RGD ACOUSTICS

Acoustical & Audiovisual Consultants

ENVIRONMENTAL NOISE STUDY FOR:

8841 Old Redwood Highway
Cotati, California

RGD Project: 21-062

PREPARED FOR:

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DATE:

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1. Introduction

The proposed project is a residential housing development located on an approximately 7-acre site on 8841 Old Redwood Highway in Cotati, California. The project's most recent conceptual site plan indicates 35 single-family buildings. The major noise source at the project site is traffic on Old Redwood Highway. This study addresses the existing and future noise environment with respect to the requirements of the City of Cotati General Plan and Cotati Municipal Code.

2. Environmental Noise Fundamentals

Noise can be defined as unwanted sound. It is commonly measured with an instrument called a sound level meter. The sound level meter captures the sound with a microphone and converts it into a number called a sound level. Sound levels are expressed in units of decibels. To correlate the microphone signal to a level that corresponds to the way humans perceive noise, the A-weighting filter is used. A weighting de-emphasizes low-frequency and very high-frequency sound in a manner similar to human hearing. The use of A-weighting is required by most local General Plans as well as federal and state noise regulations (e.g. Caltrans, EPA, OSHA and HUD). The abbreviation dBA is sometimes used when the A weighted sound level is reported.

Because of the time-varying nature of environmental sound, there are many descriptors that are used to quantify the sound level. One individual descriptor alone does not fully describe a particular noise environment. However, multiple descriptors taken together can more accurately represent the noise environment. The maximum instantaneous noise level (L_{max}) is often used to identify the loudness of a single event such as a car passby or airplane flyover. To express the average noise level the L_{eq} (equivalent noise level) is used. The L_{eq} can be measured over any length of time but is typically reported for periods of 15 minutes to 1 hour. The background noise level (or residual noise level) is the sound level during the quietest moments. It is usually generated by steady sources such as distant freeway traffic. It can be quantified with a descriptor called the L_{90} which is the sound level exceeded 90 percent of the time.

To quantify the noise level over a 24-hour period, the Day/Night Average Sound Level (DNL or L_{dn}) or Community Noise Equivalent Level (CNEL) is used. These descriptors are averages like the L_{eq} except they include a 10 dB penalty during nighttime hours (and a 5 dB penalty during evening hours in the CNEL) to account for peoples increased sensitivity during these hours. The CNEL and L_{dn} are typically within one decibel of each other.

In environmental noise, a change in noise level of 3 dB is considered a just noticeable difference. A 5 dB change is clearly noticeable, but not dramatic. A 10 dB change is perceived as a halving or doubling in loudness.

3. Acoustical Criteria

3.1. Cotati General Plan

The Noise Element of the City of Cotati General Plan has policies and actions to assure the appropriateness of new development with the noise environment of Cotati. The applicable policies and actions are below:

- Policy N 1.2: Require development and infrastructure projects to be consistent with the Land Use Compatibility for Community Noise Environments standards indicated in Table N-1 (Figure 1) to ensure acceptable noise levels at existing and future uses.
- Policy N 1.3: Require development to mitigate excessive noise through best practices, including building location and orientation, building design features, placement of noise-generating equipment away from sensitive receptors, shielding of noise-generating equipment, placement of noise-tolerant features between noise sources and sensitive receptors, and use of noise-minimizing materials such as rubberized asphalt.
- Policy N 1.8: Ensure that new development does not expose indoor sleeping areas to indoor noise levels in excess of 45 dBA L_{dn}.
- Policy N 1.11: Require acoustical studies and mitigation measures, where necessary, for new developments and transportation improvements that affect new noise sensitive uses such as schools, hospitals, libraries, group care facilities, convalescent homes, and residential areas.
- Action N 1a: Update the Land Use Code to ensure that the noise standards are consistent with this Noise Element, including Tables N-1 and N2, and to require new residential, mixed-use with a residential component, and other noise-sensitive development to be designed to minimize noise exposure to noise sensitive users through incorporation of site planning and architectural techniques such as:
  - Locating dwellings as far from noise generators as possible.
  - Locating noise sensitive interior spaces, such as bedrooms, away from noise generators.
  - Orienting buildings to shield noise sensitive outdoor spaces from noise generators.
  - Use of sound walls should be avoided or minimized, through alternative measures such as berms, setbacks, or other measures, to the maximum extent feasible and appropriate.
- Action N 1c: Require an acoustical study for all new discretionary projects, including development and transportation, with potential noise impacts. The study shall include mitigation measures necessary to ensure compliance with this Noise Element and relevant noise standards in the Land Use Code.

Figure 1: City of Cotati General Plan [GP Table N-1] –

Land Use Compatibility for Community Noise Environment

Land Use Category	Exterior Noise Exposure (Ldn)					
	55	60	65	70	75	80
Single-Family Residential						
Multi-Family Residential, Hotels, and Motels						
Outdoor Sports and Recreation, Neighborhood Parks and Playgrounds						
Schools, Libraries, Museums, Hospitals, Personal Care, Meeting Halls, Churches						
Office Buildings, Business Commercial, and Professional						
Auditoriums, Concert Halls, Amphitheaters						
Industrial						

NORMALLY ACCEPTABLE
Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special insulation requirements

CONDITIONALLY ACCEPTABLE
Specified land use may be permitted only after detailed analysis of the noise reduction requirements and needed noise insulation features included in the design

UNACCEPTABLE
New construction or development should generally not be undertaken because mitigation is usually not feasible to comply with noise element policies

3.2. Cotati Municipal Code

Section 17.30.050 of the Cotati Municipal Code has policies and standards to assure the appropriateness of new development with the noise environment of Cotati. Table 1 (Cotati Municipal Code Table 3.3) shows the maximum allowable noise level by receiving land use.

Table 1: Maximum Allowable Noise Level by Receiving Land Use

Noise Sensitive Land Use	Outdoor Activity Areas[1][2]	Interior Spaces	
	dBA L_{dn}	dBA L_{dn}	dBA L_{eq}
Residential	65	45	N.A.
Transient lodging	65	45	N.A.
Hospitals, extended care	65	45	N.A.
Theater, auditorium	(3)	45	35
Meeting facility, public or private	65	45	40
Offices	75	45	45
School, library, museum	65	45	45
Playground park	70	N.A.	N.A.

Notes:

(1) Where the location of outdoor activity areas is unknown, the exterior noise level standard shall be applied to the property line of the receiving land use.

(2) Where it is not possible to reduce noise in outdoor activity areas to 65 dB L_{dn}/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 70 dB L_{dn}/CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table.

4. Noise Environment

4.1. Noise Measurements

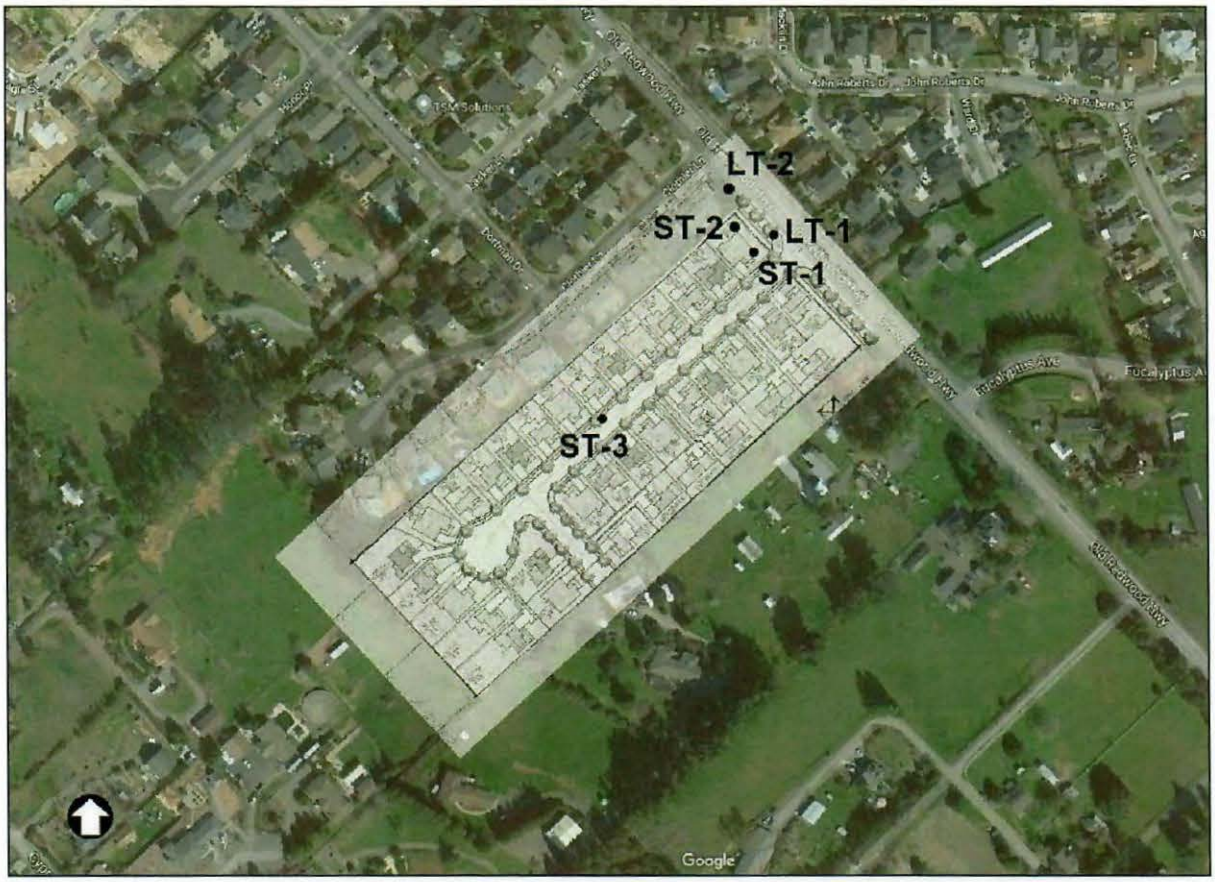
Existing noise levels were quantified by two long-term, 3-day, noise measurements (LT-1 and LT-2) and four short-term, 15 to 30-minute, noise measurements. The noise monitoring program began on Wednesday, 12 January 22 and ended on Saturday, 15 January 22. The dominant noise source was traffic on Old Redwood Highway.

The long-term noise monitors were positioned along Old Redwood Highway. The monitor at LT-1 was located on a tree along the existing fence along the project site. The monitor at LT-2 was located on a utility pole near the northern corner of the project site. Both monitors were approximately 12 feet above ground.

Three short-term noise measurements were made at the nearest proposed lot along Old Redwood Highway. The measurements were made at 24 feet and 5 feet above ground. One short-term noise measurement was near the center of the project site at 24 feet above ground.

The measurement locations are shown in Figure 2.

Figure 2: Noise Measurement Locations



The noise measurements were made with Larson Davis Model 820 and Model 824 sound level meters meeting Type 1 specifications (ANSI S1.4). The sound level meter calibrations were checked with an acoustical calibrator (Larson-Davis Model Cal200).

Figure 3 shows the long-term measurement results. Table 1 shows the short-term measurement summary.

Figure 3: Long-Term Noise Measurement Results
LT-1 L_{dn} 71 dBA, LT-2 L_{dn} 72 dBA

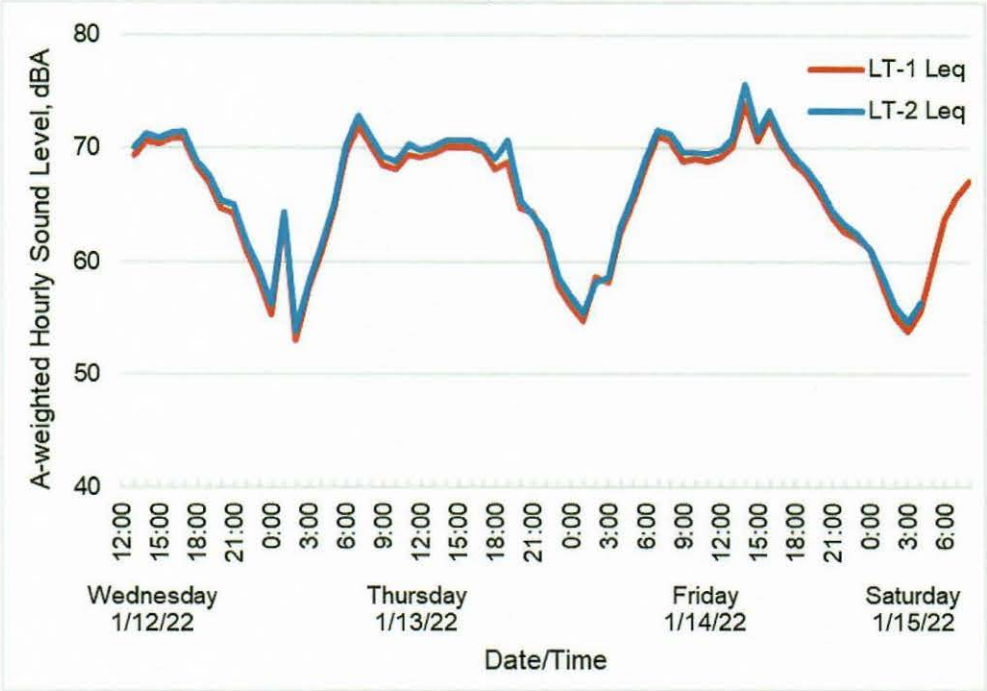


Table 1: Short Term Noise Measurements – 12 January 2022

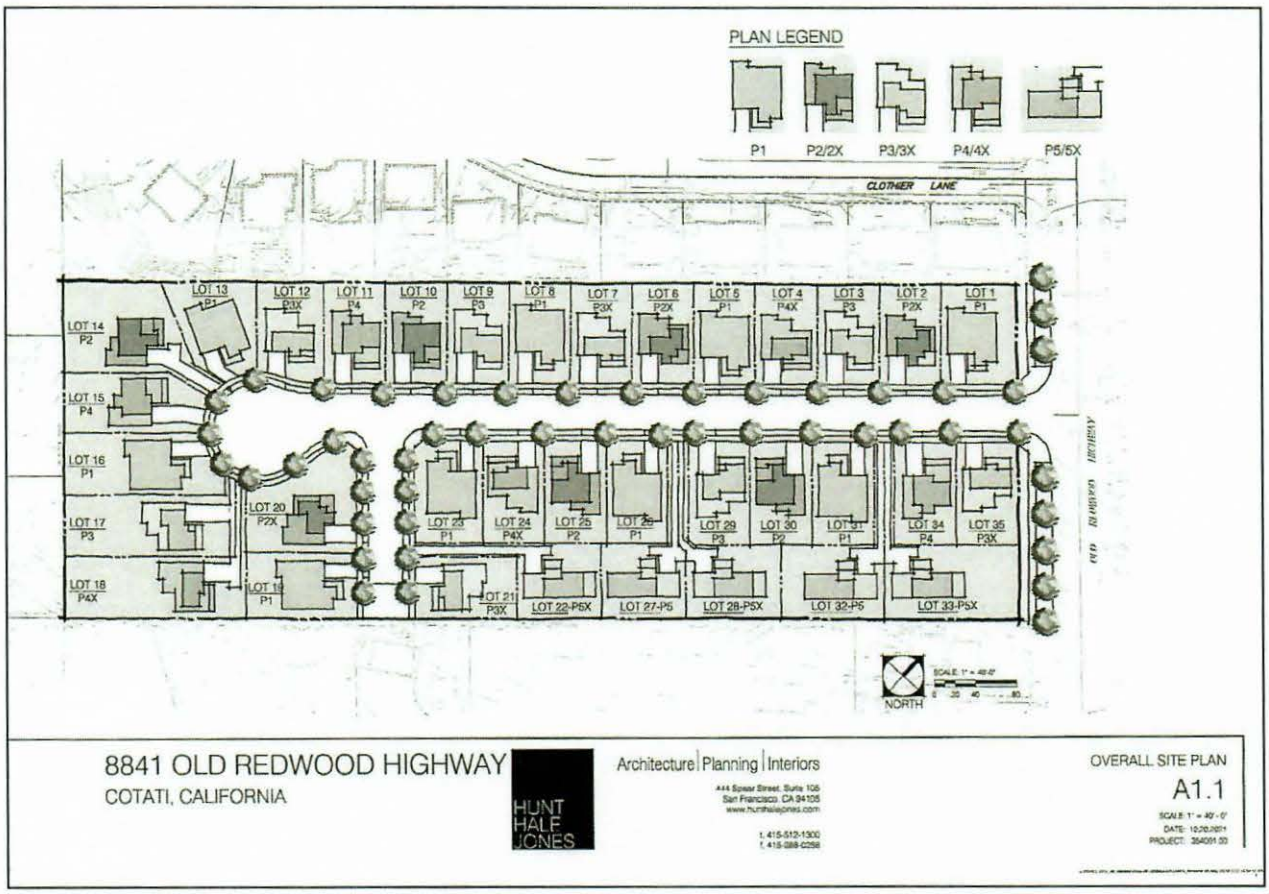
Location	Height Above Ground	Time	A-weighted Sound Level, dBA					
			L_{eq}	L_{max}	L_{33}	L_{50}	L_{90}	L_{dn}*
ST-1	24 feet	1:07 PM – 1:22 PM	67	83	67	65	57	67
	5 feet		66	82	66	64	54	66
ST-2	5 feet	1:23 PM – 2:02 PM	64	75	64	62	53	66
ST-3	24 feet	1:36 PM – 1:51 PM	52	76	50	49	47	54

*L_{dn} calculated based on correlation with simultaneous long-term measurement.

5. Analysis/Recommendations

The following analysis is based on the conceptual site plan as shown in Figure 4 below.

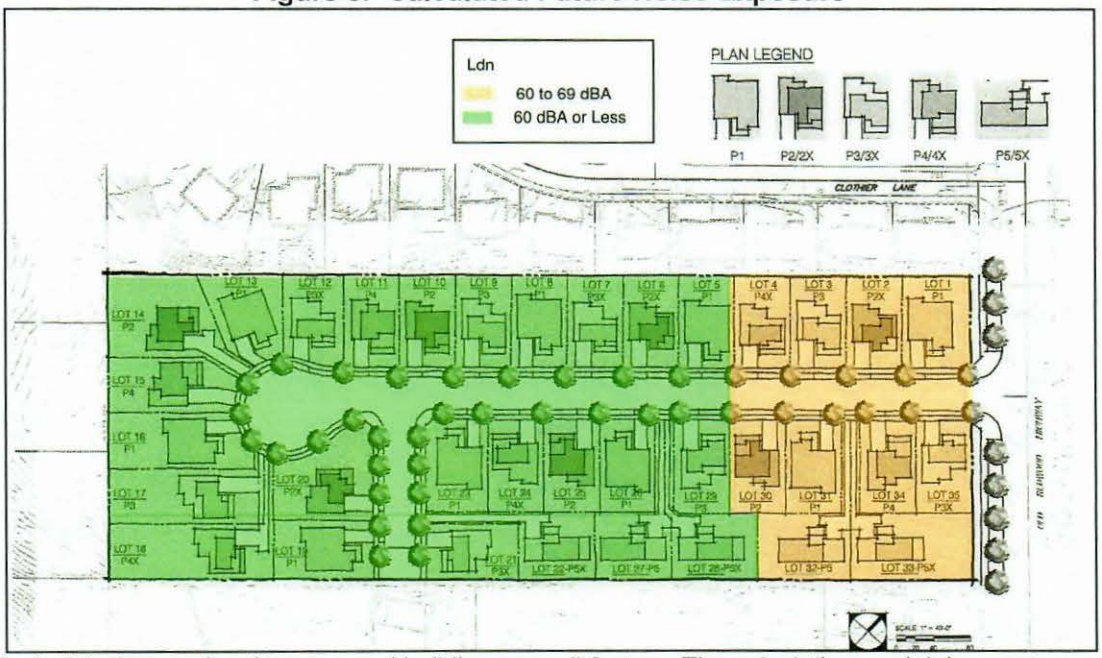
Figure 4: Conceptual Site Plan



Old Redwood Highway traffic is the dominant noise source affecting the project. According to the project's Traffic Impact Analysis[1], future traffic volume Old Redwood Highway is expected to increase by 21% which corresponds to a 0.8 dBA increase in the L_{dn}. Based on our measurements and calculations, the proposed first of row homes closest to Old Redwood Highway (Lot 1, 33, and 35) would be exposed to a future exterior L_{dn} of 66 to 69 dBA. The noise exposure of homes further from Old Redwood Highway would be less due to attenuation from increased distance and acoustical shielding provided by the intervening buildings. For example, assuming the project homes are all 2-story, homes at Lots 5, 28, and 29, would be exposed to a future exterior L_{dn} of 60 dBA or less. Figure 5 shows a map of the future noise exposure.

[1] *Traffic Impact Analysis for Flahavan Estates Project*. Transpedia Consulting Engineers, January 2022.

Figure 5: Calculated Future Noise Exposure



*calculated assuming the proposed buildings are all 2-story. The calculation model does not include any solid fences at each of the individual lots.

Most of the project would be exposed to existing and future noise levels of less than L_{dn} 60 dBA which is considered "normally acceptable" per Cotati General Plan Table N-1. Some of the homes near Old Redwood Highway (as shown in yellow in Figure 5) would be exposed to noise levels between L_{dn} 60 dBA and 69 dBA which is considered "conditionally acceptable" per General Plan Table N-1. According to the General Plan, "specified land use may be permitted only after detailed analysis of noise reduction requirements is made and needed noise insulation features are included in the design." The City of Cotati Municipal Code Section 17.30.050 further states that the maximum allowable noise levels for residential outdoor and interior spaces are L_{dn} 65 dBA and L_{dn} 45 dBA, respectively. In order to meet these goals the following noise control measures are recommended.

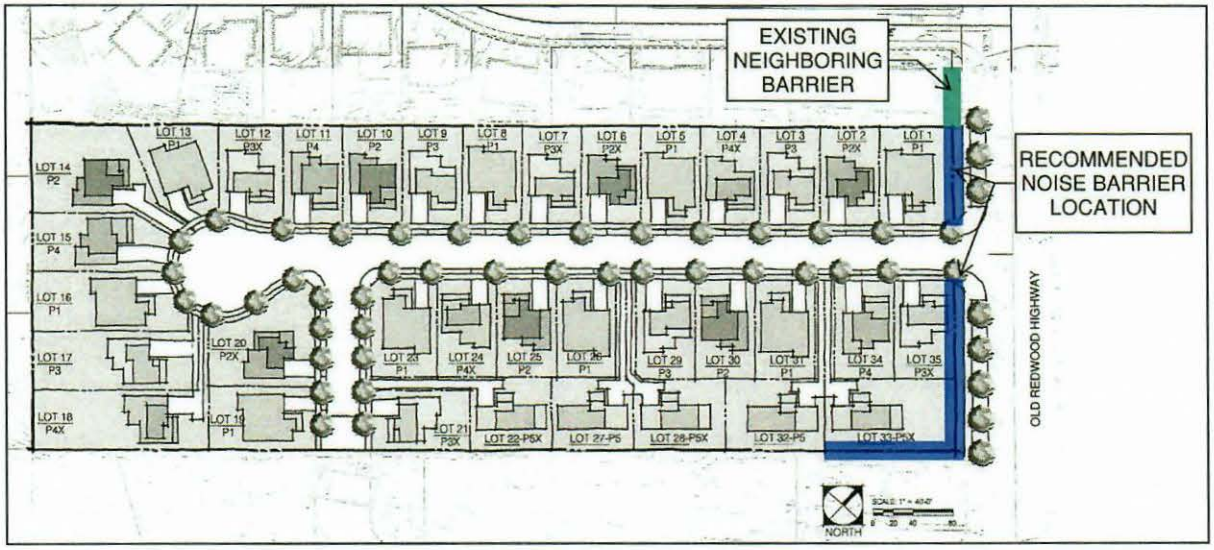
Exterior Noise

The outdoor noise criterion can be achieved by providing a six-foot tall noise barrier around the backyards of the homes closest to Old Redwood Highway. Figure 6 shows the location of the noise barrier. The height should be measured with respect to the backyard elevation. This noise barrier would provide at least 5 dBA of noise reduction and result in noise level of L_{dn} 65 dBA or less in the backyards. This would meet the City's requirement.

The project previously had a preliminary landscape plan dated July 2016 which includes a detail of the wood fence constructed with butted 1x6 boards. In our experience this type of fence construction is not appropriate for a noise barrier since does not provide sufficient surface density and will result in gaps between the boards.

The design can be improved by including a layer of plywood or a second layer of 1x6 boards that have staggered joints. Also, to avoid a gap at the bottom, the design should indicate that the bottom of the fence contacts the ground along the entire length of the fence.

Figure 6: Noise Barrier Location



Interior Noise

The homes closest to Old Redwood Highway will be exposed to an L_{dn} of 65 dBA to 69 dBA and to meet the interior standard of L_{dn} 45 dBA, an exterior-to-interior noise reduction of 20 to 24 dBA is required. Standard building construction will reduce noise levels by 20 to 25 dBA with the windows closed and 15 dBA with open windows. Therefore, our preliminary finding is that the project would meet the Cotati interior noise standard without special noise control building features (e.g. sound-rated windows).

However, where future noise levels exceed L_{dn} 60 dBA (highlighted in yellow in Figure 5), windows will need to be in the closed position to meet the interior noise level of L_{dn} 45 dBA. For these units, natural ventilation via open windows should not be relied upon and an alternate means of achieving outdoor air should be provided such as through mechanical ventilation.

Since detailed architectural drawings are not available at this time, an analysis should be conducted during the architectural design phase to confirm whether or not sound-rated constructions are needed for the homes closest to Old Redwood Highway.

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