Appendix G:
Noise Supporting Information

G.1 - Villa Siena Noise Impact Analysis

KUNZMAN ASSOCIATES, INC.

VILLA SIENA

NOISE IMPACT ANALYSIS

March 21, 2014

Traffic Engineering | Transportation Planning | Parking | Noise/Vibration | Expert Witness
Air Quality | Global Climate Change | Health Risk Assessment

KUNZMAN ASSOCIATES, INC.

VILLA SIENA

NOISE IMPACT ANALYSIS

March 21, 2014

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I. Introduction and Setting

A. Purpose and Objectives

This study was performed to address the possibility of significant impacts due to noise. The objectives of the study include:

- documentation of existing noise conditions
- discussion of noise modeling methodology and procedures
- analysis of noise and vibration generated by the construction of the project
- analysis of noise and vibration generated by the typical operation of the project
- analysis and discussion of potential traffic noise impacts to the proposed project
- analysis of noise affecting nearby sensitive receptors due to increased traffic produced by the project
- recommendations for mitigation measures

B. Project Location

The project site is located adjacent to and north of Prielipp Road, west of Jana Lane and east of Elizabeth Lane in the City of Wildomar. A vicinity map showing the project location is provided on Figure 1.

C. Project Description

The proposed development consists of 54 detached and 119 attached multi-family residential dwelling units on an approximately 9 acre site. The proposed site plan is shown on Figure 2.

Figure 1
Project Location Map

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Figure 2
Site Plan

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II. Definition of Terms

A. Noise/Sound Terminology

Sound is a pressure wave created by a moving or vibrating source that travels through an elastic medium such as air. Noise is defined as unwanted or objectionable sound. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and in extreme circumstances, hearing impairment.

Commonly used noise terms are presented in Table 1. The unit of measurement used to describe a noise level is the decibel (dB). The human ear is not equally sensitive to all frequencies within the sound spectrum. Therefore, the "A-weighted" noise scale, which weights the frequencies to which humans are sensitive, is used for measurements. Noise levels using A-weighted measurements are written dBA or dBA.

Decibels are measured on a logarithmic scale, which quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. Thus, a doubling of the energy of a noise source, such as a doubled traffic volume, would increase the noise levels by 3 dBA; halving of the energy would result in a 3 dBA decrease. Figure 3 shows the relationship of various noise levels to commonly experienced noise events.

Average noise levels over a period of minutes or hours are usually expressed as dBA $L_{eq,}$ or the equivalent noise level for that period of time. For example, $L_{eq(3)}$ would represent a 3-hour average. When no period is specified, a one-hour average is assumed.

Noise standards for land use compatibility are stated in terms of the Community Noise Equivalent Level (CNEL) and the Day-Night Average Noise Level (Ldn). CNEL is a 24-hour weighted average measure of community noise. CNEL is obtained by adding five decibels to sound levels in the evening (7:00 PM to 10:00 PM), and by adding ten decibels to sound levels at night (10:00 PM to 7:00 AM). This weighting accounts for the increased human sensitivity to noise during the evening and nighttime hours. Ldn is a very similar 24-hour average measure that weights only the nighttime hours.

It is widely accepted that the average healthy ear can barely perceive changes of 3 dBA; that a change of 5 dBA is readily perceptible, and that an increase (decrease) of 10 dBA sounds twice (half) as loud. This definition is recommended by the California Department of Transportation's Traffic Noise Analysis Protocol for New Highway and Reconstruction Projects.

The difference in sound (noise) levels from the exterior to the interior of a structure indicates the sound transmitted loss through the window, door, or wall. A Sound Transmission Class (STC) rating specifies the noise level reduction that windows, doors, wall construction materials, and insulation provide. For example, if the exterior of a structure is exposed to 75 dBA and 45 dBA is measured on the interior of the structure, then a reduction of 30 dBA is achieved. Typically, higher STC ratings indicate greater interior noise reductions.

B. Vibration Terminology

The rumbling sound caused by the vibration of room surfaces is called groundborne noise. Groundborne vibration related to human annoyance is generally related to root mean square (rms) velocity levels expressed in VdB. In contrast to airborne noise, groundborne noise is not a phenomenon that most people experience every day. The background vibration in residential areas is usually 50 VdB or lower, well below the threshold of perception for humans which is around 65 VdB. Most perceptible indoor vibration is caused by sources within buildings such as operation of mechanical equipment, movement of people, or slamming of doors. Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the vibration from traffic is rarely perceptible.

The peak particle velocity (PPV), which is defined as the maximum instantaneous positive or negative peak of the vibration signal, is the descriptor most utilized in the analysis of vibratory impacts to buildings. Table 2 shows the peak particle velocities of some common construction equipment.

Table 1

Definitions of Acoustical Terms[1]

Term	Definition
Decibel, dB	A logarithmic unit of noise level measurement that relates the energy of a noise source to that of a constant reference level; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency, Hertz	In a function periodic in time, the number of times that the quantity repeats itself in one second (i.e., the number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear.
Root Mean Square (RMS)	A measure of the magnitude of a varying noise source quantity. The name derives from the calculation of the square root of the mean of the squares of the values. It can be calculated from either a series of lone values or a continuous varying function.
Fast/Slow Meter Response	The fast and slow meter responses are different settings on a sound level meter. The fast response setting takes a measurement every 100 milliseconds, while a slow setting takes one every second.
L_{02}, L_{08}, L_{50}, L_{90}	The A-weighted noise levels that are equaled or exceeded by a fluctuating sound level, 2 percent, 8 percent, 50 percent, and 90 percent of a stated time period, respectively.
Equivalent Continuous Noise Level, L_{eq}	A level of steady state sound that in a stated time period, and a stated location, has the same A-weighted sound energy as the time-varying sound.
L_{max}, L_{min}	L_{max} is the RMS (root mean squared) maximum level of a noise source or environment measured on a sound level meter, during a designated time interval, using fast meter response. L_{min} is the minimum level.
Ambient Noise Level	The all-encompassing noise environment associated with a given environment, at a specified time, usually a composite of sound from many sources, at many directions, near and far, in which usually no particular sound is dominant.
Offensive/ Offending/ Intrusive Noise	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of sound depends on its amplitude, duration, frequency, and time of occurrence, and tonal information content as well as the prevailing ambient noise level.

[1] Adapted from: Cyril M. Harris; Handbook of Acoustical Measurement and Noise Control, 1991.

Table 2

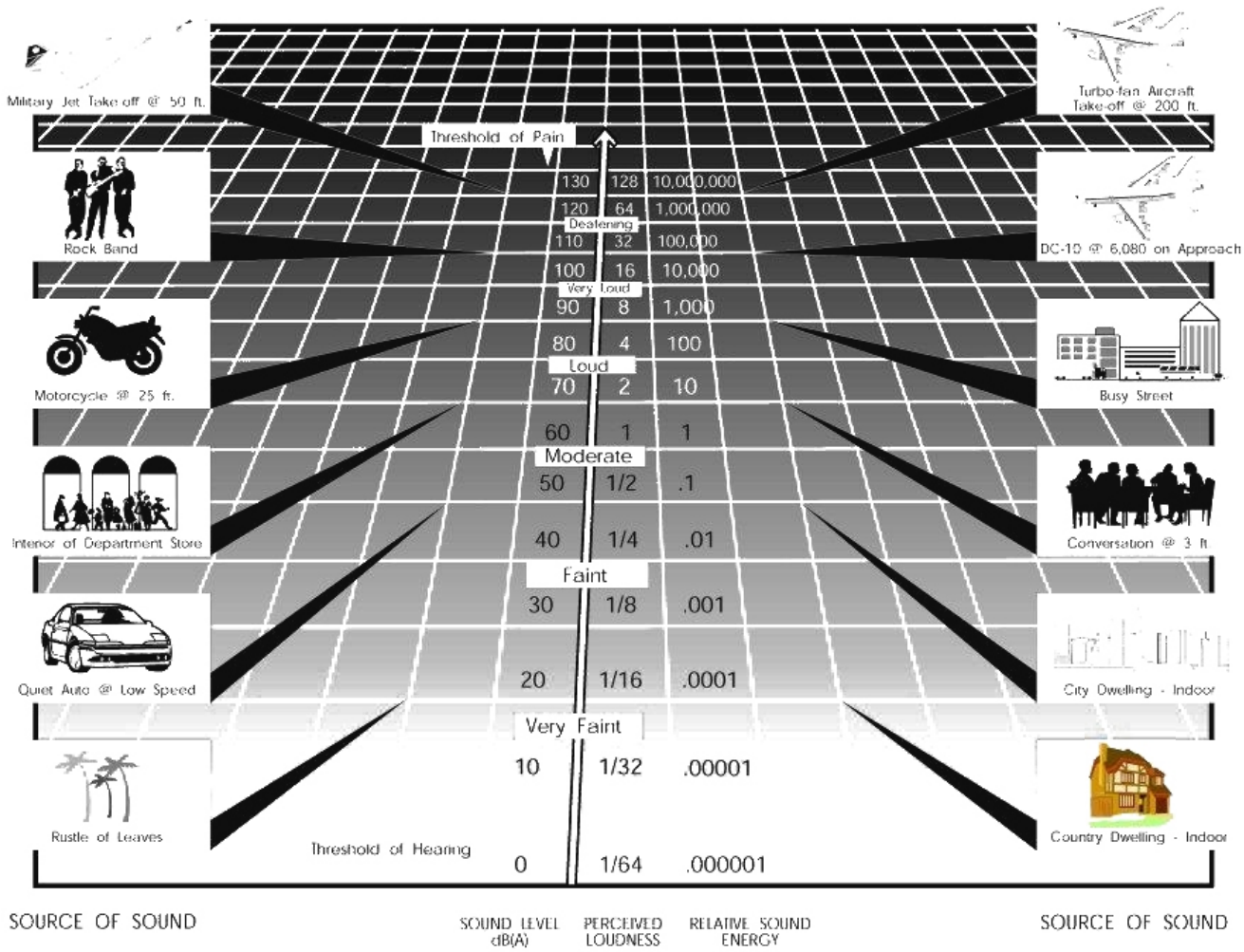
Construction Equipment Vibration Source Levels[1]

Equipment	Peak Partical Velocity in inches per second[2]		
	at 25 ft.	at 50 ft.	at 100 ft.
Clam Shovel Drop (slurry wall)	**0.202**	0.071	0.025
Vibratory Roller	**0.210**	0.074	0.026
Hoe Ram	**0.089**	0.031	0.011
Large Bulldozer	**0.089**	0.031	0.011
Caisson Drilling	**0.089**	0.031	0.011
Loaded Trucks	0.076	0.027	0.010
Jackhammer	0.035	0.012	0.004
Small Bulldozer	0.003	0.001	0.0004

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

[2] Bold values are considered annoying to people.

Figure 3
Common Noise Sources and Noise Levels



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III. Existing Noise Environment

A. Sensitive Noise Receptors

The State of California defines sensitive receptors as those land uses that require serenity or are otherwise adversely affected by noise events or conditions. Schools, libraries, churches, hospitals, and residential uses make up the majority of these areas. The project site is adjacent to several existing single-family detached residential neighborhoods to the south and east.

B. Existing Noise Levels

An American National Standards Institute (ANSI Section SI4 1979, Type 1) Larson Davis model LxT sound level meter was used to document the existing ambient noise level on September 20, 2013. One 15-minute noise measurement was taken between 3:58 PM and 4:13 PM. The ambient Leq was measured at 24.7 dBA. The noise measurement location is shown on Figure 4. Correlating ambient noise levels are presented in Table 3 and measurement output data is included within Appendix A.

Primary noise sources in the project area consist of vehicular traffic on nearby roadways, birds chirping and dogs barking.

Table 3

Ambient Noise Levels[1]

Name	Time Period	Measurement Period	Description	Existing Ambient Noise Levels (dBA)					
				L_{eq}	L_{max}	L_2	L_8	L_{25}	L_{50}
M1	3:58 PM - 4:!3 PM	15 Minutes	Along Jana Lane, approximately 500 feet north of Prielipp Road.	24.7	42.5	28.0	24.0	24.0	24.0

[1] Source: Site Visit, Kunzman Associates, Inc. (September 20, 2013).

Figure 4
Ambient Noise Measurement Locations

Legend

⊗ = Noise Measurement Location

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IV. Analytical Methodology and Model Parameters

A. Noise Modeling and Input

1. Federal Highway Administration (FHWA) Traffic Noise Prediction Model

Existing and Existing Plus Project noise levels were modeled for affected nearby road segments utilizing the FHWA Traffic Noise Prediction Model - FHWA-RD-77-108 in order to quantify the proposed project's contribution to increases in ambient noise levels.

The FHWA Traffic Noise Prediction 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 REMEL to account for: total average daily trips (ADT), roadway classification, width, speed and truck mix, roadway grade and site conditions (hard or soft ground surface). Surfaces adjacent to all modeled roadways were assumed to have a "hard site" to predict worst-case, conservative noise levels. A hard site, such as pavement, is highly reflective and does not attenuate noise as quickly as grass or other soft sites. Possible reductions in noise levels due to intervening topography and buildings were not accounted for in this analysis.

Existing and Existing Plus Project traffic volumes were obtained from the project's traffic study (Kunzman Associates, Inc. 2014). The City of Wildomar does not have published vehicle/truck mixes or Day/Evening/Night (D/E/N) for use in acoustical studies. Vehicle/truck mixes and D/E/N splits for use in acoustical studies published by the Riverside County Department of Industrial Hygiene were utilized for noise modeling. Existing Plus Project vehicle mixes were calculated by adding the proposed project trips to existing conditions.

2. Road Construction Noise Model (RCNM)

A worst-case construction noise scenario was modeled using the Federal Highway Administration's Roadway Construction Noise Model (RCNM). Modeling parameters and output are provided in Appendix B. RCNM utilizes standard noise emission levels for many different types of equipment and includes utilization percentage, impact, and shielding parameters.

3. SoundPLAN

SoundPLAN was utilized to model traffic noise associated with Prielipp Road. It is a three-dimensional noise modeling software that takes into account the shielding and reflective effects associated with intervening topography and nearby buildings. Roadway parameters utilized in the model include location, traffic volume, speed and vehicle mix (auto, medium truck and heavy truck). Because the City of Wildomar does not have published mixes, day/evening/night mixes and truck mixes as recommended by the County of Riverside Department of Industrial Hygiene were utilized for modeling purposes.

V. Applicable Standards

A. Federal Regulations

1. Federal Noise Control Act of 1972

The U.S. Environmental Protection Agency (EPA) Office of Noise Abatement and Control was originally established to coordinate federal noise control activities. After its inception, EPA's Office of Noise Abatement and Control issued the Federal Noise Control Act of 1972, establishing programs and guidelines to identify and address the effects of noise on public health, welfare, and the environment. In response, the EPA published Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (Levels of Environmental Noise). The Levels of Environmental Noise recommended that the Ldn should not exceed 55 dBA outdoors or 45 dBA indoors to prevent significant activity interference and annoyance in noise-sensitive areas.

In addition, the Levels of Environmental Noise identified five dBA as an "adequate margin of safety" for a noise level increase relative to a baseline noise exposure level of 55 dBA Ldn (i.e., there would not be a noticeable increase in adverse community reaction with an increase of five dBA or less from this baseline level). The EPA did not promote these findings as universal standards or regulatory goals with mandatory applicability to all communities, but rather as advisory exposure levels below which there would be no risk to a community from any health or welfare effect of noise.

In 1981, EPA administrators determined that subjective issues such as noise would be better addressed at lower levels of government. Consequently, in 1982 responsibilities for regulating noise control policies were transferred to State and local governments. However, noise control guidelines and regulations contained in EPA rulings in prior years remain in place by designated Federal agencies, allowing more individualized control for specific issues by designated Federal, State, and local government agencies.

2. Federal Transit Administration

The Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (2006) provides guidance for the analysis of noise and vibration associated with federally-funded transit projects. Section 7 of the manual discusses basic ground-borne vibration concepts including terminology, applicable descriptors, analysis procedures, thresholds and recommended mitigation for groundborne noise and vibration. Groundborne vibration thresholds included in this manual are frequently utilized for state and local projects where local thresholds for the analysis of groundborne noise and vibration have not been adopted. As shown in Table 4, the FTA's maximum acceptable vibration standard for human annoyance in residences where people normally sleep is 80 VdB (less than 70 vibration events per day).

B. State Regulations

1. State of California Building Standards Code

The State of California has adopted noise standards in areas of regulation not preempted by the Federal government. State standards regulate noise levels of motor vehicles, sound transmission through buildings, occupational noise control, and noise insulation. Title 24 of the California Code of Regulations, also known as the California Building Standards Code, establishes building standards applicable to all occupancies throughout the state. The code provides acoustical regulations for both exterior-to-interior sound insulation, as well as sound and impact isolation between adjacent spaces of various occupied units. Title 24 regulations state that interior noise levels generated by exterior noise sources shall not exceed 45 dBA Ldn/CNEL, with windows closed, in any habitable room for general residential uses.

Section 1208A, Sound Transmission, of the California Building Code requires acoustical evaluation and insulated building design and construction when exterior noise levels exceed 60 Ldn. New residential construction must be acoustically designed and constructed to reduce the intrusion of transportation noise and local fixed noise sources. The California Building Code requires a minimum Sound Transmission Class of 50 (STC50) and Impact Isolation Class 50 (IIC50) for multi-family attached residential dwelling units.

2. State of California General Plan Guidelines 2003

Though not adopted by law, the State of California General Plan Guidelines 2003, published by the California Governor's Office of Planning and Research (OPR) (OPR Guidelines), provides guidance for the compatibility of projects within areas of specific noise exposure. The OPR Guidelines identify the suitability of various types of construction relative to a range of outdoor noise levels and provide each local community some flexibility in setting local noise standards that allow for the variability in community preferences. Findings presented in the Levels of Environmental Noise Document (EPA 1974) influenced the recommendations of the OPR Guidelines, most importantly in the choice of noise exposure metrics (i.e., Ldn or CNEL) and in the upper limits for the normally acceptable outdoor exposure of noise-sensitive uses.

The OPR Guidelines include a Noise and Land Use Compatibility Matrix which identifies acceptable and unacceptable community noise exposure limits for various land use categories. Where the "normally acceptable" range is used, it is defined as the highest noise level that should be considered for the construction of the buildings which do not incorporate any special acoustical treatment or noise mitigation. The "conditionally acceptable" or "normally unacceptable" ranges include conditions calling for detailed acoustical study or construction mitigation to reduce interior exposure levels prior to the construction or operation of the building under the listed exposure levels.

3. California Environmental Quality Act

The California Environmental Quality Act Guidelines (Appendix G) establishes thresholds for noise impact analysis. Two of these standards apply to what is referred to as a "substantial increase" in ambient noise levels. Neither the California Environmental Quality Act nor the City of Lake Elsinore General Plan Noise Element recognizes an official numerical increase as a "substantial increase". Industry-accepted standards for what is considered to be a "substantial increase" range from 3 dB to 12 dB. It should be noted that a change of 3 dB is considered to be "barely audible" to a trained ear and that a change of 5 dB is considered to be a readily audible change. Noise generated by transportation sources propagates differently than noise generated by point sources.

For purposes of this analysis, the following two thresholds were utilized to evaluate the project's potential to result in substantial increases in ambient noise levels.

Traffic Noise

Roadway noise impacts would be considered significant if the project increases noise levels at a noise sensitive land use by 3 dBA CNEL and if: (1) the existing noise levels already exceed the residential land use compatibility standard for "normally compatible" (65 dBA CNEL), or (2) the project increases noise levels from below the 65 dBA CNEL standard to above 65 dBA CNEL.

Stationary Noise

Project operations, including noise from loading and unloading activities, and parking lot noise etc., may produce an increase noise levels which disturbs the peace and quiet of adjacent residential areas or cause discomfort/annoyance to area residents. Caltrans considers a 5 dBA increase to be "readily audible", which seems to correlate most closely to "substantial increase." For the purposes of this report, a substantial permanent increase in ambient noise levels due to stationary noise sources shall be considered 5 dBA L_{eq}.

4. California Department of Transportation (Caltrans)

The Caltrans Transportation and Vibration Guidance Manual recommends a maximum vibration level standard of 0.2 in/sec PPV for the prevention of structural damage to typical residential buildings.

C. City of Wildomar/County of Riverside

Due to its recent incorporation, the City of Wildomar currently does not have its own noise standards. For the purposes of this analysis, County of Riverside noise standards and noise ordinance are used to assess potential noise impacts. Transportation noise related impacts to the project and transportation noise impacts caused by the project are regulated using the 24-hour Community Noise Equivalent Level (CNEL) descriptor.

1. County of Riverside General Plan Noise Element

The County of Riverside General Plan Noise Element includes a version of the State's noise and land use compatibility matrix in the Noise Element of the General Plan (see Table 5. This matrix establishes standards for outdoor noise levels that are acceptable, conditionally acceptable and unacceptable, for a variety of land uses. For commercial land uses, outdoor noise levels of up to 70 dBA CNEL are "normally acceptable" and levels up to 76.5 dBA CNEL are "conditionally acceptable". For hotel and resort uses, outdoor noise levels of up to 60 dBA CNEL are "normally acceptable" and levels up to 70 dBA CNEL are "conditionally acceptable". These standards would apply to the proposed project itself and are shown in Table 5. Other County of Riverside General Plan Policies that the City apply to the proposed project are presented below.

Policy N 1.3: Consider the following uses noise-sensitive and discourage these uses in areas in excess of 65 CNEL: schools; hospitals; rest homes; long term care facilities; mental care facilities; residential uses; libraries; passive recreation uses; and places of worship. According to the State of California Office of Planning and Research General Plan Guidelines, an acoustical study may be required in cases where these noise-sensitive land uses are located in an area of 60 CNEL or greater. Any land use that is exposed to levels higher than 65 CNEL will require noise attenuation measures.

Policy N 1.4: Determine if existing land uses will present noise compatibility issues with proposed projects by undertaking site surveys.

Policy N 1.5: Prevent and mitigate the adverse impacts of excessive noise exposure on the residents, employees, visitors, and noise-sensitive uses.

Policy N 1.6: Minimize noise spillover or encroachment from commercial and industrial land uses into adjoining residential neighborhoods or noise-sensitive uses.

Policy N 1.7 Require proposed land uses, affected by unacceptably high noise levels, to have an acoustical specialist prepare a study of the noise problems and recommend structural and site design features that will adequately mitigate the noise problem.

Policy N 1.8: Limit the maximum permitted noise levels that cross property lines and impact adjacent land uses, except when dealing with noise emissions from wind turbines.

Policy N 3.2: Require acoustical studies and subsequent approval by the Planning Department and the Office of Industrial Hygiene, to help determine effective noise mitigation strategies in noise-producing areas.

Policy N 3.3: Ensure compatibility between industrial development and adjacent land uses. To achieve compatibility, industrial development projects may be required to include noise mitigation measures to avoid or minimize project impacts on adjacent uses.

Policy N 3.5: Require that a noise analysis be conducted by an acoustical specialist for all proposed projects that are noise producers. Include recommendations for design mitigation if the project is to be located either within proximity of a noise-sensitive land use, or land designated for noise-sensitive land uses.

Policy N 3.6: Discourage projects that are incapable of successfully mitigating excessive noise.

Policy N 8.3: Require development that generates increased traffic and subsequent increases in the ambient noise level adjacent to noise-sensitive land uses to provide for appropriate mitigation measures.

Policy N 8.6: Require that all future exterior noise forecasts use Level of Service C, and be based on designed road capacity or 20-year projection of development (whichever is less) for future noise forecasts.

Policy N 13.1: Enforce the California Building Standards that sets standards for building construction to mitigate interior noise levels to the tolerable 45 CNEL limit. These standards are utilized in conjunction with the Uniform Building Code by the County's Building Department to ensure that noise protection is provided to the public. Some design features may include extra-dense insulation, double-paned windows, and dense construction materials

Policy N 13.4: Consider and, when necessary to lower noise to acceptable limits, require noise barriers and landscaped berms.

2. County of Riverside Code

The existing zoning of the project site is Industrial Park and the proposed zoning is General Residential. Riverside County Ordinance 847 prohibits the creation of any sound, on any property that causes the exterior sound level property designated as "Residential" in the general plan to exceed 55 dBA L_{max} between the hours of 7:00 AM and 10:00 PM or to exceed 45 dBA L_{max} between the hours of 10:00 PM and 7:00 AM. Construction is exempt from Ordinance 847 as long as construction is limited to the hours of 6:00 AM to 6:00 PM during the months of June through September and between the hours of 7:00 AM and 6:00 PM during the months of October through May. Cooling and heating units, property maintenance equipment (between the hours of 7:00 AM and 8:00 PM), safety and alarm devices, and motor vehicles are also exempt from this standard.

Table 4

Groundborne Vibration and Noise Impact Criteria[1]

Land Use Category	Groundborne Vibration Impact Levels (VdB)		Groundborne Noise Impact Levels (dBA)	
	Frequent Events[2]	Infrequent Events[3]	Frequent Events[2]	Infrequent Events[3]
Category 1: Buildings where low ambient vibration is essential for interior vibrations	65 VdB[4]	65 VdB[4]	NA[5]	NA[5]
Category 2: Residences and buildings where people normally sleep	72 VdB	80 VdB	35 dBA	43dBA
Category 3: institutional land uses with primarily daytime use	75 VdB	83 VdB	40 dBA	48 dBA

[1] Source: United States Department of Transportation, Federal Transit Administration, Transit Noise and Vibration Assessment, 1995.

[2] "Frequent Events" is defined as more than 70 vibration events per day.

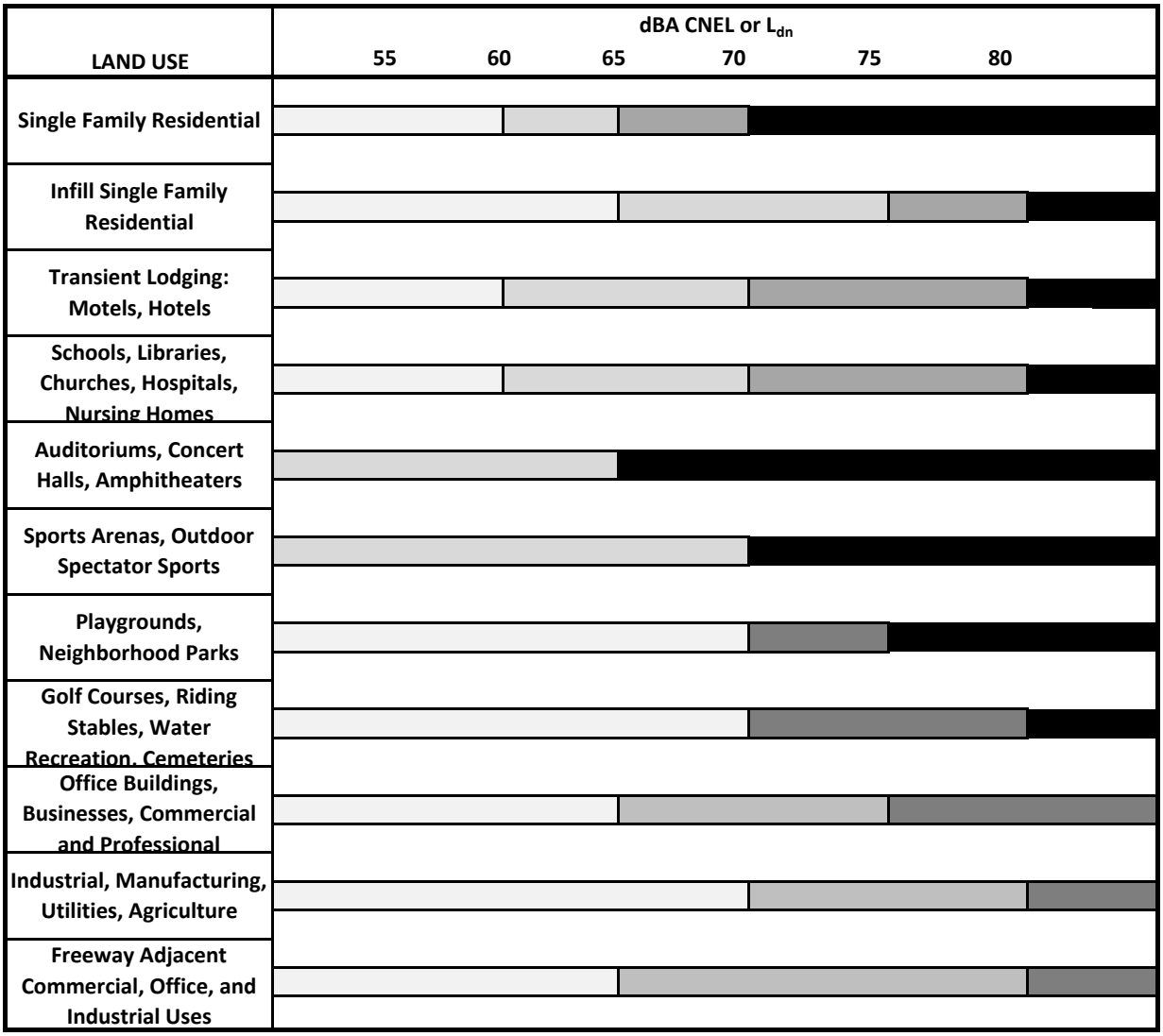
[3] "Infrequent Events" is defined as fewer than 70 vibration events per day.

[4] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes.

[5] NA – Not Applicable

Table 5

Noise and Land Use Compatibility Matrix[1]



Normally Acceptable: Specified land uses is satisfactory based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation or requirements.	**Conditionally Acceptable:** New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice. Outdoor environment will seem noisy.	**Normally Unacceptable:** New construction and development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made with needed noise insulation features included in the design. Outdoor areas must be shielded.	**Clearly Unacceptable:** New construction or development should generally not be undertaken. Construction costs to make the indoor environment acceptable would be prohibitive and the outdoor environment would not be usable.

[1] Source: Riverside General Plan 2025: Figure N-10, 2007

VI. Impact Analysis

A. Construction Noise Impacts

1. Project Generated Construction Noise Levels

Construction noise varies depending on the construction process, type of equipment involved, location of the construction site with respect to sensitive receptors, the schedule proposed to carry out each task (e.g., hours and days of the week) and the duration of the construction work. Typical noise sources and noise levels associated with construction activities are shown in Table 6.

The initial phase of construction would involve mass grading of the site, along with site development activities. This includes construction of internal roadways which involves fine grading, trenching, and paving activities. Following site preparation activities, the project would include construction of buildings. Construction of the buildings would require the following phases: site development, building construction, architectural coatings application, and paving associated with buildings. Mass site grading is expected to produce the highest construction noise levels. Grading of the site is estimated to require several graders, dozers, excavators, scrapers, and pickup trucks.

A drop-off rate of 6 dBA per doubling of distance from the construction noise sources was utilized to calculate noise levels at nearby sensitive receptors associated with a worst-case construction scenario. Noise levels were calculated utilizing the Road Construction Noise Model (RCNM) provided by the FHWA. Unmitigated noise levels could reach a maximum noise level of up to 81.0 L_{eq} and 85.0 dBA L_{max} at 50 feet, which is the closest to the nearest sensitive receptor the loudest piece of equipment (a grader) is likely to be working for any length of time. Noise levels will lower substantially as construction moves away from the property line. For example, a noise level that is 85 dBA at the source can be expected to drop to 79 dBA at a distance of 100 feet from the source and to 73 dBA at a distance of 200 feet from the source.

2. Consistency with Applicable Standards

County of Riverside Code

Construction noise is exempt from County Ordinance 847 as long as it does not occur between the hours of 6:00 PM and 6:00 AM during the months of June through September or between the hours of 6:00 PM and 7:00 AM during the months of October through May. Project construction will adhere to these hours of operation.

Project construction noise would further reduced with implementation of construction mitigation measures found in Section VII.

B. Traffic Noise Impacts to the Proposed Project

1. Traffic Noise Impacts to the Proposed Project

Buildout noise levels along Prielipp Road were modeled using SoundPLAN, which utilizes the algorithms found in the Federal Highway Administration's (FHWA) Traffic Noise Model. As shown on Figures 5 and 6, future exterior noise levels at the façade of the first floor of the proposed units located nearest to Prielipp Road would range between 60.3 and 63.8 dBA CNEL and future noise levels at the façade of 2nd story units would range between 63.0 and 66.2 dBA CNEL. Exterior noise levels at units not adjacent to Prielipp Road would not exceed 65 dBA CNEL. Future noise levels at proposed outdoor recreational areas not adjacent to Prielipp Road will not exceed 65 dBA CNEL.

Considering that normal construction typically provides 15-20 dB of exterior to interior noise reduction, a measure to require architectural treatments that achieve an exterior to interior noise reduction of at least 25 dB is included as mitigation in Section VII of this report to ensure that interior noise levels do not exceed the State standard for multi-family attached residential units (45 dBA CNEL). Exterior noise levels at proposed passive and active outdoor use areas will not exceed the City standard of 65 dBA CNEL. No mitigation is required to attenuate outdoor use areas on the project site.

2. Consistency with Applicable Standards

County of Riverside General Plan

Buildout traffic noise levels would exceed the City's 65 dBA CNEL threshold for exterior noise at the façade of the proposed units located adjacent to Prielipp Road. Therefore, mitigation is required. Enhanced building construction methods and materials must be employed to achieve acceptable interior noise levels. These methods are presented in Section VII of this report. Noise levels at proposed outdoor use areas will not exceed the County's standard of 65 dBA CNEL.

C. Project Generated Traffic Noise Impacts to Sensitive Receptors

1. Off-Site Project Generated Traffic Noise Impacts

The FHWA Traffic Noise Prediction Model - FHWA-RD-77-108 was used to model Existing and Existing Plus Project noise levels were modeled for each roadway segment analyzed in the traffic study prepared for the proposed project (Trames Solutions, 2013). Project generated increases in ambient noise levels along affected road segments were then calculated. Modeling output is included in this report as Appendix C.

The Existing traffic noise modeling resulted in noise levels ranging between 63.8 and 70.1 dBA CNEL at 50 feet from the centerline of the affected road segments; and the Existing Plus Project traffic noise model resulted in noise levels ranging from 64.2 to

70.16 dBA CNEL at 50 feet from the centerline. The results of the Existing and Existing Plus Project noise models are shown in Table 7.

2. Consistency with Applicable Standards

California Environmental Quality Act - Substantial Increase

As can be seen in Table 7, in all cases, project generated vehicle noise would contribute less than 1 dBA CNEL to the ambient noise levels along affected road segments. This increase would not be noticeable. No mitigation is required.

D. Vibration Impacts

1. Project Generated Vibration

Table 2 shows the peak particle velocities of some common construction equipment and haul trucks (loaded trucks). The most vibration-causing piece of equipment that will likely be used on-site is the vibratory roller. This machine can cause vibration strong enough to annoy people over 100 feet away. Due to the proximity of adjacent single-family detached residential dwelling units, project construction activities may result in ground borne vibration that is annoying but would only occur during site grading and preparation activities. Construction vibration will not result in any structural damage.

Based on Caltrans data, haul trucks would not be anticipated to exceed 0.10 in/sec peak particle velocity (ppv) at 10 feet (Caltrans 2002). Predicted vibration levels at the nearest off-site structures, which are located in excess of 25 feet from the traveled roadway segments, would not be anticipated to exceed even the most conservative threshold of 0.2 inch/second ppv.

2. Consistency with Applicable Standards

Table 2 shows the peak particle velocities of some common construction equipment and haul trucks (loaded trucks). The most vibration-causing piece of equipment that will likely be used on-site is the vibratory roller. This machine can cause vibration strong enough to annoy people over 100 feet away. Due to the proximity of adjacent single-family detached residential dwelling units, project construction activities may result in ground borne vibration that is annoying but would be limited to activities within 100 feet of sensitive receptors and would only occur during site grading and preparation activities. Construction vibration will not result in any structural damage.

Based on Caltrans data, haul trucks would not be anticipated to exceed 0.10 in/sec peak particle velocity (ppv) at 10 feet (Caltrans 2002). Predicted vibration levels at the nearest off-site structures, which are located in excess of 25 feet from the traveled roadway segments, would not be anticipated to exceed even the most conservative threshold of 0.2 inch/second ppv.

Vibration impacts will be reduced through implementation of construction mitigation measures provided in Section VII. Project construction will not result in any structural damage.

Table 6

Typical Construction Equipment Noise Levels[1]

Type of Equipment	Range of Maximum Sound Levels Measured (dBA at 50 ft.)	Suggested Maximum Sound Levels for Analysis (dBA at 50 ft.)
Rock Drills	83-99	96
Jack Hammers	75-85	82
Pneumatic Tools	78-88	85
Pumps	74-84	80
Dozers	77-90	85
Scrapers	83-91	87
Haul Trucks	83-94	88
Cranes	79-86	82
Portable Generators	71-87	80
Rollers	75-82	80
Tractors	77-82	80
Front-End Loaders	77-90	86
Hydraulic Backhoe	81-90	86
Hydraulic Excavators	81-90	86
Graders	79-89	86
Air Compressors	76-89	86
Trucks	81-87	86

[1] Source: Bolt, Beranek & Newman; Noise Control for Buildings and Manufacturing Plants, 1987.

Table 7

FHWA-RD-77-108 Traffic Noise Model Results[1]

Roadway	Segment	Modeled Noise Levels (dBA CNEL)			
		Existing	Existing Plus Project	Increase	Substantial Increase?
Clinton Keith Road	West of Inland Valley Drive	70.10	70.16	0.06	No
	Inland Valley Drive to Elizabeth Lane	68.56	68.62	0.06	No
	East of Elizabeth Lane	68.35	68.41	0.06	No
Inland Valley Drive	Prielipp Road to Clinton Keith Road	64.83	65.02	0.19	No
Jackson Avenue	Elizabeth Lane to Oak Creek Apts	64.10	64.45	0.35	No
	East of Oak Creek Apts	64.26	64.41	0.15	No
	West of Nutmeg Street	65.89	66.02	0.13	No
	East of Nutmeg Street	67.27	67.32	0.05	No
Nutmeg Street	South of Nutmeg Street	65.86	65.88	0.02	No
Prielipp Road	Inland Valley Drive to Yamas Drive	63.82	64.15	0.33	No
	Yamas Drive to Elizabeth Lane	64.10	65.90	1.80	No

[1] FHWA Spreadsheet Analysis (Summary of Appendix C).

Figure 5
Future Noise Levels

Signs and symbols

Proposed Buildings

Receiver at building

Prielipp Road

Level tables

1 : 1940

0 10 20 40 60 80 m

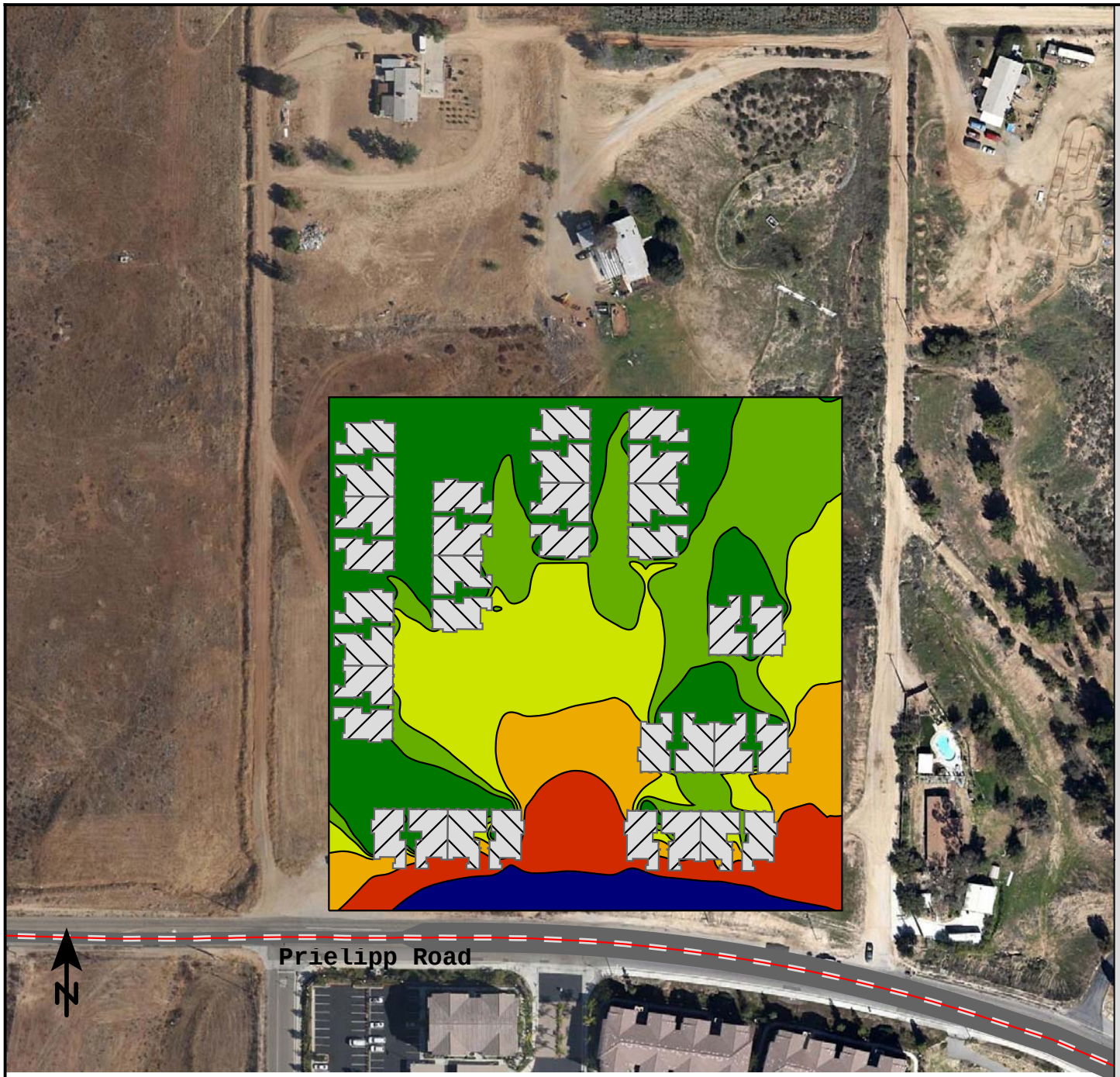


Figure 6
Future Noise Level Contours (CNEL)

Signs and symbols

Proposed Buildings

Prielipp Road

Noise Levels in dB(A)

<= 45
45 - 50
50 - 55
55 - 60
60 - 65
> 65

1 : 1940

0 10 20 40 60 80 m

VII. Mitigation Measures

A. Construction Measures

In addition to adherence to the City of Lake Elsinore Municipal Code limiting construction hours of operation, the following measures will minimize noise and vibration related impacts during demolition and construction activities.

1. During all project site excavation and grading on-site, construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturer standards. The contractor shall place all stationary construction equipment so that emitted noise is directed away from the noise sensitive receptors nearest the project site.

2. The contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise/vibration sources and sensitive receptors nearest the project site during all project construction.

3. The project proponent shall mandate that the construction contractor prohibit the use of music or sound amplification on the project site during construction.

4. The construction contractor shall limit haul truck deliveries to the same hours specified for construction equipment.

5. When feasible, avoid the use of pavement breakers and vibratory rollers and packers near sensitive receptors.

B. Operational Noise Measures

1. Mitigation is required in order to achieve interior noise levels of 45 dBA CNEL at 1st and 2nd story units proposed adjacent to Prielipp Road. Enhanced building construction methods and materials must be employed to achieve an exterior to interior noise reduction of 25. The methods required to achieve this attenuation are shown as Mitigation Methods 1 through 6 in Table 8.

Table 8

Typical Noise Attenuation Methods to Insulate the Noise Receiver[1]

Noise Level Reduction	Typical Mitigation Methods
15-20 dBA	1. Air conditioning or mechanical ventilation. 2. Double-paned glass. 3. Solid core doors with weather stripping and seals.
20-25 dBA	*Mitigation 1, 2, and 3 plus* 4. Stucco or brick veneer exterior walls or wood siding w/one-half inch thick fiberboard underlayer. 5. Glass portions of windows/doors not to exceed 20 percent. 6. Exterior vents facing noise source shall be baffled.
25-30 dBA	*Mitigation 1 through 6 plus* 7. Interior sheetrock of exterior wall attached to studs by resilient channels or double walls. 8. Window assemblies, doors, wall construction materials, and insulation shall have a lab-tested STC rating of 30 or greater.

[1] Source: City of San Diego General Plan, March 2008

VIII. References

Bolt, Baranek, and Newman

1971 Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances

California, State of

2003 Governor's Office of Planning and Research. State of California General Plan Guidelines, Appendix C, Guidelines for the Preparation and Content of the Noise Element of the General Plan. October.

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Harris, Cyril M.

1991 Handbook of Acoustical Measurement and Noise Control

Trames Solutions Inc.

2013 Siena Apartments Traffic Impact Analysis

Office of Planning and Research

2003 State of California General Plan Guidelines

Riverside, County of

2003 General Plan Circulation Element

2009 Requirements for determining and mitigating traffic noise impacts to residential structures. Department of Health – Office of Industrial Hygiene

Appendices

Appendix A –Noise Measurement Data Sheets

Appendix B – RCNM Noise Modeling Sheets

Appendix C – FHWA Traffic Noise Prediction Model - FHWA-RD-77-108 Output

APPENDIX A

Noise Measurement Data Sheets

Summary	Sienna NM1
Filename	LxT_Data.123
Serial Number	3099
Model	SoundTrack LxT®
Firmware Version	2.112
User	Roma Stromberg
Start	20/09/2013 15:58:20
Stop	20/09/2013 16:13:20
Duration	0.010416667
Run Time	0.010416667
Pause	0

Pre Calibration	20/09/2013 15:12:20
Post Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamp	PRMLxT1L
Microphone Correction	Off
Integration Method	Exponential
Overload	121.8790894 dB

Results

LASeq		24.6844068	dB
LASE		54.22682953	dB
EAS		0.029406315	µPa²h
EAS8		0.941002071	µPa²h
EAS40		4.705010891	µPa²h
LZpeak (max)	20/09/2013 16:12:26	79.4149628	dB
LASmax	20/09/2013 16:12:26	42.5025101	dB
LASmin	20/09/2013 16:13:00	21.558773	dB
SEA		-99.94000244	dB

LCSeq	36.95129776	dB	Statistics		
LASeq	24.68440628	dB	LAS1.67	28	dB
LCSeq - LASeq	12.26689148	dB	LAS8.33	24	dB
LAIeq	31.61289215	dB	LAS25.00	24	dB
LAeq	24.68355179	dB	LAS50.00	24	dB
LAIeq - LAeq	6.929340363	dB	LAS66.67	23	dB
# Overloads	0		LAS90.00	23	dB
Overload Duration	0	s			

APPENDIX B

RCNM Noise Modeling Sheets

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/19/2014
Case Description: Villa Siena

		Baselines (dBA)		Receptor 1
Description	Land Use	Daytime	Evening	Night
50'	Residential	60	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85		50	0
Backhoe	No	40		77.6	100	0
Dozer	No	40		81.7	75	0
Excavator	No	40		80.7	125	0
Pickup Truck	No	40		75	50	0

Results Calculated Results (dBA)

Equipment		*Lmax	Leq
Grader		85	81
Backhoe		71.5	67.6
Dozer		78.1	74.2
Excavator		72.8	68.8
Pickup Truck		75	71
	Total	85	82.5

*Calculated Lmax is the Loudest value.

APPENDIX C

FHWA Traffic Noise Prediction Model
– FHWA-RD-77-108 Output

FHWA Sound32 Spreadsheet

Existing Traffic Noise

Project: **Villa Siena 5414a**
Road: **Clinton Keith Road**
Segment: **West of Inland Valley Road**

	DAYTIME			EVENING			NIGHTTIME				
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	ADT	21100.00
										SPEED	45.00
										DISTANCE	50.00
INPUT PARAMETERS											
Vehicles per hour	582.26	28.17	34.73	81.21	3.08	1.84	133.57	9.81	4.58	% A	90.65
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	4.67
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	4.68
ADJUSTMENTS											
Flow	20.81	7.66	8.57	12.26	-1.96	-4.20	14.42	3.08	-0.23		
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	70.10
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	69.00
LEQ	65.09	60.21	65.64	56.53	50.59	52.87	58.69	55.63	56.85	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	69.00		EVENING LEQ	58.80		NIGHT LEQ	62.01		Use hour?	no
										GRADE dB	0.00
	CNEL		70.10								

FHWA Sound32 Spreadsheet

Existing Plus Project Traffic Noise

Project: **Villa Siena 5414a**
Road: **Clinton Keith Road**
Segment: **West of Inland Valley Road**

	DAYTIME			EVENING			NIGHTTIME				
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	ADT	21600.00
										SPEED	45.00
										DISTANCE	50.00
INPUT PARAMETERS											
Vehicles per hour	597.03	28.46	34.91	83.27	3.11	1.84	136.96	9.91	4.61	% A	90.80
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	4.61
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	4.59
ADJUSTMENTS											
Flow	20.92	7.70	8.59	12.37	-1.92	-4.18	14.53	3.12	-0.20		
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	70.16
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	69.06
LEQ	65.20	60.26	65.66	56.64	50.64	52.89	58.80	55.68	56.87	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	69.06		EVENING LEQ	58.88		NIGHT LEQ	62.08		Use hour?	no
										GRADE dB	0.00
	CNEL		70.16								

FHWA Sound32 Spreadsheet

Existing Traffic Noise

Project: **Villa Siena 5414a**
Road: **Prielipp Road**
Segment: **Inland Valley Drive to Yamas Drive**

	DAYTIME			EVENING			NIGHTTIME			ADT	6200.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	40.00
										DISTANCE	50.00
INPUT PARAMETERS											
Vehicles per hour	171.09	8.28	10.21	23.86	0.90	0.54	39.25	2.88	1.35	% A	90.65
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	4.67
NOISE CALCULATIONS											
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16	% HT	4.68
ADJUSTMENTS											
Flow	16.01	2.85	3.76	7.45	-6.77	-9.01	9.61	-1.73	-5.03		
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	63.82
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	62.78
LEQ	58.30	54.10	59.85	49.74	44.48	47.08	51.90	49.52	51.06	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	62.78		EVENING LEQ	52.39		NIGHT LEQ	55.70		Use hour?	no
										GRADE dB	0.00
	CNEL		63.82								

FHWA Sound32 Spreadsheet

Existing Plus Project Traffic Noise

Project: **Villa Siena 5414a**
Road: **Prielipp Road**
Segment: **Inland Valley Drive to Yamas Drive**

	DAYTIME			EVENING			NIGHTTIME				
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	ADT	7000.00
										SPEED	40.00
										DISTANCE	50.00
INPUT PARAMETERS											
Vehicles per hour	194.71	8.73	10.49	27.16	0.95	0.55	44.67	3.04	1.38	% A	91.38
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	4.36
NOISE CALCULATIONS											
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16	% HT	4.26
ADJUSTMENTS											
Flow	16.57	3.09	3.88	8.01	-6.53	-8.89	10.17	-1.49	-4.92		
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	64.15
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	63.08
LEQ	58.86	54.33	59.97	50.30	44.71	47.20	52.46	49.75	51.17	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	63.08		EVENING LEQ	52.77		NIGHT LEQ	56.04		Use hour?	no
										GRADE dB	0.00
	CNEL		64.15								

FHWA Sound32 Spreadsheet

Existing Traffic Noise

Project: **Villa Siena 5414a**
Road: **Prielipp Road**
Segment: **Yamas Drive to Elizabeth Lane**

	DAYTIME			EVENING			NIGHTTIME			ADT	6600.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	40.00
										DISTANCE	50.00
INPUT PARAMETERS											
Vehicles per hour	182.13	8.81	10.86	25.40	0.96	0.57	41.78	3.07	1.43	% A	90.65
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	4.67
NOISE CALCULATIONS											
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16	% HT	4.68
ADJUSTMENTS											
Flow	16.28	3.12	4.03	7.72	-6.50	-8.74	9.88	-1.46	-4.76		
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	64.10
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	63.06
LEQ	58.57	54.37	60.12	50.01	44.75	47.35	52.17	49.79	51.33	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	63.06		EVENING LEQ	52.66		NIGHT LEQ	55.98		Use hour?	no
										GRADE dB	0.00
	CNEL		64.10								

FHWA Sound32 Spreadsheet

Existing Plus Project Traffic Noise

Project: **Villa Siena 5414a**
Road: **Prielipp Road**
Segment: **Yamas Drive to Elizabeth Lane**

	DAYTIME			EVENING			NIGHTTIME				
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	ADT	12300.00
										SPEED	40.00
										DISTANCE	50.00
INPUT PARAMETERS											
Vehicles per hour	350.44	12.07	12.87	48.88	1.32	0.68	80.39	4.20	1.70	% A	93.59
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	3.43
NOISE CALCULATIONS											
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16	% HT	2.97
ADJUSTMENTS											
Flow	19.12	4.49	4.77	10.56	-5.13	-8.00	12.73	-0.09	-4.03		
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	65.90
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	64.74
LEQ	61.41	55.73	60.86	52.85	46.11	48.09	55.02	51.15	52.06	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	64.74		EVENING LEQ	54.75		NIGHT LEQ	57.84		Use hour?	no
										GRADE dB	0.00
	CNEL		65.90								

FHWA Sound32 Spreadsheet

Existing Traffic Noise

Project: **Villa Siena 5414a**
Road: **Clinton Keith Road**
Segment: **Inland Valley Drive to Elizabeth Lane**

	DAYTIME			EVENING			NIGHTTIME			ADT	14800.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	45.00
										DISTANCE	50.00
INPUT PARAMETERS											
Vehicles per hour	408.41	19.76	24.36	56.96	2.16	1.29	93.69	6.88	3.22	% A	90.65
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	4.67
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	4.68
ADJUSTMENTS											
Flow	19.27	6.12	7.03	10.72	-3.50	-5.74	12.88	1.54	-1.77		
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	68.56
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	67.46
LEQ	63.55	58.67	64.10	54.99	49.05	51.33	57.15	54.09	55.31	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	67.46		EVENING LEQ	57.26		NIGHT LEQ	60.47		Use hour?	no
										GRADE dB	0.00
	CNEL		68.56								

FHWA Sound32 Spreadsheet

Existing Plus Project Traffic Noise

Project: **Villa Siena 5414a**
Road: **Clinton Keith Road**
Segment: **Inland Valley Drive to Elizabeth Lane**

	DAYTIME			EVENING			NIGHTTIME			ADT	15100.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	45.00
										DISTANCE	50.00
INPUT PARAMETERS											
Vehicles per hour	417.27	19.93	24.47	58.20	2.18	1.29	95.72	6.94	3.23	% A	90.78
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	4.62
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	4.61
ADJUSTMENTS											
Flow	19.37	6.16	7.05	10.81	-3.46	-5.72	12.97	1.58	-1.75		
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	68.62
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	67.51
LEQ	63.64	58.71	64.12	55.09	49.09	51.35	57.25	54.13	55.32	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	67.51		EVENING LEQ	57.32		NIGHT LEQ	60.53		Use hour?	no
										GRADE dB	0.00
	CNEL		68.62								

FHWA Sound32 Spreadsheet

Existing Traffic Noise

Project: **Villa Siena 5414a**
Road: **Clinton Keith Road**
Segment: **East of Elizabeth Lane**

	DAYTIME			EVENING			NIGHTTIME				
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	ADT	14100.00
										SPEED	45.00
										DISTANCE	50.00
INPUT PARAMETERS											
Vehicles per hour	389.09	18.82	23.21	54.27	2.05	1.23	89.26	6.56	3.06	% A	90.65
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	4.67
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	4.68
ADJUSTMENTS											
Flow	19.06	5.91	6.82	10.51	-3.71	-5.95	12.67	1.33	-1.98		
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	68.35
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	67.25
LEQ	63.34	58.46	63.89	54.78	48.84	51.12	56.94	53.88	55.10	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	67.25		EVENING LEQ	57.05		NIGHT LEQ	60.26		Use hour?	no
										GRADE dB	0.00
	CNEL		68.35								

FHWA Sound32 Spreadsheet

Existing Plus Project Traffic Noise

Project: **Villa Siena 5414a**
Road: **Clinton Keith Road**
Segment: **East of Elizabeth Lane**

	DAYTIME			EVENING			NIGHTTIME				
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	ADT	14400.00
										SPEED	45.00
										DISTANCE	50.00
INPUT PARAMETERS											
Vehicles per hour	397.95	19.00	23.31	55.50	2.07	1.23	91.29	6.62	3.08	% A	90.78
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	4.61
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	4.60
ADJUSTMENTS											
Flow	19.16	5.95	6.84	10.61	-3.67	-5.93	12.77	1.37	-1.96		
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	68.41
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	67.30
LEQ	63.43	58.50	63.91	54.88	48.88	51.14	57.04	53.92	55.11	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	67.30		EVENING LEQ	57.12		NIGHT LEQ	60.32		Use hour?	no
										GRADE dB	0.00
	CNEL		68.41								

FHWA Sound32 Spreadsheet

Existing Traffic Noise

Project: **Villa Siena 5414a**
Road: **Inland Valley Drive**
Segment: **Prielipp Road to Clinton Keith Road**

	DAYTIME			EVENING			NIGHTTIME			ADT	9900.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	35.00
										DISTANCE	50.00
INPUT PARAMETERS											
Vehicles per hour	273.19	13.22	16.30	38.10	1.44	0.86	62.67	4.60	2.15	% A	90.65
Speed in MPH	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	4.67
NOISE CALCULATIONS											
Reference levels	65.11	74.83	80.05	65.11	74.83	80.05	65.11	74.83	80.05	% HT	4.68
ADJUSTMENTS											
Flow	18.62	5.46	6.37	10.06	-4.15	-6.40	12.22	0.88	-2.42		
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	64.83
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	63.86
LEQ	58.66	55.22	61.35	50.10	45.60	48.58	52.26	50.64	52.56	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	63.86		EVENING LEQ	53.24		NIGHT LEQ	56.67		Use hour?	no
										GRADE dB	0.00
	CNEL		64.83								

FHWA Sound32 Spreadsheet

Existing Plus Project Traffic Noise

Project: **Villa Siena 5414a**
Road: **Inland Valley Drive**
Segment: **Prielipp Road to Clinton Keith Road**

	DAYTIME			EVENING			NIGHTTIME			ADT	10700.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	35.00
										DISTANCE	50.00
INPUT PARAMETERS											
Vehicles per hour	296.82	13.67	16.58	41.40	1.49	0.88	68.09	4.76	2.19	% A	91.12
Speed in MPH	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	4.47
NOISE CALCULATIONS											
Reference levels	65.11	74.83	80.05	65.11	74.83	80.05	65.11	74.83	80.05	% HT	4.40
ADJUSTMENTS											
Flow	18.98	5.61	6.45	10.42	-4.01	-6.32	12.58	1.03	-2.35		
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	65.02
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	64.03
LEQ	59.02	55.37	61.42	50.46	45.75	48.65	52.62	50.79	52.63	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	64.03		EVENING LEQ	53.47		NIGHT LEQ	56.87		Use hour?	no
										GRADE dB	0.00
	CNEL		65.02								

FHWA Sound32 Spreadsheet

Existing Traffic Noise

Project: **Villa Siena 5414a**
Road: **Jackson Avenue**
Segment: **Elizabeth Lane to Oak Creek Apts**

	DAYTIME			EVENING			NIGHTTIME				
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	ADT	5300.00
										SPEED	45.00
										DISTANCE	50.00
INPUT PARAMETERS											
Vehicles per hour	146.26	7.08	8.72	20.40	0.77	0.46	33.55	2.46	1.15	% A	90.65
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	4.67
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	4.68
ADJUSTMENTS											
Flow	14.81	1.66	2.57	6.26	-7.96	-10.20	8.42	-2.92	-6.23		
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	64.10
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	63.00
LEQ	59.09	54.21	59.64	50.53	44.59	46.87	52.69	49.63	50.85	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	63.00		EVENING LEQ	52.80		NIGHT LEQ	56.01		Use hour?	no
										GRADE dB	0.00
	CNEL		64.10								

FHWA Sound32 Spreadsheet

Existing Plus Project Traffic Noise

Project: **Villa Siena 5414a**
Road: **Jackson Avenue**
Segment: **Elizabeth Lane to Oak Creek Apts**

	DAYTIME			EVENING			NIGHTTIME				
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	ADT	6000.00
										SPEED	45.00
										DISTANCE	50.00
INPUT PARAMETERS											
Vehicles per hour	166.93	7.48	8.97	23.28	0.82	0.47	38.29	2.60	1.18	% A	91.39
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	4.36
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	4.25
ADJUSTMENTS											
Flow	15.39	1.90	2.69	6.83	-7.72	-10.08	8.99	-2.68	-6.11		
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	64.45
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	63.33
LEQ	59.66	54.45	59.76	51.11	44.83	46.99	53.27	49.87	50.97	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	63.33		EVENING LEQ	53.21		NIGHT LEQ	56.38		Use hour?	no
										GRADE dB	0.00
	CNEL		64.45								

FHWA Sound32 Spreadsheet

Existing Traffic Noise

Project: **Villa Siena 5414a**
Road: **Jackson Avenue**
Segment: **East of Oak Creek Apts**

	DAYTIME			EVENING			NIGHTTIME				
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	ADT	5500.00
										SPEED	45.00
										DISTANCE	50.00
INPUT PARAMETERS											
Vehicles per hour	151.77	7.34	9.05	21.17	0.80	0.48	34.82	2.56	1.19	% A	90.65
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	4.67
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	4.68
ADJUSTMENTS											
Flow	14.97	1.82	2.73	6.42	-7.80	-10.04	8.58	-2.76	-6.07		
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	64.26
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	63.16
LEQ	59.25	54.37	59.80	50.69	44.75	47.03	52.85	49.79	51.01	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	63.16		EVENING LEQ	52.96		NIGHT LEQ	56.17		Use hour?	no
										GRADE dB	0.00
	CNEL		64.26								

FHWA Sound32 Spreadsheet

Existing Plus Project Traffic Noise

Project: **Villa Siena 5414a**
Road: **Jackson Avenue**
Segment: **East of Oak Creek Apts**

	DAYTIME			EVENING			NIGHTTIME				
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	ADT	5800.00
										SPEED	45.00
										DISTANCE	50.00
INPUT PARAMETERS											
Vehicles per hour	160.63	7.51	9.16	22.40	0.82	0.48	36.85	2.62	1.21	% A	90.98
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	4.53
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	4.49
ADJUSTMENTS											
Flow	15.22	1.92	2.78	6.67	-7.70	-9.99	8.83	-2.66	-6.01		
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	64.41
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	63.30
LEQ	59.49	54.47	59.85	50.94	44.85	47.08	53.10	49.89	51.06	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	63.30		EVENING LEQ	53.13		NIGHT LEQ	56.33		Use hour?	no
										GRADE dB	0.00
	CNEL		64.41								

FHWA Sound32 Spreadsheet

Existing Traffic Noise

Project: **Villa Siena 5414a**
Road: **Jackson Avenue**
Segment: **West of Nutmeg Street**

	DAYTIME			EVENING			NIGHTTIME			ADT	8000.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	45.00
										DISTANCE	50.00
INPUT PARAMETERS											
Vehicles per hour	220.76	10.68	13.17	30.79	1.17	0.70	50.64	3.72	1.74	% A	90.65
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	4.67
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	4.68
ADJUSTMENTS											
Flow	16.60	3.45	4.36	8.05	-6.17	-8.41	10.21	-1.13	-4.44		
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	65.89
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	64.79
LEQ	60.88	56.00	61.43	52.32	46.38	48.66	54.48	51.42	52.63	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	64.79		EVENING LEQ	54.59		NIGHT LEQ	57.80		Use hour?	no
										GRADE dB	0.00
	CNEL		65.89								

FHWA Sound32 Spreadsheet

Existing Plus Project Traffic Noise

Project: **Villa Siena 5414a**
Road: **Jackson Avenue**
Segment: **West of Nutmeg Street**

	DAYTIME			EVENING			NIGHTTIME				
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	ADT	8400.00
										SPEED	45.00
										DISTANCE	50.00
INPUT PARAMETERS											
Vehicles per hour	232.57	10.91	13.31	32.44	1.19	0.70	53.35	3.80	1.76	% A	90.95
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	4.54
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	4.50
ADJUSTMENTS											
Flow	16.83	3.54	4.40	8.27	-6.08	-8.37	10.43	-1.04	-4.39		
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	66.02
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	64.91
LEQ	61.10	56.09	61.48	52.55	46.47	48.70	54.71	51.51	52.68	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	64.91		EVENING LEQ	54.75		NIGHT LEQ	57.94		Use hour?	no
										GRADE dB	0.00
	CNEL		66.02								

FHWA Sound32 Spreadsheet

Existing Traffic Noise

Project: **Villa Siena 5414a**
Road: **Jackson Avenue**
Segment: **East of Nutmeg Street**

	DAYTIME			EVENING			NIGHTTIME			ADT	11000.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	45.00
										DISTANCE	50.00
INPUT PARAMETERS											
Vehicles per hour	303.55	14.69	18.11	42.34	1.60	0.96	69.63	5.12	2.39	% A	90.65
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	4.67
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	4.68
ADJUSTMENTS											
Flow	17.98	4.83	5.74	9.43	-4.79	-7.03	11.59	0.25	-3.05		
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	67.27
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	66.17
LEQ	62.26	57.38	62.81	53.70	47.76	50.04	55.86	52.80	54.02	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	66.17		EVENING LEQ	55.97		NIGHT LEQ	59.18		Use hour?	no
										GRADE dB	0.00
	CNEL		67.27								

FHWA Sound32 Spreadsheet

Existing Plus Project Traffic Noise

Project: **Villa Siena 5414a**
Road: **Jackson Avenue**
Segment: **East of Nutmeg Street**

	DAYTIME			EVENING			NIGHTTIME			ADT	11200.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	45.00
										DISTANCE	50.00
INPUT PARAMETERS											
Vehicles per hour	309.45	14.80	18.18	43.16	1.62	0.96	70.99	5.16	2.40	% A	90.76
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	4.62
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	4.61
ADJUSTMENTS											
Flow	18.07	4.86	5.76	9.51	-4.75	-7.01	11.67	0.28	-3.04		
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	67.32
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	66.22
LEQ	62.34	57.42	62.83	53.79	47.80	50.06	55.95	52.84	54.03	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	66.22		EVENING LEQ	56.03		NIGHT LEQ	59.24		Use hour?	no
										GRADE dB	0.00
	CNEL		67.32								

FHWA Sound32 Spreadsheet

Existing Traffic Noise

Project: **Villa Siena 5414a**
Road: **Nutmeg Street**
Segment: **South of Jackson Avenue**

	DAYTIME			EVENING			NIGHTTIME				
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	ADT	9900.00
										SPEED	40.00
										DISTANCE	50.00
INPUT PARAMETERS											
Vehicles per hour	273.19	13.22	16.30	38.10	1.44	0.86	62.67	4.60	2.15	% A	90.65
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	4.67
NOISE CALCULATIONS											
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16	% HT	4.68
ADJUSTMENTS											
Flow	18.04	4.88	5.79	9.48	-4.73	-6.98	11.64	0.30	-3.00		
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	65.86
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	64.82
LEQ	60.33	56.13	61.88	51.77	46.51	49.11	53.93	51.55	53.09	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	64.82		EVENING LEQ	54.42		NIGHT LEQ	57.74		Use hour?	no
										GRADE dB	0.00
	CNEL		65.86								

FHWA Sound32 Spreadsheet

Existing Plus Project Traffic Noise

Project: **Villa Siena 5414a**
Road: **Nutmeg Street**
Segment: **South of Jackson Avenue**

	DAYTIME			EVENING			NIGHTTIME				
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	ADT	10000.00
										SPEED	40.00
										DISTANCE	50.00
INPUT PARAMETERS											
Vehicles per hour	276.15	13.27	16.33	38.52	1.45	0.86	63.35	4.62	2.16	% A	90.71
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	4.64
NOISE CALCULATIONS											
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16	% HT	4.64
ADJUSTMENTS											
Flow	18.08	4.90	5.80	9.53	-4.72	-6.97	11.69	0.32	-2.99		
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	65.88
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	64.84
LEQ	60.37	56.15	61.89	51.82	46.53	49.12	53.98	51.57	53.10	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	64.84		EVENING LEQ	54.45		NIGHT LEQ	57.76		Use hour?	no
										GRADE dB	0.00
	CNEL		65.88								

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G.2 - HVAC Residential Noise Modeling

Siena Project
ONSITE HVAC NOISE

Location: Nearest Sensitive Recept

Noise Source	Volume	Noise Reference Level (50 feet)	Noise Level (dB L_{eq}) Distance to Point of Reception (feet) 150	200	235	155	200	235	275	250	275
Roof Mounted AC	2	55.0	45.5								
w/ screen attenuation			38.5								
Roof Mounted AC	2	55.0		43.0							
w/ screen attenuation				36.0							
Roof Mounted AC	2	55.0			41.6						
w/ screen attenuation					34.6						
Roof Mounted AC	2	55.0				45.2					
w/ screen attenuation						38.2					
Roof Mounted AC	2	55.0					43.0				
w/ screen attenuation							36.0				
Roof Mounted AC	2	55.0						41.6			
w/ screen attenuation								34.6			
Roof Mounted AC	2	55.0							40.2		
w/ screen attenuation									33.2		
Roof Mounted AC	1	55.0								41.0	
w/ screen attenuation										34.0	
Roof Mounted AC	1	55.0									40.2
w/ screen attenuation											33.2

	w/ AC screen	w/o AC screen
TOTAL ONSITE SOUND GENERATION LEVEL AT SENSITIVE RECEPTOR:	**45.3**	**52.3**