APPENDIX H – NOISE Lat!/¢ STUDY

Advanced Engineering Acoustics

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August 22, 2023

Mr. Chad Stadnicki
R.Y. Properties, Inc.
212 S. Palm Ave., Suite 200
Alhambra, CA 91801

SUBJECT: Residential Development Tract 83674
SW of Rancho Vista Blvd and NW of Tilbury Drive
Palmdale, California
Noise Impact Study Report, Rev. 1

Dear Mr. Stadnicki:

Advanced Engineering Acoustics (AEA) has conducted a noise study for the subject property located on the southwest side of Rancho Vista Blvd above Tilbury Drive (see Figure 1). This project noise study and architectural acoustical assessment have been conducted, as required by the City of Palmdale (City). This letter report provides the results of our observations, measurements, analysis and findings.

Project Description

The subject property is a new proposed 239-lot single-family residential development in the City. The proposed project has 12 open spaces, 3 on-site drainage areas and a community recreation area. All the residences will have outdoor living areas.

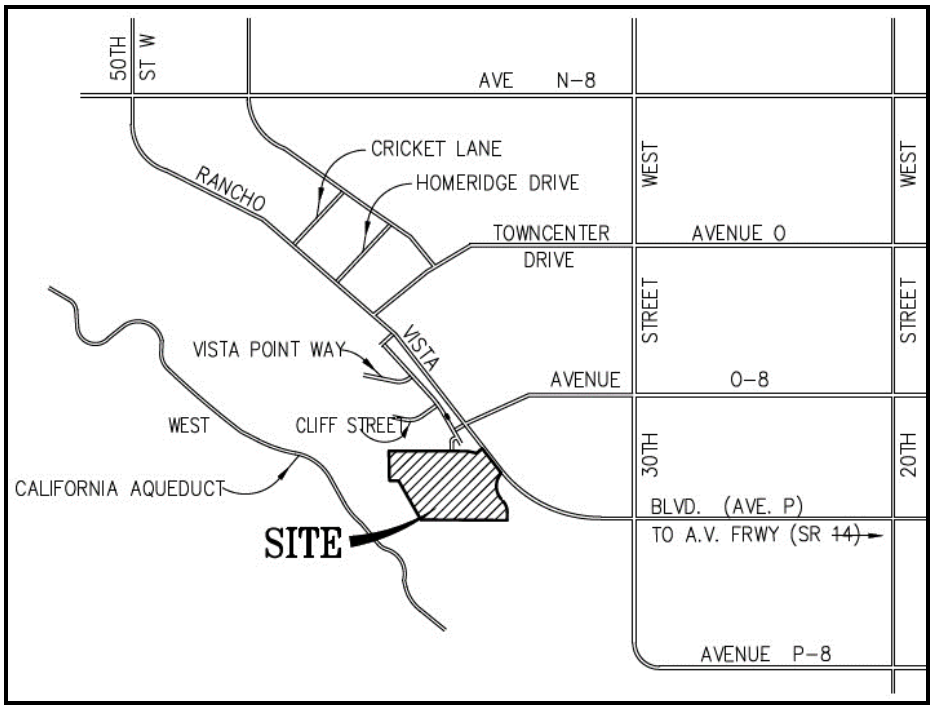


Figure 1. Project Vicinity Map

Basics of Noise

Noise is often defined as unwanted sound. It is perceived subjectively by each individual. Acceptance of a certain type of noise or noise level varies among neighborhoods, individuals, and time of day. Physically, the magnitude of noise is measured and quantified in terms of a logarithmic sound pressure decibel scale. Sound pressure decibels (dB) are derived from the base 10 logarithm of the ratio of a sound pressure over the reference sound pressure. The resulting sound pressure logarithmic ratios are called sound pressure levels. Research on human sensitivity to noise has shown that a 3 dB increase in the sound pressure level is barely noticeable, while a 10 dB increase would be perceived as being twice as loud.

Sounds, heard by humans in their daily environment, consist of a range of frequencies or pitches at different levels. Human hearing is not equally sensitive to sound at all frequencies. A frequency-dependent adjustment called A-weighting has been devised so that sound may be measured in a manner similar to the way the human hearing system perceives it. The A-weighting adjustment is applied by the monitoring instruments during traffic noise measurements and provides a generally accepted descriptor for traffic noise. The A-weighted sound pressure level is often referred to as the sound level or noise level and the A-weighted decibel is often abbreviated "dBA."

The A-weighted sound level is adequate for describing the noise at a particular instant in time. However, the sound level of environmental traffic noise fluctuates with time. Normally, ambient sounds change with the daily cycle of human activities. To account for these changes, the energy average sound level has been adopted and this sound descriptor is used in this report as the hourly energy equivalent sound level, $L_{eq}(h)$. The L_{eq} is defined as the continuous A-weighted sound level that, in a specified period of time, contains the same sound energy as the actual time-varying sound during that period. It is a particularly stable and predictable descriptor for traffic noise and, at the same time, is well-correlated to people's reaction to traffic noise. The California Model Noise Control Ordinance introduces another noise metric often called the statistical, exceedance or percentage noise level, L%. The L% would be the noise level of a variable noise source that is exceeded a certain percentages of the time (e.g., the L_2 noise level is exceeded 2% of the time or for about 1 minute in an hour, the L_8 noise level is exceeded 8% of the time or for about 5 minutes in an hour, the L_{25} noise level is exceeded 25% of the time or for 15 minutes in an hour and the L_{50} noise level is exceeded 50% of the time or for 30 minutes in an hour. The measured ambient L% data are included for reference purposes and give an indication of the temporal variability of existing noises impacting the proposed project site.

For environmental noise assessments, the Community Noise Equivalent Level (CNEL) has been adopted by the State of California and by most California communities, including the County of Los Angeles, for their environmental and traffic noise impact studies. The CNEL is similar to the 24-hour A-weighted Leq, but includes a 5 dBA penalty during the evening hours (7 p.m. to 10 p.m.) and 10 dBA penalty during the nighttime hours (10 p.m. to 7 a.m.).

The Appendix provides definitions of acoustical terminology.

City Noise Standards

The City of Palmdale requires that exterior noise not exceed 65 CNEL at outdoor living areas (patios, balconies, parks, etc) and 45 CNEL inside habitable spaces of residential dwellings. The outdoor noise criterion is recommended to provide an acceptable noise environment for outdoor activities and recreation, while the interior criterion is intended to provide an acceptable acoustic environment for communication and sleep. These noise limits also apply to the nearby residential zoned areas due to noise generating activities associated with the construction of the proposed project.

Sound Monitoring Locations

In order to conduct the noise monitoring at the subject property, AEA used four positions on the project site closest to Rancho Vista Blvd. Figure 2 shows an aerial view of the proposed project site and the ambient noise monitoring locations. Figure 3 shows the new project layout plan as well as the approximate locations of the ambient noise monitoring sound level meters. All sound meters were 5 feet high above the existing ground level (AGL).

Figure 2. Project Site Aerial View & Approximate Sound Monitoring Sites

Sound Monitoring Equipment

Four NTi Model XL2 Type 1 Integrating Sound Meters were used to monitor the exterior ambient sounds due to automobile and truck traffic on Rancho Vista Blvd. The monitoring

duration began at 4:40 p.m. on Friday, May 12th and lasted until 7:40 p.m. that same evening. The sound monitoring systems were checked and properly calibrated according to the manufacturer's instructions prior to making the ambient sound measurements.

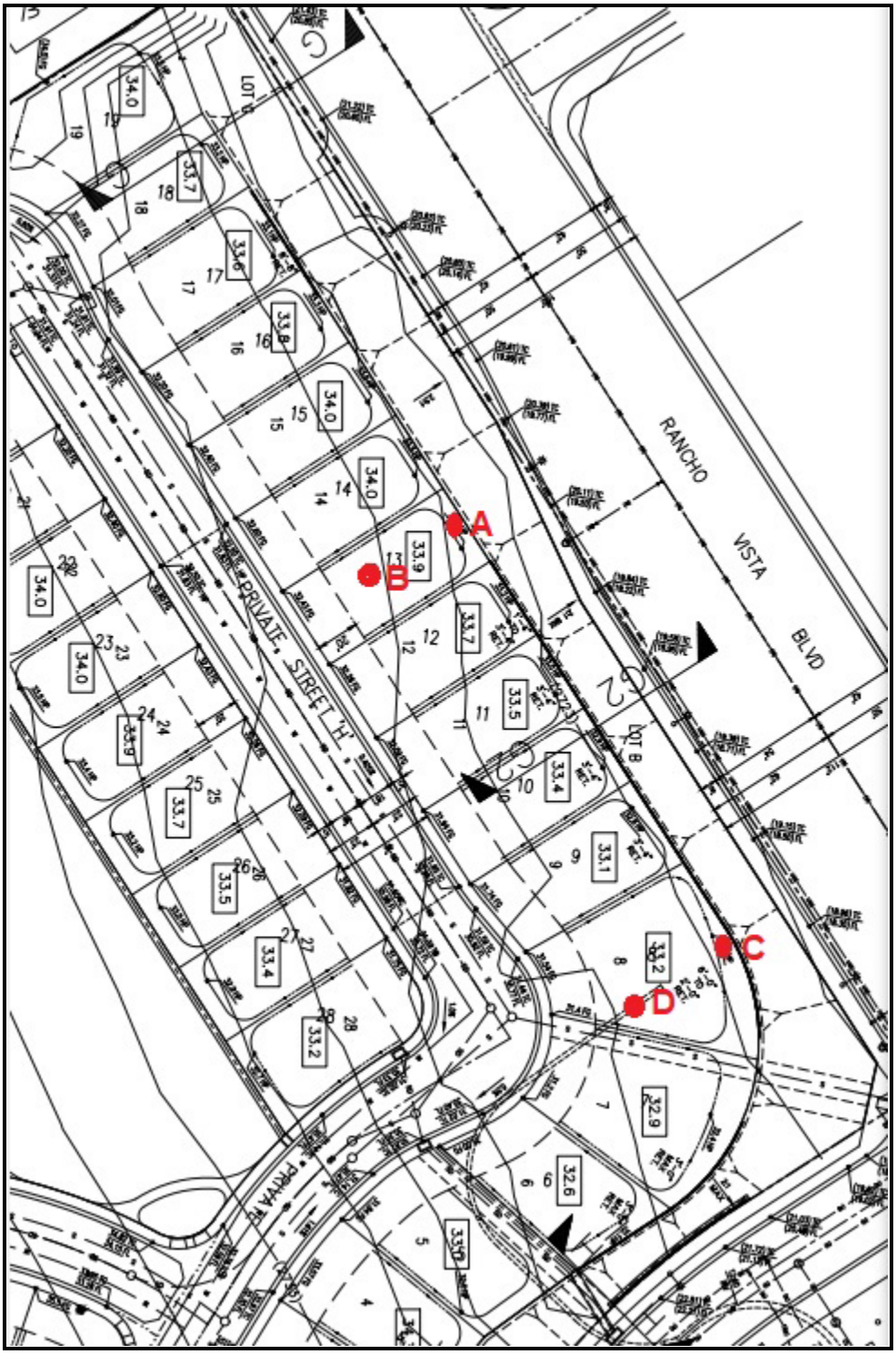


Figure 3. New Project Layout View & Approximate Sound Monitoring Sites

Sound Measurement Results and Traffic Noise Model Data and Results

The results of the exterior ambient sound monitoring are given in Tables 1 - 4. AEA observed that Rancho Vista Blvd. traffic noise was clearly audible and the dominant noise source during the monitoring period. Note that the peak noise hour for the data in Table 1 was from 5:00-6:00 p.m. and resulted in a Site A peak-hour Leq of 66.9 dBA, Site B peak-hour Leq of 60 dBA, Site C peak-hour Leq of 64.9 dBA and a Site D peak-hour Leq of 58.2 dBA. For traffic noise, the peak-hour Leq decibel level is essentially the same as the 24-hour Ldn and CNEL decibel levels. Table 5 gives the traffic noise model input data and the resulting predicted peak-hour traffic noise at the four traffic noise monitoring sites.

Table 1. Results of Site A Ambient Sound Monitoring (66.9 CNEL)

Date	Time	LAeq	LASmax	LASmin	LAS1.7%	LAS8.3%	LAS25.0%	LAS50.0%	LAS90.0%
5/12/2023	17:00:00	**66.8**	80.3	50.3	75.4	69.1	66.9	64.5	57.7
5/12/2023	17:15:00	**64.7**	74.7	40.0	70.1	68.3	66.2	63.5	51.1
5/12/2023	17:30:00	**69.4**	95.0	42.2	74.5	69.4	66.5	63.4	53.0
5/12/2023	17:45:00	**65.0**	80.9	39.2	72.2	68.3	65.8	63.0	50.1
5/12/2023	18:00:00	65.3	86.3	40.9	68.8	67.1	65.3	62.8	53.8
5/12/2023	18:15:00	64.2	74.5	41.3	69.9	67.7	65.8	62.7	52.4
5/12/2023	18:30:00	63.1	72.9	41.2	68.8	66.7	64.7	61.6	48.4
5/12/2023	18:45:00	65.1	78.5	46.6	75.1	67.6	65.5	62.4	53.1

Table 2. Results of Site B Ambient Sound Monitoring (60.0 CNEL)

Date	Time	LAeq	LASmax	LASmin	LAS1.7%	LAS8.3%	LAS25.0%	LAS50.0%	LAS90.0%
5/12/2023	17:00:00	**58.4**	69.3	39.3	64.5	61.8	59.8	57.2	47.8
5/12/2023	17:30:00	**63.3**	87.9	39.9	70.2	63.5	60.1	56.9	48.7
5/12/2023	17:45:00	**57.8**	74.1	38.5	66.5	60.6	57.6	55.0	45.2
5/12/2023	18:00:00	**57.2**	78.5	40.0	61.4	58.4	56.2	54.3	47.7
5/12/2023	18:15:00	56.1	67.0	40.3	63.3	59.7	57.0	54.1	46.9
5/12/2023	18:30:00	54.8	67.2	40.0	60.8	58.2	55.9	53.5	45.0
5/12/2023	18:45:00	60.4	73.7	42.8	72.6	61.7	57.9	55.4	48.5

Table 3. Results of Site C Ambient Sound Monitoring (64.9 CNEL)

Date	Time	LAeq	LASmax	LASmin	LAS1.7%	LAS8.3%	LAS25.0%	LAS50.0%	LAS90.0%
5/12/2023	17:00:00	**64.4**	81.0	40.3	69.4	67.5	65.3	62.6	54.6
5/12/2023	17:15:00	**63.9**	74.0	38.6	69.3	67.3	65.4	62.8	49.8
5/12/2023	17:30:00	**66.7**	88.5	40.1	73.9	68.5	65.4	62.4	52.0
5/12/2023	17:45:00	**64.0**	80.5	36.8	70.7	67.3	64.9	62.0	49.5
5/12/2023	18:00:00	63.7	83.2	39.0	68.3	66.3	64.2	61.7	51.3
5/12/2023	18:15:00	63.4	75.8	42.4	69.9	66.7	64.6	61.8	52.8
5/12/2023	18:30:00	62.3	72.4	39.0	67.7	65.9	64.0	61.0	48.0
5/12/2023	18:45:00	66.6	90.2	41.1	72.6	66.5	64.6	61.9	50.8
5/12/2023	19:00:00	62.8	73.3	45.1	72.6	67.1	62.8	59.0	46.9

Table 4. Results of Site D Ambient Sound Monitoring (58.2 CNEL)

Date	Time	LAeq	LASmax	LASmin	LAS1.7%	LAS8.3%	LAS25.0%	LAS50.0%	LAS90.0%
5/12/2023	17:00:56	**56.7**	74.2	40.0	62.0	58.9	57.1	54.3	48.4
5/12/2023	17:15:00	**57.2**	68.2	38.1	63.2	60.5	58.3	56.1	47.4
5/12/2023	17:30:00	**60.9**	84.0	39.5	69.0	62.5	58.9	55.7	48.5
5/12/2023	17:45:00	**56.1**	72.6	36.4	64.3	59.0	56.2	53.7	45.7
5/12/2023	18:00:00	54.5	73.0	37.9	60.3	56.6	54.4	52.3	46.0
5/12/2023	18:15:00	54.8	67.6	40.8	61.9	57.9	55.3	53.0	47.4
5/12/2023	18:30:00	53.7	64.7	39.3	60.0	56.8	54.9	52.6	45.3
5/12/2023	18:45:00	58.0	80.1	40.7	66.0	58.5	55.7	53.6	47.2

Note: All noise data are A-weighted decibels (dBA) referenced to 20 micropascals (μPa) and **bold data** are Peak-Hour.

Table 5 - 2023 Traffic Model Input Data and Predicted Site Noise Results (5/18/2023)

Comparison of measured and predicted existing traffic noise (FHWA/ CALVENO Model)	Rancho Vista Blvd. AEA Measurement Time 5 P.M. - 7 P.M.	TTM 83674 Project 24-Hour Traffic CNEL Exposure
2023 Average Daily Traffic Volume	16,200 [1]	
P.M. 2023 Peak Hour Volume	1,630 (1,612 auto + 4 mc + 10 mt + 5 ht)	
P.M. Peak Hour ADT %	10.06	
Medium / Heavy Trucks (% of ADT)	0.06 / 0.03	
Posted Speed (MPH)	55	
A. Measured Leq (dBA), [2023]	66.9 [90' to Rancho Vista C/L]	
A. Predicted Leq (dBA), [2023]	66.9 [90' to Rancho Vista C/L]	66.38
A. Peak Hour Correction (dBA)	0.0	Corrected = 66.38
B. Measured Leq (dBA), [2023]	60.0 [140' to Rancho Vista C/L]	
B. Predicted Leq (dBA), [2023]	64.0 [140' to Rancho Vista C/L]	63.51
B. Peak Hour Correction (dBA)	-4.0	Corrected = 59.51
C. Measured Leq (dBA), [2023]	64.9 [90' to Rancho Vista C/L]	
C. Predicted Leq (dBA), [2023]	66.9 [90' to Rancho Vista C/L]	66.38
C. Peak Hour Correction (dBA)	-2.0	Corrected = 64.38
D. Measured Leq (dBA), [2023]	58.2 [140' to Rancho Vista C/L]	
D. Predicted Leq (dBA), [2023]	64.0 [140' to Rancho Vista C/L]	63.51
D. Peak Hour Correction (dBA)	-5.8	Corrected = 57.71

Note 1: SOURCE: Ganddini Group Inc., TTM 83674 Palmdale Traffic Impact Analysis, 8/10/2023

Architectural Acoustics Recommendations

Noise intrusion from exterior traffic noise is required to be mitigated such that the unoccupied interior CNEL is 45 dBA, or less. The existing exterior CNEL at the noise measurement sites are given in Tables 1-4 are 66.9, 60.0, 64.9 and 58.2. Two of these existing exterior CNELs are near or slightly above the 65 CNEL exterior noise limit. Table 5 shows the FHWA computer noise model input data for Rancho Vista Blvd. and also shows the expected unabated and abated noise levels due to current traffic on the roadway.

Future traffic is expected to increase. Should the auto, medium truck and heavy truck volumes double over the next 20 build-out years, the future traffic noise levels in this area would increase by 3 dB, resulting in exterior traffic related CNELs of **69.6**, 63.0, **67.9** and 61.2 for Sites **A**, B, **C** and D, respectively. Thus, Sites A and C (90 feet from the centerline of Rancho Vista Blvd.) and therefore all portions of the project's residential outdoor living areas within 90 feet from that major roadway centerline, would exceed the 65 CNEL noise limit (assuming all the traffic noise is due to internal combustion driven vehicles. If a mandated secession of internal combustion driven vehicles occurs, traffic noise (and construction equipment noise as well) will decrease dramatically to a levels below the current noise limit.

In the event that motor vehicle operations and conditions remain as they currently exist, traffic noise will increase, thus requiring outdoor living area traffic noise abatement measures that reduce the traffic noise by up to 5 dBA for residential properties within 90 feet of the roadway centerline.

The following noise abatement guidelines are presented to meet the City interior noise limit.

Exterior Home Walls - A standard southern California inland exterior wall design, with thermal insulation, meets or exceeds 25 STC and would be adequate for this project.

Exterior Roof Assembly - A standard southern California inland roof/ceiling assembly design, with thermal insulation, meets or exceeds a rating of 25 STC and would be adequate.

Entry Doors - An exterior entry door/frame, such as a solid core exterior door with standard weather-stripping at jamb and head and a simple threshold seal, meets or exceeds a rating of 20 STC and would be adequate for such a project.

Windows - A standard southern California inland inoperable window assembly design meets or exceeds a rating of 20 STC and would be adequate.

Project Construction Noise

Noise effects from construction activities of the project are a function of the noise generated by construction equipment, the location and sensitivity of nearby land uses, and the timing and duration of the noise generating activities.

The noise levels generated by construction activities can be estimated at this stage based on assumed input parameters for a typical residential development. The accuracy of this estimate is directly related to the accuracy of the input parameters. The main assumptions made are for the number and types of equipment. Normally, for this type of estimate, the overall construction noise level is governed primarily by the high noise producing pieces of equipment. Table 6 lists the representative noise emission levels of the construction equipment anticipated for this project (EPA, 1971 and CERL, 1978). These noise estimates are for time-usage factor rated noise-

generating activities and would not be continuous noise emissions. The construction noise will rise and fall due to specific activities, their locations and type of equipment.

Noise levels at the nearby residential areas will increase temporarily due to the construction activities. In order to estimate the construction noise, the methods outlined by the Construction Engineering Research Laboratory have been used (CERL, 1978). The major assumption of this method, when the number and type of equipment have been properly estimated, is the time-usage factor. This parameter reflects the assumed fraction of time the item operates in its noisiest mode. The noise descriptor is termed the equivalent noise level (Leq) and forms the basis for calculating the Community Noise Equivalent Level (CNEL). Table 7 shows the estimated construction noise levels at the closest existing residential area during the major noise phases of the construction project. As can be seen in Table 7, half of the construction phases would exceed the 65 CNEL residential noise limit. In addition, it is estimated that truck and worker traffic volume increases, due to project construction related usage of local streets, would increase the local CNEL noise level by less than 1 dB.

Construction Noise Abatement Recommendations

Since this proposed project does deals only with the development of the residential areas, only measures under the control of the residential site contractor and developer are recommended.

Excessive noise is often due to poorly fitting equipment noise enclosures and ineffective engine mufflers. To be sure that the equipment is not significantly noisier than allowed, there should be appropriate steps taken by the construction contractor to assure that each piece of operating equipment is in good condition and that noise suppression equipment, such as engine mufflers and enclosures are working and fitted properly. Property line temporary noise and dust barriers must be implemented for excessively noisy construction activities near adjacent residential sites.

Do not allow noisy construction activities during the evening, nighttime, Sundays and legal holidays. Daytime construction noise levels emanating from the acoustic center of the project site during site grading and the paving phases would exceed the 65 CNEL by at least 9 dB. Exterior construction noise could exceed the 65 CNEL by up to 12 dB for the nearest activity and duration of the construction. These potential construction noise exceedances would need to be monitored, verified and properly mitigated when exceedances occur.

Since the property lines of existing residential properties adjacent to the construction site, construction noise monitoring must be performed along them. However, measurements need to be made at least 10 feet away from hard reflecting surfaces such as buildings and walls to avoid coherence between incoming source noise and outgoing reflected noise.

It is recommended that the construction contractor(s) be prepared to install temporary 25 STC noise barriers that are 8 feet higher than the offending noise sources (exhaust stacks, engines, etc.) and will block any direct line of sight between excessive equipment noise sources and 6 feet high AGL residential receiver locations such as outdoor living areas (patios and pools, etc.) and also first floor windows. Since construction noise must cease after 7 p.m., noise shielding of upper level windows would not generally be required, except for rooms with day sleepers (which would then need to be unequally protected on a case by case basis).

Table 6. Construction Equipment and Associated Noise

CONSTRUCTION PHASE	CONSTRUCTION EQUIPMENT, (Number & Item)	Max #/Hour	TIME DURATION	ITEM 50 FT NOISE LEVEL, Lmax dB(A)	USE FACTOR %	TOTAL 50 FT NOISE LEVEL, Leq dB(A)
1. Site Clearing	2 Loaders	2	1 week	82	16	77.1
	3 Saws	3	"	78	25	76.8
	1 Water Truck	1	"	87	10	77.0
	4 End Dump Trucks	2	2 days	85	16	80.1
2. Site Grading	3 Loader Dozers	3	3 weeks	85	16	77
	3 Scrapers	3	"	88	25	82
	1 980 Loader	1	"	82	16	74
	1 Blade	1	2 weeks	85	5	72
	1 Water Truck	1	4 weeks	87	10	77
3. Underground	1 Backhoe	1	5 weeks	86	16	86
	1 24" Vibrator	1	2 weeks	82	25	82
	2 Delivery Trucks	2	Varies	78	16	78
4. Conc. Foundation	1 Backhoe	1	1 week	85	16	85
	1 Skip Loader	1	3 weeks	82	16	82
	11 Concrete Trucks	4	2 weeks	79	40	79
	4 Power Saws	4	6 weeks	78	25	78
5. Masonry Walls	1 Backhoe	1	3 days	85	16	85
	1 Cement Mixer	1	3 weeks	68	16	85
	5 Concrete Trucks	2	2 weeks	85	16	79
	1 Concrete Pump	1	"	82	16	76
6. Framing	1 Fork Lift	1	15 weeks	81	10	81
	12 Power Saws	6	"	78	10	78
	2 Delivery Trucks	2	"	78	5	78
	2 Compressors	2	10 weeks	82	40	82
7. Paving	1 Blade	1	2 weeks	85	12	85
	1 Water Truck	1	"	87	16	87
	2 Skip Loaders	2	"	82	4	82
	2 Concrete Trucks	2	3 days	85	16	79
	3 Asphalt Trucks	3	2 days	85	16	79
	1 Paving Machine	1	"	85	12	85
	1 Roller	1	"	77	10	77
8. Plaster/Stucco	2 Compressors	2	8 days	82	40	82
	1 Plaster Pump	1	14 days	79	8	79
	1 Mixer	1	10 days	68	16	68

Table 7. Nosie Impacts to Adjacent Residential Areas

CONSTRUCTION PHASE	TYPICAL DURATION	NOISE LEVEL Leq(9 Hr)	NOISE LEVEL CNEL
1. Site Clearing	3 days of 1 week	63.8	60.7
	2 days of 1 week	66.8	63.7
2 Site Grading	2 weeks of 4 weeks	66.5	63.5
	2 weeks of 4 weeks	71.8	**68.7**
3. Concrete Foundation	1 weeks of 6 weeks	57.8	54.7
	2 weeks of 6 weeks	59.3	56.2
	3 weeks of 6 weeks	61.6	58.5
	4 weeks of 6 weeks	64.7	61.6
Residential Bldgs.	exterior construction	77.0	**74.0**
4. Masonry Walls	1 week of 3 weeks	58.0	54.7
	2 weeks of 3 weeks	64.8	61.7
Residential Yards	exterior construction	77.0	**74.0**
5. Framing	5 weeks of 15 weeks	62.9	59.8
	10 Weeks of 15 wks	67.0	63.9
6. Paving	11 days of 2 weeks	66.0	62.9
	3 days of 2 weeks	68.1	65.0
	2 days of 2 weeks	71.1	**68.0**
7. Plaster/Stucco	2 days of 2 weeks	55.1	52.0
	4 days of 2 weeks	54.8	51.7
	8 days of 2 weeks	65.2	62.1

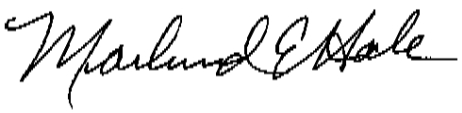
Note: Bold CNEL values exceed the residential exterior noise limit for daytime hours only.

Conclusions

Based on our ambient exterior noise measurements, upon proper implementation of the recommended project noise abatement measures the future project would be in compliance with the external and interior residential noise mitigation requirements of the City. This concludes our report on the requested noise study.

If you have any questions regarding this noise study data or report, please contact me at (805) 583-8207, or my cell phone at (805) 231-1242. I am available to continue working with you, as needed, as you complete this project.

Sincerely,



Marlund E. Hale, Ph.D., P.E., ASA, INCE, NCAC
Technical Director

APPENDIX

Acoustical Terminology

A-WEIGHTED SOUND LEVEL:	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear and gives good correlation with subjective reactions to noise.
CNEL:	Community Noise Equivalent Level. The average equivalent sound level during a 24 hour day, obtained after addition of approximately five decibels to sound levels in the evening from 7:00 p.m. to 10:00 p.m. and ten decibels to sound levels in the night between 10:00 p.m. and 7:00 a.m. The CNEL is typically within ±1 dB of the Day Night Level (LDN). The LDN is a similar descriptor to CNEL; to calculate LDN, ten decibels are added to sound levels between 10:00 p.m. and 7:00 a.m., but no weighting is added to the evening (7:00 p.m. to 10:00 p.m.) levels.
DECIBEL, dB:	A unit for describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals.
Leq:	Equivalent Sound Level. The sound level containing the same total energy as a time-varying sound over a given sample period. Leq is typically computed over 15-60 minutes and 1, 8 or 24-hour sample periods.
STC, dB	An STC rating (Sound Transmission Class rating) is a score given to a surface (barrier, wall, ceiling, window, etc.) based on its ability to reduce sound coming through it. STC ratings range from 25 – 65. The higher the rating, the lower the noise transmission or penetration.