MORRIS ENGINEERING COMPANY
P.O. Box 73, Fillmore, CA 93016-0073 • Ph/Fax: (805) 524-3727 • Email: FarmorBob@earthlink.net
"Sound Advice" - Noise • Pressure Pulsation • Surge • Vibration

October 1, 2003

Mr. David L. Magney
DAVID MAGNEY ENVIRONMENTAL CONSULTING
P.O. Box 1346
Ojai, CA 93024-1346

Subj.: Newhall County Water District Vasquez Water Main Project Draft EIR Noise Study.

Ref.: DMEC Project 01-0112-5
MEC S/O A320

Dear Mr. Magney:

The noise impact of the installation of an 18-inch diameter water main along Vasquez Canyon Road was analyzed. The approximately 2.4 mile long water main will provide water to residences and business in an approximate four square mile service area on Vasquez Canyon Road in the Santa Clarita Valley of Los Angeles County, California. This analysis predicted construction noise for the proposed equipment listed in Reference 15 (Appendix A).

The California Administrative Code and the Building Code (Reference 1 & 2) require that the interior noise levels from exterior sources do not exceed 45 CNEL in any habitable room for new residential construction. For typical community noises, the Ldn (Day–Night average sound level) is equivalent to CNEL. Acoustical terms are defined in Appendix B. This standard requires analysis of noise isolation for new residences in areas of long-term community noise above 60 CNEL. This does not apply to short term construction noise or existing residential units.

Caltrans and the Federal Highway Administration (FHA) require evaluation of highway construction noise (References 10 through 14) only if construction noise is anticipated to be a substantial problem. Since construction noise is of a temporary nature there are apparently no regulatory established limits for construction noise, although there are some recommended limits. For daytime construction, the 8-hour limits for various land uses are 80 Leq for residential, 85 Leq for commercial and 90 Leq for industrial. The 30-day average limits are 75 Ldn for residential, 80 Leq (24 hour) for commercial and 85 Leq for industrial. In urban areas with very high ambient noise levels (Ldn>65 dBA), the Ldn from construction operations should not exceed existing ambient more than 10 dBA. The noise limits are specified at the sensitive receiver, such as 5 feet from the building wall, or the property line, etc.

Potentially impacted noise sensitive land uses are the Mint Canyon Elementary School at 16400 Sierra Highway, the trailer park near the entrance to the School,

another trailer park at Gaspe Street and Vasquez Canyon Road and various homes near Vasquez Canyon Road. The school buildings are 350 to 400 feet from the centerline of Sierra Highway. The trailer park units nearest the Sierra Highway are about 70 feet from the road centerline. The trailers at the park at Gaspe Street are at least 300 feet from the centerline of Vasquez Canyon Road. Most of the homes are several hundred feet from Vasquez Canyon Road.

Morning traffic noise was measured on September 22, 2003 at two locations. This was to determine the existing ambient sound levels. The traffic noise was 72.4 Leq 60 feet east of the road centerline at 16613 Vasquez Canyon Road. This is near the North end of the project. Traffic noise was 70.1 Leq 55 feet south of the road centerline at 16400 Sierra Highway. This is near the southwest end of the project. Traffic volume counts were manually obtained at the same time to use in traffic noise prediction equations. Table 2 summarizes the traffic noise calculations for traffic noise 200 feet and 400 feet from the street centerline for these two locations. For Vasquez Canyon Road and Sierra Highway the calculated sound levels were 64.5 and 61.6 dBA at 200 feet and 60 and 57.1 dBA at 400 feet from the centerline. Figure 1 presents typical sound levels for comparison to known noise sources.

Using the equipment list and operation times in reference #15, the construction sound levels were calculated. Morris Engineering Company data and equipment sound data from several sources were used for maximum sound power levels. Figure 2 is a graphical presentation of some equipment noise levels from the EPA. The average sound power level was calculated for each piece of equipment based on the hours of operation. Then, the estimated sound levels at 50 and 200 feet were calculated. The calculations are summarized in Table 1. The sound levels are also combined for all pieces of equipment operating simultaneously. This is a very unlikely worst case, which most likely will never exist.

Most noise sensitive land uses are 200 feet or more from the construction areas. The school and homes will be exposed to construction noise levels well below 80 dBA. At 400 feet from the construction, the maximum sound level, if all equipment operated simultaneously would be below 74 dBA. Since all equipment will not be operating at the same time, the maximum sound levels will be lower than the total of all equipment. It is expected that the maximum hourly equivalent sound level at 50 feet will be near 84 dBA (trencher or water truck). The residences nearest the street in the trailer park near 16400 Sierra Highway could be exposed to sound levels up to 85 dBA. All other land uses within 50 feet are commercial, industrial or rural open space with an 8-hour limit above 85 dBA.

The only area requiring mitigation of construction noise is the trailer park near 16400 Sierra Highway. The equipment that can produce noise levels above 80 dBA are the Vermear Trencher, the 312 Cat excavator, the end dump trucks and the water truck. It is recommended that the trailer park residents be contacted and informed of the short-term noise impact and given an estimated time frame of the disruption. The establishment of a good rapport with the community can provide

high benefits for low cost. Instill an awareness of public attitudes and reactions in the equipment operators so that unnecessary annoyances are avoided. Have the operators keep the equipment in good repair to minimize excessive noise. If possible, use equipment designed for quiet operations. Keep mufflers in good repair. Keep equipment enclosure doors closed. Locate equipment such as compressors as far away as possible from noise sensitive areas. Limit construction to the daytime hours. If night or evening maintenance of equipment is performed, do the maintenance away from the trailer park or other noise sensitive land uses.

In conclusion, the construction noise will only have a significant impact on the trailer park at Sierra Highway. All other land uses are far enough away from the construction so that the noise will be below the limits for the land use. Since the construction is very short term at each location, the best mitigation is communication with the residents and care in construction operations to minimize noise impacts.

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

Very truly yours,

Robert P. Morris, P.E.
Consultant

Enc.: Figure 1 – Typical A-Weighted Sound levels
Figure 2 – Construction Equipment Maximum Noise Levels
Table 1 – Equipment Usage and Estimated Sound Levels
Table 2 – Highway Traffic Noise Calculations for NCWD
Appendix A – References
Appendix B – Acoustic Terminology

FIGURE 1
TYPICAL A-WEIGHTED SOUND LEVELS

Given Distance From Noise Source	Decibels RE $20\mu N\ m^2$	Environmental
50 HP Siren (100')	130	Possible permanent hearing damage
		Pain threshold
Jet Take off (200')		
	120	
Riveting machine (3'), Grinding (3')	110	Casting shake-out area
Power saw, Paint spraying (3') Pneumatic peen hammer		
	100	Electric furnace area
Punch press (3')		
Textile weaving plant (3')		
50kw electric motor (3'); Subway train (20')	90	Boiler room Printing press plant; LA 3rd floor apartment near freeway
Train (300')		LA - 3/4 mile from touchdown at airport [Ldn]
Pneumatic drill (50')		
Lathe (3')	80	Tabulating room Inside sport car (50 MPH) Harlem - 2nd floor apartment [Ldn]
Vacuum cleaner (10')	70	Stereo music [50 - 70 Leq]
Speech (1')		Boston- Row housing on major avenue [Ldn] Large office; Normal conversation Large Store: Watts-8 miles from LAX [Ldn] Medium office; Misc. business; Near freeway (Auto traffic)
	60	Small store; Old residential area in LA [Ldn] Small office; Accounting office TV Listening [55 - 60 Leq] Residence - speech at 10 feet
Large transformer (200')		Private business office
Light traffic (100')	50	Insulated restroom; Fillmore - small town cul-de-sac [Ldn] Average residence Residence - no TV or Radio Oxnard - Tomato field on farm [Ldn]
	40	Minimum levels - Residential area in Chicago at night
Soft whisper (5')		
	30	Studio (Speech)
	20	Studio for sound pictures; Very quiet bedroom
	10	
Threshold of hearing for youths at 1,000 to 4,000 Hz	0	

FIGURE 2

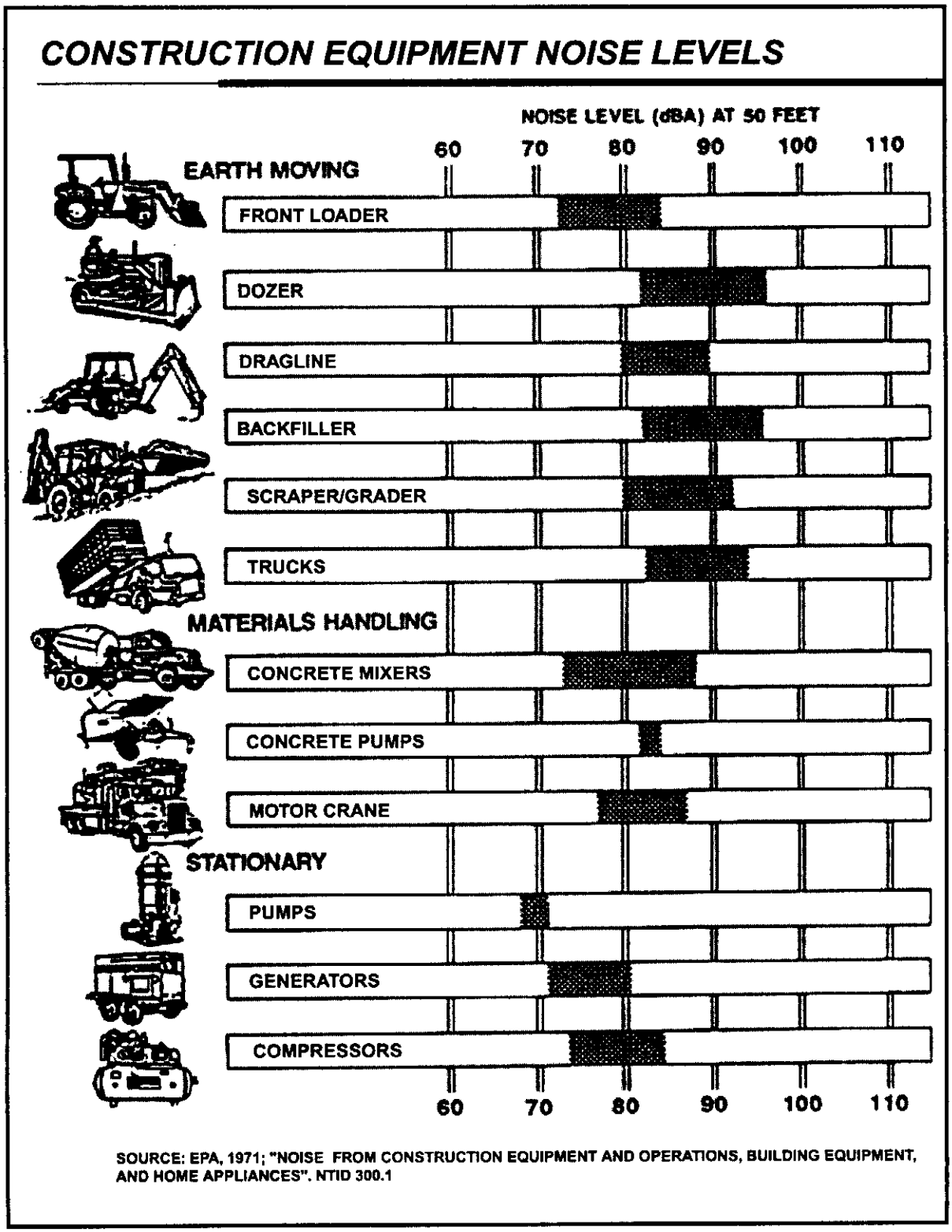
CONSTRUCTION EQUIPMENT NOISE LEVELS
NOISE LEVEL (dBA) AT 50 FEET
60
70
80
90
100
110
EARTH MOVING
FRONT LOADER
DOZER
DRAGLINE
BACKFILLER
SCRAPER/GRADER
TRUCKS
MATERIALS HANDLING
CONCRETE MIXERS
CONCRETE PUMPS
MOTOR CRANE
STATIONARY
PUMPS
GENERATORS
COMPRESSORS
60
70
80
90
100
110
SOURCE: EPA, 1971; "NOISE FROM CONSTRUCTION EQUIPMENT AND OPERATIONS, BUILDING EQUIPMENT, AND HOME APPLIANCES". NTID 300.1

TABLE 1
Newhall County Water District - Vasquez Canyon Road Pipeline EIR
Equipment Usage and Estimated Sound Levels

Equipment	Trips per Day	Time[1] in use Days - Hours	Maximum PWL[2] dBA	Average PWL[3] dBA	SL[4] at 50' dBA	SL[4] at 200' dBA
4 NCWD Light Duty Trucks						
GMC Work Truck # 5	20 for 4 trucks	60 days @ 2 Hrs	110	104	72	60
GMC Work Truck # 6	(800 total job)	60 days @ 2 Hrs	110	104	72	60
GMC Work Truck #21	"	60 days @ 2 Hrs	110	104	72	60
GMC Work Truck #66	"	*60 days @ 2 Hrs*				
GMC Work Truck #68	"	60 days @ 2 Hrs	110	104	72	60
Total SL if simultaneous operation of trucks				110	78	66
4 End Dumps & 1 Water Truck						
(1) End Dump	30 trips	67 days @ 5 Hrs	116	114	82	70
(2) End Dump	(1200 total job)	67 days @ 5 Hrs	116	114	82	70
(3) End Dump	"	67 days @ 5 Hrs	116	114	82	70
(4) End Dump	"	67 days @ 5 Hrs	116	114	82	70
2000 Gal. Water Truck	"	60 days @ 8 Hrs	116	116	84	72
Total SL if simultaneous operation of dump and water trucks				121	89	77
Excavation						
312 CAT Excavator	N/A	60 days @ 8 Hrs	117	112	80	68
950G CAT Loader	N/A	60 days @ 8 Hrs	112	107	75	63
655E Backhoe	N/A	60 days @ 8 Hrs	112	107	75	63
AV Street Sweeper	N/A	35 days @ 8 Hrs	112	107	75	63
Total SL if simultaneous operation of excavation equipment				115	83	71
Preparation, Backfill, etc.						
Vermeer Trencher	N/A	3 days @ 8 Hrs	121	116	84	72
Saw Cutting Equipment	N/A	5 days @ 8 Hrs	112	107	75	63
Andel Engnrng Work Truck	N/A	30 days @ 8 Hrs	110	105	73	61
Geobase Work Truck	N/A	40 days @ 2 Hrs	110	99	67	55
Mikasa MT-T6D Wacker	N/A	14 days @ 8 Hrs	112	107	75	63
Vulcan Truck & Trailer	N/A	32 days @ 6 Hrs	116	109	78	66
Total SL if simultaneous operation of trencher and other equipment				118	86	74
MAXIMUM EQUIVALENT PWL and SL - if all operated simultaneously.				124	92	80

Notes:

1. "Time in use" is used to calculate the Average Sound Power Level.
2. Maximum PWL is the estimated maximum Sound Power Level for the specific piece of equipment. Sound Power is total sound energy emitted.
3. Average PWL is the equivalent sound power energy for hours of operation during the day.
4. Sound Level is calculated from the PWL and distance to the source. For point sources the SL decreases 6 dB for every doubling of distance ($SL = PWL - (20*LOG_{10}(Distance) - 2.3)$).

TABLE 2

HIGHWAY TRAFFIC NOISE CALCULATIONS FOR NCWD
16613 Vasquez Canyon Road & 16400 Sierra Highway

DATA DESCRIPTION	LOCATION OF HIGHWAY NOISE CALCULATION					
	Vasquez Canyon Road			Sierra Highway		
	Measured	200'	400'	Measured	200'	400'
INPUT DATA:						
Peak VPH(Vehicles Per Hour)	312	312	312	612	612	612
%MT (% Med. Trks, 6 Tires)	2.0	2.0	2.0	2.0	2.0	2.0
%HT (% Heavy Trk, 3+Axles)	1.0	1.0	1.0	1.0	1.0	1.0
MPH (Average Speed)	45.0	45.0	45.0	45.0	45.0	45.0
Dc (Horz. Dist. Center L.) -Feet	60.00	200.00	400.00	55.00	200.00	400.00
Dnc (Horz. Dist. Near C.L.) - Feet	6.00	6.00	6.00	12.00	12.00	6.00
Dfc (Horz. Dist. Far C.L.) - Feet	6.00	6.00	6.00	12.00	12.00	6.00
Dbc (Horz. Dist. Barr-C.L.) - Feet	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
Es (Elev. Road Surface) - Feet	100.00	100.00	100.00	100.00	100.00	100.00
Eb (Elev. Top Barrier) - Feet	100.00	100.00	100.00	100.00	100.00	100.00
Er (Elev. Receiver) - Feet	105.00	105.00	105.00	105.00	105.00	105.00
Other Adjustments - dB	10.00	10.00	10.00	4.10	4.10	4.10
OUTPUT DATA:						
Car Volume - VPH	303	303	303	594	594	594
Medium Truck Volume - VPH	6	6	6	12	12	12
Heavy Truck Volume - VPH	3	3	3	6	6	6
Car & Med. Truck Speed - MPH	45.0	45.0	45.0	45.0	45.0	45.0
Heavy Truck Speed - MPH	45.0	45.0	45.0	45.0	45.0	45.0
De (Equiv. Horz. Dist.) - Feet	59.70	199.91	399.95	53.67	199.64	399.95
WITHOUT ANY BARRIER EFFECT:						
Leq - Cars	71.2	63.3	58.8	68.9	60.4	55.8
Leq - Medium Trucks	62.4	54.6	50.1	60.2	51.7	47.2
Leq - Heavy Trucks	64.0	56.1	51.6	61.8	53.2	48.7
Leq - All Vehicles	72.4	64.5	60.0	70.1	61.6	57.1
WITH BARRIER:						
Sight Line Height(Cars) - Feet	0.00	0.00	0.00	0.00	0.00	0.00
Sight Line Height(MT) - Feet	0.00	0.00	0.00	0.00	0.00	0.00
Sight Line Height (Trucks) - Feet	0.00	0.00	0.00	0.00	0.00	0.00
Sight Line Stack (H.T.) - Feet	0.00	0.00	0.00	0.00	0.00	0.00
Leq - Cars	71.2	63.3	58.8	68.9	60.4	55.8
Leq - Medium Trucks	62.4	54.6	50.1	60.2	51.7	47.2
Leq - Heavy Trucks	64.0	56.1	51.6	61.8	53.2	48.7
TOTAL Barrier Field Insertion Loss	0.0	0.0	0.0	0.0	0.0	0.0
Leq - All Vehicles	72.4	64.5	60.0	70.1	61.6	57.1

Notes: Equations from FHWA RD-77-108 & FHWA/CA/TL-87/03 (Calveno).
Er is at ear level (add 5 feet to surface elevation)
Source Heights: Car 0.0 Ft; Med. Trk 2.3 Ft; H. Trk 8.0 Ft; Stack 11.5 Ft.

APPENDIX A
REFERENCES

1. California Administrative Code, Title 25, Chapter 1, Subchapter 1, Article 4, January 1981.
2. International Conference of Building Officials, "Uniform Building Code", Appendix Chapter 35.
3. Gordon, C.G.; Galloway, W.J.; Kugler, B.A.; & Nelson D.L.; "Highway Noise - A Design Guide for Highway Engineers.", NCHRP Report 117 (1971) 79 pp.
4. Barry, T.M.; Reagan, J.A.; "FHWA Highway Traffic Noise Prediction Model.", Federal Highway Administration report FHWA RD-77-108, December 1978.
5. Hendriks, R.W.; "California Vehicle Emissions Levels.", California Department of Transportation report FHWA/CA/TL-87/03, January 1987.
6. U.S. Environmental Protection Agency - Office of Noise Abatement and Control, "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety." EPA Report 550/9-74-004, March 1974, 159 pp.
7. Harris, C.M.(ed.), "Handbook of Noise Control", 2nd edition, McGraw-Hill, New York, 1979.
8. Beranek, L.L.(ed.), "Noise and Vibration Control", McGraw-Hill, N.Y., 1971.
9. Gray, D.E.(ed.), "American Institute of Physics Handbook", McGraw-Hill, New York, 1972.
10. U.S. Environmental Protection Agency, "Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances" NTID300.1, December 31, 1971.
11. U.S. Department of Transportation, Federal Highway Administration, "Analysis of Highway Construction Noise" March 13, 1984
12. William R. Fuller and Ron Brown, "Analysis and Abatement of Highway Construction Noise," EPA 550/9-81-314-A, U.S. Environmental Protection Agency, Office of Noise Abatement and Control and U.S. Department of Transportation, Federal Highway Administration, June 1981.
13. Caltrans, "Standard Environmental Reference," Chapter 12, Noise, Construction Impacts., April 21, 2003
14. Caltrans, "Traffic Noise Analysis Protocol, For New Highway Construction and Highway Reconstruction Projects," CaTNAP, section 1.4.5, page 3, October 1998.
15. David Magney Environmental Consulting letter of 27 August 2003 to Morris Engineering Co. with Equipment list and map for NCWD Pipeline Project Noise Study.

APPENDIX B
ACOUSTIC TERMINOLOGY

AMBIENT NOISE: All-encompassing noise associated with a given environment, being usually a composite of sounds from many sources, near and far. No particular sound is dominant.

AUDIO FREQUENCY: An audible sound wave frequency. Audio frequencies are between 20 and 20,000 Hz.

A-WEIGHTED SOUND LEVEL, L_A: The sound level obtained by use of A-weighting. A sound level meter with A-weighting is progressively less sensitive to sound of frequencies below 1000 Hz, somewhat as is the ear. The unit is the decibel and unit symbol is dBA or dB(A).

BARRIER: A shielding structure used to increase the effective length of the transmission path between two points (source to receiver) and thus provide sound reduction.

COMMUNITY NOISE EQUIVALENT LEVEL, CNEL: A 24-hour equivalent continuous sound level, i.e., the time-averaged A-weighted sound levels from midnight to midnight, obtained after the addition of 5 dBA to sound levels from 7:00 p.m. to 10:00 p.m. and the addition of 10 dBA to sound levels from 10:00 p.m. to 7:00 a.m.

DAY-NIGHT AVERAGE SOUND LEVEL, L_{dn}: A 24-hour equivalent continuous sound level, i.e., the time-averaged A-weighted sound level from midnight to midnight, obtained after the addition of 10 dBA to sound levels between the hours of 10:00 p.m. and 7:00 a.m.

DECIBEL, dB: A unit of level, measured on a logarithmic scale. The threshold of hearing is 0 dB. Ten times this power level is 10 dB and ten times this pressure level is 20 dB.

EQUIVALENT CONTINUOUS SOUND LEVEL, L_{eq}: The equivalent continuous sound level which will deliver the same A-weighted sound energy as the measured fluctuating sound in the same time period.

FREQUENCY, Hz: The number of times in one second that a periodic phenomenon, such as a sound wave, repeats itself. The unit of frequency is the hertz (Hz).

IMPACT ISOLATION CLASS, IIC: A single number rating of impact sound insulation of a floor-ceiling assembly at different frequencies, derived from measured values of impact sound insulation.

NOISE REDUCTION COEFFICIENT, NRC: A single number rating of the sound absorptive properties of a material. It is the arithmetic mean of the sound absorption coefficients at 250, 500, 1000, and 2000 Hz rounded to the nearest multiple of 0.05.

OCTAVE: The frequency interval between two sounds whose basic frequency ratio is 2.

PASCAL, Pa: A unit of pressure. 1 Pa = 1 Newton/meter^2 = 10 dynes/centimeter^2.

PICOWATT, pW: A unit of power. A millionth of one-millionth of a watt (10^{-12} W).

REVERBERATION TIME, T_{60}: The time that would be required for the sound pressure level in the enclosure to decrease by 60 dB after the source has stopped.

SABIN: A unit of measure of sound absorption; a measure of the sound absorption of a surface. One sabin is the equivalent of 1 ft^2 of a perfectly absorptive surface.

SOUND ABSORPTION COEFFICIENT, SAC: A measure of the sound absorptive property of a material as approximated by ASTM method C-423. SAC = 1.00 for 100% absorption.

SOUND LEVEL, L, SL: The quantity, in decibels, measured by an instrument satisfying a standards requirement, e.g., the American National Standard Specification for Sound Level Meters S1.4-1971. Fast time-averaging and A-weighting are usually understood, but it is good practice to specify both. Sound level in decibels is 20 times the logarithm to the base 10 of the ratio of a given sound pressure to the reference sound pressure of 20 micropascals.

SOUND POWER LEVEL, L_w, PWL: In decibels, 10 times the ratio of the logarithm (to the base 10) of the ratio of a given power to the reference power of 1 picowatt.

SOUND PRESSURE LEVEL, L_p, SPL: In decibels, 20 times the ratio of the logarithm (to the base 10) of the ratio of a sound pressure to the reference sound pressure of 20 micropascals.

SOUND TRANSMISSION CLASS, STC: A single number rating derived from measured values of sound transmission loss in accordance with ASTM E-413.

SOUND TRANSMISSION LOSS, TL: A measure of the sound insulation properties of a wall, floor, ceiling, window, door or silencer that is characteristic of the item and not of the room which it bounds.

X-PERCENTILE EXCEEDED SOUND LEVEL, L_x: The A-weighted sound level equaled or exceeded by a fluctuating sound level x percent of a stated time period. For example, L_{10} represents that sound level that is equaled or exceeded 10 percent of the stated time period.