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 will be Monday through Sunday, 7am to 9pm.

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:

"Traffic sounds, sound created by emergency activities and sound created by governmental units or their contractors shall be exempt from the applications of this chapter."

Veneklasen has interpreted this language to indicate that the levels as caused by the project must not exceed 60 dBA during operation, excluding the influence of any existing traffic noise.

Based on this interpretation, traffic noise from Ball Road, Sunkist Street and the Highway 57 exit ramp is not included in the modeling. Only noise generated by the future project itself is taken into account and must comply with the 60 dBA requirement established in the Municipal Code.

3.0 EQUIPMENT SOUND MEASUREMENTS

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 1.

Table 1 – 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.

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 1 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 Future Noise Levels with the Project

Figure 1 shows the predicted sound levels as caused by the proposed convenience store and car wash with planned equipment (vacuums, washers, blowers, rooftop equipment) operational. As described in section 2.0, traffic noise has been excluded from the modeling since the project is to comply with the City's 60 dBA requirement without the influence of existing noise sources already present at the site.

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 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. All modeled levels at sensitive receptors are equal to or lower than the values shown in Figure 1. The levels are further summarized in Table 2.

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 1.

A summary of the sound levels is also included in Table 2. All inputs utilized for the model can be seen within the various appendices at the end of the report.

Figure 1 – Predicted Noise Levels with Equipment

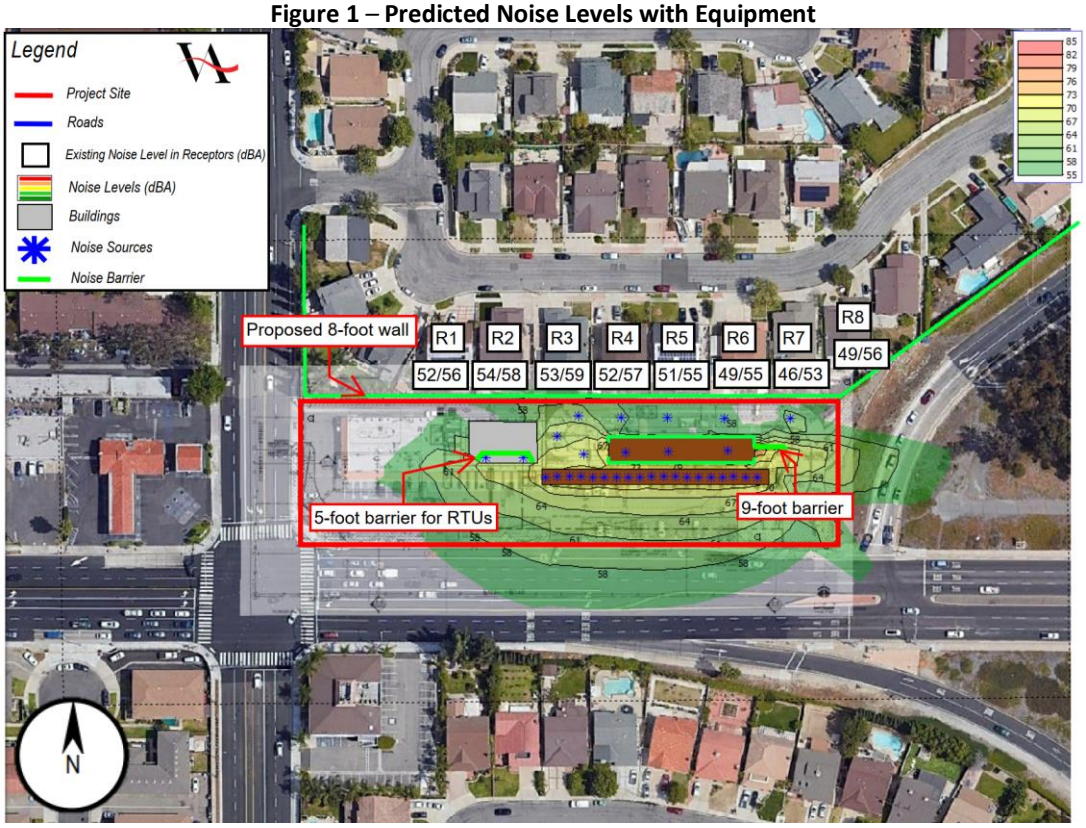

Table 2 – Comparison of Modeled Noise Levels with Municipal Code Limits

Receiver	Floor	Modeled Future Level (Equipment + Car Idling), dBA	Municipal Code Noise Level Criterion, dBA	Municipal Code Compliance
R1	1st	52	≤ 60	Yes
	2nd	56	≤ 60	Yes
R2	1st	54	≤ 60	Yes
	2nd	58	≤ 60	Yes
R3	1st	53	≤ 60	Yes
	2nd	59	≤ 60	Yes
R4	1st	52	≤ 60	Yes
	2nd	57	≤ 60	Yes
R5	1st	51	≤ 60	Yes
	2nd	55	≤ 60	Yes
R6	1st	49	≤ 60	Yes
	2nd	55	≤ 60	Yes
R7	1st	46	≤ 60	Yes
	2nd	53	≤ 60	Yes
R8	1st	49	≤ 60	Yes
	2nd	56	≤ 60	Yes

As can be seen within Figure 1 and Table 2 per the modeling as described, resultant noise levels of the car wash and convenience store operation at all receivers for both the 1st and 2nd floors meet minimum Municipal Code requirements of 60 dBA per section 2.0.

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 1.
- An 8-foot barrier should be constructed at the back of the property as shown in Figure 1.
- A 5-foot barrier wall should be constructed on the roof of the convenience store to block line-of-sight to the mechanical equipment as shown in Figure 1.
- 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 2.

Furthermore, the anticipated sound levels per Table 2 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 3 – 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 4 – 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 of all vehicle samples was selected to represent typical conditions, and sound power data was calculated based on free-field conditions during the measurements performed by USDOT NHTSA.*

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.