RK engineering group, inc.

traffic engineering ▪ transportation planning
acoustical engineering ▪ parking studies
air quality & greenhouse gas analysis

LETTER OF TRANSMITTAL

TO: UNITED ENGEINEERING GROUP
10602 Trademark Parkway, Suite 509
Rancho Cucamonga, CA 91730

ATTN: Mr. Beau Cooper

DATE: February 6, 2017
JOB NO.: 2359-2016-03
SUBJECT: Summerland Senior Living
Noise Impact Study,
County of San Bernardino

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REMARKS:

Attached is the Summerland Senior Living Noise Impact Study, City of Chino.

Please call (949) 474-0809 if you have any questions.

BY: Bryan Estrada

Bryan Estrada, PTP
Senior Transportation Planner

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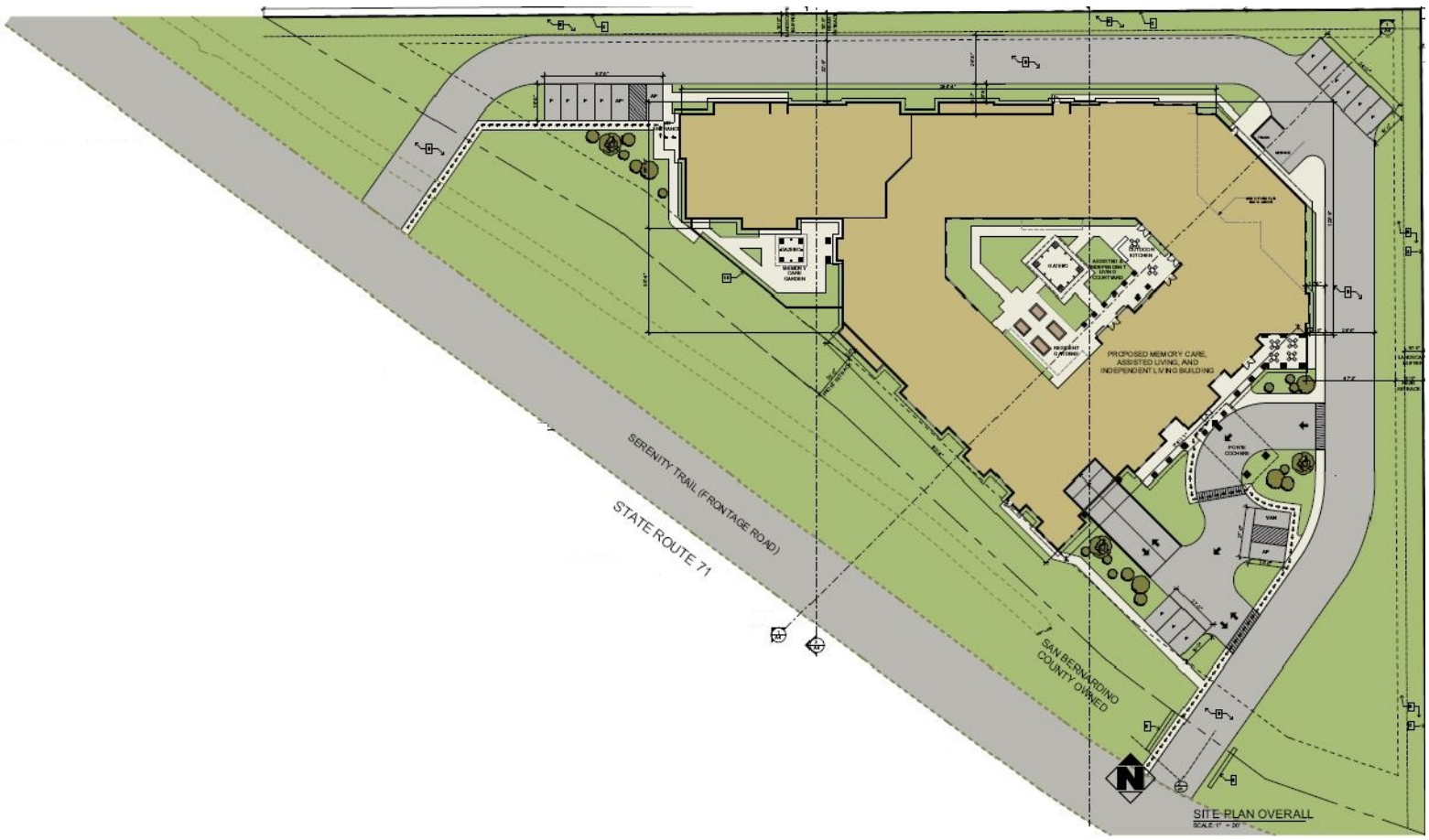
SUMMERLAND SENIOR LIVING
NOISE IMPACT STUDY
County of San Bernardino



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February 6, 2017

Mr. Beau Cooper
UNITED ENGINEERING GROUP
10602 Trademark Parkway, Suite 509
Rancho Cucamonga, CA 91730

Subject: Summerland Senior Living Noise Impact Study, County of San Bernardino

Dear Mr. Cooper:

RK ENGINEERING GROUP, INC. (RK) has completed a noise impact study for the proposed Summerland Senior Living project. The project site is located at 13225 Serenity Trail in the County of San Bernardino. A location map is provided in Exhibit A. The project will consist of 110-units of an assisted living facility on 3.16 acres. The proposed project's site plan is shown in Exhibit B. The acoustical parameters, including the County of San Bernardino noise standards, are included in Appendix A.

The project was assessed with respect to on-site and off-site noise impacts. Vibration impacts from construction were also assessed. The primary source of off-site generated noise would be traffic noise along the SR-71 Freeway and surrounding local roadway network. The primary source of on-site noise would be construction noise during the build out of the project, as well as air conditioning units and trash truck operations once the project is complete.

Based on the results of this analysis, the project is expected to have a less than significant impact with the recommendations of this report. The project will require a "windows closed" condition and upgraded STC rated windows to meet interior noise requirements.

RK ENGINEERING GROUP, INC. is pleased to provide UNITED ENGINEERING GROUP with this acoustical analysis. If you have any questions regarding this study or need further review, please call us at (949) 474-0809.

Sincerely,
RK ENGINEERING GROUP, INC.

REGISTERED PROFESSIONAL ENGINEER
ROBERT KAHN
No. 20285
Exp. 09/30/17
CIVIL
STATE OF CALIFORNIA

Bryan Estrada, P.T.P.
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SUMMERLAND SENIOR LIVING
NOISE IMPACT STUDY
County of San Bernardino, California

Prepared for:

UNITED ENGINEERING GROUP
10602 Trademark Parkway, Suite 509
Rancho Cucamonga, CA 91730

Prepared by:

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Robert Kahn, P.E.

February 6, 2016

BE:dt/RK12135.doc
JN:2359-2016-03

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1.0 Introduction

1.1 Purpose of Analysis and Study Objectives

The purpose of this acoustical assessment is to evaluate the potential noise impacts for the proposed project and to recommend noise mitigation measures, if necessary, to reduce impacts to levels of less than significant. The assessment was conducted and compared to the noise standards set forth by the Federal, State, and Local agencies. Per CEQA requirements, a significant impact related to noise would occur if a project would result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

- For a project located within 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?
- For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

The following information is provided in this report:

- A description of the study area and the proposed project
- Information regarding the fundamentals of noise
- A description of the local noise guidelines and standards
- A roadway noise impact analysis
- An exterior/interior analysis of mobile source noise impacts to the project site
- An exterior analysis of stationary noise impacts from the project site to adjacent land uses
- A noise analysis of potential short-term construction impacts to adjacent land uses
- A vibration analysis of potential short-term construction impacts to adjacent land uses

1.2 Site Location and Study Area

The project is located in the County of San Bernardino, California, near the border of City of Chino. The project site is located at 13225 Serenity Trail, just east of SR-71, as shown on the location map in Exhibit A. The project site is bounded by existing residential uses to the north and east, and Serenity Trail bounds the project site to the southwest. State Route 71 is located approximately 250 feet west of the project site (centerline to property line). The project site is approximately 720 feet above sea level, the grade varies slightly and the site is currently vacant.

1.3 Proposed Project Description

The project will construct a new three-story building with 110 units of senior assisted living, independent living and memory care facility on a 3.16 acre lot. Parking will be provided via 17 surface parking stalls and 37 parking stalls within a subterranean parking structure. A private roadway will provide access throughout the project site with a drop-off area on the west end of the project, adjacent to the parking structure entrance. The site plan used in this analysis was provided by UNITED ENGINEERING GROUP and is illustrated in Exhibit B.

The existing land use designation for the site is Single Family Residential and the proposed land use designation is General Commercial. The existing zoning is RS-1 and the proposed zoning is CG. The project will require a General Plan Amendment and Zone change.

Construction activities would consist of site preparation, on-site grading, building, paving, and architectural coating. The project is expected to export a net total of approximately 12,000 cubic yards of soil during the excavation of the parking structure and site grading.

The primary source of off-site generated noise would be traffic noise from SR-71 and the adjacent local roadway network. The primary source of on-site noise from the site would be construction noise during the build out of the project, as well as air conditioning units and trash trucks and deliveries once the project is operational. The project is located over 5 miles from Chino Airport and falls outside of the airport noise contours. No airport noise impacts are expected.

1.4 Summary of Analysis Results

The following is a summary of the noise analysis results, according to impact.

Impact NOISE-1: Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or

applicable standards of other agencies. **Less than significant with mitigation.**

Impact NOISE-2: Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels. **Less than significant.**

Impact NOISE-3: A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project. **Less than significant with mitigation.**

Impact NOISE-4: A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. **Less than significant with mitigation.**

Impact NOISE-5: For a project located within 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.**

Impact NOISE-6: For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels? **No impact.**

1.5 Mitigations Measures (MM) Applied to Project

MM-1 Install 6-foot masonry block sound wall along parcel boundary.

MM-2 Install 6-foot masonry block sound wall around memory care garden.

MM-3 Locate all rooftop mechanical equipment as far away from neighboring residential properties as possible, and not less than 100 feet from property line. Provide a 5-foot parapet wall along rooftop to shield equipment.

MM-4 Delivery, loading/unloading activity, and trash pick-up hours should be limited to daytime (7AM-10PM) hours only.

MM-5 Limit engine idling time for all delivery vehicles and moving trucks to 5 minutes or less.

MM-6 A "windows closed" condition and upgraded STC rated windows is required to meet interior noise standards. All first floor windows will require a

minimum STC rating of 25 or greater. All second and third floor windows will require a minimum STC rating of 26 or greater.

MM-7 Attic and roof vents that directly face the subject roadway, if applicable, should include an acoustical baffle to prevent vehicle noise intrusion. Exhibits E-1 and E-2 illustrate examples acoustical baffles. The contractor may install similar measures to provide noise reduction.

MM-8 For proper acoustical performance, all exterior windows, doors, and sliding glass doors must have a positive seal and leaks/cracks must be kept to a minimum.

MM-9 All construction activities should take place during daytime hours, between 7AM to 7PM, Monday through Saturday. No construction activity shall occur on Sundays or Federal holidays.

MM-10 During construction, the contractor shall ensure all construction equipment is equipped with appropriate noise attenuating devices and equipment shall be maintained so that vehicles and their loads are secured from rattling and banging. Idling equipment should be turned off when not in use.

MM-11 Locate staging area, generators and stationary construction equipment as far from the westerly property line, as reasonably feasible.

MM-12 The developer should notify the surrounding neighbors prior to beginning the heavy earth work and impact pile driving activities.

2.0 Fundamentals of Noise and Vibration

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

2.1 Sound, Noise and Acoustics

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

2.2 Frequency and Hertz

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

2.3 Sound Pressure Levels and Decibels

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

2.4 Addition of Decibels

Because decibels are on a logarithmic scale, sound pressure levels cannot be added or subtracted by simple plus or minus addition. When two (2) sounds or equal SPL are combined, they will produce an SPL 3 dB greater than the original single SPL. In other words, sound energy must be doubled to produce a 3 dB increase. If two (2) sounds differ by approximately 10 dB the higher sound level is the predominant sound.

2.5 Human Response to Changes in Noise Levels

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

2.6 Noise Descriptors

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

A-Weighted Sound Level

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

Ambient Noise Level

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

Community Noise Equivalent Level (CNEL)

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

Decibel (dB)

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

dB(A)

A-weighted sound level (see definition above).

Equivalent Sound Level (LEQ)

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

Habitable Room

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

L(n)

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

Noise

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

Outdoor Living Area

Outdoor spaces that are associated with residential land uses typically used for passive recreational activities or other noise-sensitive uses. Such spaces include patio areas, barbecue areas, jacuzzi areas, etc. associated with residential uses; outdoor patient recovery or resting areas associated with hospitals, convalescent hospitals, or rest homes; outdoor areas associated with places of worship which have a significant role in services or

other noise-sensitive activities; and outdoor school facilities routinely used for educational purposes which may be adversely impacted by noise. Outdoor areas usually not included in this definition are: front yard areas, driveways, greenbelts, maintenance areas and storage areas associated with residential land uses; exterior areas at hospitals that are not used for patient activities; outdoor areas associated with places of worship and principally used for short-term social gatherings; and, outdoor areas associated with school facilities that are not typically associated with educational uses prone to adverse noise impacts (for example, school play yard areas).

Percent Noise Levels

See L(n).

Sound Level (Noise Level)

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

Sound Level Meter

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

Single Event Noise Exposure Level (SENEL)

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

2.7 Traffic Noise Prediction

Noise levels associated with traffic depends on a variety of factors: (1) volume of traffic, (2) speed of traffic, (3) auto, medium truck (2 – 6 wheels) and heavy truck percentage (3 axle and greater), and sound propagation. The greater the volume of traffic, higher speeds and truck percentages equate to a louder volume in noise. A doubling of the Average Daily Traffic (ADT) along a roadway will increase noise levels by approximately 3 dB; reasons for this are discussed in the sections above.

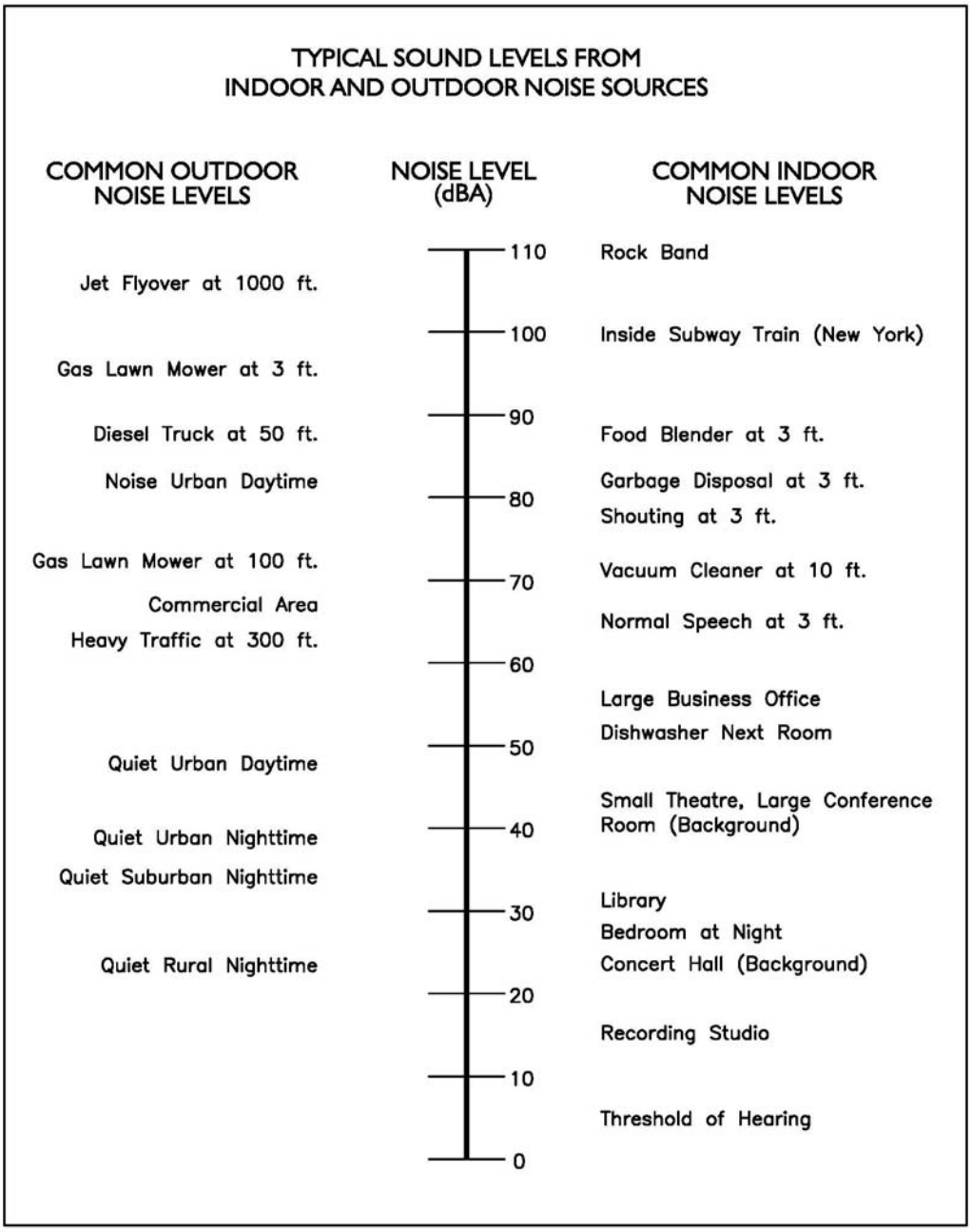
2.8 Sound Propagation

As sound propagates from a source it spreads geometrically. Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates at a rate of 6 dB per doubling of distance.

The movement of vehicles down a roadway makes the source of the sound appear to propagate from a line (i.e., line source) rather than a point source. This line source results in the noise propagating from a roadway in a cylindrical spreading versus a spherical spreading that results from a point source. The sound level attenuates for a line source at a rate of 3 dB per doubling of distance.

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

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



2.9 Vibration Descriptors

Ground-borne vibrations consist of rapidly fluctuating motions within the ground that have an average motion of zero. The effects of ground-borne vibrations typically only cause a nuisance to people, but at extreme vibration levels, damage to buildings may occur. Although ground-borne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable.

Ground-borne noise is an effect of ground-borne vibration and only exists indoors, since it is produced from noise radiated from the motion of the walls and floors of a room and may also consist of the rattling of windows or dishes on shelves.

Several different methods are used to quantify vibration amplitude.

PPV

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

RMS

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

VdB

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

2.10 Vibration Perception

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

2.11 Vibration Propagation

There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular 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.

2.12 Construction Related Vibration Level Prediction

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

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

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

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

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

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

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

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3.0 Regulatory Setting

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

3.1 Federal Regulations

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

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

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

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

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

3.2 State Regulations

Established in 1973, the California Department of Health Services Office of Noise Control (ONC) was instrumental in developing regularity tools to control and abate noise for use by local agencies. One significant model is the "Land Use Compatibility for Community Noise

Environments Matrix." The matrix allows the local jurisdiction to clearly delineate compatibility of sensitive uses with various incremental levels of noise.

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

3.3 County of San Bernardino Noise Regulations

The County of San Bernardino outlines their noise regulations and standards within the Noise Element from the General Plan and Municipal Code (Appendix A). For purposes of this analysis, the County's General Plan and Noise Ordinance (Section 83.01.080) is used to evaluate the roadway noise and stationary noise impacts to and from the proposed project. The Noise Element outlines Goals and Polices (Goal N.1, page VII-4 of the Noise Element). In addition, Section 83.01.080 outlines the applicable noise standards for the proposed project.

The project will be required to meet interior and exterior Noise Standards for Adjacent Mobile Sources as part of the land uses compatibility assessment of the proposed Senior Living facility. The project will also be required to meet Noise Standards for Stationary Noise Sources with regards to the project's operational impact to adjacent residential uses.

Mobile Noise Sources

The County specifies outdoor and indoor noise limits for residential, commercial, institutional, and open space uses land uses. Table 83-3 (Section 83.01.080) outlines the County's exterior standard for nursing home uses. Nursing home land uses are normally acceptable at 65 dBA CNEL exterior and 45 dBA CNEL interior. The following table outlines the County's Noise Standards for Adjacent Mobile Noise Sources:

Table 83-3: Noise Standards for Adjacent 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

Table 83-3: Noise Standards for Adjacent Mobile Noise Sources (Continued)

Commercial	Amphitheater, concert hall, auditorium, movie theater	45	N/A
Institutional/Public	Hospital, nursing home, school classroom, religious institution, library	45	65
Open Space	Park	N/A	65

(1) The indoor environmental 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
- 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 7:00 p.m. to 10:00 p.m. and ten decibels to sound levels in the night from 10:00 p.m. to 7:00 a.m.

Stationary Noise Regulation

Section 83.01.080(C) from the Municipal Code discusses the noise standards for stationary noise source and states the following:

(1) Table 83-2 from the noise ordinance describes the noise standard for emanations from a stationary noise source, as it affects adjacent properties:

Table 83-2: Noise Standards for Stationary Noise Sources

Affected Land Uses (Receiving Noise)	***7AM - 10PM (Leq)***	***10:00PM - 7AM (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)

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 one, eight, 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 sensitive 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 10:00 p.m. to 7:00 a.m.). In this way Ldn takes into account the lower tolerance of people for noise during nighttime periods.

(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.

Construction Noise Regulation

Construction noise sources are regulated within San Bernardino County under Section 83.01.090 (G) of the County Code, which states that temporary construction, maintenance, repair, or demolition activities between 7AM to 7PM, except Sundays and Federal Holidays are exempt from the County's noise regulations .

Vibration Regulation

Vibration sources are regulated within San Bernardino County under Section 83.01.090 of the County Code, which sets the vibration limit at that which cannot be felt without the aid of instruments at or beyond the property line, and that which does not produce a particle velocity greater than or equal to 0.2 inches per second at the property line. Construction vibration is exempt from this limit between the hours of 7:00 a.m. and 7:00 p.m., except Sundays and federal holidays and motor vehicles are exempt when not under the control of the subject use (County 2007).

4.0 Study Method and Procedures

The following section describes the methodology and procedure to evaluate existing and future noise levels and project impacts.

4.1 Measurement Procedure and Criteria

To determine the existing noise level environment, RK conducted two (2) short-term noise measurements at the project study area. The following criteria are used to select measurement locations and receptors:

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

RK conducted the sound level measurements in accordance to the County of San Bernardino and CalTrans technical noise specifications. All measurements equipment meets American National Standards Institute (ANSI) specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA). The following gives a brief description of the Caltrans Technical Noise Supplement procedures for sound level measurements:

- Microphones for sound level meters were placed 5-feet above the ground for all measurements
- Sound level meters were calibrated (Larson Davis CAL 200) before and after each measurement
- Following the calibration of equipment, a wind screen was placed over the microphone
- Frequency weighting was set on "A" and slow response
- Results of the long-term noise measurements were recorded on field data sheets
- During any short-term noise measurements any noise contaminations such as barking dogs, local traffic, lawn mowers, or aircraft fly-overs were noted
- Temperature and sky conditions were observed and documented

Noise measurements were conducted November 16, 2016 using a Larson Davis 700 type II sound level meter. The Leq, Lmin, Lmax, L2, L8, L25 and L50 were recorded over a 10-minute interval. The information was utilized to define the existing noise characteristics for the project.

4.1.1 Noise Measurement Locations

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

- Short-term noise monitoring location one (ST-1) was taken approximately 5 feet south of northern property line and 250 feet east of the westerly property line.

- Short-term noise monitoring location two (ST-2) was taken approximately 15 feet west of eastern property line and approximately 260 feet north of the southern property line.

Short term noise monitoring locations represent the existing ambient noise levels on the project site near the adjacent residential properties. Appendix B includes photographs, field sheets and measured noise data.

4.1.2 Noise Measurement Timing and Climate

The short-term noise measurements were recorded during daytime hours on November, 16 2016. Noise measurements were conducted in 10-minute intervals during the indicated time schedule. Nighttime noise levels were estimated by applying a 5 decibel reduction to daytime noise levels.

The climate data was noted during the measurements and is indicated in the field sheets within Appendix B. Measurements were not taken during abnormal weather conditions such as high wind or rain.

4.2 Traffic Noise Modeling

Traffic noise from vehicular traffic was projected using a version of the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108). The FHWA model arrives at the predicted noise level through a series of adjustments to the key input parameters. SR-71 Freeway buildout traffic volumes were obtained from the City of Chino General Plan. The SR-71 vehicle percentages and truck mix is based on 2015 Caltrans Average Annual Traffic Volume data. Traffic volumes along Serenity Trail and Chino Avenue were obtained from the Summerland Senior Living Traffic Impact Analysis (January 2017), prepared by Translutions, Inc. The referenced traffic data was applied to the model and is provided in Appendix C.

The following outlines the key adjustments made to the computer model for the roadway inputs:

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

Table 2 indicates the roadway parameters and vehicle distribution utilized for this study.

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

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

4.3 Interior Noise Modeling

The interior noise level is the difference between the projected exterior noise level at the structure's façade and the noise reduction provided by the structure itself. Typical building construction will provide a conservative 12 dBA noise level reduction with a "windows open" condition and a very conservative 20 dBA noise level reduction with "windows closed". RK estimated the interior noise level by subtracting the building shell design from the estimated exterior noise level.

4.4 Stationary Noise Modeling

The stationary noise was projected using a computer program that replicates the FHWA Noise Prediction Model (FHWA-RD-77-108). The FHWA model arrives at the predicted noise level through a series of adjustments to the reference energy noise level. For each stationary source, the referenced noise level was applied to the model. The model outputs the projected noise level based on the following key parameters:

- Measured referenced noise level – (e.g. how loud a source is at a specific distance)
- Vertical and horizontal distances (sensitive receptor distance from noise source)
- Noise barrier vertical and horizontal distances (noise barrier distance from sound source and receptor).

- Typical noise source spectra
- Topography

Table 3 indicates the referenced and adjusted noise level measurements conducted by RK. The reference noise levels provide sample data of similar noise sources as the ones being proposed by the project. RK collected reference noise data for rooftop HVAC equipment and trash truck activities in 2010. The distance from the reference source indicates the distance the microphone was placed from the noise source.

To estimate the future project operational noise level impacts at the nearest property lines, the reference noise levels are adjusted based on the modeling parameters described above. Table 3 indicates the adjusted noise level measurements. Noise calculation worksheets are located in Appendix D. The noise levels assume that the stationary sources are operating continuously when in reality all noise sources will operate intermittently throughout the daily operation.

4.5 Construction Noise Modeling

The construction noise analysis utilizes the Federal Highway Administration (FHWA) Roadway Construction Noise Model, together with several key construction parameters. Key inputs include distance to the sensitive receiver, equipment usage, and baseline parameters for the project site. This study evaluates the potential exterior noise impacts during each phase of construction. Noise levels were projected approximately 50 feet to the nearest sensitive receptor property line. The construction noise calculation output worksheets are located in Appendix G.

4.6 Construction Vibration Modeling

The construction vibration assessment utilizes referenced worst-case vibration levels and methodology set-forth within the Caltrans Transportation and Construction Induced Vibration Guidance Manual. The project is expected to use impact pile driving to construct the subterranean parking structure. The vibratory activity is considered a continuous and/or frequent event, and is required to comply with the applicable guidance thresholds criteria. It is expected that vibration levels will be highest during pile driving activity and the analysis of this activity is considered an assessment of the worst case conditions.

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

PPV = reference measurement at 100 feet from vibration source

D = distance from equipment to property line

n= vibration attenuation rate through ground (n=1.0 was utilized for this study)

Vibration impact output calculations are located in Appendix G.

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5.0 Existing Noise Environment

To determine the existing noise level environment at the project site, noise monitoring was conducted on November 16, 2016 using a Larson Davis 700 type II sound level meter. Noise measurement data indicates that traffic noise propagating from the nearby roadways is the main source of noise impacting the project site and surrounding land uses. The project is located over 5 miles from Chino Airport and falls outside of the airport noise contours. No airport noise impacts are expected.

5.1 Short-Term Noise Measurement Results

Noise levels on-site range from 56.4 dBA Leq to 61.4 dBA Leq during daytime hours and 51.4 dBA Leq to 56.4 dBA Leq during nighttime hours. The existing ambient noise levels currently exceed the City's daytime and nighttime stationary noise source standards for residential uses. Table 1 summarizes the results of the existing noise levels.

5.2 Existing Roadway Noise Levels

Existing vehicular traffic noise was projected using the FHWA Noise Prediction Model (FHWA-RD-77-108). Existing conditions roadway noise levels provide a baseline of the existing traffic noise levels near the site. The distances to the 55, 60, 65, 70 dBA CNEL noise contours were calculated. In addition, the noise level at 100 feet from the centerline was calculated and representative of the approximate location of sensitive receivers along the study area roadway. The existing traffic (without project) noise levels along the roadways are presented in Table 4.

Based on existing traffic volumes, the noise level at 100 feet from the centerline of Serenity Trail is 42.5 dBA CNEL. The existing noise level at 100 feet from the centerline of Chino Avenue is 66.5 dBA CNEL. Existing traffic noise conditions along adjacent roadways are within the allowable limits for institutional uses. Existing noise levels from the SR-71 at the project site are approximately 60.6 dBA CNEL. Future potential increases in roadway noise levels are analyzed as a result of adding project traffic to the adjoining roadway network. Future roadway noise impacts are discussed in the following section

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6.0 Future Noise Impacts and Mitigation

6.1 Roadway Noise Impacts

This assessment analyzes the traffic noise impacts from the proposed project to the adjacent roadway network. Increase in traffic noise levels are analyzed for Serenity Trail Road and Chino Avenue. Roadway noise impacts are based on traffic volumes provided in the Summerland Senior Living Traffic Impact Analysis (January 2017), prepared by Translutions, Inc. The roadway noise impact analysis worksheets are provided in Appendix D.

The finding of this analysis show the project alone will not significantly increase traffic along the adjacent roadways. The proposed change in land use would not conflict with the General Plan projections regarding roadway noise impacts.

6.1.1 Existing Plus Project Conditions

Table 4 indicates the Existing With Project noise levels along Serenity Trail and Chino Avenue and compares the change in roadway noise level to without project conditions. The project is anticipated to have minimal impact to the existing traffic noise levels. Noise levels are expected to increase by approximately 2.8 dBA CNEL along Serenity Trail and 0.1 dBA CNEL along Chino Avenue. Typically, the human ear can barely perceive the change in noise level of 3 dB, and therefore, the minor increase in noise is considered less than significant. Furthermore, noise levels along Serenity Trail will remain below the acceptable limits for residential and institutional uses.

6.1.2 Opening Year Conditions

Table 5 compares the change in roadway noise levels for Opening Year conditions without and with project conditions. Noise levels are expected to increase by approximately 2.8 dBA CNEL along Serenity Trail and 0.1 dBA CNEL along Chino Avenue, as a result of the project. Typically, the human ear can barely perceive the change in noise level of 3 dB, and therefore, the minor increase in noise is considered less than significant. Furthermore, noise levels along Serenity Trail will remain below the acceptable limits for residential and institutional uses. The project is anticipated to have a less than significant impact to the Opening Year traffic noise levels.

6.1.3 Year 2040 Conditions

Table 6 compares the change in roadway noise levels for Year 2040 conditions without and with project conditions. Noise levels are expected to increase by approximately 2.8 dBA CNEL along Serenity Trail and 0.0 dBA CNEL along Chino Avenue, as a result of the project.

Typically, the human ear can barely perceive the change in noise level of 3 dB, and therefore, the minor increase in noise is considered less than significant. Furthermore, noise levels along Serenity Trail will remain below the acceptable limits for residential and institutional uses.

6.2 Noise Levels from Mobile Sources

RK projected the traffic noise levels to the nearest building facades and outdoor habitable areas of the project site facing the adjacent roadways. Traffic noise levels were projected to the exterior study areas based on the horizontal and vertical distances from source to receiver locations. Noise projections also account for existing and proposed noise barriers that serve to attenuate noise impacts to the project site. The noise level calculation worksheets for mobile sources are provided in Appendix E.

Traffic noise from the SR-71 freeway, Chino Avenue and Serenity Trail will be the main source of noise impacting the project site and the surrounding area. This analysis is based on buildout traffic volumes of the adjacent roadways, including project related traffic, and represents the worst case future scenario.

Table 7 indicates the estimated future exterior noise levels from mobile sources at the project site. All habitable exterior patios and courtyards are shielded by proposed noise barriers and the building structure itself. Noise levels will be reduced significantly at these locations. Building shell design can reduce noise levels by as much as 12 dBA, resulting in habitable exterior areas that are below the County's noise level requirements.

The combined on-site exterior noise levels will range from 41.9 dBA CNEL to 66.2 dBA CNEL. No habitable outdoor areas will be exposed to noise levels above the allowable 65 dBA CNEL limit. The 2nd and 3rd building floor areas will be exposed to noise levels that exceed the exterior noise standards for institutional uses. Therefore, adequate building insulation and design must be provided to ensure interior noise levels do not exceed 45 dBA CNEL. A windows closed conditions will be required to meet interior noise level standards.

6.3 Noise Levels from Stationary Sources

The stationary noise impacts associated with the proposed project would include condenser unit noise from the rooftop HVAC units, and loading/unloading, deliveries and trash truck activities from the rear service area. The project must not exceed the County's stationary daytime and nighttime noise standard for residential uses at the north and east property line. Noise levels are project 5 feet beyond the property line and behind the proposed screening wall.

Table 8 indicates the daytime and nighttime stationary noise levels associated with operations at the site along the north property line. Table 9 indicates the noise levels associated with stationary sources along the east property line.

6.3.1 HVAC Equipment Noise

The proposed project would have rooftop heating, ventilation, and air conditioning (HVAC) or condenser equipment. With the effects of distance divergence, noise generated by HVAC equipment would be reduced to approximately 47.9 dBA Leq at the closest residences. In order to ensure HVAC equipment noise levels do not adversely impact the adjacent residential properties, all roof mounted equipment should be located at least 100 feet from the nearest residential property line and located behind a 5-foot parapet wall.

With the recommended equipment location and screening wall, noise impacts would be less than significant at the noise sensitive land uses adjacent to the site.

6.3.2 Service Area and Trash Truck Noise

The project would have a truck delivery and trash pick-up service area located near the rear of the building, located approximately 60 feet from the north and east property line. During loading, unloading, and trash pick-up activities noise would be generated by the trucks' engines, exhaust systems, breaking, backing up, dropping down ramps and moving materials or dumpsters.

Noise levels generated by loading area and trash truck activities would be below the County's daytime (55 dBA Leq) and nighttime (45 dBA Leq) exterior standard for the residential land uses. The project noise level for loading activities is 36.5 dBA Leq. A 6-foot noise screening wall will be installed along the property line shielding residents from noise. Furthermore, noise impacts associated with loading area and trash collection are considered short-term and infrequent occurrences. Therefore, with the installation of the proposed property line wall, noise impacts from loading and trash pick-up activity would be less than significant.

6.3.3 Combined Noise Levels

The combined noise level calculation includes the existing ambient noise level plus all stationary noise sources associated with the project. When combining the existing ambient noise level to the stationary noise levels, the project would result in a 57.0 dBA Leq level during daytime and 53.1 dBA Leq level during nighttime at the residential land uses near the northern property line. The combined ambient and stationary noise levels at residential land uses near the eastern property line would be 61.6 dBA Leq during daytime hours and 57.0 dBA LEQ during nighttime hours. A maximum increase of approximately 0.6 dBA Leq

during the daytime and 1.7 dBA Leq during the nighttime is expected as indicated in Table 5.

As previously mentioned in the Existing Noise Environment section, the existing ambient noise levels currently exceed the City's standards. Therefore, a significant noise impact would occur if the project causes a substantial permanent increase in noise levels. Typically, a substantial increase is defined as a noticeable change in the ambient environment above three (3) decibels. Three (3) dBA is generally considered the threshold for human perception, and for purposes of this analysis, is the maximum allowable noise increase without causing noticeable change. The result of the stationary noise analysis indicate that noise impacts will not result in substantial permanent increase and are considered less than significant with mitigation.

6.4 Interior Noise Levels

The future interior noise level was calculated for the sensitive receptor locations using a typical "windows open" and "windows closed" condition. A "windows open" condition assumes 12 dBA of noise attenuation from the exterior noise level. A "windows closed" condition" assumes 20 dBA of noise attenuation from the exterior noise level. Table 10 indicates the future interior noise levels for the project site. The interior noise level will be range from 46.9 dBA CNEL with the windows open on the first floor to 54.2 dBA CNEL on the third floor. In order to meet the County's interior 45 dBA CNEL standard a "windows closed" condition with upgraded STC windows is required.

With windows closed condition and upgraded STC rated windows, all interior habitable areas will be below 45 dBA CNEL. Per the Unified Building Code (UBC) a "windows closed" condition requires mechanical ventilation. The following sound transmission class (STC) window ratings are required:

- 1st Floor Windows – STC 25 or greater
- 2nd Floor Windows - STC 26 or greater
- 3rd Floor Windows - STC 26 or greater

6.5 Summary of Mitigation Measures

The recommended mitigation measures for the project are indicated in Exhibit C. In order to comply with the County of San Bernardino's Noise Criteria the project must incorporate the following recommendations into the project design.

6.5.1 Exterior Area Noise Exposure Control

The project site will experience exterior traffic noise levels that exceed the County's standard, however all habitable patios and courtyards are expected to be shielded by the building design and are expected to be below the County standards.

MM-1 Install 6-foot masonry block sound wall along parcel boundary.

MM-2 Install 6-foot masonry block sound wall around memory care garden.

MM-3 Locate all rooftop mechanical equipment as far away from neighboring residential properties as possible, and not less than 100 feet from property line, and provide a 5-foot parapet wall along rooftop to shield equipment.

MM-4 Delivery, loading/unloading activity, and trash pick-up hours should be limited to daytime (7AM-10PM) hours only.

MM-5 Limit engine idling time for all delivery vehicles and moving trucks to 5 minutes or less.

6.5.2 Interior Area Noise Exposure Control

The project site will require a "windows closed" condition. To ensure proper acoustical noise isolation the following are required:

MM-6 A "windows closed" condition and upgraded STC rated windows is required to meet interior noise standards. All first floor windows will require a minimum STC rating of 25 or greater. All second and third floor windows will require a minimum STC rating of 26 or greater.

MM-7 Attic and roof vents that directly face the subject roadway, if applicable, should include an acoustical baffle to prevent vehicle noise intrusion. Exhibits E-1 and E-2 illustrate examples acoustical baffles. The contractor may install similar measures to provide noise reduction.

MM-8 For proper acoustical performance, all exterior windows, doors, and sliding glass doors must have a positive seal and leaks/cracks must be kept to a minimum.

See Exhibit D for mitigation requirements.

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7.0 Construction Noise Impact

The degree of construction noise and vibration will vary depending on the phase of construction and type of construction activity. The closest sensitive receptors to the project site are existing residential uses to the north and east.

7.1 Construction Noise

During construction, the contractors would be required to comply with the Noise Ordinance from the County of San Bernardino's Municipal Code, as described in Appendix A. The County provides exemptions for construction activity operation during certain times. In order to ensure construction activity does not violate the County's noise standards, all construction activities should take place during daytime hours, between 7AM to 7PM, Monday through Saturday. No construction activity shall occur on Sundays or Federal holidays.

The Environmental Protection Agency (EPA) has compiled data regarding the noise generated characteristics of typical construction activities. The data is presented in Table 11. Potential short-term noise impacts of construction activity have been calculated in Table 12. The construction related noise levels are shown for each phase of construction. Noise levels are expected to be loudest during the building construction phase, when impact pile drivers will be used. During the construction period, the contractors would be required to comply with all applicable County Ordinances. Several recommendations are provided later in this Chapter to help reduce noise impacts during construction.

7.2 Construction Vibration

To determine the vibratory impacts during construction, the reference construction equipment vibration levels were utilized and then extrapolated to the nearest sensitive receptors. For this project, the nearest sensitive receptors are horse stables located approximately 100 feet from the site. For purposes of assessing structural impacts from vibration, the nearest sensitive receptors are considered "older residential structures". No historical or fragile buildings are known within the vicinity of the site.

The primary source vibration during construction will be from an impact pile driving for the subterranean parking structure. The construction vibration assessment utilizes the referenced vibration levels and methodology set-forth within the Caltrans Transportation and Construction Induced Vibration Guidance Manual. Table 13 shows the referenced vibration levels.

Table 14 shows the Construction Related Vibration Analysis. The estimated vibration noise levels at the nearest sensitive receptors are compared to the Caltrans Vibration Manual

thresholds. The vibratory impact from the site is estimated to be 0.141 PPV (in/sec) at the nearest sensitive receiver. The annoyance potential of vibration from construction activities would be within the "strongly perceptible" threshold. The damage potential to the nearest structure would be within the "fragile buildings" category and no potential damage would be expected to the residential structures in the nearby vicinity. Vibration calculation worksheets are shown in Appendix E.

In order to ensure noise and vibration levels do not adversely impact the adjacent residential land uses, all construction activities should take place during daytime hours, between 7AM to 7PM, Monday through Saturday. No construction activity shall occur on Sundays or Federal holidays.

7.3 Construction Noise and Vibration Mitigation Measures

Construction operations must follow the County's noise ordinance from the Municipal Code (Section 83.01.080g3). The following mitigation measures will be implemented by the project to help further reduce noise levels during construction:

MM-9 All construction activities should take place during daytime hours, between 7AM to 7PM, Monday through Saturday. No construction activity shall occur on Sundays or Federal holidays.

MM-10 During construction, the contractor shall ensure all construction equipment is equipped with appropriate noise attenuating devices and equipment shall be maintained so that vehicles and their loads are secured from rattling and banging. Idling equipment shall be turned off when not in use.

MM-11 Locate staging area, generators and stationary construction equipment as far from the westerly property line, as reasonably feasible.

MM-12 The developer should notify the surrounding neighbors prior to beginning the heavy earth work and impact pile driving activities.

Recommendations are provided in Exhibit D.

Exhibits

Exhibit A
Location Map

N

Exhibit B
Site Plan

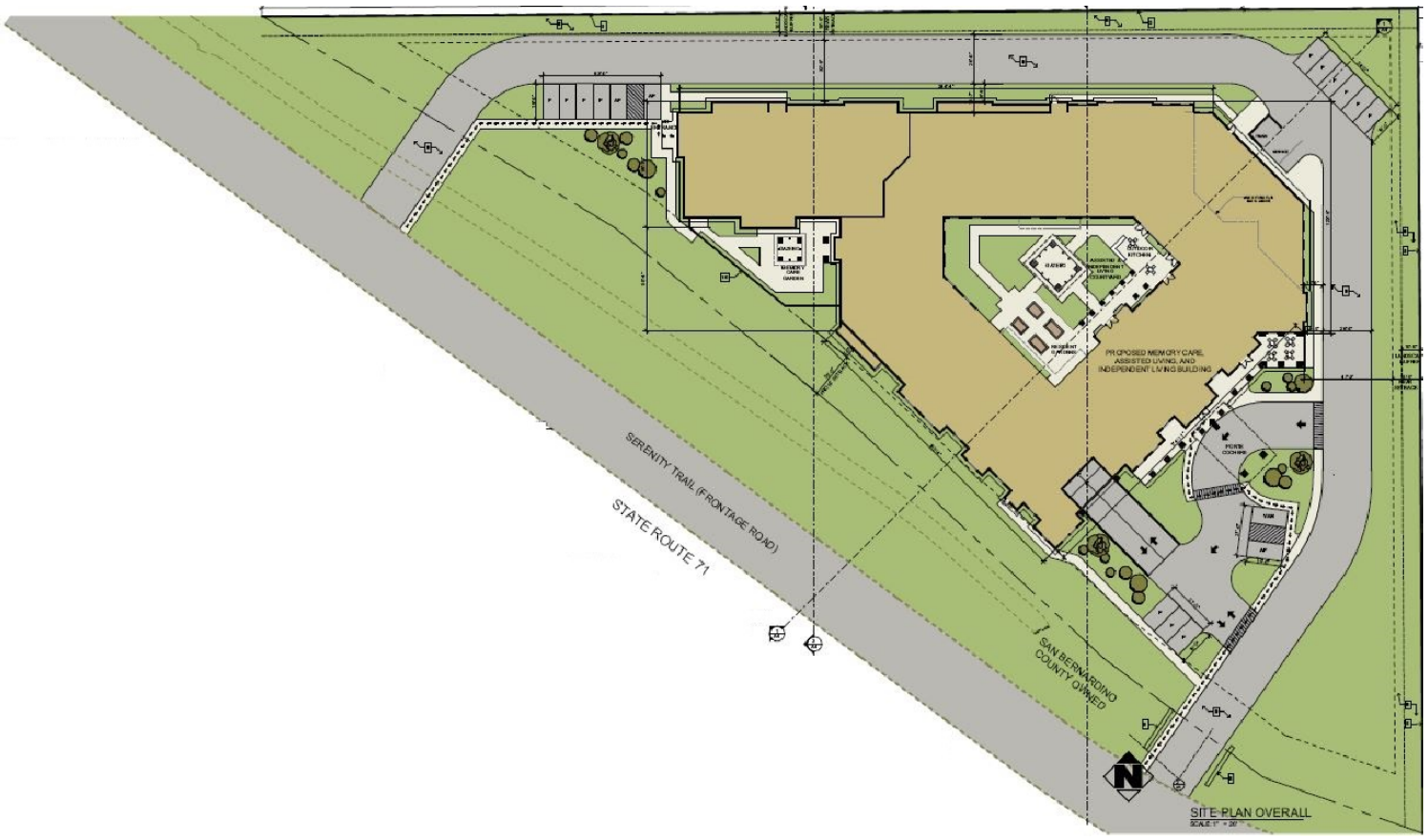

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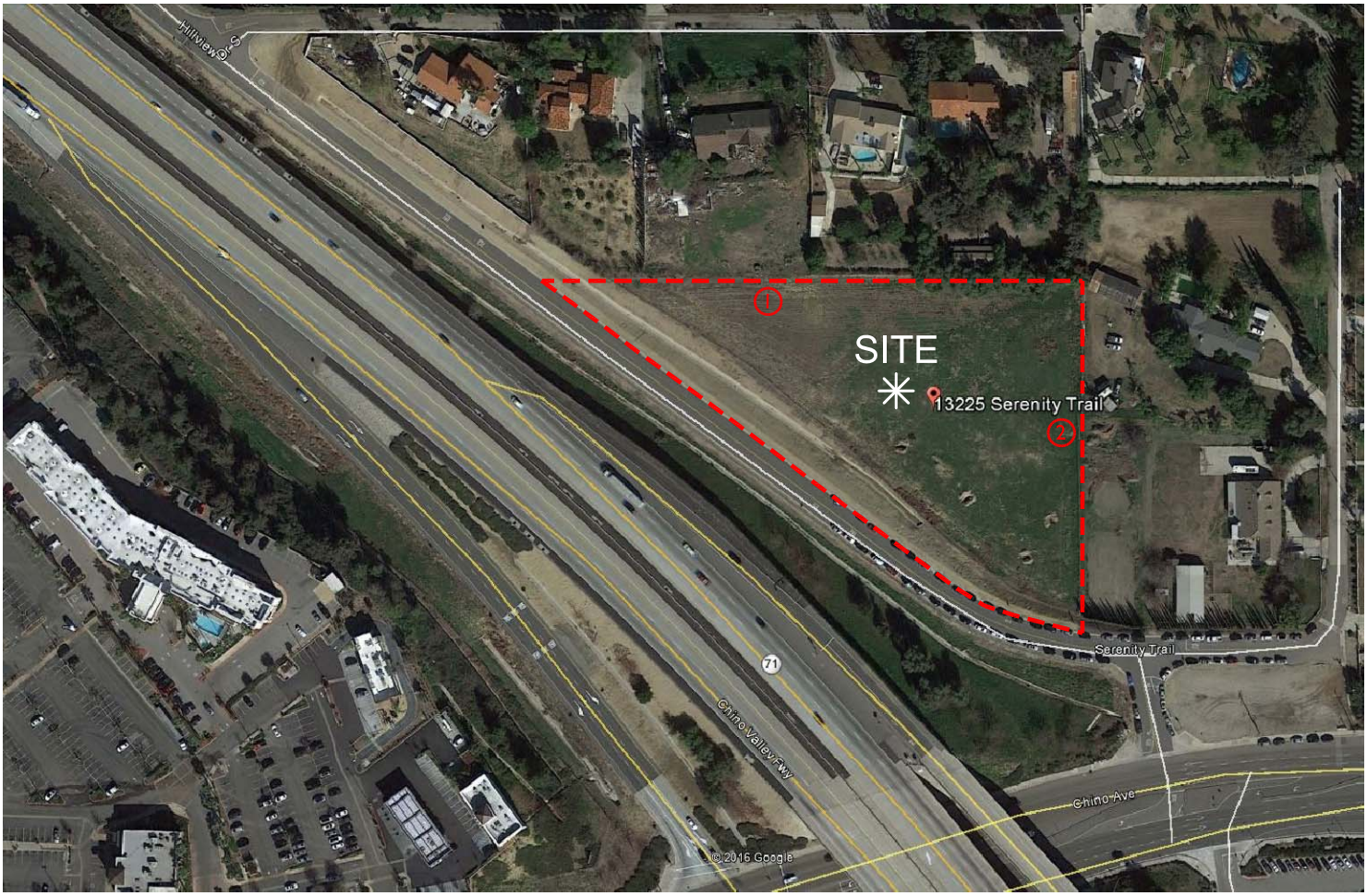
Exhibit C

Noise Monitoring Locations



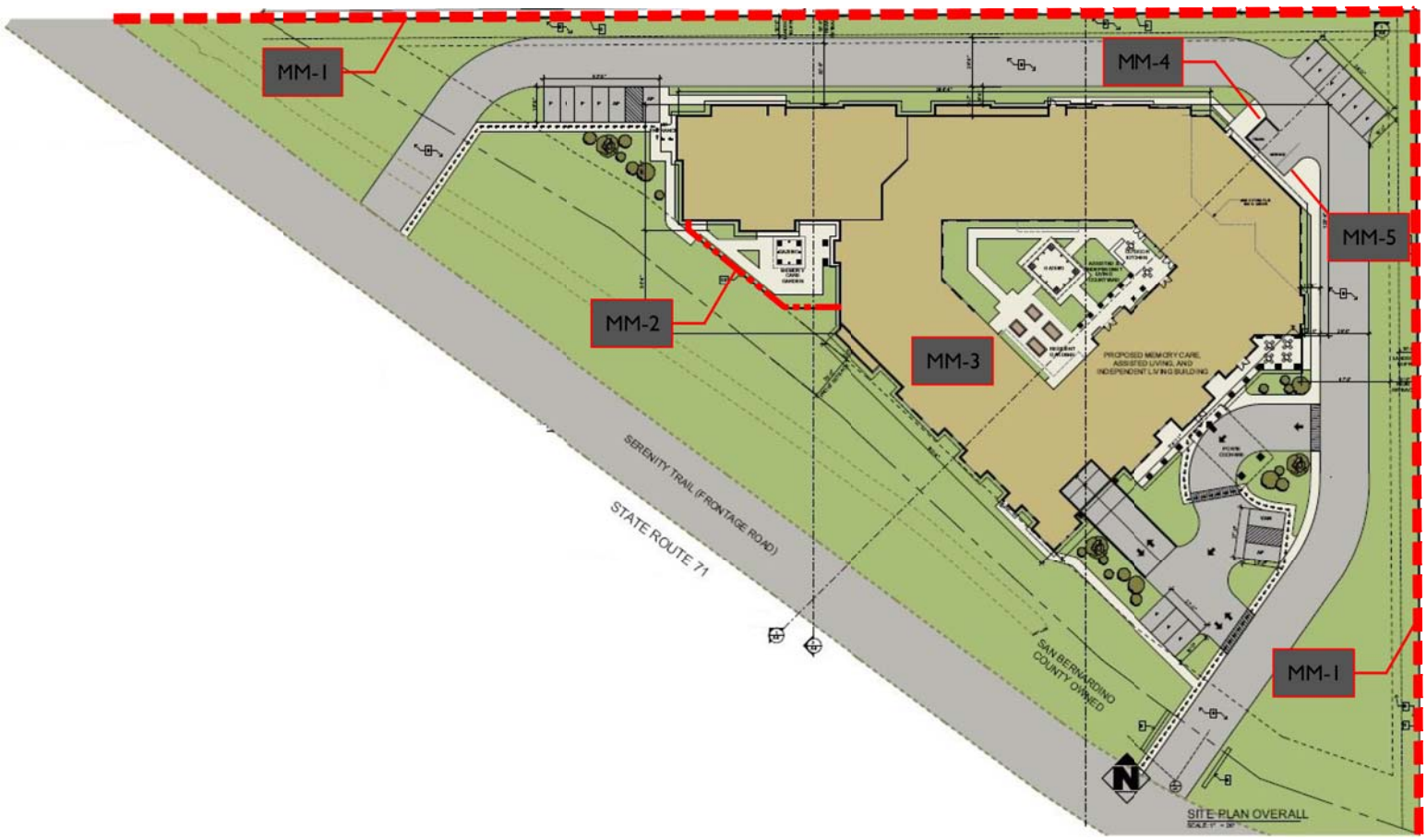
Legend:

① = Noise Monitoring Location

N

RK engineering group, inc.

Recommendations

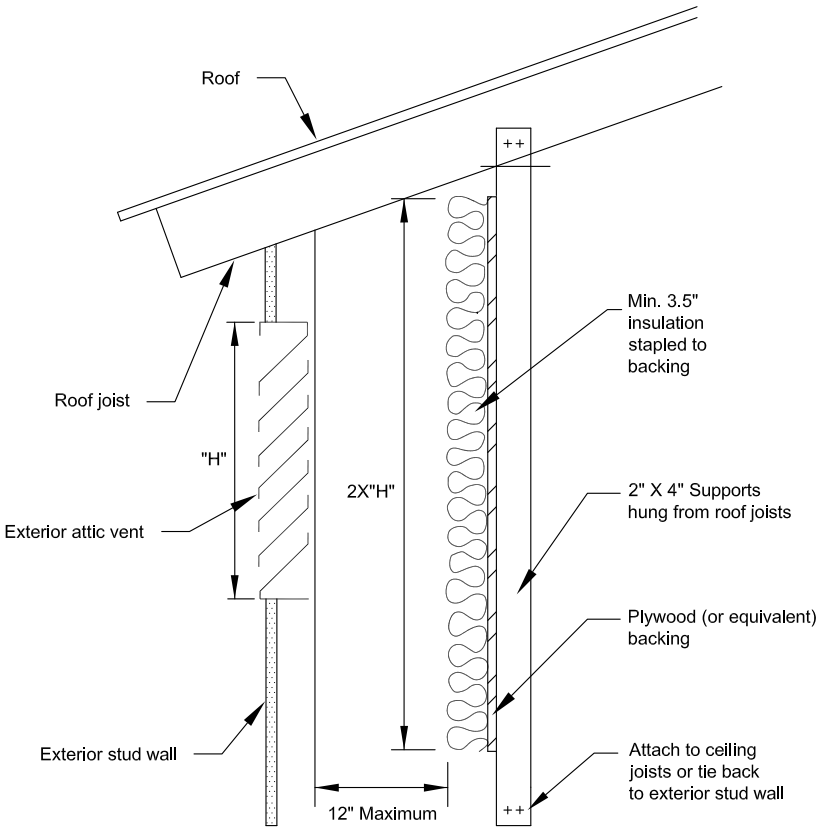


Recommendations

MM-1	Install 6-foot masonry block sound wall along parcel boundary.
MM-2	Install 6-foot masonry block sound wall around memory care garden.
MM-3	Locate all rooftop mechanical equipment as far away from neighboring residential properties as possible, and not less than 100 feet from property line. Provide a 5-foot parapet wall along rooftop to shield equipment.
MM-4	Delivery, loading/unloading activity, and trash pick-up hours should be limited to daytime (7AM-10PM) hours only.
MM-5	Limit engine idling time for all delivery vehicles and moving trucks to 5 minutes or less.
MM-6	A "windows closed" condition and upgraded STC rated windows is required to meet interior noise standards.
MM-7	Attic and roof vents facing roadways should include an acoustical baffle.
MM-8	All windows and doors must have positive seal and leaks or cracks kept to a minimum
MM-9	All construction activities should take place during daytime hours, between 7AM to 7PM, Monday through Saturday. No construction activity shall occur on Sundays or Federal Holidays.
MM-10	During construction, the contractor shall ensure all construction equipment is equipped with appropriate noise attenuating devices and Idling equipment shall be turned off when not in use.
MM-11	Locate staging area, generators and stationary construction equipment as far from the adjacent residential property lines as reasonably feasible.
MM-12	The developer should notify the surrounding neighbors prior to beginning the heavy earth work and impact pile driving activities.

Attic Vent Acoustical Baffle Detail

SECTION



PLAN VIEW

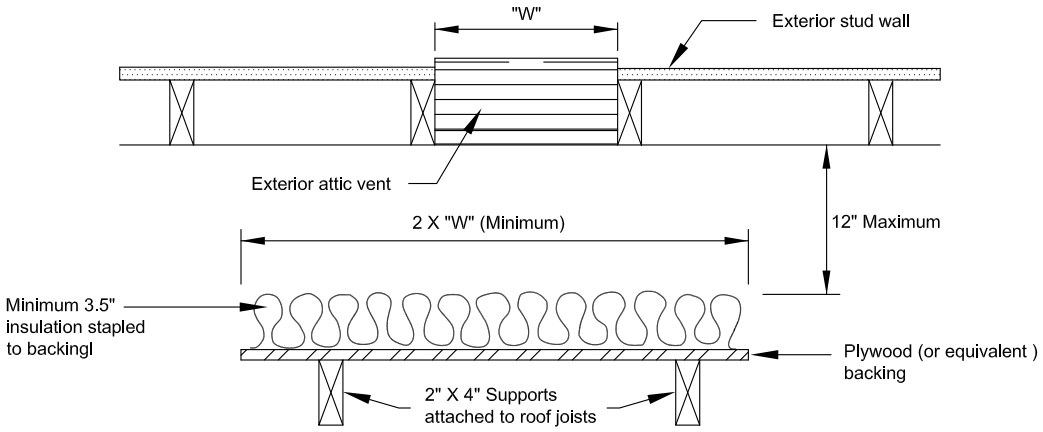
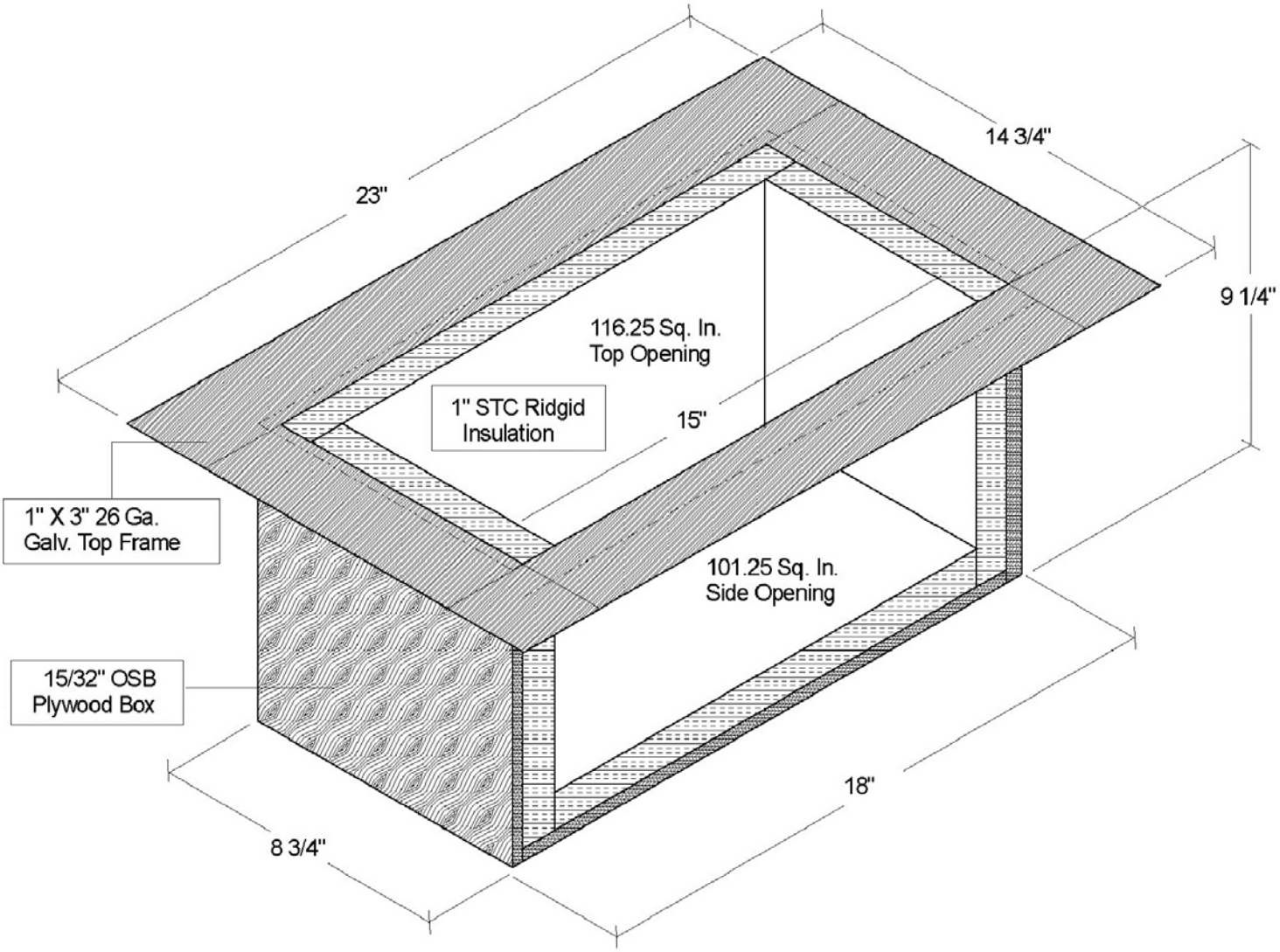


Exhibit E-2

Roof Vent Acoustical Baffle Detail



Tables

TABLE 1
Noise Level Measurements[1,2]

	Site No.	Time Started[3]	Leq	L_{max}	L_{min}	L_2	L_8	L_{25}	L_{50}	Comments
Daytime	1	10:26 AM	56.4	68.0	51.6	60.6	58.1	57.0	56.0	Noise measurement taken approximately 5 feet south of northern property line and 250 feet east of the western property line.
	2	10:54 AM	61.4	70.8	55.5	67.2	63.6	61.7	60.5	Noise measurement taken approximately 15 feet west of eastern property line and approximately 260 feet north of the southern property line.
Nighttime[3]	1	10:26 PM	51.4	63.0	46.6	55.6	53.1	52.0	51.0	Nighttime noise levels were estimated by reducing daytime levels by 5 dB.
	2	10:54 PM	56.4	65.8	50.5	62.2	58.6	56.7	55.5	

[1] Noise measurements were taken for ten minutes.

[2] Noise measurements were taken on November 16, 2016

[3] Nighttime noise levels were estimated by reducing the daytime levels by 5 dB.

TABLE 2
Roadway Parameters and Vehicle Distribution

Roadway	Classification	Lanes	Buildout (ADT)	Speed (MPH)	Site Conditions
SR-71 [1]	Freeway	8	147,900	65	Hard/Soft
Chino Avenue	Arterial	6	36,897	45	Hard/Soft
Serenity Trail Road	Local	2	775	25	Hard/Soft

SR-71 Freeway Road Vehicle Distribution (Truck Mix)[2]

Motor-Vehicle Type	Daytime %[3] (7 AM to 7 PM)	Evening %[3] (7 PM to 10 PM)	Night %[3] (10 PM to 7 AM)	Total % of Traffic Flow[2]
Automobiles	77.5	12.9	9.6	93.64
Medium Trucks	84.8	4.9	10.3	4.21
Heavy Trucks	86.5	2.7	10.8	2.15

Chino Avenue and Serenity Trail Vehicle Distribution (Truck Mix)[2]

Motor-Vehicle Type	Daytime %[3] (7 AM to 7 PM)	Evening %[3] (7 PM to 10 PM)	Night %[3] (10 PM to 7 AM)	Total % of Traffic Flow[3]
Automobiles	77.5	12.9	9.6	97.42
Medium Trucks	84.8	4.9	10.3	1.84
Heavy Trucks	86.5	2.7	10.8	0.74

[1] Buildout ADT referenced from City of Chino General Plan Draft EIR, page 4.10-32.

[2] Vehicle percentages utilized from Caltrans 2015 AADT volumes.

[3] Vehicle percentages are based on typical Southern California roadway mix.

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TABLE 3
Reference Stationary Noise Level Measurements

Source[1]	Referenced Measured Noise Levels (dBA)						
	Distance from Reference Source (feet)	L_{eq}	L_{max}	L_2	L_8	L_{25}	L_{50}
Rooftop HVAC Equipment	3	88.5	88.5	88.5	88.5	88.5	88.5
Delivery/Trash Truck	6	66.3	84.0	78.5	68.0	61.5	58.5

Adjusted Stationary Noise Level Measurements[2]

Source	Northern Property Line - Adjusted Noise Levels (dBA)						
	Distance from Reference Source (feet)	L_{eq}	L_{max}	L_2	L_8	L_{25}	L_{50}
Rooftop HVAC Equipment[3]	100	47.9	47.9	47.9	47.9	47.9	47.9
Loading Area/Trash Truck[4]	65	36.5	54.2	48.7	38.2	31.7	28.7

Source	Eastern Property Line - Adjusted Noise Levels (dBA)						
	Distance from Reference Source (feet)	L_{eq}	L_{max}	L_2	L_8	L_{25}	L_{50}
Rooftop HVAC Equipment[3]	100	46.9	46.9	46.9	46.9	46.9	46.9
Loading Area/Trash Truck[4]	65	40.1	57.8	52.3	41.8	35.3	32.3

[1] RK conducted stationary noise measurements for the sources above (2010). Reference levels for HVAC units account for four (4) units simultaneously operating.

[2] Adjusted noise levels (dBA) were calculated based on the distance of the stationary noise sources to the nearest residential property line.

[3] Adjusted noise level assumes a 5 foot parapet wall on the rooftop, adjacent to the condenser unit

[4] Adjusted noise level assumes a 6 foot shielding wall along property line.

TABLE 4
Existing Conditions
Roadway Noise Impact Analysis (dBA CNEL)[1]

Existing Conditions

Roadway[2]	Segment	CNEL at 100 Ft (dBA)	Distance to Contour (Ft)[3]			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Serenity Trail	Serenity Trail to Project Dwy.	42.5	1	3	7	15
Chino Avenue	SR-71 to Chino Creek	66.5	59	127	273	588

Existing Plus Project Conditions

Roadway[2]	Segment	CNEL at 100 Ft (dBA)	Distance to Contour (Ft)[3]			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Serenity Trail	Serenity Trail to Project Dwy.	45.3	2	5	10	22
Chino Avenue	SR-71 to Chino Creek	66.6	59	127	274	590

Change as a Result of Project

Roadway[2]	Segment	CNEL at 100 Ft (dBA)	Distance to Contour (Ft)[3]			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Serenity Trail	Serenity Trail to Project Dwy.	2.8	1	2	3	7
Chino Avenue	SR-71 to Chino Creek	0.1	0	0	1	2

[1] Exterior noise levels calculated at 5 feet above ground level.

[2] Noise levels calculated from centerline of subject roadway.

[3] Refer to Appendix C for projected noise level calculations.

TABLE 5
Opening Year Conditions
Roadway Noise Impact Analysis (dBA CNEL)[1]

Opening Year Conditions

Roadway[2]	Segment	CNEL at 100 Ft (dBA)	Distance to Contour (Ft)[3]			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Serenity Trail	Serenity Trail to Project Dwy.	42.5	1	3	7	15
Chino Avenue	SR-71 to Chino Creek	66.6	60	128	276	595

Opening Year Plus Project Conditions

Roadway[2]	Segment	CNEL at 100 Ft (dBA)	Distance to Contour (Ft)[3]			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Serenity Trail	Serenity Trail to Project Dwy.	45.3	2	5	10	22
Chino Avenue	SR-71 to Chino Creek	66.7	60	129	278	598

Change as a Result of Project

Roadway[2]	Segment	CNEL at 100 Ft (dBA)	Distance to Contour (Ft)[3]			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Serenity Trail	Serenity Trail to Project Dwy.	2.8	1	2	3	7
Chino Avenue	SR-71 to Chino Creek	0.1	0	1	2	3

[1] Exterior noise levels calculated at 5 feet above ground level.

[2] Noise levels calculated from centerline of subject roadway.

[3] Refer to Appendix C for projected noise level calculations.

TABLE 6
Year 2040 Conditions
Roadway Noise Impact Analysis (dBA CNEL)[1]

Year 2040 Conditions

Roadway[2]	Segment	CNEL at 100 Ft (dBA)	Distance to Contour (Ft)[3]			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Serenity Trail	Serenity Trail to Project Dwy.	42.5	1	3	7	15
Chino Avenue	SR-71 to Chino Creek	68.7	81	175	378	814

Year 2040 Plus Project Conditions

Roadway[2]	Segment	CNEL at 100 Ft (dBA)	Distance to Contour (Ft)[3]			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Serenity Trail	Serenity Trail to Project Dwy.	45.3	2	5	10	22
Chino Avenue	SR-71 to Chino Creek	68.7	82	176	379	817

Change as a Result of Project

Roadway[2]	Segment	CNEL at 100 Ft (dBA)	Distance to Contour (Ft)[3]			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Serenity Trail	Serenity Trail to Project Dwy.	2.8	1	2	3	7
Chino Avenue	SR-71 to Chino Creek	0.0	1	1	1	3

[1] Exterior noise levels calculated at 5 feet above ground level.

[2] Noise levels calculated from centerline of subject roadway.

[3] Refer to Appendix C for projected noise level calculations.

TABLE 7
Exterior Noise Levels from Mobile Sources (dBA CNEL)

Building Floor / Study Area	Exterior Noise Levels from Mobile Sources (dBA CNEL)[1]			Combined Exterior Noise Level
	SR-71 Freeway[2]	Chino Avenue	Serenity Trail	
1st Floor Building Façade	62.3	53.7	46.1	63.0
2nd Floor Building Façade	63.5	60.1	48.5	65.2
3rd Floor Building Façade	64.9	60.1	48.5	66.2
Memory Care Garden[3]	52.0	46.9	39.8	53.4
Assisted & Independent Living Courtyard[4]	40.5	35.9	23.6	41.9

[1] Exterior noise levels calculated based on the vertical and horizontal distance between sensitive receptor and noise source. Noise level calculations include attenuation from existing and proposed noise barriers.

[2] An existing 15 foot noise screening wall, located along SR-71 Freeway, is included in the noise projection analysis.

[3] A 6 foot masonary block wall is proposed to enclose the memory care garden and shield residents from adjacent mobile noise sources.

[4] The assisted and independent living courtyard is shielded by building shell design.

TABLE 8
Exterior Noise Levels From Stationary Sources -
Northern Property Line (dBA)[1,2]

	Source	Distance from Reference Source (feet)	Adjusted Noise Levels (dBA)[3, 4] L_{eq}	L_{max} (max)	L_2 (1 min)	L_8 (5 min)	L_{25} (15 min)	L_{50} (30 min)
Daytime (7:00 AM - 10:00 PM)	HVAC Equipment	100	47.9	47.9	47.9	47.9	47.9	47.9
	Trash Trucks/Loading Area	65	36.5	54.2	48.7	38.2	31.7	28.7
	Existing Ambient Measurement	- -	56.4	68.0	60.6	58.1	57.0	56.0
	Total Combined Exterior Noise Impact		57.0	68.2	61.1	58.5	57.5	56.6
	County of San Bernardino Noise Level Criteria		55.0	75.0	70.0	65.0	60.0	55.0
	Change in Noise Level as a Result of Project		0.6	0.2	0.5	0.4	0.5	0.6
	Significant Impact (?)[5]		NO	NO	NO	NO	NO	NO

	Source	Distance from Reference Source (feet)	Adjusted Noise Levels (dBA)[3, 4] L_{eq}	L_{max} (max)	L_2 (1 min)	L_8 (5 min)	L_{25} (15 min)	L_{50} (30 min)
Nighttime (10:00 PM - 7:00 AM)	HVAC Equipment	100	47.9	47.9	47.9	47.9	47.9	47.9
	Trash Trucks/Loading Area	65	36.5	54.2	48.7	38.2	31.7	28.7
	Existing Ambient Measurement[4]	- -	51.4	63.0	55.6	53.1	52.0	51.0
	Total Combined Exterior Noise Impact[5]		53.1	63.7	57.0	54.4	53.5	52.8
	County of San Bernardino Noise Level Criteria		45.0	65.0	60.0	55.0	50.0	45.0
	Change in Noise Level as a Result of Project		1.7	0.7	1.4	1.3	1.5	1.8
	Significant Impact (?)[5]		NO	NO	NO	NO	NO	NO

[1] Exterior noise levels calculated 10 feet from property line.

[2] Noise levels include the attenuation affects of the proposed 6-foot property line wall.

[3] See Table 3 for adjusted noise level

[4] See Appendix E for dBA calculations

[5] A significant impact is assumed if the following occurs;

(1) An individual stationary noise source exceeds the County's noise criteria, without the combined effect of existing ambient noise, or

(2) The existing ambient noise level is below the County's noise level criteria and the combined effect of stationary noise exceeds the County's noise level criteria.

(3) The existing ambient noise level is above the County's noise level criteria and the combined effect of stationary noise results in a 3 dB increase or more.

TABLE 9
Exterior Noise Levels From Stationary Sources
at Eastern Property Line (dBA)[1,2]

	Source	Distance from Reference Source (feet)	Adjusted Noise Levels (dBA)[3, 4] L_{eq}	L_{max} (max)	L_2 (1 min)	L_8 (5 min)	L_{25} (15 min)	L_{50} (30 min)
Daytime (7:00 AM - 10:00 PM)	HVAC Equipment	100	46.9	46.9	46.9	46.9	46.9	46.9
	Trash Trucks/Loading Area	65	40.1	57.8	52.3	41.8	35.3	32.3
	Existing Ambient Measurement	- -	61.4	70.8	67.2	63.6	61.7	60.5
	Total Combined Exterior Noise Impact		61.6	71.0	67.4	63.7	61.9	60.7
	County of San Bernardino Noise Level Criteria		55.0	75.0	70.0	65.0	60.0	55.0
	Change in Noise Level as a Result of Project		0.2	0.2	0.2	0.1	0.2	0.2
	Significant Impact (?)[5]		NO	NO	NO	NO	NO	NO

	Source	Distance from Reference Source (feet)	Adjusted Noise Levels (dBA)[3, 4] L_{eq}	L_{max} (max)	L_2 (1 min)	L_8 (5 min)	L_{25} (15 min)	L_{50} (30 min)
Nighttime (10:00 PM - 7:00 AM)	HVAC Equipment	100	46.9	46.9	46.9	46.9	46.9	46.9
	Trash Trucks/Loading Area	65	40.1	57.8	52.3	41.8	35.3	32.3
	Existing Ambient Measurement[4]	- -	56.4	65.8	62.2	58.6	56.7	55.5
	Total Combined Exterior Noise Impact[5]		57.0	66.2	62.5	59.0	57.3	56.2
	County of San Bernardino Noise Level Criteria		45.0	65.0	60.0	55.0	50.0	45.0
	Change in Noise Level as a Result of Project		0.6	0.4	0.3	0.4	0.6	0.7
	Significant Impact (?)[5]		NO	NO	NO	NO	NO	NO

[1] Exterior noise levels calculated 10 feet from property line.

[2] Noise levels include the attenuation affects of the proposed 6-foot property line wall.

[3] See Table 3 for adjusted noise level

[4] See Appendix E for dBA calculations

[5] A significant impact is assumed if the following occurs;

(1) An individual stationary noise source exceeds the County's noise criteria, without the combined effect of existing ambient noise, or

(2) The existing ambient noise level is below the County's noise level criteria and the combined effect of stationary noise exceeds the County's noise level criteria.

(3) The existing ambient noise level is above the County's noise level criteria and the combined effect of stationary noise results in a 3 dB increase or more.

TABLE 10
Interior Noise Level Analysis (dBA CNEL)

Receiver Location	Noise Impacts at Building Façade	Interior Noise Reduction Required to Meet Interior Noise Standard of 45 dBA CNEL	First Floor Interior Noise Level w/ Standard Windows (STC $\geq$ 25)		STC Rating for Windows Facing Subject Roadway
			Windows Open[1]	Windows Closed[2]	
1st Floor (Interior)	63.0	18.0	51.0	43.0	25
2nd Floor (Interior)	65.2	20.2	53.2	45.2	26
3rd Floor (Interior)	66.2	21.2	54.2	46.2	26

[1] A minimum of 12 dBA noise reduction is assumed with a "windows open" condition.

[2] A minimum of 20 dBA noise reduction is assumed with a "windows closed" condition.

TABLE 11
Typical Construction Noise Levels[1]

EQUIPMENT POWERED BY INTERNAL COMBUSTION ENGINES

Type	Noise Levels (dBA) at 50 Feet
Earth Moving	
Compactors (Rollers)	73 - 76
Front Loaders	73 - 84
Backhoes	73 - 92
Tractors	75 - 95
Scrapers, Graders	78 - 92
Pavers	85 - 87
Trucks	81 - 94
Materials Handling	
Concrete Mixers	72 - 87
Concrete Pumps	81 - 83
Cranes (Movable)	72 - 86
Cranes (Derrick)	85 - 87
Stationary	
Pumps	68 - 71
Generators	71 - 83
Compressors	75 - 86

IMPACT EQUIPMENT

Type	Noise Levels (dBA) at 50 Feet
Pneumatic Wrenches	82 - 87
Jack Hammers, Rock Drills	80 - 99
Pile Drivers (Peak)	95-105

OTHER

Type	Noise Levels (dBA) at 50 Feet
Vibrators	68 - 82
Saws	71 - 82

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

TABLE 12
Construction Related Noise Levels (dBA)[1]

Phase	Equipment	Quantity	Calculated Noise Level at 50 ft (dBA)		Combined Noise Level at 50 ft (dBA)	
			Lmax	Leq	Lmax	Leq
Site Preparation	Rubber Tired Dozers	3	81.7	80.7	88.3	87.3
	Tractors/Loaders/Backhoes	4	77.6	76.6		
Grading	Excavators	1	80.7	79.7	88.8	87.8
	Graders	1	85.0	84.0		
	Rubber Tired Dozers	1	81.7	80.7		
	Tractors/Loaders/Backhoes	3	77.6	76.6		
Building construction	Cranes	1	80.6	75.6	101.5	97.5
	Forklifts	3	74.7	70.7		
	Generator Sets	1	80.6	80.6		
	Tractors/Loaders/Backhoes	3	77.6	76.6		
	Welders	1	74.0	73.0		
	Impact Pile Driver	1	101.3	97.3		
Paving	Cement and Mortar Mixers	2	78.8	77.8	93.5	90.0
	Pavers	1	77.2	77.2		
	Paving Equipment	2	89.5	85.5		
	Rollers	2	80.0	76.0		
	Tractors/Loaders/Backhoes	1	77.6	76.6		
Architectural Coating	Air Compressors	1	77.7	76.7	77.7	76.7

[1] Construction noise levels calculated using the Federal Highway Administration Roadway Construction Noise Model Version 1.1

Table 13
Typical Vibration Levels for Construction Equipment[1]

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

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

TABLE 14
Construction Related Vibration Analysis[1]

Estimated Vibration Levels

Construction Activity	Distance to Nearest Structure (ft)	Duration	Calculated Vibration Level - PPV (in/sec)	Damage Potential Level	Annoyance Criteria Level
Impact Pile Driving	100 Feet	Continuous/Frequent	0.141	Fragile Buildings	Strongly Perceptible

[1] Vibration analysis is based on the Caltrans Guidance Manual for Transportation and Construction-Induced Vibration, June 2004. The following Threshold criteria has been established:

Damage Potential Threshold Criteria			Annoyance Potential Threshold Criteria		
Structure and Condition	Duration		Human Response	Duration	
	Transient Sources - PPV (in/sec)	Continuous/Frequent Sources - PPV (in/sec)		Transient Sources - PPV (in/sec)	Continuous/Frequent Sources - PPV (in/sec)
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08	Barely perceptible	0.04	0.01
Fragile buildings	0.2	0.1	Distinctly perceptible	0.25	0.04
Historic and some old buildings	0.5	0.25	Strongly perceptible	0.9	0.10
Older residential structures	0.5	0.3	Severe	2.0	0.40
New residential structures	1.0	0.5			
Modern industrial/commercial buildings	2.0	0.5			

Appendices

Appendix A

County of San Bernardino
Noise Element and Noise Standards

VII. NOISE ELEMENT

Noise has long been accepted as a byproduct of urbanization and is considered a potential environmental hazard. Excessive and/or sustained noise can contribute to both temporary and permanent hearing loss, and may be associated with increased fatigue, stress, annoyance, anxiety, and other psychological reactions in humans. For the various elements of the society to coexist, noise levels need to be controlled and minimized to limit exposure to residential communities and noise-sensitive land uses. The control of noise, therefore, is an essential component in creating a safe, compatible, and productive environment.

A. PURPOSE OF THE NOISE ELEMENT

The purpose of the Noise Element is to limit the exposure of the community to excessive noise levels. Local governments must "analyze and quantify" noise levels and the extent of noise exposure through actual measurement or the use of noise modeling. Technical data relating to mobile and point sources must be collected and synthesized into a set of noise control policies and programs that "minimizes the exposure of community residents to excessive noise." Noise-level contours must be mapped, and the conclusions of the element used as a basis for land use decisions. The Noise Element must be used to guide decisions concerning land use and the location of new roads and transit facilities because these are common sources of excessive noise levels. The Noise Background Report provides much of these technical data, and includes generalized estimates of distances to noise contours for typical traffic volumes on County roadways.

The most common sources of environmental noise in San Bernardino County are associated with roads, airports, railroad operations, and industrial activities. The facilities are used to transport residents, consumer products and provide basic infrastructure for the community by creating jobs and economic stability. In many areas of the County, noise-sensitive land uses such as residences, schools, churches and parks exist in proximity to these major noise sources.

1. RELATIONSHIP TO OTHER ELEMENTS OF THE GENERAL PLAN

The Noise Element is closely related to the Circulation and Land Use Elements. Transit thoroughfares, such as freeways, arterial highways, and railways, generate the majority of noise within the County and influence the type and intensity of development within a given area. Likewise, land uses sensitive to noise are to be considered when determining land use patterns and planned mitigation measures related to noise impacts. The location and amount of such noise generators and

receptors are also important considerations in the Open Space Element, which addresses such issues as public parks and open space buffers.

2. INPUT FROM PUBLIC PARTICIPATION PROGRAM

As part of the County's General Plan Update process, community meetings were held at several locations within the County to gather informative data and input from residents. Questions were posed to the attendees regarding the growth and development in their community, to inquire about their concerns and about what could be done to address their concerns. Noise was mentioned in several of the community meetings as being an issue of concern. Additionally, concern was expressed by citizens and staff regarding the efficacy of the noise complaint process and enforcement of noise regulations.

3. SUMMARY OF EXISTING CONDITIONS

The Noise Background Report describes the existing noise environment in the subareas of San Bernardino County. It also reviews the roles of the state and federal governments in regulating noise from specific sources. The County regulates noise from sources that are not pre-empted by state or federal jurisdiction. Such sources include project construction activities; stationary sources, such as fans, pumps, compressors or other mechanical equipment; or mobile sources operating on private property. Section 83.01.080 of the County's Development Code sets forth performance standards for affected (receiving) land uses from stationary and mobile sources, during daytime (7 AM to 10 PM) and nighttime (10 PM to 7 AM) periods. Exemptions from these standards include motor vehicles not under the control of the industrial use, emergency equipment, vehicles and devices, and temporary construction and repair or demolition activities taking place between the hours of 7 AM and 7 PM Monday through Saturday, excluding federal holidays.

4. SOURCES OF NOISE IN SAN BERNARDINO COUNTY

The County has promulgated and implemented noise policies and requirements for land development and construction projects by requiring these projects to provide specific noise analyses and implement any necessary measures to reduce noise to an acceptable level.

Circulation and transportation systems (roadways, airports and railroads) are the most significant noise-producing activities within the County, and subject some areas to unacceptable levels. Point sources, such as industrial, mining and recreational sites, also produce noise levels of concern. Some key problem areas

are wrecking yards, rock crushing, racetracks, snow and water ski areas, outdoor concerts, shooting facilities, and similar recreation facilities. Additional problems are off-road vehicles, snowmobiles, and the operation of specialized equipment.

Traffic Noise: The level of noise associated with roadways will vary with total traffic volume, vehicular speed, the relative numbers of trucks and cars in the traffic volumes, the roadway cross-section and geometric design, and the local topography. Typically, the greater the vehicle speed and truck percentage, the greater the level of noise emission from the transportation facility. Refer to the Noise Background Report for more information on traffic noise in San Bernardino County.

Rail Noise*:* Railroad activity, including heavy rail locomotives and railcars, also constitutes a major but less widespread element of the noise environment in the County. The passage of trains results in considerable noise impacts on adjacent lands, although the elevated noise levels are periodic and of relatively short duration. Railroad tracks within the County are used for passenger transportation and delivery of freight. Refer to the Noise Background Report for more information on rail noise in San Bernardino County.

Aircraft Noise: Aircraft noise generates occasional, but intrusive noise levels for the occupants of property adjacent to airports and/or under the flight patterns of aircraft using airports. The federal and state governments regulate aircraft noise. Refer to the Noise Background Report for more information on aircraft noise in San Bernardino County.

Industrial Noise: Industrial noise sources exist but do not materially affect noise-sensitive land uses within the unincorporated areas of the County. Refer to the Noise Background Report for more information on industrial noise in San Bernardino County.

5. CONCLUSION

The unincorporated portions of the County represent the full range of community noise environments from very quiet rural to moderately noisy suburban to noisy urban. Noise patterns in the County are generally consistent with published data regarding the intensity of development/type of land use and the expected levels of environmental noise.

B. COUNTYWIDE GOALS AND POLICIES OF THE NOISE ELEMENT

GOAL N 1.	**The County will abate and avoid excessive noise exposures through noise mitigation measures incorporated into the design of new noise-generating and new noise-sensitive land uses, while protecting areas within the County where the present noise environment is within acceptable limits.**

POLICIES

N 1.1 Designate areas within San Bernardino County as "noise impacted" if exposed to existing or projected future exterior noise levels from mobile or stationary sources exceeding the standards listed in Chapter 83.01 of the Development Code.

N 1.2 Ensure that new development of residential or other noise-sensitive land uses is not permitted in noise-impacted areas unless effective mitigation measures are incorporated into the project design to reduce noise levels to the standards of Noise-sensitive land uses include residential uses, schools, hospitals, nursing homes, places of worship and libraries.

N 1.3 When industrial, commercial, or other land uses, including locally regulated noise sources, are proposed for areas containing noise-sensitive land uses, noise levels generated by the proposed use will not exceed the performance standards of Table N-2 within outdoor activity areas. If outdoor activity areas have not yet been determined, noise levels shall not exceed the performance standards listed in Chapter 83.01 of the Development Code at the boundary of areas planned or zoned for residential or other noise-sensitive land uses.

Programs

1. Require an acoustical analysis prior to approval of proposed development of new residential or other noise-sensitive land uses in a noise-impacted area or a new noise generating use in an area that could affect existing noise-sensitive land uses. The appropriate time for requiring an acoustical analysis is during the environmental review process so that noise mitigation may be an integral part of the project design. The acoustical analysis shall:

    a. Be the responsibility of the applicant.

b. Be prepared by a qualified person experienced in the fields of environmental noise assessment and architectural acoustics.

c. Include representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions;

d. Include estimated noise levels in terms of the descriptors shown in Figures II-8 and II-9 of the Noise Background Report for existing and projected future (20 years hence) conditions, with a comparison made to the adopted policies of the Noise Element.

e. Include recommendations for appropriate mitigation to achieve compliance with the adopted policies and standards of the Noise Element. Where the noise source in question consists of intermittent single events, the report must address the effects of maximum noise levels in sleeping rooms in terms of possible sleep disturbance.

f. Include estimates of noise exposure after the prescribed mitigation measures have been implemented. If compliance with the adopted standards and policies of the Noise Element will not be achieved, acoustical information to support a statement of overriding considerations for the project must be provided.

2. Develop and employ procedures to ensure that requirements imposed pursuant to the finding of an acoustical analysis are implemented as part of the project review and building permit processes.

N 1.4 Enforce the state noise insulation standards (California Administrative Code, Title 24) and Chapter 35 of the California Building Code (CBC)6.

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[6] Title 24 requires that an acoustical analysis be prepared for all new developments of multi-family dwellings, condominiums, hotels, and motels proposed for areas within the 60 dB Ldn (or CNEL) contour of a major noise source for the purpose of documenting that an acceptable interior noise level of 45 dB Ldn (or CNEL) or below will be achieved with the windows and doors closed. UBC Chapter 35 requires that common wall and floor/ceiling assemblies within multi-family dwellings comply with minimum standards for the transmission of airborne sound and structure-borne impact noise.

N 1.5 Limit truck traffic in residential and commercial areas to designated truck routes; limit construction, delivery, and through-truck traffic to designated routes; and distribute maps of approved truck routes to County traffic officers.

N 1.6 Enforce the hourly noise-level performance standards for stationary and other locally regulated sources, such as industrial, recreational, and construction activities as well as mechanical and electrical equipment.

Programs

1. Develop and implement a noise ordinance that will:

    a. Be consistent with this element of the General Plan.

    b. Include the development standards provided in this element in the Development Code.

N 1.7 Prevent incompatible land uses, by reason of excessive noise levels, from occurring in the future.

Programs

1. Examine the existing and projected future noise environment when considering amendments to the circulation system.

2. Periodically review and update the Noise Element to ensure that noise exposure information and specific policies are consistent with changing conditions within the County and with noise control regulations enacted after the adoption of this element.

3. Provide sufficient noise exposure information so that existing and potential noise impacts will be identified and addressed in the project review processes.

4. Compile and publish a list of standardized noise mitigation measures.

GOAL N 2.	**The County will strive to preserve and maintain the quiet environment of mountain, desert and other rural areas.**

POLICIES

N 2.1 The County will require appropriate and feasible on-site noise attenuating measures that may include noise walls, enclosure of noise-generating equipment, site planning to locate noise sources away from sensitive receptors, and other comparable features.

N 2.2 The County will continue to work aggressively with federal agencies, including the branches of the military, the U.S. Forest Service, BLM, and other agencies to identify and work cooperatively to reduce potential conflicts arising from noise generated on federal lands and facilities affecting nearby land uses in unincorporated County areas.

C. VALLEY REGION GOALS AND POLICIES OF THE NOISE ELEMENT

NONE SPECIFIC TO THE VALLEY REGION.

D. MOUNTAIN REGION GOALS AND POLICIES OF THE NOISE ELEMENT

GOAL M/N 1.	**The County will strive to preserve and maintain the quiet environment of the Mountain Region.**

POLICIES

M/N 1.1 Encourage and support strict enforcement of vehicle code regulations to reduce vehicular noise in the mountain communities.

M/N 1.2 Encourage responsible agencies to post signs near forest access roads which explain the acceptable vehicular noise levels for vehicles using those roads.

E. DESERT REGION GOALS AND POLICIES OF THE NOISE ELEMENT

NONE SPECIFIC TO THE DESERT REGION.

Print

San Bernardino County, CA Code of Ordinances

DIVISION 3: COUNTYWIDE DEVELOPMENT STANDARDS

CHAPTER 83.01: GENERAL PERFORMANCE STANDARDS

Section

§ 83.01.010 Purpose.

The purpose 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.

(Ord. 4011, passed - -2007)

§ 83.01.020 Applicability.

ground, or in a structure.

(Ord. 4011, passed - -2007)

§ 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 standards of the American National Standards Institute (ANSI § SI4 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 83-2

Noise Standards for Stationary Noise Sources

Affected Land Uses (Receiving Noise)	***7:00 a.m. - 10:00 p.m. Leq***	***10:00 p.m. - 7:00 a.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)

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 one, eight 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 10:00 p.m. to 7:00 a.m.). In this way Ldn takes into account the lower tolerance of people for noise during nighttime periods.

(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 (Noise Standards for Adjacent Mobile Noise Sources).

Table 83-3			
Noise Standards for Adjacent 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	N/A
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 7:00 p.m. to 10:00 p.m. and ten decibels to sound levels in the night from 10:00 p.m. to 7:00 a.m.			

(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 be sound attenuated against the combined input of all present and projected exterior noise to not exceed the criteria.

Table 83-4	
Noise Standards for Other Structures	
Typical Uses	***12-Hour Equivalent Sound Level (Interior) in dBA Ldn***
Educational, 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

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

(Ord. 4011, passed - -2007; Am. Ord. 4245, passed - -2014)

§ 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 the 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.

(Ord. 4011, passed - -2007)

§ 83.01.100 Waste Disposal.

(a) *Liquid Waste Disposal and Runoff Control.* No liquids of any kind shall be discharged into a public or private sewage or drainage system, watercourse, body of water, or into the ground, except in compliance with applicable regulations of the County Code, Title 23 (Waters) of the California Code of Regulations, the California Water Code, and related Federal regulations.

(b) *Hazardous Waste.* Refer to Chapter 84.11 (Hazardous Waste Facilities) for regulations relative to hazardous waste facilities.

(c) *Solid Waste Disposal.* Refer to Chapter 84.24 (Solid Waste/Recyclable Materials Storage) for regulations relative to solid waste disposal.

(Ord. 4011, passed - -2007)

§ 83.01.110 External Commercial or Industrial Activity on Private Property.

There shall be no unpermitted external or industrial activity on properties subject to the County's jurisdiction between the hours of 9:00 p.m. and 7:00 a.m. that shall at any time impair the quiet enjoyment of neighboring property owners or residents or in any manner disturb the public peace.

(Ord. 4525, passed - -2014)

Appendix B

Field Forms and Photographs

Field Sheet

Project: Summerland Senior Living Noise Impact Study
Engineer: Jethro Narciso
Date: 11/16/2016
JN: 2359-2016-03

Measurement Address: 13225 Serenity Trail
City: Chino
Site No.: 1

Sound Level Meter:
LD-712
Serial # A0520

Calibrator:
LD-250 250
Serial # 1322

Calibration Record:

	Input, dB/	Reading, dB/	Offset, dB/	Time
Before	114.0/	114.0/	26.9/	
After	114.0/	114.0/	26.3/	
Before	/	/	/	
After	/	/	/	

Notes:

Temp:	63°
Windspeed:	--
Direction:	--
Skies:	Cloudy
Camera:	
Photo Nos.	

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

Notes:
There is a chainlink fence along the property line on all sides. The ambient noise sources include small planes overhead and roadway noise from State Route 71 (SR-71). There is an existing sound wall between SR-71 and Serenity Trail.

Measurement Type:
Long-term
Short-term X

		Start Time	Stop Time	Leq	Lmin	Lmax	L2	L8	L25	L50
Locations	1	10:26 AM	10:36 AM	56.4	51.6	68.0	60.6	58.1	57.0	56.0
		Noise measurement taken approximately 5 feet south of northern property line. The noise measurement location is also approximately 250 feet from the western end of the property.								
	2	10:54 AM	11:04 AM	61.4	55.5	70.8	67.2	63.6	61.7	60.5
		Noise measurement taken approximately 15 feet west of eastern property line. The noise measurement location is also approximately 260 feet from the southern end of the property.								
	3									
	4									
	5									

RK engineering group, inc.

Field Sheet - ST1 Location Photos

Project: Summerland Senior Living Noise Impact Study	**Engineer:** Jethro Narciso	**Date:**	11/16/2016
		JN:	2359-2016-03
Measurement Address: 13225 Serenity Trail	**City:** Chino	**Site No.:**	1

RK engineering group, inc.

Field Sheet - ST2 Location Photos

Project: Summerland Senior Living Noise Impact Study	**Engineer:** Jethro Narciso	**Date:**	11/16/2016
		JN:	2359-2016-03
Measurement Address: 13225 Serenity Trail	**City:** Chino	**Site No.:**	2

RK engineering group, inc.

Appendix C

Traffic Data

Existing and Future Traffic Volumes

Analysis Scenario	Weekday Average Daily Traffic (ADT)[1]	
	Chino Avenue	Serenity Trail Road
Existing	22,512	408
Project Only	165	367
Existing Plus Project	22,677	775
Opening Year (2017) Without Project	22,956	408
Opening Year (2017) With Project	23,121	775
Year 2040 Without Project	36,732	408
Year 2040 With Project	36,897	775

[1] Source: Existing and future traffic volume based on Summerland Senior Living Traffic Impact Analysis (January 30, 2017), prepared by Translutions, Inc. ADTs estimated from peak hour traffic volumes using the following formula:
ADT = 12 x (PM Peak Hour Approach + Departure Leg Volume)

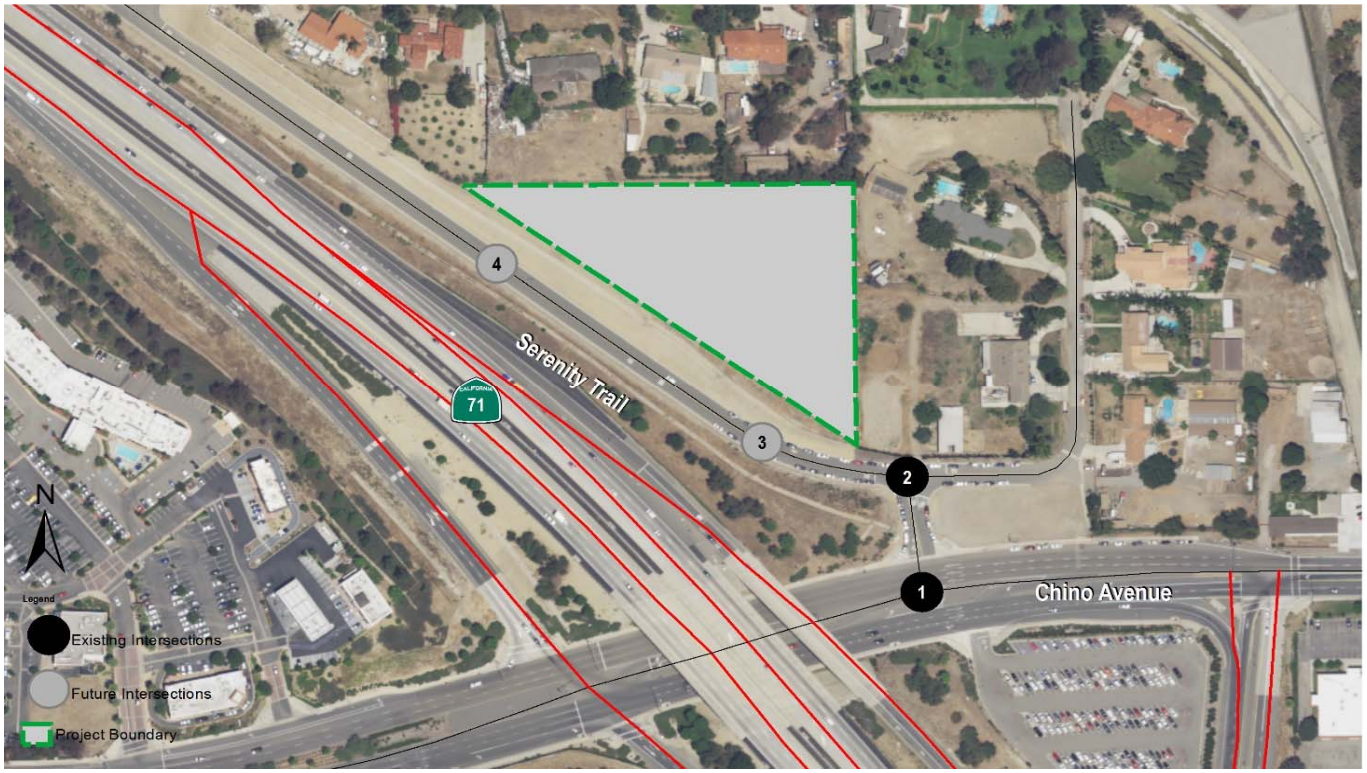
RTE	DIST	CNTY	POST MILE	LEG	DESCRIPTION	VEHICLE AADT TOTAL	TRUCK AADT TOTAL	TRUCK % TOT VEH	TRUCK AADT By Axle 2	3	4	5+	% By Axle 2	3	4	5+	EAL 2-WAY (1000)	YEAR VER/ EST
70	2	PLU	75.96	B	GULLING ST	6,300	197	3.13	41	30	12	114	20.60	15.36	5.99	58.05	45	10E
70	2	PLU	R76.6	B	PORTOLA, MEADOW WAY	4,100	211	5.15	50	29	11	121	23.58	13.97	5.25	57.20	48	10E
70	2	PLU	R76.6	A	PORTOLA, MEADOW WAY	3,650	183	5.03	41	26	3	113	22.41	14.22	1.72	61.64	43	10E
70	2	PLU	R80.315	A	BECKWOURTH, CALPINE RD	3,200	127	4.00	38	18	5	66	30.00	14.17	4.17	51.67	26	14E
70	2	PLU	81.65	O	BECKWOURTH STATE HWY MAINTENANCE STATION	3,000	127	4.23	38	17	4	68	29.92	13.39	3.15	53.54	27	15V
70	2	PLU	92.065	A	JCT. RTE. 49 SOUTH	3,600	183	5.08	47	20	8	108	25.68	10.93	4.37	59.02	42	13V
70	2	PLU	94.28	B	JCT. RTE. 284 NORTH	3,700	183	4.95	47	20	8	108	25.68	10.93	4.37	59.02	42	13V
70	2	PLU	95.964	O	PLUMAS/LASSEN COUNTY LINE	3,700	140	3.78	44	17	9	70	31.43	12.14	6.43	50.00	29	13V
70	2	LAS	0	O	PLUMAS/LASSEN COUNTY LINE	3,700	140	3.78	44	17	9	70	31.43	12.14	6.43	50.00	29	13V
70	2	LAS	0	A	PLUMAS/LASSEN COUNTY LINE	3,700	140	3.78	44	17	9	70	31.43	12.14	6.43	50.00	29	13V
70	2	LAS	3.889	B	JCT. RTE. 395	3,700	140	3.78	44	17	9	70	31.43	12.14	6.43	50.00	29	13V
71	7	LA	R0.335	A	POMONA, JCT. RTES. 10/57	44,000	3,137	7.13	1,494	217	138	1,288	47.62	6.91	4.40	41.07	1,074	05V
71	7	LA	R4.31	B	POMONA, JCT. RTE. 60	78,000	5,249	6.73	2,012	555	383	2,299	38.33	10.58	7.29	43.80	971	05V
71	7	LA	R4.697	O	LOS ANGELES/SAN BERNARDINO COUNTY LINE	100,000	6,359	6.36	3,737	470	198	1,954	58.76	7.39	3.12	30.73	877	12E
71	8	SBD	R0	O	LOS ANGELES/SAN BERNARDINO COUNTY LINE	100,000	6,359	6.36	3,737	470	198	1,954	58.76	7.39	3.12	30.73	877	12E
71	8	SBD	R7.983	B	JCT. RTE. 83 NORTH	77,000	5,044	6.55	2,955	368	156	1,565	58.59	7.29	3.10	31.03	700	14V

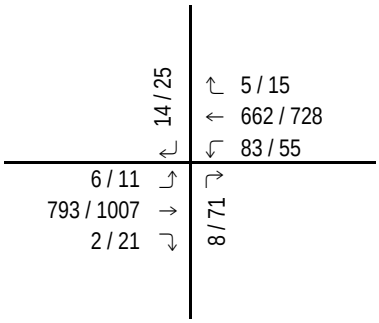
translutions

Table A - Project Trip Generation

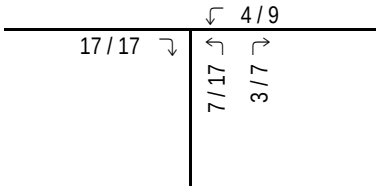
Land Use	Units[1]	Weekday AM Peak Hour In	Weekday AM Peak Hour Out	Weekday AM Peak Hour Total	Weekday PM Peak Hour In	Weekday PM Peak Hour Out	Weekday PM Peak Hour Total	Weekday Daily	Saturday Peak Hour In	Saturday Peak Hour Out	Saturday Peak Hour Total	Saturday Daily	Sunday Peak Hour In	Sunday Peak Hour Out	Sunday Peak Hour Total	Sunday Daily
Assisted Living	138 Beds															
Trip Generation Rates[1]		0.091	0.049	0.140	0.097	0.123	0.220	2.66	0.152	0.178	0.330	2.20	0.163	0.217	0.380	2.44
Inbound/Outbound Splits		65%	35%	100%	44%	56%	100%	50%/50%	46%	54%	100%	50%/50%	43%	57%	100%	50%/50%
Trip Generation																
		12	7	19	13	17	30	367	21	25	46	304	22	30	52	337

[1] Rates based on Land Use 254 - "Assisted Living" from Institute of Transportation Engineers (ITE) *Trip Generation* (9th Ed.).





1 Serenity Trail (S)/Chino Ave



2 Serenity Trail (S)/Serenity Trail

Future Intersection

3 Serenity Trail/Project Dwy 1

Future Intersection

4 Serenity Trail/Project Dwy 2

FIGURE 1

XXX / YYY AM / PM Volumes

Summerland Senior Living
Existing Traffic Volumes (in PCEs)

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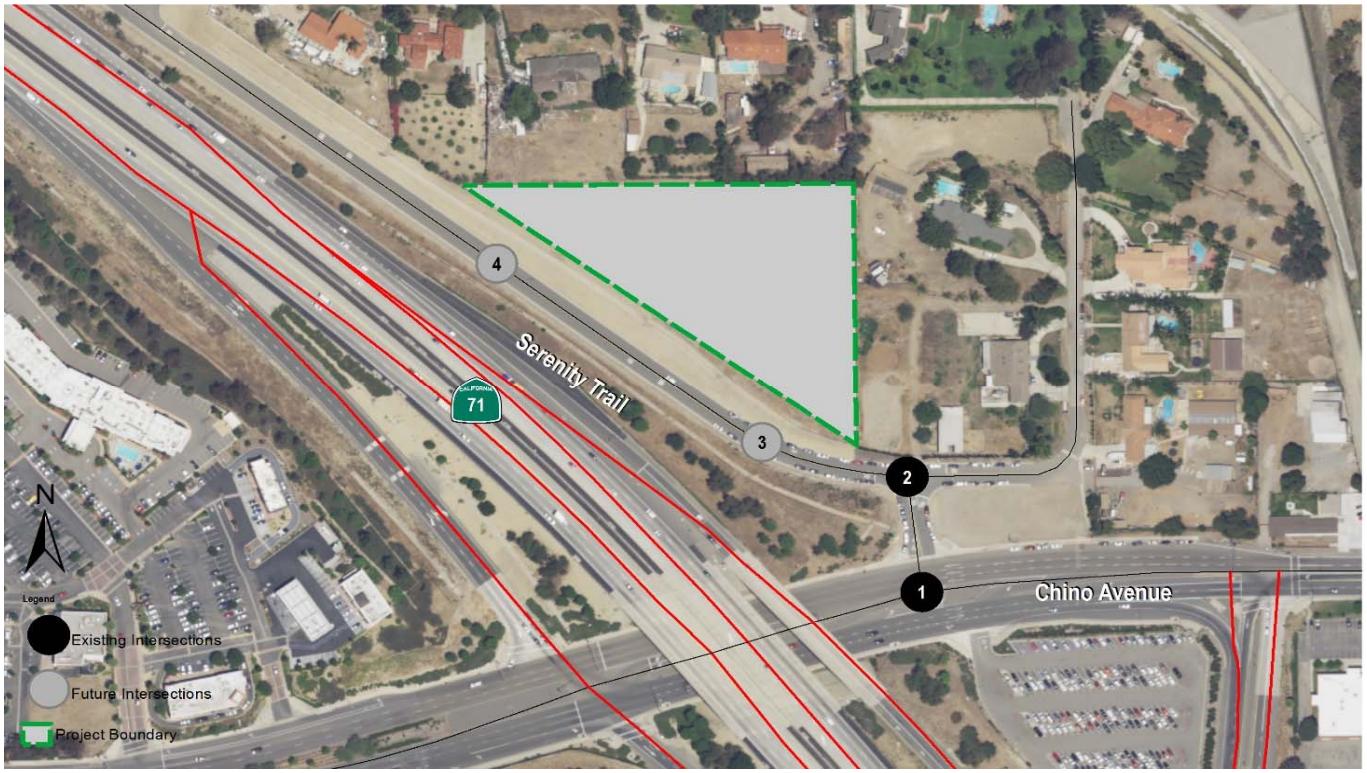
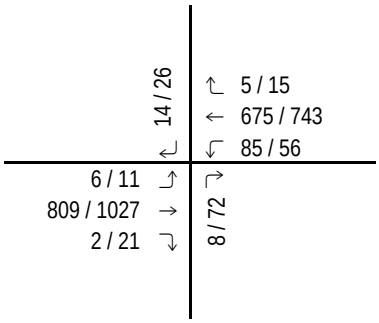
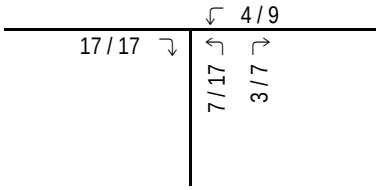




1 Serenity Trail (S)/Chino Ave



2 Serenity Trail (S)/Serenity Trail

Future Intersection

3 Serenity Trail/Project Dwy 1

Future Intersection

4 Serenity Trail/Project Dwy 2

FIGURE 4

XXX / YYY AM / PM Volumes

Summerland Senior Living
Opening Year (2017) Without Project Traffic Volumes (in PCEs)

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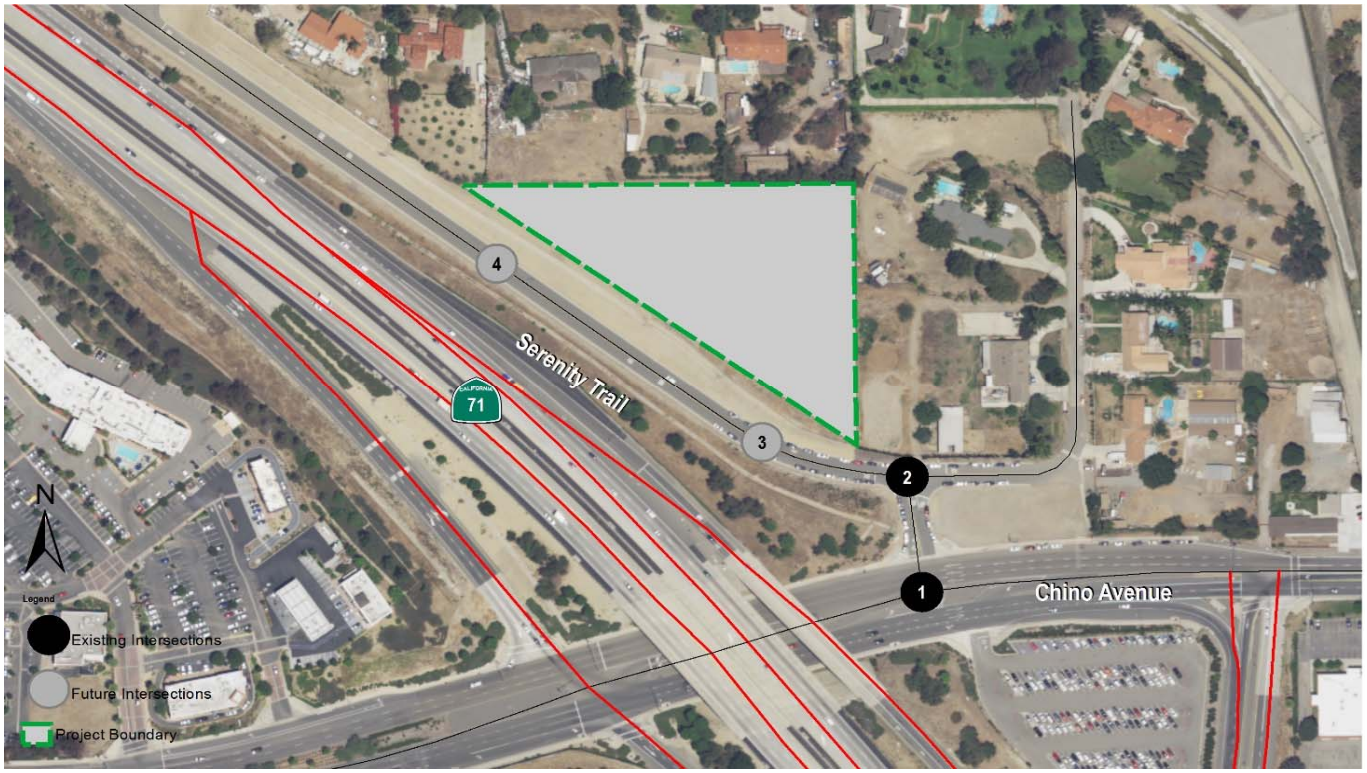
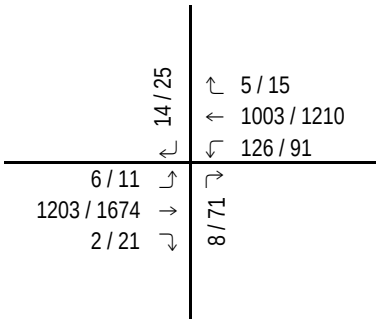
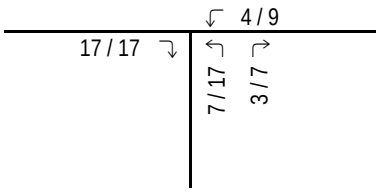




1 Serenity Trail (S)/Chino Ave



2 Serenity Trail (S)/Serenity Trail

Future Intersection

3 Serenity Trail/Project Dwy 1

Future Intersection

4 Serenity Trail/Project Dwy 2

FIGURE 7

XXX / YYY AM / PM Volumes

Summerland Senior Living
Year 2040 Without Project Traffic Volumes (in PCEs)

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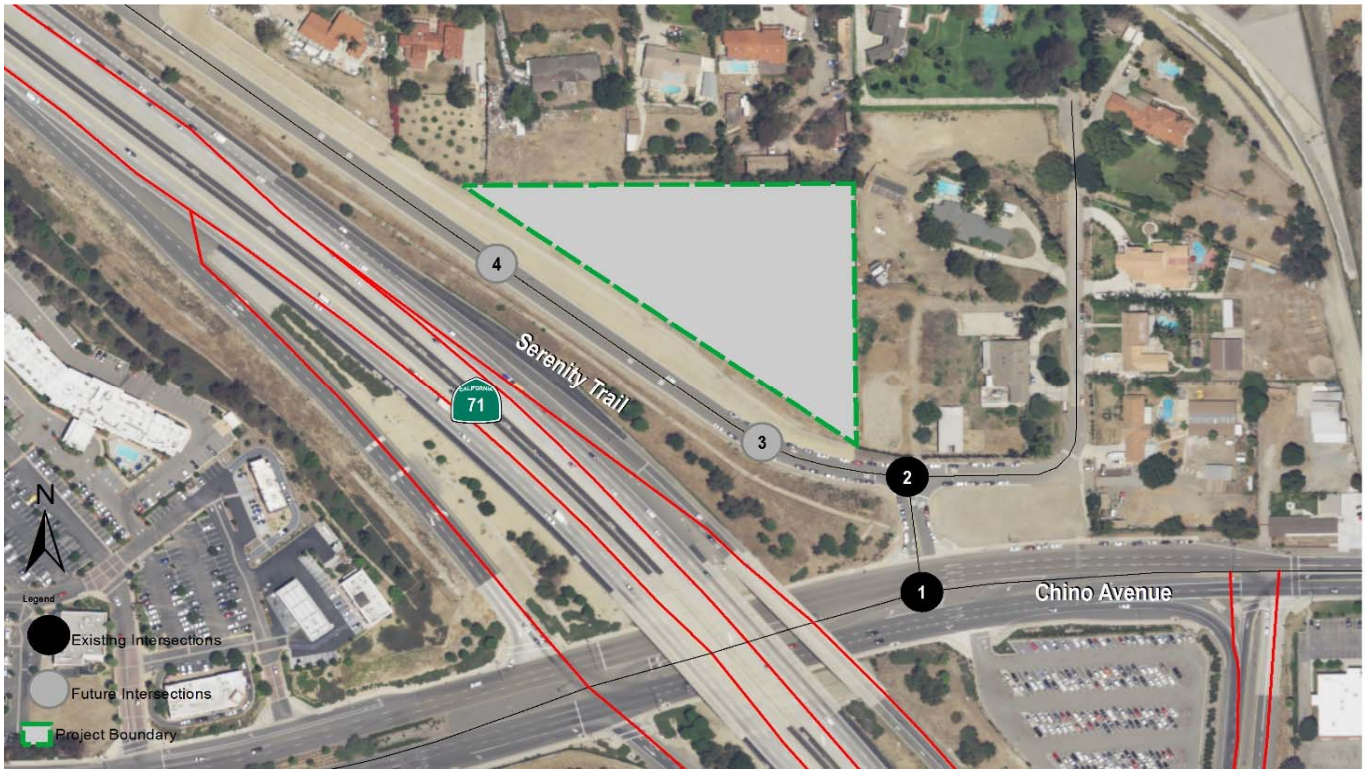
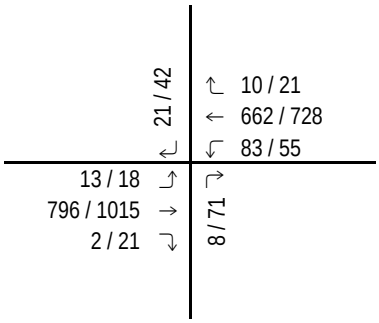
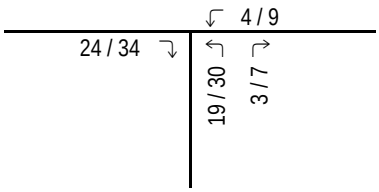
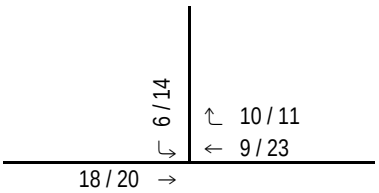




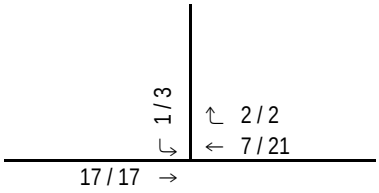
1 Serenity Trail (S)/Chino Ave



2 Serenity Trail (S)/Serenity Trail



3 Serenity Trail/Project Dwy 1



4 Serenity Trail/Project Dwy 2

FIGURE 10

XXX / YYY AM / PM Volumes

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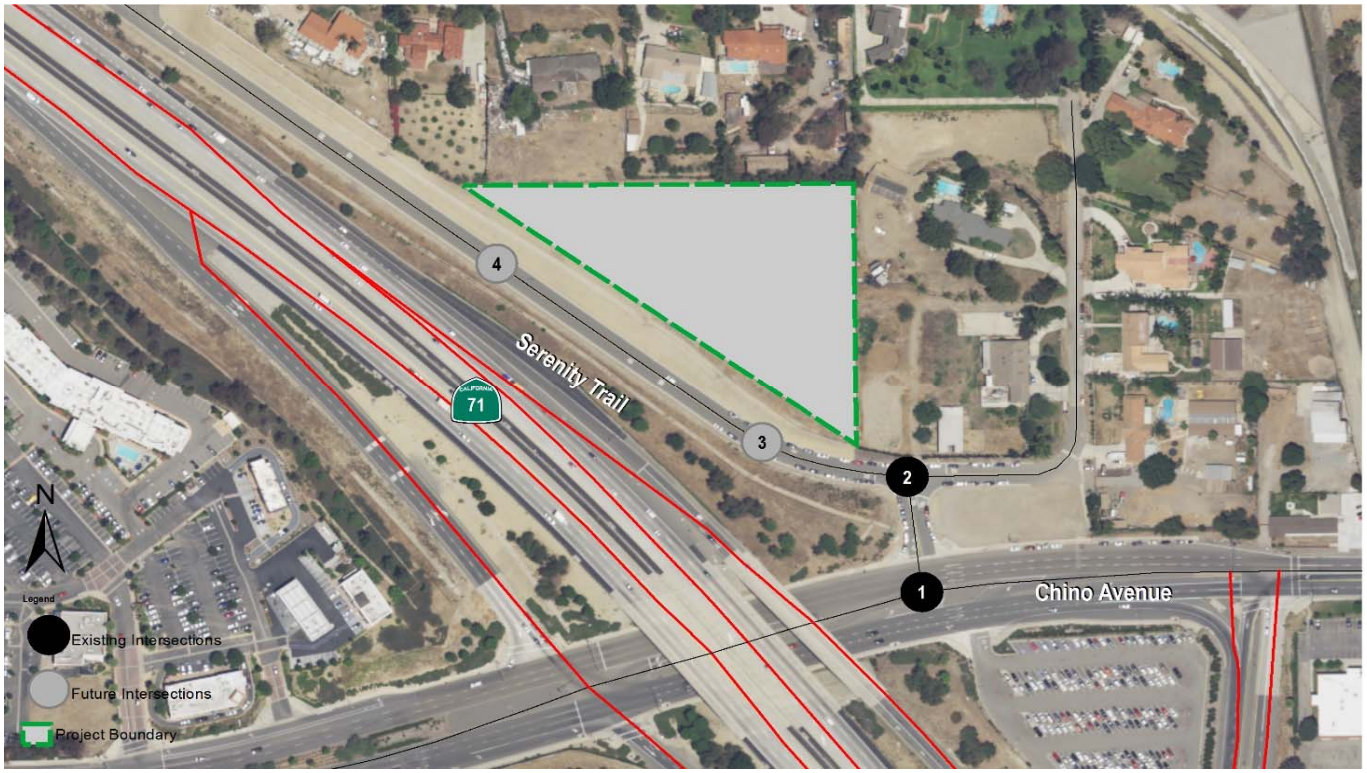
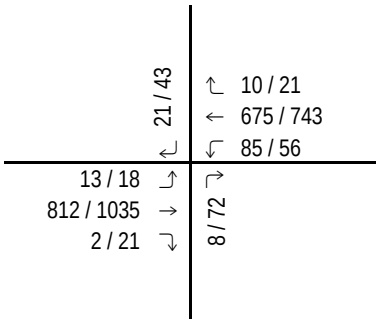
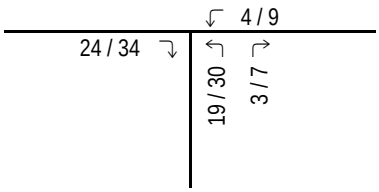
Summerland Senior Living
Existing With Project Traffic Volumes (in PCEs)

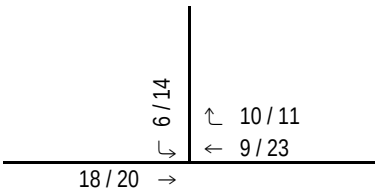




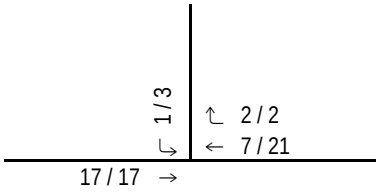
1 Serenity Trail (S)/Chino Ave



2 Serenity Trail (S)/Serenity Trail



3 Serenity Trail/Project Dwy 1



4 Serenity Trail/Project Dwy 2

FIGURE 13

XXX / YYY AM / PM Volumes

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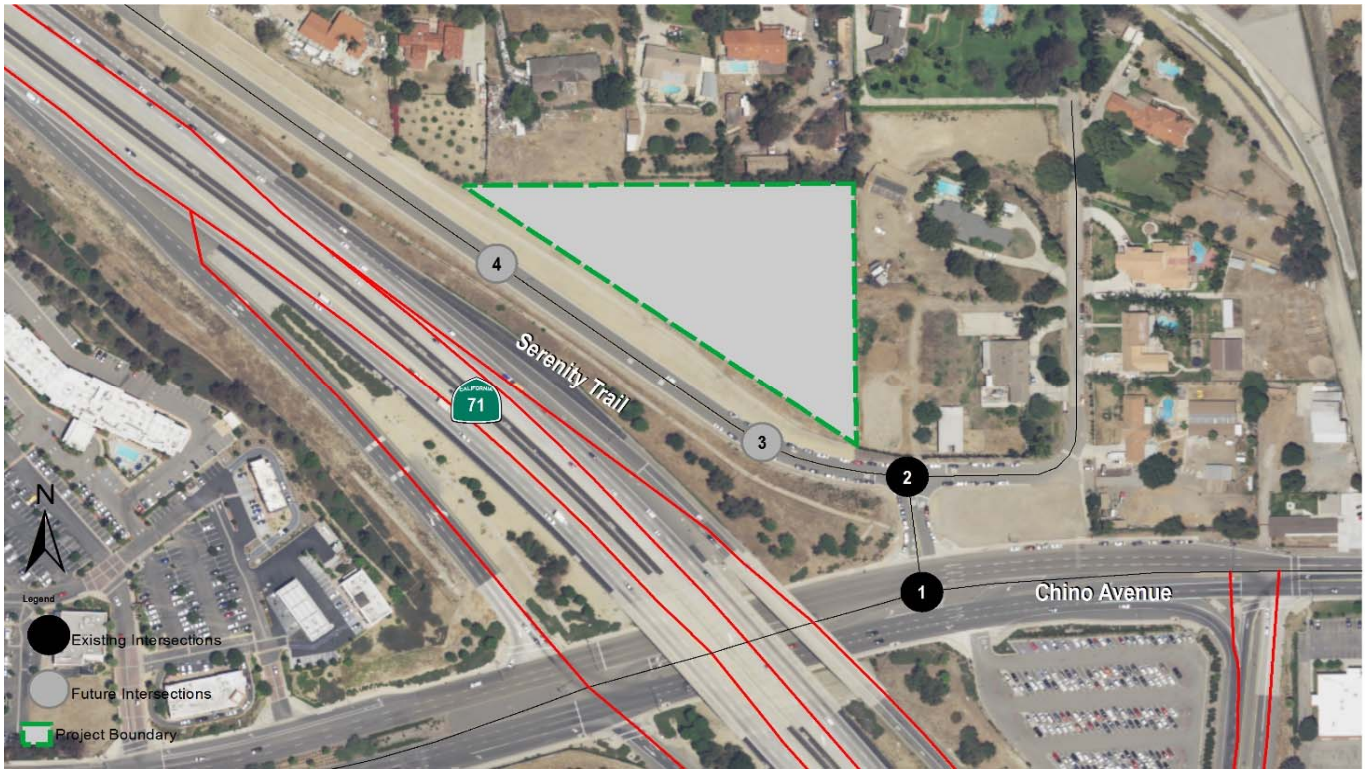
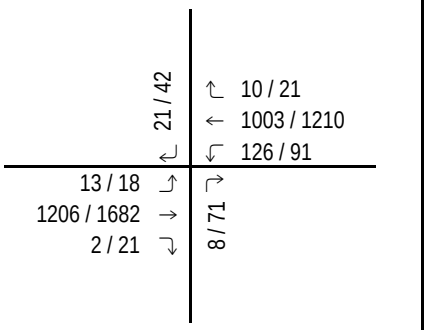
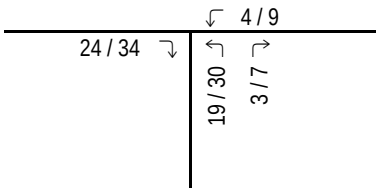
Summerland Senior Living
Opening Year (2017) With Project Traffic Volumes (in PCEs)

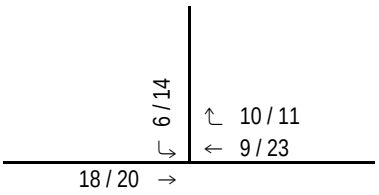




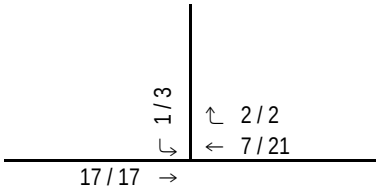
1 Serenity Trail (S)/Chino Ave



2 Serenity Trail (S)/Serenity Trail



3 Serenity Trail/Project Dwy 1



4 Serenity Trail/Project Dwy 2

FIGURE 16

XXX / YYY AM / PM Volumes

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Summerland Senior Living
Year 2040 With Project Traffic Volumes (in PCEs)

Appendix D

Roadway Noise Impact Analysis
Calculation Worksheets

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

PROJECT: SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY
ROADWAY: CHINO AVENUE
SCENARIO: EXISTING CONDITIONS
JOB #: 2359-2016-03
DATE: 2-Feb-17
ENGINEER: B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	22,512
SPEED =	45
PK HR % =	10
NEAR LANE/FAR LANE DIST	100
ROAD ELEVATION =	720.0
GRADE =	0.0 %
PK HR VOL =	2,251

RECEIVER INPUT DATA

RECEIVER DISTANCE =		100
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		100
PAD ELEVATION =		720.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

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

VEHICLE MIX DATA

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

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	722.0	86.65	- -
MEDIUM TRUCKS	724.0	86.61	- -
HEAVY TRUCKS	728.0	86.65	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	66.0	64.1	62.4	56.3	64.9	65.5
MEDIUM TRUCKS	57.1	55.6	49.2	47.7	56.1	56.4
HEAVY TRUCKS	57.6	56.2	47.2	48.4	56.8	56.9
NOISE LEVELS (dBA)	67.1	65.3	62.7	57.4	66.0	66.5

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	66.0	64.1	62.4	56.3	64.9	65.5
MEDIUM TRUCKS	57.1	55.6	49.2	47.7	56.1	56.4
HEAVY TRUCKS	57.6	56.2	47.2	48.4	56.8	56.9
NOISE LEVELS (dBA)	67.1	65.3	62.7	57.4	66.0	66.5

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	59	127	273	588
LDN	54	117	252	543

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

PROJECT: SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY
ROADWAY: CHINO AVENUE
SCENARIO: EXISTING PLUS PROJECT CONDITIONS

JOB #: 2359-2016-03
DATE: 2-Feb-17
ENGINEER: B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	22,677
SPEED =	45
PK HR % =	10
NEAR LANE/FAR LANE DIST	100
ROAD ELEVATION =	720.0
GRADE =	0.0 %
PK HR VOL =	2,268

RECEIVER INPUT DATA

RECEIVER DISTANCE =		100
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		100
PAD ELEVATION =		720.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

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

VEHICLE MIX DATA

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

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	722.0	86.65	- -
MEDIUM TRUCKS	724.0	86.61	- -
HEAVY TRUCKS	728.0	86.65	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	66.1	64.2	62.4	56.3	65.0	65.6
MEDIUM TRUCKS	57.1	55.6	49.2	47.7	56.2	56.4
HEAVY TRUCKS	57.7	56.2	47.2	48.5	56.8	56.9
NOISE LEVELS (dBA)	67.1	65.3	62.7	57.5	66.1	66.6

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	66.1	64.2	62.4	56.3	65.0	65.6
MEDIUM TRUCKS	57.1	55.6	49.2	47.7	56.2	56.4
HEAVY TRUCKS	57.7	56.2	47.2	48.5	56.8	56.9
NOISE LEVELS (dBA)	67.1	65.3	62.7	57.5	66.1	66.6

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	59	127	274	590
LDN	55	118	253	546

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

PROJECT: SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY
ROADWAY: CHINO AVENUE
SCENARIO: OPENING YEAR CONDITIONS

JOB #: 2359-2016-03
DATE: 2-Feb-17
ENGINEER: B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	22,956
SPEED =	45
PK HR % =	10
NEAR LANE/FAR LANE DIST	100
ROAD ELEVATION =	720.0
GRADE =	0.0 %
PK HR VOL =	2,296

RECEIVER INPUT DATA

RECEIVER DISTANCE =		100
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		100
PAD ELEVATION =		720.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

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

VEHICLE MIX DATA

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

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	722.0	86.65	- -
MEDIUM TRUCKS	724.0	86.61	- -
HEAVY TRUCKS	728.0	86.65	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	66.1	64.2	62.5	56.4	65.0	65.6
MEDIUM TRUCKS	57.2	55.7	49.3	47.7	56.2	56.4
HEAVY TRUCKS	57.7	56.3	47.3	48.5	56.9	57.0
NOISE LEVELS (dBA)	67.2	65.4	62.8	57.5	66.1	66.6

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	66.1	64.2	62.5	56.4	65.0	65.6
MEDIUM TRUCKS	57.2	55.7	49.3	47.7	56.2	56.4
HEAVY TRUCKS	57.7	56.3	47.3	48.5	56.9	57.0
NOISE LEVELS (dBA)	67.2	65.4	62.8	57.5	66.1	66.6

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	60	128	276	595
LDN	55	119	255	550

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

PROJECT: SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY
ROADWAY: CHINO AVENUE
SCENARIO: OPENING YEAR PLUS PROJECT CONDITIONS

JOB #: 2359-2016-03
DATE: 2-Feb-17
ENGINEER: B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	23,121
SPEED =	45
PK HR % =	10
NEAR LANE/FAR LANE DIST	100
ROAD ELEVATION =	720.0
GRADE =	0.0 %
PK HR VOL =	2,312

RECEIVER INPUT DATA

RECEIVER DISTANCE =		100
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		100
PAD ELEVATION =		720.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

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

VEHICLE MIX DATA

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

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	722.0	86.65	- -
MEDIUM TRUCKS	724.0	86.61	- -
HEAVY TRUCKS	728.0	86.65	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	66.1	64.2	62.5	56.4	65.1	65.7
MEDIUM TRUCKS	57.2	55.7	49.3	47.8	56.2	56.5
HEAVY TRUCKS	57.8	56.3	47.3	48.5	56.9	57.0
NOISE LEVELS (dBA)	67.2	65.4	62.8	57.6	66.1	66.7

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	66.1	64.2	62.5	56.4	65.1	65.7
MEDIUM TRUCKS	57.2	55.7	49.3	47.8	56.2	56.5
HEAVY TRUCKS	57.8	56.3	47.3	48.5	56.9	57.0
NOISE LEVELS (dBA)	67.2	65.4	62.8	57.6	66.1	66.7

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	60	129	278	598
LDN	55	119	257	553

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

PROJECT: SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY
ROADWAY: CHINO AVENUE
SCENARIO: YEAR 2040 CONDITIONS

JOB #: 2359-2016-03
DATE: 2-Feb-17
ENGINEER: B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	36,732
SPEED =	45
PK HR % =	10
NEAR LANE/FAR LANE DIST	100
ROAD ELEVATION =	720.0
GRADE =	0.0 %
PK HR VOL =	3,673

RECEIVER INPUT DATA

RECEIVER DISTANCE =		100
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		100
PAD ELEVATION =		720.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

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

VEHICLE MIX DATA

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

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	722.0	86.65	- -
MEDIUM TRUCKS	724.0	86.61	- -
HEAVY TRUCKS	728.0	86.65	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	68.2	66.3	64.5	58.4	67.1	67.7
MEDIUM TRUCKS	59.2	57.7	51.3	49.8	58.2	58.5
HEAVY TRUCKS	59.8	58.3	49.3	50.6	58.9	59.0
NOISE LEVELS (dBA)	69.2	67.4	64.8	59.6	68.1	68.7

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	68.2	66.3	64.5	58.4	67.1	67.7
MEDIUM TRUCKS	59.2	57.7	51.3	49.8	58.2	58.5
HEAVY TRUCKS	59.8	58.3	49.3	50.6	58.9	59.0
NOISE LEVELS (dBA)	69.2	67.4	64.8	59.6	68.1	68.7

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	81	175	378	814
LDN	75	162	349	753

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

PROJECT: SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY
ROADWAY: CHINO AVENUE
SCENARIO: YEAR 2040 PLUS PROJECT CONDITIONS

JOB #: 2359-2016-03
DATE: 2-Feb-17
ENGINEER: B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	36,897	
SPEED =	45	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	100	
ROAD ELEVATION =	720.0	
GRADE =	0.0	%
PK HR VOL =	3,690	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		100
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		100
PAD ELEVATION =		720.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

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

VEHICLE MIX DATA

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

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	722.0	86.65	- -
MEDIUM TRUCKS	724.0	86.61	- -
HEAVY TRUCKS	728.0	86.65	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	68.2	66.3	64.5	58.5	67.1	67.7
MEDIUM TRUCKS	59.2	57.7	51.4	49.8	58.3	58.5
HEAVY TRUCKS	59.8	58.4	49.3	50.6	58.9	59.1
NOISE LEVELS (dBA)	69.2	67.4	64.8	59.6	68.2	68.7

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	68.2	66.3	64.5	58.5	67.1	67.7
MEDIUM TRUCKS	59.2	57.7	51.4	49.8	58.3	58.5
HEAVY TRUCKS	59.8	58.4	49.3	50.6	58.9	59.1
NOISE LEVELS (dBA)	69.2	67.4	64.8	59.6	68.2	68.7

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	82	176	379	817
LDN	75	163	350	755

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

PROJECT: SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY
ROADWAY: SERENITY TRAIL
SCENARIO: EXISTING CONDITIONS
JOB #: 2359-2016-03
DATE: 2-Feb-17
ENGINEER: B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	408	
SPEED =	25	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	18	
ROAD ELEVATION =	735.0	
GRADE =	3.8	%
PK HR VOL =	41	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		100
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		100
PAD ELEVATION =		735.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

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

VEHICLE MIX DATA

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

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	737.0	99.64	- -
MEDIUM TRUCKS	739.0	99.60	- -
HEAVY TRUCKS	743.0	99.64	1.11

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	40.4	38.5	36.7	30.6	39.3	39.9
MEDIUM TRUCKS	34.8	33.3	26.9	25.4	33.8	34.0
HEAVY TRUCKS	38.1	36.6	27.6	28.9	37.2	37.3
NOISE LEVELS (dBA)	43.1	41.4	37.6	33.6	42.1	42.5

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	40.4	38.5	36.7	30.6	39.3	39.9
MEDIUM TRUCKS	34.8	33.3	26.9	25.4	33.8	34.0
HEAVY TRUCKS	38.1	36.6	27.6	28.9	37.2	37.3
NOISE LEVELS (dBA)	43.1	41.4	37.6	33.6	42.1	42.5

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	1	3	7	15
LDN	1	3	6	14

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

PROJECT: SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY
ROADWAY: SERENITY TRAIL
SCENARIO: EXISTING PLUS PROJECT CONDITIONS

JOB #: 2359-2016-03
DATE: 2-Feb-17
ENGINEER: B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	775	
SPEED =	25	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	18	
ROAD ELEVATION =	735.0	
GRADE =	3.8	%
PK HR VOL =	78	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		100
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		100
PAD ELEVATION =		735.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

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

VEHICLE MIX DATA

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

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	737.0	99.64	- -
MEDIUM TRUCKS	739.0	99.60	- -
HEAVY TRUCKS	743.0	99.64	1.11

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	43.1	41.2	39.5	33.4	42.0	42.6
MEDIUM TRUCKS	37.6	36.0	29.7	28.1	36.6	36.8
HEAVY TRUCKS	40.9	39.4	30.4	31.6	40.0	40.1
NOISE LEVELS (dBA)	45.9	44.2	40.4	36.3	44.9	45.3

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	43.1	41.2	39.5	33.4	42.0	42.6
MEDIUM TRUCKS	37.6	36.0	29.7	28.1	36.6	36.8
HEAVY TRUCKS	40.9	39.4	30.4	31.6	40.0	40.1
NOISE LEVELS (dBA)	45.9	44.2	40.4	36.3	44.9	45.3

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	2	5	10	22
LDN	2	5	10	21

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

PROJECT: SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY
ROADWAY: SERENITY TRAIL
SCENARIO: OPENING YEAR CONDITIONS

JOB #: 2359-2016-03
DATE: 2-Feb-17
ENGINEER: B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	408	
SPEED =	25	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	18	
ROAD ELEVATION =	735.0	
GRADE =	3.8	%
PK HR VOL =	41	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		100
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		100
PAD ELEVATION =		735.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

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

VEHICLE MIX DATA

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

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	737.0	99.64	- -
MEDIUM TRUCKS	739.0	99.60	- -
HEAVY TRUCKS	743.0	99.64	1.11

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	40.4	38.5	36.7	30.6	39.3	39.9
MEDIUM TRUCKS	34.8	33.3	26.9	25.4	33.8	34.0
HEAVY TRUCKS	38.1	36.6	27.6	28.9	37.2	37.3
NOISE LEVELS (dBA)	43.1	41.4	37.6	33.6	42.1	42.5

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	40.4	38.5	36.7	30.6	39.3	39.9
MEDIUM TRUCKS	34.8	33.3	26.9	25.4	33.8	34.0
HEAVY TRUCKS	38.1	36.6	27.6	28.9	37.2	37.3
NOISE LEVELS (dBA)	43.1	41.4	37.6	33.6	42.1	42.5

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	1	3	7	15
LDN	1	3	6	14

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

PROJECT: SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY
ROADWAY: SERENITY TRAIL
SCENARIO: OPENING YEAR PLUS PROJECT CONDITIONS

JOB #: 2359-2016-03
DATE: 2-Feb-17
ENGINEER: B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	775	
SPEED =	25	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	18	
ROAD ELEVATION =	735.0	
GRADE =	3.8	%
PK HR VOL =	78	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		100
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		100
PAD ELEVATION =		735.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

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

VEHICLE MIX DATA

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

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	737.0	99.64	- -
MEDIUM TRUCKS	739.0	99.60	- -
HEAVY TRUCKS	743.0	99.64	1.11

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	43.1	41.2	39.5	33.4	42.0	42.6
MEDIUM TRUCKS	37.6	36.0	29.7	28.1	36.6	36.8
HEAVY TRUCKS	40.9	39.4	30.4	31.6	40.0	40.1
NOISE LEVELS (dBA)	45.9	44.2	40.4	36.3	44.9	45.3

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	43.1	41.2	39.5	33.4	42.0	42.6
MEDIUM TRUCKS	37.6	36.0	29.7	28.1	36.6	36.8
HEAVY TRUCKS	40.9	39.4	30.4	31.6	40.0	40.1
NOISE LEVELS (dBA)	45.9	44.2	40.4	36.3	44.9	45.3

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	2	5	10	22
LDN	2	5	10	21

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

PROJECT: SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY
ROADWAY: SERENITY TRAIL
SCENARIO: YEAR 2040 CONDITIONS

JOB #: 2359-2016-03
DATE: 2-Feb-17
ENGINEER: B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	408	
SPEED =	25	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	18	
ROAD ELEVATION =	735.0	
GRADE =	3.8	%
PK HR VOL =	41	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		100
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		100
PAD ELEVATION =		735.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

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

VEHICLE MIX DATA

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

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	737.0	99.64	- -
MEDIUM TRUCKS	739.0	99.60	- -
HEAVY TRUCKS	743.0	99.64	1.11

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	40.4	38.5	36.7	30.6	39.3	39.9
MEDIUM TRUCKS	34.8	33.3	26.9	25.4	33.8	34.0
HEAVY TRUCKS	38.1	36.6	27.6	28.9	37.2	37.3
NOISE LEVELS (dBA)	43.1	41.4	37.6	33.6	42.1	42.5

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	40.4	38.5	36.7	30.6	39.3	39.9
MEDIUM TRUCKS	34.8	33.3	26.9	25.4	33.8	34.0
HEAVY TRUCKS	38.1	36.6	27.6	28.9	37.2	37.3
NOISE LEVELS (dBA)	43.1	41.4	37.6	33.6	42.1	42.5

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	1	3	7	15
LDN	1	3	6	14

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

PROJECT: SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY
ROADWAY: SERENITY TRAIL
SCENARIO: YEAR 2040 PLUS PROJECT CONDITIONS

JOB #: 2359-2016-03
DATE: 2-Feb-17
ENGINEER: B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	775	
SPEED =	25	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	18	
ROAD ELEVATION =	735.0	
GRADE =	3.8	%
PK HR VOL =	78	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		100
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		100
PAD ELEVATION =		735.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

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

VEHICLE MIX DATA

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

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	737.0	99.64	- -
MEDIUM TRUCKS	739.0	99.60	- -
HEAVY TRUCKS	743.0	99.64	1.11

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	43.1	41.2	39.5	33.4	42.0	42.6
MEDIUM TRUCKS	37.6	36.0	29.7	28.1	36.6	36.8
HEAVY TRUCKS	40.9	39.4	30.4	31.6	40.0	40.1
NOISE LEVELS (dBA)	45.9	44.2	40.4	36.3	44.9	45.3

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	43.1	41.2	39.5	33.4	42.0	42.6
MEDIUM TRUCKS	37.6	36.0	29.7	28.1	36.6	36.8
HEAVY TRUCKS	40.9	39.4	30.4	31.6	40.0	40.1
NOISE LEVELS (dBA)	45.9	44.2	40.4	36.3	44.9	45.3

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	2	5	10	22
LDN	2	5	10	21

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

PROJECT:	SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY	JOB #:	2359-2016-03
ROADWAY:	SR-71 FREEWAY	DATE:	6-Feb-17
LOCATION:	1ST FLOOR EXTERIOR BUILDING FACADE FACING FREEWAY	ENGINEER:	B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	100,000
SPEED =	65
PK HR % =	10
NEAR LANE/FAR LANE DIST	120
ROAD ELEVATION =	755.0
GRADE =	2.0 %
PK HR VOL =	10,000

RECEIVER INPUT DATA

RECEIVER DISTANCE =		335
DIST C/L TO WALL =		120
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		215
PAD ELEVATION =		725.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

HTH WALL=	15.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9364
MEDIUM TRUCKS	0.848	0.049	0.103	0.0421
HEAVY TRUCKS	0.865	0.027	0.108	0.0215

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	757.0	320.54	- -
MEDIUM TRUCKS	759.0	320.88	- -
HEAVY TRUCKS	763.0	321.67	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	73.7	71.8	70.0	64.0	72.6	73.2
MEDIUM TRUCKS	66.4	64.9	58.5	57.0	65.4	65.7
HEAVY TRUCKS	66.9	65.5	56.5	57.7	66.1	66.2
NOISE LEVELS (dBA)	75.1	73.4	70.5	65.5	74.1	74.6

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	59.5	57.6	55.8	49.8	58.4	59.0
MEDIUM TRUCKS	52.5	51.0	44.6	43.1	51.5	51.8
HEAVY TRUCKS	53.8	52.4	43.4	44.6	53.0	53.1
NOISE LEVELS (dBA)	61.2	59.4	56.5	51.6	60.1	60.6

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	962	3042	9619	30418
LDN	861	2721	8605	27213

Appendix E

Noise Levels from Mobile Sources
Calculation Worksheets

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

PROJECT:	SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY	JOB #:	2359-2016-03
ROADWAY:	SR-71 FREEWAY	DATE:	6-Feb-17
LOCATION:	1ST FLOOR EXTERIOR BUILDING FACADE FACING FREEWAY	ENGINEER:	B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	147,900	
SPEED =	65	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	120	
ROAD ELEVATION =	755.0	
GRADE =	2.0	%
PK HR VOL =	14,790	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		335
DIST C/L TO WALL =		120
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		215
PAD ELEVATION =		725.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

HTH WALL=	15.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9364
MEDIUM TRUCKS	0.848	0.049	0.103	0.0421
HEAVY TRUCKS	0.865	0.027	0.108	0.0215

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	757.0	320.54	- -
MEDIUM TRUCKS	759.0	320.88	- -
HEAVY TRUCKS	763.0	321.67	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	75.4	73.5	71.7	65.7	74.3	74.9
MEDIUM TRUCKS	68.1	66.6	60.2	58.7	67.1	67.4
HEAVY TRUCKS	68.6	67.2	58.2	59.4	67.8	67.9
NOISE LEVELS (dBA)	76.8	75.1	72.2	67.2	75.8	76.3

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	61.2	59.3	57.5	51.5	60.1	60.7
MEDIUM TRUCKS	54.2	52.7	46.3	44.8	53.2	53.5
HEAVY TRUCKS	55.5	54.1	45.1	46.3	54.7	54.8
NOISE LEVELS (dBA)	62.9	61.1	58.2	53.3	61.8	62.3

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	1423	4499	14227	44989
LDN	1273	4025	12727	40248

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

PROJECT: SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY
ROADWAY: SR-71 FREEWAY
LOCATION: 2ND FLOOR EXTERIOR BUILDING FAÇADE FACING FREEWAY

JOB #: 2359-2016-03
DATE: 2-Feb-17
ENGINEER: B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	147,900
SPEED =	65
PK HR % =	10
NEAR LANE/FAR LANE DIST	120
ROAD ELEVATION =	755.0
GRADE =	2.0 %
PK HR VOL =	14,790

RECEIVER INPUT DATA

RECEIVER DISTANCE =		335
DIST C/L TO WALL =		120
RECEIVER HEIGHT =		17.0
WALL DISTANCE FROM RECEIVER =		215
PAD ELEVATION =		725.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

HTH WALL=	15.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9364
MEDIUM TRUCKS	0.848	0.049	0.103	0.0421
HEAVY TRUCKS	0.865	0.027	0.108	0.0215

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	757.0	320.31	- -
MEDIUM TRUCKS	759.0	320.65	- -
HEAVY TRUCKS	763.0	321.45	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	75.4	73.5	71.7	65.7	74.3	74.9
MEDIUM TRUCKS	68.1	66.6	60.2	58.7	67.1	67.4
HEAVY TRUCKS	68.6	67.2	58.2	59.4	67.8	67.9
NOISE LEVELS (dBA)	76.8	75.1	72.2	67.2	75.8	76.3

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	62.4	60.5	58.7	52.7	61.3	61.9
MEDIUM TRUCKS	55.5	54.0	47.6	46.1	54.5	54.8
HEAVY TRUCKS	56.8	55.4	46.4	47.6	56.0	56.1
NOISE LEVELS (dBA)	64.1	62.3	59.4	54.5	63.0	63.5

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	1424	4502	14237	45020
LDN	1274	4028	12736	40276

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

PROJECT:	SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY	JOB #:	2359-2016-03
ROADWAY:	SR-71 FREEWAY	DATE:	2-Feb-17
LOCATION:	3RD FLOOR EXTERIOR BUILDING FAÇADE FACING FREEWAY	ENGINEER:	B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	147,900	
SPEED =	65	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	120	
ROAD ELEVATION =	755.0	
GRADE =	2.0	%
PK HR VOL =	14,790	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		335
DIST C/L TO WALL =		120
RECEIVER HEIGHT =		28.0
WALL DISTANCE FROM RECEIVER =		215
PAD ELEVATION =		725.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

HTH WALL=	15.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9364
MEDIUM TRUCKS	0.848	0.049	0.103	0.0421
HEAVY TRUCKS	0.865	0.027	0.108	0.0215

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	757.0	320.70	- -
MEDIUM TRUCKS	759.0	321.04	- -
HEAVY TRUCKS	763.0	321.83	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	75.4	73.5	71.7	65.7	74.3	74.9
MEDIUM TRUCKS	68.1	66.6	60.2	58.7	67.1	67.4
HEAVY TRUCKS	68.6	67.2	58.2	59.4	67.8	67.9
NOISE LEVELS (dBA)	76.8	75.1	72.2	67.2	75.8	76.3

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	63.7	61.8	60.0	54.0	62.6	63.2
MEDIUM TRUCKS	56.9	55.4	49.0	47.5	55.9	56.2
HEAVY TRUCKS	58.4	57.0	48.0	49.2	57.6	57.7
NOISE LEVELS (dBA)	65.5	63.7	60.8	55.9	64.4	64.9

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	1422	4497	14220	44966
LDN	1272	4023	12721	40227

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

PROJECT:	SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY	JOB #:	2359-2016-03
SOURCE:	SR-71 FREEWAY	DATE:	02-Feb-17
LOCATION:	MEMORY CARE GARDEN	BY:	B. Estrada

NOISE INPUT DATA

OBS DIST=	335.0			
DT WALL=	325.0			
DT W/OB=	10.0			
HTH WALL=	6.0	********		
BARRIER =	0.0	(0=WALL,1=BERM)		
OBS HTH=	5.0			
NOISE HTH=	38.0		BARRIER+	
OBS EL =	0.0		TOPO SHIELDING =	-4.96
NOISE EL =	0.0		NOISE HTH EL=	38.0
DROP-OFF=	10.0	(20 = 6 dBA PER DOUBLING OF DISTANCE)		
COFF				

NOISE OUTPUT DATA (dBA)

	DIST (FT)	CNEL
REF LEVEL	335	57.0
PROJ LEVEL	335	57.0
SHIELDING	335	-5.0
ADJ LEVEL	335	***52.0***

NOISE LEVEL REDUCTION DUE TO DISTANCE = 0

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

PROJECT:	SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY	JOB #:	2359-2016-03
SOURCE:	SR-71 FREEWAY	DATE:	02-Feb-17
LOCATION:	ASSISTED & INDEPENDENT LIVING COURTYARD	BY:	B. Estrada

NOISE INPUT DATA

OBS DIST=	415.0			
DT WALL=	335.0			
DT W/OB=	80.0			
HTH WALL=	39.0	********		
BARRIER =	0.0	(0=WALL,1=BERM)		
OBS HTH=	5.0			
NOISE HTH=	38.0		BARRIER+	
OBS EL =	0.0		TOPO SHIELDING =	-15.10
NOISE EL =	0.0		NOISE HTH EL=	38.0
DROP-OFF=	10.0	(20 = 6 dBA PER DOUBLING OF DISTANCE)		
COFF				

NOISE OUTPUT DATA (dBA)

	DIST (FT)	CNEL
REF LEVEL	335	57.0
PROJ LEVEL	415	56.1
SHIELDING	415	-15.1
ADJ LEVEL	415	***41.0***

NOISE LEVEL REDUCTION DUE TO DISTANCE = -0.9300329

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

PROJECT:	SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY	JOB #:	2359-2016-03
ROADWAY:	CHINO AVENUE	DATE:	2-Feb-17
LOCATION:	1ST FLOOR EXTERIOR BUILDING FACADE FACING FREEWAY	ENGINEER:	B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	36,897
SPEED =	45
PK HR % =	10
NEAR LANE/FAR LANE DIST	100
ROAD ELEVATION =	720.0
GRADE =	0.0 %
PK HR VOL =	3,690

RECEIVER INPUT DATA

RECEIVER DISTANCE =		550
DIST C/L TO WALL =		550
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		0
PAD ELEVATION =		725.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	0
	DF ANGLE=	90

SITE CONDITIONS

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

WALL INFORMATION

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

VEHICLE MIX DATA

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

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	722.0	547.78	- -
MEDIUM TRUCKS	724.0	547.76	- -
HEAVY TRUCKS	728.0	547.73	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	53.2	51.3	49.5	43.4	52.1	52.7
MEDIUM TRUCKS	44.2	42.7	36.3	34.8	43.3	43.5
HEAVY TRUCKS	44.8	43.3	34.3	35.6	43.9	44.0
NOISE LEVELS (dBA)	54.2	52.4	49.8	44.6	53.2	53.7

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	53.2	51.3	49.5	43.4	52.1	52.7
MEDIUM TRUCKS	44.2	42.7	36.3	34.8	43.3	43.5
HEAVY TRUCKS	44.8	43.3	34.3	35.6	43.9	44.0
NOISE LEVELS (dBA)	54.2	52.4	49.8	44.6	53.2	53.7

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	45	97	208	448
LDN	41	89	192	414

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

PROJECT:	SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY	JOB #:	2359-2016-03
ROADWAY:	CHINO AVENUE	DATE:	2-Feb-17
LOCATION:	2ND FLOOR EXTERIOR BUILDING FAÇADE FACING FREEWAY	ENGINEER:	B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	36,897	
SPEED =	45	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	100	
ROAD ELEVATION =	720.0	
GRADE =	0.0	%
PK HR VOL =	3,690	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		550
DIST C/L TO WALL =		550
RECEIVER HEIGHT =		17.0
WALL DISTANCE FROM RECEIVER =		0
PAD ELEVATION =		725.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	0
	DF ANGLE=	90

SITE CONDITIONS

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

WALL INFORMATION

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

VEHICLE MIX DATA

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

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	722.0	548.09	- -
MEDIUM TRUCKS	724.0	548.02	- -
HEAVY TRUCKS	728.0	547.90	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	59.6	57.7	55.9	49.9	58.5	59.1
MEDIUM TRUCKS	50.6	49.1	42.8	41.2	49.7	49.9
HEAVY TRUCKS	51.2	49.8	40.7	42.0	50.3	50.5
NOISE LEVELS (dBA)	60.6	58.8	56.2	51.0	59.6	60.1

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	59.6	57.7	55.9	49.9	58.5	59.1
MEDIUM TRUCKS	50.6	49.1	42.8	41.2	49.7	49.9
HEAVY TRUCKS	51.2	49.8	40.7	42.0	50.3	50.5
NOISE LEVELS (dBA)	60.6	58.8	56.2	51.0	59.6	60.1

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	56	178	561	1775
LDN	50	158	499	1577

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

PROJECT:	SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY	JOB #:	2359-2016-03
ROADWAY:	CHINO AVENUE	DATE:	2-Feb-17
LOCATION:	3RD FLOOR EXTERIOR BUILDING FAÇADE FACING FREEWAY	ENGINEER:	B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	36,897	
SPEED =	45	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	100	
ROAD ELEVATION =	720.0	
GRADE =	0.0	%
PK HR VOL =	3,690	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		550
DIST C/L TO WALL =		550
RECEIVER HEIGHT =		28.0
WALL DISTANCE FROM RECEIVER =		0
PAD ELEVATION =		725.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	0
	DF ANGLE=	90

SITE CONDITIONS

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

WALL INFORMATION

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

VEHICLE MIX DATA

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

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	722.0	548.60	- -
MEDIUM TRUCKS	724.0	548.49	- -
HEAVY TRUCKS	728.0	548.29	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	59.6	57.7	55.9	49.9	58.5	59.1
MEDIUM TRUCKS	50.6	49.1	42.8	41.2	49.7	49.9
HEAVY TRUCKS	51.2	49.8	40.7	42.0	50.3	50.5
NOISE LEVELS (dBA)	60.6	58.8	56.2	51.0	59.6	60.1

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	59.6	57.7	55.9	49.9	58.5	59.1
MEDIUM TRUCKS	50.6	49.1	42.8	41.2	49.7	49.9
HEAVY TRUCKS	51.2	49.8	40.7	42.0	50.3	50.5
NOISE LEVELS (dBA)	60.6	58.8	56.2	51.0	59.6	60.1

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	56	177	561	1774
LDN	50	158	498	1576

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

PROJECT: SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY
ROADWAY: CHINO AVENUE
LOCATION: MEMORY CARE GARDEN

JOB #: 2359-2016-03
DATE: 2-Feb-17
ENGINEER: B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	36,897	
SPEED =	45	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	100	
ROAD ELEVATION =	720.0	
GRADE =	0.0	%
PK HR VOL =	3,690	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		660
DIST C/L TO WALL =		650
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		10
PAD ELEVATION =		725.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	0
	DF ANGLE=	90

SITE CONDITIONS

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

WALL INFORMATION

HTH WALL=	6.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

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

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	722.0	658.19	- -
MEDIUM TRUCKS	724.0	658.16	- -
HEAVY TRUCKS	728.0	658.13	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	52.0	50.1	48.3	42.2	50.9	51.5
MEDIUM TRUCKS	43.0	41.5	35.1	33.6	42.1	42.3
HEAVY TRUCKS	43.6	42.2	33.1	34.4	42.7	42.8
NOISE LEVELS (dBA)	53.0	51.2	48.6	43.4	52.0	52.5

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	46.4	44.5	42.7	36.6	45.3	45.9
MEDIUM TRUCKS	37.5	36.0	29.6	28.1	36.5	36.8
HEAVY TRUCKS	38.1	36.6	27.6	28.9	37.2	37.3
NOISE LEVELS (dBA)	47.4	45.6	43.0	37.8	46.4	46.9

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	45	96	208	448
LDN	41	89	192	414

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

PROJECT:	SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY	JOB #:	2359-2016-03
ROADWAY:	CHINO AVENUE	DATE:	2-Feb-17
LOCATION:	ASSISTED AND INDEPENDENT LIVING COURTYARD	ENGINEER:	B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	36,897	
SPEED =	45	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	100	
ROAD ELEVATION =	720.0	
GRADE =	0.0	%
PK HR VOL =	3,690	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		620
DIST C/L TO WALL =		550
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		70
PAD ELEVATION =		725.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	0
	DF ANGLE=	90

SITE CONDITIONS

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

WALL INFORMATION

HTH WALL=	39.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

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

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	722.0	627.15	- -
MEDIUM TRUCKS	724.0	627.00	- -
HEAVY TRUCKS	728.0	626.72	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	52.3	50.4	48.6	42.6	51.2	51.8
MEDIUM TRUCKS	43.3	41.8	35.5	33.9	42.4	42.6
HEAVY TRUCKS	43.9	42.5	33.4	34.7	43.0	43.2
NOISE LEVELS (dBA)	53.3	51.5	48.9	43.7	52.3	52.8

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	35.4	33.5	31.7	25.7	34.3	34.9
MEDIUM TRUCKS	26.4	24.9	18.6	17.0	25.5	25.7
HEAVY TRUCKS	27.3	25.9	16.8	18.1	26.4	26.6
NOISE LEVELS (dBA)	36.5	34.7	32.1	26.8	35.4	35.9

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	44	95	205	441
LDN	41	88	189	408

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

PROJECT:	SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY	JOB #:	2359-2016-03
ROADWAY:	SERENITY TRAIL	DATE:	2-Feb-17
LOCATION:	1ST FLOOR EXTERIOR BUILDING FACADE FACING FREEWAY	ENGINEER:	B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	775	
SPEED =	25	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	18	
ROAD ELEVATION =	735.0	
GRADE =	3.8	%
PK HR VOL =	78	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		88
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		88
PAD ELEVATION =		725.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

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

VEHICLE MIX DATA

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

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	737.0	87.82	- -
MEDIUM TRUCKS	739.0	88.00	- -
HEAVY TRUCKS	743.0	88.50	1.11

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	44.0	42.1	40.3	34.2	42.9	43.5
MEDIUM TRUCKS	38.4	36.8	30.5	28.9	37.4	37.6
HEAVY TRUCKS	41.6	40.2	31.2	32.4	40.8	40.9
NOISE LEVELS (dBA)	46.7	45.0	41.2	37.1	45.7	46.1

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	44.0	42.1	40.3	34.2	42.9	43.5
MEDIUM TRUCKS	38.4	36.8	30.5	28.9	37.4	37.6
HEAVY TRUCKS	41.6	40.2	31.2	32.4	40.8	40.9
NOISE LEVELS (dBA)	46.7	45.0	41.2	37.1	45.7	46.1

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	2	5	10	22
LDN	2	5	10	21

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

PROJECT:	SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY	JOB #:	2359-2016-03
ROADWAY:	SERENITY TRAIL	DATE:	2-Feb-17
LOCATION:	2ND FLOOR EXTERIOR BUILDING FAÇADE FACING FREEWAY	ENGINEER:	B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	775	
SPEED =	25	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	18	
ROAD ELEVATION =	735.0	
GRADE =	3.8	%
PK HR VOL =	78	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		88
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		17.0
WALL DISTANCE FROM RECEIVER =		88
PAD ELEVATION =		725.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

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

VEHICLE MIX DATA

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

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	737.0	87.68	- -
MEDIUM TRUCKS	739.0	87.59	- -
HEAVY TRUCKS	743.0	87.54	1.11

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	46.4	44.5	42.8	36.7	45.3	45.9
MEDIUM TRUCKS	40.8	39.3	33.0	31.4	39.9	40.1
HEAVY TRUCKS	44.1	42.7	33.7	34.9	43.3	43.4
NOISE LEVELS (dBA)	49.1	47.5	43.7	39.6	48.1	48.5

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	46.4	44.5	42.8	36.7	45.3	45.9
MEDIUM TRUCKS	40.8	39.3	33.0	31.4	39.9	40.1
HEAVY TRUCKS	44.1	42.7	33.7	34.9	43.3	43.4
NOISE LEVELS (dBA)	49.1	47.5	43.7	39.6	48.1	48.5

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	1	2	6	20
LDN	1	2	6	18

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

PROJECT:	SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY	JOB #:	2359-2016-03
ROADWAY:	SERENITY TRAIL	DATE:	2-Feb-17
LOCATION:	3RD FLOOR EXTERIOR BUILDING FAÇADE FACING FREEWAY	ENGINEER:	B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	775	
SPEED =	25	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	18	
ROAD ELEVATION =	735.0	
GRADE =	3.8	%
PK HR VOL =	78	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		88
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		28.0
WALL DISTANCE FROM RECEIVER =		88
PAD ELEVATION =		725.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

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

VEHICLE MIX DATA

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

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	737.0	88.99	- -
MEDIUM TRUCKS	739.0	88.65	- -
HEAVY TRUCKS	743.0	88.11	1.11

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	46.4	44.5	42.7	36.6	45.3	45.9
MEDIUM TRUCKS	40.8	39.3	32.9	31.4	39.8	40.1
HEAVY TRUCKS	44.1	42.7	33.7	34.9	43.3	43.4
NOISE LEVELS (dBA)	49.1	47.4	43.6	39.6	48.1	48.5

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	46.4	44.5	42.7	36.6	45.3	45.9
MEDIUM TRUCKS	40.8	39.3	32.9	31.4	39.8	40.1
HEAVY TRUCKS	44.1	42.7	33.7	34.9	43.3	43.4
NOISE LEVELS (dBA)	49.1	47.4	43.6	39.6	48.1	48.5

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	1	2	6	20
LDN	1	2	6	18

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

PROJECT: SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY
ROADWAY: SERENITY TRAIL
LOCATION: MEMORY CARE GARDEN

JOB #: 2359-2016-03
DATE: 2-Feb-17
ENGINEER: B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	775	
SPEED =	25	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	18	
ROAD ELEVATION =	0.0	
GRADE =	3.8	%
PK HR VOL =	78	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		98
DIST C/L TO WALL =		88
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		10
PAD ELEVATION =		0.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

HTH WALL=	6.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

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

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	97.68	- -
MEDIUM TRUCKS	4.0	97.61	- -
HEAVY TRUCKS	8.0	97.61	1.11

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	43.3	41.4	39.6	33.5	42.2	42.8
MEDIUM TRUCKS	37.7	36.2	29.8	28.3	36.7	37.0
HEAVY TRUCKS	41.0	39.6	30.5	31.8	40.1	40.3
NOISE LEVELS (dBA)	46.0	44.3	40.5	36.5	45.0	45.4

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	37.4	35.5	33.7	27.6	36.3	36.9
MEDIUM TRUCKS	32.1	30.6	24.2	22.7	31.1	31.4
HEAVY TRUCKS	35.8	34.4	25.3	26.6	34.9	35.1
NOISE LEVELS (dBA)	40.4	38.7	34.9	30.8	39.4	39.8

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	2	5	10	22
LDN	2	5	10	21

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

PROJECT: SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY
ROADWAY: SERENITY TRAIL
LOCATION: ASSISTED & INDEPENDENT LIVING COURTYARD

JOB #: 2359-2016-03
DATE: 2-Feb-17
ENGINEER: B. Estrada

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	775	
SPEED =	25	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	18	
ROAD ELEVATION =	0.0	
GRADE =	3.8	%
PK HR VOL =	78	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		150
DIST C/L TO WALL =		88
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		62
PAD ELEVATION =		0.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

HTH WALL=	39.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

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

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	165.75	- -
MEDIUM TRUCKS	4.0	164.99	- -
HEAVY TRUCKS	8.0	163.57	1.11

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	39.8	37.9	36.2	30.1	38.7	39.3
MEDIUM TRUCKS	34.3	32.8	26.4	24.8	33.3	33.5
HEAVY TRUCKS	37.6	36.2	27.2	28.4	36.8	36.9
NOISE LEVELS (dBA)	42.6	40.9	37.1	33.1	41.6	42.0

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	21.3	19.4	17.7	11.6	20.2	20.8
MEDIUM TRUCKS	15.8	14.3	7.9	6.3	14.8	15.0
HEAVY TRUCKS	19.5	18.1	9.1	10.3	18.7	18.8
NOISE LEVELS (dBA)	24.2	22.5	18.7	14.7	23.2	23.6

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	2	4	9	20
LDN	2	4	9	19

NOISE LEVEL ADDITION (dBA)
SUMMERLAND SENIOR LIVING MOBILE NOISE SOURCES

Exterior First Floor Facade (unmitigated)

Street Name	Noise Level (dBA)	10
SR-71	62.3	1,698,243.7
CHINO AVENUE	53.7	234,422.9
SERENITY TRAIL	46.1	40,738.0
Combined Noise Level (dBA)	63.0	1,973,404.6

Total Combined Noise Impacts to
Exterior Unmitigated
63.0

NOISE LEVEL ADDITION (dBA)
SUMMERLAND SENIOR LIVING MOBILE NOISE SOURCES

Exterior SECOND Floor Facade (unmitigated)

Street Name	Noise Level (dBA)	10
SR-71	63.5	2,238,721.1
CHINO AVENUE	60.1	1,023,293.0
SERENITY TRAIL	48.5	70,794.6
Combined Noise Level (dBA)	65.2	3,332,808.7

Total Combined Noise Impacts to
Exterior Unmitigated
65.2

NOISE LEVEL ADDITION (dBA)
SUMMERLAND SENIOR LIVING MOBILE NOISE SOURCES

Exterior THIRD Floor Facade (unmitigated)

Street Name	Noise Level (dBA)	10
SR-71	64.9	3,090,295.4
CHINO AVENUE	60.1	1,023,293.0
SERENITY TRAIL	48.5	70,794.6
Combined Noise Level (dBA)	66.2	4,184,383.0

Total Combined Noise Impacts to
Exterior Unmitigated
66.2

NOISE LEVEL ADDITION (dBA)
SUMMERLAND SENIOR LIVING MOBILE NOISE SOURCES

Exterior MEMORY CARE GARDEN (unmitigated)

Street Name	Noise Level (dBA)	10
SR-71	52.0	158,489.3
CHINO AVENUE	46.9	48,977.9
SERENITY TRAIL	39.8	9,549.9
Combined Noise Level (dBA)	53.4	217,017.1

Total Combined Noise Impacts to
Exterior Unmitigated
53.4

NOISE LEVEL ADDITION (dBA)
SUMMERLAND SENIOR LIVING MOBILE NOISE SOURCES

Exterior ASSISTED & INDEPENDENT LIVING COURTYARD (unmitigated)

Street Name	Noise Level (dBA)	10
SR-71	40.5	11,220.2
CHINO AVENUE	35.9	3,890.5
SERENITY TRAIL	23.6	229.1
Combined Noise Level (dBA)	41.9	15,339.7

Total Combined Noise Impacts to
Exterior Unmitigated
41.9

Appendix F

Noise Levels from Stationary Sources
Calculation Worksheets

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

PROJECT:	SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY	JOB #:	2359-2016-03
SOURCE:	ROOFTOP HVAC EQUIPMENT	DATE:	02-Feb-17
LOCATION:	RESIDENTIAL UNITS TO THE NORTH	BY:	B. Estrada

NOISE INPUT DATA

OBS DIST=	100.0			
DT WALL=	3.0			
DT W/OB=	97.0			
HTH WALL=	5.0	********		
BARRIER =	0.0	(0=WALL,1=BERM)		
OBS HTH=	5.0			
NOISE HTH=	3.0		BARRIER+	
OBS EL =	741.0		TOPO SHIELDING =	-10.10
NOISE EL =	759.0		NOISE HTH EL=	762.0
DROP-OFF=	20.0	(20 = 6 dBA PER DOUBLING OF DISTANCE)		
COFF				

NOISE OUTPUT DATA (dBA)

	DIST (FT)	Leq	Lmax	L2	L8	L25	L50
REF LEVEL	3	88.5	88.5	88.5	88.5	88.5	88.5
PROJ LEVEL	100	58.0	58.0	58.0	58.0	58.0	58.0
SHIELDING	100	-10.1	-10.1	-10.1	-10.1	-10.1	-10.1
ADJ LEVEL	100	***47.9***	***47.9***	***47.9***	***47.9***	***47.9***	***47.9***

NOISE LEVEL REDUCTION DUE TO DISTANCE = -30.4575749

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

PROJECT:	SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY	JOB #:	2359-2016-03
SOURCE:	ROOFTOP HVAC EQUIPMENT	DATE:	02-Feb-17
LOCATION:	RESIDENTIAL UNITS TO THE EAST	BY:	B. Estrada

NOISE INPUT DATA

OBS DIST=	100.0			
DT WALL=	3.0			
DT W/OB=	97.0			
HTH WALL=	5.0	********		
BARRIER =	0.0	(0=WALL,1=BERM)		
OBS HTH=	5.0			
NOISE HTH=	3.0		BARRIER+	
OBS EL =	725.0		TOPO SHIELDING =	-11.10
NOISE EL =	759.0		NOISE HTH EL=	762.0
DROP-OFF=	20.0	(20 = 6 dBA PER DOUBLING OF DISTANCE)		
COFF				

NOISE OUTPUT DATA (dBA)

	DIST (FT)	Leq	Lmax	L2	L8	L25	L50
REF LEVEL	3	88.5	88.5	88.5	88.5	88.5	88.5
PROJ LEVEL	100	58.0	58.0	58.0	58.0	58.0	58.0
SHIELDING	100	-11.1	-11.1	-11.1	-11.1	-11.1	-11.1
ADJ LEVEL	100	***46.9***	***46.9***	***46.9***	***46.9***	***46.9***	***46.9***

NOISE LEVEL REDUCTION DUE TO DISTANCE = -30.4575749

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

PROJECT:	SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY	JOB #:	2359-2016-03
SOURCE:	DELIVERY/TRASH TRUCK/LOADING	DATE:	02-Feb-17
LOCATION:	RESIDENTIAL UNITS TO THE NORTH	BY:	J. Narciso

NOISE INPUT DATA

OBS DIST=	65.0			
DT WALL=	55.0			
DT W/OB=	10.0			
HTH WALL=	6.0	********		
BARRIER =	0.0	(0=WALL,1=BERM)		
OBS HTH=	5.0			
NOISE HTH=	5.0		BARRIER+	
OBS EL =	741.0		TOPO SHIELDING =	-9.10
NOISE EL =	725.0		NOISE HTH EL=	730.0
DROP-OFF=	20.0	(20 = 6 dBA PER DOUBLING OF DISTANCE)		

NOISE OUTPUT DATA (dBA)

	DIST (FT)	Leq	Lmax	L2	L8	L25	L50
REF LEVEL	6	66.3	84.0	78.5	68.0	61.5	58.5
PROJ LEVEL	65	45.6	63.3	57.8	47.3	40.8	37.8
SHIELDING	65	-9.1	-9.1	-9.1	-9.1	-9.1	-9.1
ADJ LEVEL	65	***36.5***	***54.2***	***48.7***	***38.2***	***31.7***	***28.7***

NOISE LEVEL REDUCTION DUE TO DISTANCE = -20.6952421

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

PROJECT:	SUMMERLAND SENIOR LIVING NOISE IMPACT STUDY	JOB #:	2359-2016-03
SOURCE:	DELIVERY/TRASH TRUCK/LOADING	DATE:	02-Feb-17
LOCATION:	RESIDENTIAL UNITS TO THE EAST	BY:	J. Narciso

NOISE INPUT DATA

OBS DIST=	65.0			
DT WALL=	55.0			
DT W/OB=	10.0			
HTH WALL=	6.0	********		
BARRIER =	0.0	(0=WALL,1=BERM)		
OBS HTH=	5.0			
NOISE HTH=	5.0		BARRIER+	
OBS EL =	725.0		TOPO SHIELDING =	-5.51
NOISE EL =	725.0		NOISE HTH EL=	730.0
DROP-OFF=	20.0	(20 = 6 dBA PER DOUBLING OF DISTANCE)		

NOISE OUTPUT DATA (dBA)

	DIST (FT)	Leq	Lmax	L2	L8	L25	L50
REF LEVEL	6	66.3	84.0	78.5	68.0	61.5	58.5
PROJ LEVEL	65	45.6	63.3	57.8	47.3	40.8	37.8
SHIELDING	65	-5.5	-5.5	-5.5	-5.5	-5.5	-5.5
ADJ LEVEL	65	***40.1***	***57.8***	***52.3***	***41.8***	***35.3***	***32.3***

NOISE LEVEL REDUCTION DUE TO DISTANCE = -20.6952421

NOISE INTERVAL AVERAGER (2.0)

PROJECT: SUMMERLAND SENIOR LIVING FACILITY JOB #: 2359-2017-1
LOCATION: NORTHERN PROPERTY LINE DATE: 2/2/2017
SOURCE: ALL STATIONARY NOISE SOURCES (DAYTIME) BY: B. Estrada

NOISE LEVEL MEASUREMENTS (dBA)

NOISE SOURCE	LEQ	L(MAX)	L(2)	L(8)	L(25)	L(50)
HVAC EQUIPMENT	47.9	47.9	47.9	47.9	47.9	47.9
LOADING AREA / TRASH	36.5	54.2	48.7	38.2	31.7	28.7
AMBIENT	56.4	68.0	60.6	58.1	57.0	56.0
TOTAL	57.0	68.2	61.1	58.5	57.5	56.6

NOISE INTERVAL AVERAGER (2.0)

PROJECT: SUMMERLAND SENIOR LIVING FACILITY JOB #: 2359-2017-1
LOCATION: NORTHERN PROPERTY LINE DATE: 2/2/2017
SOURCE: ALL STATIONARY NOISE SOURCES (NIGHTTIME) BY: B. Estrada

NOISE LEVEL MEASUREMENTS (dBA)

NOISE SOURCE	LEQ	L(MAX)	L(2)	L(8)	L(25)	L(50)
HVAC EQUIPMENT	47.9	47.9	47.9	47.9	47.9	47.9
LOADING AREA / TRASH	36.5	54.2	48.7	38.2	31.7	28.7
AMBIENT	51.4	63.0	55.6	53.1	52.0	51.0
TOTAL	53.1	63.7	57.0	54.4	53.5	52.8

NOISE INTERVAL AVERAGER (2.0)

PROJECT: SUMMERLAND SENIOR LIVING FACILITY JOB #: 2359-2017-1
LOCATION: EASTERN PROPERTY LINE DATE: 2/2/2017
SOURCE: ALL STATIONARY NOISE SOURCES (DAYTIME) BY: B. Estrada

NOISE LEVEL MEASUREMENTS (dBA)

NOISE SOURCE	LEQ	L(MAX)	L(2)	L(8)	L(25)	L(50)
HVAC EQUIPMENT	46.9	46.9	46.9	46.9	46.9	46.9
LOADING AREA / TRASH	40.1	57.8	52.3	41.8	35.3	32.3
AMBIENT	61.4	70.8	67.2	63.6	61.7	60.5
TOTAL	61.6	71.0	67.4	63.7	61.9	60.7

NOISE INTERVAL AVERAGER (2.0)

PROJECT: SUMMERLAND SENIOR LIVING FACILITY JOB #: 2359-2017-1
LOCATION: EASTERN PROPERTY LINE DATE: 2/2/2017
SOURCE: ALL STATIONARY NOISE SOURCES (NIGHTTIME) BY: B. Estrada

NOISE LEVEL MEASUREMENTS (dBA)

NOISE SOURCE	LEQ	L(MAX)	L(2)	L(8)	L(25)	L(50)
HVAC EQUIPMENT	47.9	47.9	47.9	47.9	47.9	47.9
LOADING AREA / TRASH	36.5	54.2	48.7	38.2	31.7	28.7
AMBIENT	56.4	65.8	62.2	58.6	56.7	55.5
TOTAL	57.0	66.2	62.5	59.0	57.3	56.2

Appendix G

Construction Noise and Vibration
Calculation Worksheets

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 2/2/2017

Case Description: SUMMERLAND SENIOR LIVING FACILITY

Construction Phase: SITE PREPARATION PHASE

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Property Line	Residential	60	60	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	50	0
Dozer	No	40		81.7	50	0
Dozer	No	40		81.7	50	0
Backhoe	No	40		77.6	50	0
Backhoe	No	40		77.6	50	0
Backhoe	No	40		77.6	50	0
Backhoe	No	40		77.6	50	0

Results

Calculated (dBA)

Equipment	*Lmax	L10
Dozer	81.7	80.7
Dozer	81.7	80.7
Dozer	81.7	80.7
Backhoe	77.6	76.6
Backhoe	77.6	76.6
Backhoe	77.6	76.6
Backhoe	77.6	76.6
Total	81.7	87.3

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 2/2/2017

Case Description: SUMMERLAND SENIOR LIVING FACILITY

Construction Phase: Grading

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Property Line	Residential	60	60	45

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

Results

Calculated (dBA)

Equipment	*Lmax	L10
Excavator	80.7	79.7
Grader	85	84
Dozer	81.7	80.7
Backhoe	77.6	76.6
Backhoe	77.6	76.6
Backhoe	77.6	76.6
Total	85	87.8

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 2/2/2017
Case Description: SUMMERLAND SENIOR LIVING

Construction Phase: Building Construction

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
PROPERTY LINE	Residential	60	60	45

		Equipment				
Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	50	0
Man Lift	No	20		74.7	50	0
Man Lift	No	20		74.7	50	0
Man Lift	No	20		74.7	50	0
Generator	No	50		80.6	50	0
Backhoe	No	40		77.6	50	0
Welder / Torch	No	40		74	50	0
Impact Pile Driver	Yes	20		101.3	50	0

Results

		Calculated (dBA)
Equipment	*Lmax	L10
Crane	80.6	75.6
Man Lift	74.7	70.7
Man Lift	74.7	70.7
Man Lift	74.7	70.7
Generator	80.6	80.6
Backhoe	77.6	76.6
Welder / Torch	74	73
Impact Pile Driver	101.3	97.3
Total	101.3	97.5

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 2/2/2017

Case Description: SUMMERLAND SENIOR LIVING FACILITY

Construction Phase: Paving

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Property Line	Residential	60	60	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Mixer Truck	No	40		78.8	50	0
Concrete Mixer Truck	No	40		78.8	50	0
Paver	No	50		77.2	50	0
Pavement Scarafier	No	20		89.5	50	0
Pavement Scarafier	No	20		89.5	50	0
Roller	No	20		80.0	50	0
Roller	No	20		80.0	50	0
Backhoe	No	40		77.6	50	0

Results

Calculated (dBA)

Equipment	*Lmax	L10
Concrete Mixer Truck	78.8	77.8
Concrete Mixer Truck	78.8	77.8
Paver	77.2	77.2
Pavement Scarafier	89.5	85.5
Pavement Scarafier	89.5	85.5
Roller	80.0	76.0
Roller	80.0	76.0
Backhoe	77.6	76.6
Total	89.5	90.0

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 2/2/2017

Case Description: SUMMERLAND SENIOR LIVING FACILITY

Construction Phase: Architectural Coating

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Property Line	Residential	60	60	45

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

Results

	Calculated (dBA)	
Equipment	*Lmax	L10
Concrete Mixer Truck	77.7	76.7
Total	77.7	76.7

*Calculated Lmax is the Loudest value.

VIBRATION IMPACTS FROM CONSTRUCTION AND OPERATIONS

PROJECT:	SUMMERLAND SENIOR L	JOB #:	2359-2016-03
ACTIVITY:	BUILDING CONSTRUCTIC	DATE:	2-Feb-17
SOURCE:	IMPACT PILE DRIVING	ENGINEER:	B. ESTRADA
RECEIVER:	NEAREST RESIDENTIAL STRUCTURE		

VIBRATION INPUT/OUTPUT DATA

IMPACT PILE DRIVERS

$$PPV = PPV_{ref}(25/D)^{n} \times (E_{equip}/E_{ref})^{0.5} \text{ (in/sec)}$$

PPV = 0.141 in/sec

PPV ref =	0.65	in/sec at 25 ft.
D =	100.00	Distance from pile driver to receiver in ft.
n =	1.10	Vibration attenuation rate through the ground
Eref	36,000	ft-lbs rated energy of reference pile driver
E_{equip} =	36,000	ft-lbs rated energy of reference pile driver

VIBRATION PILE DRIVERS

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

PPV = 0.141 in/sec