Environmental Noise Assessment

Alhambra Redevelopment

City of Sacramento, California

December 13, 2024

Project #240901

Prepared for:

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INTRODUCTION

The Alhambra Redevelopment project consists of the development of a mixed-use multifamily residential building in the City of Sacramento, California. The project is located east of 30th Street, west of Alhambra Boulevard, south of C street, and north of D street. The project will include the demolition of existing commercial and residential uses on the site. The primary noise source affecting the project is Interstate 80 Business Loop (I-80).

Figure 1 shows the project site plan. **Figure 2** shows the noise measurement locations and an aerial view of the project site.

ENVIRONMENTAL SETTING

BACKGROUND INFORMATION ON NOISE

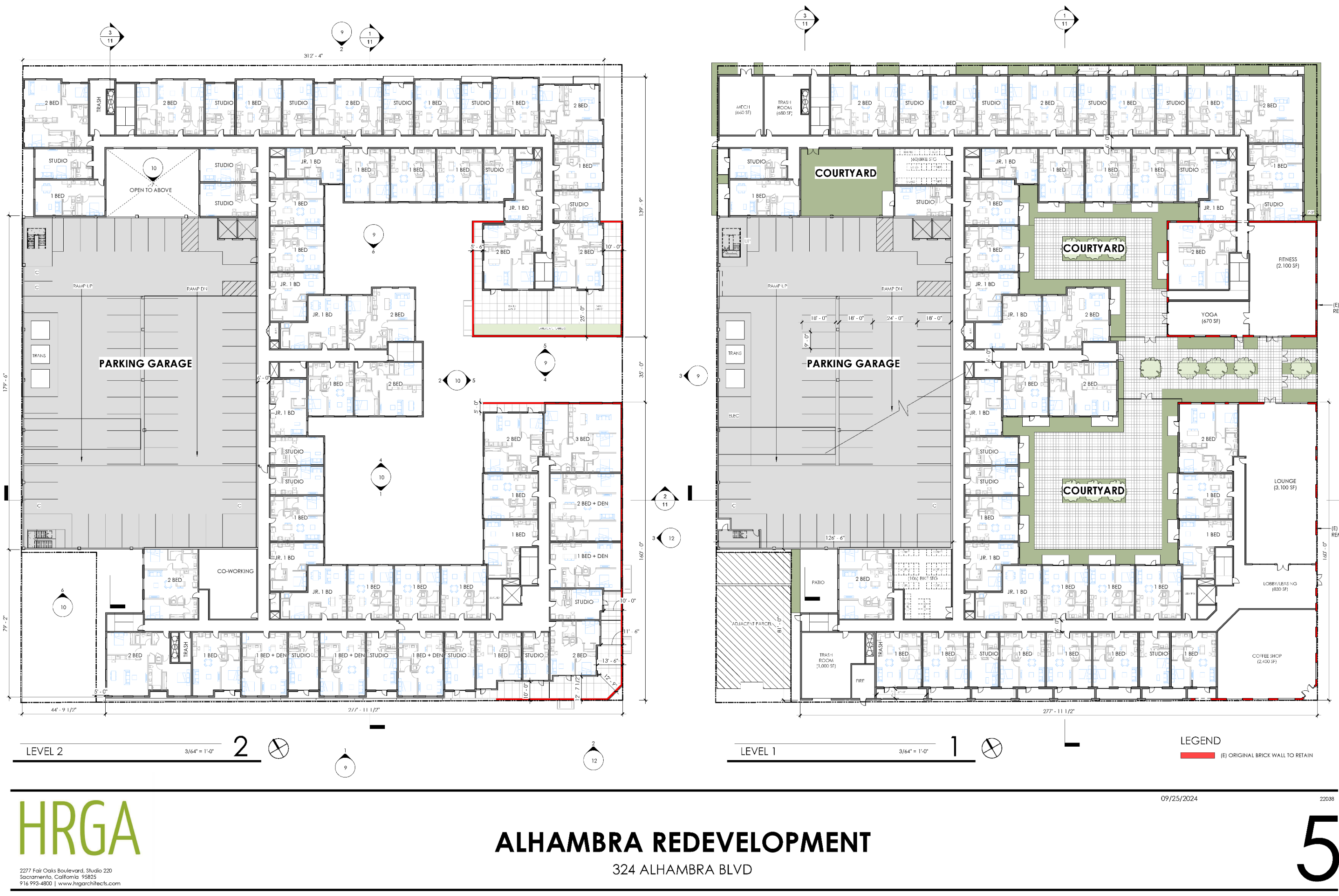
Fundamentals of Acoustics

Acoustics is the science of sound. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves through a medium to human (or animal) ears. If the pressure variations occur frequently enough (at least 20 times per second), then they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound and is expressed as cycles per second or Hertz (Hz).

Noise is a subjective reaction to different types of sounds. Noise is typically defined as (airborne) sound that is loud, unpleasant, unexpected or undesired, and may therefore be classified as a more specific group of sounds. Perceptions of sound and noise are highly subjective from person to person.

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale uses the hearing threshold (20 micropascals), as a point of reference, defined as 0 dB. Other sound pressures are then compared to this reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB, and changes in levels (dB) correspond closely to human perception of relative loudness.

The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by A-weighted sound levels. There is a strong correlation between A-weighted sound levels (expressed as dBA) and the way the human ear perceives sound. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment.



Alhambra Redevelopment

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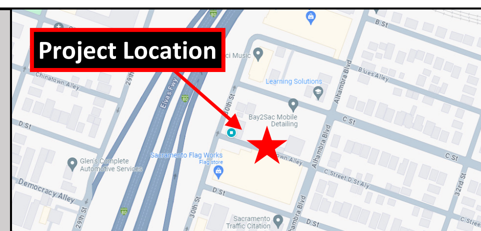
Figure 1

Project Site Plan



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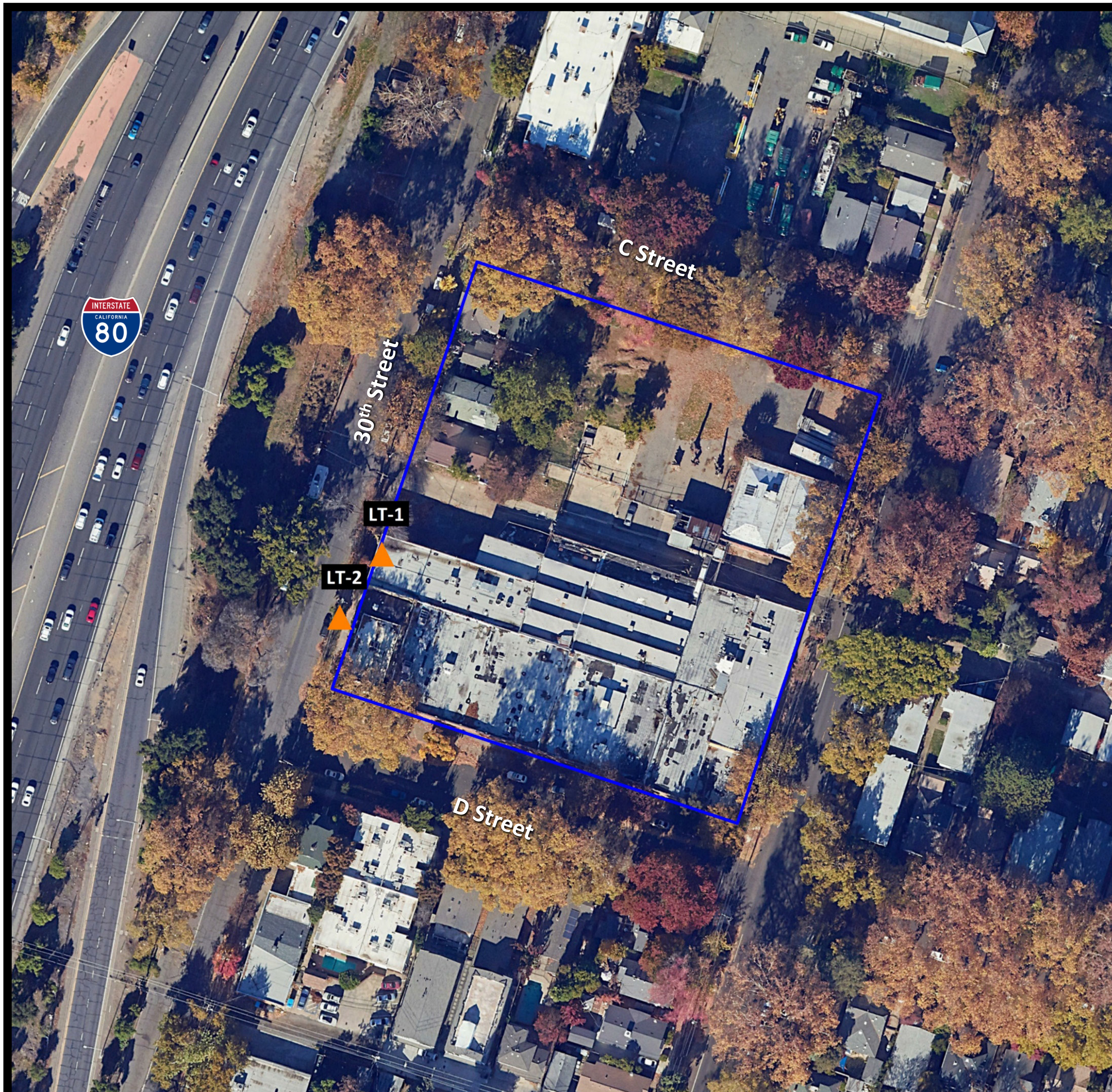

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Figure 2

Noise Measurement Sites

Legend

Project Site

Noise Measurement - Long Term

25 ft 75 ft 125 ft 175 ft

Projection: UTM Zone 10 / WGS84 / meters
Rev. Date: 12/12/2024

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The decibel scale is logarithmic, not linear. In other words, two sound levels 10-dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted, an increase of 10-dBA is generally perceived as a doubling in loudness. For example, a 70-dBA sound is half as loud as an 80-dBA sound, and twice as loud as a 60-dBA sound.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given environment. A common statistical tool is the average, or equivalent, sound level (L_{eq}), which corresponds to a steady-state A-weighted sound level containing the same total energy as a time varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptor, L_{dn}, and shows very good correlation with community response to noise.

The day/night average level (DNL or L_{dn}) is based upon the average noise level over a 24-hour day, with a +10-decibel weighing applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because L_{dn} represents a 24-hour average, it tends to disguise short-term variations in the noise environment.

Table 1 lists several examples of the noise levels associated with common situations. **Appendix A** provides a summary of acoustical terms used in this report.

TABLE 1: TYPICAL NOISE LEVELS

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	--110--	Rock Band
Jet Fly-over at 300 m (1,000 ft.)	--100--	
Gas Lawn Mower at 1 m (3 ft.)	--90--	
Diesel Truck at 15 m (50 ft.), at 80 km/hr. (50 mph)	--80--	Food Blender at 1 m (3 ft.) Garbage Disposal at 1 m (3 ft.)
Noisy Urban Area, Daytime Gas Lawn Mower, 30 m (100 ft.)	--70--	Vacuum Cleaner at 3 m (10 ft.)
Commercial Area Heavy Traffic at 90 m (300 ft.)	--60--	Normal Speech at 1 m (3 ft.)
Quiet Urban Daytime	--50--	Large Business Office Dishwasher in Next Room
Quiet Urban Nighttime	--40--	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	--30--	Library
Quiet Rural Nighttime	--20--	Bedroom at Night, Concert Hall (Background)
	--10--	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	--0--	Lowest Threshold of Human Hearing

Source: Caltrans, Technical Noise Supplement, Traffic Noise Analysis Protocol. September, 2013.

Effects of Noise on People

The effects of noise on people can be placed in three categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction
- Interference with activities such as speech, sleep, and learning
- Physiological effects such as hearing loss or sudden startling

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise or the corresponding reactions of annoyance and dissatisfaction. A wide variation in individual thresholds of annoyance exists and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted: the so-called ambient noise level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it.

With regards to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1-dBA cannot be perceived;
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference;
- A change in level of at least 5-dBA is required before any noticeable change in human response would be expected; and
- A 10-dBA change is subjectively heard as approximately a doubling in loudness and can cause an adverse response.

Stationary point sources of noise – including stationary mobile sources such as idling vehicles – attenuate (lessen) at a rate of approximately 6-dB per doubling of distance from the source, depending on environmental conditions (i.e. atmospheric conditions and either vegetative or manufactured noise barriers, etc.). Widely distributed noises, such as a large industrial facility spread over many acres or a street with moving vehicles, would typically attenuate at a lower rate.

EXISTING NOISE AND VIBRATION ENVIRONMENTS

EXISTING NOISE RECEPTORS

Some land uses are considered more sensitive to noise than others. Land uses often associated with sensitive receptors generally include residences, schools, libraries, hospitals, and passive recreational areas. Sensitive noise receptors may also include threatened or endangered noise-sensitive biological species, although many jurisdictions have not adopted noise standards for wildlife areas. Noise sensitive land uses are typically given special attention in order to achieve protection from excessive noise.

Sensitivity is a function of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities involved. In the vicinity of the project site, sensitive land uses include existing single-family and multifamily residential uses to the north, south, and east of the project site.

EXISTING GENERAL AMBIENT NOISE LEVELS

The existing noise environment in the project area is defined primarily by traffic on I-80. To quantify the existing ambient noise environment in the project vicinity, Saxelby Acoustics conducted continuous (24-hr.) noise level measurements at two locations on the project site. Noise measurement locations are shown on **Figure 2**. A summary of the noise level measurement survey results is provided in **Table 2**. **Appendix B** contains the complete results of the noise monitoring.

The sound level meters were programmed to record the maximum, median, and average noise levels at each site during the survey. The maximum value, denoted L_{max}, represents the highest noise level measured. The average value, denoted L_{eq}, represents the energy average of all of the noise received by the sound level meter microphone during the monitoring period. The median value, denoted L_{50}, represents the sound level exceeded 50 percent of the time during the monitoring period.

Larson Davis Laboratories (LDL) model 812 and 820 precision integrating sound level meters were used for the ambient noise level measurement survey. The meters were calibrated before and after use with a CAL 200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute for Type 1 sound level meters (ANSI S1.4).

TABLE 2: SUMMARY OF EXISTING BACKGROUND NOISE MEASUREMENT DATA

Site	Date	L_{dn}	Daytime L_{eq}	Daytime L_{50}	Daytime L_{max}	Nighttime L_{eq}	Nighttime L_{50}	Nighttime L_{max}
LT-1: Ground Level Adjacent to 30th Street	4/17/24	73	69	68	82	67	65	79
LT-2: Rooftop of Mary Ann's Bakery	4/17/24	73	69	67	80	67	65	79

Notes:

- *All values shown in dBA*
- *Daytime hours: 7:00 a.m. to 10:00 p.m.*
- *Nighttime Hours: 10:00 p.m. to 7:00 a.m.*
- *Source: Saxelby Acoustics 2024*

FUTURE TRAFFIC NOISE ENVIRONMENT AT OFF-SITE RECEPTORS

OFF-SITE TRAFFIC NOISE IMPACT ASSESSMENT METHODOLOGY

To assess noise impacts due to project-related traffic increases on the local roadway network, traffic noise levels are predicted at sensitive receptors for project and no-project conditions.

Existing noise levels due to traffic are calculated using the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA RD-77-108). The model is based upon the Calveno reference noise factors for automobiles, medium trucks and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site.

The FHWA model was developed to predict hourly L_{eq} values for free-flowing traffic conditions. To predict traffic noise levels in terms of L_{dn}, it is necessary to adjust the input volume to account for the day/night distribution of traffic.

It was estimated that the project would generate approximately 1,328 daily trips based on similar projects. Truck usage and vehicle speeds on the local area roadways were estimated from field observations. The predicted increases in traffic noise levels on the local roadway network for Existing and Existing Plus Project conditions which would result from the project are provided in terms of L_{dn}.

Traffic noise levels are predicted at the sensitive receptors located at the closest typical setback distance along each project-area roadway segment. In some locations sensitive receptors may not receive full shielding from noise barriers or may be located at distances which vary from the assumed calculation distance.

Table 3 summarizes the modeled traffic noise levels at the nearest sensitive receptors along each roadway segment in the project area. It should be noted that the noise levels presented in the table include noise contributions from I-80. **Appendix C** provides the complete inputs and results of the FHWA traffic modeling.

TABLE 3: PREDICTED TRAFFIC NOISE LEVEL AND PROJECT-RELATED TRAFFIC NOISE LEVEL INCREASES

Roadway	Segment	Existing no Project (dBA L_{dn})	Existing + Project (dBA L_{dn})	Change (dBA L_{dn})
30th Street	C St. to E St.	73.8	73.9	0.1
C Street	30th St. to Alhambra Blvd.	61.3	61.8	0.5
Alhambra Blvd	C St. to E St.	60.4	61.0	0.6
D Street	30th St. to Alhambra Blvd.	68.2	69.0	0.8

EVALUATION OF PROJECT OPERATIONAL NOISE ON EXISTING SENSITIVE RECEPTORS

Project site traffic circulation and residential HVAC noise are considered to be the primary noise sources for this project. The following is a list of assumptions used for the noise modeling. The data used is based upon a combination of manufacturer's provided data and Saxelby Acoustics data from similar operations.

Parking Garage: Saxelby Acoustics estimated that the project would generate 140 trips in the peak hour based upon similar projects. Saxelby Acoustics assumed that 1-2 of these trips could be heavy trucks. Parking lot movements are predicted to generate a sound exposure level (SEL) of 71 dBA SEL at 50 feet for cars and 85 dBA SEL at 50 feet for trucks. Nighttime traffic outside of the AM or PM peak hour is estimated to be approximately 1/4 of daytime trips during nighttime hours (10:00 p.m. to 7:00 a.m.). Saxelby Acoustics data.

HVAC: Assumes a single mini-split condenser unit for each residential unit. The units were assumed to have a sound level rating of 64 dBA (manufacturer's data). Steady state HVAC noise does not fluctuate greatly, so exceedances of the City's maximum noise level standard are not predicted to occur.

Saxelby Acoustics used the SoundPLAN noise prediction model. Inputs to the model included sound power levels for the proposed amenities, existing and proposed buildings, terrain type, and locations of sensitive receptors. These predictions are made in accordance with International Organization for Standardization (ISO) standard 9613-2:1996 (Acoustics – Attenuation of sound during propagation outdoors). ISO 9613 is the most commonly used method for calculating exterior noise propagation. **Figure 3** shows the noise level contours resulting from the operation of the project.

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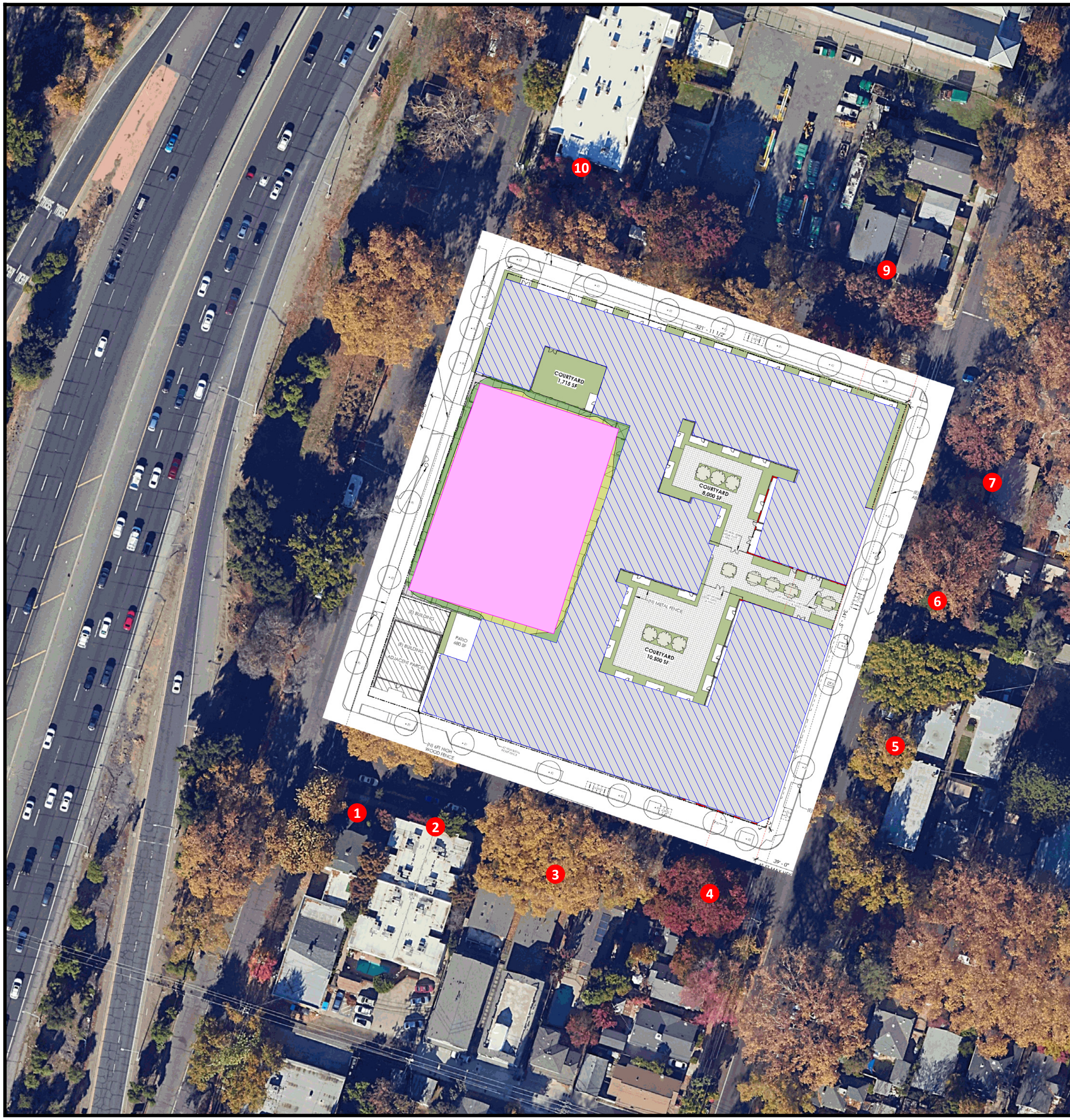
Figure 3

Project Operational Noise Levels
L50, dBA



Noise Level, dBA

50 <	<= 52
52 <	<= 54
54 <	<= 56
56 <	<= 58
58 <	<= 60
60 <	

Legend

Project Building

Receiver

Scale 1:110

0 20 40 80 120 160 feet

N

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EVALUATION OF FUTURE TRANSPORTATION NOISE ON PROJECT SITE

Saxelby Acoustics used the SoundPLAN noise model to calculate traffic noise levels at the proposed residential uses due to traffic on the local roadway network. Inputs to the SoundPLAN noise model include traffic noise level data from the ambient noise level survey, topography, existing and proposed structures, roadway elevations, and the proposed building pad elevations. It was estimated that existing noise levels would increase by +1 dBA to account for future increases in traffic volumes on I-80. The results of this analysis are shown graphically on **Figure 4**.

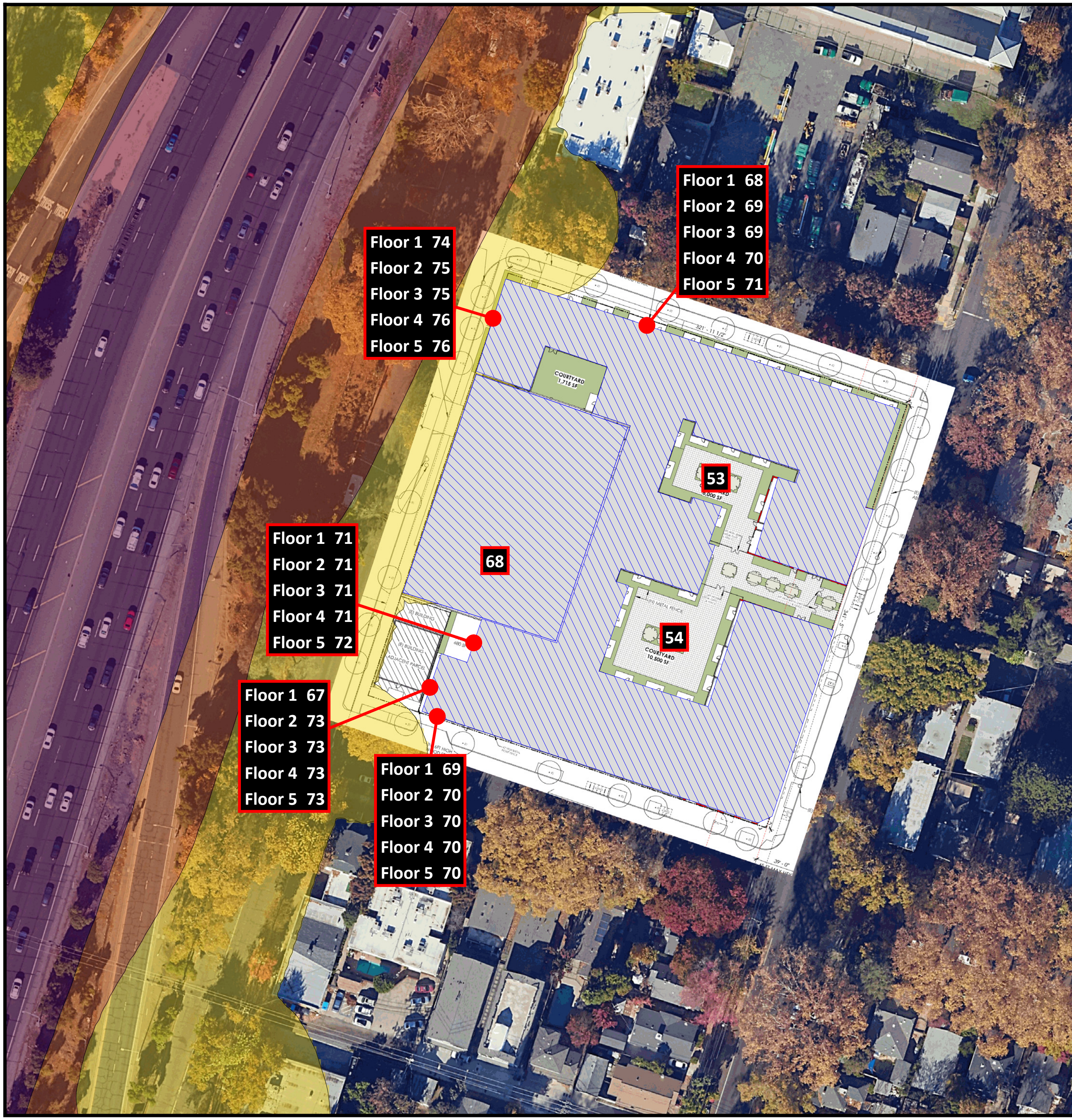

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Figure 4

Future Transportation Noise Levels
Ldn, dBA

Noise Level, dBA

70 < <= 75
75 < <= 80
80 <

Legend

Project Building

Noise Level dBA

Scale 1:110

0 20 40 80 120 160 feet

N

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CONSTRUCTION NOISE ENVIRONMENT

The Federal Highway Administration's (FHWA) Roadway Construction Noise Model (RCNM) was used to predict noise levels for standard construction equipment used for roadway improvement projects. The assessment of potential significant noise effects due to construction is based on the standards and procedures described in the Federal Transit Authority (FTA) guidance manual and FHWA's RCNM.

The RCNM is a Windows-based noise prediction model that enables the prediction of construction noise levels for a variety of construction equipment based on a compilation of empirical data and the application of acoustical propagation formulas. It enables the calculation of construction noise levels in more detail than the manual methods, which eliminates the need to collect extensive amounts of project-specific input data. RCNM allows for the modeling of multiple pieces of construction equipment working either independently or simultaneously, the character of noise emission, and the usage factors for each piece of equipment.

Construction noise varies depending on the construction process, type of equipment involved, location of the construction site with respect to sensitive receptors, the schedule proposed to carry out each task (e.g., hours and days of the week), and the duration of the construction work.

Noise sources in the RCNM database include actual noise levels and equipment usage percentages. This source data was used in this construction noise analysis. **Table 4** shows predicted construction noise levels for each of the project construction phases.

TABLE 4: CONSTRUCTION EQUIPMENT NOISE LEVELS FOR PRIMARY CONSTRUCTION PHASES

Equipment	Quantity	Usage (%)	Maximum, Lmax (dBA at 50 feet)	Hourly Average, Leq (dBA at 50 feet)
Demolition				
Concrete Saw	1	20	90	83
Dump Truck	1	40	76	72
Excavator	1	40	81	77
Mounted Impact Hammer	1	20	90	83
Total:				**87**
Site Preparation				
Grader	1	40	85	81
Dozer	1	40	82	78
Tractor/Loader/Backhoe	1	40	84	80
Total:				**85**
Grading				
Grader	1	40	85	81
Dozer	1	40	82	78
Tractor/Loader/Backhoe	1	40	84	80
Total:				**85**
Building Construction				
Crane	1	16	81	73
Fork Lift	1	40	83	79
Generator	1	50	81	78
Tractor/Loader/Backhoe	1	40	84	80
Welder / Torch	3	40	74	75
Total:				**85**
Paving				
Concrete Mixer Truck	1	40	79	75
Paver	1	50	77	74
Paving Equipment	1	50	77	74
Roller	1	20	80	73
Tractor/Loader/Backhoe	1	40	84	80
Total:				**83**
Architectural Coating				
Air Compressor	1	40	79	75
Total:				**75**

Source: FHWA, Roadway Construction Noise Model (RCNM), January 2006.

Based upon the table, demolition is predicted to be the loudest phase of construction with an average noise exposure of 87 dBA at 50 feet. **Figure 5** shows predicted construction noise contours.

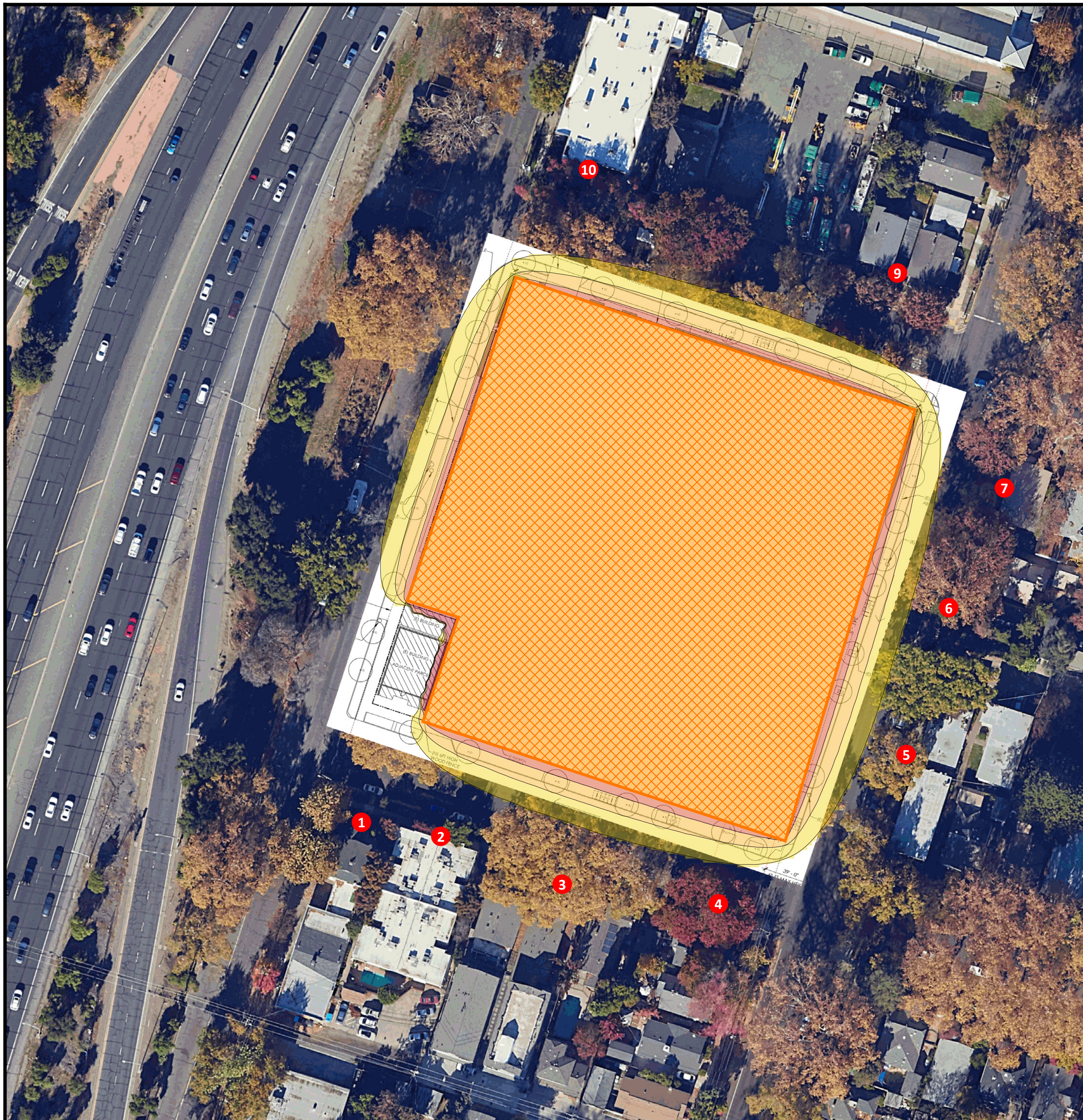

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Figure 5

Construction Noise Levels
Leq, dBA

Noise Level, dBA

75 <		<=	77
77 <		<=	79
79 <		<=	81
81 <		<=	83
83 <		<=	85
85 <			

Legend

- Project Building
- Receiver
- Construction Area

Scale 1:110

0 20 40 80 120 160 feet

N

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CONSTRUCTION VIBRATION ENVIRONMENT

The primary vibration-generating activities associated with the proposed project would occur during construction when activities such as grading, utilities placement, and parking lot construction occur. **Table 5** shows the typical vibration levels produced by construction equipment.

TABLE 5: VIBRATION LEVELS FOR VARIOUS CONSTRUCTION EQUIPMENT

Type of Equipment	Peak Particle Velocity at 25 feet (inches/second)	Peak Particle Velocity at 50 feet (inches/second)	Peak Particle Velocity at 100 feet (inches/second)
Large Bulldozer	0.089	0.031	0.011
Loaded Trucks	0.076	0.027	0.010
Small Bulldozer	0.003	0.001	0.000
Auger/drill Rigs	0.089	0.031	0.011
Jackhammer	0.035	0.012	0.004
Vibratory Hammer	0.070	0.025	0.009
Vibratory Compactor/roller	0.210 (Less than 0.20 at 26 feet)	0.074	0.026

Source: Transit Noise and Vibration Impact Assessment Guidelines. Federal Transit Administration. May 2006.

REGULATORY CONTEXT

STATE

The State Building Code, Title 24, Part 2 of the State of California Code of Regulations, establishes uniform minimum noise insulation performance standards to protect persons within new buildings which house people, including hotels, motels, dormitories, apartment houses, and dwellings other than single-family dwellings. Title 24 mandates that interior noise levels attributable to exterior sources shall not exceed 45 dB L_{dn} or CNEL in any habitable room. Title 24 also mandates that for structures containing noise-sensitive uses to be located where the L_{dn} or CNEL exceeds 60 dB, an acoustical analysis must be prepared to identify mechanisms for limiting exterior noise to the prescribed allowable interior levels. If the interior allowable noise levels are met by requiring that windows be kept closed, the design for the structure must also specify a ventilation or air conditioning system to provide a habitable interior environment.

LOCAL

City of Sacramento General Plan

The Environmental Resources and Constraints element of the City's General Plan identifies noise and land use compatibility standards for various land uses. The City's goal is to minimize noise impacts on human activity to ensure the health and safety of the community. **Table 6** below shows exterior noise compatibility standards for various land uses.

TABLE 6: CITY OF SACRAMENTO EXTERIOR NOISE COMPATIBILITY STANDARDS FOR VARIOUS LAND USES

Land Use Type	Highest Level of Noise Exposure that is Regarded as "Normally Acceptable"[a] (L_{dn}[b] or CNEL[c])
Residential - Low Density Single Family, Duplex, Mobile Homes	60 dBA[d,e]
Residential – Multi-family[g]	65 dBA
Urban Residential Infill[h] and Mixed-Use Projects[i,j]	70 dBA
Transient Lodging – Motels, Hotels	65 dBA
Schools, Libraries, Churches, Hospitals, Nursing Homes	70 dBA
Auditoriums, Concert Halls, Amphitheaters	Mitigation based on site-specific study
Sports Arena, Outdoor Spectator Sports	Mitigation based on site-specific study
Playgrounds, Neighborhood Parks	70 dBA
Golf Courses, Riding Stables, Water Recreation, Cemeteries	75 dBA
Office Buildings – Business, Commercial and Professional	70 dBA
Industrial, Manufacturing, Utilities, Agriculture	75 dBA

Source: Governor's Office of Planning and Research, State of California General Plan Guidelines 2003, October 2003

a. As defined in the California Office of Planning and Research Guidelines, "Normally Acceptable" means that the "specified land use is satisfactory, based upon the assumption that any building involved is of normal conventional construction, without any special noise insulation requirements.

b. Ldn, or day-night average sound level, is an average 24-hour noise measurement that factors in day and night noise levels.

c. CNEL, or Community Noise Equivalent Level, measurements are a weighted average of sound levels gathered throughout a 24-hour period.

d. Applies to the primary open space area of a detached single-family home, duplex, or mobile home, which is typically the backyard or fenced side yard, as measured from the center of the primary open space area (not the property line). This standard does not apply to secondary open space areas, such as front yards, balconies, stoops, and porches.

e. dBA, or A-weighted decibel scale, is a measurement of noise levels.

f. The exterior noise standard for the residential area west of McClellan Airport known as McClellan Heights/Parker Homes is 65 dBA.

g. Applies to the primary open space areas of townhomes and multi-family apartments or condominiums (private year yards for townhomes; common courtyards, roof gardens, or gathering spaces for multi-family developments). These standards shall not apply to balconies or small attached patios in multistoried multi-family structures.

h. Applies to the Central City and areas with a Residential Mixed-Use designation.

i. All mixed-use projects located anywhere in the City of Sacramento.

j. See notes d and g above for definition of primary open space areas for single-family and multi-family developments.

ERC-10.1 Exterior Noise Standards.

The City shall require noise mitigation for all development where the projected exterior noise levels exceed those shown in Table ERC-1, to the extent feasible.

ERC-10.3 Interior Noise Standards

The City shall require new development to include noise attenuation to assure acceptable interior noise levels appropriate to the land use, as follows:

- 45 dBA L_{dn} for residential, transient lodgings, hospitals, nursing homes, and other uses where people normally sleep; and
- 45 dBA L_{eq} (peak hour with windows closed) for office buildings and similar uses.

ERC-10.4 Interior Noise Review for Multiple, Loud, Short-Term Events.

In cases where new development is proposed in areas subject to frequent, high-noise events (such as aircraft over-flights, or train and truck passbys), the City shall evaluate interior noise impacts at proposed sensitive receptors. The evaluation shall incorporate measures necessary to meet the 45 dBA L_{dn} standard.

City of Sacramento Municipal Code

The City of Sacramento Municipal Code, Section 8.68.060 establishes and allowable exterior noise level limit of 55 dBA L_{50} and 75 dBA L_{max} during daytime (7:00 a.m. to 10:00 p.m.) hours and 50 dBA L_{50} and 70 dBA L_{max} during nighttime (10:00 p.m. to 7:00 a.m.) for sources of noise which occur for more than 30 minutes per hour (L_{50}).

If the existing ambient noise level exceeds the 50/55 dBA L_{50} standard the allowable limit is increased in five dBA increments to encompass the ambient noise level. If the existing ambient noise level exceeds the 70/75 dBA L_{max} noise standard, the limit becomes the measured L_{max} existing ambient noise level. For example, if measured existing ambient daytime noise levels are 57 dBA L_{50} and 77 dBA L_{max}, the noise ordinance limits would be 60 dBA L_{50} and 77 dBA L_{max}.

The City of Sacramento Municipal Code standards are summarized in **Table 7** below.

TABLE 7: STATIONARY NOISE SOURCE NOISE STANDARDS

Noise Level Descriptor	Outdoor Activity Areas Daytime (7 a.m. to 10 p.m.)	Outdoor Activity Areas Nighttime (10 p.m. to 7 a.m.)
Hourly equivalent sound level (L_{50}), dB	55	50
Maximum sound level (L_{max}), dB	75	70

Source: City of Sacramento Municipal Code

CRITERIA FOR ACCEPTABLE VIBRATION

Vibration is like noise in that it involves a source, a transmission path, and a receiver. While vibration is related to noise, it differs in that noise is generally considered to be pressure waves transmitted through air, whereas vibration usually consists of the excitation of a structure or surface. As with noise, vibration consists of an amplitude and frequency. A person's perception to the vibration will depend on their individual sensitivity to vibration, as well as the amplitude and frequency of the source and the response of the system which is vibrating.

Vibration can be measured in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration measures in terms of peak particle velocities in inches per second. Standards pertaining to perception as well as damage to structures have been developed for vibration levels defined in terms of peak particle velocities.

Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration, and the number of perceived vibration events. **Table 8**, which was developed by Caltrans, shows the vibration levels which would normally be required to result in damage to structures. The vibration levels are presented in terms of peak particle velocity in inches per second.

Table 8 indicates that the threshold for architectural damage to structures is 0.20 in/sec p.p.v. A threshold of 0.20 in/sec p.p.v. is considered to be a reasonable threshold for short-term construction projects.

TABLE 8: EFFECTS OF VIBRATION ON PEOPLE AND BUILDINGS

Peak Particle Velocity		Human Reaction	Effect on Buildings
mm/second	in/second		
0.15-0.30	0.006-0.019	Threshold of perception; possibility of intrusion	Vibrations unlikely to cause damage of any type
2.0	0.08	Vibrations readily perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
2.5	0.10	Level at which continuous vibrations begin to annoy people	Virtually no risk of "architectural" damage to normal buildings
5.0	0.20	Vibrations annoying to people in buildings (this agrees with the levels established for people standing on bridges and subjected to relative short periods of vibrations)	Threshold at which there is a risk of "architectural" damage to normal dwelling - houses with plastered walls and ceilings. Special types of finish such as lining of walls, flexible ceiling treatment, etc., would minimize "architectural" damage
10-15	0.4-0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause "architectural" damage and possibly minor structural damage

Source: Transportation Related Earthborne Vibrations. Caltrans. TAV-02-01-R9601. February 20, 2002.

IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

Appendix G of the CEQA Guidelines states that a project would normally be considered to result in significant noise impacts if noise levels conflict with adopted environmental standards or plans or if noise generated by the project would substantially increase existing noise levels at sensitive receivers on a permanent or temporary basis. Significance criteria for noise impacts are drawn from CEQA Guidelines Appendix G (Items XI [a-c]).

Would the project:

a. Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

b. Generate excessive groundborne vibration or groundborne noise levels?

c. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

The proposed project is not located within two miles of a public or private airport, therefore item "c" is not discussed any further in this study.

Noise Level Increase Criteria for Long-Term Project-Related Noise Level Increases

The California Environmental Quality Act (CEQA) guidelines define a significant impact of a project if it "increases substantially the ambient noise levels for adjoining areas." Generally, a project may have a significant effect on the environment if it will substantially increase the ambient noise levels for adjoining areas or expose people to severe noise levels. In practice, more specific professional standards have been developed. These standards state that a noise impact may be considered significant if it would generate noise that would conflict with local project criteria or ordinances, or substantially increase noise levels at noise sensitive land uses. The potential increase in traffic noise from the project is a factor in determining significance. Research into the human perception of changes in sound level indicates the following:

- A 3-dB change is barely perceptible,
- A 5-dB change is clearly perceptible, and
- A 10-dB change is perceived as being twice or half as loud.

A limitation of using a single noise level increase value to evaluate noise impacts is that it fails to account for pre-project noise conditions. **Table 9** is based upon recommendations made by the Federal Interagency Committee on Noise (FICON) to provide guidance in the assessment of changes in ambient noise levels resulting from aircraft operations. The recommendations are based upon studies that relate aircraft noise levels to the percentage of persons highly annoyed by the noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, it has been accepted that they are applicable to all sources of noise described in terms of cumulative noise exposure metrics such as the L_{dn}.

TABLE 9: SIGNIFICANCE OF CHANGES IN NOISE EXPOSURE

Ambient Noise Level Without Project, L_{dn}	Increase Required for Significant Impact
<60 dB	+5.0 dB or more
60-65 dB	+3.0 dB or more
>65 dB	+1.5 dB or more

Source: Federal Interagency Committee on Noise (FICON).

Based on the **Table 9** data, an increase in the traffic noise level of 5 dB or more would be significant where the pre-project noise levels are less than 60 dB L_{dn}, or 3 dB or more where existing noise levels are between 60 to 65 dB L_{dn}. Extending this concept to higher noise levels, an increase in the traffic noise level of 1.5 dB or more may be significant where the pre-project traffic noise level exceeds 65 dB L_{dn}. The rationale for the **Table 9** criteria is that, as ambient noise levels increase, a smaller increase in noise resulting from a project is sufficient to cause annoyance.

Temporary Construction Noise Impacts

With temporary noise impacts (construction), identification of "substantial increases" depends upon the duration of the impact, the temporal daily nature of the impact, and the absolute change in decibel levels. The City of Sacramento's Noise Ordinance of the Municipal Code exempts construction activities from the noise standards, provided that construction takes place between the hours of 7:00 AM and 6:00 PM Monday through Saturday and 9:00 AM and 6:00 PM Sundays and holidays.

PROJECT-SPECIFIC IMPACTS AND MITIGATION MEASURES

Impact 1: ***Would the project generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?***

Traffic Noise Increases at Off-Site Receptors

The FICON guidelines specify criteria to determine the significance of traffic noise impacts. Where existing traffic noise levels are greater than 65 dB L_{dn}, a +1.5 dB L_{dn} increase in roadway noise levels will be considered significant. According to **Table 3**, the maximum increase is traffic noise at the nearest sensitive receptor is predicted to be 0.8 dBA. Therefore, impacts resulting from increased traffic noise would be considered ***less-than-significant***, and no mitigation is required.

Operational Noise at Existing Sensitive Receptors

Compliance with City of Sacramento Standards

The City of Sacramento Municipal Code establishes noise level standards of 55 dBA L_{50} and 75 dBA L_{max} during daytime (7:00 a.m. to 10:00 p.m.) hours and 50 dBA L_{50} and 70 dBA L_{max} during nighttime (10:00 p.m. to 7:00 a.m.) hours.

The proposed project mechanical equipment and parking garage are the primary noise sources for the project. **Table 10** below shows predicted noise levels at nearby sensitive receptors due to these sources. **Figure 4** shows receiver locations.

TABLE 10: PROJECT-GENERATED NOISE LEVELS AT SENSITIVE RECEPTORS

Receiver	Daytime L_{50} dBA	Nighttime L_{50} dBA	Daytime L_{max} dBA	Nighttime L_{max} dBA
1	34	28	44	38
2	25	19	32	26
3	24	18	30	24
4	23	17	29	23
5	25	19	30	24
6	26	20	31	25
7	24	18	29	23
8	24	18	28	22
9	23	17	29	23
10	37	31	48	42
Limit	**55**	**50**	**75**	**70**

As shown in **Table 10**, the proposed project is not predicted to generate noise levels which exceed the City's noise level standards. Therefore, this is a ***less-than-significant*** impact.

Analysis of Significance of Long-Term Project-Related Noise Increases

The City of Sacramento does not provide standards to evaluate long-term project-related noise level increases. Therefore, the FICON criteria are used to determine significance. For noise environments where the existing ambient is above 65 dBA, a +1.5 dBA increase in noise levels would be considered significant.

As shown in **Table 10**, the proposed project is predicted to generate noise levels of up to 37 dBA L_{50} at the residence north of the project site. As shown in **Table 2**, the existing noise level at this receptor is represented by LT-1. The existing (68 dBA L_{50}) plus project (37 dBA L_{50}) noise level would be 68 dBA L_{50}, resulting in no increase. Therefore, this is a ***less-than-significant*** impact, and no mitigation is required.

Construction Noise

During the construction phases of the project, noise from construction activities would add to the noise environment in the immediate project vicinity. Construction activities would be temporary in nature and are anticipated to occur during normal daytime working hours. Noise would also be generated during the construction phase by increased truck traffic on area roadways. A project-generated noise source would be truck traffic associated with transport of heavy materials and equipment to and from the construction site. This noise increase would be of short duration and would occur during daytime hours.

Caltrans defines a significant increase due to noise as an increase of 12 dBA over existing ambient noise levels; Saxelby Acoustics used this criterion to evaluate increases due to construction noise associated with the project. Construction noise levels were modeled using the input data shown in **Table 3** and evaluated for significance in **Table 11** below. **Figure 5** shows modeled construction noise level contours as well as the locations of the analyzed receptors.

TABLE 11: PREDICTED CONSTRUCTION NOISE LEVEL INCREASES

Receiver	Predicted Daytime Ambient (L_{eq} dBA)	Predicted Construction Noise Level (L_{eq} dBA)	Sum (L_{eq} dBA)	Difference (L_{eq} dBA)
1	68.2	69.1	71.7	3.5
2	66.1	71.4	72.5	6.4
3	63.8	71.6	72.3	8.5
4	65.1	72.4	73.1	8.0
5	62.4	72.4	72.8	10.4
6	63.6	73.1	73.6	10.0
7	63.7	71.2	71.9	8.2
8	62.7	65.6	67.4	4.7
9	63.1	69.8	70.6	7.5
10	68.3	68.7	71.5	3.2

As shown in **Table 11**, the proposed project is predicted to generate construction noise level increases of up to 10.4 dBA. This is less than the +12.0 dBA criterion.

Although construction activities are temporary in nature and would occur during normal daytime working hours, construction-related noise could result in sleep interference at existing noise-sensitive land uses in the vicinity of the construction if construction activities were to occur outside the normal daytime hours. Therefore, impacts resulting from noise levels temporarily exceeding the threshold of significance due to construction would be considered ***potentially significant***. Mitigation measure 1(a) would reduce construction noise impacts to ***less-than-significant***.

Transportation Noise on Project Site (Non-CEQA Issue)

Exterior Transportation Noise

Compliance with City's standards on new noise-sensitive receptors is not a CEQA consideration. However, this information is provided here so that a determination can be made regarding the ability of the proposed project to meet the requirements of the City of Sacramento for exterior and interior noise levels at new sensitive uses proposed under the project.

As shown on **Figure 4**, the outdoor activity areas (pool deck and courtyards) of the proposed project would be exposed to exterior noise levels of up to 68 dBA L_{dn}. This complies with the City's 70 dBA L_{dn} exterior noise standard for Urban Residential Infill and Mixed-Use Projects with no additional exterior noise control measures.

Interior Transportation Noise

Modern building construction methods typically yield an exterior-to-interior noise level reduction of 25 dBA[1]. Therefore, where exterior noise levels are 70 dBA L_{dn}, or less, no additional interior noise control measures are typically required. Based upon the exterior transportation noise levels along I-80 of 76 dBA L_{dn}, an exterior-to-interior noise level reduction of 31 dBA would be required to meet the City's noise level standards. **Figure 5** shows the required interior noise control measures. **Appendix C** shows the complete exterior-to-interior noise calculations.

[1] Assuming standard construction with a minimum STC rating of 29 for exterior window assemblies

Note: Standard construction is sufficient for project units that do not need acoustical upgrades. Standard construction assumes a minimum STC rating of 29 for exterior window assemblies.

Interior Noise Control Measures
(Required for Indicated Facades of Proposed Building)

- *Glazing shall have a sound transmission class (STC) rating of 38 minimum;*
- *Exterior finish shall be stucco with sheathing or system with equivalent weight;*
- *Interior gypsum at exterior walls shall be 5/8". For corner units, interior gypsum shall be hung on on resilient channel or staggered stud wall assembly;*
- *Ceiling gypsum shall be 5/8";*
- *Mechanical ventilation shall be installed in all residential uses to allow residents to keep doors and windows closed, as desired for acoustical isolation;*
- *No PTAC's shall be used.*

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Figure 6

Interior Noise Control Measures

Legend

Facades Needing Acoustic Upgrades

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Mitigation Measure(s)

Implementation of the following mitigation measures would reduce the above impact to a *less-than-significant* level.

1(a) The City shall establish the following as conditions of approval for any permit that results in the use of construction equipment:

- Construction shall be limited to 7:00 a.m. to 6:00 p.m. Monday through Saturday and 9:00 a.m. to 6:00 p.m. on Saturday.
- All construction equipment powered by internal combustion engines shall be properly muffled and maintained.
- Quiet construction equipment, particularly air compressors, are to be selected whenever possible.
- All stationary noise-generating construction equipment such as generators or air compressors are to be located as far as is practical from existing residences. In addition, the project contractor shall place such stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.
- Unnecessary idling of internal combustion engines is prohibited.
- The construction contractor shall, to the maximum extent practical, locate on-site equipment staging areas to maximize the distance between construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.

Timing/Implementation: Implemented prior to approval of grading and/or building permits
Enforcement/Monitoring: City of Sacramento

Implementation of mitigation measures 1(a) would help to reduce construction-generated noise levels. With mitigation, this impact would be considered ***less-than-significant***.

Recommended Condition of Approval

*The proposed residential buildings located along the I-80 frontage shall be designed to achieve a 31 dBA exterior to interior noise level reduction to satisfy the requirements of the City of Sacramento. **Figure 6** shows the locations of facades requiring acoustic upgrades. **Figure 6** and **Appendix D** provide interior noise control measures required to meet the applicable standards. These measures include the use of STC rated 38 glazing and resilient channels at exterior walls.*

Impact 2: Would the project generate excessive groundborne vibration or groundborne noise levels?

Construction vibration impacts include human annoyance and building structural damage. Human annoyance occurs when construction vibration rises significantly above the threshold of perception. Building damage can take the form of cosmetic or structural.

With the exception of vibratory compactors, the **Table 5** data indicate that construction vibration levels anticipated for the project are less than the 0.2 in/sec threshold at distance of 26 feet. However, the proposed project includes parking lot and building construction which would occur at distances of approximately 15 feet from the adjacent commercial uses. Therefore, use of vibratory compactors within 26 feet of the adjacent buildings could cause vibrations in excess of 0.2 in/sec. Therefore, this is a ***potentially significant*** impact.

Mitigation Measure(s)

Implementation of the following mitigation measures would reduce the above impact to a ***less-than-significant*** level.

1(a) Any compaction required less than 26 feet from the adjacent commercial and residential structures to the south should be accomplished by using static drum rollers which use weight instead of vibrations to achieve soil compaction. As an alternative to this requirement, pre-construction crack documentation and construction vibration monitoring could be conducted to ensure that construction vibrations do not cause damage to any adjacent structures.

1(b) Use of bulldozers, loaded trucks, auger/drill rigs, and vibratory hammers shall occur at distances of 15 feet or greater from adjacent residential structures.

Impact 3: ***For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?***

There are no airports within two miles of the project vicinity. Therefore, this impact is not applicable to the proposed project.

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Appendix A: Acoustical Terminology

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
ASTC	Apparent Sound Transmission Class. Similar to STC but includes sound from flanking paths and correct for room reverberation. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
Attenuation	The reduction of an acoustic signal.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by +5 dBA and nighttime hours weighted by +10 dBA.
DNL	See definition of Ldn.
IIC	Impact Insulation Class. An integer-number rating of how well a building floor attenuates impact sounds, such as footsteps. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz (Hz).
Ldn	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
Leq	Equivalent or energy-averaged sound level.
Lmax	The highest root-mean-square (RMS) sound level measured over a given period of time.
L(n)	The sound level exceeded a described percentile over a measurement period. For instance, an hourly L50 is the sound level exceeded 50% of the time during the one-hour period.
Loudness	A subjective term for the sensation of the magnitude of sound.
NIC	Noise Isolation Class. A rating of the noise reduction between two spaces. Similar to STC but includes sound from flanking paths and no correction for room reverberation.
NNIC	Normalized Noise Isolation Class. Similar to NIC but includes a correction for room reverberation.
Noise	Unwanted sound.
NRC	Noise Reduction Coefficient. NRC is a single-number rating of the sound-absorption of a material equal to the arithmetic mean of the sound-absorption coefficients in the 250, 500, 1000, and 2,000 Hz octave frequency bands rounded to the nearest multiple of 0.05. It is a representation of the amount of sound energy absorbed upon striking a particular surface. An NRC of 0 indicates perfect reflection; an NRC of 1 indicates perfect absorption.
RT60	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
Sabin	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 Sabin.
SEL	Sound Exposure Level. SEL is a rating, in decibels, of a discrete event, such as an aircraft flyover or train pass by, that compresses the total sound energy into a one-second event.
SPC	Speech Privacy Class. SPC is a method of rating speech privacy in buildings. It is designed to measure the degree of speech privacy provided by a closed room, indicating the degree to which conversations occurring within are kept private from listeners outside the room.
STC	Sound Transmission Class. STC is an integer rating of how well a building partition attenuates airborne sound. It is widely used to rate interior partitions, ceilings/floors, doors, windows and exterior wall configurations. The STC rating is typically used to rate the sound transmission of a specific building element when tested in laboratory conditions where flanking paths around the assembly don't exist. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.
Impulsive	Sound of short duration, usually less than one second, with an abrupt onset and rapid decay.
Simple Tone	Any sound which can be judged as audible as a single pitch or set of single pitches.

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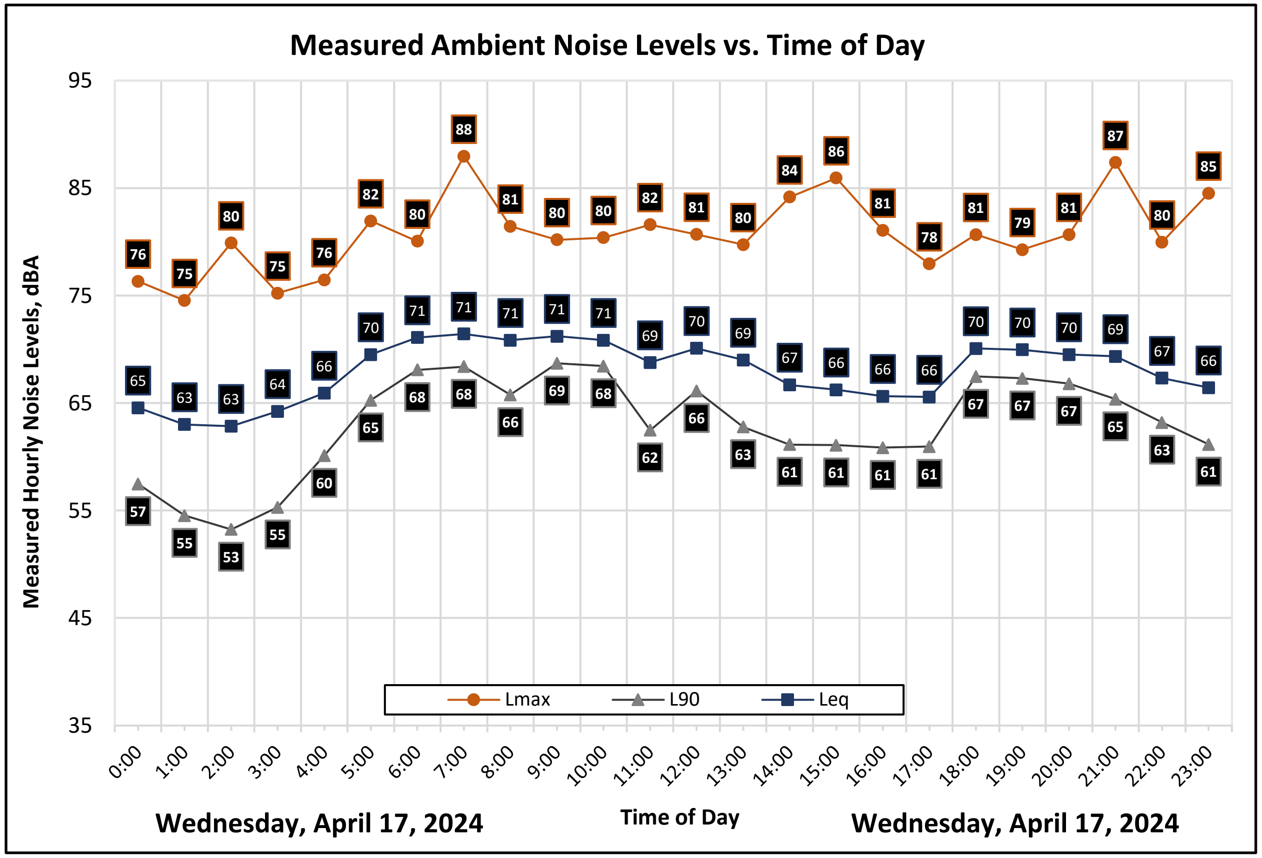
Appendix B: Continuous Long-Term Ambient Noise Measurement Results

Appendix B1: Continuous Noise Monitoring Results

Site: LT-1
Project: Mary Ann's Bakery Residential
Meter: 812-2
Location: Mary Ann's Bakery Ground Level
Calibrator: CAL200
Coordinates: (38.5799233,-121.4635208)

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Wednesday, April 17, 2024	0:00	65	76	63	57
Wednesday, April 17, 2024	1:00	63	75	61	55
Wednesday, April 17, 2024	2:00	63	80	60	53
Wednesday, April 17, 2024	3:00	64	75	62	55
Wednesday, April 17, 2024	4:00	66	76	65	60
Wednesday, April 17, 2024	5:00	70	82	69	65
Wednesday, April 17, 2024	6:00	71	80	71	68
Wednesday, April 17, 2024	7:00	71	88	71	68
Wednesday, April 17, 2024	8:00	71	81	70	66
Wednesday, April 17, 2024	9:00	71	80	70	69
Wednesday, April 17, 2024	10:00	71	80	70	68
Wednesday, April 17, 2024	11:00	69	82	67	62
Wednesday, April 17, 2024	12:00	70	81	70	66
Wednesday, April 17, 2024	13:00	69	80	68	63
Wednesday, April 17, 2024	14:00	67	84	64	61
Wednesday, April 17, 2024	15:00	66	86	63	61
Wednesday, April 17, 2024	16:00	66	81	63	61
Wednesday, April 17, 2024	17:00	66	78	63	61
Wednesday, April 17, 2024	18:00	70	81	70	67
Wednesday, April 17, 2024	19:00	70	79	70	67
Wednesday, April 17, 2024	20:00	70	81	69	67
Wednesday, April 17, 2024	21:00	69	87	69	65
Wednesday, April 17, 2024	22:00	67	80	67	63
Wednesday, April 17, 2024	23:00	66	85	65	61

Statistics	Leq	Lmax	L50	L90
Day Average	69	82	68	65
Night Average	67	79	65	60
Day Low	66	78	63	61
Day High	71	88	71	69
Night Low	63	75	60	53
Night High	71	85	71	68
Ldn	73	Day %		77
CNEL	74	Night %		23

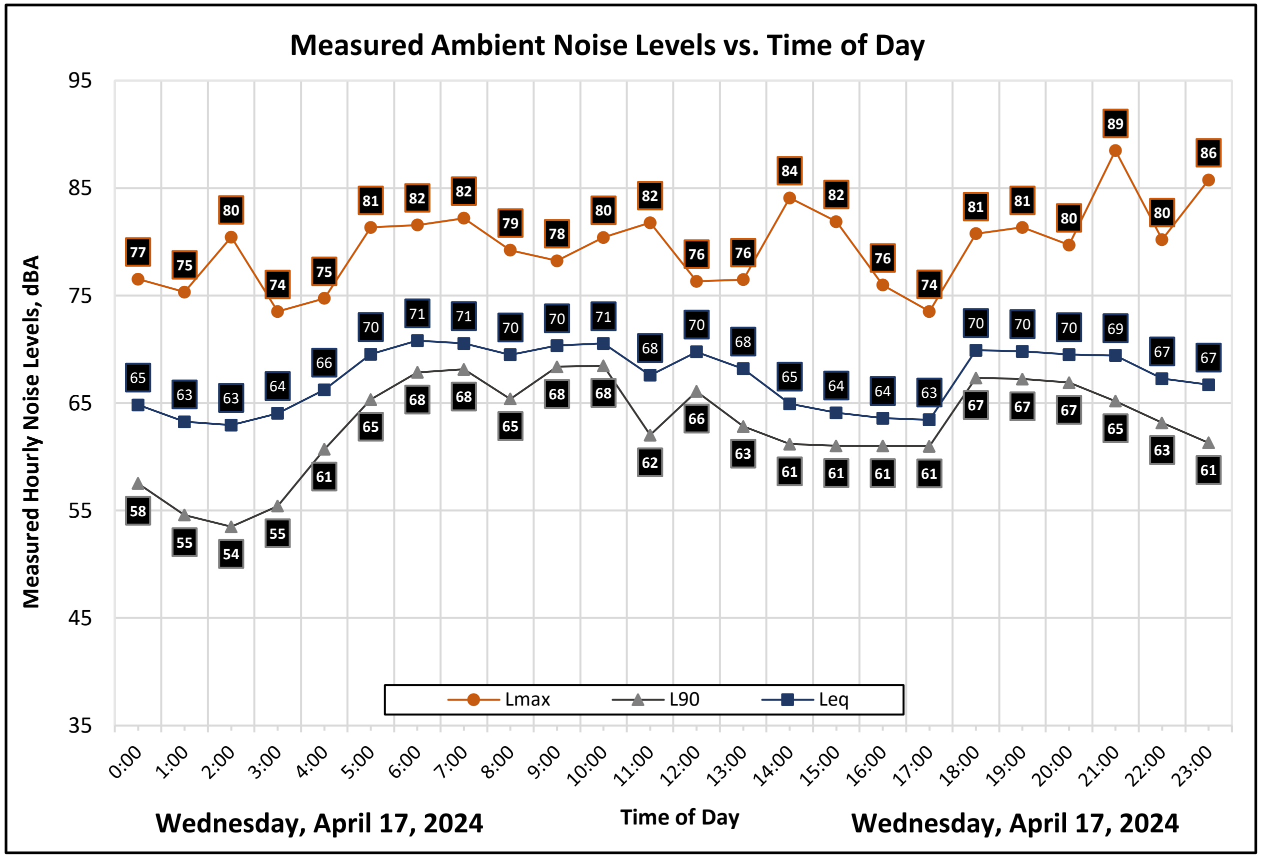


Appendix B2: Continuous Noise Monitoring Results

Site: LT-2
Project: Mary Ann's Bakery Residential
Location: Mary Ann's Bakery Roof Top
Coordinates: (38.5800481,-121.4634104)
Meter: 820-7
Calibrator: CAL200

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Wednesday, April 17, 2024	0:00	65	77	64	58
Wednesday, April 17, 2024	1:00	63	75	61	55
Wednesday, April 17, 2024	2:00	63	80	60	54
Wednesday, April 17, 2024	3:00	64	74	62	55
Wednesday, April 17, 2024	4:00	66	75	65	61
Wednesday, April 17, 2024	5:00	70	81	69	65
Wednesday, April 17, 2024	6:00	71	82	71	68
Wednesday, April 17, 2024	7:00	71	82	70	68
Wednesday, April 17, 2024	8:00	70	79	69	65
Wednesday, April 17, 2024	9:00	70	78	70	68
Wednesday, April 17, 2024	10:00	71	80	70	68
Wednesday, April 17, 2024	11:00	68	82	66	62
Wednesday, April 17, 2024	12:00	70	76	70	66
Wednesday, April 17, 2024	13:00	68	76	67	63
Wednesday, April 17, 2024	14:00	65	84	64	61
Wednesday, April 17, 2024	15:00	64	82	63	61
Wednesday, April 17, 2024	16:00	64	76	63	61
Wednesday, April 17, 2024	17:00	63	74	63	61
Wednesday, April 17, 2024	18:00	70	81	70	67
Wednesday, April 17, 2024	19:00	70	81	70	67
Wednesday, April 17, 2024	20:00	70	80	69	67
Wednesday, April 17, 2024	21:00	69	89	69	65
Wednesday, April 17, 2024	22:00	67	80	67	63
Wednesday, April 17, 2024	23:00	67	86	65	61

Statistics	Leq	Lmax	L50	L90
Day Average	69	80	67	65
Night Average	67	79	65	60
Day Low	63	74	63	61
Day High	71	89	70	68
Night Low	63	74	60	54
Night High	71	86	71	68
Ldn	73	Day %		74
CNEL	74	Night %		26



Appendix C: Traffic Noise Calculation Inputs and Results

Appendix C-1
FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Project #: 240901 Alhambra Redevelopment CEQA Level Analysis
Description: Existing Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway	Segment	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)	Contours (ft.) - No Offset 60 dBA	65 dBA	70 dBA	Level, dBA
	I-80 BUS	**West of Project Site**	**147,000**	**77**	**0**	**23**	**1.2%**	**2.0%**	**65**	**100**	**0**	**2102**	**976**	**453**	**79.8**
1	30th Street	C St. to E St.	5,600	80	0	20	1.0%	1.0%	35	50	0	75	35	16	62.6
2	C Street	30th St. to Alhambra Blvd.	5,600	80	0	20	1.0%	1.0%	35	50	-5	75	35	16	57.6
3	Alhambra Blvd	C St. to E St.	5,600	80	0	20	1.0%	1.0%	35	50	-5	75	35	16	57.6
4	D Street	30th St. to Alhambra Blvd.	56,000	80	0	20	1.0%	1.0%	35	50	-5	347	161	75	67.6

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Appendix C-2

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Project #: 240901 Alhambra Redevelopment CEQA Level Analysis
Description: Existing Plus Project Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

												Contours (ft.) - No Offset			
Segment	Roadway	Segment	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)	60 dBA	65 dBA	70 dBA	Level, dBA
	I-80 BUS	**West of Project Site**	**148,328**	**77**	**0**	**23**	**1.2%**	**2.0%**	**65**	**100**	**0**	**2115**	**981**	**456**	**79.9**
1	30th Street	C St. to E St.	6,928	80	0	20	1.0%	1.0%	35	50	0	86	40	19	63.6
2	C Street	30th St. to Alhambra Blvd.	6,928	80	0	20	1.0%	1.0%	35	50	-5	86	40	19	58.6
3	Alhambra Blvd	C St. to E St.	6,928	80	0	20	1.0%	1.0%	35	50	-5	86	40	19	58.6
4	D Street	30th St. to Alhambra Blvd.	69,280	80	0	20	1.0%	1.0%	35	50	-5	400	186	86	68.6

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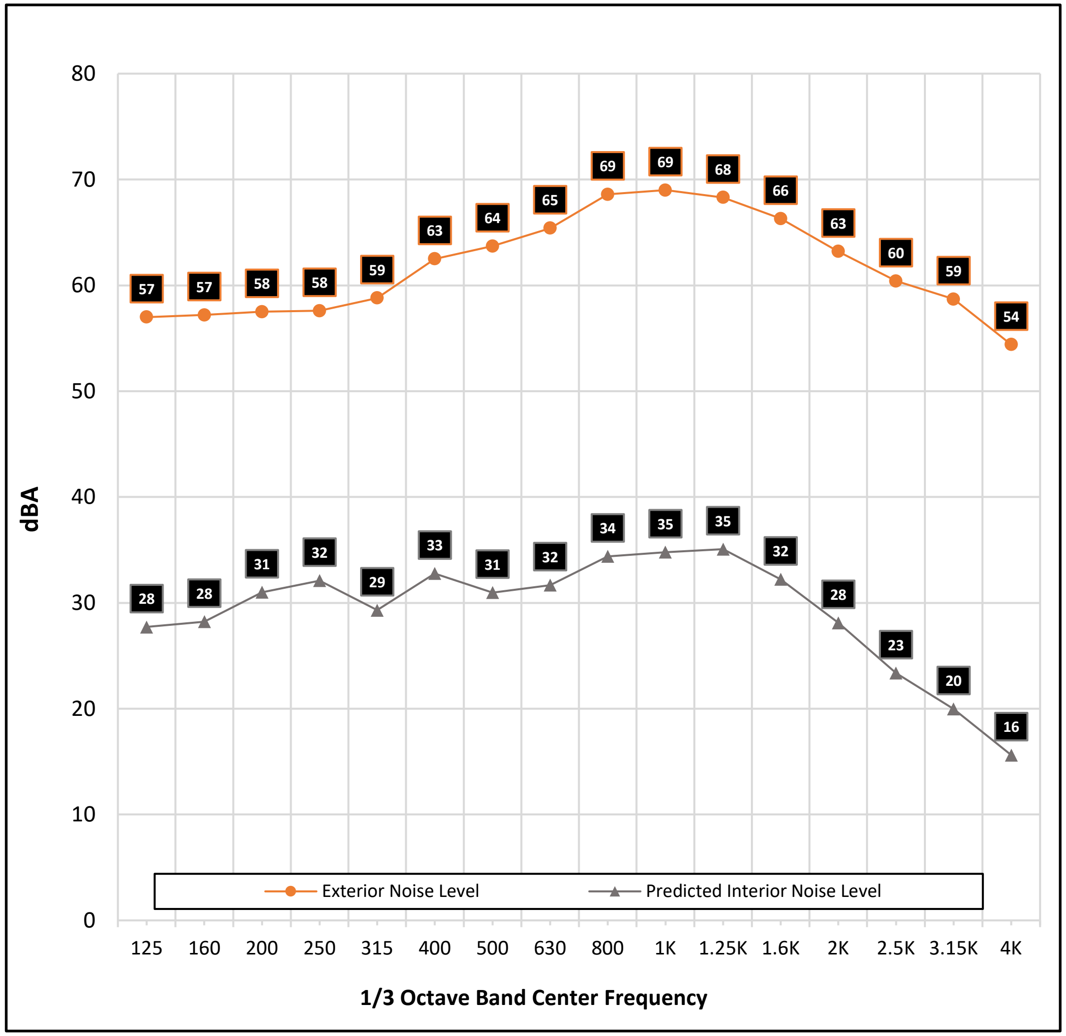
Appendix D: Exterior to Interior Noise Reduction Calculations

Appendix D1: Interior Noise Calculation Sheet

Project: Mary Ann's Bakery Residential Project
Room Description: Bedroom - 2 Bed Apt

Inputs		
Parallel Exterior level, dBA:	76.0	Ldn
Correction Factor, dBA:	5.0	
Noise Source:	Highway Traffic	
Room Length, ft:	17.0	
Room Width, ft:	10.5	
Room Height, ft:	9.0	
Transmitting Panel Length, ft:	10.5	
Glazing Area, ft:	50.0	
Ceiling Finish:	Gyp Board	
Ceiling, sf:	178.5	
Wall Finish 1:	Gyp Board	
Wall Finish 1, sf:	445	
Wall Finish 2:	Glass	
Wall Finish 2, sf:	50	
Floor:	Vinyl Plank	
Floor, sf:	178.5	
Misc. Finish:	Soft Furnishings	
Misc. Finish, sf:	25	
Transmitting Element 1:	Wall - 3-coat Stucco wall with RC	
Element 1, sf:	45	
Transmitting Element 2:	Glazing - STC 38	
Element 2, sf:	50	
Transmitting Element 3:		
Element 3, sf:		
Transmitting Element 4:		
Element 4, sf:		

Predicted Interior Noise Level, dBA: 43
Noise Reduction, dBA: -33



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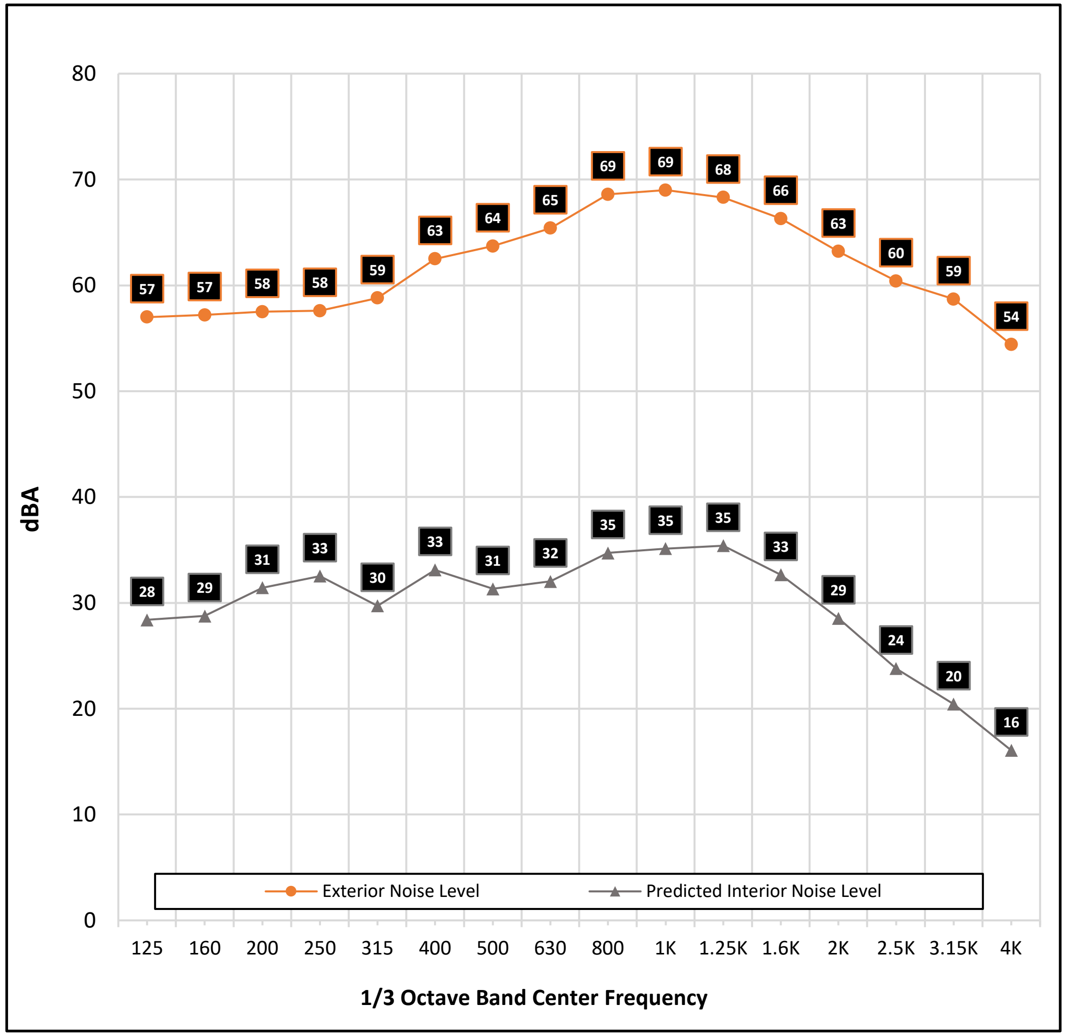
Appendix D2: Interior Noise Calculation Sheet

Project: Mary Ann's Bakery Residential Project
Room Description: Bedroom - 2 Bed Apt

Inputs

Parallel Exterior level, dBA:	76.0	**Ldn**
Correction Factor, dBA:	5.0	
Noise Source:	Highway Traffic	
Room Length, ft:	13.3	
Room Width, ft:	11.5	
Room Height, ft:	9.0	
Transmitting Panel Length, ft:	11.7	
Glazing Area, ft:	50.0	
Ceiling Finish:	**Gyp Board**	
Ceiling, sf:	152.95	
Wall Finish 1:	**Gyp Board**	
Wall Finish 1, sf:	396.4	
Wall Finish 2:	**Glass**	
Wall Finish 2, sf:	50	
Floor:	**Vinyl Plank**	
Floor, sf:	152.95	
Misc. Finish:	**Soft Furnishings**	
Misc. Finish, sf:	25	
Transmitting Element 1:	**Wall - 3-coat Stucco wall with RC**	
Element 1, sf:	55	
Transmitting Element 2:	**Glazing - STC 38**	
Element 2, sf:	50	
Transmitting Element 3:		
Element 3, sf:		
Transmitting Element 4:		
Element 4, sf:		

Predicted Interior Noise Level, dBA: 44
Noise Reduction, dBA: -32



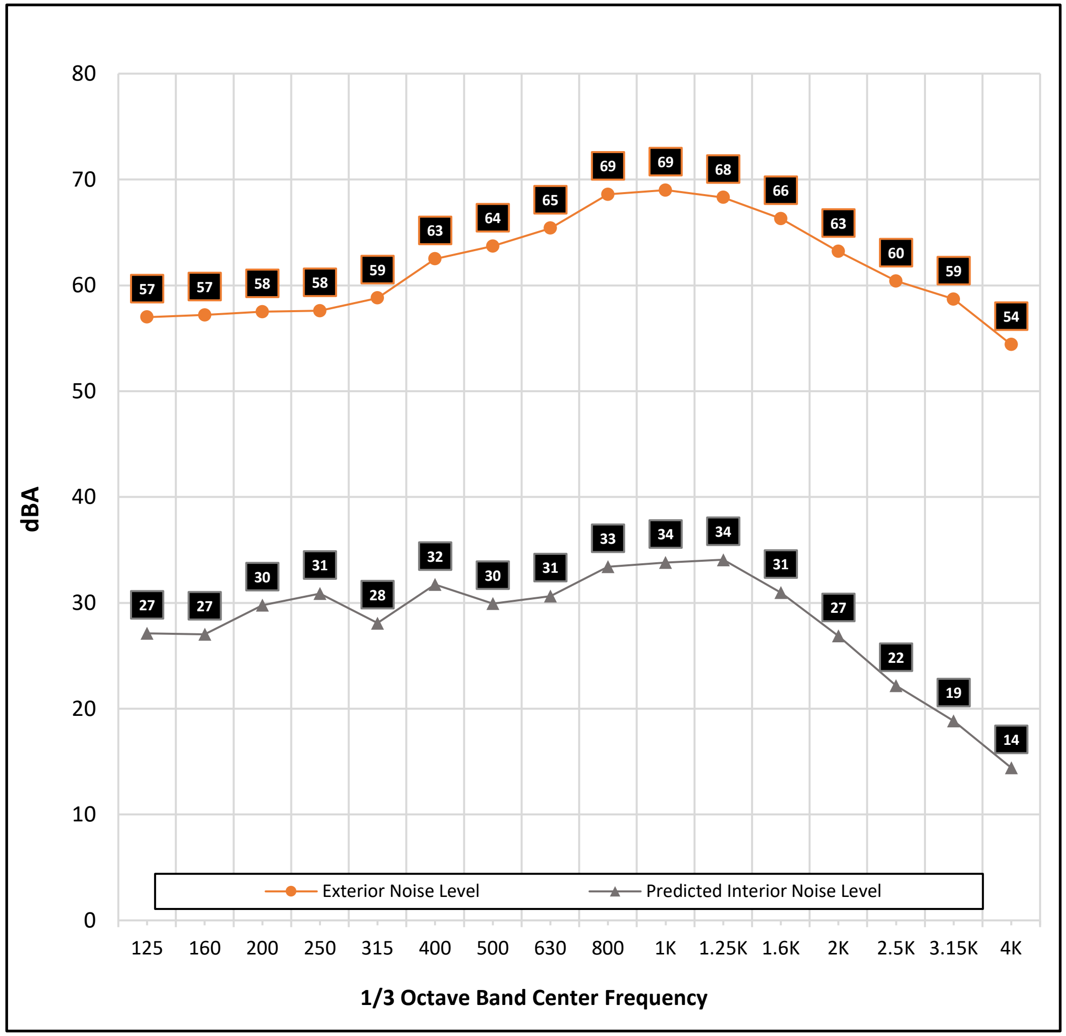
Appendix D3: Interior Noise Calculation Sheet

Project: Mary Ann's Bakery Residential Project
Room Description: Studio

Inputs

Parallel Exterior level, dBA:	76.0 **Ldn**
Correction Factor, dBA:	5.0
Noise Source:	Highway Traffic
Room Length, ft:	19.0
Room Width, ft:	16.0
Room Height, ft:	9.0
Transmitting Panel Length, ft:	16.0
Glazing Area, ft:	50.0
Ceiling Finish:	Gyp Board
Ceiling, sf:	304
Wall Finish 1:	Gyp Board
Wall Finish 1, sf:	580
Wall Finish 2:	Glass
Wall Finish 2, sf:	50
Floor:	Vinyl Plank
Floor, sf:	304
Misc. Finish:	Soft Furnishings
Misc. Finish, sf:	25
Transmitting Element 1:	Wall - 3-coat Stucco wall with RC
Element 1, sf:	94
Transmitting Element 2:	Glazing - STC 38
Element 2, sf:	50
Transmitting Element 3:	
Element 3, sf:	
Transmitting Element 4:	
Element 4, sf:	

Predicted Interior Noise Level, dBA: 42
Noise Reduction, dBA: -34



Appendix D4: Interior Noise Calculation Sheet

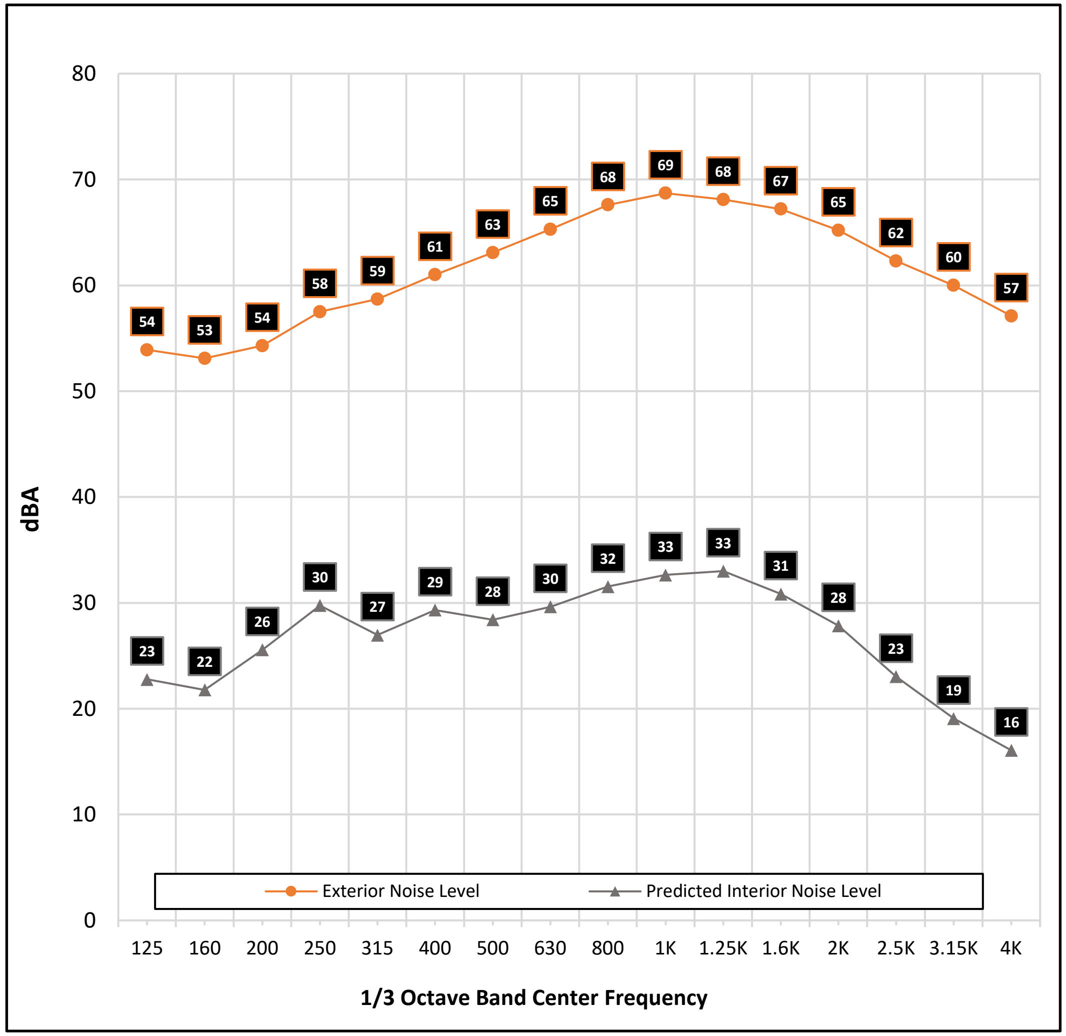
Project: Mary Ann's Bakery Residential Project

Room Description: Living Room

Inputs		
Parallel Exterior level, dBA:	76.0	**Ldn**
Correction Factor, dBA:	5.0	
Noise Source:	Freeway Traffic	
Room Length, ft:	28.6	
Room Width, ft:	15.0	
Room Height, ft:	9.0	
Transmitting Panel Length, ft:	15.0	
Glazing Area, ft:	50.0	
Ceiling Finish:	**Gyp Board**	
Ceiling, sf:	429	
Wall Finish 1:	**Gyp Board**	
Wall Finish 1, sf:	734.8	
Wall Finish 2:	**Glass**	
Wall Finish 2, sf:	50	
Floor:	**Vinyl Plank**	
Floor, sf:	429	
Misc. Finish:	**Soft Furnishings**	
Misc. Finish, sf:	25	
Transmitting Element 1:	**Wall - 3-coat Stucco wall with RC**	
Element 1, sf:	85	
Transmitting Element 2:	**Glazing - STC 38**	
Element 2, sf:	50	
Transmitting Element 3:		
Element 3, sf:		
Transmitting Element 4:		
Element 4, sf:		

Predicted Interior Noise Level, dBA: 41

Noise Reduction, dBA: -35



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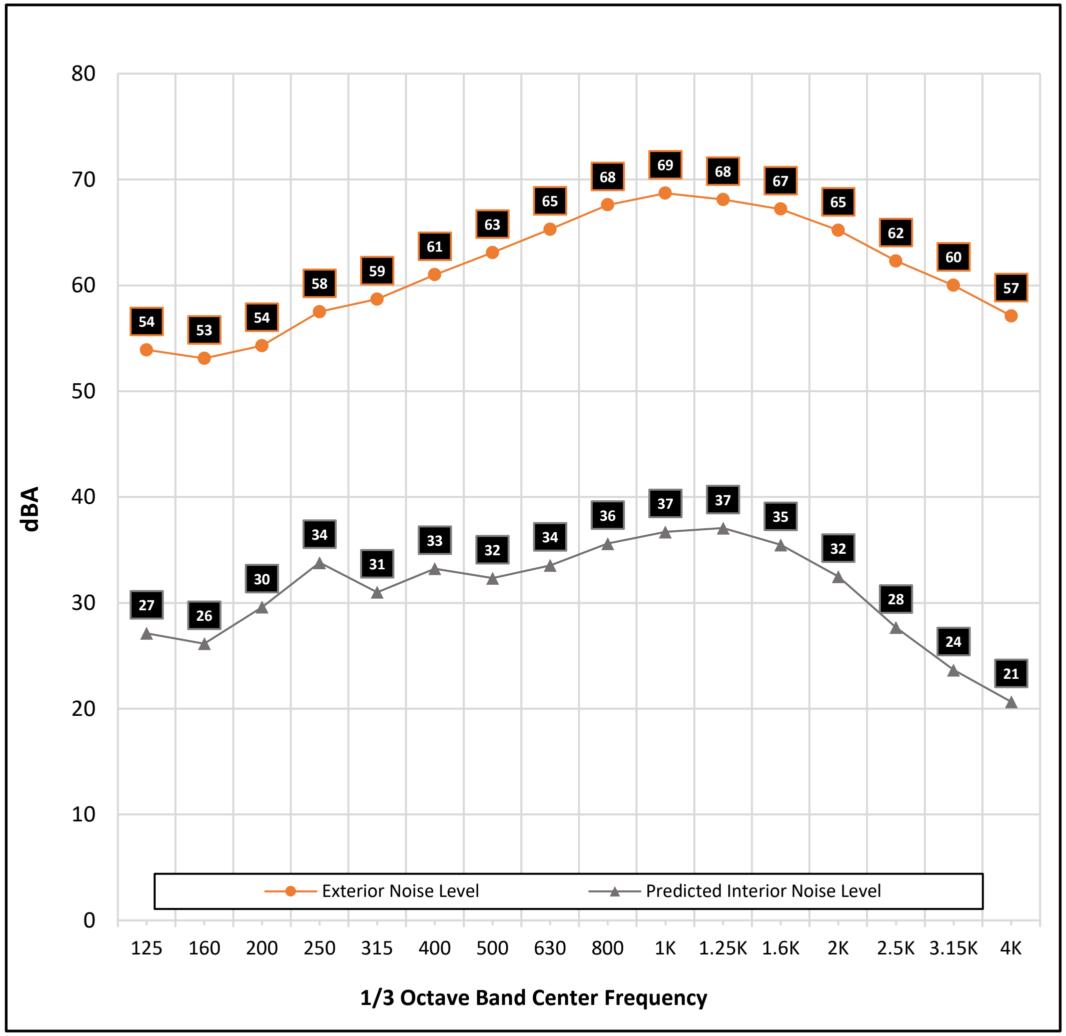
Appendix D5: Interior Noise Calculation Sheet

Project: Mary Ann's Bakery Residential Project
Room Description: Living Room - Corner

Inputs

Parallel Exterior level, dBA:	76.0 **Ldn**
Correction Factor, dBA:	5.0
Noise Source:	Freeway Traffic
Room Length, ft:	23.0
Room Width, ft:	22.0
Room Height, ft:	9.0
Transmitting Panel Length, ft:	45.0
Glazing Area, ft:	150.0
Ceiling Finish:	Gyp Board
Ceiling, sf:	506
Wall Finish 1:	Gyp Board
Wall Finish 1, sf:	660
Wall Finish 2:	Glass
Wall Finish 2, sf:	150
Floor:	Vinyl Plank
Floor, sf:	506
Misc. Finish:	Soft Furnishings
Misc. Finish, sf:	25
Transmitting Element 1:	Wall - 3-coat Stucco wall with RC
Element 1, sf:	255
Transmitting Element 2:	Glazing - STC 38
Element 2, sf:	150
Transmitting Element 3:	
Element 3, sf:	
Transmitting Element 4:	
Element 4, sf:	

Predicted Interior Noise Level, dBA: 45
Noise Reduction, dBA: -31



Appendix D6: Interior Noise Calculation Sheet

Project: Mary Ann's Bakery Residential Project
Room Description: Living Room - Corner

Inputs		
Parallel Exterior level, dBA:	76.0	Ldn
Correction Factor, dBA:	5.0	
Noise Source:	Freeway Traffic	
Room Length, ft:	24.3	
Room Width, ft:	19.4	
Room Height, ft:	9.0	
Transmitting Panel Length, ft:	43.7	
Glazing Area, ft:	156.0	
Ceiling Finish:	Gyp Board	
Ceiling, sf:	471.42	
Wall Finish 1:	Gyp Board	
Wall Finish 1, sf:	630.6	
Wall Finish 2:	Glass	
Wall Finish 2, sf:	156	
Floor:	Vinyl Plank	
Floor, sf:	471.42	
Misc. Finish:	Soft Furnishings	
Misc. Finish, sf:	25	
Transmitting Element 1:	Wall - 3-coat Stucco wall with RC	
Element 1, sf:	237	
Transmitting Element 2:	Glazing - STC 38	
Element 2, sf:	156	
Transmitting Element 3:		
Element 3, sf:		
Transmitting Element 4:		
Element 4, sf:		

Predicted Interior Noise Level, dBA: 45
Noise Reduction, dBA: -31