RGD ACOUSTICS

Acoustical & Audiovisual Consultants

DRAFT **EXTERIOR NOISE STUDY:**

Butcher's Corner Apartments

Sunnyvale, CA

RGD Project #: 16-030

PREPARED FOR:

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1. Introduction

The proposed project is a mixed use development consisting of 153 residential units in two apartment buildings and eighteen townhome buildings along El Camino Real in the City of Sunnyvale, California. El Camino Real, Wolfe Road and Fremont Avenue are the major noise sources at the project site. This study assesses the noise affecting the project site with respect to the policies of the City of Sunnyvale General Plan.

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. Although one individual descriptor alone does not fully describe a particular noise environment, taken together, they 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 less that one decibel from 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

The Noise Element of the City of Sunnyvale's General Plan has policies to promote land uses that are compatible with the noise environment at a site.

Policy SN-8.4: Prevent significant noise impacts from new development by applying State noise guidelines and Sunnyvale Municipal Code noise regulations in the evaluation of land use issues and proposals. (Previously Noise Policy 3.6A.1)

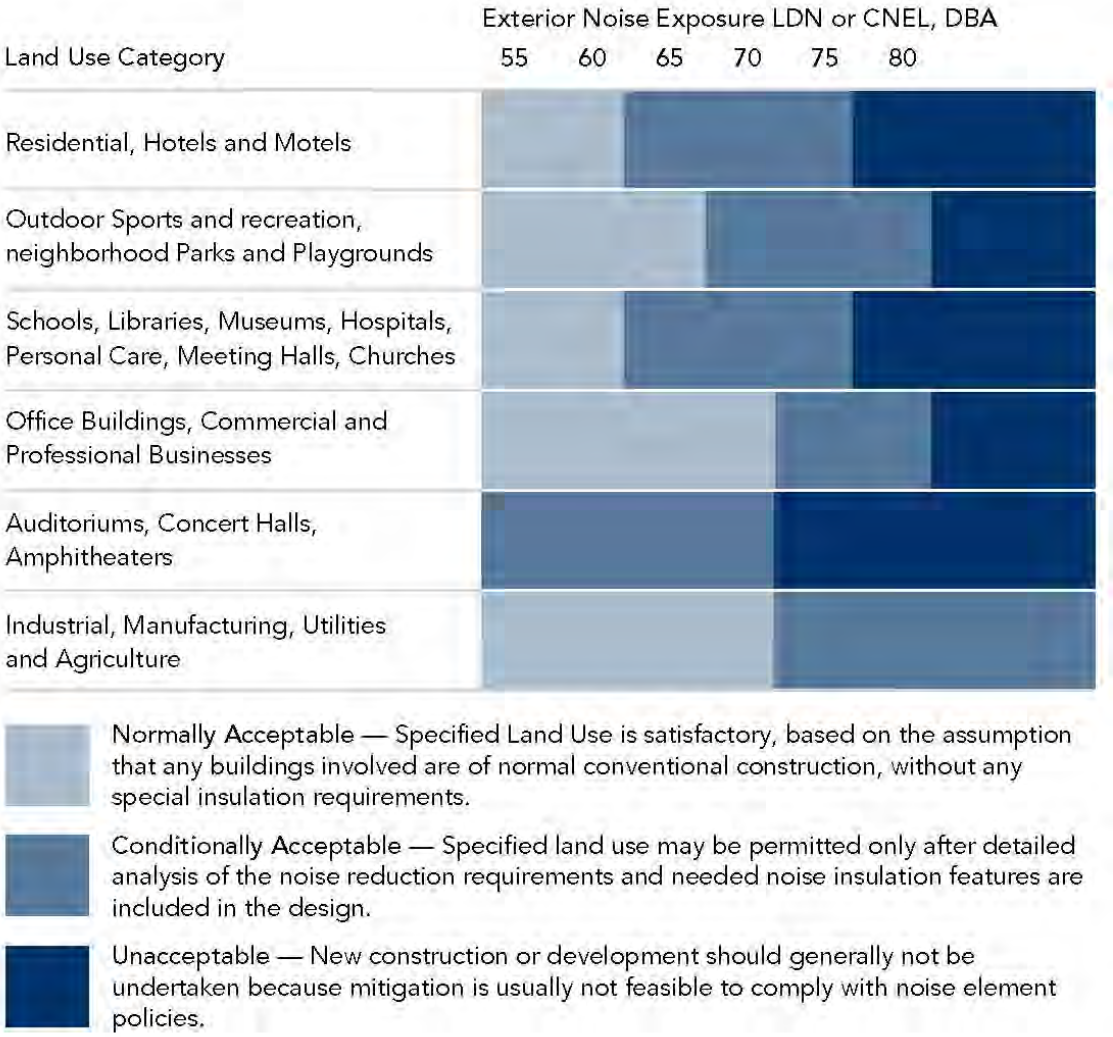
Policy SN-8.5: Comply with "State of California Noise Guidelines for Land Use Planning" (Figure 6-5) for the compatibility of land uses with their noise environments, except where the City determines that there are prevailing circumstances of a unique or special nature. *(Previously Noise Action 3.6A.1c)*

Policy SN-8.7: Supplement Figure 6-5, "State of California Noise guidelines for Land Use Planning" for residential uses by attempting to achieve an outdoor Ldn of no greater than 60 dBA for common recreational areas, backyards, patios and medium and large-size balconies. These guidelines should not apply where the noise source is railroad or an airport. If the noise source is a railroad, then an Ldn of no greater than 70 dBA should be achieved in common areas, backyards, patios and medium and large balconies. If the noise source is from aircraft, then preventing new residential uses within areas of high Ldn from aircraft noise is recommended. (Previously Noise Action Statement 3.6A.1f)

The noise guidelines for land use planning (referred to as Figure 6.5 in the City's policies) are reproduced in this report as Figure 1[1].

[1]City of Sunnyvale General Plan, Noise Element, Figure 6-5, Page 6-32.

Figure 1: State of California Noise Guidelines for Land Use Planning Summary of Land Use Compatibility for Community Noise Environments (Figure 6-5 of Sunnyvale Noise Element)



4. Computer Modeling

In order to determine future on-site noise levels, an environmental noise modeling software program *SoundPLAN* (ver 7.4) was used. *SoundPLAN* allows for the creation of a virtual 3D model of the building and uses traffic volume information for nearby roadways to calculate the noise level at various locations on and around the project site.

5. Analysis/Recommendations

The City's Noise Element policy regarding outdoor noise (SN-8.7) is that a project should supplement the State's noise guidelines for land use planning by attempting to achieve an L_{dn} of no greater than 60 dBA for common recreational areas, backyards, patios and medium and large-size balconies.

This project includes a common first floor courtyard/pool area that is adjacent to the apartment buildings as well as private backyards for townhomes. Since these areas will count toward the project's usable open space requirement, they are considered in the analysis of outdoor noise levels. Apartment balconies and front yards of townhomes facing Fremont Ave. are not counted toward the projects usable open space requirement so they are also excluded from the analysis.

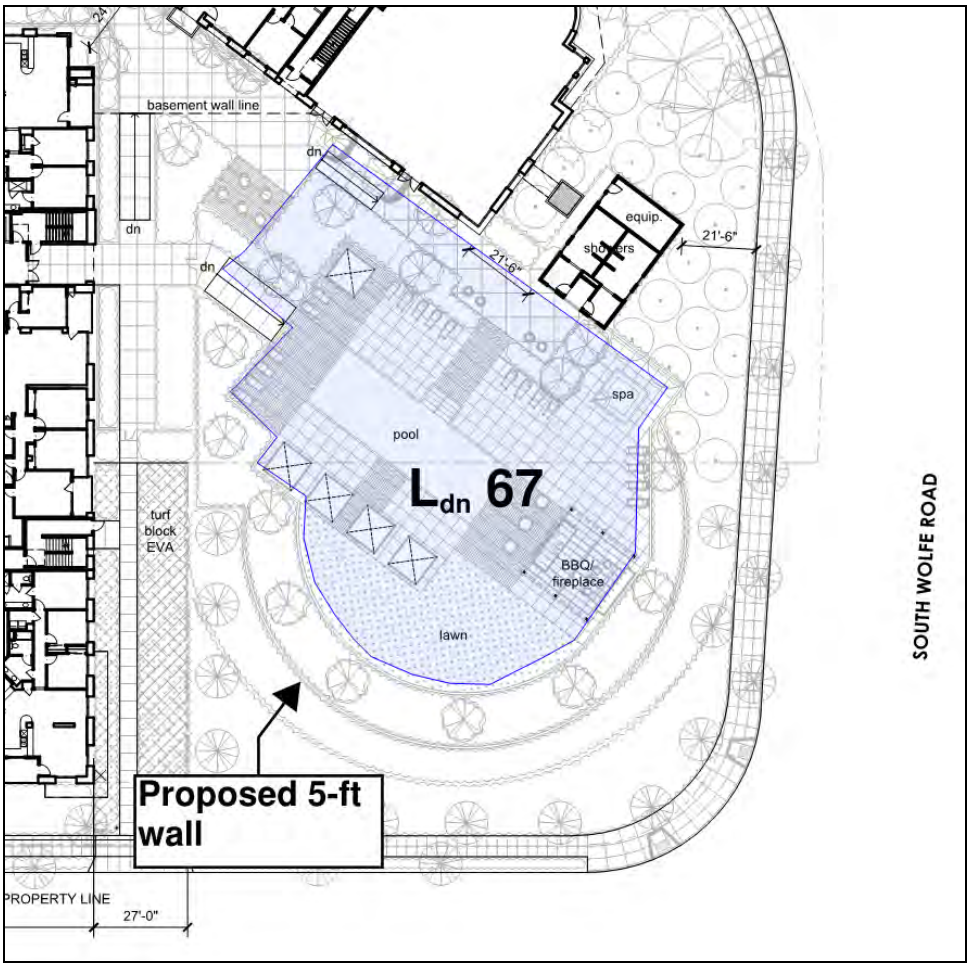
The following section discussed the future noise levels in these areas (courtyard and backyards) with the proposed plan and then provides recommendations for measures that would reduce noise to the noise goals in the City's General Plan policies, where feasible. Our analysis is based on the preliminary design drawings issued by Dahlin Group dated July 19, 2016.

It is important to note that all heights and locations of recommended walls should be considered preliminary and subject to refinement during the architectural design phase.

5.1. First Floor Courtyard & Swimming Pool

There is one main common outdoor use area – a first floor courtyard and swimming pool. Figure 2 shows the predicted noise levels in the courtyard and pool area from future traffic including the effects of the proposed and 5-foot tall barriers as shown in the drawings.

Figure 2: Noise levels at first floor courtyard & swimming pool with currently proposed 5 foot barrier



The proposed design for the first floor common areas include a 5-foot wall surrounding the common usable open space that would provide some reduction of noise from traffic on El Camino Real, Fremont Avenue, and Wolfe Road. However in addition to still having significant exposure to traffic on Fremont Avenue and Wolfe Road, the common use areas would also be subjected to any reflected sounds off the proposed walls. Thus, the noise in courtyard and pool areas would reach an L_{dn} of up to 67 dBA.

To meet a L_{dn} of 60 dBA or less in the common outdoor use spaces, the 5-foot wall would need to be increased to 12 feet in height and extend to the cottage building near the swimming pool. The space between the El Camino Building and the cottage building near the pole should also be connected by a 12-foot wall. Figure 3 shows the location of the recommended 12-foot wall. If a 12-foot tall wall is not reasonably feasible, a wall with a height of 8 feet, as shown in Figure 4, would meet an L_{dn} of 65 dBA which the City considers "conditionally acceptable".

Figure 3: Noise levels at first floor courtyard & swimming pool with 12 foot tall expanded noise barrier

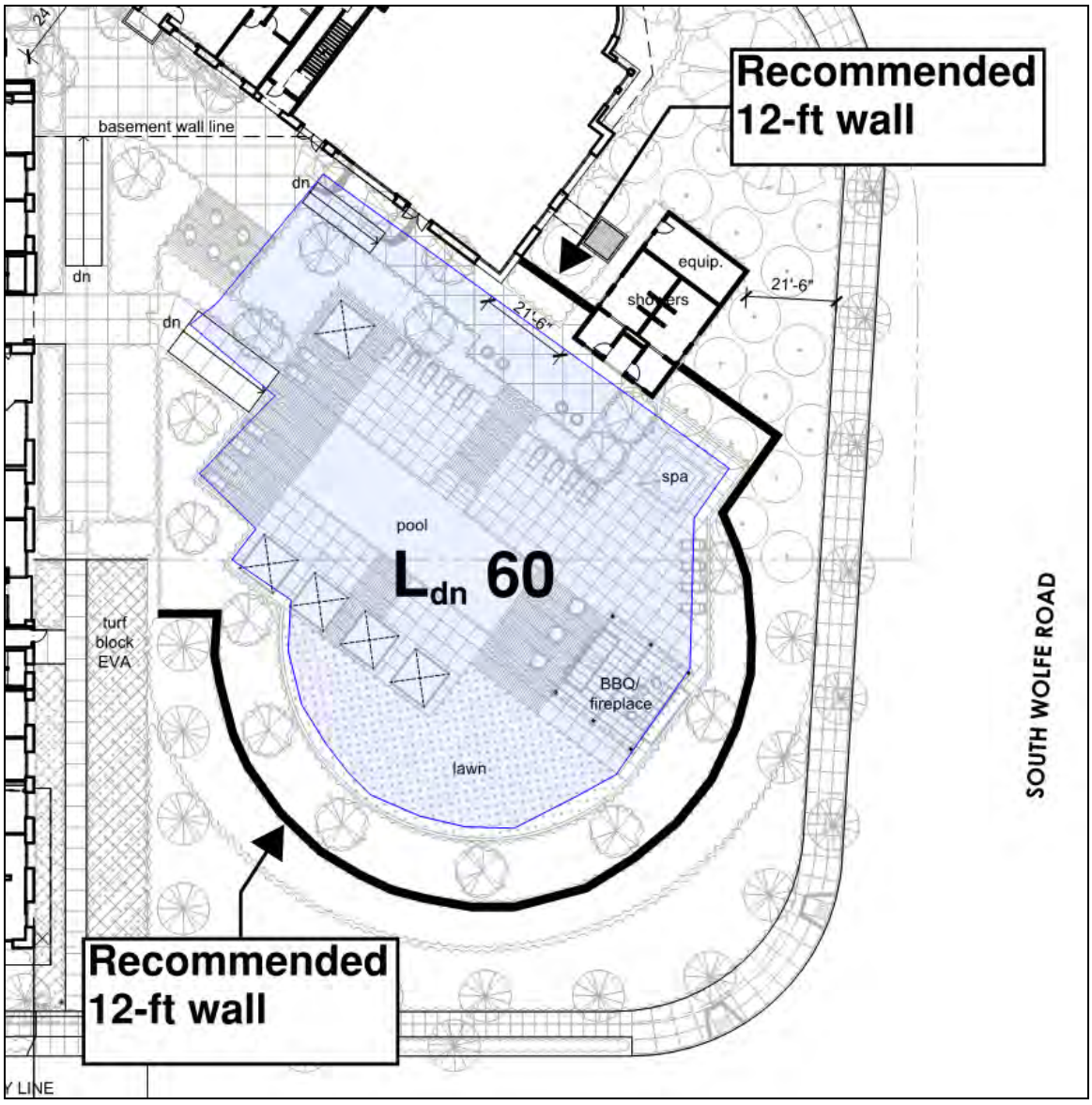
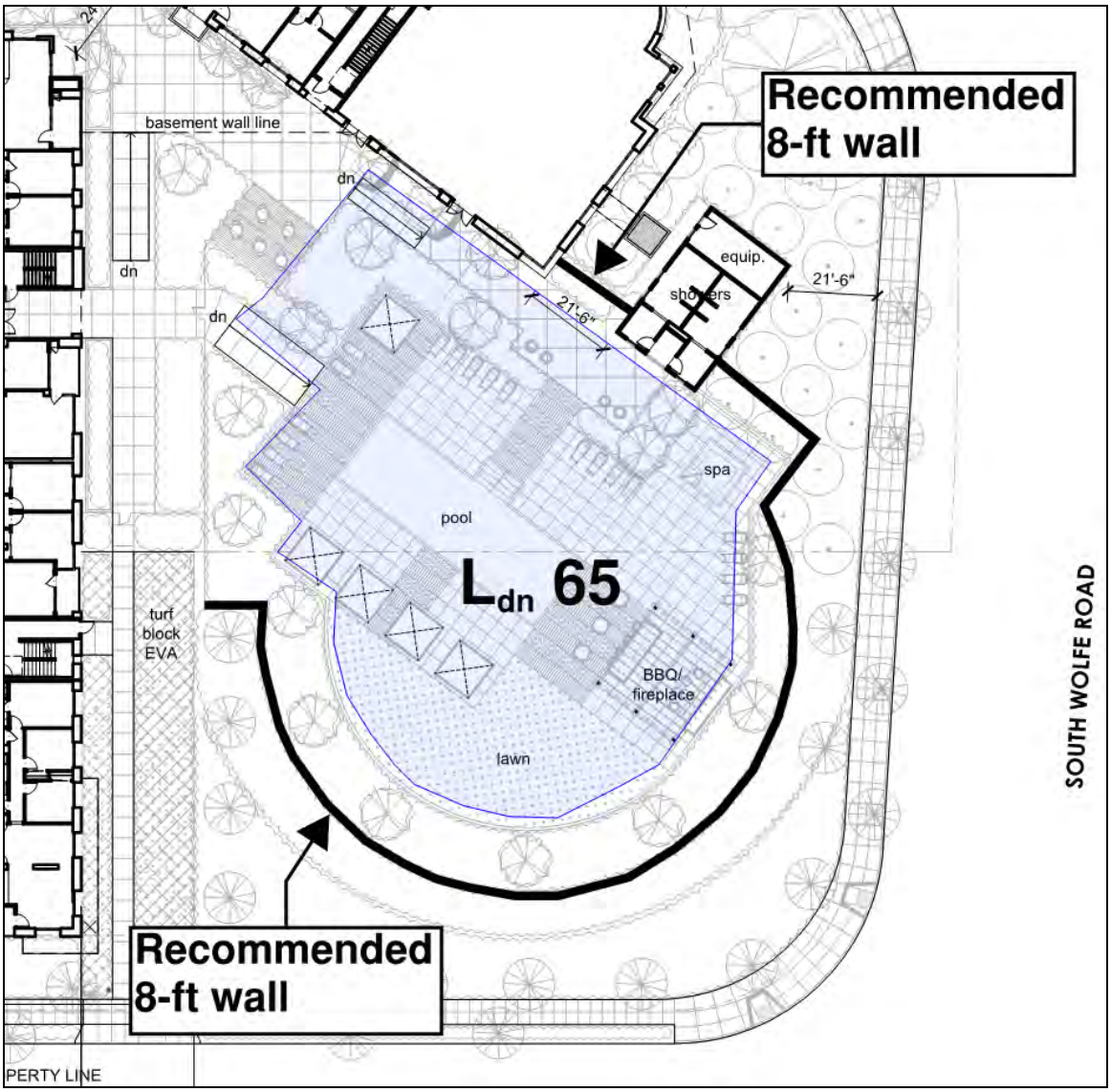


Figure 4: Noise levels at first floor courtyard & swimming pool with 8 foot tall expanded noise barrier



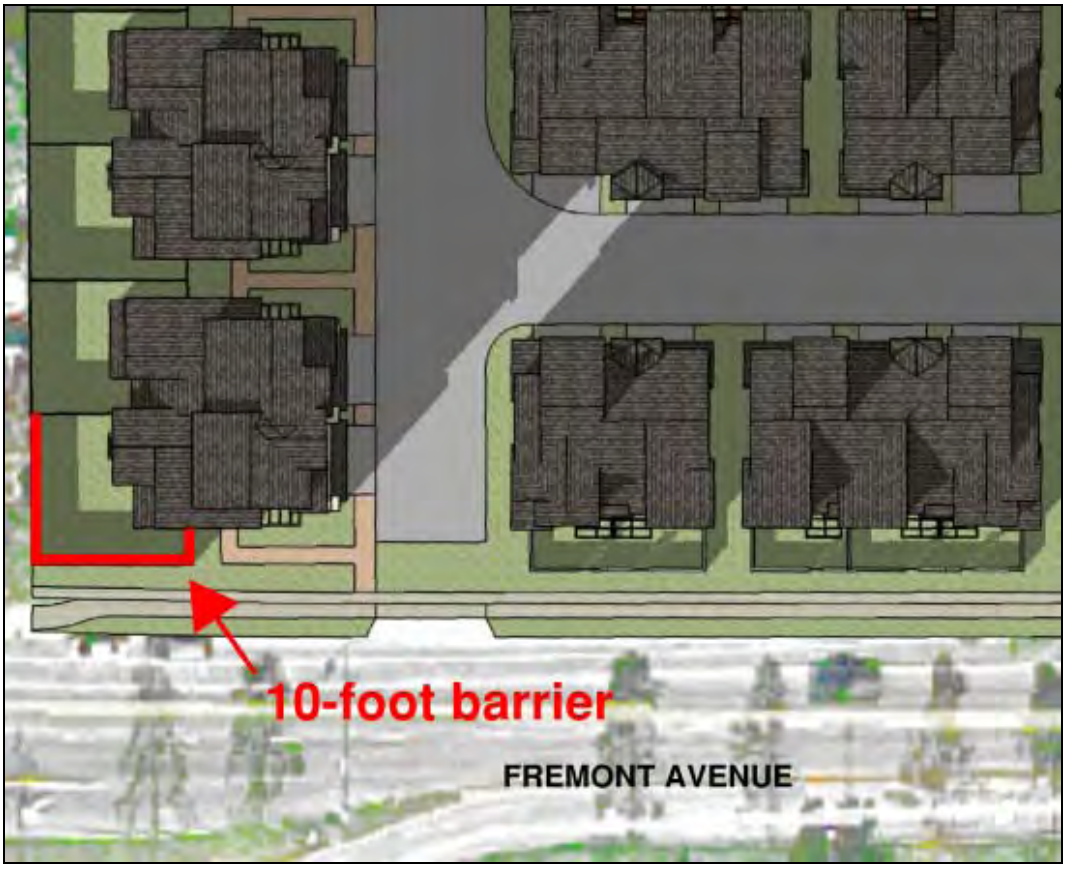
5.2. Private Backyards - Townhouses

The project includes a six foot tall pre-cast wall at the property line. Backyards located toward the center of the site (away from roadways) would be exposed to noise levels that are an L_{dn} of 60 dBA or less which is considered "normally acceptable." However, the noise level in the backyard of the townhome at the southwest corner of the site along Fremont Avenue would be subjected to a L_{dn} in excess of 60 dBA.

In order to meet an L_{dn} of 60 dBA in the backyard of the townhome, the six foot barrier would need to be increased to 10 foot tall as shown in Figure 5. The barrier can be made of masonry or wood provided it has adequate mass (minimum surface weight of 2-1/2 lbs. per sq. ft.) and has no cracks or gaps.

If the 10-foot tall barrier is not reasonably feasible, a 6-foot tall wall (in lieu of the 10 foot wall) would result in an L_{dn} that exceeds 60 dBA but less than 65 dBA which the City considers "conditionally acceptable".

Figure 5: Location of 10 foot tall noise barrier along Fremont Avenue



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