening	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer	65.1	61.2	N/A	N/A	N/A	N/A
Dozer	65.1	61.2	N/A	N/A	N/A	N/A
Dozer	65.1	61.2	N/A	N/A	N/A	N/A
Tractor	67.5	63.5	N/A	N/A	N/A	N/A
Front End Loader	62.6	58.6	N/A	N/A	N/A	N/A
Backhoe	61.0	57.1	N/A	N/A	N/A	N/A
Tractor	67.5	63.5	N/A	N/A	N/A	N/A
Total	**68**	**70**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 6/28/2021
Case Description: Yorba Villas Residential - Grading

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to North	Residential	55.9	55.9	55.9

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	310	0
Excavator	No	40		80.7	310	0
Grader	No	40	85		310	0
Dozer	No	40		81.7	310	0
Scraper	No	40		83.6	310	0
Scraper	No	40		83.6	310	0
Tractor	No	40	84		310	0
Front End Loader	No	40		79.1	310	0

	Calculated (dBA)		Results Noise Limits (dBA) Day		Evening	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq
Excavator	64.9	60.9	N/A	N/A	N/A	N/A
Excavator	64.9	60.9	N/A	N/A	N/A	N/A
Grader	69.2	65.2	N/A	N/A	N/A	N/A
Dozer	65.8	61.8	N/A	N/A	N/A	N/A
Scraper	67.7	63.8	N/A	N/A	N/A	N/A
Scraper	67.7	63.8	N/A	N/A	N/A	N/A
Tractor	68.2	64.2	N/A	N/A	N/A	N/A
Front End Loader	63.3	59.3	N/A	N/A	N/A	N/A
Total	**69**	**72**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 6/28/2021
Case Description: Yorba Villas Residential - Grading

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to West	Residential	63.3	63.3	63.3

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	335	0
Excavator	No	40		80.7	335	0
Grader	No	40	85		335	0
Dozer	No	40		81.7	335	0
Scraper	No	40		83.6	335	0
Scraper	No	40		83.6	335	0
Tractor	No	40	84		335	0
Front End Loader	No	40		79.1	335	0

Equipment		Calculated (dBA) *Lmax	Leq	Results Day Lmax	Noise Limits (dBA) Leq	Evening Lmax	Leq
Excavator		64.2	60.2	N/A	N/A	N/A	N/A
Excavator		64.2	60.2	N/A	N/A	N/A	N/A
Grader		68.5	64.5	N/A	N/A	N/A	N/A
Dozer		65.1	61.2	N/A	N/A	N/A	N/A
Scraper		67.1	63.1	N/A	N/A	N/A	N/A
Scraper		67.1	63.1	N/A	N/A	N/A	N/A
Tractor		67.5	63.5	N/A	N/A	N/A	N/A
Front End Loader		62.6	58.6	N/A	N/A	N/A	N/A
	Total	**69**	**71**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 6/28/2021
Case Description: Yorba Villas Residential - Building Construction

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to North	Residential	55.9	55.9	55.9

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	310	0
Excavator	No	40		80.7	310	0
Grader	No	40	85		310	0
Dozer	No	40		81.7	310	0
Scraper	No	40		83.6	310	0
Scraper	No	40		83.6	310	0
Tractor	No	40	84		310	0
Front End Loader	No	40		79.1	310	0
Backhoe	No	40		77.6	310	0

Equipment	Calculated (dBA) *Lmax	Leq	Results Day Lmax	Noise Limits (dBA) Day Leq	Evening Lmax	Evening Leq
Excavator	64.9	60.9	N/A	N/A	N/A	N/A
Excavator	64.9	60.9	N/A	N/A	N/A	N/A
Grader	69.2	65.2	N/A	N/A	N/A	N/A
Dozer	65.8	61.8	N/A	N/A	N/A	N/A
Scraper	67.7	63.8	N/A	N/A	N/A	N/A
Scraper	67.7	63.8	N/A	N/A	N/A	N/A
Tractor	68.2	64.2	N/A	N/A	N/A	N/A
Front End Loader	63.3	59.3	N/A	N/A	N/A	N/A
Backhoe	61.7	57.7	N/A	N/A	N/A	N/A
Total	**69**	**72**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 6/28/2021
Case Description: Yorba Villas Residential - Building Construction

				---- Receptor #2 ----
		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Home to West	Residential	63.3	63.3	63.3

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	335	0
Excavator	No	40		80.7	335	0
Grader	No	40	85		335	0
Dozer	No	40		81.7	335	0
Scraper	No	40		83.6	335	0
Scraper	No	40		83.6	335	0
Tractor	No	40	84		335	0
Front End Loader	No	40		79.1	335	0
Backhoe	No	40		77.6	335	0

			Results			
	Calculated (dBA)		Noise Limits (dBA)			
			Day		Evening	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq
Excavator	64.2	60.2	N/A	N/A	N/A	N/A
Excavator	64.2	60.2	N/A	N/A	N/A	N/A
Grader	68.5	64.5	N/A	N/A	N/A	N/A
Dozer	65.1	61.2	N/A	N/A	N/A	N/A
Scraper	67.1	63.1	N/A	N/A	N/A	N/A
Scraper	67.1	63.1	N/A	N/A	N/A	N/A
Tractor	67.5	63.5	N/A	N/A	N/A	N/A
Front End Loader	62.6	58.6	N/A	N/A	N/A	N/A
Backhoe	61.0	57.1	N/A	N/A	N/A	N/A
Total	**69**	**71**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 6/28/2021
Case Description: Yorba Villas Residential - Paving

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to North	Residential	55.9	55.9	55.9

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	310	0
Paver	No	50		77.2	310	0
Paver	No	50		77.2	310	0
Paver	No	50		77.2	310	0
Roller	No	20		80	310	0
Roller	No	20		80	310	0

Equipment	Calculated (dBA) *Lmax	Leq	Results Day Lmax	Noise Limits (dBA) Day Leq	Evening Lmax	Evening Leq
Paver	61.4	58.4	N/A	N/A	N/A	N/A
Paver	61.4	58.4	N/A	N/A	N/A	N/A
Paver	61.4	58.4	N/A	N/A	N/A	N/A
Paver	61.4	58.4	N/A	N/A	N/A	N/A
Roller	64.2	57.2	N/A	N/A	N/A	N/A
Roller	64.2	57.2	N/A	N/A	N/A	N/A
Total	**64**	**66**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 6/28/2021
Case Description: Yorba Villas Residential - Paving

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to West	Residential	63.3	63.3	63.3

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	335	0
Paver	No	50		77.2	335	0
Paver	No	50		77.2	335	0
Paver	No	50		77.2	335	0
Roller	No	20		80	335	0
Roller	No	20		80	335	0

Equipment	Calculated (dBA) *Lmax	Leq	Results Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq
Paver	60.7	57.7	N/A	N/A	N/A	N/A
Paver	60.7	57.7	N/A	N/A	N/A	N/A
Paver	60.7	57.7	N/A	N/A	N/A	N/A
Paver	60.7	57.7	N/A	N/A	N/A	N/A
Roller	63.5	56.5	N/A	N/A	N/A	N/A
Roller	63.5	56.5	N/A	N/A	N/A	N/A
Total	**64**	**65**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 6/28/2021
Case Description: Yorba Villas Residential - Painting

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to North	Residential	55.9	55.9	55.9

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	310	0

Equipment		Calculated (dBA) *Lmax	Leq	Results Day Lmax	Day Leq	Noise Limits (dBA) Evening Lmax	Evening Leq
Compressor (air)		61.8	57.8	N/A	N/A	N/A	N/A
	Total	**62**	**58**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Home to West	Residential	63.3	63.3	63.3

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	335	0

Equipment		Calculated (dBA) *Lmax	Leq	Results Day Lmax	Day Leq	Noise Limits (dBA) Evening Lmax	Evening Leq
Compressor (air)		61.1	57.2	N/A	N/A	N/A	N/A
	Total	**61**	**57**	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

APPENDIX D

FHWA Model Offsite Traffic Noise Calculation Printouts

FHWA-RD-77-108 HIGHWAY TRAFFIC NOISE PREDICTION MODEL

Scenario: EXISTING CONDITIONS

Project: Yorba Villas Residential
Site Conditions: Soft

	Vehicle Mix 1 (Local)				Vehicle Mix 2 (Arterial)				Vehicle Mix 3 (SR 83)			
Vehicle Type	Day	Evening	Night	Daily	Day	Evening	Night	Daily	Day	Evenin	Night	Daily
Automobiles	73.60%	13.60%	10.22%	97.42%	69.50%	12.90%	9.60%	92.00%	65.20%	13.36%	15.63%	94.20%
Medium Trucks	0.90%	0.90%	0.04%	1.84%	1.44%	0.06%	1.50%	3.00%	1.48%	0.29%	0.95%	2.72%
Heavy Trucks	0.35%	0.04%	0.35%	0.74%	2.40%	0.10%	2.50%	5.00%	1.53%	0.16%	1.39%	3.08%

Road Name: Francis Avenue **Segment: West of Yorba Avenue**

Average Daily Traffic: 3580 Vehicles Vehicle Speed: 35 MPH Vehicle Mix: 2 Roadway Classification: Secondary

	NOISE PARAMETERS AT 50 FEET FROM CENTERLINE (Equiv. Lane Dist: 45.38 ft)										**Centerline Distance to**		
	Noise Adjustments				**Unmitigated Noise Levels**						**Noise Contour (in feet)**		
Vehicle Type	REMEL	Traffic Adj.	Dist Adj.	Finite Adj	Leq Peak	Leq Day	Leq Eve.	Leq Night	Ldn	CNEL		Ldn	CNEL
Automobiles	65.11	-5.57	0.53	-1.20	58.87	56.50	55.20	49.15	57.58	58.21	70 dBA:	**9**	**10**
Medium Trucks	74.83	-20.44	0.53	-1.20	53.72	34.51	26.73	35.94	42.09	42.13	65 dBA:	**19**	**20**
Heavy Trucks	80.05	-18.22	0.53	-1.20	61.16	44.17	36.39	45.59	51.75	51.78	60 dBA:	**41**	**44**
				Total:	**63.64**	**56.77**	**55.27**	**50.88**	**58.68**	**59.19**	55 dBA:	**88**	**95**

Road Name: Yorba Avenue **Segment: North of Francis Avenue**

Average Daily Traffic: 780 Vehicles Vehicle Speed: 35 MPH Vehicle Mix: 1 Roadway Classification: Local

	NOISE PARAMETERS AT 55 FEET FROM CENTERLINE (Equiv. Lane Dist: 54.55 ft)										**Centerline Distance to**		
	Noise Adjustments				**Unmitigated Noise Levels**						**Noise Contour (in feet)**		
Vehicle Type	REMEL	Traffic Adj.	Dist Adj.	Finite Adj	Leq Peak	Leq Day	Leq Eve.	Leq Night	Ldn	CNEL		Ldn	CNEL
Automobiles	65.11	-11.94	-0.67	-1.20	51.30	49.18	47.86	41.85	50.27	50.90	70 dBA:	**3**	**3**
Medium Trucks	74.83	-29.18	-0.67	-1.20	43.78	22.53	28.55	10.26	23.40	26.15	65 dBA:	**6**	**6**
Heavy Trucks	80.05	-33.13	-0.67	-1.20	45.04	19.69	16.29	20.94	27.14	27.24	60 dBA:	**12**	**14**
				Total:	**52.80**	**49.19**	**47.92**	**41.89**	**50.30**	**50.93**	55 dBA:	**27**	**29**

FHWA-RD-77-108 HIGHWAY TRAFFIC NOISE PREDICTION MODEL

Scenario: EXISTING WITH PROJECT CONDITIONS

Project: Yorba Villas Residential
Site Conditions: Soft

	Vehicle Mix 1 (Local)				Vehicle Mix 2 (Arterial)				Vehicle Mix 3 (SR 83)			
Vehicle Type	Day	Evening	Night	Daily	Day	Evening	Night	Daily	Day	Evenin	Night	Daily
Automobiles	73.60%	13.60%	10.22%	97.42%	69.50%	12.90%	9.60%	92.00%	65.20%	13.36%	15.63%	94.20%
Medium Trucks	0.90%	0.90%	0.04%	1.84%	1.44%	0.06%	1.50%	3.00%	1.48%	0.29%	0.95%	2.72%
Heavy Trucks	0.35%	0.04%	0.35%	0.74%	2.40%	0.10%	2.50%	5.00%	1.53%	0.16%	1.39%	3.08%

Road Name: Francis Avenue **Segment: West of Yorba Avenue**

Average Daily Traffic: 4005 Vehicles Vehicle Speed: 35 MPH Vehicle Mix: 2 Roadway Classification: Secondary

	NOISE PARAMETERS AT 50 FEET FROM CENTERLINE (Equiv. Lane Dist: 45.38 ft)										**Centerline Distance to**		
	Noise Adjustments				**Unmitigated Noise Levels**						**Noise Contour (in feet)**		
Vehicle Type	REMEL	Traffic Adj.	Dist Adj.	Finite Adj	Leq Peak	Leq Day	Leq Eve.	Leq Night	Ldn	CNEL		Ldn	CNEL
Automobiles	65.11	-5.08	0.53	-1.20	59.36	56.98	55.69	49.64	58.07	58.70	70 dBA:	**9**	**10**
Medium Trucks	74.83	-19.95	0.53	-1.20	54.21	35.00	27.22	36.43	42.58	42.61	65 dBA:	**20**	**22**
Heavy Trucks	80.05	-17.73	0.53	-1.20	61.64	44.65	36.87	46.08	52.24	52.27	60 dBA:	**44**	**48**
				Total:	**64.13**	**57.26**	**55.75**	**51.37**	**59.17**	**59.68**	55 dBA:	**95**	**102**

Road Name: Yorba Avenue **Segment: North of Francis Avenue**

Average Daily Traffic: 780 Vehicles Vehicle Speed: 35 MPH Vehicle Mix: 1 Roadway Classification: Local

	NOISE PARAMETERS AT 55 FEET FROM CENTERLINE (Equiv. Lane Dist: 54.55 ft)										**Centerline Distance to**		
	Noise Adjustments				**Unmitigated Noise Levels**						**Noise Contour (in feet)**		
Vehicle Type	REMEL	Traffic Adj.	Dist Adj.	Finite Adj	Leq Peak	Leq Day	Leq Eve.	Leq Night	Ldn	CNEL		Ldn	CNEL
Automobiles	65.11	-11.94	-0.67	-1.20	51.30	49.18	47.86	41.85	50.27	50.90	70 dBA:	**3**	**3**
Medium Trucks	74.83	-29.18	-0.67	-1.20	43.78	22.53	28.55	10.26	23.40	26.15	65 dBA:	**6**	**6**
Heavy Trucks	80.05	-33.13	-0.67	-1.20	45.04	19.69	16.29	20.94	27.14	27.24	60 dBA:	**12**	**14**
				Total:	**52.80**	**49.19**	**47.92**	**41.89**	**50.30**	**50.93**	55 dBA:	**27**	**29**

FHWA-RD-77-108 HIGHWAY TRAFFIC NOISE PREDICTION MODEL

Scenario: FUTURE YEAR 2035 WITHOUT PROJECT CONDITIONS

Project: Yorba Villas Residential
Site Conditions: Soft

	Vehicle Mix 1 (Local)				Vehicle Mix 2 (Arterial)				Vehicle Mix 3 (SR 83)			
Vehicle Type	Day	Evening	Night	Daily	Day	Evening	Night	Daily	Day	Evenin	Night	Daily
Automobiles	73.60%	13.60%	10.22%	97.42%	69.50%	12.90%	9.60%	92.00%	65.20%	13.36%	15.63%	94.20%
Medium Trucks	0.90%	0.90%	0.04%	1.84%	1.44%	0.06%	1.50%	3.00%	1.48%	0.29%	0.95%	2.72%
Heavy Trucks	0.35%	0.04%	0.35%	0.74%	2.40%	0.10%	2.50%	5.00%	1.53%	0.16%	1.39%	3.08%

Road Name: Francis Avenue **Segment: West of Yorba Avenue**

Average Daily Traffic: 5570 Vehicles Vehicle Speed: 35 MPH Vehicle Mix: 2 Roadway Classification: Secondary

	NOISE PARAMETERS AT 50 FEET FROM CENTERLINE (Equiv. Lane Dist: 45.38 ft)										**Centerline Distance to**		
	Noise Adjustments				**Unmitigated Noise Levels**						**Noise Contour (in feet)**		
Vehicle Type	REMEL	Traffic Adj.	Dist Adj.	Finite Adj	Leq Peak	Leq Day	Leq Eve.	Leq Night	Ldn	CNEL		Ldn	CNEL
Automobiles	65.11	-3.65	0.53	-1.20	60.79	58.42	57.12	51.07	59.50	60.13	70 dBA:	**12**	**13**
Medium Trucks	74.83	-18.52	0.53	-1.20	55.64	36.43	28.65	37.86	44.01	44.05	65 dBA:	**25**	**28**
Heavy Trucks	80.05	-16.30	0.53	-1.20	63.08	46.09	38.31	47.51	53.67	53.70	60 dBA:	**55**	**59**
				Total:	**65.56**	**58.69**	**57.19**	**52.80**	**60.60**	**61.11**	55 dBA:	**118**	**128**

Road Name: Yorba Avenue **Segment: North of Francis Avenue**

Average Daily Traffic: 900 Vehicles Vehicle Speed: 35 MPH Vehicle Mix: 1 Roadway Classification: Local

	NOISE PARAMETERS AT 55 FEET FROM CENTERLINE (Equiv. Lane Dist: 54.55 ft)										**Centerline Distance to**		
	Noise Adjustments				**Unmitigated Noise Levels**						**Noise Contour (in feet)**		
Vehicle Type	REMEL	Traffic Adj.	Dist Adj.	Finite Adj	Leq Peak	Leq Day	Leq Eve.	Leq Night	Ldn	CNEL		Ldn	CNEL
Automobiles	65.11	-11.32	-0.67	-1.20	51.92	49.80	48.49	42.47	50.89	51.52	70 dBA:	**3**	**3**
Medium Trucks	74.83	-28.56	-0.67	-1.20	44.40	23.15	29.17	10.88	24.02	26.78	65 dBA:	**6**	**7**
Heavy Trucks	80.05	-32.51	-0.67	-1.20	45.66	20.31	16.91	21.56	27.76	27.86	60 dBA:	**14**	**15**
				Total:	**53.43**	**49.81**	**48.54**	**42.51**	**50.92**	**51.55**	55 dBA:	**29**	**32**

FHWA-RD-77-108 HIGHWAY TRAFFIC NOISE PREDICTION MODEL

Scenario: FUTURE YEAR 2035 WITH PROJECT CONDITIONS

Project: Yorba Villas Residential
Site Conditions: Soft

	Vehicle Mix 1 (Local)				Vehicle Mix 2 (Arterial)				Vehicle Mix 3 (SR 83)			
Vehicle Type	Day	Evening	Night	Daily	Day	Evening	Night	Daily	Day	Evenin	Night	Daily
Automobiles	73.60%	13.60%	10.22%	97.42%	69.50%	12.90%	9.60%	92.00%	65.20%	13.36%	15.63%	94.20%
Medium Trucks	0.90%	0.90%	0.04%	1.84%	1.44%	0.06%	1.50%	3.00%	1.48%	0.29%	0.95%	2.72%
Heavy Trucks	0.35%	0.04%	0.35%	0.74%	2.40%	0.10%	2.50%	5.00%	1.53%	0.16%	1.39%	3.08%

Road Name: Francis Avenue **Segment: West of Yorba Avenue**

Average Daily Traffic: 5995 Vehicles Vehicle Speed: 35 MPH Vehicle Mix: 2 Roadway Classification: Secondary

	NOISE PARAMETERS AT 50 FEET FROM CENTERLINE (Equiv. Lane Dist: 45.38 ft)										**Centerline Distance to**		
	Noise Adjustments				**Unmitigated Noise Levels**						**Noise Contour (in feet)**		
Vehicle Type	REMEL	Traffic Adj.	Dist Adj.	Finite Adj	Leq Peak	Leq Day	Leq Eve.	Leq Night	Ldn	CNEL		Ldn	CNEL
Automobiles	65.11	-3.33	0.53	-1.20	61.11	58.74	57.44	51.39	59.82	60.45	70 dBA:	**12**	**13**
Medium Trucks	74.83	-18.20	0.53	-1.20	55.96	36.75	28.97	38.18	44.33	44.37	65 dBA:	**27**	**29**
Heavy Trucks	80.05	-15.98	0.53	-1.20	63.40	46.41	38.63	47.83	53.99	54.02	60 dBA:	**58**	**62**
				Total:	**65.88**	**59.01**	**57.51**	**53.12**	**60.92**	**61.43**	55 dBA:	**124**	**134**

Road Name: Yorba Avenue **Segment: North of Francis Avenue**

Average Daily Traffic: 900 Vehicles Vehicle Speed: 35 MPH Vehicle Mix: 1 Roadway Classification: Local

	NOISE PARAMETERS AT 55 FEET FROM CENTERLINE (Equiv. Lane Dist: 54.55 ft)										**Centerline Distance to**		
	Noise Adjustments				**Unmitigated Noise Levels**						**Noise Contour (in feet)**		
Vehicle Type	REMEL	Traffic Adj.	Dist Adj.	Finite Adj	Leq Peak	Leq Day	Leq Eve.	Leq Night	Ldn	CNEL		Ldn	CNEL
Automobiles	65.11	-11.32	-0.67	-1.20	51.92	49.80	48.49	42.47	50.89	51.52	70 dBA:	**3**	**3**
Medium Trucks	74.83	-28.56	-0.67	-1.20	44.40	23.15	29.17	10.88	24.02	26.78	65 dBA:	**6**	**7**
Heavy Trucks	80.05	-32.51	-0.67	-1.20	45.66	20.31	16.91	21.56	27.76	27.86	60 dBA:	**14**	**15**
				Total:	**53.43**	**49.81**	**48.54**	**42.51**	**50.92**	**51.55**	55 dBA:	**29**	**32**

APPENDIX E

FHWA Model Onsite Traffic Noise Calculation Printouts

FHWA-RD-77-108 HIGHWAY TRAFFIC NOISE PREDICTION MODEL

Road Name: Yorba Avenue
Lot Number: 1

Project Name: Yorba Villas
Job Number: 21066

NOISE MODEL INPUTS

Highway Data

Average Daily Traffic:	900 vehicles
Peak Hour Volume:	90 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	14 feet

Vehicle Mix

	Day	Evening	Night	Daily
Autos:	73.6%	13.6%	10.2%	97.4%
Medium Trucks:	0.9%	0.0%	0.9%	1.8%
Heavy Trucks:	0.4%	0.0%	0.4%	0.7%

Site Data

Barrier Height:	**6 feet**
Barrier Type(Wall/Berm):	Wall
Site Conditions(Hard/Soft):	Soft
Centerline (C.L.) Dist. to Barrier:	35 feet
C.L. Dist. To Observer (Backyard):	45 feet
Barrier Dist. To Observer (Backyard):	10 feet
C.L. Dist. To Observer (Structure):	38 feet
Barrier Dist. To Observer (Structure):	3 feet
Road Grade:	0.00 %
Left View:	-90 degrees
Right View:	90 degrees

Elevations

Barrier Base Elevation:	847.3 feet
Road Elevation:	845.0 feet
Noise Source Elevation above Road	
Autos:	0 feet
Med Trucks:	2.3 feet
Hvy Trucks:	8 feet
Pad Elevation:	847.3 feet
Observer Heights Above Pad Elevation	
Exterior:	5 feet
First Floor:	5.5 feet
Second Floor:	14 feet

FHWA NOISE MODEL CALCULATIONS

	REMEL	Traffic Flow	Distance	Finite Road	Grade	Barrier Attenuation Exterior	1st Flr	2nd Flr
Autos:	65.11	-11.32	0.58	-1.20	0.00	-9.82	-8.1	0
Med Trucks:	74.83	-28.56	0.58	-1.20	0.00	-9.3	-7.9	0
Hvy Trucks:	80.05	-32.51	0.58	-1.20	0.00	-6.08	-6	0

UNMITIGATED NOISE LEVELS (Backyard with topographical attenuation)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	53.0	50.9	49.6	43.6	52.0	52.6
Med Trucks:	45.6	24.4	16.9	25.6	31.8	31.9
Hvy Trucks:	46.9	21.6	18.2	22.8	29.0	29.1
Traffic Noise:	**54.6**	**50.9**	**49.6**	**43.7**	**52.0**	**52.7**

MITIGATED NOISE LEVELS (Backyard with sound wall)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	43.3	41.2	39.9	33.9	42.3	42.9
Med Trucks:	36.3	15.1	7.6	16.3	22.5	22.6
Hvy Trucks:	40.8	15.5	12.1	16.7	22.9	23.0
Traffic Noise:	**45.8**	**41.2**	**39.9**	**34.1**	**42.4**	**43.0**

MITIGATED NOISE LEVELS (First Floor)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	46.2	44.0	42.7	36.7	45.1	45.7
Med Trucks:	38.8	17.6	10.1	18.8	25.0	25.0
Hvy Trucks:	42.0	16.6	13.2	17.9	24.1	24.2
Traffic Noise:	**48.1**	**44.0**	**42.7**	**36.8**	**45.2**	**45.8**

MITIGATED NOISE LEVELS (Second Floor)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	53.8	51.7	50.4	44.3	52.8	53.4
Med Trucks:	46.3	25.0	17.5	26.3	32.4	32.5
Hvy Trucks:	47.5	22.2	18.8	23.4	29.6	29.7
Traffic Noise:	**55.3**	**51.7**	**50.4**	**44.4**	**52.8**	**53.4**

FHWA-RD-77-108 HIGHWAY TRAFFIC NOISE PREDICTION MODEL

Road Name: Francis Avenue
Lot Number: 18

Project Name: Yorba Villas
Job Number: 21066

NOISE MODEL INPUTS

Highway Data

Average Daily Traffic:	5,995 vehicles
Peak Hour Volume:	600 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	42 feet

Vehicle Mix

	Day	Evening	Night	Daily
Autos:	71.4%	13.2%	12.4%	97.0%
Medium Trucks:	1.4%	0.2%	0.4%	2.0%
Heavy Trucks:	0.7%	0.1%	0.2%	1.0%

Site Data

Barrier Height:	**6 feet**
Barrier Type(Wall/Berm):	Wall
Site Conditions(Hard/Soft):	Soft
Centerline (C.L.) Dist. to Barrier:	54 feet
C.L. Dist. To Observer (Backyard):	64 feet
Barrier Dist. To Observer (Backyard):	10 feet
C.L. Dist. To Observer (Structure):	73 feet
Barrier Dist. To Observer (Structure):	19 feet
Road Grade:	0.00 %
Left View:	-90 degrees
Right View:	90 degrees

Elevations

Barrier Base Elevation:	839.3 feet
Road Elevation:	835.5 feet
Noise Source Elevation above Road	
Autos:	0 feet
Med Trucks:	2.3 feet
Hvy Trucks:	8 feet
Pad Elevation:	839.3 feet
Observer Heights Above Pad Elevation	
Exterior:	5 feet
First Floor:	5.5 feet
Second Floor:	14 feet

FHWA NOISE MODEL CALCULATIONS

	REMEL	Traffic Flow	Distance	Finite Road	Grade	Barrier Attenuation Exterior	1st Flr	2nd Flr
Autos:	65.11	-3.33	-1.41	-1.20	0.00	-9.12	-8.9	-0.3
Med Trucks:	74.83	-18.20	-1.41	-1.20	0.00	-8.95	-8.35	-0.15
Hvy Trucks:	80.05	-15.98	-1.41	-1.20	0.00	-6.64	-5.6	0

UNMITIGATED NOISE LEVELS (Backyard with topographical attenuation)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	59.0	56.6	55.3	49.3	57.7	58.4
Med Trucks:	54.0	34.8	27.0	36.2	42.4	42.4
Hvy Trucks:	61.5	44.5	36.7	45.9	52.1	52.1
Traffic Noise:	**63.9**	**56.9**	**55.4**	**51.1**	**58.9**	**59.4**

MITIGATED NOISE LEVELS (Backyard with sound wall)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	50.1	47.7	46.4	40.3	48.8	49.4
Med Trucks:	45.1	25.9	18.1	27.3	33.4	33.5
Hvy Trucks:	54.8	37.8	30.0	39.3	45.4	45.4
Traffic Noise:	**56.4**	**48.1**	**46.5**	**43.0**	**50.5**	**50.9**

MITIGATED NOISE LEVELS (First Floor)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	49.6	47.0	45.7	39.6	48.0	48.7
Med Trucks:	43.0	25.5	17.7	27.0	33.1	33.1
Hvy Trucks:	48.1	37.9	30.2	39.4	45.5	45.5
Traffic Noise:	**52.4**	**47.5**	**45.8**	**42.6**	**50.1**	**50.5**

MITIGATED NOISE LEVELS (Second Floor)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.0	55.4	54.1	48.1	56.5	57.1
Med Trucks:	51.0	33.6	25.8	35.0	41.2	41.2
Hvy Trucks:	53.5	43.4	35.6	44.8	51.0	51.0
Traffic Noise:	**59.9**	**55.7**	**54.2**	**49.9**	**57.7**	**58.2**

FHWA-RD-77-108 HIGHWAY TRAFFIC NOISE PREDICTION MODEL

Road Name: Yorba Avenue
Lot Number: 29

Project Name: Yorba Villas
Job Number: 21066

NOISE MODEL INPUTS

Highway Data

Average Daily Traffic:	900 vehicles
Peak Hour Volume:	90 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	14 feet

Vehicle Mix

	Day	Evening	Night	Daily
Autos:	73.6%	13.6%	10.2%	97.4%
Medium Trucks:	0.9%	0.0%	0.9%	1.8%
Heavy Trucks:	0.4%	0.0%	0.4%	0.7%

Site Data

Barrier Height:	**6 feet**
Barrier Type(Wall/Berm):	Wall
Site Conditions(Hard/Soft):	Soft
Centerline (C.L.) Dist. to Barrier:	35 feet
C.L. Dist. To Observer (Backyard):	45 feet
Barrier Dist. To Observer (Backyard):	10 feet
C.L. Dist. To Observer (Structure):	45 feet
Barrier Dist. To Observer (Structure):	10 feet
Road Grade:	0.00 %
Left View:	-90 degrees
Right View:	90 degrees

Elevations

Barrier Base Elevation:	840.1 feet
Road Elevation:	840.0 feet
Noise Source Elevation above Road	
Autos:	0 feet
Med Trucks:	2.3 feet
Hvy Trucks:	8 feet
Pad Elevation:	840.1 feet
Observer Heights Above Pad Elevation	
Exterior:	5 feet
First Floor:	5.5 feet
Second Floor:	14 feet

FHWA NOISE MODEL CALCULATIONS

	REMEL	Traffic Flow	Distance	Finite Road	Grade	Barrier Attenuation Exterior	1st Flr	2nd Flr
Autos:	65.11	-11.32	0.62	-1.20	0.00	-8.8	-7.85	0
Med Trucks:	74.83	-28.56	0.62	-1.20	0.00	-8.05	-7.08	0
Hvy Trucks:	80.05	-32.51	0.62	-1.20	0.00	-5.2	-4.9	0

UNMITIGATED NOISE LEVELS (Backyard with topographical attenuation)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	53.1	51.0	49.7	43.6	52.1	52.7
Med Trucks:	45.7	24.4	16.9	25.7	31.9	31.9
Hvy Trucks:	47.0	21.6	18.2	22.9	29.1	29.1
Traffic Noise:	**54.6**	**51.0**	**49.7**	**43.7**	**52.1**	**52.7**

MITIGATED NOISE LEVELS (Backyard with sound wall)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	44.4	42.3	41.0	35.0	43.4	44.0
Med Trucks:	37.6	16.4	8.9	17.6	23.8	23.9
Hvy Trucks:	41.8	16.4	13.0	17.7	23.9	23.9
Traffic Noise:	**46.8**	**42.3**	**41.0**	**35.1**	**43.5**	**44.1**

MITIGATED NOISE LEVELS (First Floor)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	45.4	43.2	41.9	35.9	44.3	45.0
Med Trucks:	38.6	17.4	9.9	18.6	24.8	24.8
Hvy Trucks:	42.0	16.7	13.3	17.9	24.1	24.2
Traffic Noise:	**47.6**	**43.3**	**41.9**	**36.1**	**44.4**	**45.0**

MITIGATED NOISE LEVELS (Second Floor)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	52.9	50.8	49.5	43.5	51.9	52.5
Med Trucks:	45.4	24.2	16.7	25.4	31.6	31.6
Hvy Trucks:	46.7	21.3	17.9	22.6	28.8	28.9
Traffic Noise:	**54.4**	**50.8**	**49.5**	**43.6**	**52.0**	**52.6**

FHWA-RD-77-108 HIGHWAY TRAFFIC NOISE PREDICTION MODEL

Road Name: Francis Avenue
Lot Number: 40

Project Name: Yorba Villas
Job Number: 21066

NOISE MODEL INPUTS

Highway Data

Average Daily Traffic:	5,995 vehicles
Peak Hour Volume:	600 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	42 feet

Vehicle Mix

	Day	Evening	Night	Daily
Autos:	71.4%	13.2%	12.4%	97.0%
Medium Trucks:	1.4%	0.2%	0.4%	2.0%
Heavy Trucks:	0.7%	0.1%	0.2%	1.0%

Site Data

Barrier Height:	**6 feet**
Barrier Type(Wall/Berm):	Wall
Site Conditions(Hard/Soft):	Soft
Centerline (C.L.) Dist. to Barrier:	54 feet
C.L. Dist. To Observer (Backyard):	64 feet
Barrier Dist. To Observer (Backyard):	10 feet
C.L. Dist. To Observer (Structure):	69 feet
Barrier Dist. To Observer (Structure):	15 feet
Road Grade:	0.00 %
Left View:	-90 degrees
Right View:	90 degrees

Elevations

Barrier Base Elevation:	840.5 feet
Road Elevation:	837.6 feet
Noise Source Elevation above Road	
Autos:	0 feet
Med Trucks:	2.3 feet
Hvy Trucks:	8 feet
Pad Elevation:	840.5 feet
Observer Heights Above Pad Elevation	
Exterior:	5 feet
First Floor:	5.5 feet
Second Floor:	14 feet

FHWA NOISE MODEL CALCULATIONS

	REMEL	Traffic Flow	Distance	Finite Road	Grade	Barrier Attenuation Exterior	1st Flr	2nd Flr
Autos:	65.11	-3.33	-1.40	-1.20	0.00	-8.85	-8.2	-0.141
Med Trucks:	74.83	-18.20	-1.40	-1.20	0.00	-8.55	-7.75	0
Hvy Trucks:	80.05	-15.98	-1.40	-1.20	0.00	-6.32	-5.3	0

UNMITIGATED NOISE LEVELS (Backyard with topographical attenuation)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	59.0	56.7	55.4	49.3	57.7	58.4
Med Trucks:	54.0	34.8	27.0	36.3	42.4	42.4
Hvy Trucks:	61.5	44.5	36.7	45.9	52.1	52.1
Traffic Noise:	**63.9**	**56.9**	**55.4**	**51.1**	**58.9**	**59.4**

MITIGATED NOISE LEVELS (Backyard with sound wall)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	50.3	48.0	46.7	40.6	49.0	49.7
Med Trucks:	45.5	26.3	18.5	27.7	33.9	33.9
Hvy Trucks:	55.2	38.2	30.4	39.6	45.7	45.8
Traffic Noise:	**56.7**	**48.4**	**46.8**	**43.3**	**50.8**	**51.2**

MITIGATED NOISE LEVELS (First Floor)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	50.7	48.1	46.8	40.7	49.2	49.8
Med Trucks:	44.0	26.5	18.8	28.0	34.1	34.2
Hvy Trucks:	48.8	38.6	30.9	40.1	46.2	46.3
Traffic Noise:	**53.4**	**48.6**	**46.9**	**43.5**	**51.0**	**51.5**

MITIGATED NOISE LEVELS (Second Floor)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.6	56.0	54.7	48.6	57.0	57.7
Med Trucks:	51.6	34.1	26.3	35.5	41.7	41.7
Hvy Trucks:	53.9	43.8	36.0	45.2	51.4	51.4
Traffic Noise:	**60.4**	**56.2**	**54.7**	**50.4**	**58.2**	**58.7**

FHWA-RD-77-108 HIGHWAY TRAFFIC NOISE PREDICTION MODEL

Road Name: Francis Avenue
Lot Number: 42

Project Name: Yorba Villas
Job Number: 21066

NOISE MODEL INPUTS

Highway Data

Average Daily Traffic:	5,995 vehicles
Peak Hour Volume:	600 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	42 feet

Vehicle Mix

	Day	Evening	Night	Daily
Autos:	71.4%	13.2%	12.4%	97.0%
Medium Trucks:	1.4%	0.2%	0.4%	2.0%
Heavy Trucks:	0.7%	0.1%	0.2%	1.0%

Site Data

Barrier Height:	**6 feet**
Barrier Type(Wall/Berm):	Wall
Site Conditions(Hard/Soft):	Soft
Centerline (C.L.) Dist. to Barrier:	54 feet
C.L. Dist. To Observer (Backyard):	64 feet
Barrier Dist. To Observer (Backyard):	10 feet
C.L. Dist. To Observer (Structure):	69 feet
Barrier Dist. To Observer (Structure):	15 feet
Road Grade:	0.00 %
Left View:	-90 degrees
Right View:	90 degrees

Elevations

Barrier Base Elevation:	840.5 feet
Road Elevation:	837.8 feet
Noise Source Elevation above Road	
Autos:	0 feet
Med Trucks:	2.3 feet
Hvy Trucks:	8 feet
Pad Elevation:	840.5 feet
Observer Heights Above Pad Elevation	
Exterior:	5 feet
First Floor:	5.5 feet
Second Floor:	14 feet

FHWA NOISE MODEL CALCULATIONS

	REMEL	Traffic Flow	Distance	Finite Road	Grade	Barrier Attenuation Exterior	1st Flr	2nd Flr
Autos:	65.11	-3.33	-1.39	-1.20	0.00	-8.75	-8.1	-0.138
Med Trucks:	74.83	-18.20	-1.39	-1.20	0.00	-8.45	-7.65	0
Hvy Trucks:	80.05	-15.98	-1.39	-1.20	0.00	-6.24	-5.3	0

UNMITIGATED NOISE LEVELS (Backyard with topographical attenuation)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	59.0	56.7	55.4	49.3	57.8	58.4
Med Trucks:	54.0	34.8	27.0	36.3	42.4	42.4
Hvy Trucks:	61.5	44.5	36.7	45.9	52.1	52.1
Traffic Noise:	**63.9**	**57.0**	**55.4**	**51.1**	**58.9**	**59.4**

MITIGATED NOISE LEVELS (Backyard with sound wall)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	50.4	48.1	46.8	40.7	49.1	49.8
Med Trucks:	45.6	26.4	18.6	27.8	34.0	34.0
Hvy Trucks:	55.2	38.2	30.5	39.7	45.8	45.9
Traffic Noise:	**56.8**	**48.5**	**46.9**	**43.4**	**50.9**	**51.3**

MITIGATED NOISE LEVELS (First Floor)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	50.8	48.2	46.9	40.8	49.3	49.9
Med Trucks:	44.1	26.6	18.9	28.1	34.2	34.3
Hvy Trucks:	48.8	38.6	30.9	40.1	46.2	46.3
Traffic Noise:	**53.4**	**48.7**	**47.0**	**43.6**	**51.1**	**51.5**

MITIGATED NOISE LEVELS (Second Floor)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.6	56.0	54.7	48.6	57.1	57.7
Med Trucks:	51.6	34.1	26.3	35.5	41.7	41.7
Hvy Trucks:	53.9	43.8	36.0	45.2	51.4	51.4
Traffic Noise:	**60.5**	**56.3**	**54.7**	**50.4**	**58.2**	**58.7**

FHWA-RD-77-108 HIGHWAY TRAFFIC NOISE PREDICTION MODEL

Road Name: Francis Avenue
Lot Number: 45

Project Name: Yorba Villas
Job Number: 21066

NOISE MODEL INPUTS

Highway Data

Average Daily Traffic:	5,995 vehicles
Peak Hour Volume:	600 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	42 feet

Vehicle Mix

	Day	Evening	Night	Daily
Autos:	71.4%	13.2%	12.4%	97.0%
Medium Trucks:	1.4%	0.2%	0.4%	2.0%
Heavy Trucks:	0.7%	0.1%	0.2%	1.0%

Site Data

Barrier Height:	**6 feet**
Barrier Type(Wall/Berm):	Wall
Site Conditions(Hard/Soft):	Soft
Centerline (C.L.) Dist. to Barrier:	54 feet
C.L. Dist. To Observer (Backyard):	64 feet
Barrier Dist. To Observer (Backyard):	10 feet
C.L. Dist. To Observer (Structure):	69 feet
Barrier Dist. To Observer (Structure):	15 feet
Road Grade:	0.00 %
Left View:	-90 degrees
Right View:	90 degrees

Elevations

Barrier Base Elevation:	840.6 feet
Road Elevation:	838.0 feet
Noise Source Elevation above Road	
Autos:	0 feet
Med Trucks:	2.3 feet
Hvy Trucks:	8 feet
Pad Elevation:	840.6 feet
Observer Heights Above Pad Elevation	
Exterior:	5 feet
First Floor:	5.5 feet
Second Floor:	14 feet

FHWA NOISE MODEL CALCULATIONS

	REMEL	Traffic Flow	Distance	Finite Road	Grade	Barrier Attenuation Exterior	1st Flr	2nd Flr
Autos:	65.11	-3.33	-1.39	-1.20	0.00	-8.7	-8.1	-0.136
Med Trucks:	74.83	-18.20	-1.39	-1.20	0.00	-8.45	-7.6	0
Hvy Trucks:	80.05	-15.98	-1.39	-1.20	0.00	-6.16	-5.2	0

UNMITIGATED NOISE LEVELS (Backyard with topographical attenuation)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	59.0	56.7	55.4	49.3	57.8	58.4
Med Trucks:	54.0	34.8	27.0	36.3	42.4	42.4
Hvy Trucks:	61.5	44.5	36.7	45.9	52.1	52.1
Traffic Noise:	**63.9**	**57.0**	**55.4**	**51.1**	**58.9**	**59.4**

MITIGATED NOISE LEVELS (Backyard with sound wall)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	50.5	48.1	46.8	40.8	49.2	49.8
Med Trucks:	45.6	26.4	18.6	27.8	34.0	34.0
Hvy Trucks:	55.3	38.3	30.5	39.8	45.9	45.9
Traffic Noise:	**56.9**	**48.6**	**46.9**	**43.4**	**51.0**	**51.4**

MITIGATED NOISE LEVELS (First Floor)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	50.8	48.2	46.9	40.8	49.3	49.9
Med Trucks:	44.1	26.7	18.9	28.1	34.3	34.3
Hvy Trucks:	48.9	38.7	31.0	40.2	46.3	46.4
Traffic Noise:	**53.5**	**48.7**	**47.0**	**43.6**	**51.1**	**51.6**

MITIGATED NOISE LEVELS (Second Floor)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.6	56.0	54.7	48.6	57.1	57.7
Med Trucks:	51.6	34.1	26.3	35.6	41.7	41.7
Hvy Trucks:	53.9	43.8	36.0	45.2	51.4	51.4
Traffic Noise:	**60.5**	**56.3**	**54.7**	**50.4**	**58.2**	**58.7**