Veneklasen Associates
Consultants in Acoustics | Noise | Vibration | AV | IT

June 10, 2020

Gwin Property Inc.
2479 E. Bayshore Road, Suite 135
Palo Alto, CA 94030

Attention: Jin Pi | CEO

Subject: **Car Dealership; Palo Alto, California**
Acoustic Review
Veneklasen Project No. 7644-001

Dear Jin:

Veneklasen has reviewed the Mercedes Benz/Audi Car Dealership project noise study report dated May 20, 2019 and other project information at your request. This letter summarizes our comments.

EXECUTIVE SUMMARY

The May 2019 noise study contains multiple errors that falsely predict the car wash dryers' noise to meet Palo Alto Municipal Code 9.10. Technical corrections to this report show that the project's car wash is calculated to be more than twice as loud as noise levels allowed by Code. Furthermore, the May 2019 noise study fails to address all major noise sources from the car dealership and does not evaluate noise exposure to a nearby school.

1.0 INTRODUCTION

This proposed project includes an expanded car dealership, car wash along the property line including 45-hp blower dryer fans, indoor parking area including car stacking systems, associated outdoor mechanical equipment, and automobile service areas.

The project's car wash is immediately adjacent an office complex's outdoor seating area, and near an office building with teleconference rooms' and private offices' glazing facing the car wash.

Veneklasen has focused only on the major elements of this project that concern Gwin Property.

2.0 PROJECT REQUIREMENTS

Palo Alto Municipal Code 9.10.020 gives the following definitions:

> *(c) "Noise level" means the maximum continuous sound level or repetitive peak sound level, produced by a source or group of sources as measured with a precision sound level meter. In order to measure a noise level, the controls of the precision sound level meter should be arranged to the setting appropriate to the type of noise being measured.*
>
> *(d) "Local ambient" means the lowest sound level repeating itself during a six-minute period as measured with a precision sound level meter, using slow response and "A" weighting. The minimum sound level shall be determined with the noise source at issue silent, and in the same location as the measurement of the noise level of the source or sources at issue. However, for purposes of this chapter, in no case shall the local ambient be considered or determined to be less than: (1) Thirty dBA for interior noise in Section 9.10.030 (b); (2) Forty dBA in all other sections. If a significant portion of the local ambient is produced by one or more individual identifiable sources which would otherwise be operating continuously during the six-minute measurement period and contributing significantly to the ambient sound level, determination of the local ambient shall be accomplished with these separate identifiable noise sources silent.*

(f) "Property plane" means a vertical plane including the property line which determines the property boundaries in space.

Veneklasen interprets "local ambient" to approximate the L_{90} when measured over an interval of one hour. L_{90} is the sound level exceeded 90% of the time (six minutes of an hour would be quieter than this sound level). L_{90} is generally considered to represent the background or ambient sound level of an environment.

The Code also states allowable noise levels at neighboring properties:

9.10.040 Commercial and industrial property noise limits.
No person shall produce, suffer or allow to be produced by any machine or device, or any combination of same, on commercial or industrial property, a noise level more than eight dB above the local ambient at any point outside of the property plane.

3.0 PALO ALTO DETERMINATION OF LOCAL AMBIENT

Veneklasen understands that for this project, the City of Palo Alto may have determined "local ambient" by using noise contours of Figure N-5 of the 2030 General Plan's Noise Element (based on the email sent Friday, May 29, 2020). The sound levels given in Figure N-5 are daily average sound levels measured from a specific noise source (in this case US-101) at calculated distances. Simply translating these sound levels as "local ambient" is incorrect for the following reasons:

- Palo Alto's definition of "local ambient" is not the average and is significantly quieter than the average.
- The 24-hour average sound levels reported in Figure N-5 are CNEL. This metric penalizes nighttime hours by 10 decibels; this weights nighttime noise as twice as loud as daytime noise. As a result, normal traffic patterns typically have the loudest hour's average approximately equal to the CNEL value. In other words, CNEL value is approximately equal to the average of the loudest hour of the day.
- The noise contours simplify noise exposure without regard for shielding effects from terrain or buildings. These effects can easily account for sound levels being quieter by 15 decibels or more. For this case, shielding effects from overpasses and buildings including Stanford Health Care at 2452 Watson Ct, 2370 Watson Ct, and 2479 E Bayshore Rd affect the noise levels from US-101 at the project location.

In summary, the noise contours of Figure N-5 should *never* be interpreted as equal to "local ambient" as defined by the Palo Alto Municipal Code. For the case of this project, using this method would result in a local ambient *more than twice as loud* as measured data as presented in Section 4.3 of this report.

4.0 REVIEW OF INFORMATION PRESENTED

The May 2019 report (https://www.cityofpaloalto.org/civicax/filebank/blobdload.aspx?t=57654.04&BlobID=72230) contains multiple technical errors that change the predicted noise levels from violating Code to meeting Code.

4.1 Distance to Nearest Property Plane

Page 14 of the noise study gives predicted noise levels from the car wash dryers at the corners of the project site. The report does not give predicted noise levels at the nearest point from the car wash.

Using the data presented in the report and information provided about a proposed wall at the car wash exit, the nearest point on the neighboring property would be 17 feet away. With simple distance attenuation calculated using the correct distance, the difference between noise levels reported at approximately 62 feet away at the corner of the project site and 17 feet away at the nearest point on the neighboring property with the proposed wall is 11 decibels louder.

This error alone changes the car wash dryers' noise from meeting Code to violating Code.

4.2 Calculation of Dryer Noise through Closed Door

Pages 9 and 10 of the report assume a door construction and page 14 Table 6 gives a loss of 29 decibels to the car wash exit roll-up garage door. This assumption and this calculation are not for a closed door, but for a steel sheet without moving parts or gaps to allow movement. This style of roll-up door moves by rolling tracks. The top of the door and the rolling tracks have gaps between the door surfaces and the building. These air leaks allow sound to pass through freely. Assuming typical gaps at roll-up garage doors account for 0.5% to 2% of the garage door area, the sound leaks around the sides and top of door would be 8 to 13 decibels[1] louder than reported. Furthermore, the report does not specify sound isolation requirements for the car wash doors.

This error alone changes the car wash dryers' noise from meeting Code to violating Code.

4.3 Incorrect Determination of Local Ambient

The noise study defined local ambient per the Palo Alto Municipal Code but used data that was very different from this definition. An average sound level for a single 15-minute measurement was reported as ambient. This inflates the local ambient level significantly.

Veneklasen measured sound levels from 8 am to 5 pm Thursday June 4, 2020 to establish local ambient. Hourly local ambient levels ranged from 48 dBA at 11 am to 52 dBA during afternoon hours. This measurement data is given in the appendix, along with comparison to the May 2019 noise study data (average to average) showing that noise levels are similar, but the incorrect metric was reported. As stated in section 2 of this report, the L_{90} should be used as local ambient, not the average sound level.

With the local ambient measured to be 48 dBA, the allowed noise limit at the property plane is 56 dBA. This correction reduces the Code limit 5 dBA quieter than the Code limit established in the May 2019 noise study.

5.0 REVIEW OF INFORMATION ABSENT

The following summarizes Veneklasen's review of major points not mentioned in the May 2019 noise study.

5.1 Service Bays

The report fails to address noise from automobile service areas. This includes noise from pneumatic tools, impact wrenches, hydraulic lifts and car stackers. While these areas are indoors, large bay doors will remain open, allowing noise to travel uninterrupted to outdoor areas.

The report should include descriptions of the dealership service areas, types of equipment used with measured noise levels, openings in the building at these areas and their relationship to the property plane. Resulting noise levels at the property plane should be calculated.

5.2 Car Wash Audio Alarms and Buzzers

The report fails to mention if the car wash has alarms or buzzers. Typical car washes may have buzzers to guide drivers through the car wash.

Audible alarms must be clearly louder than all other equipment to be even heard, including the dryers. Because this would be the loudest noise in the car wash, these types of signals would violate the Municipal Code, and therefore should not be used. The report should explicitly prohibit the use of audio alarms and buzzers in the car wash.

[1] Mehta, Johnson, Rocafort, *Architectural Acoustics Principles and Design*, (Prentice-Hall, 1999), p. 103.

5.3 School Noise Exposure

There is a school (Bay Area Christian Church) located 380 feet from the project location. Noise analysis to this sensitive location was not mentioned in the noise study. The study provides analysis with the car wash doors open; this condition would violate the Municipal Code at the school location assuming the local ambient is approximately similar at the school location.

The report should include analysis of the car wash dryers to the school property line, including establishing local ambient at the location on the school property line nearest the car wash dryers.

6.0 CONCLUSION

1. The project's car wash dryers are calculated to violate the Palo Alto Municipal Code, as shown by information presented in the May 2019 noise study but applied with correct analysis. Multiple errors in the noise study individually account for a violation of Municipal Code; the sum of these errors is approximately four times louder than what was reported, and more than twice as loud as allowed by Municipal Code. Calculated noise levels from the car wash dryers range as high as 74 dBA at the nearest point on the neighboring property. As shown in Appendix B, this noise level is significantly louder than conversation level.
2. The noise study fails to address other major car dealership noise sources and analysis of car wash noise to a nearby school. These should be included in the noise study and reviewed by Palo Alto Planning as part of the approval process.

Please call with any questions.

Sincerely,
Veneklasen Associates, Inc.

Ryan Schofield
Senior Associate

Appendix A – Sound Level Measurements of Local Ambient

The following sound levels in Table 1 were measured Thursday June 4, 2020. These were measured near location M1 as described in the May 20, 2019 noise study.

Table 1 – Local Ambient Measured

Time	L_{90} (dBA)
8:10 – 9:00 am	50
9:00 am – 10:00 am	50
10:00 am – 11:00 am	49
11:00 am – 12:00 pm	48
12:00 pm – 1:00 pm	49
1:00 pm – 2:00 pm	51
2:00 pm – 3:00 pm	52
3:00 pm – 4:00 pm	52
4:00 pm – 5:00 pm	52

Table 1 shows that the hourly ambient sound levels are as low as 48 dBA during weekday daytime hours.

Measured average sound levels from Thursday June 4 is included in Table 2 in comparison with data published May 2019 measured by Helix (location M1) on Tuesday April 30, 2019.

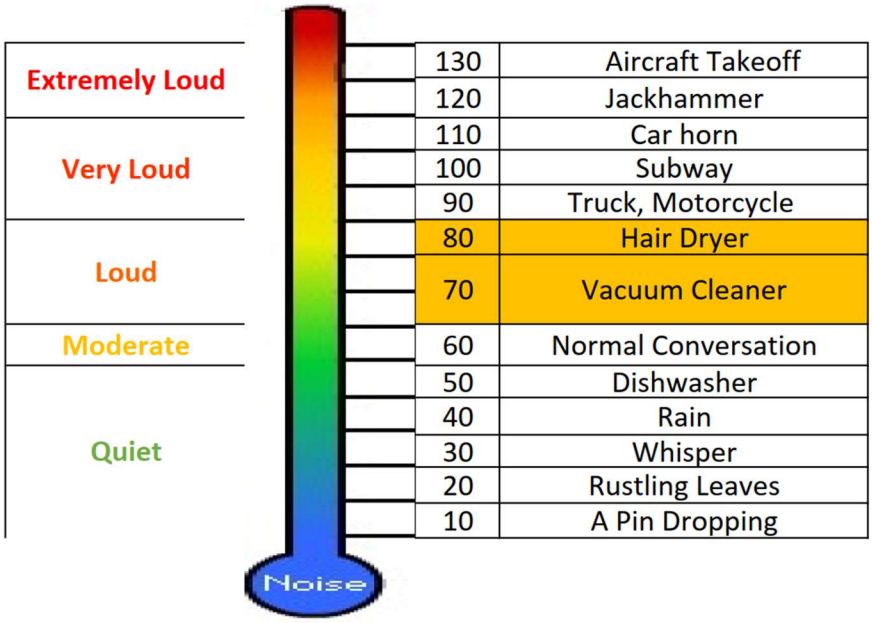
Table 2 – Comparison of average sound levels to previously published data by others

Time	6/4/2020 L_{eq} (dBA)	4/30/2019 L_{eq} (dBA)
8:10 – 9:00 am	66	
9:00 am – 10:00 am	64	
10:00 am – 11:00 am	63	
11:00 am – 12:00 pm	56	
12:00 pm – 1:00 pm	52	
1:00 pm – 2:00 pm	54	53
2:00 pm – 3:00 pm	56	
3:00 pm – 4:00 pm	54	
4:00 pm – 5:00 pm	55	

Table 2 shows that the average sound levels measured Thursday June 4, 2020 are similar to or louder than the previously measured average sound levels on Tuesday April 30, 2019.

Appendix B – Sound Levels on the Decibel Scale

Decibel Comparison Chart



Extremely Loud	130	Aircraft Takeoff
	120	Jackhammer
Very Loud	110	Car horn
	100	Subway
	90	Truck, Motorcycle
Loud	80	Hair Dryer
	70	Vacuum Cleaner
Moderate	60	Normal Conversation
Quiet	50	Dishwasher
	40	Rain
	30	Whisper
	20	Rustling Leaves
	10	A Pin Dropping