Noise Monitoring Services
Sound and Vibration Measurement, Testing & Consulting

Noise Analysis Report

for the

Mixed Use Development at 24601 Hawthorne Boulevard in Torrance

October 13, 2020

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Introduction

This report details the exterior-to-interior noise analysis and mechanical equipment noise analysis performed for the proposed mixed-use project at 24601 Hawthorne Boulevard in Torrance. The proposed development will consist of two new buildings with a total floor area of 18,340 sq. ft. The project will consist of 11 apartments, common open spaces, and office building and a parking area. The noise study was performed to assess compliance with the City and State requirements. This report provides the City of Torrance Municipal Code and General Plan noise standards, the State of California Green Building Standards noise requirements, the existing noise levels at the site, an assessment of impact and the measures required to achieve compliance with the noise standards.

The location of the project site is shown in Figure 1. The site is bounded on the north by a gas station; on the east by Hawthorne Boulevard; on the south side by Via Valmonte and on the west by single family homes. Additional nearby residential properties are located south of Via Valmonte and east of Hawthorne Boulevard.

Figure 1 Project location

City of Torrance Noise Standards

The City of Torrance General Plan Noise Element provides guidelines for compatible land uses based on the exterior noise level. The Noise Element indicates that for offices and commercial buildings an exterior CNEL below 70 dBA is normally acceptable. For multi-family residences, an exterior CNEL of 70 dBA is normally acceptable. A CNEL above 70 dBA requires that noise insulation features are included in the project design. The Noise Element requires an interior Community Noise Equivalent Level (CNEL) no higher than 45 dBA for residential uses and 50 dBA for office uses.

Chapter 6, Article 7, Section 46.7.2 of the City of Torrance Municipal Code contains exterior noise limits on residential land. (See Appendix I for a glossary of acoustical terms used in this report).

46.7.2 Noise Limits.
To provide for methodical enforcement and to give reasonable notice of the performance standards to be met, the foregoing intent is expressed in the following numerical standards.

a) Noise Limits on Residential Land. It shall be unlawful for any person within the City of Torrance (wherever located) to produce noise in excess of the following levels as received on residential land owned or occupied by another person within the designated regions. In addition to the noise limits stated herein, the noise limits set forth in Section 46.7.2 b) shall also comply with.

1) For noise receivers located on residential land, for measurement positions five hundred (500) feet or more distance from the boundaries of Regions 1 (Region 1 includes the predominantly industrial areas in and around the refineries and industrial uses on the western edge of the City) and 2 (Region 2 includes the area in and around the airport and includes the commercial and industrial uses south of Lomita Boulevard and north of Pacific Coast Highway), the limits in Table 1 apply.

Table 1. Exterior noise levels

Region	Noise Level, dBA	
	Day (7:00 am to 10:00 pm)	Night (10:00 pm to 7:00 am)
3	50	45
Note: Region 3 encompasses the residential neighborhoods south of Pacific Coast Highway and west of Hawthorne Boulevard.		

2) For noise receivers located on residential land, for positions within five hundred (500) feet from the boundary of Region 1 or 2, the following limits apply: Five (5) dB above the limits set forth in Table 1, or 5 dB above the ambient noise level, whichever is the lower number.

b) Corrections to the Noise Limits: The numerical limits given in Sec 46.7.2.a) shall be adjusted by addition of the following corrections where appropriate in Table 2.

Table 2 Correction to the Exterior Noise Limits

Noise Conditions	Correction to the Limits, decibels
1. Noise contains a steady, audible tone, such as a whine, screech or hum	-5
2. Noise is a repetitive impulsive noise, such as hammering or riveting	-5
3. If the noise is not continuous, one of the following corrections to the limits shall be applied: a) Noise occurs less than 5 hours per day or less than 1 hour per night b) Noise occurs less than 90 minutes per day or less than 20 minutes per night c) Noise occurs less than 30 minutes per day or less than 6 minutes per night	 +5 +10 +15
4. Noise occurs on Sunday morning (between 12:01 am and 12:01 pm Sunday)	-5

The noise study requirements for this project, provided by the City, state that the operational noise level is significant if it exceeds 50 dBA Leq during the daytime and 45 dBA Leq during the nighttime at the property line of a residential property and cannot be mitigated to be below that level.

California Green Building Standards

The California Green Building Standards Code (CALGreen code) requires non-residential properties to have an interior hourly average noise level (Leq-1hr) attributable to exterior noise sources no higher than 50 dBA during any hour of operation in occupied areas.

Existing Noise Environment

Ambient noise in the area is primarily due to traffic on the nearby surface streets. A 24-hour ambient noise measurement was obtained at the site in order to determine the existing ambient noise levels at the nearby properties. The location of the measurement is provided in Figure 1. The measurement was obtained from 5:00 pm on March 4, 2020 for a period of 24-hours. Figure 2 provides the results of the ambient noise measurement. The noise measurement data is provided as 1-hour average sound levels over the duration of the measurement period. The range of 1-hour average noise levels during the daytime and nighttime periods and measured CNEL level are summarized in Table 3.

Table 3 Summary of ambient noise measurement results

Time period	Range of 1-hour average noise levels (dBA)	CNEL (dBA)
Daytime (7 am to 10 pm)	53.5 to 58.3	58.2
Nighttime (10 pm to 7 am)	45.9 to 53.8	

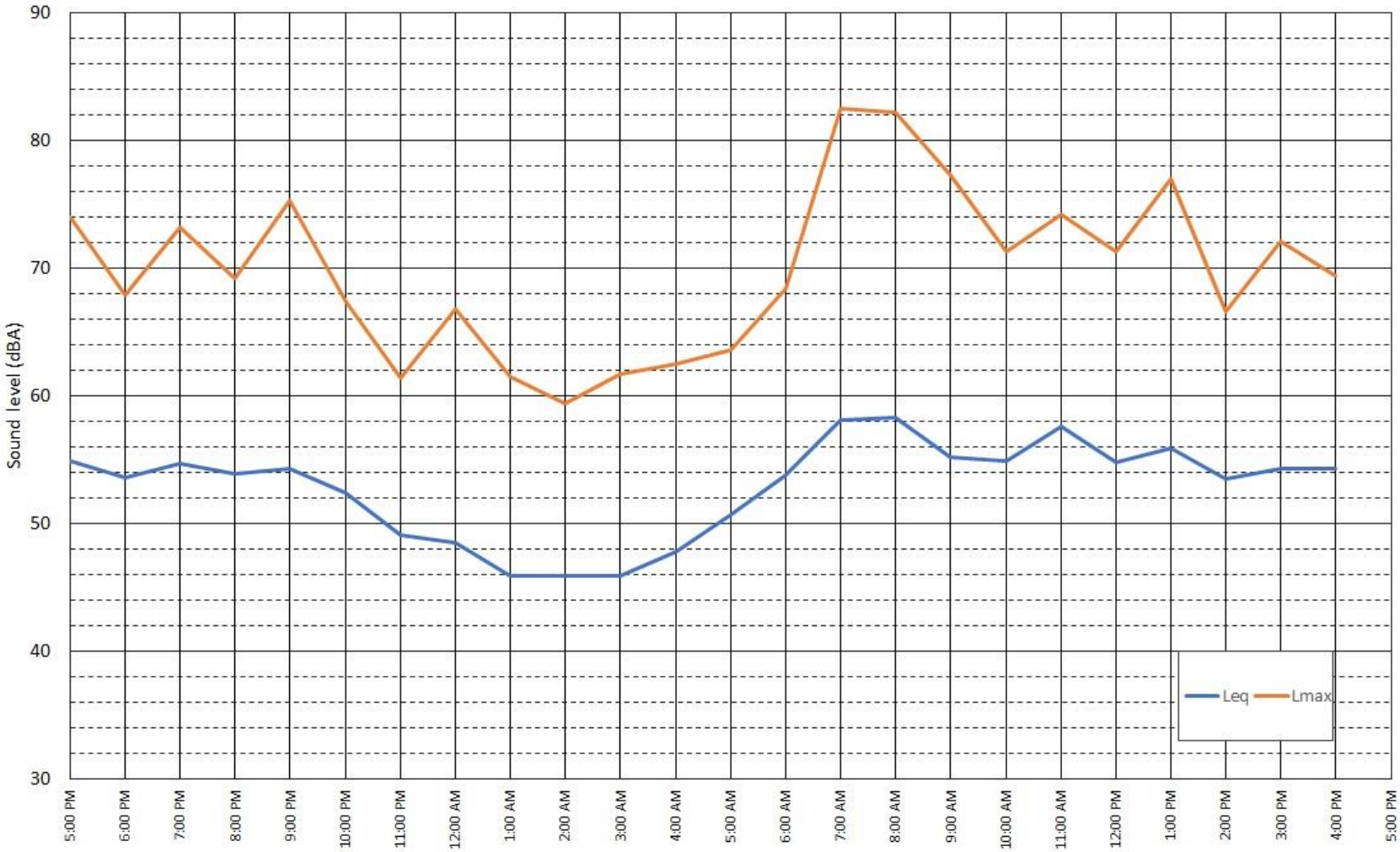

Figure 2 Measured ambient noise levels

HVAC Noise Analysis

The noise sources associated with the project include air conditioning units on the roof. The air conditioning units would be located on the roof approximately 70 feet from the nearest residential property line to the west. A computer noise model of the exterior noise sources was generated to estimate worst-case noise levels produced by the project operation of roof top air conditioning units. The estimated worst-case noise level would occur during nighttime, with the operation of twelve (12) roof top air conditioning units for the residential building and two (2) roof top air conditioning units for the office building. The manufacturer's sound data for air conditioning units are not available at this stage of the project. As part of our analysis, it was determined that a sound power level of 93.5 dBA (equivalent to a sound pressure level of 82.5 dBA at a distance of one meter from the equipment) for the air conditioning would be required to ensure the noise level will comply with the City's noise limits at the property lines of the nearby residential uses. The noise model was constructed using SoundPlan three-dimensional noise modeling software, which takes into account the locations, levels and frequency spectra of the noise sources, and the terrain, buildings and barriers at the site.

Our noise analysis indicates that the worst-case project operational noise levels will comply with the nighttime noise limit of 45 dBA Leq at the nearest residential property lines when HVAC equipment with a sound power level of 93.5 dBA or less is used. A noise contour map showing the modeled Leq noise levels is provided in Figure 3.

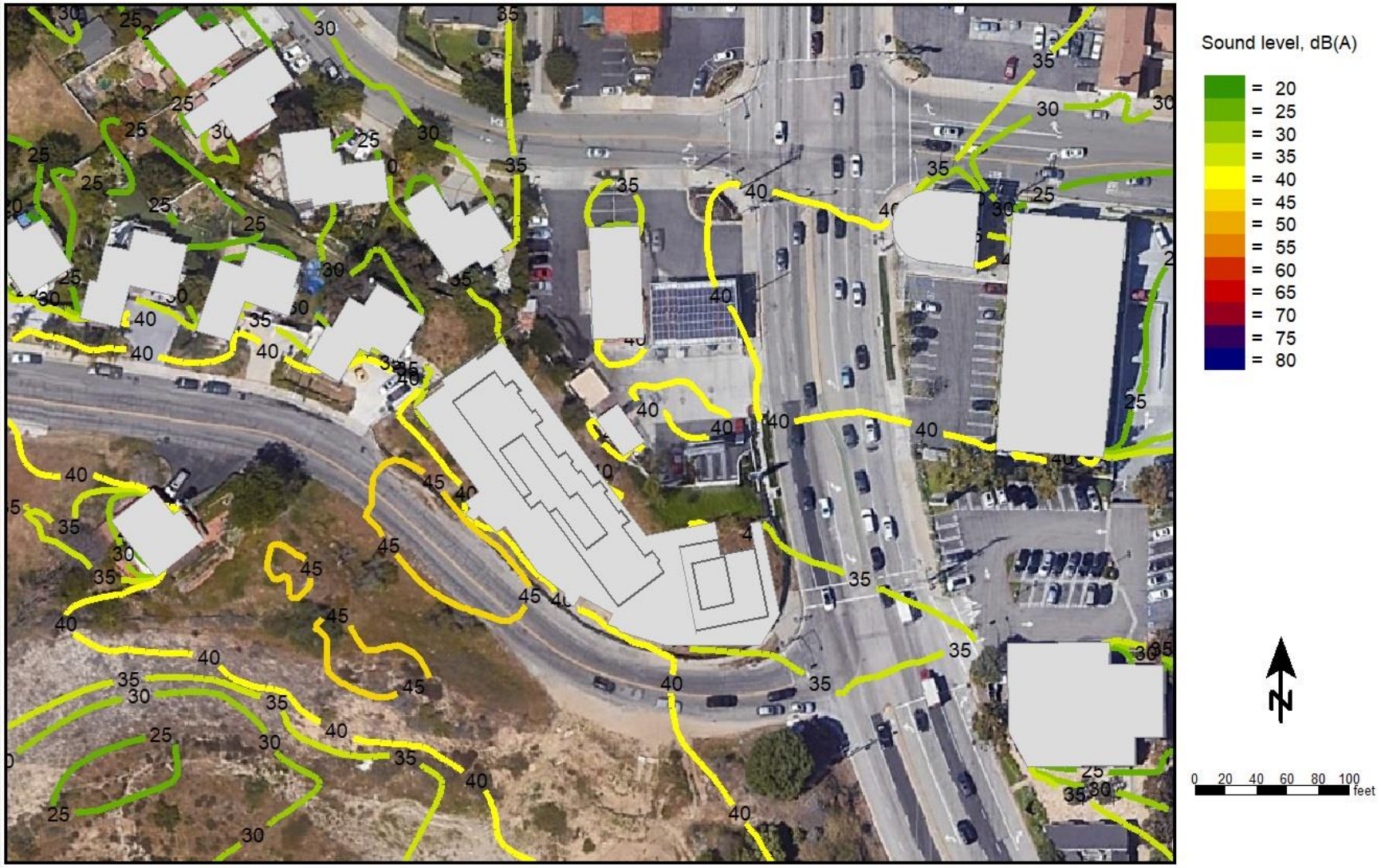

Figure 3 Roof top air conditioning unit operational noise level contour map

Interior Noise Analysis

Our study involved the modeling of noise levels at the site using three-dimensional noise modeling software. The model included the traffic on the roads near the site. The model accounts for the traffic volume and speed, road surface and gradient, and the barrier and reflective properties of the nearby buildings, barriers and terrain. The future (2030) traffic volumes on roads near the project site were estimated using 2008 traffic volume data provided in the Citywide Speed Zone Survey Engineering and Traffic Surveys in the City of Torrance based on traffic volume growth factor of 0.525% per year provided by the City of Torrance Department of Civil and Traffic Engineering. The following data was used in our analysis of traffic noise exposures at the site:

Table 4. Data Used in Future (2030) Traffic Noise Analysis

Traffic Parameter	Hawthorne Boulevard	Newton Street	Via Valmonte
Average Daily Traffic Volume (ADT)	43,315	47,874	4,559
Speed Limit	35 mph	35 mph	35 mph
Percentage medium trucks	1.8%	1.8%	1.8%
Percentage heavy trucks	0.7%	0.7%	0.7%

Our analysis indicates that the future exterior noise levels at the façade facing Hawthorne Boulevard will be up to 65 dBA CNEL at the residential building and up to 70 dBA CNEL at the office building. It was estimated that the future exterior noise levels during the loudest hour at the office building façade facing Hawthorne Boulevard will be 67 dBA Leq. The residential building will therefore need to provide a noise reduction of at least 20 dBA to comply with the City's interior residential noise standard of 45 dBA CNEL. The office building will need to provide a noise reduction of at least 20 dBA to comply with the City's interior office noise standard of 50 dBA CNEL. A noise reduction of 17 dBA at the office area will be required to comply with the CALGreen code's non-residential use interior 50 dBA Leq 1-hr. Compliance with the City standards will therefore ensure compliance with the State standards. Noise contour maps showing the exterior levels are provided in Figures 4 and 5.

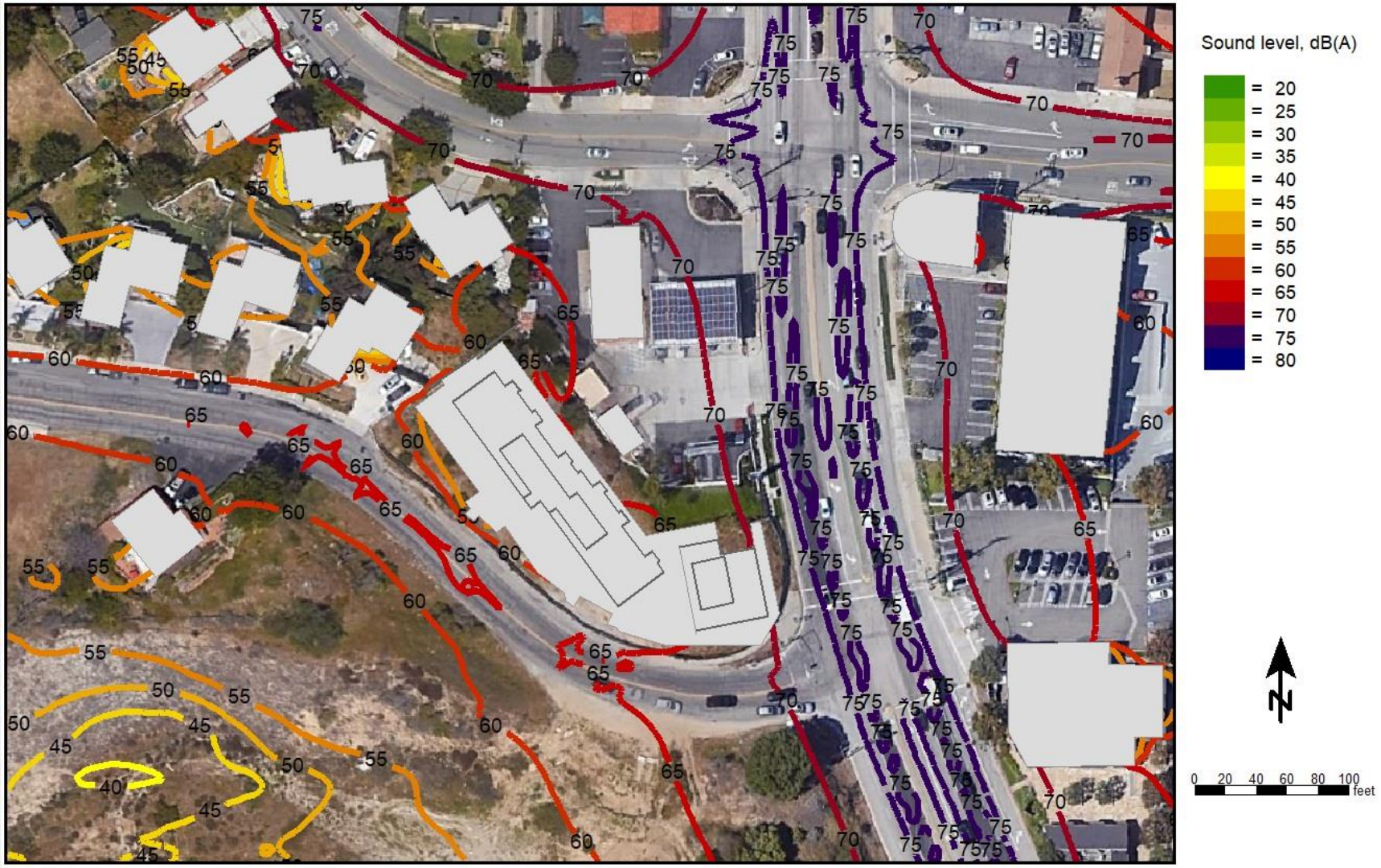

Figure 4 Predicted Future CNEL Noise Levels 5 ft Above Ground Level (First Floor Locations)

Figure 5 Predicted Future CNEL Noise Levels 8 ft Above Ground Level (Second Floor Locations)

Recommendations

The following noise control recommendations are provided to achieve compliance with the City of Torrance interior noise standard of 45 dBA CNEL for residential uses and 50 dBA CNEL for office uses and exterior noise limits at the nearby residential uses:

1. The maximum sound power level for each piece of rooftop mechanical equipment shall not exceed a sound power level of 93.5 dBA (equivalent to a sound pressure level of 82.5 dBA at a distance of one meter from the equipment).

2. Exterior walls of the residential building and office building shall be constructed as follows:
   a. Minimum 7/8" stucco exterior finish;
   b. Minimum 6" studs;
   c. Stud space filled with minimum R-19 insulation batts;
   d. 5/8" gypsum wallboard interior.

3. All window and door assemblies used throughout the project shall be well fitted and well weather-stripped. The perimeters of all window and door frames shall be sealed to the exterior wall construction with a weather-resistant sealant. The windows and doors of the residential and office unit facades shall also be sound-rated assemblies. Figures 6 through 8 describe the locations at which sound-rated assemblies are necessary, and the minimum outdoor-indoor transmission class (OITC) ratings required.

4. The interior noise standard is to be met with windows and doors closed. Therefore, ventilation is required per the Uniform Building Code and Uniform Mechanical Code standards in order to provide a habitable environment. Wall-mounted air conditioners shall not be used.

5. All supply and return ducts to the exterior (including, but not limited to ducts serving HVAC equipment, attic-mounted equipment, bathroom fans, and dryer exhausts), at facades facing Hawthorne Boulevard shall be oriented away from the street and shall incorporate at least 6' of flexible air duct with internal fiberglass lining and at least one 90º bend. For compliance with health and safety requirements, kitchen exhaust ducts should not be internally lined.

6. Building heating units with flues or combustion air vents shall be located in a closet or room closed off from any occupied space by doors. The doors shall be weather-stripped solid core wood or minimum 20-gauge hollow steel assemblies at least 1 ¾"-thick.

7. The roof system shall have minimum ½" plywood sheathing that is well sealed to form a continuous barrier to noise. Minimum R-19 unfaced fiberglass insulation batts shall be placed on the underside of the roof sheathing.

8. At any penetrations of exterior walls by pipes, ducts or conduits, the space between the wall and pipes, ducts or conduits shall be caulked or filled with mortar to form an airtight seal.

9. Except as identified in Items 2 through 8 above, there shall be no other openings (through-the-wall or -door mailboxes, vents, etc.) in the exterior facades facing Hawthorne Boulevard.

Conclusion

This report provides an analysis of the exterior to interior noise levels and mechanical equipment noise levels associated with the residential and office buildings at 24601 Hawthorne Blvd in Torrance. The noise reduction measures that will be implemented at the site will reduce noise levels to comply with the requirements of the City and State's noise standards.

References

Mixed-Use Development Site Plan, Ashai Design. June 19, 2019.

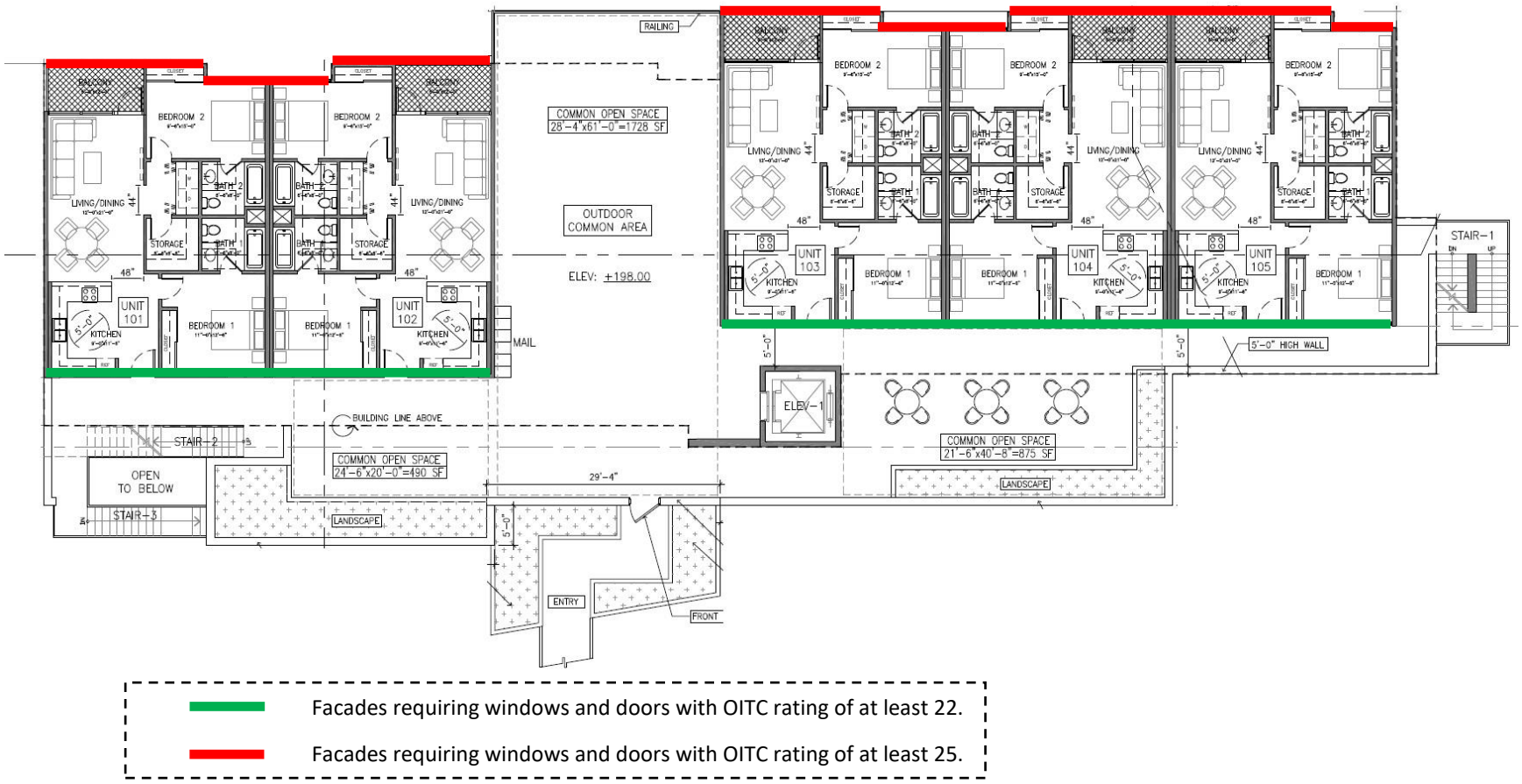

Figure 6 Required Window and Door OITC Ratings at First Floor of the Residential Building

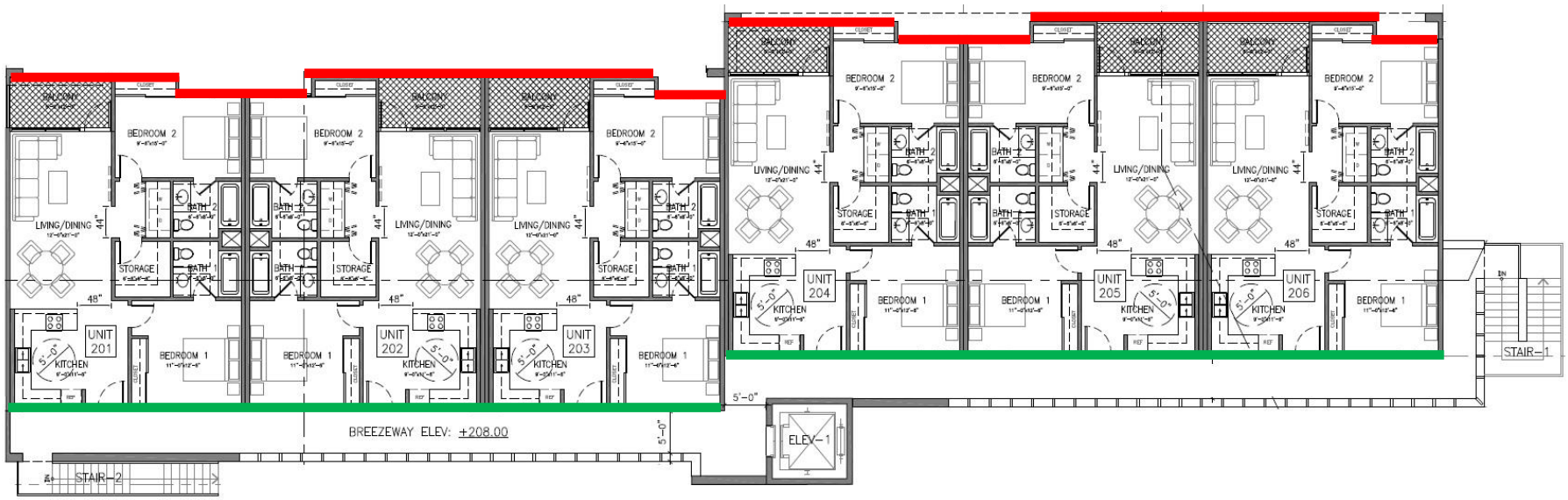

Figure 7 Required Window and Door OITC Ratings at Second Floor of the Residential Building

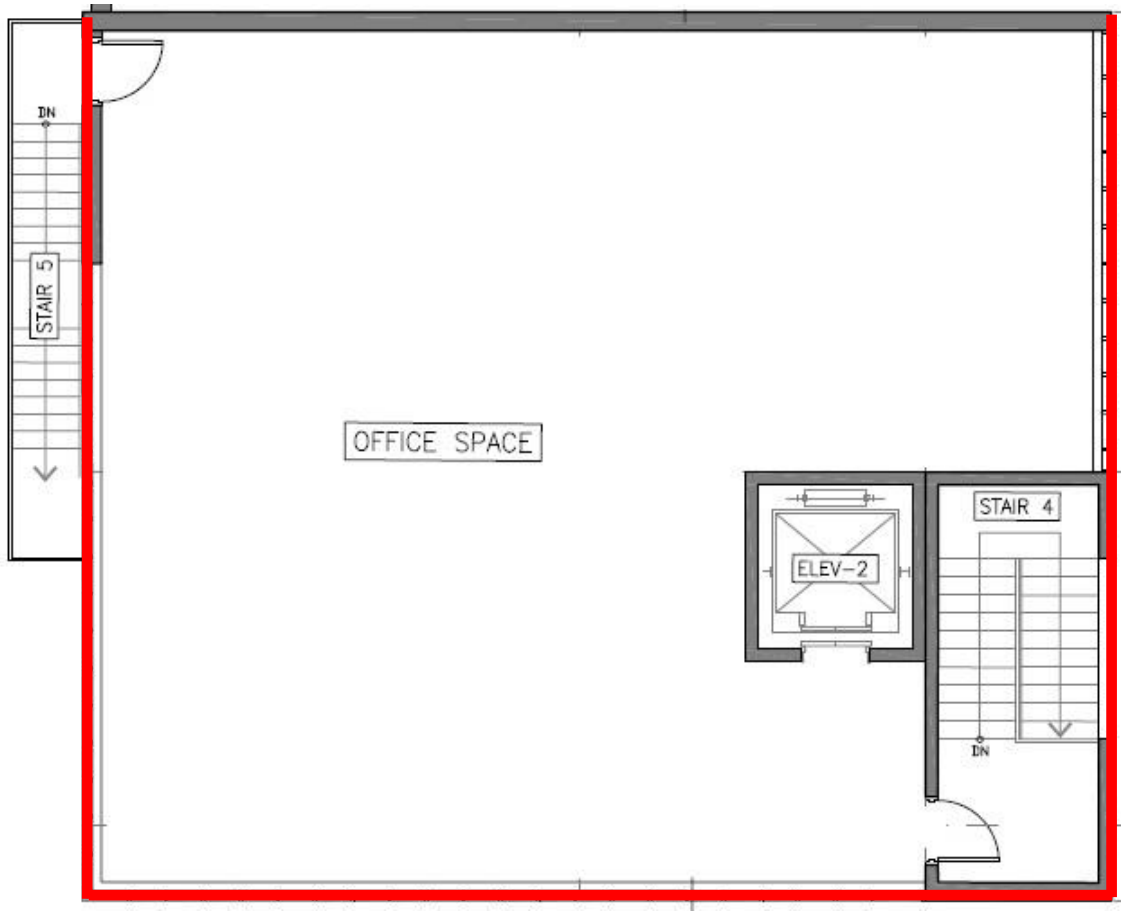

Figure 8 Required Window and Door OITC Ratings at the Office Building

Appendix I

Glossary of Acoustical Terms

Glossary of Terms

The following is a list of definitions of terms commonly used in the field of acoustics. Some, or all, of these terms may have been used in the preceding report:

Ambient Noise: The all-encompassing noise associated with a given environment at a specified time, usually a composite of sound from many sources both near and far.

Average Sound Level: See Equivalent-Continuous Sound Level.

A-Weighted Sound Level, dB(A): The sound level obtained by use of A-weighting. Weighting systems were developed to measure sound in a way that more closely mimics the ear's natural sensitivity. The A- weighting system is incorporated into the sound level meter to alter its sensitivity relative to frequency so that the instrument is less sensitive to noise at frequencies where the human ear is less sensitive and more sensitive at frequencies where the human ear is more sensitive. (Refer to Figure l-l for typical noise source levels.)

Community Noise Equivalent Level (CNEL): A 24-hour A-weighted average sound level which takes into account the fact that a given level of noise may be more or less tolerable depending on when it occurs. The CNEL measure of noise exposure weights average hourly noise levels by 5 dB for the evening hours (between 7:00 p.m. and 10:00 p.m.), and 10 dB between 10:00 p.m. and 7:00 a.m., then combines the results with the daytime levels to produce the final CNEL value. It is measured in decibels, dB. (Refer to Figure l-2 for typical noise exposure levels.)

CNEL: See Community Noise Equivalent Level.

Day-Night Average Sound Level (DNL or Ldn): A measure of noise exposure level that is similar to CNEL except that there is no weighting applied to the evening hours of 7:00 p.m. to 10:00 p.m. It is measured in decibels, dB. (Refer to Figure I-2 for typical noise exposure levels.)

Daytime Average Sound Level (Leq(12)): The time-averaged A-weighted sound level measured between the hours of 7:00 am to 7:00 pm. It is measured in decibels, dB.

Decay Rate: The time taken for the sound pressure level at a given frequency to decrease in a room. It is measured in decibels per second, dB/s.

Decibel (dB): The basic unit of measure for sound level.

Direct Sound: Sound that reaches a given location in a direct line from the source without any reflections.

Divergence: The spreading of sound waves from a source in a free field, resulting in a reduction in sound pressure level with increasing distance from the source.

Energy Basis: This refers to the procedure of summing or averaging sound pressure levels on the basis of their squared pressures. This method involves the conversion of decibels to pressures, then performing the necessary arithmetic calculations, and finally changing the pressures back to decibels.

Equivalent-Continuous Sound Level (Leq): The average sound level measured over a specified time period. It is a single-number measure of time-varying noise over a specified time period. It is the level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time-varying sound. For

example, a person who experiences an Leq of 60 dB(A) for a period of 10 minutes standing next to a busy street is exposed to the same amount of sound energy as if he had experienced a constant noise level of 60 dB(A) for 10 minutes rather than the time varying traffic noise level. It is measured in decibels, dB.

Fast Response: A setting on the sound level meter that determines how sound levels are averaged over time. A first sound level is always more strongly influenced by recent sounds, and less influenced by sounds occurring in the distant past, than the corresponding slow sound level. For the same non-steady sound, the maximum first sound level is generally greater than the corresponding maximum slow sound level. Fast response is typically used to measure impact sound levels.

Field Impact Insulation Class (IIC): A single number rating similar to the impact insulation class except that the impact sound pressure levels are measured in the field.

Field Sound Transmission Class (FSTC): A single number rating similar to sound transmission class except that the transmission loss values used to derive this class are measured in the field.

FIIC: See Field Impact Insulation Class.

Flanking Sound Transmission: The transmission of sound from a room in which a source is located to an adjacent receiving room by paths other than through the common partition. Also, the diffraction of noise around the ends of a barrier.

Frequency: The number of oscillations per second of a sound wave (i.e., the number of cycles per second). It is measured in hertz. Hz.

FSTC: See Field Sound Transmission Class.

Hertz (Hz): See Frequency.

Hourly Average Sound Level (HNL): The equivalent-continuous sound level, Leq, over a 1-hour time period. It is measured in decibels.

Impact Insulation Class (IIC): A single number rating used to compare the effectiveness of floor/ceiling assemblies in providing reduction of impact-generated sounds such as the sound of a person walking across the upstairs floor.

Impact Noise: The noise that results when two objects collide.

Impulse Noise: Noise of a transient nature due to a sudden impulse of pressure like that created by a gunshot or a balloon bursting.

Insertion Loss: The decrease in sound power level measured at the location of the receiver when an element (e.g., a noise barrier) is inserted in the transmission path between the sound source and the receiver. It is measured in decibels.

Inverse Square Law: A rule by which the sound intensity varies inversely with the square of the distance from the source. This results in a 6 dB decrease in sound pressure level for each doubling of distance from the source.

L_2, L_8, L_{25}, L_{50}: See X-Percentile-Exceeded Sound Level.

Ldn: See Day-Night Average Sound Level.

Leq: See Equivalent-Continuous Sound Level.

Leq(12): See Daytime Average Sound Level.

Lmax: See Maximum Sound Level.

Ln: See X-Percentile-Exceeded Sound Level.

Lpk: See Peak Sound Level.

Masking: The process by which the threshold of hearing for one sound is raised by the presence of another sound.

Maximum Sound Level (Lmax): The greatest sound level measured on a sound level meter during a designated time interval or event. It is measured in decibels.

NC Curves (Noise Criterion Curves): A system for rating the noisiness of an occupied indoor space. An actual octave-band spectrum is compared with a set of standard NC curves to determine the NC level of the space.

NIC: See Noise Isolation Class.

NNIC: See Normalized Noise Isolation Class.

Noise: Any unwanted or disagreeable sound.

Noise Criterion Curves: See NC Curves.

Noise Isolation Class (NIC): A single number rating derived from measured values of noise reduction between two enclosed spaces that are connected by one or more partitions. Unlike STC or NNIC, this rating is not adjusted or normalized to a measured or standard reverberation time.

Noise Reduction: The difference in sound pressure level between any two points.

Noise Reduction Coefficient (NRC): A single number rating of the sound absorption properties of a material. It is the average of the sound absorption coefficients at 250, 500, 1000, and 2000 Hz, rounded to the nearest multiple of 0.05.

Normalized Noise Isolation Class (NNIC): A single number rating similar to the noise isolation class except that the measured noise reduction values are normalized to a reverberation time of 0.5 seconds.

NRC: See Noise Reduction Coefficient.

Octave: The frequency interval between two sounds whose frequency ratio is 2. For example, the frequency interval between 500 Hz and 1,000 Hz is one octave.

Octave-Band Sound Level (Octave-Band Level): For an octave frequency band, the sound pressure level of the sound contained within that band. It is measured in decibels.

One-Third Octave: The frequency interval between two sounds whose frequency ratio is $2^{1/3}$ (1.26). For example, the frequency interval between 200 Hz and 250 Hz is one-third octave.

One-Third-Octave-Band Sound Level (One-Third-Octave-Band Level): For a one-third-octave frequency band, the sound pressure level of the sound contained within that band. It is measured in decibels.

Outdoor-Indoor Transmission Class (OITC): A single number rating used to compare the sound insulation properties of building facade elements. This rating is designed to correlate with subjective impressions of the ability of facade elements to reduce the overall loudness of ground and air transportation noise.

Peak Sound Level (Lpk): The maximum instantaneous sound level during a stated time period or event. It is measured in decibels.

Pink Noise: Noise that has approximately equal intensities at each octave or one-third-octave band.

Point Source: A source that radiates sound as if from a single point.

RC Curves (Room Criterion Curves): A system for rating the noisiness of an occupied indoor space. An actual octave-bond spectrum is compared with a set of standard RC curves to determine the RC level of the space.

Real-Time Analyzer (RTA): An instrument for the determination of a sound spectrum.

Receiver: A person (or persons) or equipment which is affected by noise.

Reflected Sound: Sound that persists in an enclosed space as a result of repeated reflections or scattering. It does not include sound that travels directly from the source without reflections.

Reverberation: The persistence of a sound in an enclosed or partially enclosed space after the source of the sound has stopped, due to the repeated reflection of the sound waves.

Reverberation Time (T_{60}): The time required for the sound pressure level of a given frequency in an enclosed or partially enclosed space to decrease by 60 dB after the source of the sound has stopped. It is measured in seconds.

Room Absorption: The total absorption within a room due to all objects, surfaces and air absorption within the room. It is measured in Sabins or metric Sabins.

Room Criterion Curves: See RC Curves.

RTA: See Real-Time Analyzer.

SLM: See Sound Level Meter.

Slow Response: A setting on the sound level meter that determines how measured sound levels are averaged over time. A slow sound level is more influenced by sounds occurring in the distant past that the corresponding fast sound level.

Sound: A physical disturbance in a medium (e.g.. air) that is capable of being detected by the human ear.

Sound Absorption: The process of dissipation of sound energy, and the property of materials and structures to dissipate sound energy.

Sound Absorption Coefficient (α): A measure of the sound-absorptive property of a material.

Sound Insulation: The capacity of a structure or element to prevent sound from reaching a receiver room either by absorption or reflection.

Sound Level: See Sound Pressure Level.

Sound Level Meter (SLM): An instrument used for the measurement of sound level, with a standard frequency-weighting and standard exponentially weighted time averaging.

Sound Power Level: A physical measure of the amount of power a sound source radiates into the surrounding air. It is measured in decibels.

Sound Pressure Level: A physical measure of the magnitude of a sound. It is related to the sound's energy. The terms sound pressure level and sound level are often used interchangeably. It is measured in decibels.

Sound Transmission Class (STC): A single number rating used to compare the sauna' insulation properties of walls, floors, ceilings, windows, or doors. This rating is designed to correlate with subjective impressions of the ability of building elements to reduce the overall loudness of speech, radio, television, and similar noise sources in offices and buildings.

Source Room: A room that contains a noise source or sources.

Spectrum: The spectrum of a sound wave is a description of its resolution into components, each of different frequency and usually different amplitude (level).

STC: See Sound Transmission Class.

T_{60}: See Reverberation Time.

Tapping Machine: A device used in rating different floor constructions against impacts. It produces a series of impacts on the floor under test, 10 times per second.

Tone: A sound with a distinct pitch (i.e., a dominant frequency).

Transmission Loss (TL): A property of a material or structure describing its ability to reduce the transmission of sound at a particular frequency from one space to another. The higher the TL value the more effective the material or structure is in reducing sound between two spaces. It is measured in decibels.

White Noise: Noise that has approximately equal intensities at all frequencies. (White noise need not be random noise.)

Windscreen: A porous covering for a microphone, designed to reduce the noise generated by the passage of wind over the microphone.

X-Percentile-Exceeded Sound Level (L_n): The A-weighted sound level equaled or exceeded by a fluctuating sound level x percent of a stated time period. E.g., the letter symbol L_{10}, represents the sound level which is exceeded 10 percent of the stated time period. For a 1-hour measurement, L_{50}, is the sound level exceeded for more than 30 minutes in an hour, L_{25} is the sound level exceeded for more than 15 minutes in an hour. L_8 is the sound level exceeded for more than 5 minutes in an hour, and L_2 is the sound level exceeded for more than 1 minute in an hour.

Appendix II

Interior Noise Analysis

Table II-1. Calculation of Interior Noise Levels *

Client: Ashai Design Consulting Corporation Project: 24601 Hawthorne Boulevard
Case: Unit 105 Bedroom 1

NOISE SOURCE:

Source #	Source Name
2	Traffic

SOUND ABSORPTION:

Type	Area	Material	Type	Area	Material
17	163	1/2" Gypsum Board, Painted	35	16	Padded Furniture
17	283	1/2" Gypsum Board, Painted			
15	30	1/4" Glass, Sealed, Large Pane			
11	163	Concrete or Terrazo Floor			

PARTITION ELEMENTS:

	South Façade		East Façade			
Element	Type	Area	Type	Area	Type	Area
Wall	27	117	27	113		
Windows						
Openable	5	30				
Fixed						
Doors						
Entry						
Sliding Glass						
French						
Wall A/C						
Miscellaneous						

EXTERIOR LEVEL:

	South Façade	East Façade	0
CNEL	56.0	57.6	

INTERIOR LEVEL:

	Partition #1	Partition #2	Partition #3	**Sum**
CNEL	35.9	22.0		**36.0**

Partition Elements are:

	Partition #1	Partition #2	Partition #3
Element	OITC	OITC	OITC
Wall	42	42	
Openable Window	22		
Fixed Window			
Entry Door			
Sliding Glass Dr.			
French Door			
Wall A/C			
Miscellaneous			

* Analysis based on FHWA-EWR method per E966-99, Section 9.72, with 3 dB correction for room center.

Table II-2. Calculation of Interior Noise Levels *

Client: Ashai Design Consulting Corporation Project: 24601 Hawthorne Boulevard
Case: Unit 105 Bedroom 2

NOISE SOURCE:

Source #	Source Name
2	Traffic

SOUND ABSORPTION:

Type	Area	Material	Type	Area	Material
17	146	1/2" Gypsum Board, Painted	35	15	Padded Furniture
17	389	1/2" Gypsum Board, Painted			
15	58	1/4" Glass, Sealed, Large Pane			
11	146	Concrete or Terrazo Floor			

PARTITION ELEMENTS:

	North		East/West			
Element	Type	Area	Type	Area	Type	Area
Wall	27	79	27	86		
Windows						
Openable	45	58				
Fixed						
Doors						
Entry						
Sliding Glass						
French						
Wall A/C						
Miscellaneous						

EXTERIOR LEVEL:

	North	East/West	0
CNEL	64.6	57.6	

INTERIOR LEVEL:

	Partition #1	Partition #2	Partition #3	**Sum**
CNEL	43.6	20.2		**43.6**

Partition Elements are:

	Partition #1	Partition #2	Partition #3
Element	OITC	OITC	OITC
Wall	42	42	
Openable Window	25		
Fixed Window			
Entry Door			
Sliding Glass Dr.			
French Door			
Wall A/C			
Miscellaneous			

* Analysis based on FHWA-EWR method per E966-99, Section 9.72, with 3 dB correction for room center.

Table II-3. Calculation of Interior Noise Levels *

Client: Ashai Design Consulting Corporation Project: 24601 Hawthorne Boulevard
Case: Unit 206 Bedroom 2

NOISE SOURCE:

Source #	Source Name
2	Traffic

SOUND ABSORPTION:

Type	Area	Material	Type	Area	Material
17	146	1/2" Gypsum Board, Painted	35	15	Padded Furniture
17	389	1/2" Gypsum Board, Painted			
15	58	1/4" Glass, Sealed, Large Pane			
11	146	Concrete or Terrazo Floor			

PARTITION ELEMENTS:

	North Façade		East Façade		Roof	
Element	Type	Area	Type	Area	Type	Area
Wall	27	79	27	86	25	146
Windows						
Openable	45	58				
Fixed						
Doors						
Entry						
Sliding Glass						
French						
Wall A/C						
Miscellaneous						

EXTERIOR LEVEL:

	North Façade	East Façade	Roof
CNEL	64.1	58.1	64.1

INTERIOR LEVEL:

	Partition #1	Partition #2	Partition #3	**Sum**
CNEL	43.1	20.6	34.7	**43.7**

Partition Elements are:

	Partition #1	Partition #2	Partition #3
Element	OITC	OITC	OITC
Wall	42	42	40
Openable Window	25		
Fixed Window			
Entry Door			
Sliding Glass Dr.			
French Door			
Wall A/C			
Miscellaneous			

* Analysis based on FHWA-EWR method per E966-99, Section 9.72, with 3 dB correction for room center.

Table II-4. Calculation of Interior Noise Levels *

Client: Ashai Design Consulting Corporation Project: 24601 Hawthorne Boulevard
Case: Office Spaces Second Floor

NOISE SOURCE:

Source #	Source Name
2	Traffic

SOUND ABSORPTION:

Type	Area	Material	Type	Area	Material
17	2312	1/2" Gypsum Board, Painted	35	231	Padded Furniture
17	1504	1/2" Gypsum Board, Painted			
15	351	1/4" Glass, Sealed, Large Pane			
11	2312	Concrete or Terrazo Floor			

PARTITION ELEMENTS:

	North Façade		West Façade		Roof	
Element	Type	Area	Type	Area	Type	Area
Wall	27	25	27	45	25	2312
Windows						
Openable						
Fixed	15	223	15	363		
Doors						
Entry						
Sliding Glass						
French						
Wall A/C						
Miscellaneous						

EXTERIOR LEVEL:

	North Façade	West Façade	Roof
CNEL	69.9	68.8	69.9

INTERIOR LEVEL:

	Partition #1	Partition #2	Partition #3	**Sum**
CNEL	45.0	46.0	37.7	**48.9**

Partition Elements are:

	Partition #1	Partition #2	Partition #3
Element	OITC	OITC	OITC
Wall	42	42	42
Openable Window			
Fixed Window	25	25	
Entry Door			
Sliding Glass Dr.			
French Door			
Wall A/C			
Miscellaneous			

* Analysis based on FHWA-EWR method per E966-99, Section 9.72, with 3 dB correction for room center.