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PASSION FRUIT, TRINITY COURT, 16 JOHN DALTON STREET, MANCHESTER

NOISE IMPACT ASSESSMENT

Report **15690-NIA-01 RevA**

Prepared on 19 March 2020

Issued For:
Helical (Chart) Limited
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15690-SP1	Indicative Site Plan
15690-TH1	Environmental Noise Time History
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1.0 INTRODUCTION

Clement Acoustics Ltd has been commissioned by Helical (Chart) Limited to investigate and assess the suitability of the ground floor and mezzanine unit at Trinity Court, 16 John Dalton Street, Manchester for development as a café venue with seating areas for customers.

This report presents the results of a background noise survey and break out assessment followed by an assessment of the anticipated noise emission levels and outlines any necessary mitigation measures.

2.0 SITE DESCRIPTION

Proposals are to redevelop a ground floor unit within Trinity for use as a café for daytime and evening food and drink. Proposals will include customer seating areas over ground and mezzanine floors, where it is anticipated background levels of music will be played during the majority of the time. There are no proposals for a dance floor or live music, and amplified music is not anticipated to be played at an 'entertainment' level.

The proposed opening hours of the café are as follows:

- Monday to Sunday: 07:00 - 22:00.

A residential receiver has been identified in the location shown in the attached site plan. The area is predominantly commercial, with uses such as retail units and restaurants with office accommodation above.

Residential receivers were identified through a combination of an onsite inspection of the area, and council tax checks on available online databases. The closest residential receiver was identified as a property located approximately 25 m to the east on Mulberry Street, beyond intermediate buildings. If there are any receivers closer to that identified within this report then a further assessment will need to be carried out. Therefore, the closest noise sensitive receiver should be confirmed by the client before any works are undertaken.

The noise profile of the area is dominated by surrounding commercial uses, as well as road traffic noise from surrounding roads.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Procedure

In order to assess existing background noise levels in the area, an environmental noise survey was undertaken at the position marked on indicative site plan 15690-SP1.

The microphone was mounted on a 1st storey window on the façade of the building overlooking John Dalton Street. The microphone was positioned 1 m in front of the window and as such the monitoring position is not considered free-field according to the guidance of BS 4142: 2014. Based on the presence of the reflective surface and the nature of surrounding noise sources, a correction for reflections of 3 dB has been applied, in line with the recommendations of the standard.

Noise levels at the monitoring position were dominated by road traffic on surrounding roads during the installation and collection of equipment. The position was considered to be suitably away from the dominant sources of noise to provide a robust assessment for noise sensitive receivers in the area.

Continuous automated monitoring was undertaken for the duration of the survey between 11:45 on 26 February 2020 and 11:40 on 28 February 2020.

Weather during the survey was generally dry with light winds, therefore suitable for measurement of environmental noise. There were some periods of high winds, but these were short in duration.

The measurement procedure generally complied with BS7445:1991. *Description and measurement of environmental noise, Part 2- Acquisition of data pertinent to land use.*

3.2 Equipment

The equipment calibration was verified before and after use and no abnormalities were observed.

The equipment used was as follows.

- 1 No. Svantek Type 957 Class 1 Sound Level Meter
- Norsonic Type 1251 Class 1 Calibrator

4.0 RESULTS

4.1 Environmental Noise Survey

The L_{Aeq} : 5min, L_{Amax} : 5min, L_{A10} : 5min and L_{A90} : 5min acoustic parameters were measured and are shown as a time history in Figure 15690-TH1.

In order to protect the amenity of nearby noise sensitive receivers, minimum existing background noise levels were calculated for the proposed operating hours covered during the survey.

Minimum measured background levels for these periods are shown in Table 4.1.

Minimum background noise level L_{A90} : 5min dB(A)	
Proposed Survey Operating Hours (07:00 - 22:00)	50

Table 4.1: Minimum background noise levels

5.0 NOISE EMISSIONS CRITERIA

5.1 Residential Receivers

The noise emissions criteria, typically set by the local authority are as follows:

"The noise level from any plant or activities shall be 10dB or more below the lowest measured external background noise L_{A90T} at the closest residential window. The equipment shall be installed and constructed in accordance with any approved scheme and be permanently maintained thereafter."

In order to provide a robust assessment, we propose to set the noise criteria at 40 dB(A), the value 10 dB below the minimum measured background noise during the proposed hours of operation.

It is understood there is also a requirement for spectral noise levels to be 10 dB below the corresponding background noise levels.

5.2 Commercial Receivers

The closest receivers to the proposed café facility are existing commercial uses on the first floor of Trinity Court, directly above the proposed mezzanine level of the café.

The first floor was observed to be in use largely as storage, however in order to present a robust assessment, it will be assumed that the first floor could be repurposed as office accommodation in the future.

In order to assess whether noise emissions will be controlled to an acceptable level, guidance has been sought in British Standard 8233: 2014 '*Guidance on sound insulation and noise reduction for buildings*'

In Table 6, guidance is given on typical noise levels for non-domestic buildings where concentration may be required. The relevant guidance given in this table is summarised in Table 5.1.

Objective	Location	Design range $L_{Aeq,T}$ dB
Study and work requiring concentration	Staff/meeting room	35-45 dB(A)
	Executive office	35-40 dB(A)

Table 5.1: BS8233 recommended internal background noise levels

Based on the use of the adjacent space, we would recommend noise emissions should not exceed the design ranges shown in Table 5.1.

6.0 NOISE IMPACT ASSESSMENT - INTERNAL ACTIVITIES

6.1 Proposed Activities

As the building is not currently in use as a café, manual measurements were taken of similar sized venue, with patrons present and music played back at a level considered to be an 'entertainment' level.

Further measurements were taken at a bar with customers present, and music at a level considered to be a 'background' level.

In this way, an assessment will be provided for the worst-case scenario of loudest noise levels, with current proposals.

The measured noise levels are as shown in Table 6.1.

Source	Sound Pressure Level (dB) in each Frequency Band, at source								dB(A)
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
Noise Profile 1: <i>Entertainment Level</i>	93	93	90	91	87	81	71	66	92
Noise Profile 2: <i>Background Level</i>	70	73	76	81	78	74	68	56	82

Table 6.1: Measured Music Noise Levels

For these proposals, which include playing music at a 'background' level of noise, the levels shown as Noise Profile 2 in Table 6.1 will be used to inform the assessment.

These levels will be used to calculate the current noise breakout to nearby noise sensitive receivers.

For all calculated levels shown below, full formulae used and spectral calculations are shown in Appendix B.

6.2 Noise Breakout Assessment – Residential Receiver

Windows to rooms used for residential purposes have been identified at the location shown in attached site plan 15690-SP1. The closest windows are located a minimum of 30 m from the glazed façade of the proposed venue, with the intermediate building envelope providing a significant amount of screening attenuation.

The facade to the venue is formed of existing glazing. In order to provide a robust assessment, laboratory data for nominal single glazing is as shown in Table 6.2.

Construction	Stated Sound Reduction in Each Frequency Band							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
5mm Single Glazing	20	19	23	30	35	27	32	35

Table 6.2: Predicted sound reduction of café bar facade

The main entrance doors to the café bar are on the front façade, facing away from the identified receiver. This will limit breakout of noise through these transmission paths, although certain steps are recommended in the noise management plan, shown in Section 7.0.

In order to present a particularly robust assessment, calculations will be undertaken assuming an open entrance door. According to BS 8233: 2014, a typical building facade with a partially open window offers 15 dB attenuation. This will be assumed to be applicable to the entire façade of the building when the front door is opened.

With music played back at the above levels, predicted noise emissions levels at nearest residential windows would be as shown in Table 6.3.

Levels have been calculated using the measured background music levels, the stated sound reduction of the venue façade with an open door, and the formula shown in Appendix B1.

Receiver	Operating Hours Criterion	Noise Level at Receiver (due to amplified music)
Closest Residential Receiver	40 dB(A)	21 dB(A)

Table 6.3: Noise levels and criteria at Residential Receiver

As shown in Table 6.3 and Appendix B1, transmission of noise to the nearest sensitive windows due to the effects of the events and activities would meet the set criteria, based on current proposals. The criterion is met both spectrally and overall.

6.3 Noise Breakout Assessment – Commercial Receiver (Offices)

To provide a robust assessment, it has been assumed that offices could be developed directly above the proposed café. The weakest path for noise transmission will be through the separating floor to the adjacent space.

In order to predict the transmission of noise to adjacent spaces, calculations have been undertaken using the following standard acoustic formula:

$$SPL_{receiver} = SPL_{source} - SRI_{separation} + 10\log_{10} S - 10\log_{10} A$$

Where:

- $SRI_{separation}$ is the sound reduction of the separating floor [see below],
- S is the area of the transmitting floor,
- and A is the absorption area of the receiving room.

The sound insulation of the separating floor between first floor and ground floor was measured through sound insulation testing on site.

High volume “white” noise was generated from two loudspeakers in the source room, positioned in order to obtain a diffuse sound field. A spatial average of the resulting one-third octave band noise levels between 50 Hz and 10 kHz was obtained by using a moving microphone technique over a minimum period of 15 seconds at each of two positions.

The same measurement procedure was followed in the receiver room.

The results of the tests were rated in accordance with BS EN ISO 717-1: 1997 “*Rating of sound insulation in buildings and of building elements. Part 1 - Airborne sound insulation*”.

The measured sound insulation performance of the floor between ground floor and first floor spaces is as shown in Table 6.4. It should be noted that residual background noise was a limiting factor, with no white noise from the source room audible in the receiving room.

Construction	Measured Sound Reduction in Each Frequency Band							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Existing Separating Floor	32	40	39	40	46	40	39	42

Table 6.4: Measured sound reduction of separating floor

With music played back at the levels shown in Table 6.1, noise emissions levels within the adjacent commercial premises due to internal music play back would be as shown in Table 6.5.

Levels have been calculated using the measured amplified music levels, the calculated sound reduction of the separating floor and the formula shown above. Detailed calculations are shown in Appendix B2.

Receiver	Design Range	Noise Level at Receiver (due to amplified music)
Adjacent Office	35-40 dB(A)	40 dB(A)

Table 6.5: Noise levels and criteria at Commercial Receiver

As shown in Table 6.5 and Appendix B2, transmission of noise to the proposed office space above the venue would meet the relevant design range, with music played at a background level.

6.4 Internal Noise Transmission to Residential Spaces

With residential premises identified on Mulberry Street, the commercial and residential buildings are potentially connected by the intermediate building.

However, the intermediate building presents a significant buffer zone between the proposed café and the residential building. The combination of buffer zones would be expected to reduce noise transmission from the café to an imperceptible level.

We would recommend certain steps to avoid transmission of structure-borne noise (See Section 7.0).

7.0 PROPOSED NOISE MANAGEMENT PLAN

In order to ensure the calculated noise emission levels are not exceeded, we would recommend following certain steps when operating the café bar, as detailed below:

- We would recommend maximum noise levels as follows, to protect the amenity of offices on the first floor:

Source	Low Frequency Limits		Overall Limit
	63Hz	125Hz	
Amplified Music	70 dB	73 dB	82 dB(A)

Proposed noise limits in café^[1]

- The above limits could typically be implemented through the use of an inline noise limiter, installed in the audio chain before the amplifier, to compress any signal and ensure the limit isn't exceeded.
- All loud speakers should be isolated from the building structure. For fixed speakers, this should be achieved using neoprene fixings for all speaker mountings. For free standing speakers, these should be sited on a suitable isolating material.
- Patrons should also be reminded of the nature of surrounding premises and behaviour outside the premises should be monitored accordingly.

[1] The main driving factor in determining the proposed noise limits is transmission of noise through the existing separating floor and openable doors. If in future there is a desire to increase allowable noise levels, this could be done through the specification of suitable improvements, e.g. a suspended acoustic ceiling and a lobbied entrance.

8.0 PROPOSED PLANT INSTALLATION

Details of any proposed plant installation are not currently known, as the project is currently at an early stage.

If any external plant is proposed, full noise impact calculations will be undertaken in order to predict the level of noise expected at the closest residential window.

It is anticipated that compliance with the recommendations would be possible through the implementation of typical mitigation measures such as the following:

- Selection of an appropriate unit, suitable for the location,
- Considered location of the unit (eg within the building envelope where possible),
- Specification of adequate attenuators and enclosures where necessary.

Through the above measures, it will be demonstrated that any installed plant will not be expected to have a negative impact on the amenity of nearby noise sensitive receivers.

9.0 CONCLUSION

A noise survey has been undertaken at Trinity Court, 16 John Dalton Street, Manchester. The results of the survey, combined with a noise breakout assessment, have enabled the assessment of noise propagation of proposed activities within indoor spaces to surrounding receivers.

Calculations have been based on noise breakout through the glazed facade to the closest identified residential receivers, and through a separating floor to adjacent commercial premises.

Calculations have shown that proposed café activities within the venue would meet the set noise criteria during proposed operational hours, provided a noise management plan is adhered to.

Further assessment can be undertaken for proposed plant units once more details are known, in order to ensure noise emissions are also suitably controlled.

Report by
Duncan Martin MIOA

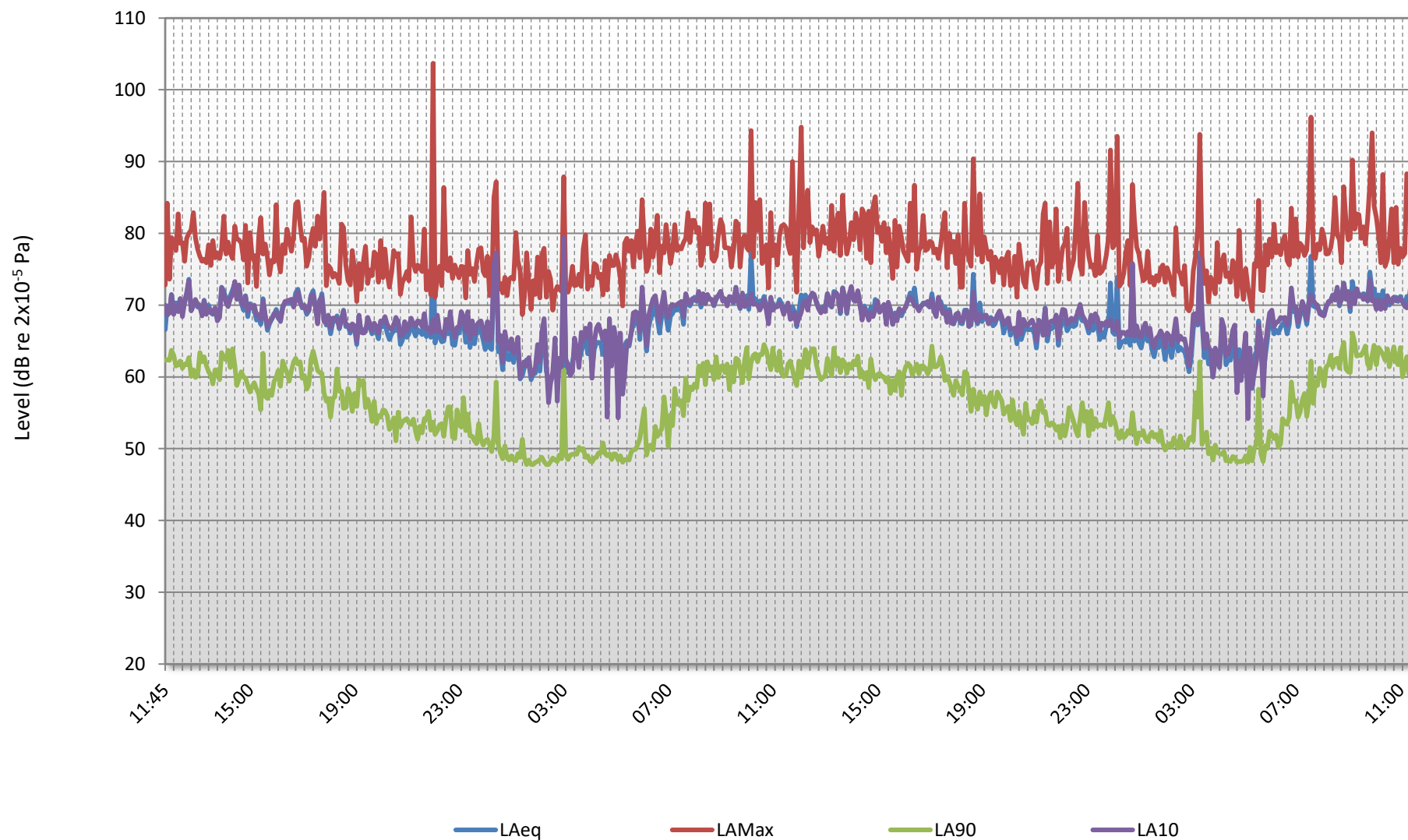
Checked by
Florian Clement MIOA



- Noise Survey Position
- Noise Sensitive Receiver

Trinity Court, 16 John Dalton Street,
Manchester

Environmental Noise Time History
26 February 2020 to 28 February 2020



GLOSSARY OF ACOUSTIC TERMINOLOGY

dB(A)

The human ear is less sensitive to low (below 125Hz) and high (above 16kHz) frequency sounds. A sound level meter duplicates the ear's variable sensitivity to sound of different frequencies. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called an A-weighting filter. Measurements of sound made with this filter are called A-weighted sound level measurements and the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq} . The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for not more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise

L_{90}

This is the level exceeded for not more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 10 such octave bands whose centre frequencies are defined in accordance with international standards.

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than one alone and 10 sources produce a 10dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Sound intensity is not perceived directly at the ear; rather it is transferred by the complex hearing mechanism to the brain where acoustic sensations can be interpreted as loudness. This makes hearing perception highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a reasonable guide to help explain increases or decreases in sound levels for many acoustic scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud
20	About 4 times as loud

Barriers

Outdoor barriers can be used to reduce environmental noises, such as traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and its construction.

Reverberation control

When sound falls on the surfaces of a room, part of its energy is absorbed and part is reflected back into the room. The amount of reflected sound defines the reverberation of a room, a characteristic that is critical for spaces of different uses as it can affect the quality of audio signals such as speech or music. Excess reverberation in a room can be controlled by the effective use of sound-absorbing treatment on the surfaces, such as fibrous ceiling boards, curtains and carpets.

APPENDIX B1

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Trinity Court, 16 John Dalton Street, Manchester

Acoustic Calculation used for Indoor to Outdoor Transmission:

$$SPL_{outdoor} = SPL_{indoor} - SRI_{composite} + 10 \log_{10} S + 10 \log \left(\frac{Q}{4\pi r^2} \right) - 6dB$$

Receiver 1: Identified Residential Window

Source: Amplified Music Levels

	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Internal Sound Pressure Level									
Predicted Source Noise Level Within Ground Floor	70	73	76	81	78	74	68	56	82
Predicted Sound Reduction of façade (open door) (SRI)	-15	-15	-15	-15	-15	-15	-15	-15	
Correction for total area of building facade (S = 12m ²)	11	11	11	11	11	11	11	11	
Correction for directivity (Q) and distance (r) (Q=4, r = 30m)	-35	-35	-35	-35	-35	-35	-35	-35	
Reduction from screening of intermediate building	-4	-7	-12	-15	-18	-18	-18	-18	
Non reverberant correction	-6	-6	-6	-6	-6	-6	-6	-6	
Sound pressure level at receiver due to music play back	21	21	19	21	15	11	0	0	21
Spectral background noise levels	51	50	49	48	45	43	32	19	50
Difference between noise emissions and background	-30	-29	-30	-27	-30	-32	-32	-19	-29

APPENDIX B2

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Trinity Court, 16 John Dalton Street, Manchester

Acoustic Calculation used for Room to Room Transmission:

$$SPL_2 = SPL_1 - R + 10 \log_{10} S - 10 \log_{10} A$$

APPENDIX B2: First Floor Office

Source: Music Playback Levels

	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Internal Measured Sound Pressure Level									
Predicted Music Source Noise Level Within Ground Floor	70	73	76	81	78	74	68	56	82
Predicted Sound Reduction of separating floor, dB (R)	-32	-40	-39	-40	-46	-40	-39	-42	
Correction for total area of floor ($S = 12m^2$)	11	11	11	11	11	11	11	11	
Correction for absorption area of receiver room ($A = 12m^2$)	-11	-11	-11	-11	-11	-11	-11	-11	
Sound pressure level at receiver	37	32	36	40	32	34	29	14	40

Design Criterion	35-40
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