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

October 4, 2024

Legacy Partners
5141 California Avenue, Suite 100
Irvine, California 92617

Attention: Benjamin Mount

Subject: **Hive**
Costa Mesa, California
Exterior Noise and Exterior Façade Acoustical Analysis
Veneklasen Project No. 3287-008

Dear Benjamin:

Veneklasen Associates, Inc. (Veneklasen) has completed the review of the Hive project located in Costa Mesa, California. This report predicts the exterior noise level at the site using measurements and computer modeling. Using this information, interior noise levels were calculated based on the exterior noise exposure and the construction types proposed. From this, the exterior façade design was determined. This report discusses the results of the analysis.

1.0 INTRODUCTION

This study was conducted to determine the impact of the exterior noise sources on the Hive project in Costa Mesa, California. Veneklasen's scope of work included calculating the exterior noise levels impacting the site and determining the method, if any, required to reduce the interior and exterior sound levels to meet the applicable code requirements of the State of California and the City of Costa Mesa.

The project consists of a 1050-unit apartment building, three separate 5-story buildings retail space, art gallery, and public plaza will also be part of the project. The site is bounded by Sunflower Avenue to the north, Susan Street to the east, S Coast Drive to the south with I-405 approximately 1400 feet beyond, and a new commercial building complex to the west including its cooling tower yard. At the northwest corner of the parcel is a city utility lot, although very little equipment is unhoused.

2.0 NOISE CRITERIA

CNEL (Community Noise Equivalent Level) is the 24-hour equivalent (average) sound pressure level in which the evening (7 pm–10 pm) and nighttime (10 pm – 7 am) noise is weighted by adding 5 and 10 dB, respectively, to the hourly level. Since this is a 24-hour metric, short-duration noise events (truck pass-bys, buses, trains, etc.) are not as prominent in the analysis.

Leq (equivalent continuous sound level) is defined as the steady sound pressure level which, over a given period of time, has the same total energy as the actual fluctuating noise.

All reported noise levels are A-weighted.

2.1 Interior Noise Levels – Residential

The State of California Building Code (Title 24, Part 2, Section 1206 "Sound Transmission") and the City of Costa Mesa Noise Element state that interior CNEL for residential land uses are not to exceed 45 dB in any habitable room.

If the windows must be closed to meet an interior CNEL of 45 dB, then a mechanical ventilating system or other means of natural ventilation may be required.

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2.2 CALGreen – Non-Residential

The California Green Building Standards Code (CALGreen Section 5.507.4.2) stipulates that for buildings exposed to a noise level of 65 dB or more when measured as a 1-hour Equivalent Sound Level (Leq), the building façade, including walls, windows, and roofs, shall provide enough sound insulation so that the interior sound level from exterior sources does not exceed 50 dB during any hour of operation. This applies to non-residential spaces such as retail space, leasing, and amenities.

3.0 EXTERIOR NOISE ENVIRONMENT

3.1 Noise Measurements

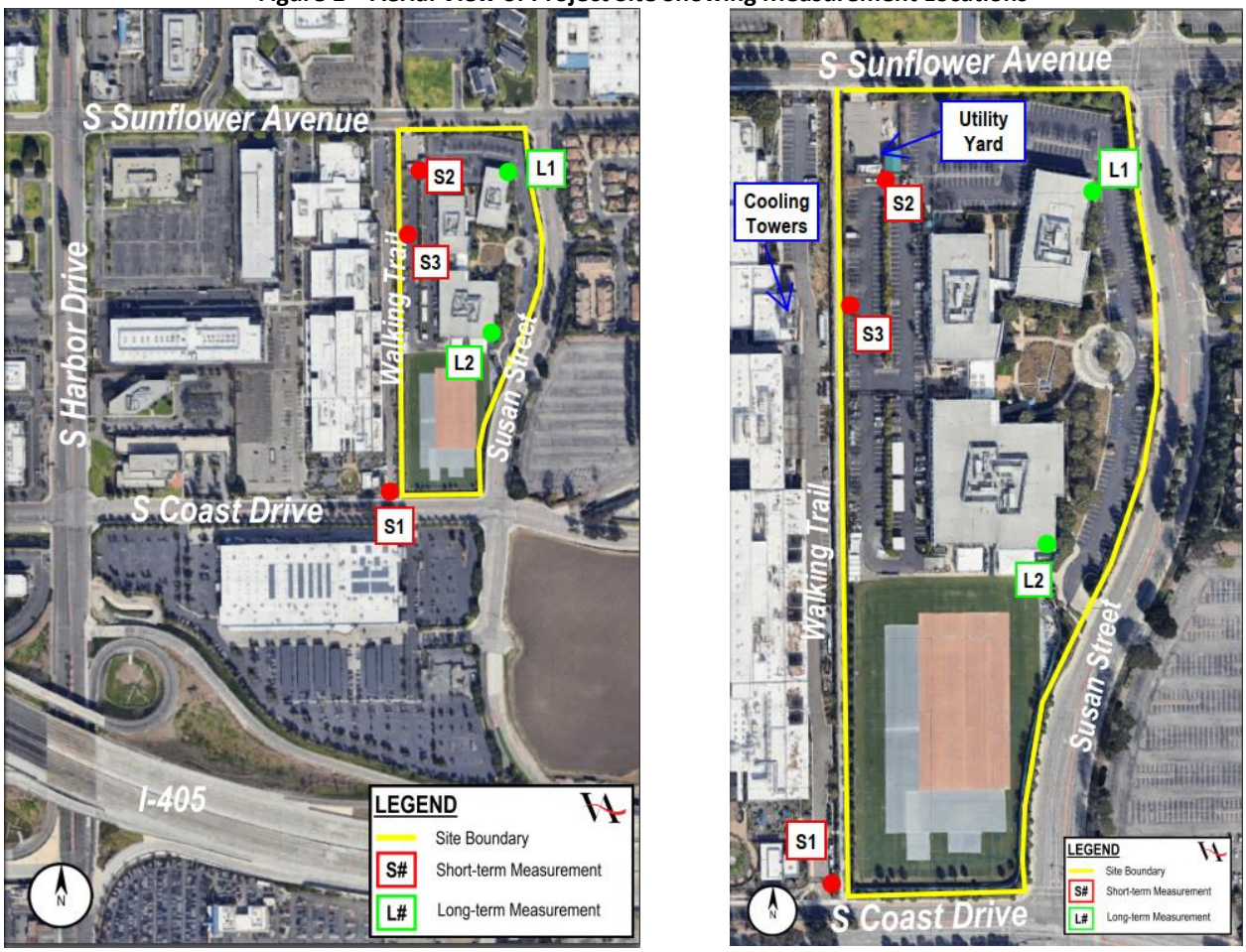
Traffic on all nearby streets are the primary sources affecting the site, along with the cooling tower from the commercial campus to the west. Veneklasen visited the site on Thursday, September 19, 2024 and completed short-term noise measurements. Long-term locations were also set up for 24-hours. Table 1 and Figure 1 show the location and summary of the noise measurements.

Table 1 – Measured Sound Levels

Location	Noise Source	Measured Level (dB)	Measured CNEL (dB)	Loudest Daytime Hour
S1	Coast	64	-	65
S2	Utility Yard/Sunflower	60*	-	-
S3	Cooling Tower	58**	-	58**
L1	Sunflower/Susan	61	64	66
L2	Susan/I-405	60	65	64

*Street noise was also reaching this location. Contribution of utility yard unclear.
**Operating load likely on lower side, weather was not warm

Figure 1 – Aerial View of Project Site Showing Measurement Locations



3.2 Computer Modeling

Veneklasen has utilized the Traffic Noise Model 2.5 software (TNM) developed by the Federal Highway Administration (FHWA) in order to predict vehicular noise levels at various locations. The primary purpose of the computer model was to determine how the noise environment will change due to traffic and site changes.

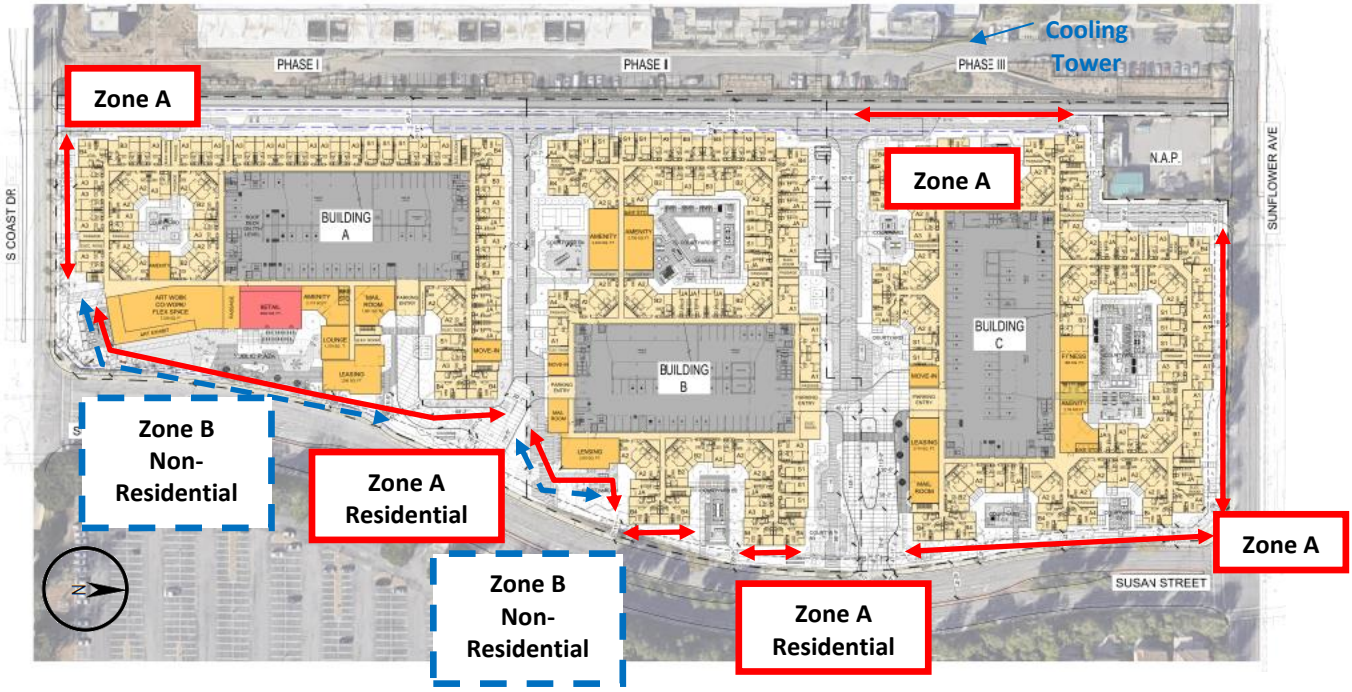
3.3 Overall Exterior Exposure

Based on the computer model and measurements, Veneklasen calculated the noise level at different locations across the project site. To simplify the presentation of the exterior noise levels, Veneklasen has separated the site into locations based on the sound exposure and required mitigation. The predicted sound levels at each zone, shown in Figure 2, are listed in Table 2 below.

Table 2 – Exterior Noise Levels

Location	Floor	Exterior CNEL (dB)
Zone A	All	64-67
Remaining Units	All	<64

Figure 2 – Noise Zones



4.0 INTERIOR NOISE CALCULATION

4.1 Exterior Façade Construction

Calculations were based on the conceptual site plan shown above. The it is assumed that the exterior wall will consist of 3-coat stucco over sheathing on wood studs with a single layer of gypsum board on the interior and batt insulation in the cavity.

Veneklasen's analysis included the roof path, but this was insignificant in the interior noise level calculated.

Veneklasen utilized the glazing ratings (glass, frame, and seals) shown in Appendix I.

4.2 Interior Average Noise Level (CNEL) – Residential

Veneklasen calculated the interior level within the residential units given the measured noise environment and the exterior façade construction described above. Table 3 shows the predicted interior CNEL based on the windows and doors with STC ratings as shown and glazing construction as described in Appendix I. Note that the STC ratings indicated in the table do not completely specify the building element performance, as the building element must also meet the octave band transmission loss across the frequency spectrum as specified in Appendix I.

Table 3 – Calculated Interior CNEL

Location	Floor	Exterior CNEL (dB)	Window/ Door Rating[1]	Interior CNEL (dB)
Zone A	All	64-67	STC 30	<45
Remaining Units	All	<64	No STC requirement. STC 28 recommended.	

[1] STC rating does not fully specify the building element performance. Refer to Appendix I.

4.3 Mechanical Ventilation – Residential

Because the windows and doors must be kept closed to meet the noise requirements, mechanical or other means of ventilation may be required for units in Zone A, units directly facing a street or the cooling towers. The ventilation system shall not compromise the sound insulation capability of the exterior façade assembly.

4.4 CALGreen – Non-Residential

In a similar manner, Veneklasen calculated the noise level within non-residential spaces. CALGreen is based on the loudest hourly Leq. Veneklasen utilized a statistical methodology to determine this level from the measurements[2]. The results are shown in Table 4 below.

Table 4 – Calculated Interior Average Noise Levels at Non-Residential Areas

Location	Exterior Loudest Daytime Hour (dB)	Minimum Glazing	Interior Loudest Daytime Hour (dB)
Zone B	65-66	STC 30	< 50

5.0 SUMMARY

The following summarizes the acoustical items required to satisfy the noise criteria as described in this report.

Residential

- Exterior wall assembly is acceptable as described in Section 4.1.
- The roof assembly was included in the analysis and is not a significant path of sound and can remain as designed.
- Windows and glass doors as shown in Table 3 with Transmission Loss values and STC ratings defined in Appendix I are required. Appendix I shall be the acoustical specification for all exterior windows and doors.
- Residential mechanical ventilation, or other means of natural ventilation, may be required for units in Zone A.

Non-Residential

- At retail, amenity, and other non-residential spaces, windows and glass doors as shown in Table 4 with Transmission Loss values and STC ratings defined in Appendix I are required to meet the CALGreen interior noise criterion.

Various noise mitigation methods may be utilized to satisfy the noise criteria described in this report. Alteration of mitigation methods that deviate from requirements should be reviewed by the acoustical consultant.

If you have any questions or comments regarding this report, please do not hesitate to contact the undersigned.

Sincerely,
Veneklasen Associates, Inc.

Cathleen C. Novak

Cathleen Novak
Associate

[2] LoVerde, John; Dong, Wayland; Rawlings, Samantha. *Noise Prediction of Traffic on Freeways and Arterials from Measured Data*. (Fort Lauderdale, Florida: Noise-Con 2014).

APPENDIX I – GLAZING REQUIREMENTS

In order to meet the predicted interior noise levels described in Section 4.0, the glazing shall meet the following requirements:

Table 5 – Acoustical Glazing Requirements: Minimum Octave Band Transmission Loss and STC Rating

Nominal Thickness	Minimum Transmission Loss Octave Band Center Frequency (Hz)						Min. STC Rating
	125	250	500	1000	2000	4000	
1” dual	21	18	24	32	36	31	**28**
1” dual	21	18	27	34	37	32	**30**

The transmission loss values in the table above can likely be met with the following glazing assemblies:

1. Up to STC 35: nominal 1” insulated glazing unit

An assembly’s frame and seals may limit the performance of the overall system. Therefore, the window and door systems selected for the project shall not be selected on the basis of the STC rating of the glass alone, but on the entire assembly including frame and seals. Additionally, the assemblies given above are provided as a basis of design, but regardless of construction, the octave band Transmission Loss (TL) and STC value of the system selected must meet the minimum values in Table 5 above.

Independent laboratory acoustical test reports should be submitted for review by the design team to ensure compliance with glazing acoustical performance requirements. Laboratories shall be accredited by the Department of Commerce National Voluntary Laboratory Accreditation Program (NVLAP). Labs shall be pre-approved by Veneklasen Associates. Tests shall be required to be performed in North America. Lab tests and lab reports shall be in compliance with ASTM standard E90 and be no more than 10 years old from the date of submission for this project.

If test reports are not available for a proposed assembly, the assembly, including frame, seals and hardware, shall be tested at an independent pre-approved NVLAP-accredited laboratory to demonstrate compliance with the requirements of this report. Veneklasen shall be invited to witness acoustical testing completed and reserves the right to exclude test reports from laboratories that are not pre-approved by Veneklasen.

APPENDIX II – MEASURED HOURLY NOISE LEVELS

Start Time	Duration	L1 LAeq	L2 LAeq
1:00 pm	1:00:00	62	62
2:00 pm	1:00:00	61	60
3:00 pm	1:00:00	62	61
4:00 pm	1:00:00	63	61
5:00 pm	1:00:00	63	62
6:00 pm	1:00:00	61	61
7:00 pm	1:00:00	60	59
8:00 pm	1:00:00	58	58
9:00 pm	1:00:00	58	58
10:00 pm	1:00:00	56	56
11:00 pm	1:00:00	54	55
12:00 am	1:00:00	53	53
1:00 am	1:00:00	53	52
2:00 am	1:00:00	53	51
3:00 am	1:00:00	53	52
4:00 am	1:00:00	55	53
5:00 am	1:00:00	57	56
6:00 am	1:00:00	59	66
7:00 am	1:00:00	62	64
8:00 am	1:00:00	61	59
9:00 am	1:00:00	61	59
10:00 am	1:00:00	60	59
11:00 am	1:00:00	64	60
12:00 pm	1:00:00	63	61
1:00 pm	1:00:00	63	62