

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

16080-R03-A

17 November 2016

75 Mosley Street, Manchester

Assessment of noise transfer from retail to offices

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Version	Date	Comments	Author	Reviewer
A	17 Nov 16		Ben Phillips	James Atha

Summary

Sandy Brown has been appointed by OBI Property Ltd to provide acoustic consultancy for the proposed development at 75 Mosley Street, Manchester.

It is understood that the ground floor units (currently unoccupied) are intended for A1, A3 or A4 use and are likely to include bar/restaurant tenants. An assessment of noise transfer to the offices above from amplified sound associated with the retail units has been carried out.

Guidance on internal limits for amplified sound within the retail units have been set, and are based upon the measured sound insulation performance of separating elements, and a target criteria of at least 10 dB below the typical internal noise levels in the adjacent office spaces to minimise the risk of disturbance. The recommended limits are relatively low but would typically allow for a bar/restaurant with background music (no DJs or live bands) within the ground floor retail units. As such, outline enhancement have also been provided which would allow for higher levels of amplified sound within the retail units.

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1 Introduction

Sandy Brown has been commissioned by OBI Property Ltd to provide acoustic consultancy for the proposed development at 75 Mosley Street, Manchester.

It is understood that the ground floor units (currently unoccupied) are intended for A1, A3 or A4 use which may include bar/restaurant tenants.

Sound insulation measurements have been carried out in order to determine the existing airborne sound insulation provided by the separating floor between the retail units and the offices above.

The report presents measurement results, guidance on internal limits for amplified sound in the retail units, and outline recommendations for enhancements to the sound insulation.

2 Proposed ground floor use

The two proposed ground floor retail units are intended for A1, A3 or A4 use. Although there are no tenants confirmed for these units it is understood that bar/restaurant use may be proposed which could include amplified sound.

The current layouts are provided in Appendix A with the proposed layouts in Appendix B. Immediately adjacent to the unit is the lobby/reception of 75 Mosley Street and immediately above the unit is speculative office space which is currently being refurbished.

The architectural drawings received for the development indicate that the ground floor slab is 130 mm thick concrete and the first floor concrete slab is approximately 160 mm thick. Currently the first floor concrete slabs has a screed on top which is proposed to be removed and a raised access floor installed. As there are basements below, the ground floor slab is not ground bearing.

3 Measurement results and observations

The results of the airborne sound insulation performance of the floor separating the ground floor unit and the offices on level 1 are summarised in Table 1. Graphs showing the results of the testing are provided in Appendix C.

Table 1 Measured airborne sound insulation

Test location	Measured airborne sound insulation, $D_{nT,w}$ (dB)
Floor test 1	50
Floor test 2	51

Observations on-site indicate that the airborne sound insulation of the separating floor is limited by transfer via the existing floor slab itself. Generally, flanking sound transmission is well controlled as first floor columns are boxed-in with plasterboard and the facades are stepped. No significant flanking via these paths was noted during the measurements.

It should be noted that the sound insulation measurements were performed into offices which were located on the Nicholas Street and Mosley Street facades as shown in the drawings in Appendix A. The proposed first floor office space is to be speculative therefore it may contain cellular or open plan configurations.

4 Assessment – amplified sound transfer

4.1 Internal noise criteria

Guidance on acceptable internal noise levels for various types of use relevant to the development are given in BS 8233:2014 *Sound insulation and noise reduction for buildings – Code of practice*, and is also provided by the British Council for Offices *Best practices in the specification of offices*. These are given in Table 2.

Table 2 Internal noise criteria for various types of use

Internal space	Design range, L_{Aeq} (dB)	
	BS8233	BCO
Cellular offices	35-45	40-45
Open-plan offices	45-50	45-50
Speculative offices	-	43*
Corridor	45-50	-

* Maximum design limit, no lower limit given

4.2 Internal noise limits

Amplified sound transfer to the environment to meet the requirements of Manchester City Council has also been considered, information relating to which is provided in report 16080-R02-B *Amplified sound egress report- planning condition 13*.

To minimise the risk of disturbance to users of the offices, the limits for amplified sound in the ground floor retail units depend on the sound insulation of the floor and the ambient noise levels in the office.

The aim is to minimise the audibility of the music from the retail units within the office, and the quieter the office is, the more apparent music noise transfer becomes.

The existing internal ambient noise levels in the office spaces were measured during the testing. The building services (such as the ventilation system) were operating although it is not known at what duty.

The measured internal ambient noise levels in the level 1 offices were:

- L_{Aeq} 44 dB in the Test 1 receiving space. This is in general accordance with the advice from BCO.
- L_{Aeq} 35 dB in the Test 2 receiving space. This is lower than would usually be expected in a cellular office.

The octave band spectrum for the measured internal ambient noise levels is provided in Table 3.

Table 3 Measured internal ambient noise levels within the level 1 offices

	Measured internal noise level, $L_{eq,30\text{ sec}}$ (dB)						
	Octave band centre frequency (Hz)						
	63	125	250	500	1k	2k	4k
Test location 1	57	52	45	43	35	30	24
Test location 2	48	43	38	33	26	25	23

It is understood that the level 1 offices are being refurbished to be speculative office space. Therefore, the lower limit of the BCO guidance for a cellular office has been used for the assessment (L_{Aeq} 40 dB) and the measured ambient noise level spectra have been shifted to this for the assessment.

Guidance on internal limits from amplified sound within the retail units when the offices above are in use are provided in Table 4. Appropriate allowances have been made for the removal of screed to the level 1 slab and the installation of a raised access floor.

Table 4 Guidance on maximum internal noise limits for amplified sound in octave bands

	Maximum internal amplified sound limits, L_{eq} (dB)						
	Octave band centre frequency (Hz)						
	63	125	250	500	1k	2k	4k
Maximum internal amplified sound limits, L_{Aeq} (dB)	79	76	75	81	75	76	77

These limits are more onerous than those given in report 16080-R02-B although the limits above are applicable only when the offices are in use.

As part of the office refurbishment, a new ventilation system including the installation of fan coil units is proposed. If noise from the ventilation system is significantly lower than L_{Aeq} 40 dB, the internal noise limits within the ground floor retail units may be lower than those given in Table 4.

The limits given above would typically be suitable for a busy bar or restaurant with background music only (eg no loud amplified music such as DJs or live bands).

It is recommended that the above amplified sound limits be included in the retail unit tenancy agreements. If the tenants wish to produce higher levels of amplified sound, enhancement will be required.

4.3 Noise transfer to the reception

In addition to noise transfer through the ground floor ceiling, consideration should be made to the sound insulation of the partition separating the retail units and the reception area.

The required performance of this partition will depend on the uses of the unit. As a guide, if the units are to be used as cafe/bar/restaurants with background music a partition with a laboratory performance of R_w 50 dB would typically be suitable.

5 Outline enhancements for higher levels of amplified sound

In order to increase the amplified sound limits above those given in Table 4, enhancements to the sound insulation between the ground floor units and the offices would be required. Such enhancements would typically be provided by the tenant if they wish to exceed the limits set in the tenancy agreement. Outline enhancements which could be provided to allow for higher levels of amplified sound are given below.

- Installing a sound insulating ceiling to the ground floor units
- Boxing-in of structural columns
- Boxing-in or infilling of mullions
- Sealing ventilation grilles in the facade
- Enhanced envelope sound insulation performance (such as secondary glazing to the facade)
- Lobbied entrance doors to the facade
- Treating any common ventilation ductwork and services routes.

In addition to the above, consideration should be given to noise transfer to the reception area. The required sound insulation performance of the separating partition will depend on the proposed use of the adjacent retail unit.

6 Possible further testing

To minimise the risk of disturbance to the office users, once the proposed refurbishment works are complete, along with any enhancements to the retail units, it is recommended that the following further tests be carried to allow for more accurate limits to be set for the retail units:

- Sound insulation tests between the ground floor units and offices above
- Background noise level measurements in the office spaces.

7 Conclusion

An assessment of noise transfer from the ground floor units to the offices above has been carried out.

Internal noise limits for amplified music in the units have been set based upon the measured sound insulation performance of separating elements and upon achieving at least 10 dB below the internal noise criteria for the adjacent space. The limits are suitable for a cafe/bar/restaurant with background music.

In order that the limits can be increased further to allow greater flexibility of use, the airborne sound insulation of the separating floor will need to be improved and recommendations are given for how this can be achieved in Section 5 Improvement of the sound insulation of the separating floor will require works to the facade and installing a resiliently hung sound insulating ceiling.

Following completion of the proposed refurbishment works along with any enhancements, it is advised that further testing be performed to allow for more accurate internal amplified sound limits to be set for the retail units and minimise the risk of disturbance to the office users.

Appendix A

Current layout and testing locations

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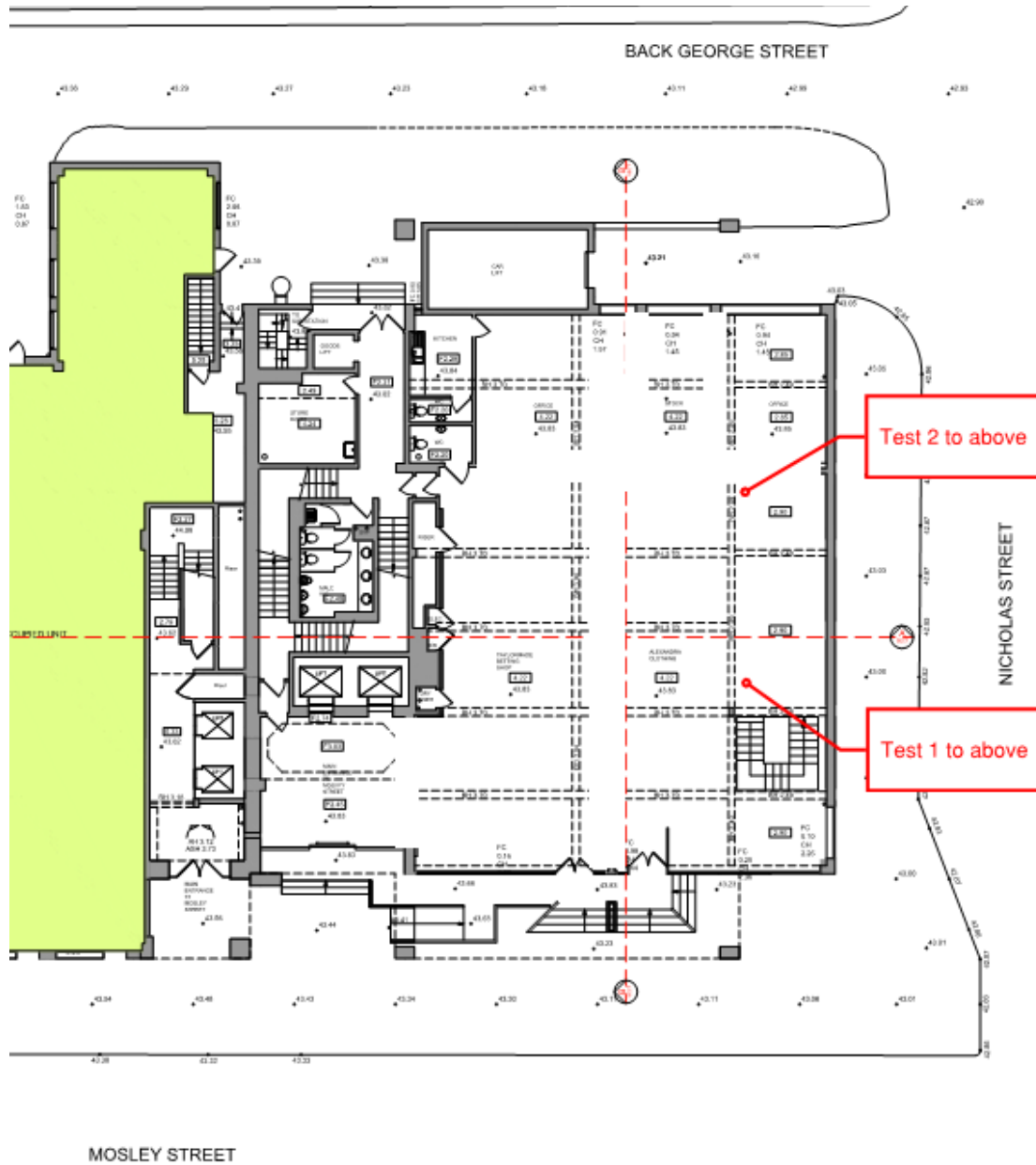


Figure A1 Current ground floor layout

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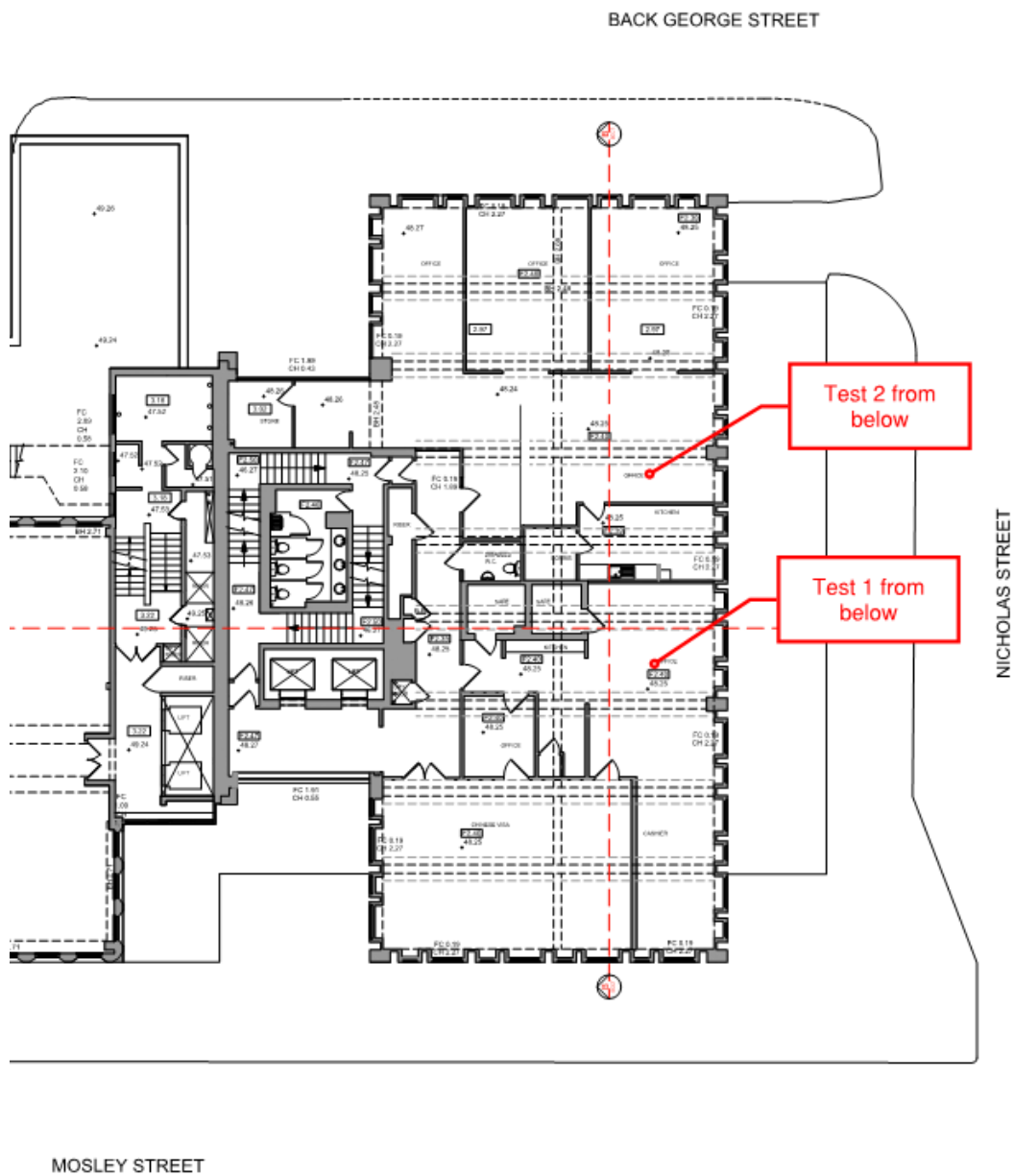


Figure A2 Current first floor layout

Appendix B

Proposed layouts

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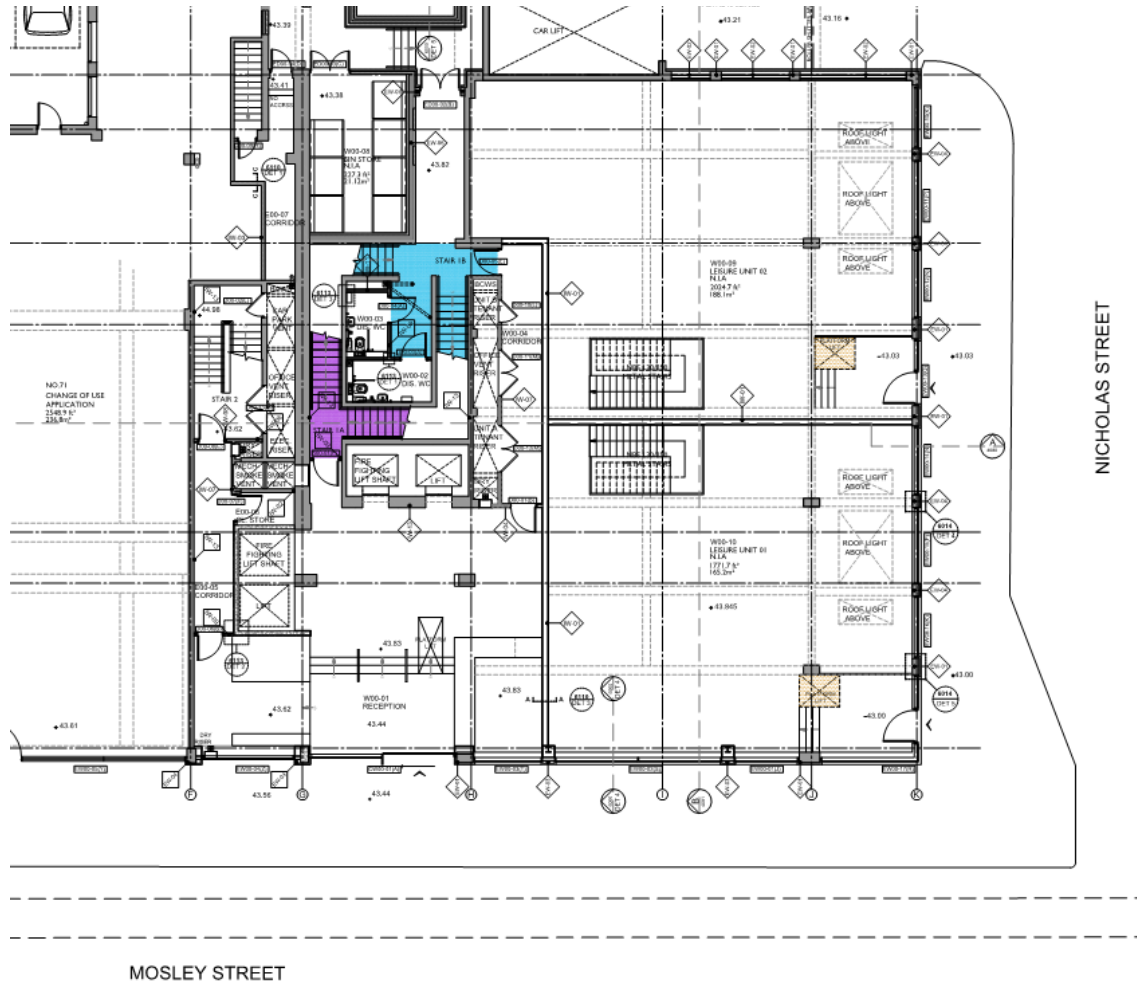


Figure B1 Proposed ground floor layout

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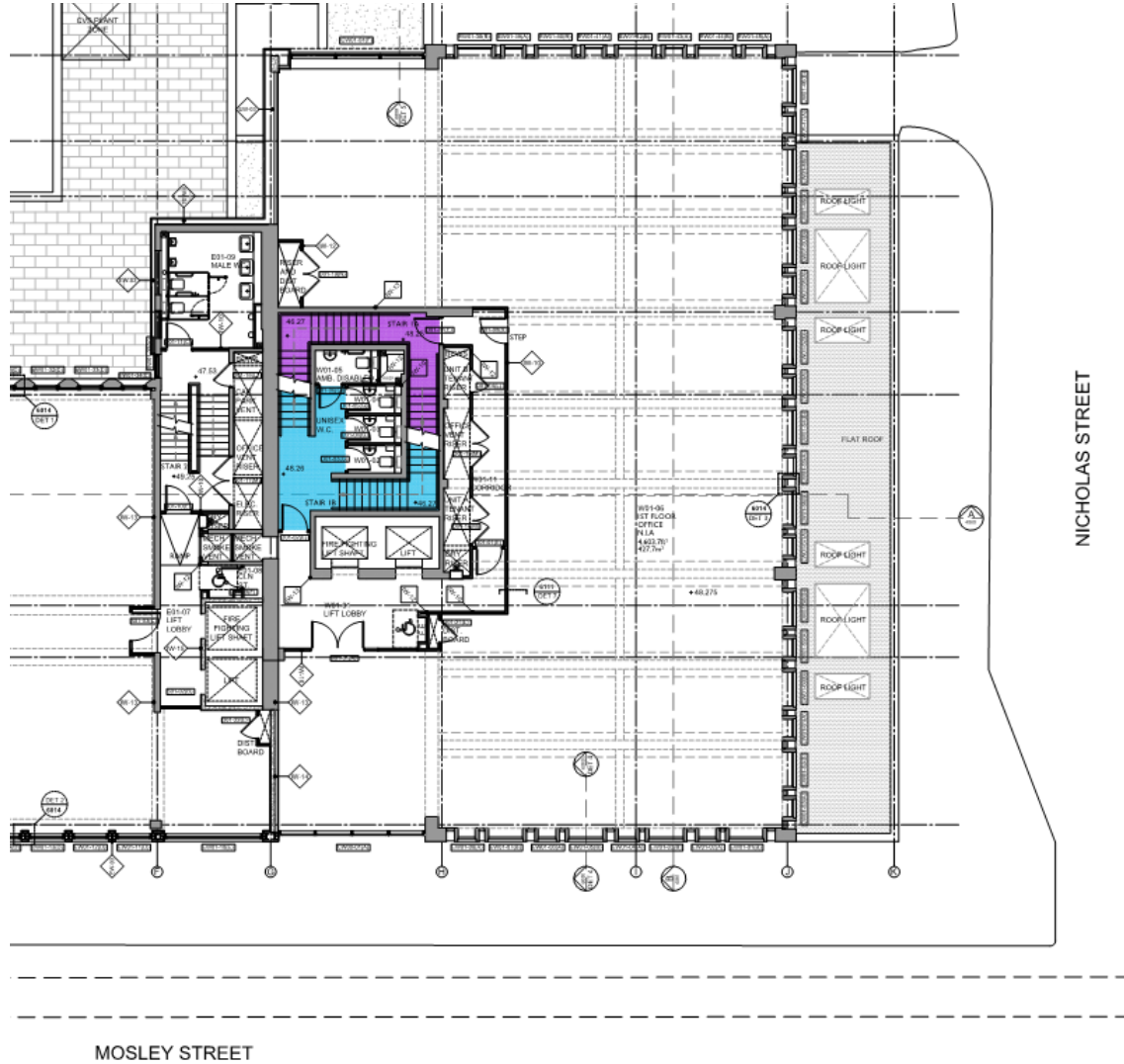


Figure B2 Proposed first floor layout

Appendix C

Sound insulation test graphs

Standardized level difference according to ISO 140-4

Field measurement of airborne sound insulation between rooms

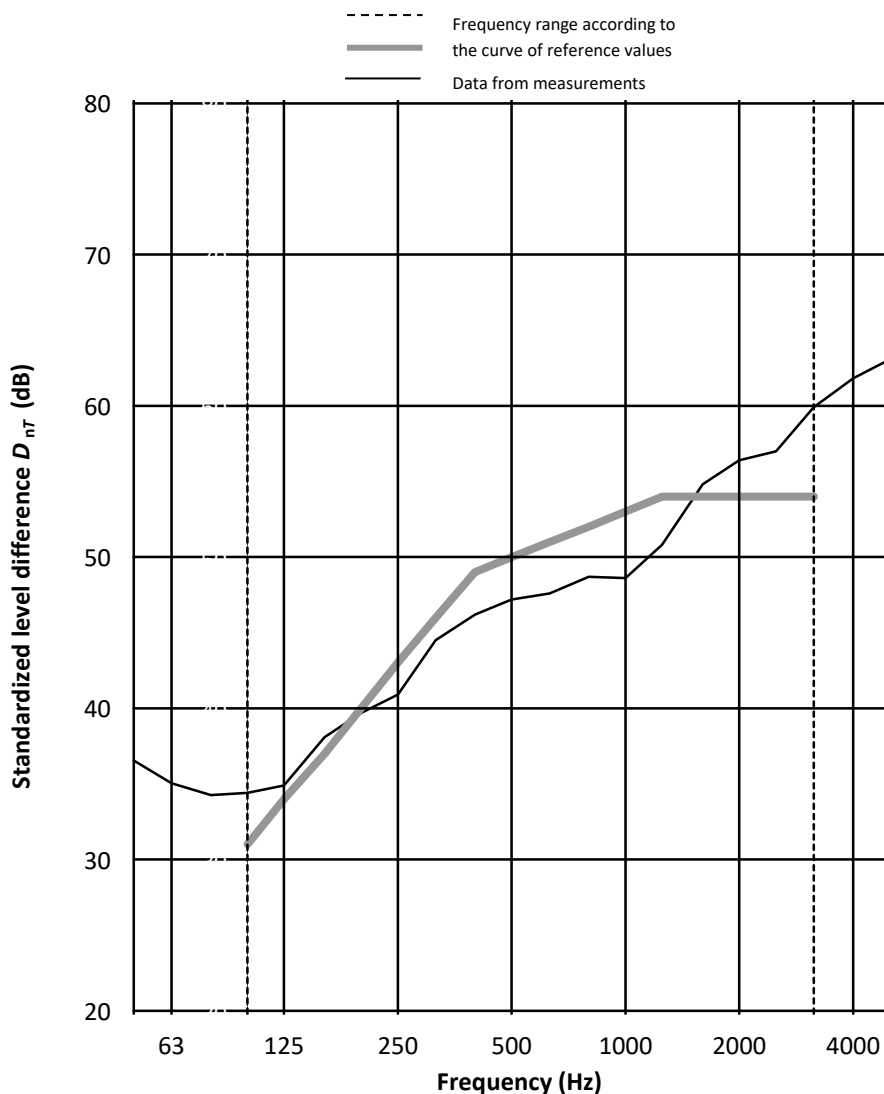
Client name and address **OBI Property Ltd, 80 Mosley Street, Manchester, M2 3FX**File ref **16080/DM**Job name and address **75 Mosley Street, Manchester, M2 3HR**Test ref **1**Test date **31 Oct 16**Test rooms and direction **Ground floor to first floor office**Construction details **Concrete slab with screed above**

Frequency (Hz)	D_{nT} (1/3 octave, dB)
50	≥ 36.6
63	35.0 B
80	34.3 B
100	34.4
125	34.9
160	38.1
200	39.7
250	40.9
315	44.5
400	46.2
500	47.2
630	47.6
800	48.7
1000	48.6
1250	50.8 B
1600	54.8 B
2000	56.4 B
2500	57.0 B
3150	59.9 B
4000	≥ 61.8
5000	63.1 B

"F" indicates where source room sound pressure levels in that frequency band differed by more than 6 dB from source room sound pressure levels in an adjacent band.

"B" indicates where receiving room sound pressure levels in that frequency band were within 10 and 6 dB of the background noise levels and have been corrected

"≥" indicates where receiving room sound pressure levels in that frequency band were within 6 dB of the background noise levels and are the limit of measurement and have been corrected



Evaluation based on field measurement results obtained by an engineering method

Rating according to ISO 717-1

$D_{nT,w} (C; C_{tr}) = 50 (-1; -4) \text{ dB}$

Reference reverberation time $T_0 = 0.5$ seconds

Test personnel **Jose Gonzalez-Diaz**

Standardized level difference according to ISO 140-4

Field measurement of airborne sound insulation between rooms

Client name and address **OBI Property Ltd, 80 Mosley Street, Manchester, M2 3FX**

File ref **16080/DM**

Job name and address **75 Mosley Street, Manchester, M2 3HR**

Test ref **2**

Test date **31 Oct 16**

Test rooms and direction **Ground floor to first floor office/reception**

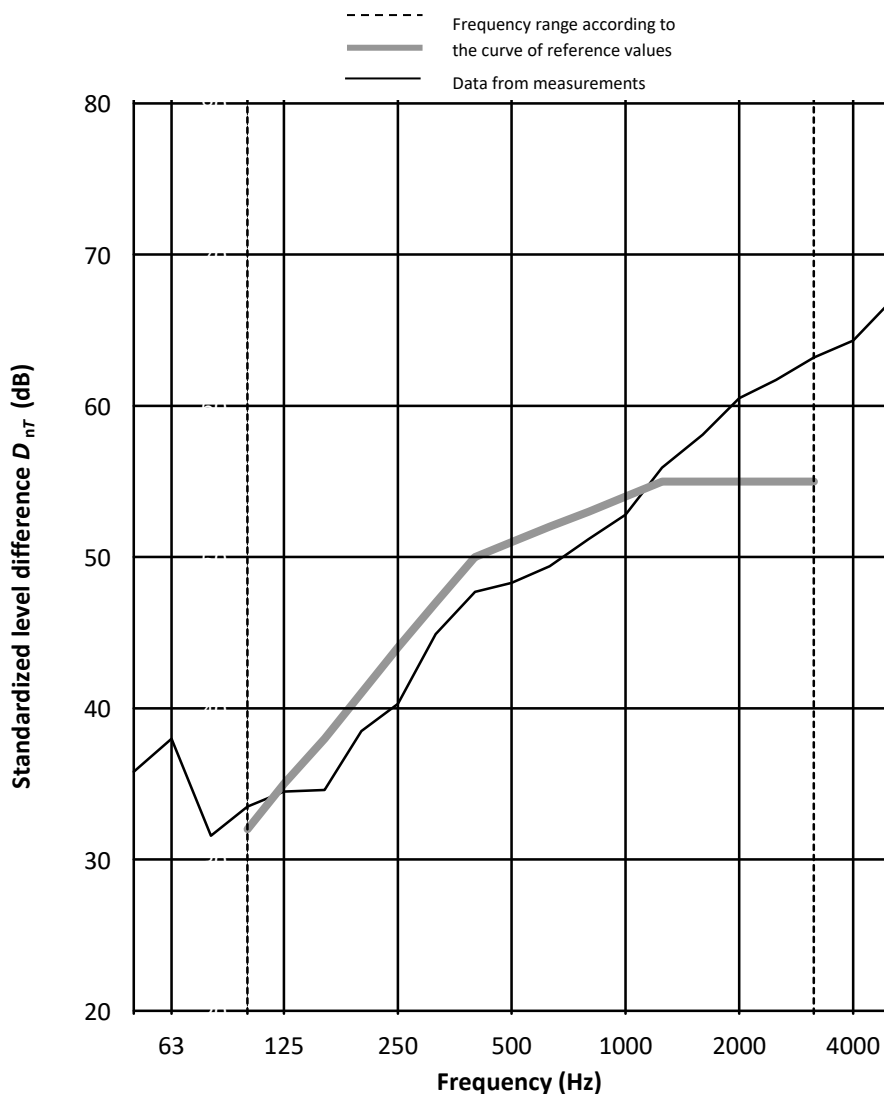
Construction details **Concrete slab with screed above**

Frequency (Hz)	D_{nT} (1/3 octave, dB)	
50	35.8	B
63	38.0	
80	31.6	
100	33.5	
125	34.5	
160	34.6	
200	38.5	
250	40.3	
315	44.9	
400	47.7	
500	48.3	
630	49.4	
800	51.2	
1000	52.8	
1250	55.9	B
1600	58.1	B
2000	60.5	B
2500	≥ 61.7	
3150	≥ 63.2	
4000	≥ 64.3	
5000	≥ 66.8	

"F" indicates where source room sound pressure levels in that frequency band differed by more than 6 dB from source room sound pressure levels in an adjacent band.

"B" indicates where receiving room sound pressure levels in that frequency band were within 10 and 6 dB of the background noise levels and have been corrected

"≥" indicates where receiving room sound pressure levels in that frequency band were within 6 dB of the background noise levels and are the limit of measurement and have been corrected



Evaluation based on field measurement results obtained by an engineering method

Rating according to ISO 717-1

$D_{nT,w}$ (C; C_{tr}) = **51 (-1;-5) dB**

Reference reverberation time T_0 = 0.5 seconds

Test personnel **Jose Gonzalez-Diaz**