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Escape Room, 55B Camden Street London

Acoustic Design Review
Report 19030.ADR.01 Rev A

IME Investments
20-22 Wenlock Road
London
England N1 7GU

First Issue date: 25/04/2019			
Revision History **Report** 19030.ADR.01			
A	**10/02/2020** – Updates made further to client review	D	
B		E	
C		F	

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1.0 INTRODUCTION

The aim of this report is to define the acoustic requirements for the proposed development at 55b Camden Street, London, NW1 0HG. Performance specifications will be established, reflecting a pragmatic approach without compromising on the building's intended use.

Current proposals state that the basement of 55b Camden Street is to be renovated and used as an Escape Room. An Escape Room is a mental and physical adventure-based game in which players solve a series of puzzles and riddles. Low levels of background noise will be played through loudspeakers mounted to the walls and ceiling throughout the venue space. The basement is located directly beneath a residential unit.

The following sections describe the acoustic recommendations for the different areas and the advantages that may be attained through implementation. The basis for all design recommendations within this report is Approved Document E (ADE) 2003 of the 2010 Building Regulations.

2.0 INTERNAL BUILDING FABRIC

2.1 Design Aspirations

The client has expressed a preference to provide sound insulation levels that would comfortably meet the Building Regulations requirements.

The main parameter that is used throughout this document to express airborne sound insulation of separating constructions is $D_{nT,w} + C_{tr}$. All specifications in this report will, therefore, be given with respect to this descriptor.

Additionally, planning condition 3 states that a higher degree of sound insulation should be achieved:

3. Prior to commencement of the development, details shall be submitted to and approved in writing by the Council, of the sound insulation of the ceiling separating the commercial part(s) of the premises from noise sensitive premises. Details shall demonstrate that the sound insulation value DnT,w is enhanced by at least 10dB above the Building Regulations value and, where necessary, additional mitigation measures are implemented to contain commercial noise within the commercial premises and to achieve the criteria of BS8233:2014 within the noise sensitive premises. Approved details shall be implemented prior to occupation of the development and thereafter be permanently retained.

In order to satisfy the requirements of the Building Regulations and the increased level of sound insulation required by Planning Condition 3, the minimum sound insulation performance criteria, as shown in Table 2.1, should be met by all Floor constructions (i.e. separating elements between different residential dwellings).

Criteria	Design Criteria – Between dwellings and non-residential use	
	Airborne	Impact
Approved Document E Criteria	New Build $D_{nT,w} + C_{tr} \geq 45$ dB Conversion $D_{nT,w} + C_{tr} \geq 43$ dB	N/A
Planning Condition 3 (Enhanced Criteria)	$D_{nT,w} \geq 53$ dB	N/A

Table 2.1 Building regulations requirements for new build/conversion party elements and enhanced design criteria

The proposed escape room space is a renovation/conversion project and is located directly beneath an existing residential space. This report will therefore make reference to the corresponding sound insulation criterion as displayed in Table 2.1

2.2 Separating Wall Constructions

It is understood that there are no residential units adjoining the surrounding walls of the proposed escape room space.

2.3 Separating Floor Constructions

It is understood that the proposed floor construction between the residential unit and basement space below is as follows:

- Final walking surface
- Poured concrete slab (assumed minimum thickness of 150mm)

The above construction would not meet the requirements of Approved Document E (ADE) 2003 of the 2010 Building Regulations. To meet he minimum requirements of ADE 2003 and the enhanced design criteria, we would recommend the following upgrade proposals:

- A suspended ceiling should be installed beneath the existing slab with 2x15mm layers of Fermacell board suspended from either Kinetics ICC Deck-suspended Ceiling Hangers, or Akustik Super T47 hangers

- The void created should have a minimum depth of 100mm and be filled with 50mm of RW3 mineral wool (or any similar material with a minimum density of 60kg/m^3).

The above construction detail is illustrated within attachments Insul.1 and DWG.1.

2.4 Wall Junctions and Penetration Details

Interfaces between walls and all other adjacent elements should be built to ensure that the sound insulation performance of the wall is not affected. All gaps should be tightly packed with mineral wool and all joints should be sealed with a flexible sealant, such as silicone caulk.

Where any ducts, pipes, conduits or other services penetrate the wall, provide an air-tight seal between the service and partition using a flexible sealant. All gaps should be tightly packed with mineral wool and sealed with plasterboard pattress and mastic seal. We would recommend the incorporation of PFC Corofil intumescent collars in all pipe penetrations.

All partitions should ideally be built off the concrete slab. In this case, isolating strips such as Monarfloor or CMS-Danskin should be used in order to block horizontal flanking. In the case of additional heavy fixtures or services, 150FC90 nogging channels could be employed without significantly affecting the sound insulation properties of the proposed walls.

2.5 Lighting and Electrical Services

Downlighters or recessed lighting may be installed at no more than one unit per 2m^2 of ceiling area, at centres not less than 0.75m and into openings not exceeding 100mm diameter.

Electrical sockets should be installed in a staggered configuration at a minimum distance of 600mm from one another. Sockets should not be installed in a ‘back-to-back’ configuration.

Wall cavities should remain clear of rubble and debris in order to maintain the acoustic separation of the leaves.

2.6 Door Requirements

Where a degree of sound insulation is deemed necessary, doors with rated acoustic performance would be required. Recommendations with regards to the necessary sound insulation performance of the door units to be installed in the most sensitive spaces are shown in Table 2.3.

R_w (dB)	Typical Door Construction
32 for all entrance doors	Solid core timber door, with drop seals and gaskets, or high quality acoustic perimeter and threshold seals

Table 2.3 Acoustic specification of door systems

Some general points that should be followed regarding the acoustic performance of doors are as follows.

- Non-hardening caulk should be used to seal joints airtight
- If hollow metal frames are used, they should be fibre- or grout-filled
- Doors should be gasketed around the entire perimeter to be airtight when closed
- Seals should be adjustable to compensate for wear, thermal movement, settlement of building structure and other factors that cause misalignment of the doors
- Good quality hydraulic closers should be fitted on all doors likely to be subjected to heavy use

3.0 NOISE MITIGATION PROPOSALS

It is understood that low levels of background noise are to be played through speakers within the escape room space.

Installation of a Sound Limiter

In order to ensure that the source noise levels are controlled within the escape room, we would recommend that a sound limiter is installed. The system designer should be able to advise on the type and standard of sound limiter suitable for the proposed installation.

The limiter should enable the separate control of the different zones and incorporate all elements of the sound system, including any additional filters or amplifiers. Programmable limiters are preferred as these permit a more sophisticated control of frequency content and volume and are fully tamper-proof. Programmed limits should match those shown in Table 8.1.

Noise Limiter	Octave band centre frequency SRI, dB							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Maximum permissible noise levels played through loudspeakers (L_{eq},1 min)	67	60	55	53	53	49	40	33

Table 7.4 Maximum permissible noise levels played through loudspeakers within escape room

On-going attention will need to be given by escape room management to transmitted noise levels to ensure that the final operational conditions do not undermine the settings of the limiter. Different types of music and activities can result in varied subjective effects. It is strongly recommended that the management remain aware as the operation becomes established and reset the limiter, if necessary.

Distributed Sound System

A loudspeaker system employing relatively few speakers requires each unit to generate high noise levels to maintain a given noise level in the space.

A distributed system with numerous speakers allows each speaker to operate at a lower volume. This ensures that localised noise levels are lower, which reduces the noise directly incident on the structure.

The specifications of the speakers will be dependent on the use of each zone or focus area but should allow sufficient capacity for them to operate at optimum efficiency.

Loudspeaker Mounting

Rigid mounting systems are entirely inadequate for the control of transmitted sound from the speakers. To ensure efficient control of noise it is recommended that a proprietary frame support is used for each speaker.

This must incorporate suitable anti-vibration mounting between support and speaker enclosure, with no rigid connections permitted to short-circuit the isolation

The use of neoprene mounts or hangers is recommended. These are expected to provide a static deflection of approximately 3-5mm (i.e. under the load of the speaker). High stiffness neoprene / rubber and metal springs should be avoided in general. The use of neoprene mounts or hangers in fully-enclosed metal casings is not advisable as if these are angled the casings can short circuit. Any mount / hanger must be capable of maintaining a 30-degree

offset without any rigid components short-circuiting the mount. It must be noted, however, that vertical alignment is more effective.

Generally available speaker vibration mountings are not typically effective for isolation of this standard. Use of heavy duty, proprietary supports coupled with hangers / mounts will be far more effective.

Should the suspended installation of bass cabinets not be possible, we would recommend the use of a proprietary resilient pad on which the cabinets can rest. We would therefore recommend a product such as Regupol 6010BA which would isolate the speakers from generating any vibro-acoustic excitation of the structure.

Bass Cabinets

For the isolation of any bass cabinets from the floor, we would recommend the installation of ND-A-Black isolators from Mason UK.

These would attenuate the lowest frequency of 35Hz by around 85% and efficiency will rise quickly as the spectrum increases.

4.0 CONCLUSION

The drawings for the proposed development at 55b Camden Street, London have been reviewed and suitable acoustic specifications have been determined.

While a realistic approach to the actual needs of the various spaces has been adopted, it was deemed necessary to refine the acoustic provision of some elements such as the acoustic detailing of junctions, beyond the base build specification currently proposed to meet the enhanced sound insulation requirement.

Sound Insulation Prediction (v9.0.8)

margin of error is generally within Rw +/- 3 dB
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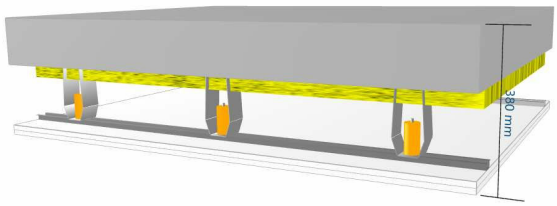
Job No.: 19030 Initials:Aidan Tolkien MIOA
Date:10/02/2020
File Name:Separating floor.ixl

Notes:



Rw	92 dB
C	-2 dB
Ctr	-7 dB

Mass-air-mass resonant frequency = =20 Hz
Panel Size = 2.7 m x 4.0 m
Partition surface mass = 389 kg/m²

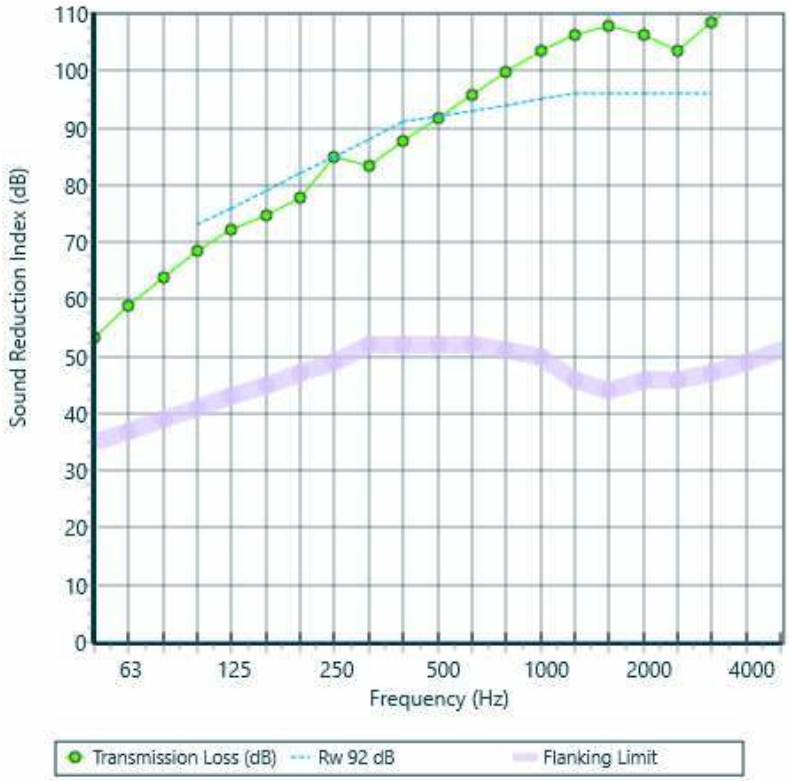
System description

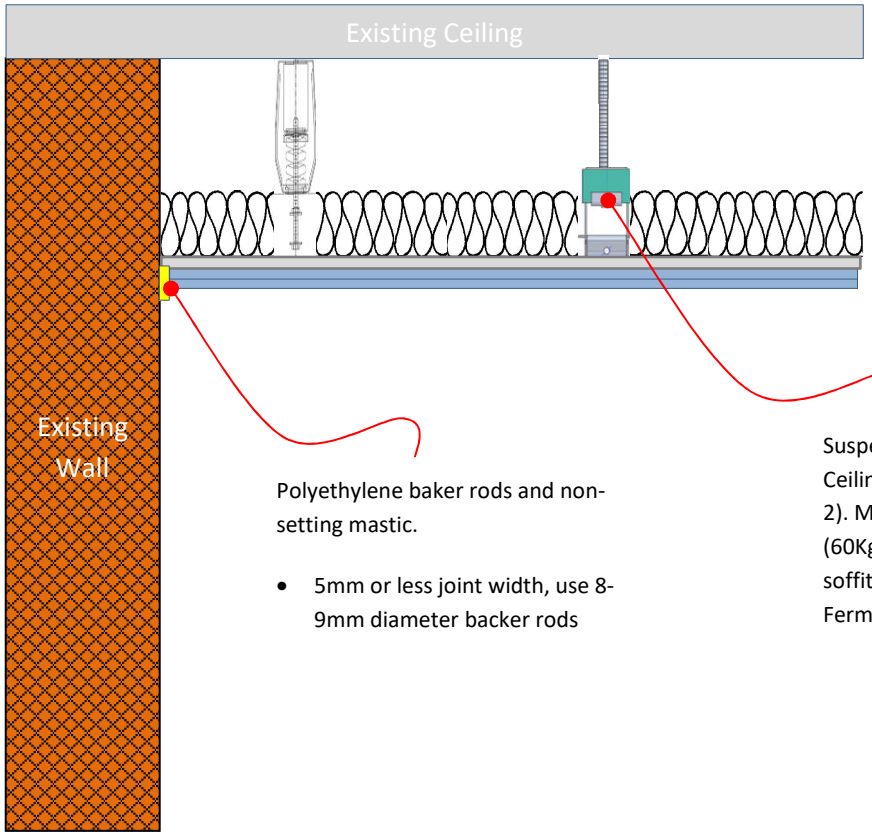
Panel 1 : 1 x 150 mm Concrete

Frame: Steel Spring Hanger with neoprene; Cavity Width 200 mm ,Stud spacing 600 mm , 1 x Rockwool (60kg/m3) Thickness 50 mm
Panel 2 + 2 x 15 mm Fermacell 15

Floor Cover: Thickness 0.02 mm

freq.(Hz)	TL(dB)	TL(dB)
50	53	
63	59	57
80	64	
100	68	
125	72	71
160	75	
200	78	
250	85	81
315	83	
400	88	
500	92	90
630	96	
800	100	
1000	104	102
1250	106	
1600	108	
2000	106	105
2500	103	
3150	108	
4000	113	112
5000	118	





Polyethylene baker rods and non-setting mastic.

- 5mm or less joint width, use 8-9mm diameter backer rods

Suspended ceiling with Kinetics ICC Deck-suspended Ceiling Hangers (option 1) or Akustik Super T47 (option 2). Minimum void of 100mm with 50mm mineral wool (60Kg/m3) in the cavity. The newly formed ceiling soffit should be constructed using 2x15mm layers of Fermacell board.

Title:

Ceiling upgrade (NTS)

Date: 25 April 2019

FIGURE 19030.DWG1

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