Environmental Consulting Services **18488 Prospect Road – Suite 1, Saratoga, CA 95070**
Phone: (408) 257-1045 stanshell99@toast.net

May 27, 2025

Mr. Eason Yuan, AIA,
Ms. Jun Zhang, AIA
Z & D ARCHITECTS, INC
Los Altos, CA

Re: Revised Noise Study and Update for 4-Unit
Residential Project, 838 Azure Street, Sunnyvale - Rev C

Dear Mr. Yuan and Ms. Zhang,

This report is a combination of the original project noise report of April 11, 2016, the mitigation summary of July 8, 2016, and new information and modifications I have made to bring it up to date. This revision of the noise report includes the new content and the format requested by the Sunnyvale Planning Division.

Overview of Project

The project site is located between Azure Street and Sunnyvale Saratoga Road in Sunnyvale. Originally, there were two houses on the lot, which have been removed. All surrounding areas are residential. The main source of noise is traffic on Sunnyvale Saratoga Road, which is adjacent to the site to the west. There is a sound wall between Sunnyvale Saratoga Road and the lot, and there is a wrought iron gate and another opening in the wall facing Sunnyvale Saratoga Road. The project plan is to construct four two-story houses, as shown in the Project Site Map on Page 3.

Noise Environment

The main contribution to the high noise levels at this site is the Sunnyvale-Saratoga Road traffic noise. To understand the existing noise levels on the project site, measurements of noise levels were made in the midday period of Friday April 11, 2025, at the middle opening in the masonry wall on the property line, adjacent to Sunnyvale-Saratoga Road, as shown on the Project Site Map. Traffic noise measurements were made with an ANSI specified Class I Norsonic 140 Precision Noise Meter and Analyzer, calibrated with a B & K Model 4230 Sound Level Calibrator.

Noise levels were measured for 15 minutes and are reported using percentile noise descriptors as follows: L_{90} (the background noise level exceeded 90 % of the time), L_{50} (the median noise level exceeded 50% of the time), L_{10} (high noise levels exceeded 10% of the time), L_1 (the peak level exceeded 1% of the time) and L_{eq} (the average energy-equivalent noise level for the measurement period). Measured noise levels are presented in the table on the following page. The Ldn noise level was computed as the long-term average of the L_{eq} using the daily traffic distribution on Sunnyvale Saratoga Road, with standard weighted penalties for the nighttime hours, and modeled with an enhanced version of the National Cooperative Highway Research Board traffic noise model.

TRAFFIC NOISE LEVELS (dBA)
Sunnyvale Saratoga Road north of Cumulus Drive

Location	L_{90}	L_{50}	L_{10}	L_1	Leq	L_{dn}
At property line	54.7	66.8	78.1	81.5	73.3	74

Noise levels in any location typically depend primarily upon nearby traffic volume, its average speed, and the distance to the nearest lane of the dominant traffic flow. With heavy traffic and moderate speeds in this location, noise levels are relatively high, with typical vehicle passby noise levels of 70 to 80 dBA at a distance of 20 feet. To significantly reduce these noise levels at the four project properties adjacent to this roadway, a substantial noise reduction must be provided. This should be achieved by supplementing the protection by the existing masonry wall, and adding a new wooden gate with excellent noise-reduction protection. This gate is described in detail in the Mitigation section of this document.
Based on information from the Sunnyvale Traffic Engineering Department concerning traffic volumes in recent years and expected increases in future years, traffic volumes will increase less than 3% per year, so even 10 years from now outside noise levels on the site will increase only 1-2 dBA due to traffic increases on Sunnyvale Saratoga Road. See the Mitigation section and the Conclusion section to see how traffic noise will be dealt with and achieve the required noise levels on site.

Applicable Noise Regulations

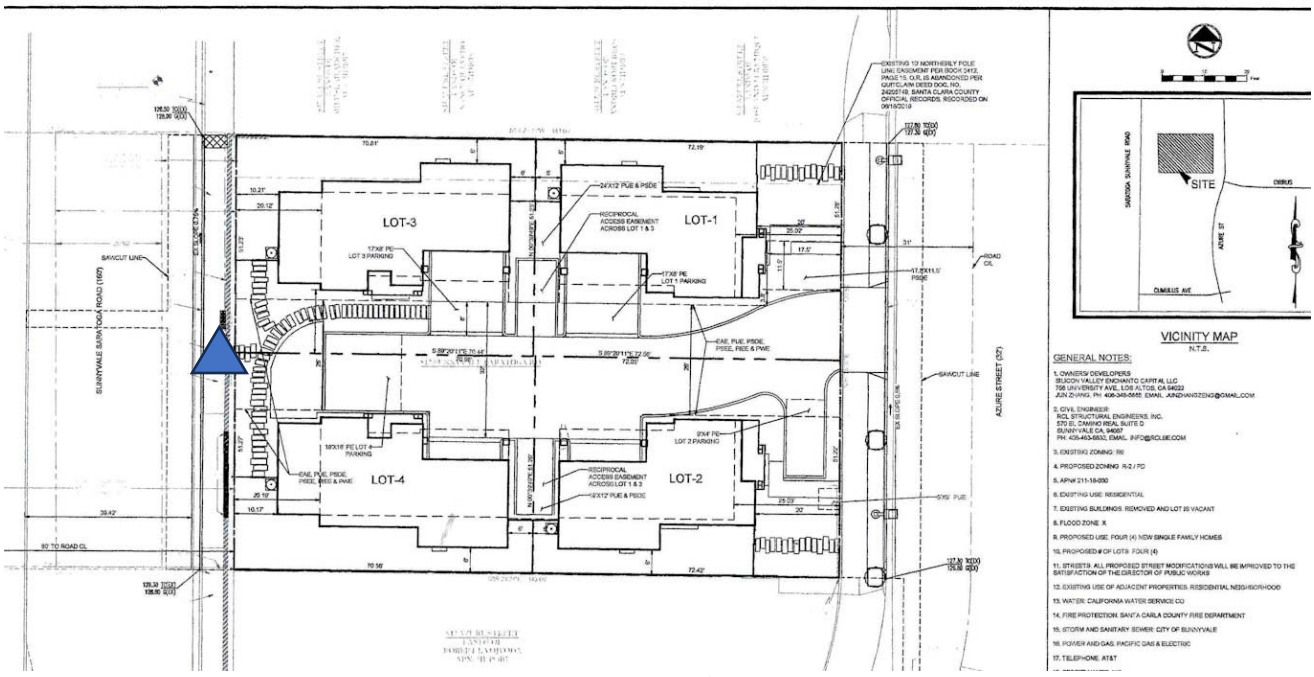
The City's noise regulations require a maximum of 60 dBA exterior and 45 dBA interior (day-night levels - Ldn) on residential properties. Because the height of the sound wall *will not* be raised to 12 feet, design alternatives are presented to achieve the required noise mitigation, as described in the Mitigation section. This noise analysis is guided by the following policy set forth in Chapter 6 of the City of Sunnyvale General Plan (2011), Policy SN-8.7: Supplement figure 6-5, "state of California noise guidelines for land use planning" for residential uses by achieving an outdoor Ldn of no greater than 60 dBA for common recreational areas, backyards, patios and medium and large-size balconies.

Design Details Related to Noise Protection

Based on the present drawing set and the latest mitigation recommendations, the following is a list of site and building design details:

- Sound wall modifications and a new gate will allow meeting Sunnyvale noise requirements.
- There are no residential doors facing Sunnyvale Saratoga Road.
- The height of the masonry wall is 10 ft. 4".
- There are no air duct openings on the west wall of the houses. In fact, if there is any air duct opening, it should face the east (that is, next to the garage door).
- The first and second floors are 10 ft and 20 ft from the sound wall, respectively.
- The bedrooms are on the second floor. One of the north and south walls also has 20% window area, while the other wall does not have any windows.
- The west walls do not have any windows.
- The bedrooms have thin carpet. All walls are one-layer painted gypsum boards, and the ceiling finish is also gypsum.

The existing sound wall of height 10 ft 4" breaks the line of sight to the ground level and provides sufficient insertion loss to achieve the exterior day night level of 60dB. Since there are no second-floor balconies in any units in the project, all required areas are protected to a 60 dBA Ldn level. See details on mitigation plans in the next section of this report.



Map of Azure Road Project Site Plan

Recommended Mitigation Measures

To achieve an interior day night noise level of 45dB, windows providing high acoustic insulation must be used. If it is necessary to include windows on the west wall of the homes, the windows would have to achieve a minimum OITC 36 rating, which can be quite costly. We recommend that the west wall (facing Sunnyvale Saratoga Rd) not have any windows. The minimum requirements can be reduced by locating windows on the North, South, or East walls of the buildings. Windows on the East wall will not require selection based on acoustical properties. For windows on the North and South walls, we recommend windows which provide an OITC 33 rating or better. The following windows achieve this rating:

MANUFACTURER	MODEL	COMPOSITION	RATING (STC / OITC)
MILGARD	QUIET LINE 7420 TL01-293	3/16”-1/8”-3/16”	43 / 33
MILGARD	QUIET LINE 7220 TL99-313	3/16”-1/8”-3/16”	45 / 33
MILGARD	QUIET LINE 7420 TL01-294	3/16”-1/8”-1/4”	43 / 34

The use of OITC 33 windows will satisfy the interior noise requirement (Ldn 45 dB). The windows may be operable. However, the interior noise requirement will not be met when they are open. As the windows are likely to be closed most of the time, it is recommended that a fresh air intake be included. From an acoustic perspective, this intake would ideally be located on the eastern side of the building, which is exposed to lower sound levels.

In addition to the window requirements, we recommend that all exterior walls have an STC 50 rating or better to achieve the interior noise requirement. This is commonly achieved with the use of resilient channels or staggered stud walls.

To significantly reduce traffic noise on site, the existing masonry wall should be modified, and a new wooden pedestrian gate should be installed, using the following steps:

1. Remove the existing ironwork, gates, and any other materials in the present masonry wall openings.
2. Fill in any openings other than the middle opening with solid masonry matching that existing.
3. In the middle opening fill in the masonry wall at both ends, leaving a 5-foot opening for the new wood gate where the pedestrian path into the site will be.
4. Install a new wood gate composed of two layers of 5/8" thick wood, with the layers offset so that the cracks between pieces on the layers do not line up. This wood material can be marine plywood (painted) or other weather-resistant and treated solid wood. The wood gate should be as tall as the existing masonry wall (10 feet 4 inches) for the best noise control. See Exhibits 1 and 2 on Pages 5 and 6 for details.
5. Install the wood gate using a heavy iron post, with hinges sturdy enough to support the gate, since the gate will weigh 3.5-4.0 lbs. per square foot.
6. Attach an angle iron vertically to the masonry wall on each side of the gate from top to bottom, covering the ends of the gate by 6" to reduce noise going between the gate and the masonry wall.
7. Install a Fire Department-approved lock that allows access by residents of the project.
8. Along the full width of the bottom of the gate attach two 4" wide strips of ¼" thick Mass Loaded Vinyl (MLV) that extends ¾" below the bottom of the wall, as shown in Exhibit 1. Attach the MLV with washers and wood screws at 6" spacing along the bottom of the gate. This will close the ½" opening between the bottom of the gate and the concrete surface.

Conclusion

The expected noise reduction provided by the changes to the masonry wall and the installation of a tall wood gate as described above, is 15 to 16 dBA. This means that the noise levels on all four properties on the project site are expected to be less than 60 dBA outside and 45 dBA inside (Ldn) when the units are constructed and at least 10 years in the future, meeting Sunnyvale noise requirements for residential properties.

If I may provide further information or clarifications of this letter, please let me know.

Regards,

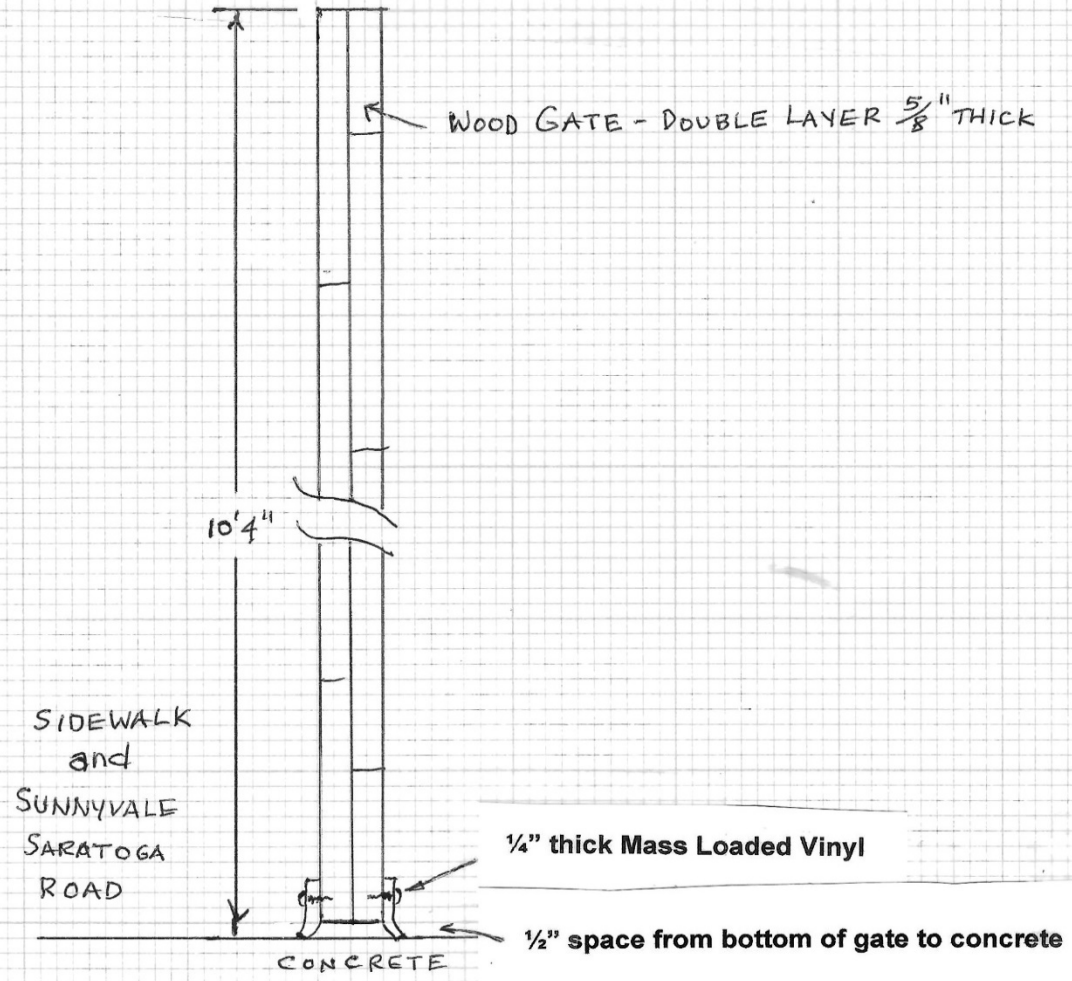
Stan Shelly

H. Stanton Shelly
Acoustical Consultant
Board Certified Member (1982)
Institute of Noise Control Engineering

Att: Statement of Qualifications

Exhibit 1

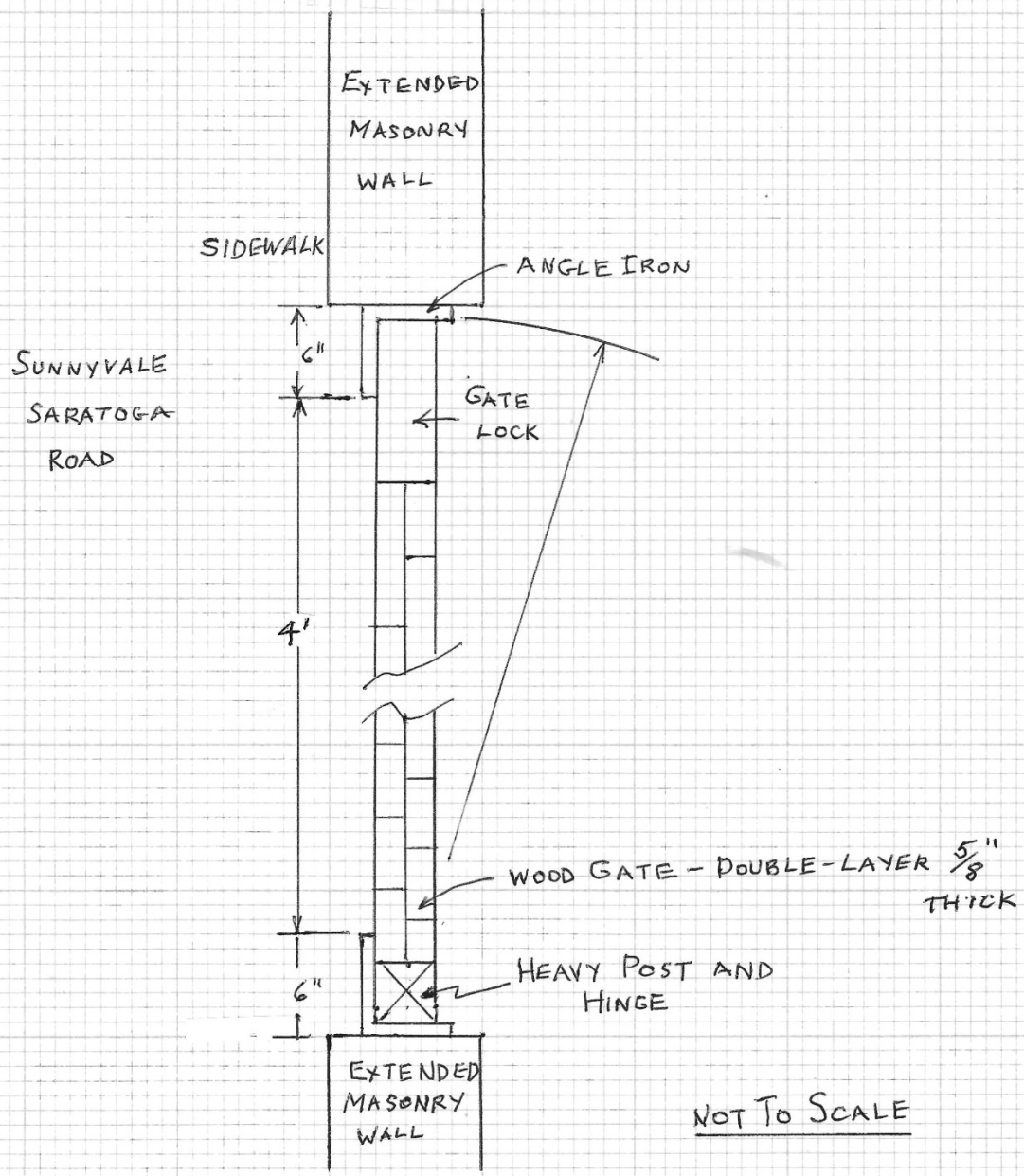
Pedestrian Access Gate Cross Section - Side View



NOT TO SCALE

Exhibit 2

Pedestrian Access Gate Cross Section - Top View



Statement of Qualifications

H. Stanton Shelly - Acoustical Consultant

Professional Interests and Capabilities

Architectural noise control, exterior and interior, including California Title 24 Noise Insulation Standards; machinery noise measurement, analysis, and control; traffic noise measurement and modeling; municipal noise ordinance development and enforcement; land use planning for noise compatibility, including environmental impact analysis and mitigation.

Relevant Experience

Developed and managed the municipal noise control program for the City of Palo Alto, including preparing a unique Noise Ordinance and a Noise Element for the Comprehensive Plan; as an independent consultant, prepared over three hundred noise impact assessment and mitigation studies for residential, commercial, industrial, and public facility projects. List of representative ECS noise studies available on request.

Education and Training

B.S.E. (Electrical Engineering) - University of Michigan

M.S. Civil Engineering (Environmental) - StanfordUniversity

Institute of Noise Control Engineering (INCE): Associate Member from INCE founding in 1972 to 1982; Board Certified Member since 1982.

Professional Employment

Principal Consultant, Environmental Consulting Services - 1977 to present.

Environmental Specialist, City of Palo Alto - 1971-1976

Systems Test Engineer, Eastman Kodak, Rochester, NY - 1967-1969

Electronic and Acoustical Test Engineer, General Dynamics/Astronautics, San Diego - 1963-1967

Mei Wu Acoustics

Experts in acoustics, noise and vibration

To:	**William Lei, Shine Capital Management LLC**	**william.lei@shinecap.com**
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From:	**William Rosentel, Mei Wu Acoustics**	**william.rosentel@mei-wu.com**
	Mei Wu, Mei Wu Acoustics	**meiwu@mei-wu.com**
CC:	**Zhuang Li, Mei Wu Acoustics**	**zhuang.li@mei-wu.com**

Date: **July 08, 2016**
Subject: **Residential Noise Study - 838 Azure St. & 842 Sunnyvale/Saratoga Rd. Sunnyvale, CA**
MWA Project – 16029 Revision 0001

Mei Wu Acoustics (MWA) reported noise mitigation recommendations, including sound wall design and window design in the previous report dated May 12, 2016. In this report, the noise mitigation recommendations, including sound wall design and window design, have been updated to reflect the requests of the City of Sunnyvale.

As summarized in the previous report, the City's noise regulations for the interior and exterior day-night levels are 45 dB and 60 dB, while the measured noise levels are both 17 dB higher than those allowed by the regulations. The main contribution to these high noise levels is the traffic noise. Because of the request that the height of the sound wall not be raised to 12ft as suggested in the previous report; we consider design alternatives to achieve the required noise mitigation.

Since the complete architectural drawings are not available yet, we have made the following assumptions in our calculations.

- The sound wall has a gate meeting the below requirements.
- There is no door facing Sunnyvale/Saratoga Rd.
- The height of the wall (both the first and second floor) is 10 ft.
- According to the 2013 California Building Code, we assume the brick wall thickness is 5 inches.
- There is no air duct opening on the west wall. In fact, if there is any air duct opening, it should face the east (e.g. next to the garage door).
- The first and second floors are 10 ft and 20 ft from the sound wall, respectively.
- We also assume the bedrooms are on the second floor. One of the north and south walls also has 20% window area, while the other wall does not have any windows.
- The west walls do not have any windows.
- The bedroom has thin carpet. All walls are one-layer painted gypsum boards, and the ceiling finish is also gypsum.

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Based on the analyses in the previous report, the main challenge is the second floor, since the sound wall is not tall enough to block line-of-sight to Sunnyvale/Saratoga Rd.

Our analysis was guided by the following policy set forth in Chapter 6 of the City of Sunnyvale General Plan (2011).

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 existing sound wall of height 8.5' breaks the line of sight to the ground level and provides sufficient insertion loss to achieve the exterior day night level of 60dB. However, the wall is not sufficient in height to achieve this noise mitigation at the second story of the new constructions. Per Policy SN-8.7, **there shall be no exposed recreational areas, backyards, patios, or balconies on the second story of the proposed constructions.**

In order to achieve the interior day night level of 45dB, windows providing high acoustic insulation must be used. If it is necessary to include windows on the west wall of the homes, the windows would have to achieve a minimum OITC 36 rating, which can be quite costly. **We recommend the west wall (facing Sunnyvale Saratoga Rd) not have any windows.** The minimum requirements can be reduced by locating windows on the North, South, or East walls of the buildings. Windows on the East wall will not require selection based on acoustical properties.

For windows on the North and South walls, we recommend windows which provide an OITC 33 rating or better. The following windows achieve this rating:

MANUFACTURER	MODEL	COMPOSITION	RATING (STC / OITC)
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The use of OITC 33 windows will satisfy the interior noise requirement (Ldn 45 dB). The windows may be operable; however the interior noise requirement will not be met when they are

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open. As the windows are likely to be closed most of the time, it is **recommended to include a fresh air intake**. From an acoustic perspective this intake would ideally be located **on the eastern side of the building,** which is subjected to lower sound levels.

Given that there will be a pedestrian gate located on the sound wall, it is important that it "not exist" acoustically. **The gate shall be constructed of any solid material with a density no less than 2 lb. per square foot. Materials meeting this requirement include ½-inch thick wood, ½-inch outdoor plywood, 16 gauge steel sheet, and any masonry units. All gaps on the barrier should be sealed.**

As a side note, if a new sound wall is to be constructed, it is in accordance that with Policy SN-8.9c that sound readings be taken post-construction to determine the efficacy of the new sound wall.

Policy SN-8.9: *Consider techniques which block the path of noise And insulate people from noise. (previously noise policy 3.6a.3)*

Policy SN-8.9c: *Proposed sound walls or other noise reduction barriers should be reviewed for design, location and material before installing the barrier.* ***Sound readings should be taken before and after installing the noise reduction barrier in order to determine the efficacy of the noise reduction barrier.*** *Measurement techniques shall be similar to procedures used by caltrans to measure efficiency of sound walls. (previously noise action statement 3.6a.3c)*

MWA would be happy to provide these post-construction measurements for an additional fee.

Additional to the window requirements, **we recommend that all exterior walls have an STC-50 rating or better** to achieve the interior noise requirement. This is commonly achieved with the use of resilient channels.

This report completes the noise study for the lot at 838 Azure St. & 842 Sunnyvale/Saratoga Rd. Sunnyvale, CA. Should you have any questions or concerns, please feel free to contact Mei Wu Acoustics.

* * *

Mei Wu Acoustics

Experts in acoustics, noise and vibration

To: **William Lei, Shine Capital Management LLC** **william.lei@shinecap.com**
Rodger Griffin, Paragon Design Group, Inc. **rgriffin@paragondgi.com**
From: **Zhuang Li, Mei Wu Acoustics** **zhuang.li@mei-wu.com**
Mei Wu, Mei Wu Acoustics **meiwu@mei-wu.com**
Date: **April 11, 2016**
Subject: **Residential Noise Study - 838 Azure St. & 842 Sunnyvale/Saratoga Rd. Sunnyvale, CA**
MWA Project – 16029

Mei Wu Acoustics (MWA) conducted 24-hour sound level measurements at the site to understand the existing ambient environmental sound levels. In this report, the noise standards by the City of Sunnyvale are presented first. The measurement results are analyzed and compared with the noise regulations. Mitigation recommendations will be presented in the next report for sound wall design and window design in order to comply with the Sunnyvale Municipal Code Requirements.

1. Project Overview

The site is at 838 Azure St. & 842 Sunnyvale/Saratoga Rd. Sunnyvale, CA. There are two existing houses in the lot. All surrounding areas are residential, and the main source of noise is Sunnyvale/Saratoga Rd. to the west of the site. There is a sound wall between Sunnyvale Saratoga Rd. and the lot, and there is a gate facing Sunnyvale Saratoga Rd. The project will demolish the two existing houses and build four two-story houses.

Figure 1 shows the proposed site plan. A sound wall will be about 9' from Sunnyvale/Saratoga Rd. The new sound wall will not have a gate. For the two west houses, the first floor is 10' from the sound wall, and the second floor is 20' from the sound wall, as shown in Figure 1. There will be windows on the walls facing Sunnyvale/Saratoga Rd.

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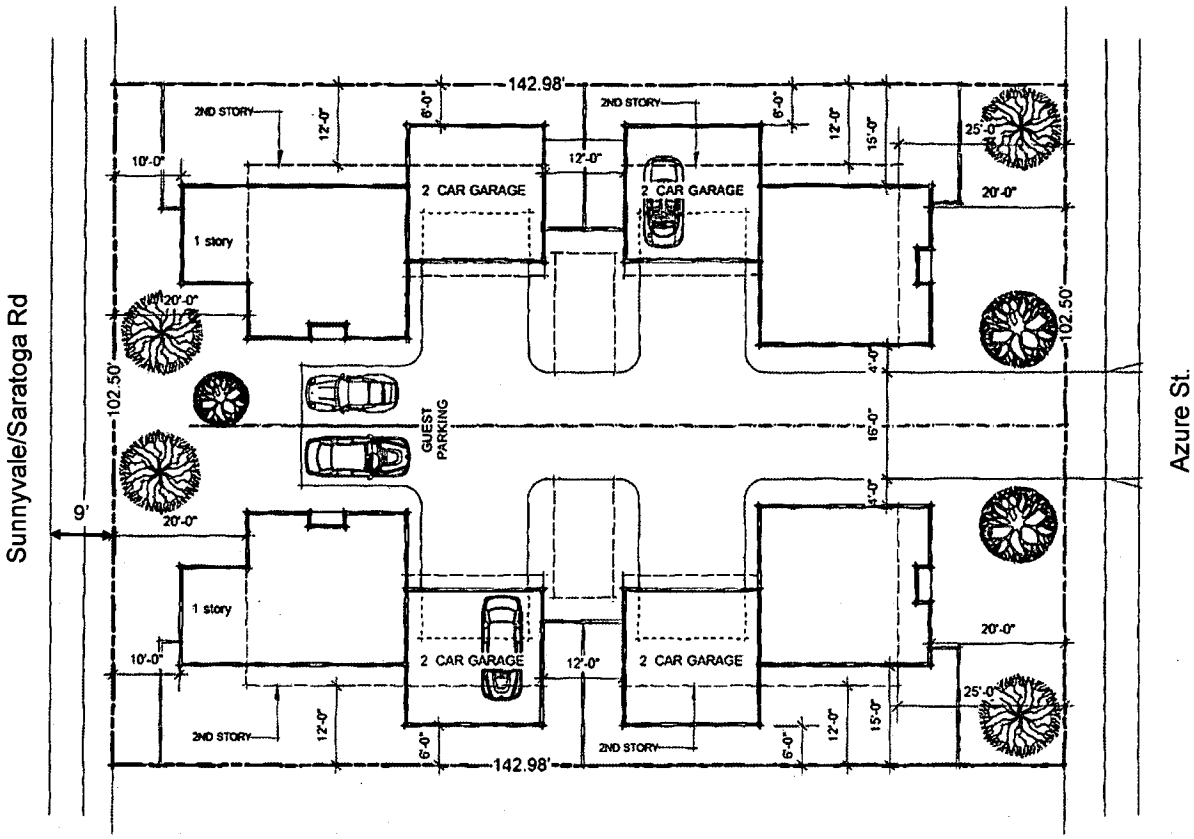

Figure 1. Proposed site plan

2. Noise Standards

This section documents the environmental noise criteria and code requirements applicable to the project site.

2.1. Sunnyvale General Plan – Chapter 6

The *Sunnyvale General Plan* of 2011 is available online at http://ecityhall.sunnyvale.ca.gov/cd/GeneralPlan.pdf

Chapter 6 of the *General Plan* requires that, for ambient or transportation related noise, an average day-night noise level (Ldn) should be used. The day night level, Ldn, is a 24-hour average sound pressure level with a 10 dB penalty applied for nine hours between 10:00 PM and 7:00 AM.

Chapter 6 of the *General Plan* regulates both the interior and exterior noise standard. "*Interior noise levels cannot exceed an Ldn of 45 dBA with doors and windows closed and a residential site with an exterior Ldn above 60 dBA needs a detailed noise study and mitigation plan. The study must show how the dwelling will meet an interior Ldn of 45 dBA. These requirements are enforced through development review and the building permit process.*"

For exterior noise standards, the *General Plan* cites the State of California's guidelines. Residential areas are considered "normally acceptable" if the Ldn is below 60 dBA, while Ldn between 60 and 75 dBA is considered "conditionally acceptable", and above 75 dBA is "unacceptable". The *General Plan* also shows noise contours for the city. The project site is in the <60 dBA Ldn area (Figure 6-4 of General Plan, Figure 2 below in this report with the red star for the site).

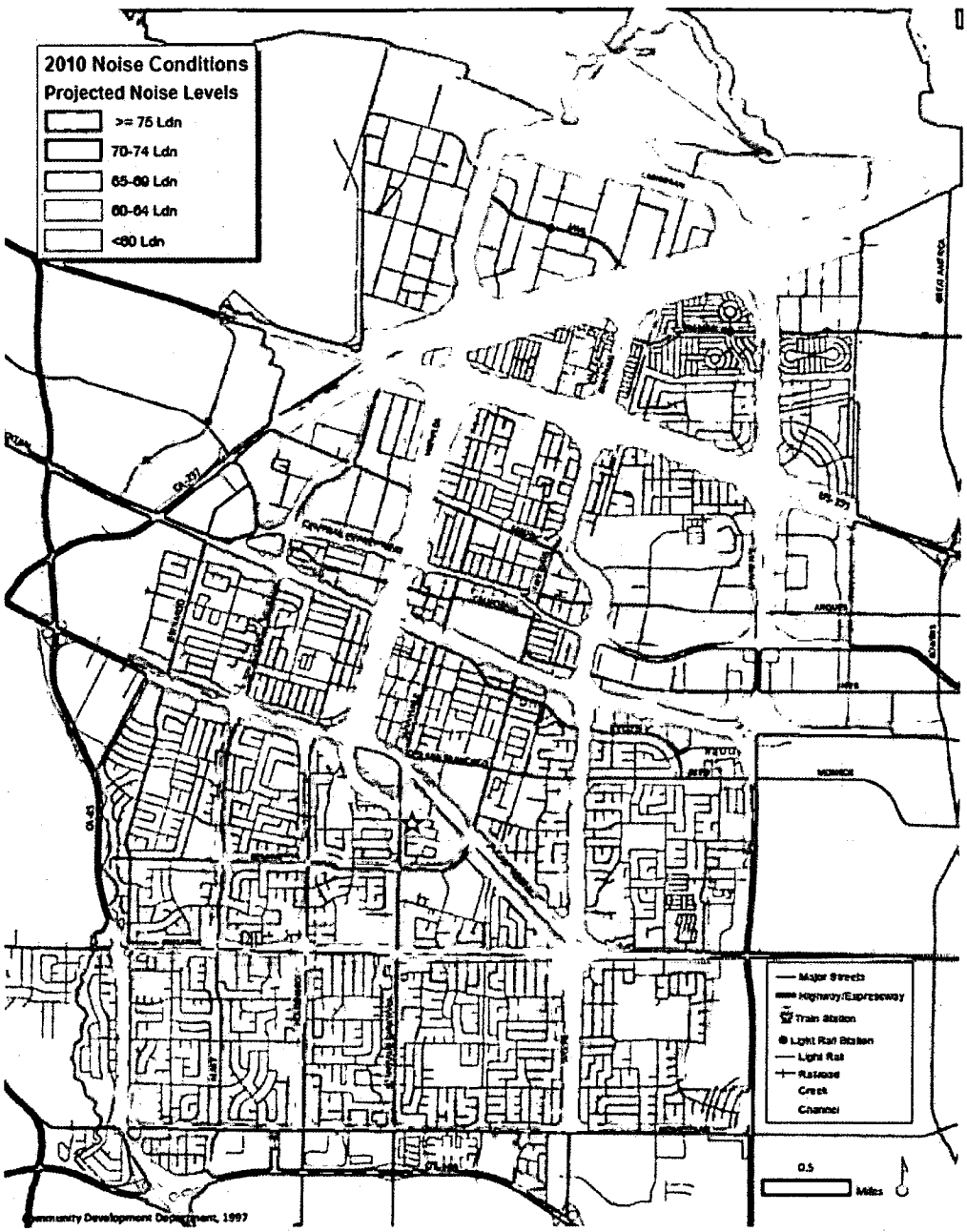

Figure 2. Noise Conditions Map of Sunnyvale City. The site is marked as a red star.

2.2. Sunnyvale Municipal Code

The Sunnyvale Municipal Code is available online at http://qcode.us/codes/sunnyvale/

The following paragraphs from the City Municipal Code may be applicable to the construction phase of the project.

19.42.030. Noise or sound level.

(a) Operational noise shall not exceed seventy-five dBA at any point on the property line of the premises upon which the noise or sound is generated or produced; provided, however, that the noise or sound level shall not exceed fifty dBA during nighttime or sixty dBA during daytime hours at any point on adjacent residentially zoned property. If the noise occurs during nighttime hours and the enforcing officer has determined that the noise involves a steady, audible tone such as a whine, screech or hum, or is a staccato or intermittent noise (e.g., hammering) or includes music or speech, the allowable noise or sound level shall not exceed forty-five dBA.

(b) Powered equipment used on a temporary, occasional or infrequent basis which produces a noise greater than the applicable operational noise limit set forth in subsection (a) shall be used only during daytime hours when used adjacent to a property with a residential zoning district. Powered equipment used on other than a temporary, occasional or infrequent basis shall comply with the operational noise requirements. For the purpose of this section, powered equipment does not include leaf blowers. Construction activity regulated by Title 16 of this code shall not be governed by this section.

3. Environmental Ambient Sound Level Measurements

3.1. Site visit details

MWA personnel:	Joshua Marcley
Date and time:	March 30, 2016 10:30 AM – March 31, 2016 11: 51 AM
Equipment used:	Cesva SC160, Type II sound level meters

3.2. Measurement procedure

Two sound level meters were installed to measure the interior and exterior noise levels, respectively. One was in the house, next to the window facing Sunnyvale/Saratoga Rd. The house was empty and the AC was off. The other sound level meter was on the roof, about 15 ft above ground to simulate the future second floor. The two measurement locations are marked in orange (indoor) and yellow (roof) in Figure 3. The measurement setups are also shown in Figure 4 and Figure 5. The measurement at each location lasted more than 24 hours from 10:33 AM of March 30 to 11:15 AM of March 31, 2016.

After the 24-hour interior and exterior noise measurements, the traffic noise spectrum was also measured by locating the sound level meter in front of the gate, facing Sunnyvale/Saratoga Rd. The measurement location is marked in red in Figure 3. The setup is also shown in Figure 6. The measurements were from 11:32 AM to 11:51 AM, about 20 minutes.

Figure 3. Test locations: Orange = indoor, Yellow = roof, Red = traffic noise

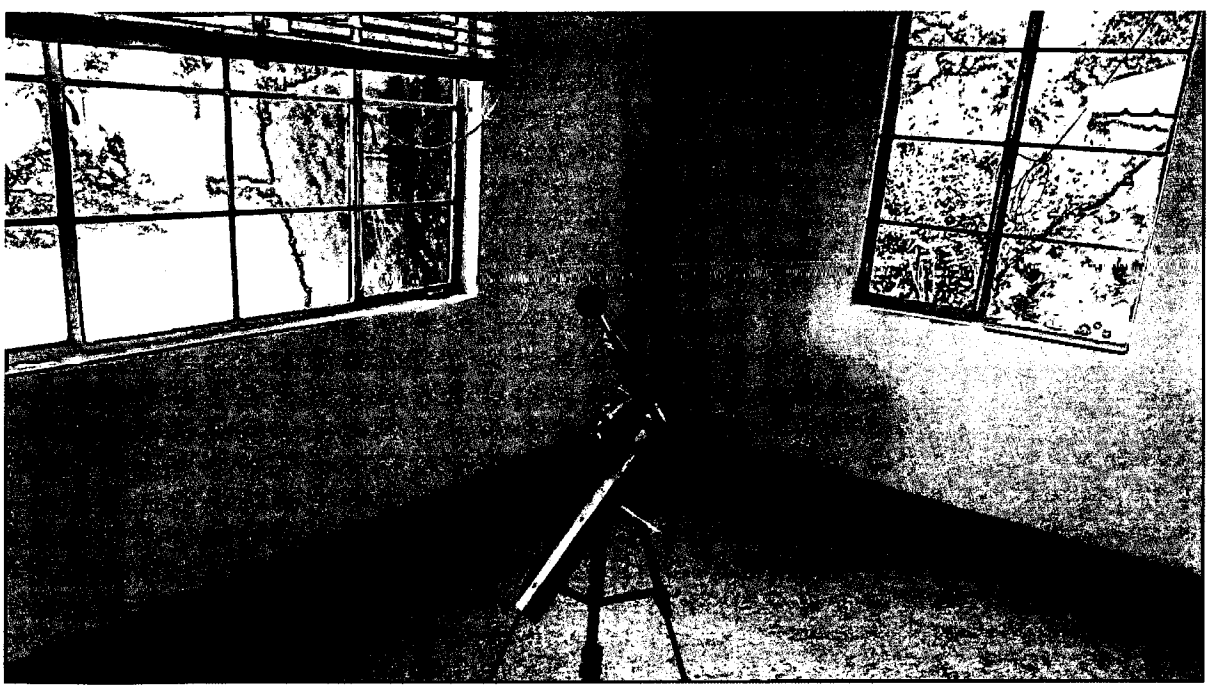

Figure 4. Indoor noise measurement setup.

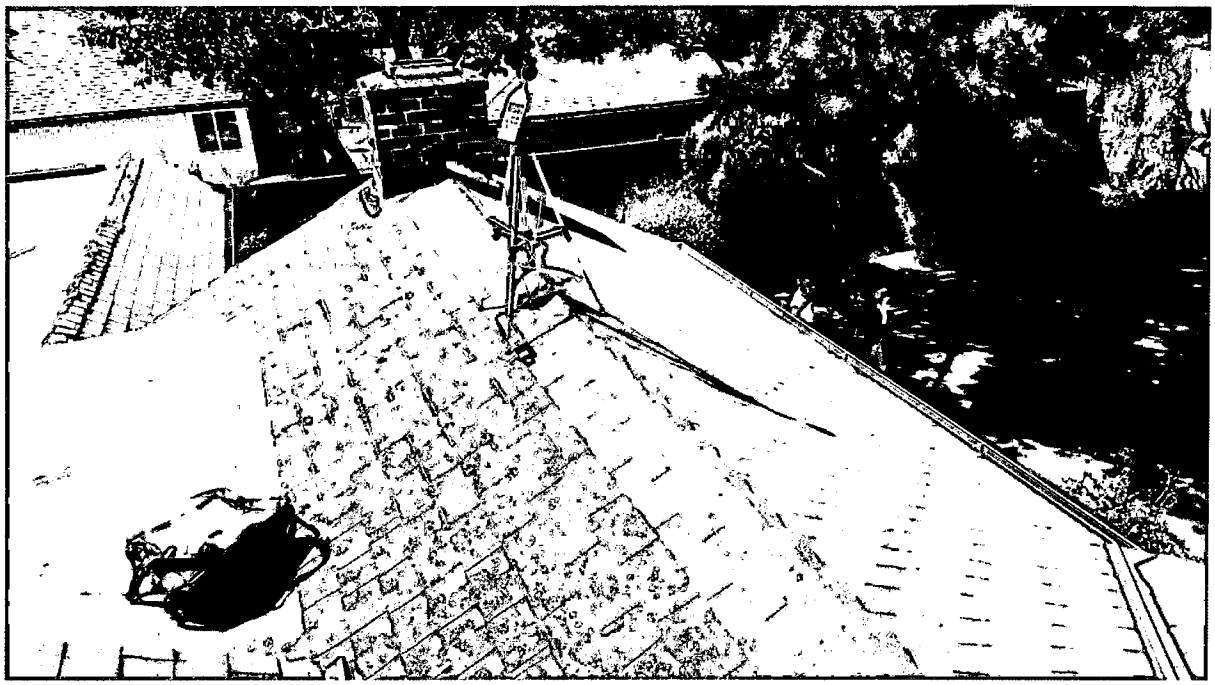

Figure 5. Roof noise measurement setup.

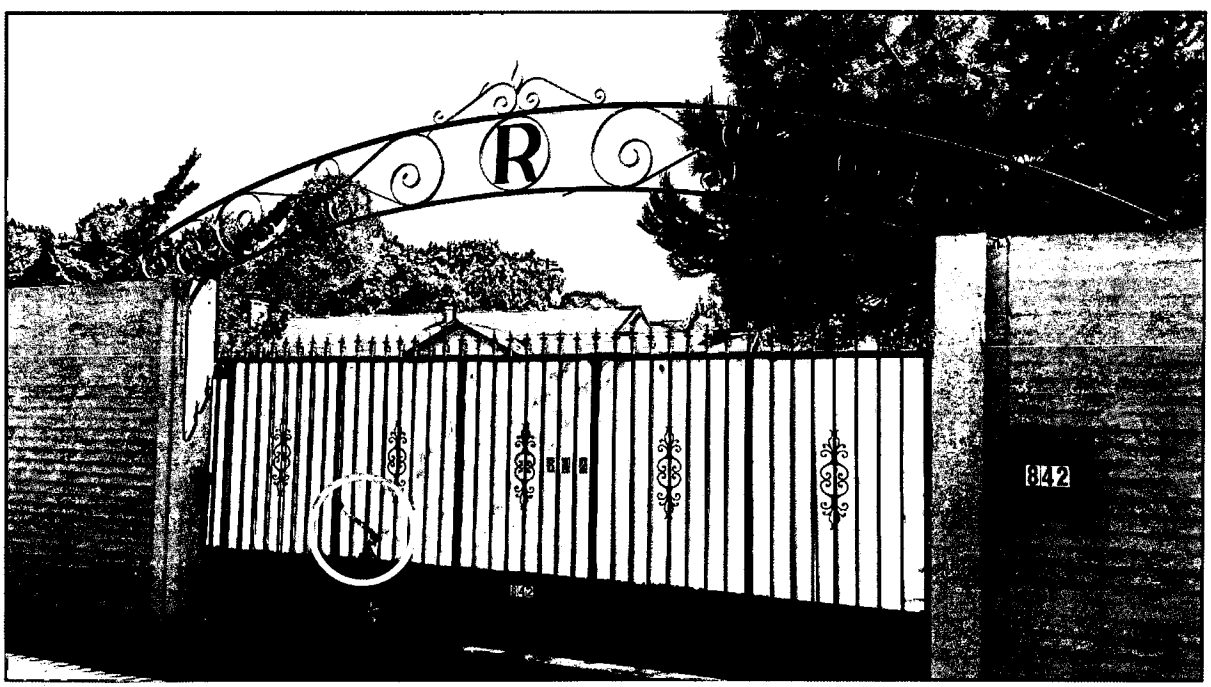

Figure 6. Traffic noise measurement setup.

3.3. Measurement Results

Table 1 below lists the measured hourly average sound pressure levels. All measurements indicated are given in dBA (A-weighted). For the indoor measurements, the quietest measured hourly average level was 51.2 dBA, measured from 3-4 AM. For

the roof measurements, the quietest measured hourly average level was 57.7 dBA, also from 3-4AM. The calculated day-night levels (Ldn) are **62.4 dBA** and **77.8 dBA**. Please notice the measured interior noise level is only for reference since the walls and windows would be different in the new constructions.

From the measurements it can be concluded that both the interior and exterior noise levels are quite high. The interior noise level Ldn, 62.4 dBA, is 17.4 dBA higher than the Sunnyvale City's regulation; while the exterior noise level Ldn, 77.8 dBA, is 17.8 dBA higher than the Sunnyvale City's regulation.

Table 1. Hourly average sound level measurement.

Time	**Indoor (dBA)**	**Roof (dBA)**
11:00 AM ~ 12:00 PM	59.5	71.7
12:00 PM ~ 1:00 PM	59.9	77.6
1:00 PM ~ 2:00 PM	60.4	80.2
2:00 PM ~ 3:00 PM	61.1	82.0
3:00 PM ~ 4:00 PM	61.2	83.7
4:00 PM ~ 5:00 PM	61.2	83.7
5:00 PM ~ 6:00 PM	60.5	82.4
6:00 PM ~ 7:00 PM	60.2	80.7
7:00 PM ~ 8:00 PM	59.4	78.5
8:00 PM ~ 9:00 PM	57.5	72.8
9:00 PM ~ 10:00 PM	57.7	69.3
10:00 PM ~ 11:00 PM	55.4	67.6
11:00 PM ~ 12:00 AM	54.6	63.2
12:00 AM ~ 1:00 AM	53.2	60.5
1:00 AM ~ 2:00 AM	53.9	60.7
2:00 AM ~ 3:00 AM	51.9	58.6
3:00 AM ~ 4:00 AM	51.2	57.7
4:00 AM ~ 5:00 AM	53.4	59.8
5:00 AM ~ 6:00 AM	56.0	64.1
6:00 AM ~ 7:00 AM	57.4	66.4
7:00 AM ~ 8:00 AM	60.5	70.9
8:00 AM ~ 9:00 AM	60.7	71.1
9:00 AM ~ 10:00 AM	61.2	70.6
10:00 AM ~ 11:00 AM	61.1	70.9
L_{DN}	**62.4**	**77.8**

Next, we need to correlate these high noise levels with the traffic noise and determine if the traffic noise is the main noise source. As mentioned above, the traffic noise was also measured off the road for about 20 minutes from 11:32 AM to 11:51 AM. The equivalent noise level is **76.1 dBA**. Compared this traffic noise level with the roof measurement of 11 AM – 12 PM, 71.7 dBA (highlighted in Table 1 above), the noise

reduction is roughly 5 dB from road to roof. Our calculation shows that the distance reduction from road to roof is also 5 dB, which agrees with the the measured data quite well. In addition, the AC was off in the house during the measurement period of time. Therefore, we can conclude that the main contribution to the high noise levels, both interior and exterior, are the traffic noise.

Figure 7 also illustrates the spectrum of the traffic noise recorded for the 20 minutes period. The spectrum is plotted over one-third octave bands. Please notice the horizontal axis is in log scale. It can be seen that the noise is mainly at frequencies lower than 3 kHz. This result is typical.

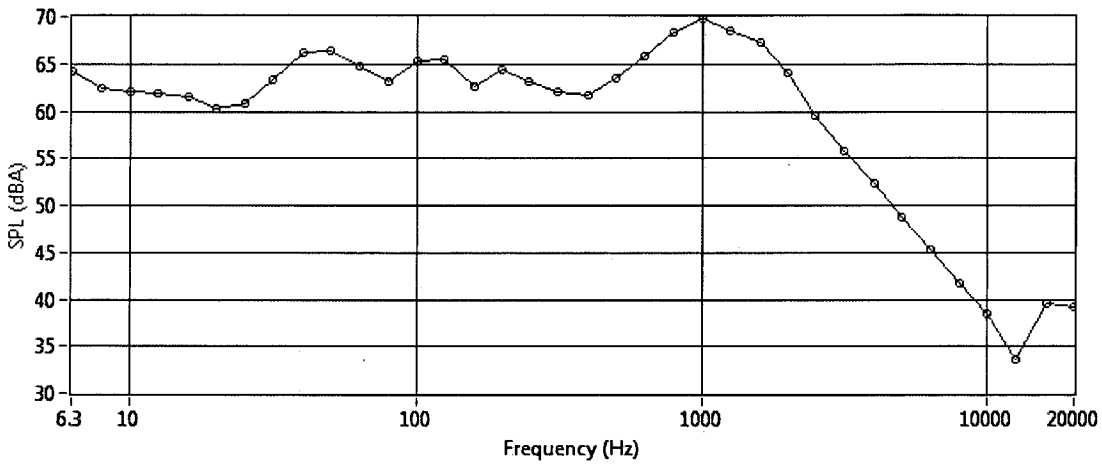

Figure 7. Traffic noise spectrum

4. Summary & Conclusions

From the measurement data and analyses, we can draw the following conclusions.

- Both the interior and exterior noise levels are 17 dB higher than the City's noise regulations.
- The main contribution to these high noise levels is traffic noise.
- In order to satisfy the noise standards (interior Ldn 45 dBA, and exterior Ldn 60 dBA), the sound wall requires a re-design. Also, the windows need careful design to achieve high outdoor-indoor transmission loss.
- The mitigation recommendations will be presented in the next report.

This concludes the measurements of the residential noise study for the lot at 838 Azure St. & 842 Sunnyvale/Saratoga Rd. Sunnyvale, CA. Should you have any questions or concerns, please feel free to contact Mei Wu Acoustics.

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