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

November 25, 2020

Golcheh Group
1180 Beverly Drive, Suite 300
Los Angeles, California 90035

Attention: **Ilan Golcheh | President**

Subject: **East Ball Road Gas & Car Wash; Anaheim, California**
Property Line Noise Study
VA Project No. 7431-001

Dear Ilan:

Veneklasen Associates, Inc. (Veneklasen) was contracted to perform an acoustical study to evaluate the proposed East Ball Road Gas & Car Wash project in Anaheim, California. This study includes an assessment of the existing and future sound levels as caused by traffic, car wash activity, and any mechanical equipment for the convenience store compared to the City of Anaheim Municipal Code. This report documents our findings. A list of acoustical terms and their definitions is presented in Appendix A.

1.0 INTRODUCTION

The following report contains the results of an acoustical study conducted for the East Ball Road Gas & Car Wash in Anaheim, California. The project consists of a future convenience store and car wash which includes mechanical equipment for the convenience store and washing machines, blowers and sprayers for the car wash tunnel. An exterior area with a vacuum system is also included with a canopy structure. The hours of operation are understood to be Monday through Sunday, 7:00am to 9:00pm for the car wash portion, which generates the most amount of noise at the site.

2.0 NOISE CRITERIA

The City of Anaheim Municipal Code establishes a noise ordinance in Chapter 6.70. This ordinance regulates various types of noise sources and establishes sound level limits for those sources. Section 6.70.010 states the following:

"No person shall within the City create any sound radiated for extended periods from any premises which produces a sound pressure level at any point on the property line in excess of sixty [60] decibels…read on the A-scale of a sound level meter. Readings shall be taken in accordance with the instrument manufacturer's instructions, using the slowest meter response."

Section 6.70.010 also states the following:

"At any point, the measured level shall be the average of three (3) readings taken at two (2) minute intervals. To have valid readings, the levels must be five (5) decibels or more above the levels prevailing at the same point when the source(s) of the alleged objectionable sound are not operating."

Veneklasen has interpreted this language to indicate that if the existing ambient noise level matches or exceeds the 60 dBA limit established by the ordinance, then the new maximum allowable exterior standard would become 5 dBA above the existing ambient noise level. Veneklasen will utilize this interpretation to assess compliance of the future project with the noise ordinance as established by the City of Anaheim Municipal Code.

3.0 EXISTING TRAFFIC AND EQUIPMENT SOUND MEASUREMENTS

Sound measurements were conducted at the proposed project site to capture existing ambient noise levels on July 15, 2019. Shown in Table 1 and Figure 1 below. These acoustical measurements were conducted with Brüel & Kjær Type 2270 sound level meters, which conform to ANSI S.14-1961 for Type 1 precision sound level meters and were conducted using Brüel & Kjær Type 4189 microphones.

Figure 1 – Project Site Location

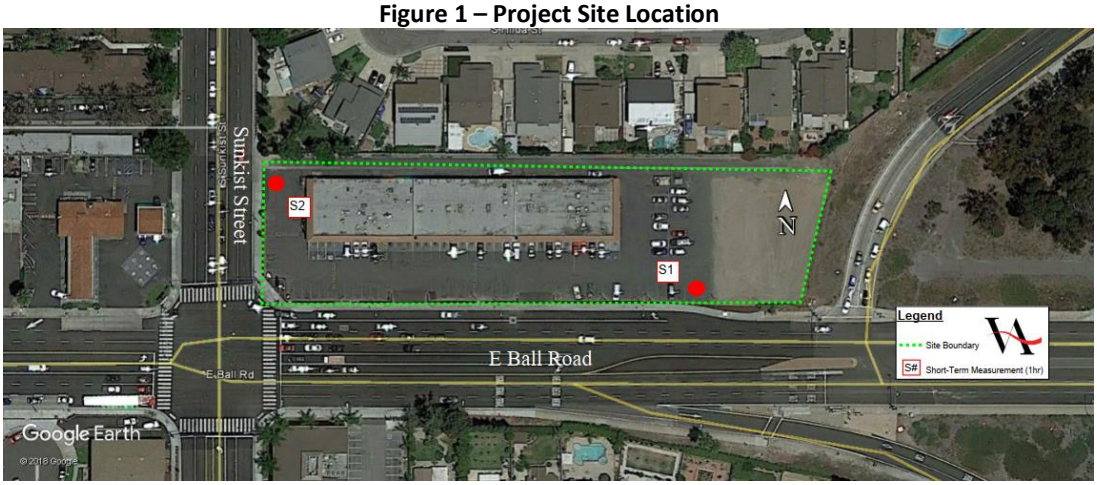


Table 1 – Existing Ambient Noise Measurements

Location	Time	Daytime Hour L_{eq} (dBA)
S1	1:00 PM	70
S2		68

Veneklasen does not anticipate a significant variation in the overall level during the evening hours due to the project site's proximity to Highway 57 and the significant traffic volume along Ball Road. Based on previous measurements completed by Veneklasen, statistical analysis, and traffic patterns, we expect the noise levels to be similar throughout daytime and evening hours. This is primarily due to an increase in free-flowing traffic along Highway 57 during the evening hours, which results in higher noise levels as caused by tire noise.

In addition, Veneklasen utilized sound measurements conducted for a previous project at an existing Rapid Express Car Wash at 2045 North Tustin Street in Orange, California on July 30, 2019. Measurements were performed on the blowers, water sprayers, rotating brushes and central vacuum. The sound levels for each source were measured independently to determine the levels of each piece of equipment that could be used to incorporate into the computer model.

All of the acoustical measurements of the equipment were conducted with an NTi XL2 sound level meter, which conforms to ANSI S.14-1961 for Type 1 precision sound level meters. All measurement equipment was field-calibrated before use. A summary of measured noise levels from the car wash mechanical equipment is shown in Table 2.

Table 2 – Car Wash Equipment Noise Measurement Results

Equipment	Distance, ft	L_{eq} (dBA)
Blowers	5	101
Water Sprayers	5	85
Rotating Brushes	5	89
Central Vacuum	3	80

4.0 NOISE MODELING, ANALYSIS, AND RESULTS

From the measurement data and provided specifications, Veneklasen has utilized the *Brüel & Kjær* Predictor computer software program in order to predict sound levels at various locations around the project site. Sound exposure due to the proposed building geometry for the car wash and convenience store was modeled based on drawings provided by the Client.

Traffic counts for local roadways were obtained from the Orange County Transportation Authority. Traffic for the Highway 57 exit ramp were obtained from the California Department of Transportation. The latest traffic counts available for Ball Road were from 2015. Since this does not represent current conditions, Veneklasen modified the modeled counts to align with the measurements completed at the project site. Once the measured and modeled existing sound levels due to traffic noise matched, the project was assessed.

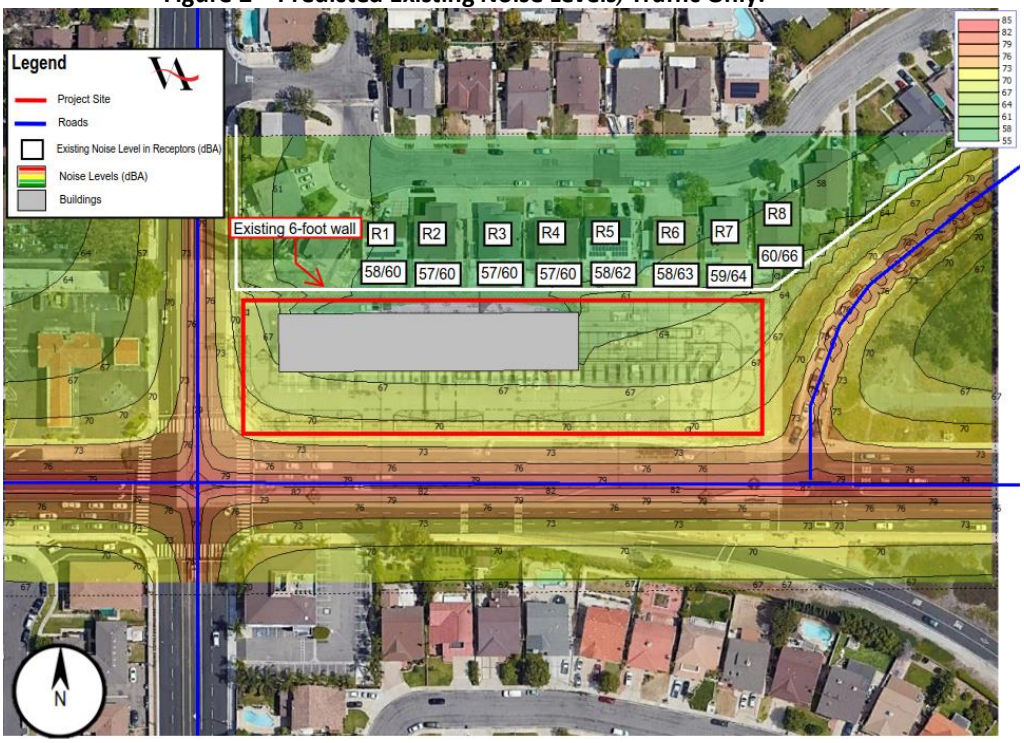
There is an existing 6-foot wall between the project site and sensitive receptors to the north. Client informed Veneklasen that a new 8-foot wall is planned to be installed in order to improve the shielding effect. The planned 8-foot wall at the property line, vacuum canopies, the car wash tunnel itself, along with a new 9-foot tall, 25-foot long wall at the car wash tunnel exit were included in the computer model.

The measured sound level data summarized in Table 2 was used to model the car wash equipment. Veneklasen also used published sound power data for the two (2) Carrier 48HC-D08 rooftop units scheduled on the roof of the convenience store. Sound power data for this equipment was taken from Carrier's published datasheet. Lastly, car idling was included for the queue when entering the car wash tunnel.

4.1 Existing Noise Levels Without Project

Figure 2 shows the existing noise levels around the project site due to traffic noise only, primarily caused by traffic flow along Ball Road and Highway 57. The first number at each receiver indicates the noise level at 1st floor, while the second number indicates the noise level at the 2nd floor. Since the 2nd floor of sensitive receptors to the north have direct line of sight to the roadway over the barrier, the noise levels as shown are slightly higher than the 1st floor levels. The levels shown are representative of the property line closest to the convenience store and car wash equipment sources. The levels are further summarized in Table 3.

Figure 2 – Predicted Existing Noise Levels, Traffic Only.



As can be seen by the results of the model without the project, the existing ambient noise levels as caused by traffic only from Ball Road and the Highway 57 exit ramp are 57 to 60 dBA at the 1st floor and 60 to 66 dBA at the 2nd floor.

Per Veneklasen's interpretation of the Municipal Code in section 2.0, this would establish the maximum allowable level as caused by the convenience store and car wash operations to be 60 to 65 dBA at the 1st floor and 65 to 71 dBA at the 2nd floor.

4.2 Future Noise Levels with the Project

Figure 3 shows the predicted sound levels as caused by the proposed convenience store and car wash with planned equipment (vacuums, washers, blowers, rooftop equipment) operational. Within the design, Veneklasen has assumed an 8-foot tall barrier along the back property line, a 9-foot tall, 25-foot long barrier at the exit of the car wash tunnel near the blowers, a 5-foot barrier to shield from future RTUs at the roof of the convenience store, and cars idling at the car wash queue as shown in Figure 3.

A summary of the sound levels is also included in Table 3. All inputs utilized for the model can be seen within the various appendices at the end of the report.

Figure 3 – Predicted Noise Levels, Traffic and Equipment

Table 3 – Comparison of Modeled Noise Levels with Municipal Code Limits

Receiver	Floor	Modeled Existing Level (Traffic Only), dBA	Modeled Future Level (Traffic + Equipment + Car Idling), dBA	Municipal Code Noise Level Criterion, dBA	Municipal Code Compliance
R1	1st	58	59	≤ 60	Yes
	2nd	60	63	≤ 65	Yes
R2	1st	57	59	≤ 60	Yes
	2nd	60	63	≤ 65	Yes
R3	1st	57	59	≤ 60	Yes
	2nd	60	63	≤ 65	Yes
R4	1st	57	58	≤ 60	Yes
	2nd	60	62	≤ 65	Yes
R5	1st	58	58	≤ 60	Yes
	2nd	62	61	≤ 67	Yes
R6	1st	58	58	≤ 60	Yes
	2nd	63	62	≤ 68	Yes
R7	1st	59	59	≤ 60	Yes
	2nd	64	64	≤ 69	Yes
R8	1st	60	60	≤ 65	Yes
	2nd	66	66	≤ 71	Yes

As can be seen within Figure 3 per the modeling as described, resultant level of the car wash and convenience store operation at all receivers for both the 1st and 2nd floors meets minimum Municipal Code requirements established in Section 3.0.

Further, this establishes that the sound levels as contributed by the convenience store and car wash equipment by itself, without the contribution of traffic noise along Ball Road, would be less than or equal to 59 dBA at both the 1st and 2nd floors of the property line.

5.0 CONCLUSIONS

Veneklasen provides the following comments and conclusions regarding the acoustical study for the addition of the convenience store and car wash as it relates to the noise ordinance within the City of Anaheim Municipal Code:

- A 9-foot barrier at approximately 25 feet long should be constructed along the tunnel exit as shown in Figure 3.
- An 8-foot barrier should be constructed at the back of the property as shown in Figure 3.
- A 5-foot barrier wall should be constructed on the roof of the convenience store as shown in Figure 3 to block line-of-sight to the mechanical equipment. This also aids in shielding from traffic noise.
- All barrier walls should be constructed out of a solid material (i.e. no holes, openings, or gaps) with a minimum 2-inch thickness.

Given the mitigation measures described herein:

- The predicted sound levels at both the 1st and 2nd floor sensitive receptors along the property lines of nearest sensitive receptors are in compliance with the noise ordinance established by the City of Anaheim Municipal Code as shown in Table 3.

Therefore, this report finds that the impact on the residences will fall within the noise ordinance per the City of Anaheim Municipal Code. The noise at the property line to the north is primarily dominated by existing traffic along Ball Road and the Highway 57 ramp, and modeled levels are compliant with the City's requirements.

Furthermore, the anticipated sound levels per Table 3 represent a worst-case scenario of all equipment in operation simultaneously, and the actual sound levels on-site as caused by the convenience store and car wash are anticipated to be lower than those indicated herein.

No further mitigation is required for the project, beyond the barrier walls established herein, to comply with the Municipal Code requirements for noise established by the City of Anaheim, as the construction of the tunnel itself and various barrier utilized in the project's design provide adequate shielding of noise to nearest receptors to comply with the City of Anaheim Municipal Code.

If you have any questions, please do not hesitate to call.

Sincerely,
Veneklasen Associates, Inc.

Chris Kezon
Senior Associate

Elias Montoya
Associate

APPENDIX A – GLOSSARY OF ACOUSTICAL TERMS

Term	Definition
Decibel (dB)	A unit describing the amplitude of sound in a logarithmic ratio to a reference value.
A-weighted Decibels (dBA)	A filter applied to sound pressure levels in decibel to simulate the response of the human ear at the threshold of hearing. A-weighting de-emphasizes the low frequency components of a sound similar to the human ear at these levels. This metric has been closely tied to subjective reactions of annoyance to noise, and is used as a noise metric in this and in many other environmental acoustics reports. In this report, all dBA levels reported refer to the sound pressure level, referenced to 20µPa
Sound Pressure Level (L_p)	The amplitude of sound compared to the reference value of 20µPa. Sound Pressure Level is what we perceive as audible sound. Sound Pressure Level decreases as distance from the source to the receiver increases.
Sound Power Level (L_w)	The amplitude of sound compared to the reference value of 1pW. Sound Power Level does not vary with distance, and represents the level of sound emitted by a given source. The sound power level is generally used to model the sound pressure level of a source at a given distance or location.
Equivalent Sound Level (L_{eq})	The time-weighted average sound or vibration level for a given period of time. Use of this metric allows the observation of the overall sound level for the measurement period.
Maximum Sound Level (L_{max})	The instantaneous maximum sound or vibration level of an event. The L_{max} can occur over very short periods of time, and fluctuates much more than the L_{eq} due to the presence of intermittent events in the noise environment.
Community Noise Equivalent Level (CNEL)	The time-weighted noise level representing the noise exposure over a 24-hour period. Noise events that occur within the evening hours (7pm to 10pm) are given a +5dB penalty, and noise events that occur within the nighttime hours (10pm to 7am) are given a +10dB penalty, to account for increased sensitivity to noise during these hours. This metric has units of A-weighted decibels, and has been correlated to probability of annoyance.

APPENDIX B – EQUIPMENT SOUND LEVEL MEASUREMENTS

Table 4 – Measured Octave Band Sound Pressure Level for Car Wash Equipment, dB

Equipment	Distance, ft	One-Octave Frequency Band in Hz (dB)								L_{eq} Global(dBA)
		63	125	250	500	1000	2000	4000	8000	
Blowers	5	58	76	87	96	97	95	88	79	101
Water Sprayers	5	51	64	72	79	82	81	79	75	87
Rotating Brushes	5	40	55	68	74	74	75	71	67	89
Central Vacuum (in)	3	60	68	75	84	85	83	78	70	90
Central Vacuum (out)	3	50	57	65	74	72	71	65	57	78
Vacuum Stations	3	45	49	56	63	69	73	70	64	76

APPENDIX C – MECHANICAL EQUIPMENT AND ESTIMATED CAR IDLING SOUND POWER LEVELS

Table 5 – Octave Band Sound Power Level, dB

Equipment	One-Octave Frequency Band in Hz (dB)								L_w
	63	125	250	500	1000	2000	4000	8000	Global(dBA)
Carrier 48HC-D08	90.6	84.3	80.2	79.3	77.1	72.2	67.4	63.7	92
Car idling*	71.3	65.6	59.2	57.8	57.9	56.4	54.3	48.8	63

** Data for car idling obtained from the U.S. Department of Transportation (USDOT) National Highway Traffic Safety Administration (NHTSA). Median value was selected to represent typical conditions.*

Capacity ratings (cont)

Carrier
United Technologies

SOUND RATINGS TABLE

48HC UNIT	COOLING STAGES	OUTDOOR SOUND (dB) AT 60 HZ								
		A-WEIGHTED	63	125	250	500	1000	2000	4000	8000
A04	1	76	78.2	78.0	74.2	73.3	70.6	66.0	62.4	56.9
A05	1	78	84.7	83.6	77.1	74.6	72.3	68.3	64.7	60.9
A06	1	77	87.5	82.5	76.1	73.6	71.3	67.1	64.1	60.0
A07	1	82	90.1	82.6	81.0	79.4	77.0	73.0	70.4	66.7
D07	2	82	90.1	82.6	81.0	79.4	77.0	73.0	70.4	66.7
D08	2	82	90.6	84.3	80.2	79.3	77.1	72.2	67.4	63.7
D09	2	82	88.6	85.0	81.6	79.5	77.4	74.1	71.0	66.3
D11	2	87	85.9	87.9	85.6	84.4	82.8	78.5	74.9	72.5
D12	2	87	85.9	87.9	85.6	84.4	82.8	78.5	74.9	72.5
D14	2	83	89.3	86.0	82.9	80.7	78.5	73.6	69.6	64.5

LEGEND
dB — Decibel

NOTES:
1. Outdoor sound data is measured in accordance with AHRI.
2. Measurements are expressed in terms of sound power. Do not compare these values to sound pressure values because sound pressure depends on specific environmental factors which normally do not match individual applications. Sound power values are independent of the environment and therefore more accurate.
3. A-weighted sound ratings filter out very high and very low frequencies, to better approximate the response of "average" human ear. A-weighted measurements for Carrier units are taken in accordance with AHRI.

APPENDIX D – TRAFFIC COUNTS

Table 6 – Traffic Counts for Modeling

Roadway	Year of Latest Count	AADT
Ball Road*	2013	52,000
Sunkist Street*	Over 10yrs	14,000
Highway 57 Exit Ramp**	2015	16,756

** Obtained from the Orange County Transportation Authority (OCTA)*
*** Obtained from the California Department of Transportation (CADOT)*