ABC Acoustics, Inc.
NOISE CONTROL EXPERTS

ACOUSTICAL ANALYSIS REPORT
1398 LIETA STREET RESIDENCES
City of San Diego, California

PREPARED FOR:
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TABLE OF CONTANTS

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION:

Lieta Street Residences project would construct two new three-story residential buildings. Project site is located east of Interstate 5 (I-5) and Morena Boulevard, west of Lieta Street, and south of Asher Street in San Diego, California. The project site and vicinity land uses are primarily residential (Figure 1). The City of San Diego has requested an Acoustical Analysis Report to assess compliance of the project with the City's exterior and interior noise standards.

This Acoustical Analysis Report addresses the cumulative exterior and interior noise levels impacting the project resulting from surface and rail traffic noise sources in the area. It is based on vehicular traffic information provided by the City of San Diego and noise measurements conducted at the project site by ABC Acoustics. It also makes use of the architectural plans prepared for the project by De Bartolo + Rimanic Design Studio (September, 2016).

The following sections of this report include a description of the project site, a discussion of the applicable standards, results of acoustical analysis and acoustical treatment recommendations to improve interior acoustics of the project to 45 dBA Ldn or lower, as required by the City of San Diego.

FIGURE 1: VICINITY MAP

2.0 PROJECT DESCRIPTION:

Lieta Street Residences project site is located at 1398 Lieta Street within the City of San Diego, California. The project site is currently occupied by a single-family home. All existing improvements at the site will be removed prior to construction of 1398 Lieta Street Residences. The project would construct a total of 13 attached residential units accommodated within two buildings. A Site Plan for the project is included in Figure 2.

Noise levels impacting the project site stem primarily from traffic on I-5, Morena Boulevard, and the Atchison, Topeka & Santa Fe Railway tracks which run west of the site (Figure 1). The south side of the proposed buildings would receive the highest noise impacts because of proximally to these sources. I-5, Morena Boulevard and the Topeka & Santa Fe Railway tracks are at a lower elevation than the project site. As a result, difference in height screens some of sources noise. The units closest to I-5 and Morena Boulevard would receive the highest noise impacts because of proximally to the noise sources. These Units are at approximately 350 feet from the centerline of I-5, 85 feet from Morena Boulevard.

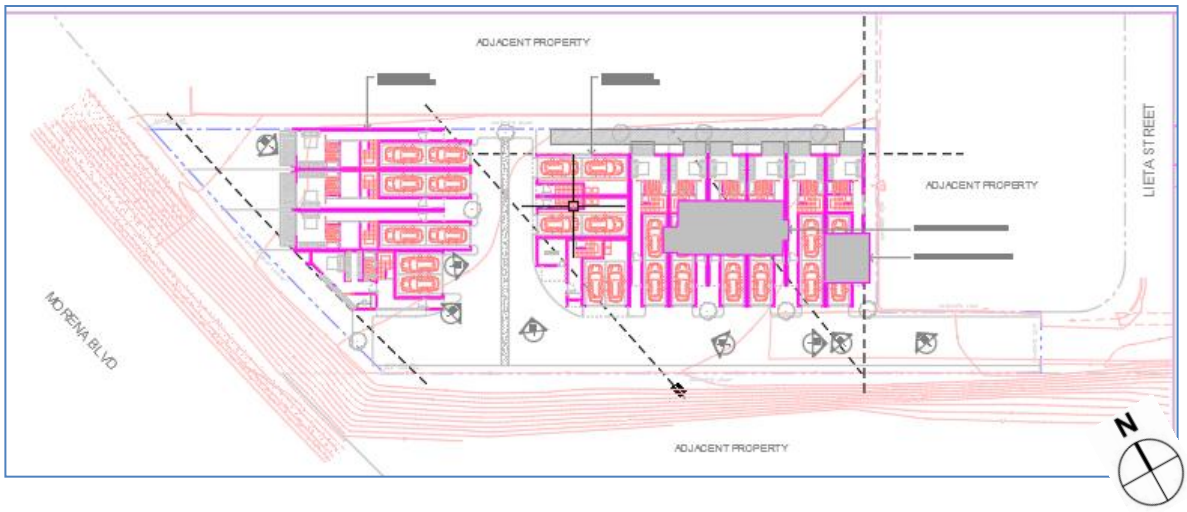


FIGURE 2: SITE PLAN

3.0 APPLICABLE STANDARDS:

3.1 Exterior Noise Limits:

The City of San Diego Noise Element to the General Plan has established a set of community noise standards which identify compatible outdoor and indoor noise levels for various land uses (Table 1). The maximum compatible exterior noise level for residential land uses is 65 dBA CNEL. Pursuant to the City's Noise Element (2015), this limit also applies to all exterior use areas such as exterior seating/picnic areas, pools, playgrounds, etc. It also applies to all balconies and patio areas which are included in project's required open-space calculations, provided the noise impacts are not due to air traffic.

Units of noise are expressed as decibels (dB) and the "A"-weighted noise scale is used (dBA) because it closely approximates the perception of loudness by humans. Community Noise Equivalent Level (CNEL) is the energy-averaged time-weighted annual noise level over a 24-hour period. Time-weighting technique applies a penalty to the actual hourly noise level during certain periods of evening and/or nighttime hours. CNEL applies a 5 dBA penalty to the evening hours of 7 pm to 10 pm, and a 10 dBA penalty to the nighttime hours of 10 pm to the following 7 am. These time periods and penalties were selected to reflect people's sensitivity to noise as a function of activity.

Day-Night Equivalent Level (Ldn) is similar to CNEL except it does not apply the evening hours' penalty. Ldn and CNEL are often used interchangeably.

3.2 Interior Noise Limits:

The City of San Diego, per California Code of Regulations, Title 24, requires all new multi-unit residential projects located within an exterior noise environment exceeding 60 dBA CNEL to conduct an interior acoustical analysis. The interior Acoustical Analysis Report must address the interior noise impacts at the project site and, if necessary, recommend sound attenuation measures to reduce such impacts at all habitable areas to 45 dBA CNEL or lower (Table 1).

TABLE 1: CITY OF SAN DIEGO LAND USE – NOISE COMPATIBILITY GUIDELINE						
Land Use Category	**Exterior Noise Exposure (dBA CNEL)**					
	60	**65**	**70**	**75**		
Parks and Recreational						
Parks, Active and Passive Recreation						
Outdoor Spectator Sports, Golf Courses; Water Recreational Facilities; Indoor Recreation Facilities						
Agricultural						
Crop Raising & Farming; Community Gardens, Aquaculture, Dairies; Horticulture Nurseries & Greenhouses; Animal Raising, Maintain & Keeping; Commercial Stables						
Residential						
Single Swelling; Mobile Homes		45				
Multiple Dwelling Units **For uses affected by aircraft noise, refer to Policies NE-D.2. & NE-D.3.*		45	45*			
Institutional						
Hospitals; Nursing Facilities; Intermediate Care Facilities; Kindergarten through Grade 12 Educational Facilities; Libraries; Museums; Child Care Facilities		45				
Other Educational Facilities including Vocational/Trade Schools and Colleges and Universities)		45	45			
Cemeteries						
Retail Sales						
Building Supplies/Equipment; Food, Beverages & Groceries; Pets & Pet Supplies; Sundries, Pharmaceutical, & Convenience Sales; Wearing Apparel & Accessories			50	50		
Commercial Services						
Building Services; Business Support; Eating & Drinking; Financial Institutions; Maintenance & Repair; Personal Services; Assembly & Entertainment (includes public and religious assembly); Radio & Television Studios; Golf Course Support			50	50		
Visitor Accommodations		45	45	45		
Offices						
Business & Professional; Government; Medical, Dental & Health Practitioner; Regional & Corporate Headquarters			50	50		
Vehicle and Vehicular Equipment Sales and Services Use						
Commercial or Personal Vehicle Repair & Maintenance; Commercial or Personal Vehicle Sales & Rentals; Vehicle Equipment & Supplies Sales & Rentals; Vehicle Parking						
Wholesale, Distribution, Storage Use Category						
Equipment & Materials Storage Yards; Moving & Storage Facilities; Warehouse; Wholesale Distribution						
Industrial						
Heavy Manufacturing; Light Manufacturing; Marine Industry; Trucking & Transportation Terminals; Mining & Extractive Industries						
Research & Development				50		

	Compatible	Indoor Uses	Standard construction methods should attenuate exterior noise to an acceptable indoor noise level. Refer to Section I.
		Outdoor Uses	Activities associated with the land use may be carried out.
	Conditionally Compatible	Indoor Uses	Building Structure must attenuate exterior noise to the indoor noise level indicated by the number (45 or 50) for occupied areas. Refer to Section I.
		Outdoor Uses	Feasible noise mitigation techniques should be analyzed and incorporated make the outdoor activities acceptable. Refer to Section I.
	Incompatible	Indoor Uses	New construction should not be undertaken.
		Outdoor Uses	Severe noise Interference makes outdoor activities unacceptable.

3.3 Construction-Related Noise Standards:

The anticipated noise levels during construction phase of the project must comply with the City of San Diego's Noise Ordinance, established in Section 59.5.0404 of Article 9.5 of the City's Municipal Codes which reads as follows:

Section 59.5.0404: Construction Noise:

(a) It shall be unlawful for any person, between the hours of 7:00 p.m. of any day and 7:00 a.m. of the following day, or on legal holidays as specified in Section 21.04 of the San Diego Municipal Code, with exception of Columbus Day and Washington's Birthday, or on Sundays, to erect, construct, demolish, excavate for, alter or repair any building or structure in such a manner as to create disturbing, excessive or offensive noise unless a permit has been applied for and granted beforehand by the Noise Abatement and Control Administrator. In granting such permit, the Administrator shall consider whether the construction noise in the vicinity of the proposed work site would be less objectionable at night than during the daytime because of different population densities or different neighboring activities; whether obstruction and interference with traffic particularly on streets of major importance, would be less objectionable at night than during the daytime; whether the type of work to be performed emits noises at such a low level as to not cause significant disturbances in the vicinity of the work site; the character and nature of the neighborhood of the proposed work site; whether great economic hardship would occur if the work were spread over a longer time; whether proposed night work is in the general public interest; and he shall prescribe such conditions, working times, types of construction equipment to be used, and permissible noise levels as he deems to be required in the public interest.

(b) Except as provided in subsection C. hereof, it shall be unlawful for any person, including The City of San Diego, to conduct any construction activity so as to cause, at or beyond the property lines of any property zoned residential, an average sound level greater than 75 decibels during the 12–hour period from 7:00 a.m. to 7:00 p.m.

(c) The provisions of subsection B. of this section shall not apply to construction equipment used in connection with emergency work, provided the Administrator is notified within 48 hours after commencement of work. (Amended 1–3–1984 by O–16100 N.S.)

3.4 Partition Sound and Impact Rating Requirements:

The City of San Diego requires the common party walls of all attached residential development to be rated for sound. The common floor/ceiling assemblies of

residential units should also comply with a minimum impact rating in addition to the sound rating.

All common party walls of attached residential units are required to have a sound transmission class (STC) rating of 50 or higher. Similarly, all common floor/ceiling assemblies are required to have an STC rating of 50 or higher and an impact insulation class (IIC) rating of 50 or higher.

STC and IIC ratings are single-numbered ratings which are arrived at through testing the transmission loss of a wall or a floor/ceiling assembly at octave-band frequencies and then fitting the results into a preset curve. The higher the STC or IIC rating, the better the sound and vibration performance of a partition.

4.0 NOISE IMPACT ASSESSMENT:

4.1 Existing Noise Environment:

Existing noise sources of potential significance in the vicinity of 1398 Lieta Street Residences project are I-5, Morena Boulevard and the Topeka & Santa Fe Railway tracks.

I-5 is a four-lane, one-way Freeway running north-south to the south of the project site. The posted speed limit is 65 mph. In the vicinity of the project site, according to Caltrans 2015 traffic volumes, I-5 currently carries a traffic volume of approximately 213,000 ADT traveling northbound.

Morena Boulevard is a four-lane, two-way major arterial south of the project site. The posted speed limit is 40 mph. According to SanDAG, the current traffic volume is estimated to be approximately 14,600 Average Daily Trips (ADT).

No current or future truck percentages were available for any of the roadways in the vicinity of the project site other than for I-5. However; based on neighboring and surrounding land use, roadway classification, professional experience and on-site observations, a truck percentage mix of 1.0% medium and 0.5% heavy trucks was used for Morena Boulevard. According to traffic counts performed by the Caltrans Traffic Data Branch, the 2015 truck percentage mix on I-5 in the vicinity of the project site is 4.1% trucks.

The cumulative noise levels at the project site were measured during peak hours of afternoon traffic on February 22, 2017, a typical sunny and calm San Diego day. On-site cumulative hourly average noise levels (Leqh) at 85 feet from Morena Boulevard were measured to be between 74-76 dBA (i.e., southern property line, closest to Morena Boulevard). Hourly average noise levels during peak hours of traffic are often equivalent to the Ldn at that location. Noise measurements were conducted using a Brüel and Kjær (B&K) Type 2250 analyzer, a Type 1 Sound Level Meter, per ANSI S1.4.

Noise levels impacting the project site were also calculated using the SoundPlan Computer Model along with the San Diego International Airport's noise contours. To present a worst-case scenario, the higher of the measured and calculated values were used in this analysis.

4.1.1 Vehicular Traffic Noise:

Exterior noise levels impacting the project site from traffic along area circulation network were calculated using the SoundPlan Computer Model and traffic data

provided by the City of San Diego. Details of noise modeling are presented in Attachment "A". Noise contours are shown in Figure 4 below. Traffic-related noise impacts at building façade would be approximately 76 dBA CNEL.

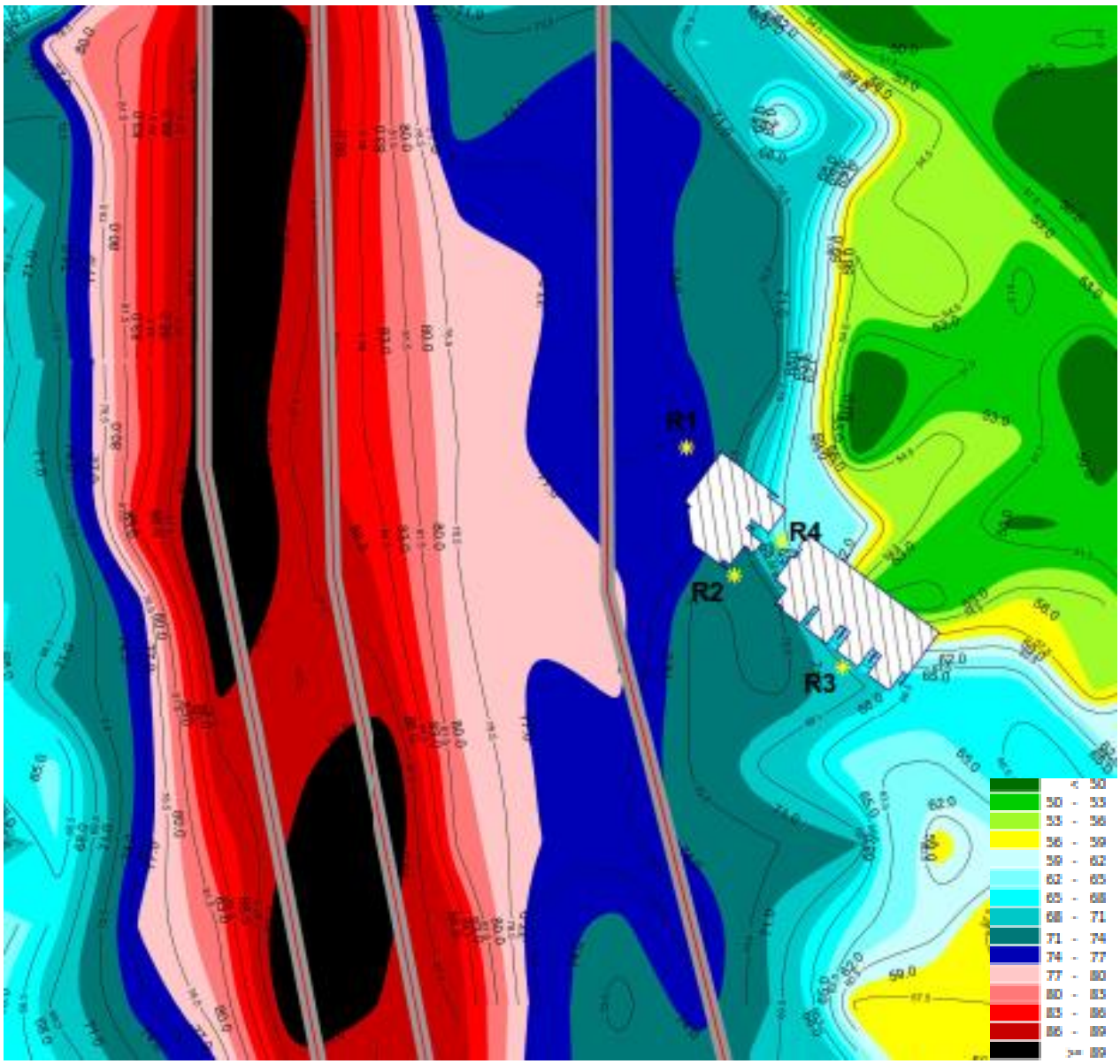


FIGURE 3: SITE PLAN NOISE CNEL CONTOURS

4.1.2 Railroad Noise Impacts:

The Topeka & Santa Fe railroad tracks pass 180 feet west of the project site. These tracks are utilized by the Amtrak as well as the Coaster and the BNSF Cargo trains. Train noise impacts are normally dominated by train horns. Sound intensity of conventional train horns with respect to distance is presented in Figure 4. Although there are no railroad crossings at immediate vicinity of the project site, a 2-dB correction was applied to the measured levels to account for occasional train horns.

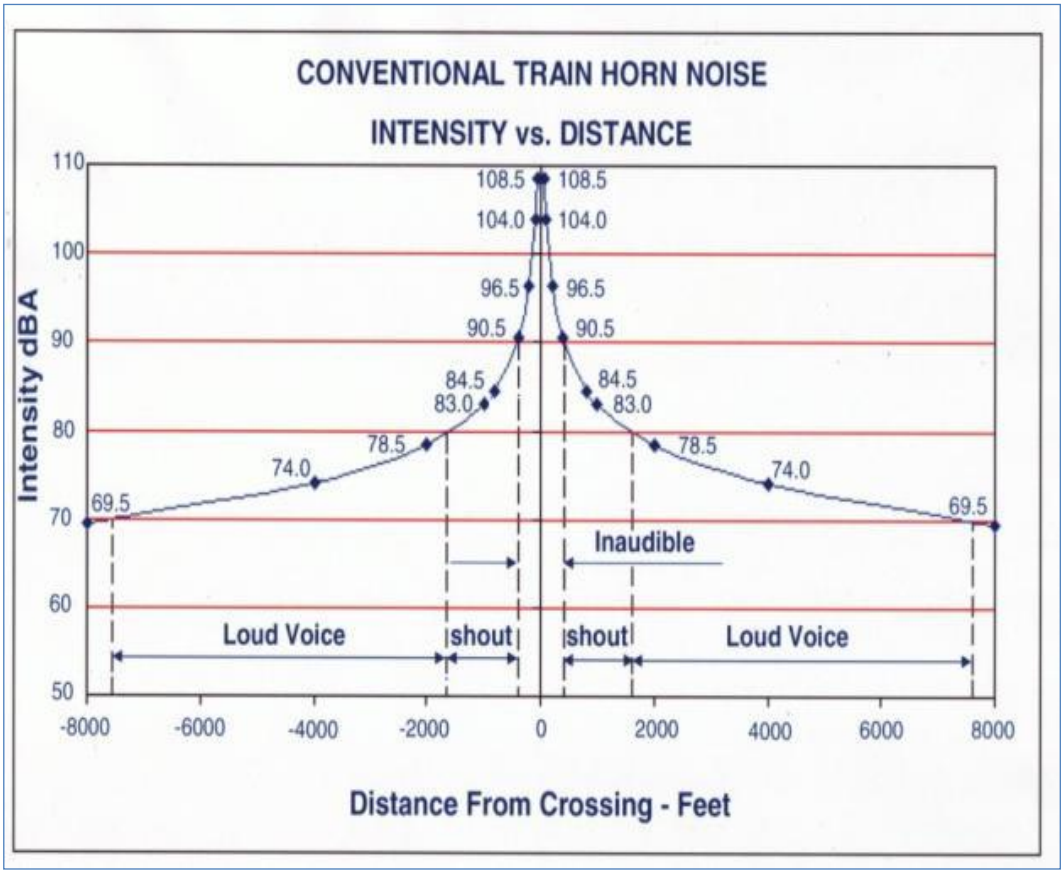


FIGURE 4: CONVENTIONAL TRAIN HORN NOISE

4.1.3 Existing Cumulative Noise Impacts:

Noise modeling for the project resulted in a cumulative (roadway + railroad) exterior noise impact of approximately 76 dBA CNEL. The exterior noise impacts are primarily surface traffic-related. To present a worst-case scenario, results of exterior noise modeling was used to assess interior noise levels.

4.2 Future Noise Environment:

Project-generated traffic on Lieta Street would be minimal and would not affect the existing noise levels along the street. According to the City of SanDag, traffic volume I-5 and Morena Boulevard are not anticipated to increase in the future. Therefore, future noise levels along Lieta Street are anticipated to be similar to existing levels. The same truck percentages from the current traffic volumes were used for future traffic volume modeling. The roadway alignment and roadbed grade elevations are expected to remain the same for these sections of all roadways.

Additionally, noise impacts relating to the Topeka & Santa Fe Railway are anticipated to remain constant for foreseeable future. Therefore, the cumulative noise impacts at the project site are would be approximately 76 dBA CNEL which is compatible with the City of San Diego's requirement for residential uses. However, since surface traffic-related exterior noise impacts at building façade exceed the allowable limit of 60 dBA CNEL, measures need to be incorporated to ensure that interior noise impacts do not exceed 45 dBA CNEL.

4.3 Construction Noise Impacts:

In addition to noise impacts due to air and surface traffic, short-term noise impacts would occur during construction of the proposed project. Adjacent uses would experience temporary increases in noise levels due to construction activities. Although such noise impacts are short-term, they are considered obtrusive and may result in some annoyance to pre-existing residents in the area. According to the applicant, construction activities at 1398 Lieta Street Residences would make use of the equipment listed in Table 2. A representative sample of noise levels associated with such construction equipment is presented in Table 3.

Noisiest stage of construction would be during the 3.5 weeks of demolition, grading, and site utilities. Noise impacts at existing residential uses to the north are anticipated to be 73-74 dBA Leq during 12-hours of 7 am to 7 pm.

TABLE 2 TYPICAL CONSTRUCTION EQUIPMENT NOISE LEVELS		
Scope of Work	**Duration**	**Anticipated Large Equipment**
Demo	1 week	1 Scraper, Dump Truck
Grading	1.5 week	1 Excavator
Site Utilities	1 week	1 Backhoe
Building Construction	8 months	construction crews only

TABLE 3 CONSTRUCTION EQUIPMENT NOISE LEVELS (Measured at a distance of 50 feet)	
Equipment	**Noise Level (dB-A)**
Dump Truck	75.3
Excavator	74.6
Backhoe	73.5

Notes:

- Sound level attenuation associated with distance between noise sources and receivers are controlled by several factors. Sound levels drop a minimum of approximately 3 decibels per doubling of distance for line-noise-sources due to the inverse square law. Point-noise-sources are reduced at a rate of approximately 6 decibels per doubling of distance.

- The intervening topography between noise sources and receivers, atmospheric conditions, molecular conditions, etc. significantly effect attenuation of sound at varying distances.

1 Source: DEFRA Update of Noise Database for Prediction of Noise on Construction and Open Sites.

5.0 CONDITIONS OF DEVELOPMENT AND MITIGATION:

5.1 Exterior Noise Attenuation:

Since exterior noise at patios and balconies exceeds 65 dB, therefore, a 6-foot-high noise barrier shall be constructed at patios and balconies. This barrier may be constructed of stucco wall-Plexiglass combination. It shall be solid and continues with no opening or gaps within its entirety.

5.2 Interior Noise Attenuation:

Since exterior noise impacts at building façade exceed the allowable limit of 60 dBA Ldn, measures need to be incorporated to ensure that interior noise impacts do not exceed 45 dBA Ldn.

California light-frame residential structures provide for 15 dB exterior-to-interior noise reduction with windows open. Hence, exterior noise of 65 dBA Ldn would be reduced to 45 dBA Ldn inside. Closed-window conditions provide for an additional 5-10 dB reduction with double-glazed windows. Therefore, an exterior noise of 65 dBA CNEL would be reduced to 40-45 dBA CNEL with windows closed. Results of interior noise calculations are presented in Attachment "A".

Interior noise levels within all habitable areas of the project would be in compliance if the following treatment measures are incorporated.

1) **All habitable areas of 1398 Lieta Street Residences project shall be equipped with mechanical ventilation to provide for fresh air, in compliance with CBC and California Mechanical Codes (CMC) Chapter 4.**

2) **Figure 5 bellow includes STC ratings for exterior windows and doors. As presented in figure 5, windows and doors located in the area shown in red shall have STC of 43 or higher. Windows and doors located in the area shown in blue shall have STC 40 or higher. Windows and doors located in the area shown in green shall have STC 33 or higher.**

3) **Residential entry doors shall be solid core wooden and weather-stripped with an STC of 30 or higher.**

The above noise treatment measures, if incorporated, would reduce the interior noise impacts at the proposed project site to 45 dBA CNEL or lower, as required by the City of San Diego.

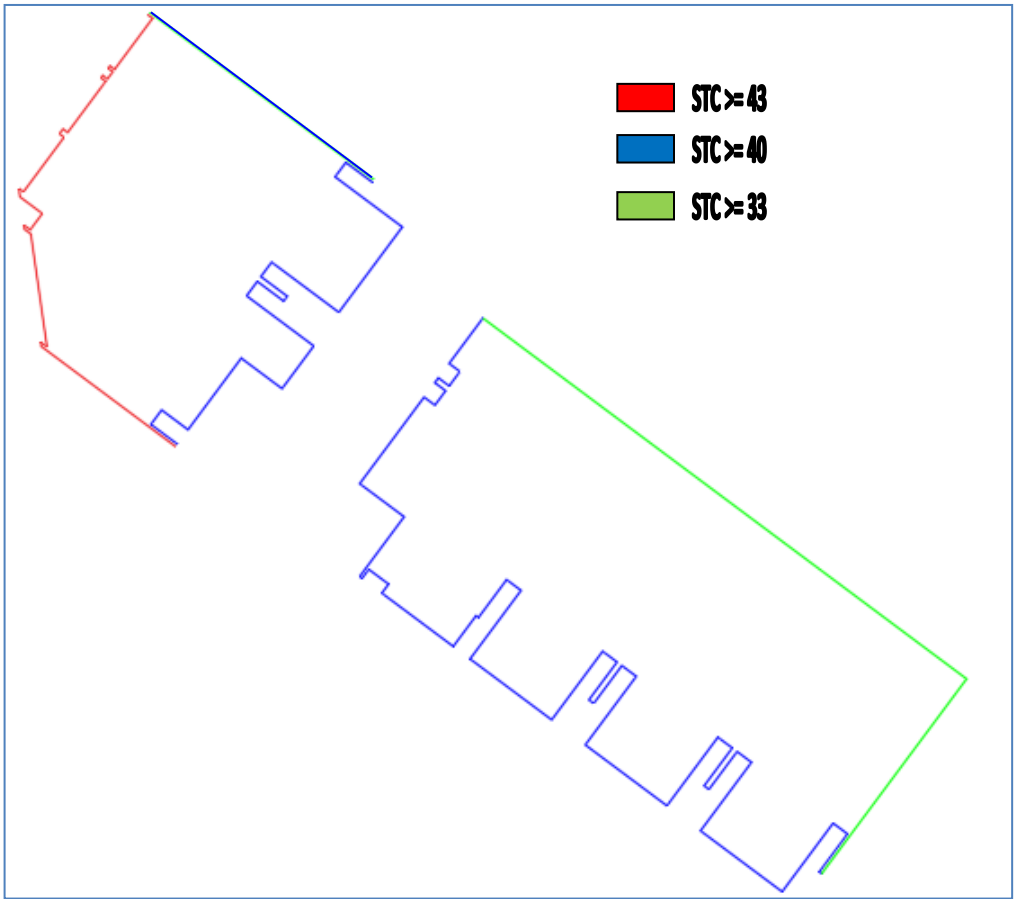


FIGURE 5: STC RATINGS FOR EXTERIOR WINDOWS AND DOORS

5.2.1 Partition Sound and Impact Rating Requirements:

Table 4 includes details of the sound-rated common party (demising) wall at the project site. As presented in Table 4, STC rating of the demising wall would be 55 or more, exceeding the City of San Diego' requirement of STC 50.

Table 4 also includes details of the Common floor/ceiling assemblies at 1398 Lieta Street Residences. The floor/ceiling assembly has an STC rating exceeding 50. The Impact Insulation Class (IIC) rating of the assembly would depend on the topping. Carpeted areas would have an IIC rating of 60 or more. All floor areas with hard finishes (i.e., wood, tile, concrete, etc.) shall include an acoustical underlayment in order to comply with the IIC rating of 50. These areas include tile, ceramic, and wood floors as well as decks which are above habitable areas.

Use Acoustimat II underlayment system manufactured by Maxxon or equivalent. Attachment "B" of this report includes additional information on Acoustimat underlayment products.

5.2.2 Partition Penetration and Design Guidelines:

The State of California Building Code requires that walls and floor-ceilings separating dwelling units from other units or common use spaces achieve a minimum STC rating of 50. Additionally, party floor-ceiling assemblies shall achieve a minimum IIC rating of 50. All sound-rated assemblies, including party walls, corridor walls, plumbing walls, and dropped ceilings between residences, must include batt insulation and have acoustical caulking around the entire perimeter.

Additional acoustical notes and guidelines are presented in the following section of this report. All acoustical notes, details, and guidelines shall be included in project's drawings after they have been reviewed by the project's architects & engineers.

TABLE 4

STC RATINGS OF TYPICAL RESIDENTIAL PARTITIONS
1398 LIETA STREET RESIDENCES, SAN DIEGO, CALIFORNIA

A. Demising Wall (Ref: NGC 3056)	**STC/IIC**
1. 2 layers of 5/8" type x gypsum wallboard	
2. 2x4 wood studs	
3. R-11 Insulation in all stud cavities	
4. 1" Air Space	
5. 2x4 wood studs	
6. R11 insulation in all stud cavities	
7. 2 layers of 5/8" type x gypsum wallboard (one layer replaced w/ shear panel, per structural)	
8. Nominal wall thickness = 10 1/2"	≥55

B. Typical Common Floor/Ceiling Assembly (Ref: F 99 1736-4 & 7)	
1. **Flooring:** 1) carpet & pad, 2) wood, or 3) ceramic tile over crack suppression membrane	
2. **Core:** 1 ½" Maxxon approved concrete underlayment over Acoustimat II	
3. ¾" plywood subfloor	
4. 16" TJI joists	
5. R-30 batt insulation	
6. **Ceiling:** RC-1 resilient channels	
9. 2 layers of 5/8" type x gypsum wallboard	≥55/≥50

Notes:

- Increased size/thickness usually results in improved STC rating.
- References: Catalog of STC and IIC Ratings for Wall and Floor/Ceiling Assemblies, (California Department of Health Services, 1980) and Gypsum Association.

5.3 Construction Noise Attenuation:

Although noise impacts at existing residential uses closest to the project site would increase during construction phase of the project, they are not anticipated to exceed 75 decibels during the 12–hour period from 7 am to 7 pm. The project shall comply with the following construction attenuation requirement:

Construction activities shall be limited to daytime hours permissible by the City of San Diego and adherence to the general good practice construction noise control techniques, temporary construction noise is expected to remain in compliance with the City if San Diego noise limits.

As a courtesy to existing neighbors, the following construction practices are included and shall be practiced:

1) Use newer equipment with effective mufflers.
2) Place stationary equipment in locations that will have a lesser noise impact on nearby sensitive receivers.
3) Turn off equipment when not in use.
4) Maintain equipment regularly to ensure proper operating condition.
5) Schedule work to avoid simultaneous operation of noisy equipment.
6) Minimize the use of backup alarms.

6.0 ACOUSTICAL NOTES, DETAILS & GUIDELINES:

State of California Building Code requires that walls and floor-ceilings separating dwelling units from other units or common use spaces achieve a minimum STC rating of 50. In addition, party floor-ceiling assemblies are required to have a minimum IIC rating of 50. All sound-rated assemblies, including party walls, corridor walls, plumbing walls, shaft walls, and dropped ceilings between residences, shall include batt insulation and have acoustical caulking around the entire perimeter.

a) Top & bottom runners of sound-rated party walls shall be set on acoustical isolation tape or a continuous bead of approved acoustical sealant, as shown in Figure C-1.

b) The face layer of gypsum board at exterior walls and interior sound-rated partitions shall be held back ¼ inch from intersecting surfaces and caulked airtight with an approved acoustical sealant (Figure C-1).

c) Demising walls (i.e., walls between adjacent residential units) shall be an insulated double-stud wall with minimum two layers of gypsum board on one side and one layer on the opposite side, as shown in Figure C-1 in Attachment "C".

d) Party walls in bathrooms behind the tub/shower are to be extended to the floor and sealed.

e) The tub/shower enclosures and sinks shall be installed such that all edges contacting a party wall (or a cabinet attached to a party wall) are set on acoustic sealant.

f) Non-carpeted floors over habitable areas shall include acoustical underlayment (e.g., AcoustiMat II), as shown in Figures C-2 in Attachment "C".
   Note: While acoustical underlayment is not required at carpeted areas, there are advantages to installing the underlayment throughout the residences: 1) it allows for carpet to be replaced with hard-surfaced finishes later; 2) it provides for a uniform floor.

g) Where elevator is adjacent to occupied spaces, a structural separation shall be maintained. At a minimum, this shall consist of a furred wall with RC-1, a layer of 5/8" gypsum board and batt insulation.

h) Electrical, phone, cable, and all other outlet boxes on opposite sides of sound-rated partitions or plumbing walls are to be separated by 24 inches. The exposed backs and sides shall be completely covered with Lowry's pads, as shown in Figure C-3 in Attachment "C".

i) Entry doors shall be solid-core wood and gasketed, as shown in Figure C-4 in Attachment "C".

6.1 Piping and Ductwork:

a) All stud and joist spaces including piping shall have a minimum of R-11 (3-½-inch thick) batt insulation.

b) All HVAC and domestic piping (i.e., supply water, waste, drain, vent, condenser water, rainwater leaders, etc.) are to be vibration isolated from the structure as well as other piping, ductwork, gypsum board, etc. (Note: The Contractor shall submit proposed plumbing isolation devices for approval).

c) Cast iron pipe shall be used for waste, drain, rainwater, or similar systems. If thin-walled copper, PVC, or other lightweight piping is used, then it must be completely wrapped with approved acoustical lagging material.

d) In double-stud assemblies, do not attach plumbing piping to both stud bays (i.e., a length of plumbing piping shall only be attached to one row of studs).

e) Walls containing plumbing piping shall be sized so that there is two-inch clearance between the piping and the gypsum board at non-plumbing rooms and one-inch clearance at plumbing rooms (Figure C-5 in Attachment "C").

f) Openings for ducts, large pipes (three-inch diameter or greater), conduits, or other penetrations through sound-rated constructions shall be oversized and sealed airtight with acoustically rated caulking, as shown in Figure C-6 in Attachment "C".

g) Smaller pipe, conduit, and other penetrations (less than three-inch diameter) shall be oversized by ¼ inch and sealed airtight with acoustically rated caulking (Figure C-7 in Attachment "C").

h) An approved ¾-inch thick neoprene waffle pad is needed between pipe riser clamps and the structure (Figure C-6 in Attachment "C").

i) Rainwater leaders shall be avoided in residential ceilings, especially over bedrooms. These pipes often have high levels of fluid flow for long periods of time and can be a source of complaint.

j) Supply water flow rates shall not exceed four (4) feet per second (fps) in ½-inch and ¾-inch diameter pipes. For larger pipes, six (6) fps is allowable.

k) Maintain a maximum water pressure of 50 psi at plumbing fixtures as consistent with adequate flow rates.

l) At trapeze and unistrut installations, a resilient material shall be required between the piping and the clamp.

6.2 HVAC Vibration Isolation:

a) All vibration isolation shall conform to current ASHRAE standards. The ASHRAE guidelines include items such as spring isolators and inertia bases as well as ancillary items such as flexible piping and electrical connections. Submittals for all proposed isolation are required. If possible, all vibration isolation devices shall be from a single manufacturer.

b) The slab under rooftop condenser units shall float (i.e., be isolated from the structure).

c) Rooftop condenser units shall be placed on spring vibration isolators. Condensers shall be located over common space, where possible.

d) Unhoused springs are to be used; where necessary separate seismic snubbers are to be added. Equipment is to use external spring isolation; if internal springs are used, then the housing needs to be isolated on neoprene waffle pads. The acoustical vibration isolation must not compromise seismic code or other structural/safety codes/requirements and vice-versa.

e) All attachments to vibration-isolated equipment shall be flexible.

f) Suspended fan-coil units and heat pumps are to be isolated with spring-and-neoprene hangers; floor-mounted units may be isolated with neoprene pads.

g) Medium and high-pressure ductwork riser supports shall be isolated from the structure with captive neoprene mounts or isolated waffle pads.

j) Air registers are to be rated with NC ratings at least five points less than the criterion for the space being served.

k) Toilet exhaust fans shall be rated at a noise level of 1.5 sones or less. In addition, you shall consider placing the fan and light on separate switches.

l) The kitchen hood fans are to be multi-speed units.

m) The residential ventilation systems (e.g., fan-coil units, heat pumps, furnaces) shall be placed adjacent to spaces such as corridors and kitchens, and far from bedrooms, living rooms, etc. Where the fan needs to be near a noise-sensitive area, the equipment selection, door assembly, etc. will need to be reviewed to reduce potential noise impacts.

n) The residential ventilation systems shall be fully ducted

6.3 Electrical System:

a) Outlet boxes on opposite sides of sound-rated partitions or plumbing walls are to be separated by 24 inches. The exposed backs and sides shall be completely covered with Lowry's pads, as shown in Figure C-3 in Attachment "C".

b) Low-voltage devices, such as cable and telephone jacks, shall be placed in outlet boxes and treated as such. If there are limitations as to where outlets can be placed (e.g., outlets for microwave ovens at back-to-back kitchens), the Electrical Engineer/Contractor shall submit a proposed layout for acoustical review.

c) Transformers shall be isolated with captive neoprene mounts. The specific isolators can be determined after the equipment has been selected. In addition, the larger units shall include certified measured noise levels at least ten dB below the NEMA rating.

6.4 Elevator Isolation:

The following isolation guidelines are for the elevator shafts and equipment. The Project Elevator Consultant shall review these as some of our recommendations might be superseded by the applicable elevator codes.

a) Where elevator shafts back to suites, a furring wall shall be added to include RC-1 resilient channels, a layer of 5/8" gypsum board and batt insulation.

b) Provide vibration isolation for the motor assemblies using load bearing neoprene isolators designed to compress a minimum of 0.2 inches under load.

c) Provide flexible couplings (to reduce pipe-borne noise) where the hydraulic lines attach to the pump capable of withstanding pressures specified by the elevator manufacturer.

d) Isolate hydraulic lines from the building structure at all points of attachment using Mason BR isolators or equal between the pipe clamp and the building to prevent metal-to-metal rigid connection between the pipe and the building.

e) Provide a neoprene pad between the plunger and elevator cab. Provide neoprene pads, washers and bushings between the rail brackets and the building.

f) Use resilient roller guide tires.

g) Provide adjustable volume controls for elevator cab arrival enunciators.

h) Provide optical cab position detectors in order to eliminate structure-borne noise associated with mechanical detectors.

6.5 Resilient Channel Installation Guidelines:

The following installation guidelines shall be incorporated into the specifications. To meet fire and structural requirements, it might be necessary to modify these guidelines.

a) Attach channels directly to the framing system only. Do not install channels on gypsum board, shear plywood, or like material.

b) Attaching Channels:
   i. Attach single leg resilient channels at 24-inch center-to-center spacing perpendicular to framing at 16 inches o.c. Use 16-inch channel spacing if framing at 24 inches o.c., as shown in Figure C-8 in Attachment "C".
   ii. Use Clark Dietrich RC Deluxe (RCSD) 25-gauge single-leg resilient channels or other channels that can be shown to have equivalent laboratory acoustical performance to USG RC-1 channels.
   iii. Use one-inch Type S Bugle Head dry wall or similar screws.
   iv. Attach channels with mounting flanges facing in only one direction.
   v. Hold back ends of channels ½ inch from intersecting surfaces.
   vi. Splice channels only at framing and overlap butt ends no more than 1-½ inches. Screw attach through both flanges.

6.6 Additional Guidelines:

a) Recessed cabinets in sound-rated assemblies shall be boxed in and treated as shown in Figure C-9 in Attachment "C".
b) Acoustically isolate garage openers, as shown in Figure C-10 in Attachment "C".

6.7 Quality Control:

c) Quality workmanship will be required to limit sound transmission to lowest practical level.
d) Acoustics-related submittals must be reviewed by a qualified acoustical engineer.
e) During construction of the project, acoustical inspections must be conducted by a qualified acoustical engineer.
f) If a certain note or detail presented herein does not apply to this project, the remaining notes and details must be incorporated.
g) The pertinent acoustical notes and details included herein shall be incorporated into project's drawings and design after they are reviewed and approved by project's Architect(s) and Engineer(s).

7.0 FUTURE ACOUSTICAL CONSIDERATIONS:

Acoustical performance of partitions at the proposed 1398 Lieta Street Residences project depends on proper implementation of all recommendations.

1. All acoustics-related submittals shall be reviewed by a qualified Acoustical Engineer.

2. Inspections shall be conducted by a qualified Acoustical Engineer during construction phase of the project.

The following confirmation tests shall be conducted after completion of the project and prior to occupation.

1. Field STC and IIC testing of common party walls and common floor/ceiling assemblies.

2. Interior noise measurements at habitable areas of selected residential units. These measurements shall include measurements within selected units located along the southwestern, northeastern, and northwestern corners of the site.

3. Plumbing noise measurements within the project site to ensure proper isolation.

If the above noise testing results in noise impacts which exceed the maximum compatible levels presented in this report or the industry standards, treatment measures shall be added to ensure project's compliance.

8.0 REFERENCES CITED:

California, State of; Uniform Building Codes
2005 Section 1203 of the California Building Codes (CBC).

De Bartolo + Rimanic Design Studio
2016 Architectural Plans for 1398 Lieta Street Residences project

San Diego, City of
2011 General Plan, Noise Element.

U.S. Department of Health, Education, and Welfare
1975 Compendium of Materials for Noise Control.

U.S. Department of Transportation, Federal Highway Administration
1978 Highway Traffic Noise Prediction Model (FHWA-RD-77-108).

9.0 CERTIFICATION:

The findings and recommendations presented in this acoustical analysis report are based on available information at the time of analysis. They represent a true and factual analysis of the scope of work relating to potential acoustical issues associated with the subject 1398 Lieta Street Residences project.

There are many factors involved in actual acoustical performance of a structure. And since ABC Acoustics, Inc. has no control over the construction, workmanship and building materials performance, ABC Acoustics, Inc. is not, and could not be held liable, for final results of any recommendations or implementation of such recommendations presented herein.

This report was prepared by Sharo T. Sanavi.

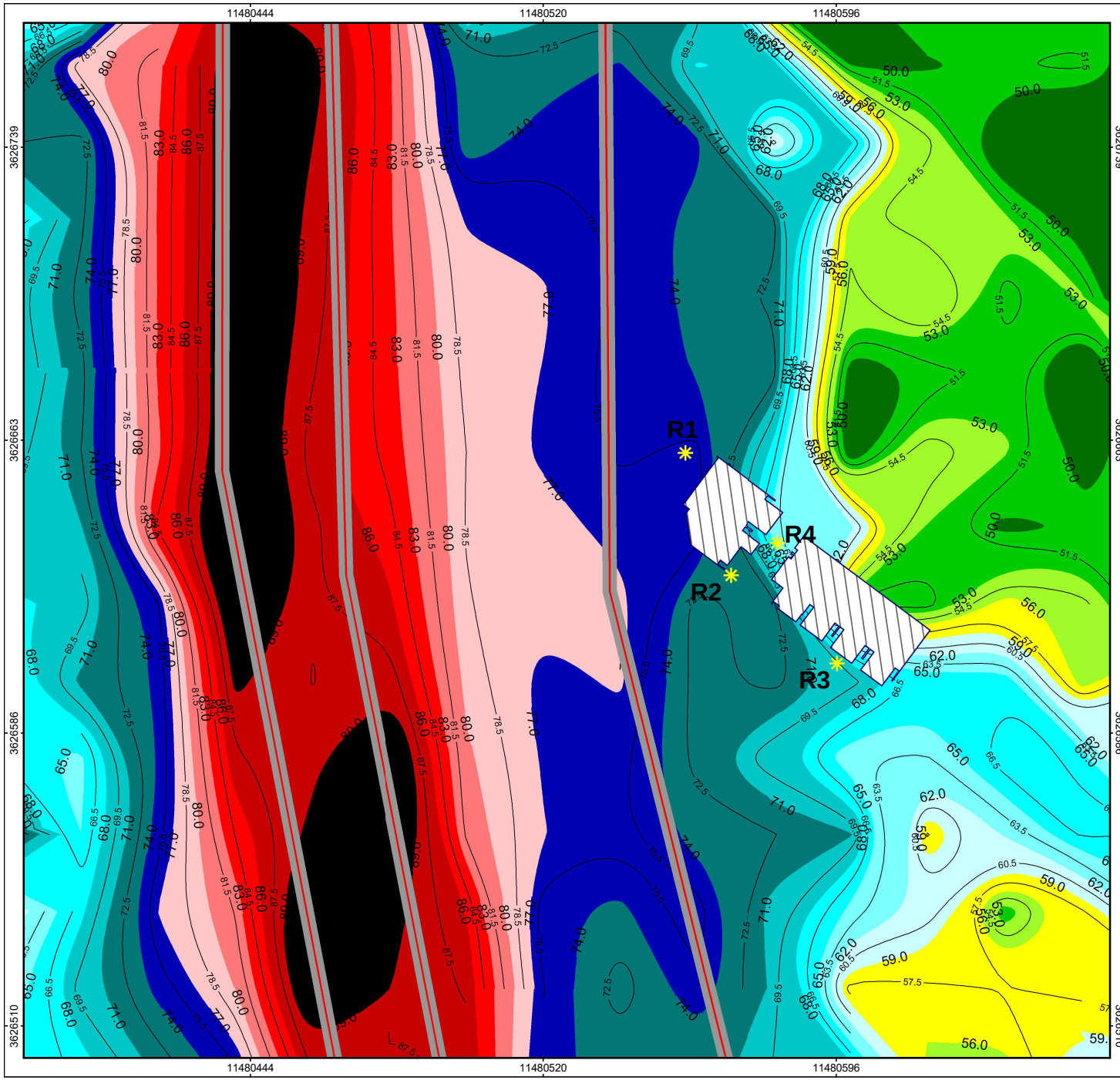
ABC Acoustics, Inc.

Sharo T. Sanavi

Sharo T. Sanavi
Principal
sharo@abcacoustics.com

ATTACHMENT "A"

NOISE CALCULATION DATA



Client: Almeria Investments, LP.
Project: 1398 Lieta Street Residences
Project-No. 2476

Map

1

Grid
Result number 2
Calculation in 1.5 m above ground

Project engineer: Sal Atter
Created: 3/1/2017
Processed with SoundPLAN 7.3, Update 3/19/2015

Levels Ldn
in dB(A)

	< 50
	50 - 53
	53 - 56
	56 - 59
	59 - 62
	62 - 65
	65 - 68
	68 - 71
	71 - 74
	74 - 77
	77 - 80
	80 - 83
	83 - 86
	86 - 89
	>= 89

Signs and symbols
- Road axis
- Emission line
- Wall
- inside tunnels
- Signal
- Railway axis
- Surface
- Wall
- inside tunnels
- Main building
- Auxiliary building
- School
- Wall
- Sloped wall areas
- Point receiver
- Noise calculation area

N

Length scale 1:1009
0 5 10 20 30 40 m

ABC Acoustics, Inc.
NOISE CONTROL EXPERTS

F:\sp\ lietaStreetResidences\1398 Lieta.sgs

ABC Acoustics, Inc.
Project No: 2476

1398 Lieta Street Residences
Source level road
"Situation1.sit"

Road	KM	ADT	Gradient
	km	Veh/24h	%
I-5 SN	0.000	213000	0.5
I-5 NS	0.000	213000	0.0
Morena	0.000	16100	-0.4

ABC Acoustics, Inc.
Project No: 2476

1398 Lieta Street Residences
Assessed receiver levels
"Situation1.sit"

Receiver	Fl	X m	Y m	Z m	Ldn dB(A)	Leq,d dB(A)	Leq,n dB(A)
R1	G	11480557.0	3626659.30	12.96	75.0	73.2	67.0
	F2			15.76	76.7	74.9	68.7
	F3			18.56	77.5	75.6	69.4
R2	G	11480568.8	3626627.47	15.28	74.6	72.7	66.6
	F2			18.08	75.4	73.5	67.3
	F3			20.88	76.0	74.1	68.0
R3	G	11480596.5	3626604.54	14.03	71.8	70.0	63.9
	F2			16.83	74.6	72.8	66.6
	F3			19.63	75.3	73.4	67.2
R4	G	11480581.0	3626635.88	15.32	69.5	67.6	61.5
	F2			18.12	71.1	69.2	63.0
	F3			20.92	71.7	69.9	63.7

ABC ACOUSTICS

03-06-2017 ATTACHMENT
REPORT-2476

TABLE A-1

RESULTS OF INTERIOR NOISE ANALYSIS

Location - Building 1- Corner Unit- Bedroom

Noise Source - TRAFFIC NOISE (NBS, 1978)

Octave Band Center Frequency, Hz					
125	250	500	1000	2000	4000
Reference Exterior A-Weighted Sound Level Spectrum (re. total of 100 dB)					
86.0	90.7	93.5	95.8	92.7	87.0
Room Sound Absorption in sabins					
146	146	146	146	146	146
INTERIOR A-WEIGHTED SOUND LEVEL SPECTRUM ('CLOSED WINDOWS' CONDITIONS)					
44.0	36.5	34.5	34.2	34.0	20.0

Building Facade Reflection Correction - 3.0 dB
Quality Correction - 3.0 dB

SOUND TRANSMISSION THROUGH CONSTRUCTIONS

#	Building Element Information Construction	STC	AREA sq.ft.	A-Weighted Sound Level EXTERIOR	INTERIOR Closed	Open	%	ACorr
1.	STUCCO WALL	46	88.0	77	41	41	0	0.0
2.	WINDOW MULTI-GLAZED=43	43	88.0	77	43	74	50	0.0
TOTAL A-WEIGHTED SOUND LEVEL IN THE ROOM					45	74		

ABC ACOUSTICS

03-06-2017 ATTACHMENT
REPORT-2476

TABLE A-2

RESULTS OF INTERIOR NOISE ANALYSIS

Location - Building 1- Freeway Face- Bedroom

Noise Source - TRAFFIC NOISE (NBS, 1978)

Octave Band Center Frequency, Hz					
125	250	500	1000	2000	4000
Reference Exterior A-Weighted Sound Level Spectrum (re. total of 100 dB)					
86.0	90.7	93.5	95.8	92.7	87.0
Room Sound Absorption in sabins					
122	122	122	122	122	122
INTERIOR A-WEIGHTED SOUND LEVEL SPECTRUM ('CLOSED WINDOWS' CONDITIONS)					
43.3	36.7	33.7	33.1	34.7	20.0

Building Facade Reflection Correction - 3.0 dB
Quality Correction - 3.0 dB

SOUND TRANSMISSION THROUGH CONSTRUCTIONS

#	Building Element Information Construction	STC	AREA sq.ft.	A-Weighted Sound Level EXTERIOR	INTERIOR Closed	Open %	ACorr
1.	STUCCO WALL	46	9.6	77	32	32 0	0.0
2.	WINDOW MULTI-GLAZED=43	43	96.0	77	45	76 50	0.0
TOTAL A-WEIGHTED SOUND LEVEL IN THE ROOM					45	76	

ABC ACOUSTICS

03-06-2017 ATTACHMENT
REPORT-2476

TABLE A-3

RESULTS OF INTERIOR NOISE ANALYSIS

Location - Building 2- Freeway Face- Bedroom

Noise Source - TRAFFIC NOISE (NBS, 1978)

Octave Band Center Frequency, Hz					
125	250	500	1000	2000	4000
Reference Exterior A-Weighted Sound Level Spectrum (re. total of 100 dB)					
86.0	90.7	93.5	95.8	92.7	87.0
Room Sound Absorption in sabins					
162	162	162	162	162	162
INTERIOR A-WEIGHTED SOUND LEVEL SPECTRUM ('CLOSED WINDOWS' CONDITIONS)					
42.6	35.9	33.1	32.5	33.7	19.2

Building Facade Reflection Correction - 3.0 dB
Quality Correction - 3.0 dB

SOUND TRANSMISSION THROUGH CONSTRUCTIONS

#	Building Element Information Construction	STC	AREA sq.ft.	A-Weighted Sound Level EXTERIOR	INTERIOR Closed	Open	%	ACorr
1.	STUCCO WALL	46	38.5	75	35	35	0	0.0
2.	WINDOW MULTI-GLAZED=40	40	80.0	75	44	72	50	0.0
TOTAL A-WEIGHTED SOUND LEVEL IN THE ROOM					45	72		

ABC ACOUSTICS

03-06-2017 ATTACHMENT
REPORT-2476

TABLE A-4

RESULTS OF INTERIOR NOISE ANALYSIS

Location - Building 2- North side- Bedroom

Noise Source - TRAFFIC NOISE (NBS, 1978)

Octave Band Center Frequency, Hz					
125	250	500	1000	2000	4000
Reference Exterior A-Weighted Sound Level Spectrum (re. total of 100 dB)					
86.0	90.7	93.5	95.8	92.7	87.0
Room Sound Absorption in sabins					
118	118	118	118	118	118
INTERIOR A-WEIGHTED SOUND LEVEL SPECTRUM ('CLOSED WINDOWS' CONDITIONS)					
37.2	37.8	36.7	38.0	31.8	23.0

Building Facade Reflection Correction - 3.0 dB
Quality Correction - 3.0 dB

SOUND TRANSMISSION THROUGH CONSTRUCTIONS

#	Building Element Information Construction	STC	AREA sq.ft.	A-Weighted Sound Level EXTERIOR	INTERIOR Closed	Open	%	ACorr
1.	STUCCO WALL	46	44.0	70	32	32	0	0.0
2.	WINDOW (5/16 LAMINATED)	33	74.5	70	44	68	50	0.0
TOTAL A-WEIGHTED SOUND LEVEL IN THE ROOM					44	68		

ATTACHMENT "B"

ACOUSTICAL MATERIAL CUT-SHEETS
ACOUSTIMAT LP, ISOMAX RC

another superior product from MAXXON CORPORATION

ACOUSTI-MAT®

ULTIMATE SOUND CONTROL SYSTEMS

- **NEW CONSTRUCTION**
- **RENOVATION**
- **WOOD FRAME CONSTRUCTION**
- **CONCRETE CONSTRUCTION**
- **OPEN BEAM CONSTRUCTION**
- **LIGHT GAUGE STEEL CONSTRUCTION**
- **HARD SURFACE AREAS**

PROVEN SOUND CONTROL SOLUTIONS

- Documented sound tests over a variety of assemblies
- More than 100 UL Fire Rated Designs
- Light weight, easy to install
- Low deflection rate with high load levels
- Durable — chemical and moisture insensitive
- Proven on over 200 million square feet

WHY ACOUSTI-MAT?

BECAUSE ONE ROOM'S FLOOR IS ANOTHER ROOM'S CEILING.

We have all experienced the pitfalls of an inferior sound control system. Whether in a commercial, multifamily, or single family application, sound control is important to the end user. Don't let your project be one of the casualties of poor sound control.

With Acousti-Mat®, design possibilities include the full spectrum of floor good options such as marble, ceramic tile or hardwood, without sacrificing sound control. Acousti-Mat can be installed in hard surface areas only, or throughout the entire floor plan to ensure peace and quiet from impact and airborne noises. Backed by over 1,000 third party acoustical tests, Acousti-Mat is the proven sound control solution in all types of construction.

Designed for today's fast-track project schedules, Acousti-Mat installation is fast and easy. After laying Acousti-Mat over the subfloor, Maxxon dealers pour a high-strength Maxxon Underlayment over it. Acousti-Mat I, Acousti-Mat II, Acousti-Mat II HP, Enkasonic®, Enkasonic HP, Acousti-Mat 3, Acousti-Mat 3 HP, and Acousti-Mat SD have a core of fused entangled filaments attached to a non-woven fabric that creates a void and actually isolates sound waves between the subfloor and the high-strength Maxxon Underlayment. Acousti-Mat LP and Acousit-Mat LPR are manufactured with a blend of ploymeric fibers offering low profile sound control solutions.

When installed together, the Acousti-Mat and Maxxon Underlayments form a warrantied engineered system, offering peace of mind in your sound system.

Not only do Acousti-Mat and Enkasonic help reduce noise pollution, they also promote indoor air quality. The Acousti-Mat/Maxxon Underlayment system is the only sound control mat/underlayment system that is GREENGUARD and GREENGUARD Gold Certified.

Manufactured with 40% pre-consumer recycled content, the entangled mesh Acousti-Mat sound control mats may also help contribute toward points for LEED® project certification. For information regarding Acousti-Mat and Enkasonic's contribution to LEED, contact your Regional Representative at (800) 356-7887 or visit www.maxxon.com/go_green.

CHOOSING A SOUND MAT

WHICH SOUND MAT IS RIGHT FOR MY PROJECT?

There are many factors that go into determining which sound control mat you should choose:

WHAT IS THE FLOOR/CEILING ASSEMBLY?

The inherent design of a building can dictate the level of sound control you need in order to meet and/or exceed code. Knowing the base sound performance of your floor/ceiling assembly will help narrow down your choices for a sound control mat.

WHAT IS THE FIRE CODE?

Maxxon sound control mats are in numerous codes as well as in over 100 UL Fire Designs. See the chart on page 12 for a complete list of Maxxon's UL Fire Designs. Refer to Maxxon's *Fire & Sound Manual* for a list of UL numbers, the Maxxon sound control mats included in the design, and how each mat performs acoustically on the given assembly.

WHAT IS THE ACOUSTICAL REQUIREMENT?

The International Building Code specifies that assemblies shall have a sound transmission class (STC) of not less than 50 (45 if field tested). This STC rating measures the amount of airborne noise transmitted through common walls, partitions, and floor/ceiling assemblies. The code also specifies that the impact insulation class (IIC) rating, which measures the impact noise, be no less than 50 (45 if field tested).

It has been observed that this code level STC and IIC performance does not guarantee acoustical privacy or that complaints will not be received. In response, the authors of the International Building Code, the International Code Council, have issued an appendix to the code called ICC G2-2010 Guideline for Acoustics. This guideline concedes that current sound code minimums are not acceptable levels of sound control and establishes two additional levels of acoustical performance. Please refer to the chart below for the International Code Council's Guideline for Acoustics.

ICC G2-2010 GUIDELINE FOR ACOUSTICS

	Laboratory Sound Rating	Field Sound Rating
Code Minimum	50 STC/IIC	45 F-STC/F-IIC
Acceptable Performance	55 STC/IIC	52 F-STC/F-IIC
Preferred Performance	60 STC/IIC	57 F-STC/F-IIC

WHAT IS THE BUDGET?

Of course, budget also needs to be taken into consideration when selecting a sound control mat. However, future use of the project should also be considered; improving acoustics once construction is complete is costly and time-consuming.

OTHER CONSIDERATIONS

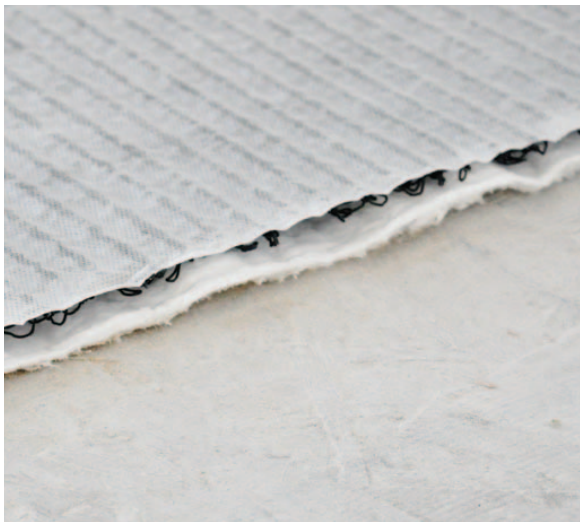
What about projects that demand even better sound control or those with floor height limitations? Maxxon now offers a high performance line of sound control solutions, Acousti-Mat HP series, which maximizes sound control while keeping topping depth at a minimum. See page 4 to learn more.

Mat	Commonly used in Assembly Type			
	Wood	Open Beam	Concrete	Steel Deck
Acousti-Mat LP			X	
Acousti-Mat LPR	X		X	
Acousti-Mat I	X		X	
Acousti-Mat II	X		X	X
Acousti-Mat II HP	X		X	X
Enkasonic	X		X	X
Enkasonic HP	X		X	X
Acousti-Mat 3	X	X	X	X
Acousti-Mat 3 HP	X	X	X	X
Acousti-Mat SD				X

HP HIGH PERFORMANCE UPGRADE

As you determine the proper level of sound control for your project, keep in mind Maxxon's new high performance (HP) upgrade. Available on Acousti-Mat II, Enkasonic and Acousti-Mat 3, this innovative upgrade adds the noise deadening technology of a high performance acoustical fabric that is laminated to the bottom of each mat's entangled mesh core. The HP fabric creates an absorptive cushion upon which the entangled mesh "spring" rests.

The Acousti-Mat HP line of sound control mats reduces impact noise without adding to the overall floor height, making it an ideal solution where floor height considerations play a factor or simply to provide upgraded sound control without adding to the required topping depth. Detailed information on Acousti-Mat II HP, Enkasonic HP and Acousti-Mat 3 HP is available on pages 6–8 of this brochure.



ACOUSTI-MAT SYSTEM SELECTOR

INTERACTIVE SYSTEM SELECTOR

Maxxon Corporation now offers an Interactive System Selector to help you identify the best sound control system for your project. A few clicks of your mouse allows you to see how recommended Acousti-Mat products impact the sound control performance of your assembly. In addition to providing approximate sound ratings, the Interactive System Selector helps to identify the best solutions for upgraded sound control and matches your selections to a common UL Fire Rated Design. The Interactive System Selector also allows you to e-mail detail drawings and to request sound tests based on your selections. Get started at www.maxxon.com/selector.

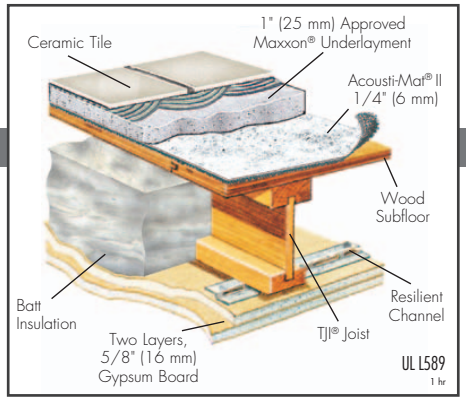
SYSTEM SELECTOR CHART*

Mat	Topping Min.	Total System Height	Approximate Sound Rating**		Typical Code Performance*** (Using ICC G2-2010 Guideline for Acoustics)
			F-IIC	F-STC	
Acousti-Mat LPR	3/4" (19 mm)	≈3/4"	48–52	55–58	Code Minimum
Acousti-Mat I	3/4" (19 mm)	≈1"	50–53	57–59	Code Minimum
Acousti-Mat II	1" (25 mm)	1¼"	51–54	58–60	Code Minimum
Acousti-Mat II HP	1" (25 mm)	≈1¼"	54–57	58–60	Acceptable
Enkasonic	1" (25 mm)	1⅜"	54–57	59–62	Acceptable
Enkasonic HP	1" (25 mm)	≈1⅜"	57–60	59–62	Preferred
Acousti-Mat 3	1½" (38 mm) Reinforced	2¼"	57–60	59–62	Preferred
Acousti-Mat 3 HP	1½" (38 mm) Reinforced	≈2¼"	61–64	59–62	Preferred

* Approximate ratings above include a hard surface finished floor good in traditional wood frame construction. Actual ratings may vary based on project variables. F-IIC/F-STC levels above are an approximation of sound reduction potential in a well-designed, acoustically sound assembly. It should be expected that carpet and pad will significantly increase the overall performance of the sound control system. This information is based on solid data and years of experience in the underlayment industry, however, due to the many variables beyond our control (for example quality control of drywall installation, type of resilient channel, design and density of the building materials, flanking paths, etc.), it should not be considered a guarantee of performance. The code performance listed represents typical levels found in wood frame construction utilizing insulation, resilient channel and gypsum board ceiling.

** See Page 3 for explanation of ICC G2-2010 Guideline for Acoustics.

*** Consult the System Selector and/or Maxxon for approximate sound ratings over concrete or steel deck.



ACOUSTI-MAT® II

The Industry Standard

TECHNICAL DATA

Description ..... Entangled polymeric filament mat
Thickness ..... 1/4" (6 mm)
Density ..... 4.0 pcf (64 kg/m³)
Thermal Resistance R-Value (ft²•°F•h/BTU)
- Mat Only 0.620
- 1" Maxxon Underlayment 0.192
- Mat/Underlayment System 0.812

Underlayment Depth ..... See page 4

Pressure/Deflection
- 500 psf (2,441 kg/m²) ..... 0.06" (1.52 mm)
- 1,000 psf (4,882 kg/m²) ..... 0.08" (2.03 mm)
- 2,000 psf (9,765 kg/m²) ..... 0.15" (3.81 mm)
- 4,000 psf (19,530 kg/m²) ..... 0.20" (5.08 mm)

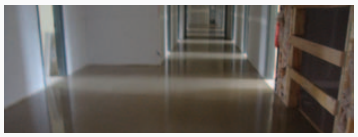
Fire Performance ASTM E-84 w/ Maxxon Underlayment
- Fuel Contribution 0
- Smoke Contribution 0
- Flame Spread 0

UL Fire Designs ..... See page 12
Fire & Sound Code Listings ..... See page 12

BENEFITS

- Low 1/4" profile allows a thinner floating floor composite
- Requires only 1" Maxxon Underlayment (3/4" with reinforcement)
- Increases STC rating 3–6 points compared to a 3/4" Maxxon Underlayment/wood frame system, 6–15 points when compared to a bare wood frame system
- Increases IIC rating up to 10 points over wood frame and up to 20 points over concrete
- Always with 40% pre-consumer recycled content
- GREENGUARD Gold Certified
- Sound tests available on sales/technical sheet

PROJECT SPOTLIGHT



EASTERN NEW MEXICO UNIVERSITY

PORTALES, NM

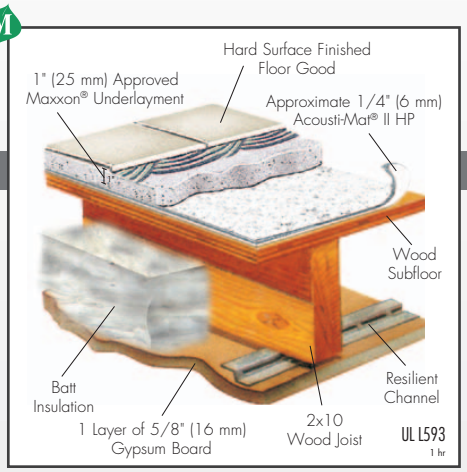
Contractor: Bradbury Stamm Construction, Inc.

Architect: Van H. Gilbert Architect, PC

Scope: 47,700 sq. ft. of Acousti-Mat® II and Maxxon® Reinforcement topped with Level-Right®.

ACOUSTI-MAT® II HP

High Performance



TECHNICAL DATA

Description ..... Entangled polymeric filament mat attached to water-resistant fabric
HP Layer ..... Microfibrous non-woven fabric

Thickness, nominal ..... 1/4" (6 mm)
Density ..... 4.9 pcf (78.5 kg/m³)
Thermal Resistance R-Value (ft²•°F•h/BTU)
- Mat Only 1.050
- 1" Maxxon Underlayment 0.192
- Mat/Underlayment 1.242

Underlayment Depth ..... See page 4

Pressure/Deflection
- 500 psf (2,441 kg/m²) ..... 0.047" (1.19 mm)
- 1,000 psf (4,882 kg/m²) ..... 0.068" (1.72 mm)
- 2,000 psf (9,765 kg/m²) ..... 0.098" (2.48 mm)
- 4,000 psf (19,530 kg/m²) ..... 0.180" (4.57 mm)

Fire Performance ASTM E-84
- Fuel Contribution 0
- Smoke Density 0
- Flame Spread 0

UL Fire Designs ..... See page 12
Fire & Sound Code Listings ..... See page 12

BENEFITS

- Acousti-Mat II HP attaches an acoustical fabric entangled mesh mat, for an overall approximate 1/4" mat profile
- Requires only a 1" topping (3/4" with reinforcement)
- Increases IIC rating up to 16 points over wood frame and up to 20 points over concrete
- Increases STC rating 3–6 points compared to a 3/4" Maxxon Underlayment/wood frame system, 6–15 points when compared to a bare wood frame system
- Always with 40% pre-consumer recycled content
- GREENGUARD Gold Certified
- Sound tests available on sales/technical sheet

PROJECT SPOTLIGHT

SOLARIUM AT PONCE HALL FLAGLER COLLEGE

ST. AUGUSTINE, FL

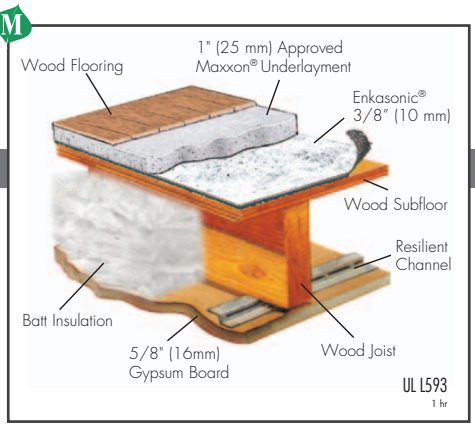
Contractor: A.D. Davis Construction Corp.

Architect: Kenneth Smith Architects, Inc.

Scope: 2,700 sq. ft. of Acousti-Mat® II HP topped with 1–3"+ of Maxxon® Underlayment.

Enkasonic®

The Original Sound Control Mat



TECHNICAL DATA

Description ..... Entangled polymeric filament mat
Thickness ..... 3/8" (10 mm)
Density ..... 4.65 pcf (74.4 kg/m³)
Thermal Resistance R-Value (ft²•°F•h/BTU)
- Mat Only 0.780
- 1" Maxxon Underlayment 0.192
- Mat/Underlayment System 0.972

Underlayment Depth ..... See page 4

Pressure/Deflection
- 500 psf (2,441 kg/m²) ..... 0.087" (2.210 mm)
- 1,000 psf (4,882 kg/m²) ..... 0.131" (3.327 mm)
- 2,000 psf (9,765 kg/m²) ..... 0.189" (4.801 mm)
- 4,000 psf (19,530 kg/m²) ..... 0.256" (6.502 mm)

Fire Performance ASTM E-84 w/ Maxxon Underlayment
- Fuel Contribution 0
- Smoke Density 0
- Flame Spread 0

UL Fire Designs ..... See page 12
Fire & Sound Code Listings ..... See page 12

BENEFITS

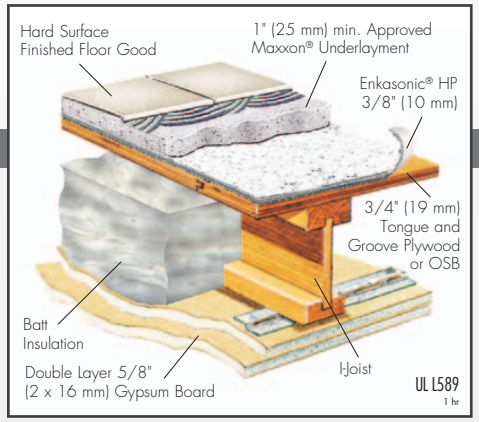
- Durable and proven solution — the only mat in the industry tested after 10 years of use. (Enkasonic retained 97% of original thickness, was as pliable as a new roll, and performed equally to a newly manufactured roll.)
- Increases IIC rating up to 12 points over wood frame and up to 20 points over concrete
- Requires only a 1" topping (3/4" with reinforcement)
- Exceeds code minimum to achieve the "Preferred Performance" higher IIC and STC levels, as outlined in the ICC Guideline for Acoustics (For more information, see page 3)
- Sound tests available on sales/technical sheet
- Increases STC rating 3–6 points compared to a 3/4" Maxxon Underlayment/wood frame system, 6–15 points when compared to a bare wood frame system
- Always with 40% pre-consumer recycled content
- GREENGUARD Gold Certified

PROJECT SPOTLIGHT

THE METROPOLITAN CONDOS OMNI SAN DIEGO HOTEL

SAN DIEGO, CA

Contractor: JMI Realty
Architect: Hornberger & Worstell, Inc.
Scope: 80,000 sq. ft. of Enkasonic® and Maxxon® Underlayment installed in 36 luxury condominiums on floors 22 through 32, which overlooks San Diego harbor and the San Diego Petco Ballpark.



Enkasonic® HP

High Performance

TECHNICAL DATA

Description ..... Entangled polymeric filament mat attached to water-resistant fabric
HP Layer ..... Microfibrous non-woven fabric

Thickness, nominal ..... 3/8" (10 mm)
Density ..... 3.84 pcf (61.56 kg/m³)
Thermal Resistance R-Value (ft²•°F•h/BTU)
- Mat Only 1.380
- 1" Maxxon Underlayment 0.192
- Mat/Underlayment 1.572

Underlayment Depth ..... See page 4

Pressure/Deflection
- 500 psf (2,441 kg/m²) ..... 0.067" (1.70 mm)
- 1,000 psf (4,882 kg/m²) ..... 0.116" (2.95 mm)
- 2,000 psf (9,765 kg/m²) ..... 0.172" (4.37 mm)
- 4,000 psf (19,530 kg/m²) ..... 0.244" (6.20 mm)

Fire Performance ASTM E-84
- Fuel Contribution 0
- Smoke Density 0
- Flame Spread 0

UL Fire Designs ..... See page 12
Fire & Sound Code Listings ..... See page 12

BENEFITS

- Enkasonic HP combines acoustical fabric with entangled mesh for an overall approximate 3/8" (10 mm) mat profile
- Requires only a 1" topping
- Increases IIC rating up to 18 points over wood frame and up to 25 points over concrete
- Increases STC rating 3–6 points compared to a 3/4" Maxxon Underlayment/wood frame system, 6–15 points when compared to a bare wood frame system
- Always with 40% pre-consumer recycled content
- GREENGUARD Gold Certified
- Sound tests available on sales/technical sheet

PROJECT SPOTLIGHT

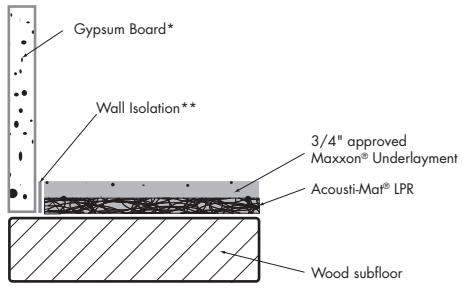
KRJ BUILDING NORTH FARGO, ND

Contractor: MBA Development Co.
Architect: Mutchler Bartram Architects
Scope: Gyp-Crete 2000®/3.2K poured as a leveling layer. 9,000 sq. ft. of Enkasonic® HP topped with Gyp-Crete 2000/3.2K poured at a depth of 1⅝".

INSTALLATION DETAILS

Typical installation detail drawings. For alternate detail drawings, including transition options, please contact your Maxxon Regional Representative.

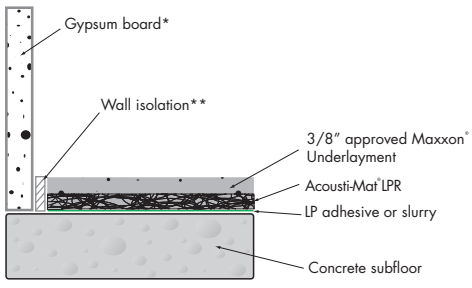
ACOUSTI-MAT® LPR



* Gypsum Wall Board must be installed within 1/2 inch of subfloor

** Wall Isolation is installed around the perimeter of the entire room to receive Acousti-Mat LPR, and around any floor penetrations such as toilet collars, electrical, plumbing, etc.

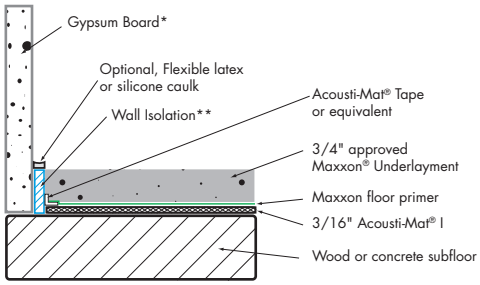
ACOUSTI-MAT® LPR



* Gypsum Wall Board must be installed within 1/2 inch of subfloor

** Wall Isolation is installed around the perimeter of the entire room to receive Acousti-Mat LPR, and around any floor penetrations such as toilet collars, electrical, plumbing, etc.

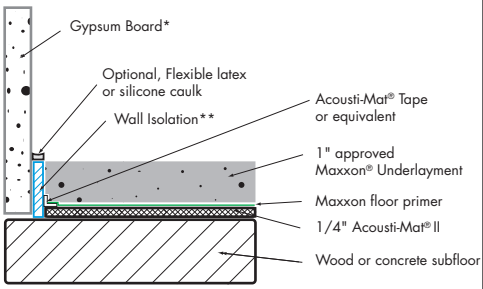
ACOUSTI-MAT® I



* Gypsum Wall Board must be installed within 1/2 inch of subfloor

** Wall Isolation is installed around the perimeter of the entire room to receive Acousti-Mat I, and around any floor penetrations such as toilet collars, electrical, plumbing, etc.

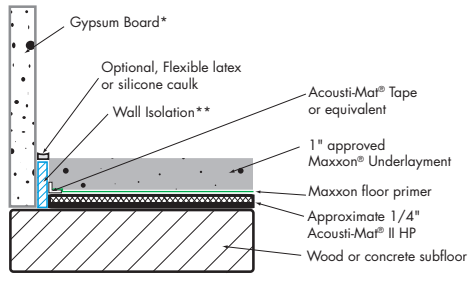
ACOUSTI-MAT® II



* Gypsum Wall Board must be installed within 1/2 inch of subfloor

** Wall Isolation is installed around the perimeter of the entire room to receive Acousti-Mat II, and around any floor penetrations such as toilet collars, electrical, plumbing, etc.

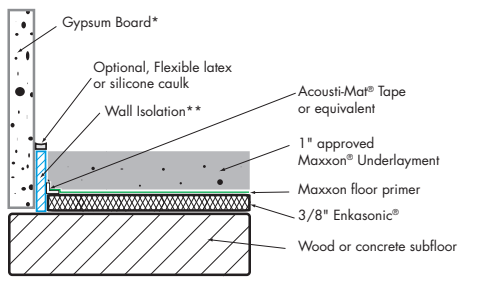
ACOUSTI-MAT® II HP



* Gypsum Wall Board must be installed within 1/2 inch of subfloor

** Acousti-Mat Wall Isolation is installed around the perimeter of the entire room to receive Acousti-Mat II HP, and around any floor penetrations such as toilet collars, electrical, plumbing, etc.

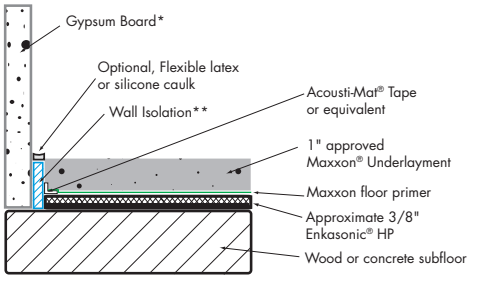
ENKASONIC®



* Gypsum Wall Board must be installed within 1/2 inch of subfloor

** Wall Isolation is installed around the perimeter of the entire room to receive Enkasonic, and around any floor penetrations such as toilet collars, electrical, plumbing, etc.

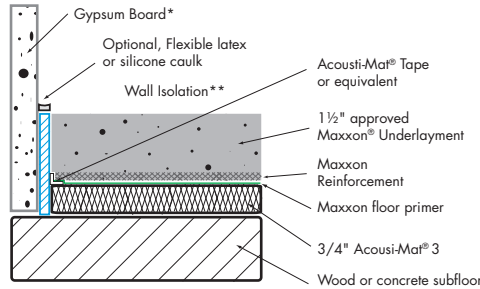
ENKASONIC® HP



* Gypsum Wall Board must be installed within 1/2 inch of subfloor

** Acousti-Mat Wall Isolation is installed around the perimeter of the entire room to receive Enkasonic HP, and around any floor penetrations such as toilet collars, electrical, plumbing, etc.

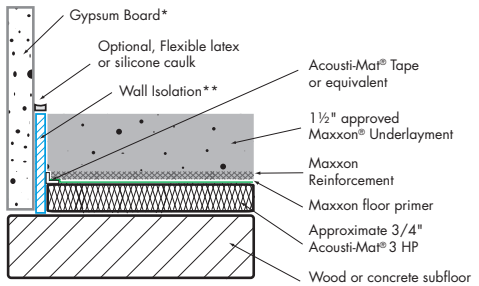
ACOUSTI-MAT® 3



* Gypsum Wall Board must be installed to floor no more than 1/2 inch of subfloor

** Wall Isolation is installed around the perimeter of the entire room to receive Acousti-Mat 3, and around any floor penetrations such as toilet collars, electrical, plumbing, etc.

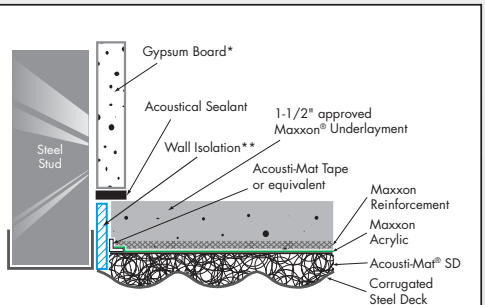
ACOUSTI-MAT® 3 HP



* Gypsum Wall Board must be installed to floor no more than 1/2 inch of subfloor

** Wall Isolation is installed around the perimeter of the entire room to receive Acousti-Mat 3 HP, and around any floor penetrations such as toilet collars, electrical, plumbing, etc.

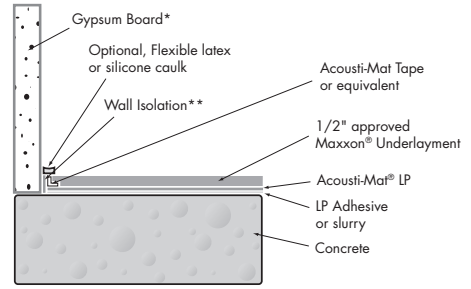
ACOUSTI-MAT® SD



* Gypsum Wall Board must be installed within 1/2 inch of subfloor

** Wall Isolation is installed around the perimeter of the entire room, and around any floor penetrations such as toilet collars, electrical, plumbing, etc.

ACOUSTI-MAT® LP



* Gypsum Wall Board must be installed within 1/2 inch of subfloor

** Wall Isolation is installed around the perimeter of the entire room, and around any floor penetrations such as toilet collars, electrical, plumbing, etc.

Resilient Sound Isolation Wall and Ceiling Clips

IsoMax - Patent No. 7,093,814

Low Cost, Space Saving Walls and Ceilings

Designers wanting low-cost, space-saving ceilings and walls that provide superior noise control employ Kinetics Model IsoMax resilient sound isolation clips. Model IsoMax, attached to ceiling joists, wall studs, or masonry, simply and easily secures drywall furring channel. One or more layers of gypsum board are hung to the furring channel using common construction practices. Offering higher STC values than drywall attached to resilient channel, Model IsoMax ensures that installers will not inadvertently screw through the "resilient" leg of the channel into the joist or stud. This feature cannot be underestimated given the frequent, unknown occurrences where resilient channel is accidentally rendered ineffective because it is hard-attached.

Benefits

- Can achieve same rating (STC 63) as double wall construction with less material in smaller space
- Flexible "snap-on" clips install quickly, and allow for height adjustments during installation of channel
- Low-profile design; maximizes available occupied space and reduces materials vs. double stud wall design
- Error free installation of standard drywall furring channel. Eliminates accidental short circuiting common with RC Channel

UL Fire Rated Assemblies

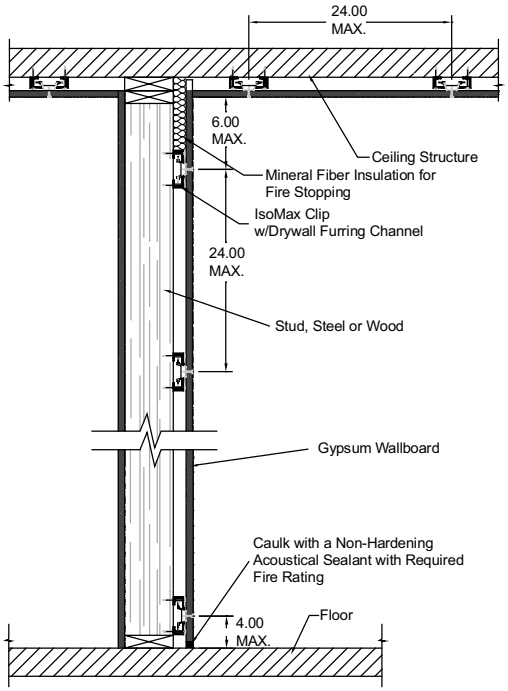
Design No. L583
Floor/Ceiling Assembly **allows the broadest range of joist or truss assemblies** including: engineered "I" joists, wood and steel trusses, 2 x 10 wood joists, and parallel chord trusses. Allows fiberglass or mineral wool insulation with two (2) layers of gypsum wallboard.

More UL fire rated assemblies detailed online at **kineticsnoise.com/arch/isomax/ul.aspx**.

Ceilings
Design No. L546
Design No. V477
Design No. V489

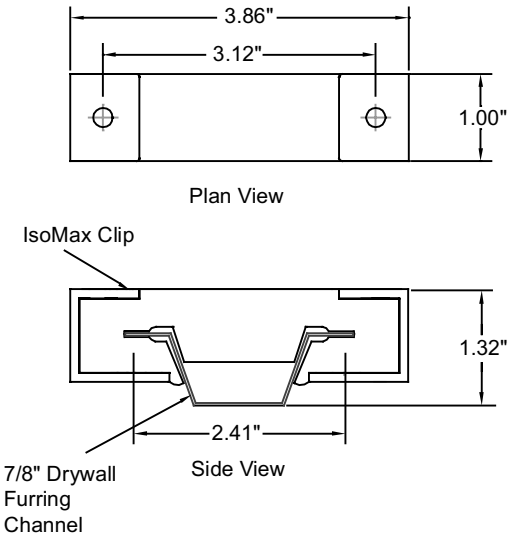
Walls
Design No. U305
Design No. U419

Typical Construction Detail



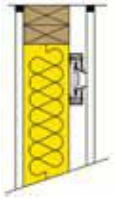
Clips typically spaced 48" apart along channels.

Product Detail



Sound Tests for Airborne and Impact Noise - STC and IIC

Tested Composite Wall Constructions per ASTM E90 and ASTM E413 at Riverbank Labs.



STC 57

+7 STC improvement compared to the same wall with resilient channel. Request our report, IsoMax vs RC, for details

Wood Stud partition, 2 x 4, 16" O.C. with 5/8" gypsum board, one layer each side. Fiberglass in cavity. IsoMax clips and 7/8" furring channel.

Additional IsoMax STC and IIC test results:
IIC 57 - Wood I-Joist floor/ceiling assembly with wood floor
STC 60 - 63 -Steel Stud wall assemblies
STC 66 - Gypsum board ceiling/concrete slab
IIC 58 - Gypsum board ceiling/concrete slab/wood floor on 1/8" mat

STC 63

Wood stud partition, 2 x 4, 16" O.C. with 5/8" gypsum board, two layers on both sides. Fiberglass in cavity. IsoMax clips and 7/8" furring channel.

*Visit **www.kineticsnoise.com/arch/tests/isomax.html** for complete IsoMax STC/IIC Sound test data*

NOTE: *Some color variation on the rubber component of the IsoMax clip is normal. This is based on the amount of surface wax (white in color) present on the black rubber. Product performance is not affected.*

Kinetics Noise Control, Inc.

United States
6300 Irelan Place
Dublin, Ohio, 43017
Phone: 614-889-0480
Fax: 614-614-889-0540

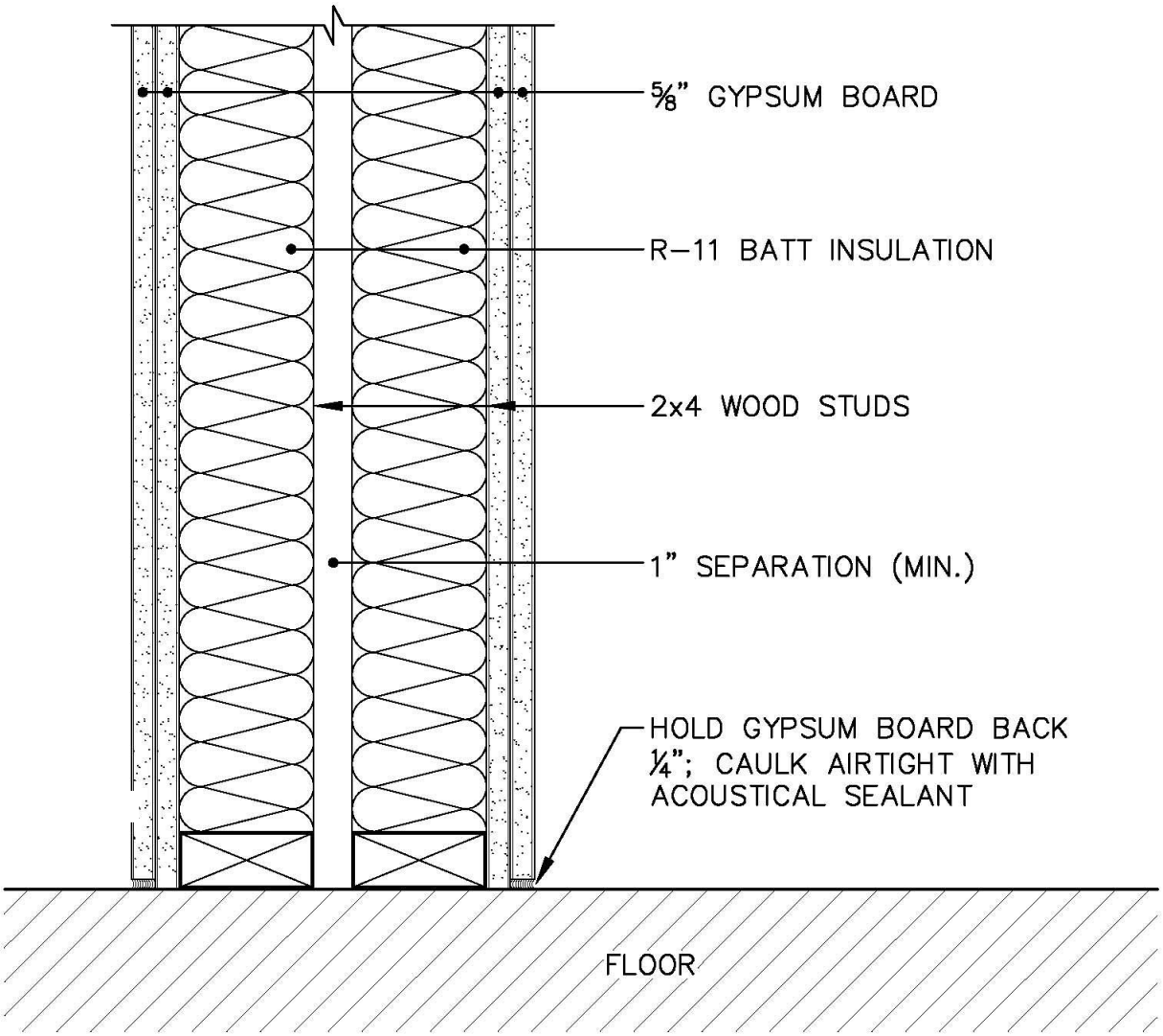
Canada
3570 Nashua Drive
Mississauga, Ontario, L4V1L2
Phone: 905-670-4922
Fax: 905-670-1698

Download Model IsoMax installation guidelines, three-part specification, and more at www.kineticsnoise.com/arch/isomax/. Call the factory at 800-959-1229 if needing additional information; ask for Architectural sales. Purchase Model IsoMax and accessories through your local sales representative (www.kineticsnoise.com/replocation.asp).

www.kineticsnoise.com/arch/isomax/
archsales@kineticsnoise.com

ATTACHMENT "C"

ACOUSTICAL DETAILS



NOTE: WHERE REQUIRED FOR SHEAR, PLYWOOD MAY BE SUBSTITUTED FOR BASE LAYER OF GYPSUM BOARD.

NOTES: MINIMUM 1" AIR SPACE AND 3 LAYERS OF 5/8" GYPSUM WALL BOARD.

FIGURE C-1 **ACOUSTICAL TREATMENT OF PARTY WALLS**

FOR ACOUSTICAL INFORMATION ONLY

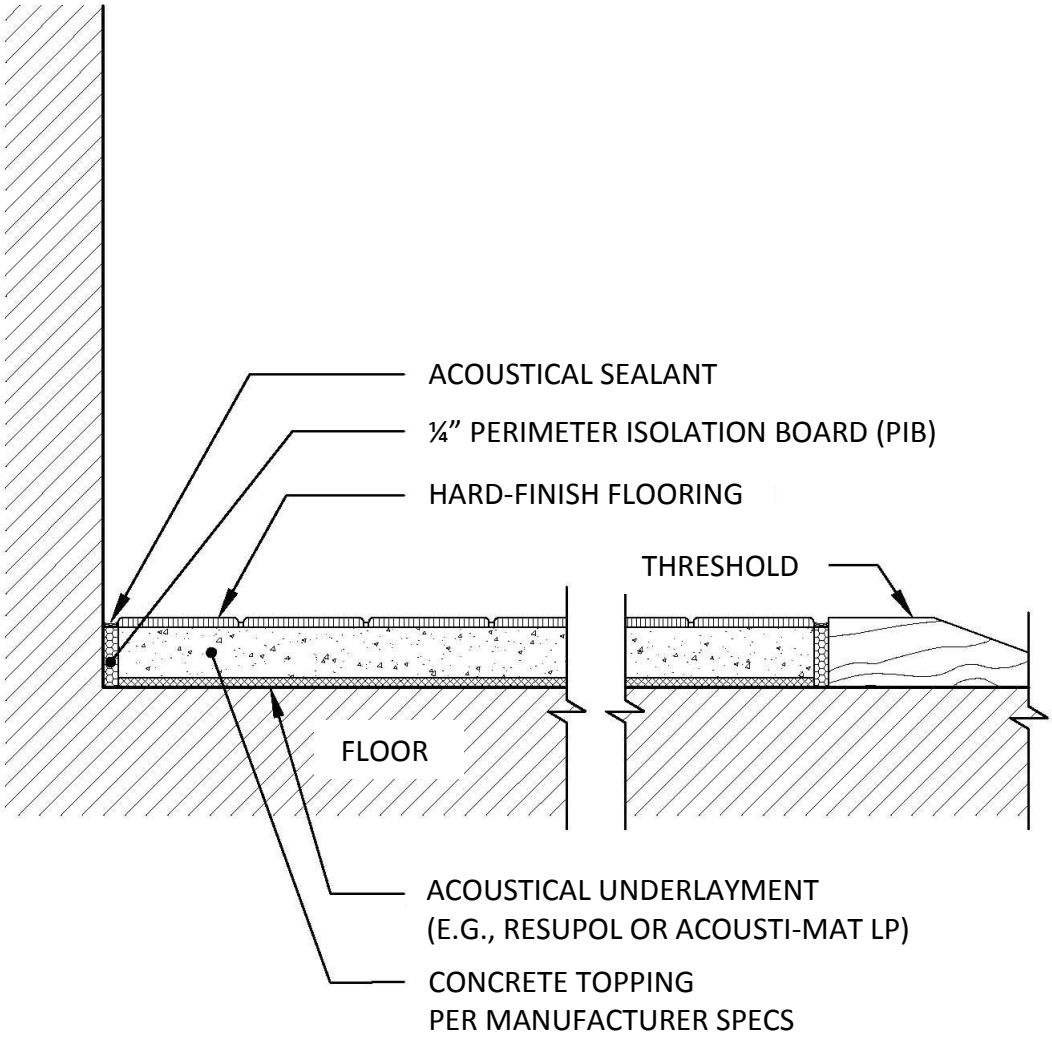
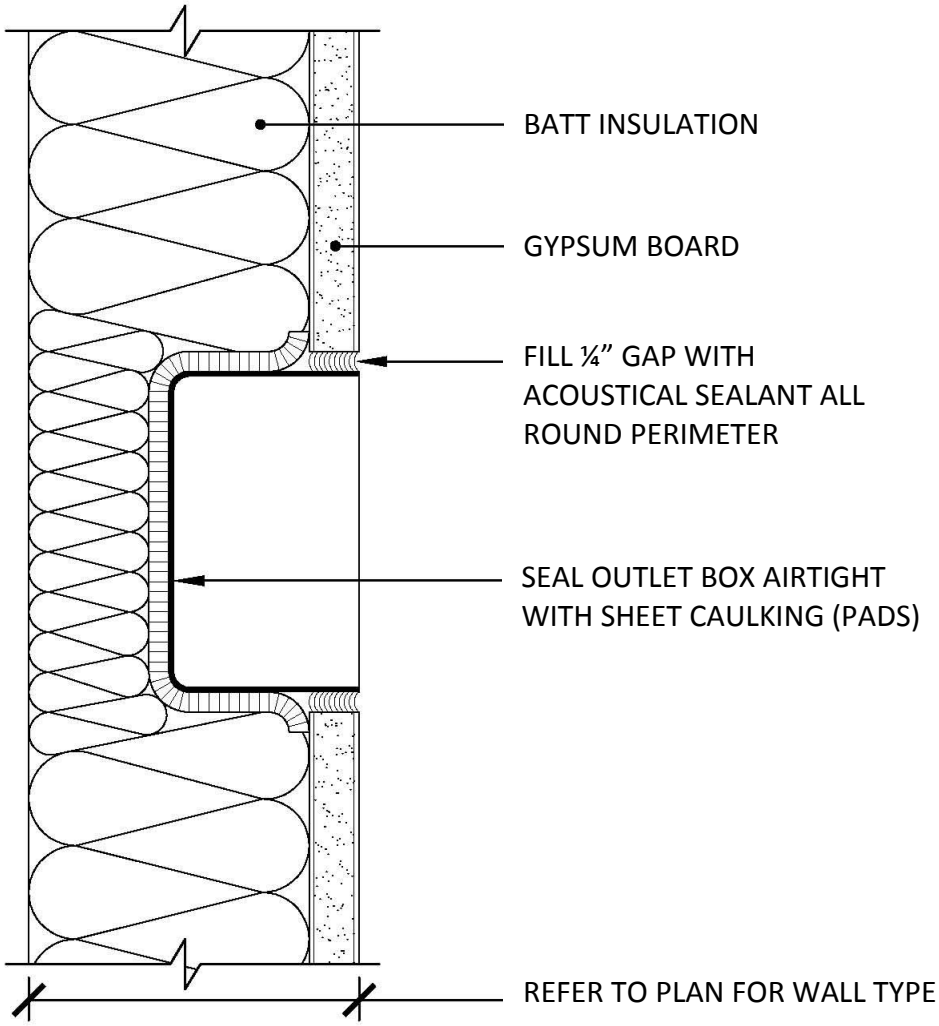


FIGURE C-2 **IMPACT ISOLATION OF FLOOR**

FOR ACOUSTICAL INFORMATION ONLY



NOTES:

1. SEPARATE OUTLETS ON OPPOSITE SIDES OF THE WALL BY 24" MINIMUM
2. CEILING CONDITIONS SIMILAR
3. APPLICABLE AT ALL SOUND-RATED CONSTRUCTION, INCLUDING INTERIOR INSULATED ASSEMBLIES.

FIGURE C-3 | **JUNCTION BOX ISOLATION IN SOUND-RATED CONSTRUCTION**

FOR ACOUSTICAL INFORMATION ONLY

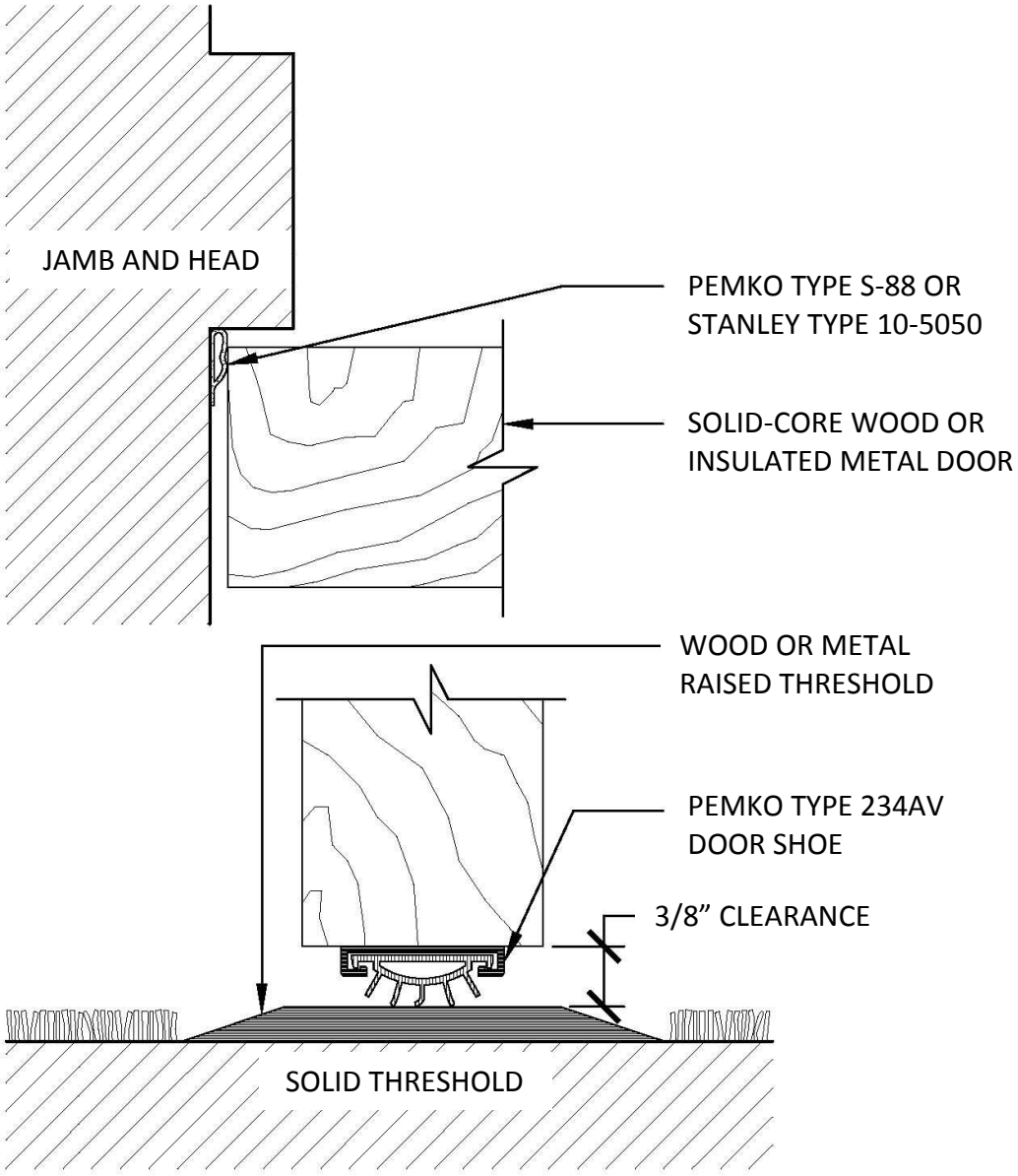


FIGURE C-4 **UNIT ENTRY DOOR**

FOR ACOUSTICAL INFORMATION ONLY

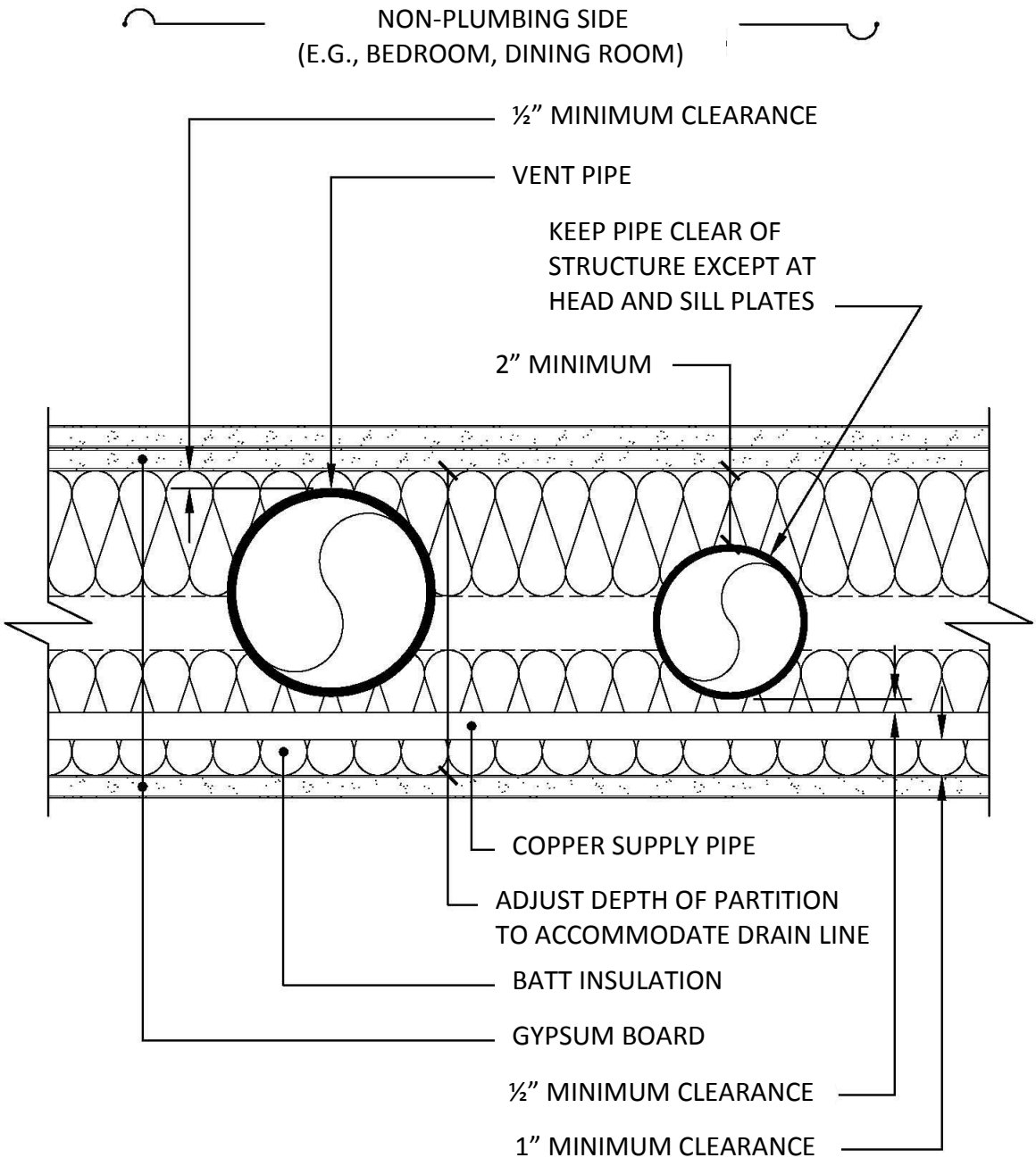
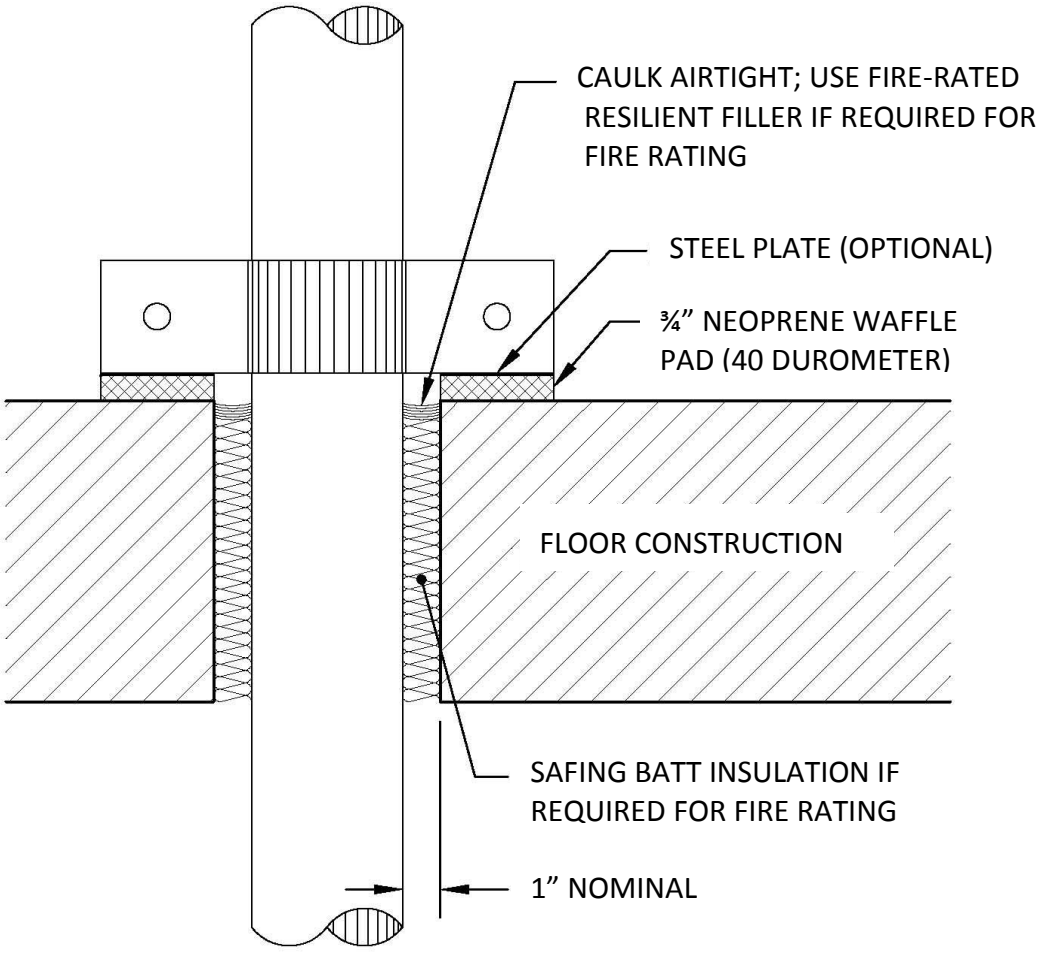


FIGURE C-5 **PLUMBING WALL WIDTH AND CLEARANCES**

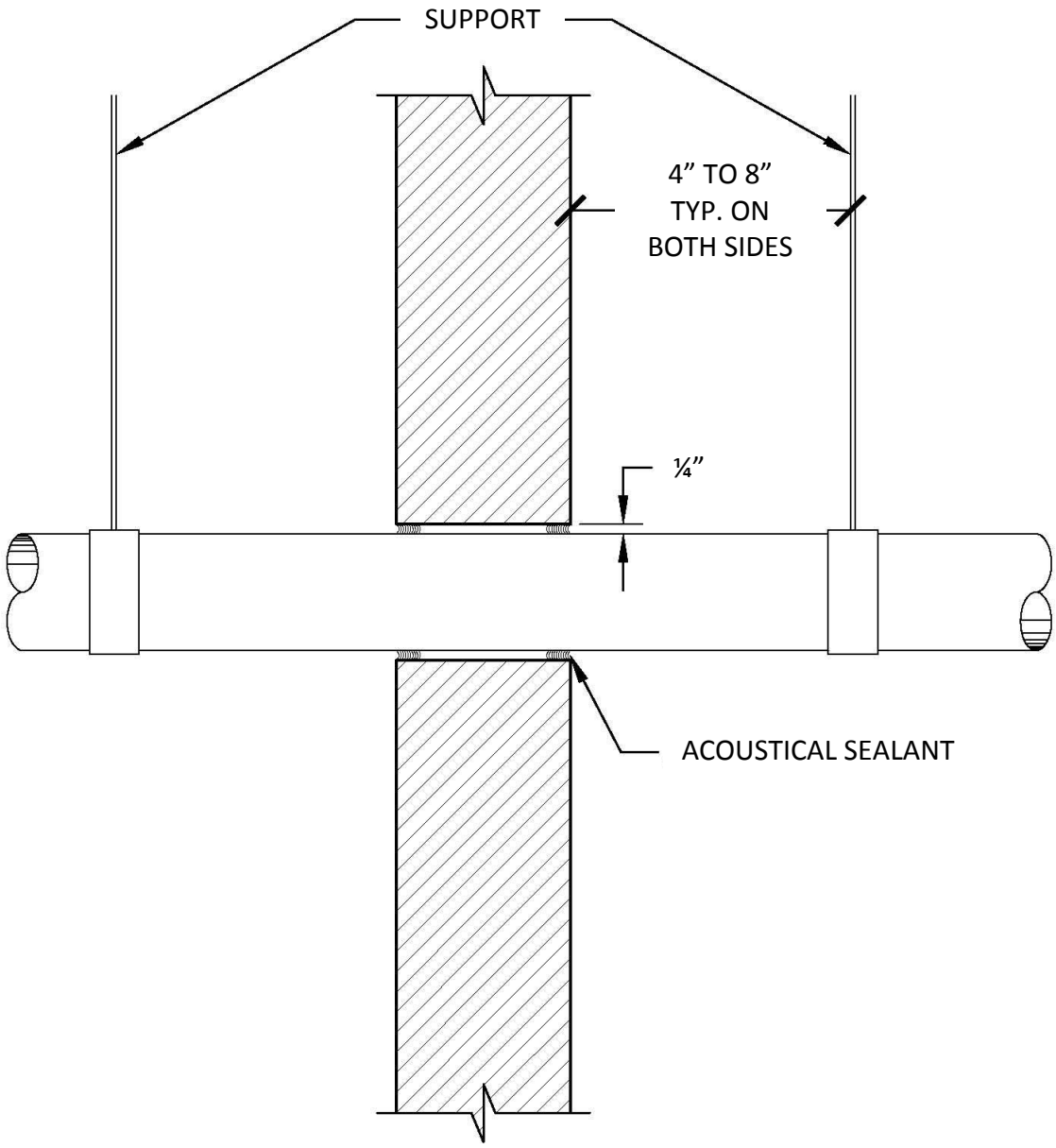
FOR ACOUSTICAL INFORMATION ONLY



NOTE: IF PIPE IS SUSPENDED FROM-OR DIRECTLY ATTACHED TO STRUCTURE OR OTHER BUILDING ELEMENTS, USE 3/8" THICK FELT, OR 40-DUROMETER NEOPRENE AS SLEEVE BETWEEN PIPE AND PIPE HANGER

FIGURE C-6 PIPE ISOLATION FOR PLUMBING RISERS

FOR ACOUSTICAL INFORMATION ONLY

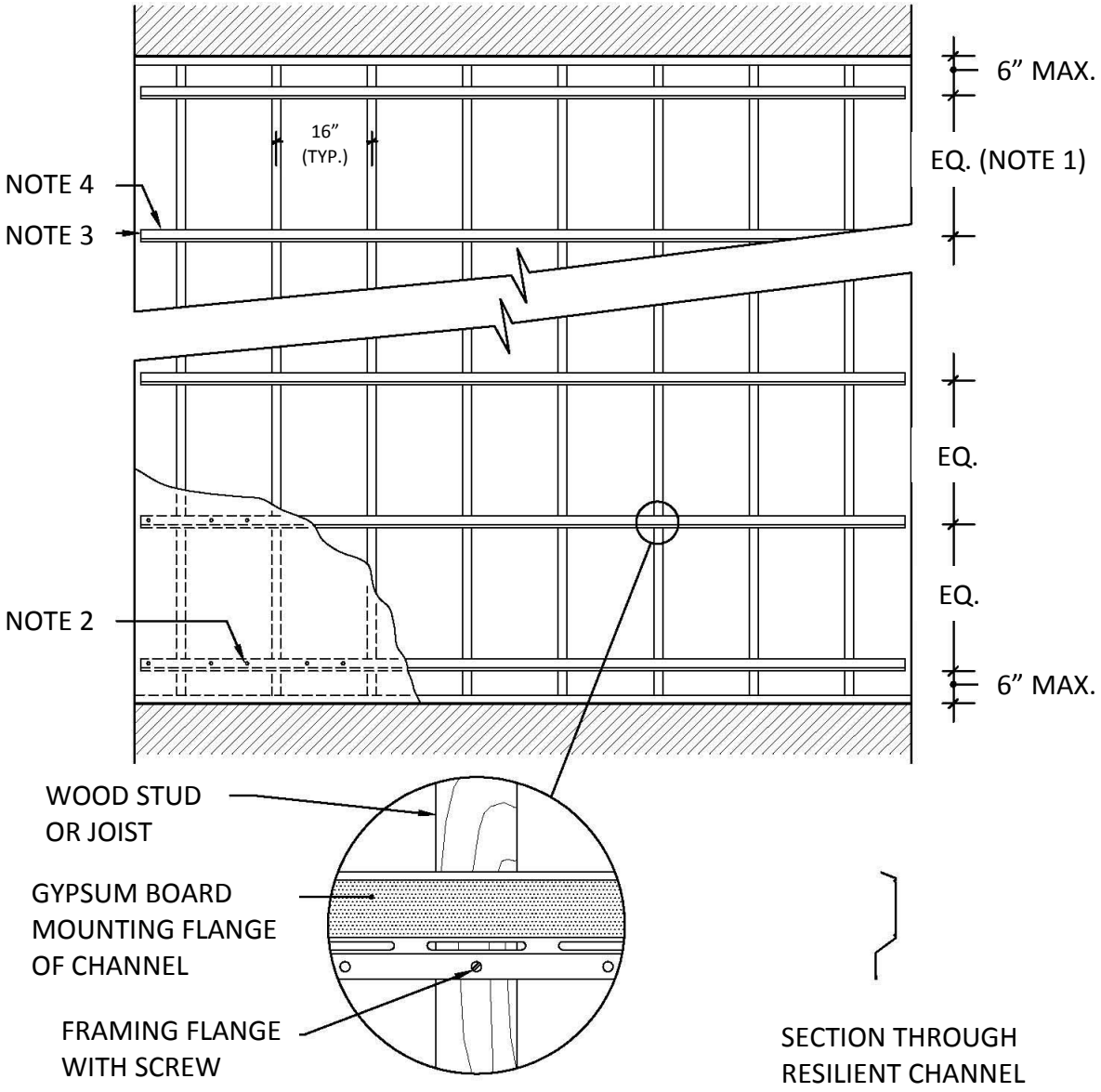


(PIPE OR CONDUIT LESS THAN 3" DIA.)

NOTE: APPLICABLE AT ALL SOUND-RATED CONSTRUCTION INCLUDING INTERIOR INSULATED ASSEMBLIES.

FIGURE C-7 | **TYPICAL PIPE/CONDUIT PENETRATION THRU SOUND-RATED CONSTRUCTION**

FOR ACOUSTICAL INFORMATION ONLY



NOTES:

1. INSTALL CHANNELS 24" ON CENTER UNLESS OTHERWISE SPECIFIED
2. AVOID STUD OR JOIST WHEN FASTENING GYPSUM BOARD TO CHANNEL-GYPSUM BOARD SCREWS MUST NOT CONTACT FRAMING
3. HOLD BACK ½" FROM INTERSECTING SURFACES
4. DO NOT CANTILEVER CHANNEL BY MORE THAN 6" FROM FRAMING

FIGURE C-8 | **INSTALLATION GUIDE FOR RESILIENT CHANNEL**

FOR ACOUSTICAL INFORMATION ONLY

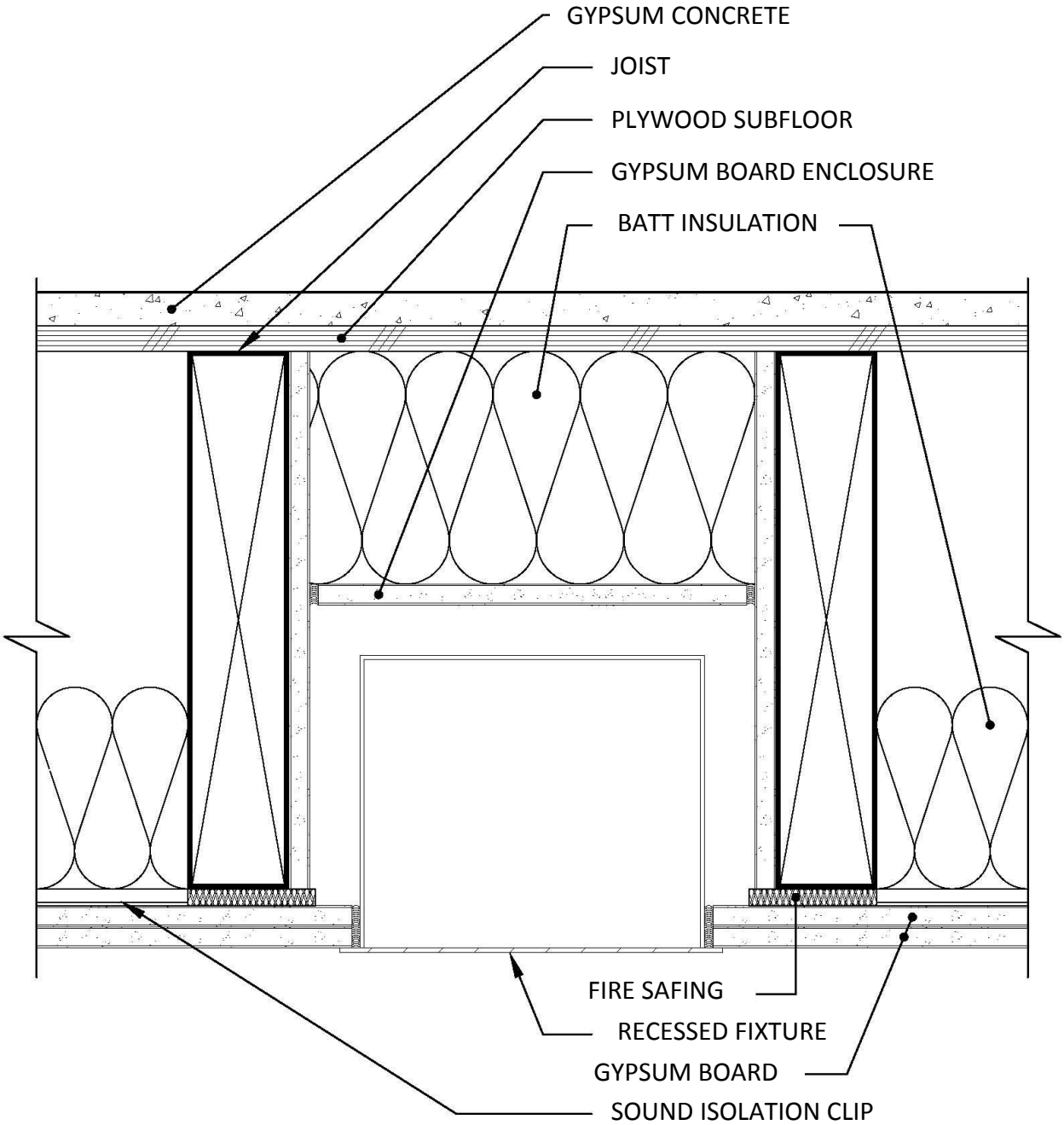


FIGURE C-9 **RECESSED FIXTURES IN SOUND-RATED FLOOR-CEILING ASSEMBLIES**

FOR ACOUSTICAL INFORMATION ONLY

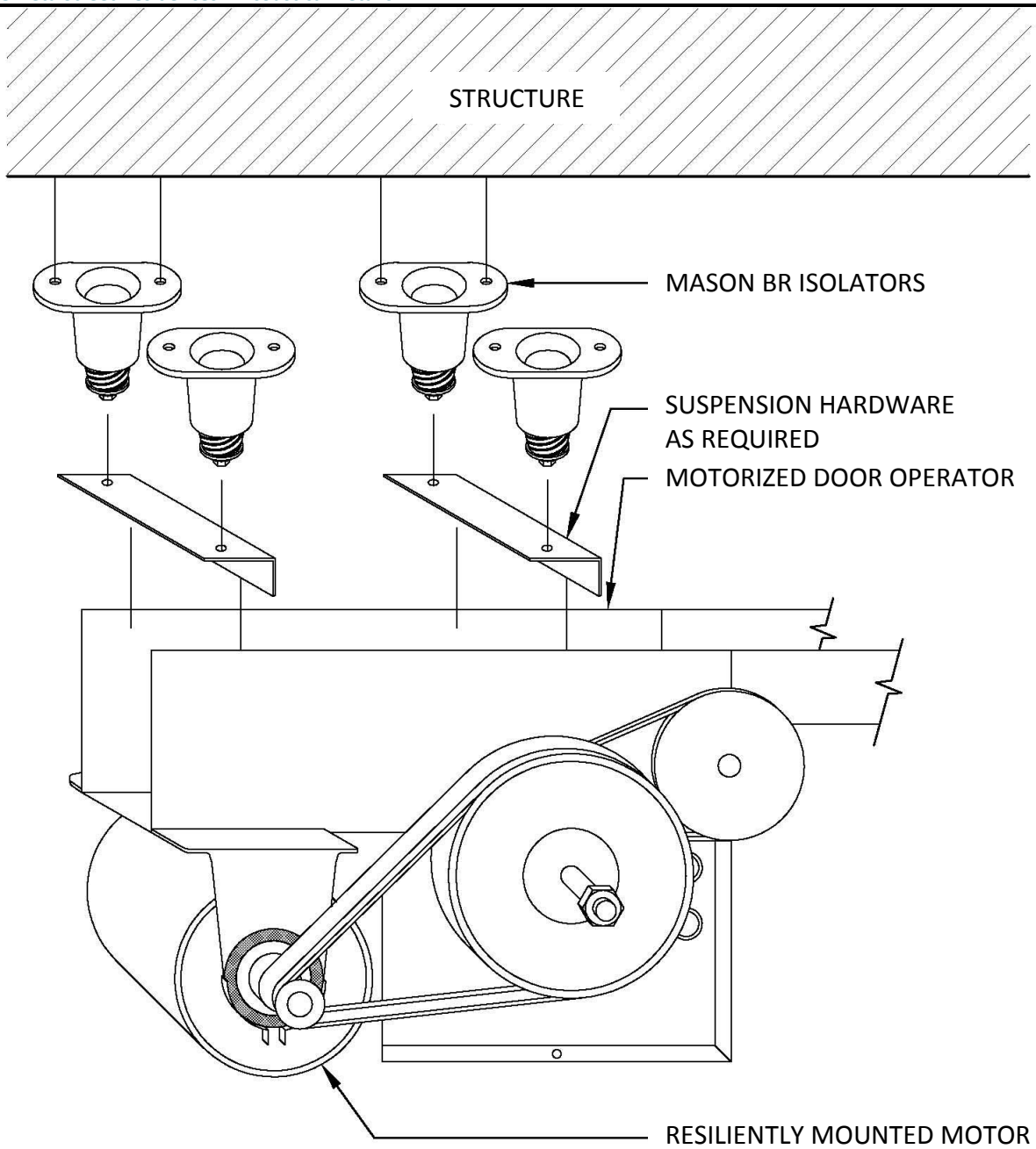


FIGURE C-10 | **GARAGE DOOR OPENER ISOLATION**

FOR ACOUSTICAL INFORMATION ONLY