SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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Randall & Aubin, 64 Bridge Street

Acoustic planning report

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Version	Date	Comments	Author	Reviewer
A	23 May 16		Jake Howarth	Mark Howarth
B	1 Jun 16	Plant noise egress section added	Jake Howarth	Mark Howarth

Summary

Sandy Brown Associates LLP (SBA) has been commissioned by Buchanan Hartley Architects Ltd to provide an acoustic planning report in relation the change of use of a ground floor unit at 64 Bridge Street, Manchester. It is proposed that the ground floor unit is converted into a restaurant.

An environmental noise survey has been carried out to determine the existing background sound levels in the area and setting appropriate plant noise limits in line with the requirements of Manchester City Council (MCC).

The noise survey was performed between 10:15 on 11 May 2016 and 11:30 on 16 May 2016 and an additional measurement was taken on 1 June 2016 between 13:45 and 14:00.

The representative background sound levels measured during the survey were $L_{A90,15min}$ 53 dB during the daytime and $L_{A90,15min}$ 57 dB at night.

Based on the requirements of Manchester City Council (MCC) and on the results of the noise survey, the relevant plant noise limits at the worst affected nearby sensitive premises have been set. Additionally, based on the existing background noise levels in the vicinity of the site and surrounding noise sensitive premises, external noise limits for operational noise egress have been set.

Benchmark acoustic testing was carried out on 26 February 2016 to establish the existing levels of sound insulation between the ground floor unit and the offices above. The measured sound insulation performance of the separating floor has been used set internal amplified noise levels for the proposed restaurant.

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1 Introduction

Sandy Brown Associates LLP (SBA) has been commissioned by Buchanan Hartley Architects Ltd to provide an acoustic planning report in relation to the proposed development at 64 Bridge Street, Manchester.

An environmental noise survey has been carried out at the site, the purpose of which was to establish the existing background noise levels in the vicinity of nearby noise sensitive premises. The background noise levels measured enable appropriate limits to be set regarding noise emission from proposed building services plant and amplified noise egress limits. These limits are to be set in accordance with the requirements of Manchester City Council (MCC).

Benchmark acoustic testing has been carried out in order to establish the existing levels of sound insulation between the proposed restaurant and the offices located directly above.

This report presents the survey method, results of the environmental noise survey, results from the acoustic testing and a discussion of acceptable limits for noise emission from building services plant and amplified sound.

2 Site description

2.1 The site and its surrounding

The proposed restaurant is located in a ground floor unit at 64 Bridge Street, Manchester. Wood Street runs along the south side of the building and Deansgate is located approximately 55 metres to the east.

The unit is currently a furniture shop and the other occupants of the building are mainly office premises.

The building in which the unit is located is highlighted in red in Figure 1 along with the nearest noise sensitive premises, highlighted in green.



Figure 1 Site map (courtesy of Google Earth Pro)

2.2 Adjacent premises

The adjacent premises are understood to be mainly commercial and office premises, with the nearest residential premises located at least 250 metres away on Left Bank. Due to the distance of the nearest residential premises, noise egress levels at this premises have not been set.

Therefore, the nearest noise sensitive premises are highlighted in green in Figure 1 and considered to be the following:

- The offices premises located in 62 Bridge Street, which overlook an existing light well
- The offices in 79-89 Bridge Street.
- The John Rylands Library located on Wood Street

Note that the above premises are both office premises and assuming standard working hours for conventional offices; it is assumed that the above premises are only noise sensitive during day time hours during the week.

3 Method

Details of the equipment used, the noise indices and the weather conditions during the survey are provided in Appendix A. Further information on the specific survey method is provided in this section.

3.1 Unattended measurements

Unattended noise monitoring was undertaken at the site over 5 days to determine the existing background sound levels in the vicinity of nearby noise sensitive premises.

The unattended measurements were performed over 15 minute periods between 10:15 on 11 May 2015 and 11:30 on 16 May 2016. The equipment was installed and collected by Jake Howarth.

The measurement position used during the survey is indicated in Figure 1, denoted by the letter 'L'. A photograph showing the measurement location is provided Figure 2. This location was considered to be reasonably representative of the nearest noise sensitive premises.



Figure 2 Photograph showing location of unattended measurement position 'L'

3.2 Attended measurements

Attended sample measurements, synchronised with the unattended measurement position, were performed by Jake Howarth at 2 locations around the building. These are indicated in Figure 1 as positions 1 and 2. The attended measurements were carried out on 16 May 2016, over 15 minute periods, with the purpose of determining the existing noise levels from road traffic, pedestrians and other significant noise sources in the area.

Photographs showing the locations of the measurements are indicated in Figure 3.



Figure 3 Photographs showing attended measurement locations – position 1 (left) and position 2 (right)

An additional measurement was carried out by Jake Howarth on 1 June 2016 between 13:45 and 14:00 on Wood Street in order to establish the background noise level in the vicinity of The John Rylands Library. This measurement position is indicated in Figure 1 as position 3. A photograph showing the measurement location is provided in Figure 4.

For each attended measurement the microphone was mounted on a tripod approximately 1.5 m above the ground level and 0.5 m from the building facade.



Figure 4 Photograph showing attended measurement location 3

4 Measurement results

4.1 Observations

The dominant noise sources observed at the site during the survey consisted of traffic noise from Bridge Street which included the passing of busses and HGVs, vehicles passing over loose manhole covers/drains were noted as causing the maximum levels measured.

Less significant noise sources included existing plant noise, passing pedestrians and occasional activity noise from nearby commercial and office premises.

Existing plant close to position 2 was not operational during the survey.

4.2 Unattended measurement results

The results of the unattended noise measurements are summarised in the following tables, all values are considered to be free field measurements. A graph showing the results of the unattended measurements is provided in Appendix B.

The day and night time ambient noise levels measured during the unattended survey are presented in Table 1.

Table 1 Ambient noise levels measured during the survey

Date	Daytime (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Wednesday 11 May 2016	63[1]	59
Thursday 12 May 2016	64	60
Friday 13 May 2016	64	62
Saturday 14 May 2016	63	62
Sunday 15 May 2016	61	59
Monday 16 May 2016	64[1]	-
Average	63	60

[1]Measurement not made over full period due to monitoring start and end time (the measurement on 11 May 16 was over 13 hours, and on 16 May 16 over 4 hours); not included in the average

The minimum background sound levels measured during the unattended survey are given in Table 2.

Table 2 Minimum background sound levels measured during the survey

Date	Daytime (07:00 – 23:00) $L_{A90,15min}$ (dB)	Night (23:00 – 07:00) $L_{A90,15min}$ (dB)
Wednesday 11 May 2016	54[1]	45
Thursday 12 May 2016	53	45
Friday 13 May 2016	55	45
Saturday 14 May 2016	48	44
Sunday 15 May 2016	48	44
Monday 16 May 2016	54[1]	-

[1]Measurement not made over full period due to monitoring start and end time

The lowest background sound levels measured during the survey were $L_{A90,15min}$ 48 dB during the daytime and $L_{A90,15min}$ 44 dB at night.

The octave band sound pressure levels corresponding to the minimum background L_{A90} (dB) levels measured are provided in Table 3.

Table 3 Minimum octave band background noise level measured in position 'L'

	Octave band centre frequency (Hz) Minimum sound pressure level, $L_{90,15min}$ (dB)						
	63	125	250	500	1000	2000	4000
Daytime (07:00-23:00)	50	51	47	46	42	37	29
Night (23:00-07:00)	48	48	45	41	38	33	26

In line with BS 4142:2014, for the purpose of analysis and establishing representative background sound levels, day and night time typical levels have been quantified using statistical analysis from the continuous logging measurements.

Daytime and night time statistical analysis of representative values for the site are given in Figure 5 and Figure 6.

From this analysis, the representative background sound levels measured at location *'L'* during the survey were $L_{A90,15min}$ 57 dB during the daytime and $L_{A90,15min}$ 53 dB at night. These levels will be corrected in order to calculate the representative background noise levels at each noise sensitive premises in section 4.3.1.

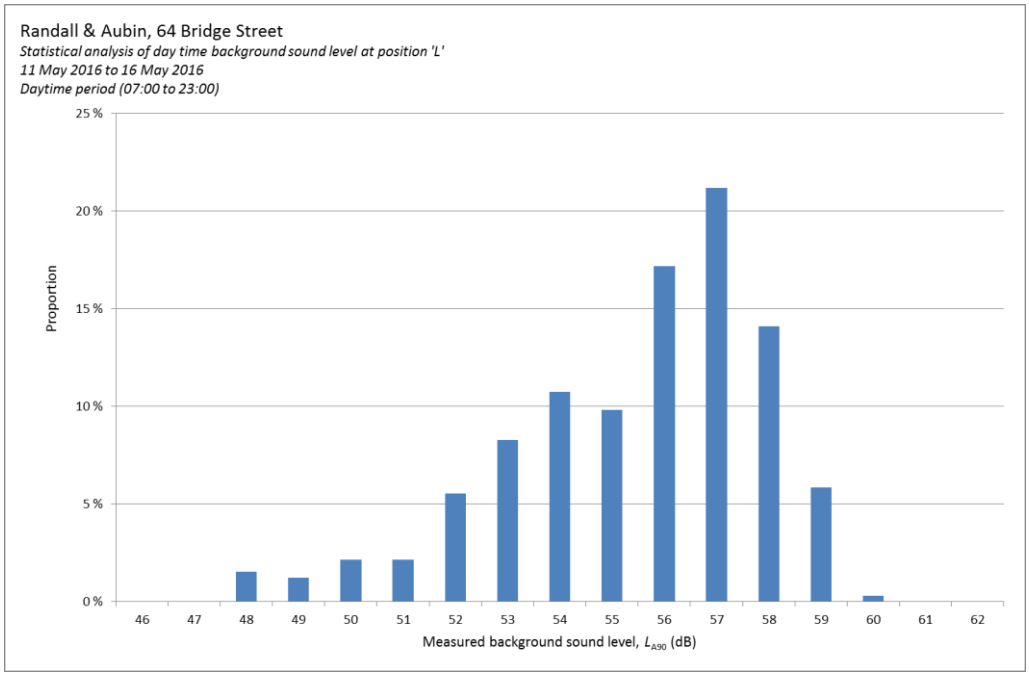


Figure 5 Daytime statistical analysis of measured background noise levels

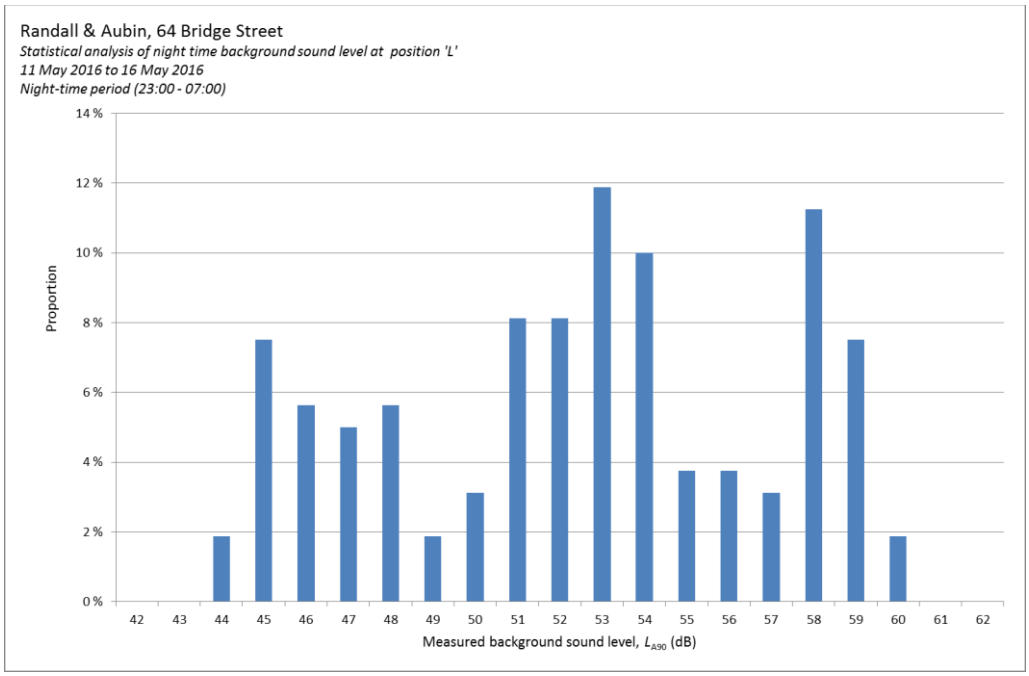


Figure 6 Night-time statistical analysis of measured background noise levels

4.3 Attended measurement results

The sound pressure levels recorded during the synchronised attended measurements are summarised in Table 4. The dominant noise sources noted during the measurements are also described in Table 4. All the attended measurements were performed over 15 minute periods and are considered to be facade sound pressure levels.

The octave band sound pressure levels corresponding to the measured background noise level in each position are given in Table 5.

Table 4 Sound pressure levels from attended measurements

Pos	Date	Start time	Sound pressure levels (dB)			Noise sources
			$L_{Aeq,15min}$	$L_{AFmax,15min}$	$L_{A90,15min}$	
1	16 May 16	11:00	71	90	60	Traffic passing on Bridge street (including busses and HVGs), maximum noise levels produced by vehicles passing over lose manhole/drain covers
2	16 May 16	11:30	48	68	46	Faint traffic noise from Bridge Street, occasional and dryer from office WC, faint plant noise
3	01 Jun 16	13:45	60	79	57	Existing plant noise, Traffic passing on Deansgate, occasional pedestrians passing, cars passing on Wood Street

Table 5 Octave band background sound pressure levels

Position	Octave band centre frequency (Hz), Measured background sound pressure levels, L_{90} (dB)						
	63	125	250	500	1000	2000	4000
1	69	64	58	56	55	52	44
2	54	51	45	44	40	33	23
3	63	63	57	56	52	47	40

4.3.1 Corrected background noise levels

In order to establish the representative daytime background noise levels in the vicinity of each noise sensitive premises, as discussed above, sample measurements synchronised with the unattended measurement location were performed.

The synchronised measurement carried out at position 1, which is considered to be representative of the office overlooking Bridge Street, has been corrected for the results of the unattended measurement position. The corrected daytime representative background noise level at the offices overlooking Bridge Street is $L_{Aeq,16hr}$ 60 dB.

The synchronised measurement carried out within the light well, position 2, has been corrected for the results of the unattended measurement position in order to establish a representative background noise level at this position. The corrected representative daytime background noise level within the light well is $L_{Aeq,16hr}$ 47 dB.

5 Acoustic testing

Benchmark acoustic testing was carried out between the existing ground floor unit and the offices to the front, overlooking Bridge Street, and back, overlooking Wood Street, of 64 Bridge on 18 February 2016.

In addition to sound insulation tests, the existing internal noise levels within the two offices above were measured and the results are detailed in Table 6.

Table 6 Measured internal noise levels within the existing office spaces

	Octave band centre frequency (Hz), Measured internal ambient noise level, L_{eq} (dB)							
Location	63	125	250	500	1000	2000	4000	L_{Aeq} (dB)
Offices in 64 Bridge Street – Overlooking Bridge Street	50	43	41	39	38	34	30	42
Offices in 64 Bridge Street – Overlooking Wood Street	46	40	36	34	33	30	21	38

The airborne sound insulation performances of floors separating the ground floor unit and the offices to the front and back of 64 Bridge Street were measured. In each case, the source room was the ground floor retail unit and the receiving rooms were in the offices above. The sound insulation performances measured are detailed in Table 7.

Table 7 Measured sound insulation performances between ground floor unit and offices above

Location	Airborne sound insulation, $D_{nT,w}$ (dB)
Location 1 – Offices in 64 Bridge Street – Overlooking Bridge Street	51[1]
Location 2 – Offices in 64 Bridge Street – Overlooking Wood Street	54[1]

[1]Measured airborne sound insulation limited by background noise in the receiving room

6 MMC response to initial application

It is understood that MMC have requested further information in relation to the planning application for the proposed restaurant. MCC have requested the following in a response to the original application dated 5 April 2016:

'An acoustic study identifying ambient noise levels during daytime, night time and weekends along with an indication of noise levels that you propose to achieve within the accommodation and details of the acoustic glazing and acoustically treated ventilation you propose to use.'

'…the study should identify the acoustic treatment and measures that will limit the breakout of noise in accordance with a noise study of the premises. The scheme proposed shall include measures such as acoustic lobbies at access and egress points of the premises, acoustic treatment of the building structure, sound limiters linked to sound amplification equipment, and specified maximum internal noise levels.'

It is understood that the above refers to amplified noise egress from the proposed restaurant to the nearest noise sensitive premises.

The response letter also states that:

'Full details of method of fume extraction and ventilation measures including details of the location of equipment, the appearance of equipment, noise levels that may be generated from such equipment, acoustic attenuation measures for such equipment to reduce their noise output and any odours/fumes that may be emitted.'

7 Assessment criteria

7.1 Plant noise egress

Manchester City Council (MCC) Planning and Noise technical Guide dated December 2015 gives following criteria in regards to plant noise emissions:

'Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location.'

7.2 Amplified sound egress

It is understood that it is proposed to have amplified sound inside the proposed restaurant. It is recommended that the overall noise egress levels from amplified sound associated with the unit is limited to be no higher than 10 dB below the existing background levels in octave bands outside the nearest noise sensitive premises.

7.3 Amplified sound transfer

In order minimise the risk of disturbance to occupants in the office spaces above recommended levels of noise transfer between the restaurant and t the offices are at least 10 dB below the internal noise levels given in Table 6.

8 Plant noise limits

8.1 Criteria

Based on the above criteria and the measurement results, the cumulative noise level resulting from the operation of all new plant at 1 m from the most affected windows of the nearest noise sensitive premises should not exceed 5 dB below the minimum external noise level in octave bands. These limits are set out below.

Table 8 Plant noise egress limits at the nearest noise sensitive premises

Location	Daytime (07:00-23:00)	Night-time (23:00-07:00)
62 Bridge Street	42	N/A
The John Rylands Library	52	N/A
79-89 Bridge St	55	N/A

These limits have been set on that basis that the propose plant items do not include any attention catching features. The penalties for attention catching features may be significant, and will need to be considered as the building services design progresses. This is discussed further in Section 8.2.

8.2 Attention catching features

If the proposed plant noise contains attention catching features (such as tonal elements, whines, whistles, bangs etc), the plant should be designed to achieve a limit below those set out above, based on the type and impact of the features.

If appropriate, a subjective assessment of the plant features can be adopted. Where the plant noise contains tonal elements, the following corrections can be made depending on how perceptible the tone is at the noise receptor:

- 0 dB where the tone is not perceptible
- 2 dB where the tone is just perceptible
- 4 dB where the tone is clearly perceptible
- 6 dB where the tone is highly perceptible

Where the plant noise is impulsive, the following corrections can be made depending on how perceptible the impulsivity is at the noise receptor:

- 0 dB where the impulse is not perceptible
- 3 dB where the impulse is just perceptible
- 6 dB where the impulse is clearly perceptible
- 9 dB where the impulse is highly perceptible

For noise which is equally both impulsive and tonal, then both features can be taken into account by linearly summing the corrections for both characteristics.

If the plant has other distinctive characteristics, such as intermittency, then a 3 dB correction can be made.

If a subjective assessment is not appropriate then an objective assessment can be made. A noise source is deemed to be tonal if the time averaged sound pressure level in a one-third octave band exceeds the level in adjacent one-third octave bands by the level differences given below:

- 15 dB in the low frequency one-third octave bands (25 Hz to 125 Hz)
- 8 dB in the mid frequency one-third octave bands (160 Hz to 400 Hz)
- 5 dB in the high frequency one-third octave bands (500 Hz to 10000 Hz)

If an objective assessment identifies the plant noise to be tonal then a 6 dB correction must be made.

8.3 Assessment

8.3.1 Operational times

It is unclear as to the specific operational times of the proposed plant items. However, as the nearest noise sensitive premises are office/commercial spaces. Only the day-time plant noise egress levels have been calculated as it is assumed the nearby premises will be vacant during night time hours.

8.3.2 Proposed units

It is understood that the proposed plant items are those detailed in Table 9 and Table 10. The locations of the proposed units are shown in Appendix C.

Table 9 Proposed plant items

	Octave-band centre frequency (Hz)						
	63	125	250	500	1000	2000	4000
KEF – systemair MUB/T 062 560EC POTI, L_w (dB)	90	82	79	75	71	67	62
SF – Systemair MUB 062 560EC POTI MULTIBOX	81	88	86	79	72	69	64
TEF – Systemair K 200 L SILEO, L_w (dB)	76	78	69	66	62	59	53

Table 10 proposed rooftop condensing units

Plant item	Sound power level, L_{wA} (dB)
CU 1 – 4 -Daikin AZQS125B8V1	70

8.3.3 Proposed attenuators

It is understood that the following attenuator is proposed to the atmosphere side of units KEF and SF. The locations of the attenuators are shown on the services drawings included in Appendix C.

Table 11 Octave band insertion loss for proposed attenuators

	Octave-band centre frequency (Hz)						
	63	125	250	500	1000	2000	4000
ATT 1-4 - Insertion loss (dB)	9	12	20	30	37	32	27

8.3.4 Calculated noise egress levels

The based on the proposed plant items and attention measures, the plant noise egress levels at the nearest noise sensitive receivers are given below.

Table 12 calculated noise egress levels

Location	Calculation plant noise egress level, L_{Aeq} (dB)
62 Bridge Street	58
The John Rylands Library	44
79-89 Bridge St[1]	23

8.3.5 Possible mitigation measures

It can be seen from Table 12 that the noise egress level within the light well are expected to be 16 dBA higher than the noise egress limits. This is due to the external condensing units. In order to achieve the noise egress limit in this area, an enclosure could be fitted to the condensing units which should have a minimum sound reduction index of R_w 20 dB.

Example suppliers of suitable acoustic enclosures are:

- Environ - www.environ.co.uk
- Sound planning - www.soundplanning.co.uk

The noise levels at all other noise sensitive receptors are likely to be in-line with the noise egress limits set out in Table 8.

9 Amplified sound limits

9.1 Noise egress limits

Based on the criteria set out in section 7.2 and the measurements results, the cumulative noise level resulting from amplified sound egress at 1 m from the most affected windows of the nearest noise sensitive premises should not exceed 10 dB below the existing background (L_{A90}).

The nearby retail units and offices are considered to be noise sensitive during the daytime. It is understood that the nearby office premises are traditional working spaces, and it is assumed that they will be occupied from 07:00 to 19:00 hours during the week. Therefore no noise egress limits have been set for the night-time period.

Based on the above, the amplified sound noise egress limits are set out in Table 13.

Table 13 Daytime maximum amplified sound egress limits

Location	Octave band centre frequency (Hz), Daytime (07:00-23:00) amplified noise egress limits at nearest noise sensitive premises, L_{eq} (dB)						
	63	125	250	500	1000	2000	4000
62 Bridge St[1]	44	41	35	34	30	23	13
The John Rylands Library	63	63	57	56	52	47	40
79-89 Bridge St	40	41	37	36	32	27	19

[1]Amplified noise egress levels calculated from octave band background sound pressure levels measured at position 2
[2]Amplified noise egress levels calculated from octave band background sound pressure levels measured at position 3
[3]Amplified noise egress levels calculated from octave band background sound pressure levels measured at position 'L'

9.2 Noise transfer limits to offices above

The risk of amplified sound within the ground floor restaurant causing disturbance to occupants of the first floor offices above depends on the sound insulation provided by the separating floor, the noise level in the ground floor units and the internal ambient noise in the offices.

The sound insulation performance of the separating floor and the internal ambient noise level in the office spaces were measured during the testing carried out at the site.

Therefore, in order minimise the risk of disturbance to occupants in the office spaces above recommended levels of noise transfer between the restaurant and t the offices are at least 10 dB below the internal noise levels given in Table 6.

9.3 Internal amplified noise limits

Based on the existing levels of sound insulation between the proposed restaurant and the offices above, the most onerous amplified sound limit is that to the offices rather than noise egress to adjacent premises.

Therefore, in order minimise the risk of disturbance to occupants in the office spaces above recommended internal noise limits, due to amplified sound, within the proposed restaurant are provided in Table 14.

Table 14 Internal amplified noise limits

	Octave band centre frequency (Hz)						
	63	125	250	500	1000	2000	4000
Maximum internal noise limits (daytime), L_{eq} (dB)	63	66	74	79	76	72	70

These limits would typically be suitable for restaurants with low level background music. However, these limits would not be suitable for high levels of amplified music (eg DJs or live music).

9.4 Assessment

Based on the internal noise limits set out in Table 14 being achieved internally a minimum glazing performance of $R_w + C_{tr}$ 28 dB, will also control amplified noise egress to the nearby noise sensitive premises highlighted in Figure 1 with all external doors and windows closed.

The internal noise limits due to operational noise would typically be suitable for a restaurant, with low background music. However, the limits would not be suitable for high levels of amplified sound (eg, DJs or live music).

If higher noise levels than those given in Table 14 are required the sound insulation performance of the separating floor between restaurant and offices above will need to be increased and an enhanced glazing configuration will be need to the increased to ensure that:

- Noise transfer from the lower floor units to the first floor offices and/or second floor offices, is limited to sound pressure levels (L_{eq}) at least 10 dB below internal ambient noise levels in octave bands
- External noise egress from the restaurant meet the external noise limits set out in Table 13.

10 Conclusion

A noise survey has been carried out to determine the existing background noise levels in the vicinity of the proposed restaurant and surrounding noise sensitive premises. On the basis of the requirements of MCC, the relevant plant noise limits at the worst affected nearby sensitive premises have been set.

A noise egress assessment has been carried out in order to calculate the levels of noise egress from the proposed plant items. The results of this assessment indicate that the noise egress limit at the offices overlooking the light well is likely to be exceeded. As such, minimum requirements for acoustic enclosures for the external condensing units have been given in order to reduce the likely hood of the noise egress level being exceeded.

The plant noise egress levels at the remaining noise sensitive receivers are likely to be met under the current proposals.

Additionally, based on the existing background noise levels in the vicinity of the site and surrounding noise sensitive premises, external noise limits for operational noise egress have been set.

An assessment of noise transfer from the proposed restaurant to the offices above has been carried out. Internal noise limits for operational noise in the proposed restaurant have been set, and are based upon the measured sound insulation performance of separating floor and upon achieving at least 10 dB below the internal noise level in octave bands for the adjacent space. These limits are relatively stringent, and would only allow restaurant (with low background music). They would not be suitable for high levels of amplified sound (eg, DJs or live music).

Based on these internal noise limits, an amplified noise egress assessment has been carried out. The results of which indicate that standard thermal double glazing, achieving a sound insulation performance of $R_w + C_{tr}$ 28 dB, is likely to control amplified noise egress to the nearest noise sensitive premises when all windows and doors are closed.

Where higher noise levels are required enhancements to the sound insulation performance between the units and to the facade will be required.

Appendix A

Survey details

Equipment

A Rion NL-52 sound level meter was used to undertake the unattended measurements. The attended measurements, carried out on 16 May 2016, and the benchmark testing were carried out using a Norsonic 118 sound level meter. The measurement carried out on 1 June 2016 was carried out with a Rion NL-52 sound level meter. The calibration details for the equipment used during the survey are provided in Table A1.

Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification number
Sound level meter	NL-52/00932326	Rion	24 Feb 17	1502114
Microphone	UC-59/035549	Rion	24 Feb 17	1502114
Pre-amp	NH-25/32354	Rion	24 Feb 17	1502114
Calibrator	NC-74/34125432	Rion	24 Feb 17	1502110
Sound level meter	Nor118/31754	Norsonic	2 Mar 17	08241
Microphone	40AF/62396	Gras	2 Mar 17	08241
Pre-amp	1206/30873	Norsonic	2 Mar 17	08241
Calibrator	1251/31322	Norsonic	20 Feb 17	08208
Sound level meter	NL-52/01143564	Rion	5 May 18	1605230
Microphone	UC-59/08880	Rion	5 May 18	1605230
Pre-amp	NH-25/43581	Rion	5 May 18	1605230
Calibrator	NC-74/34257023	Rion	5 May 18	1605221

Calibration of the sound level meters used for the tests is traceable to national standards. The calibration certificates for the sound level meters used in this survey are available upon request.

The sound level meters and microphones were calibrated at the beginning and end of the measurements using their respective sound level calibrators. No significant deviation in calibration occurred.

Noise indices

The equipment was set to record a continuous series of broadband sound pressure levels. Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{AFmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period with a fast time weighting.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

The L_{A90} is considered most representative of the background sound level for the purposes of complying with any local authority requirements.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg L_{A90}) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures.*

Weather conditions

During the attended measurements carried out on 16 May 2016, the weather was generally clear and dry and no rain occurred. Wind speeds were low and did not affect measurements.

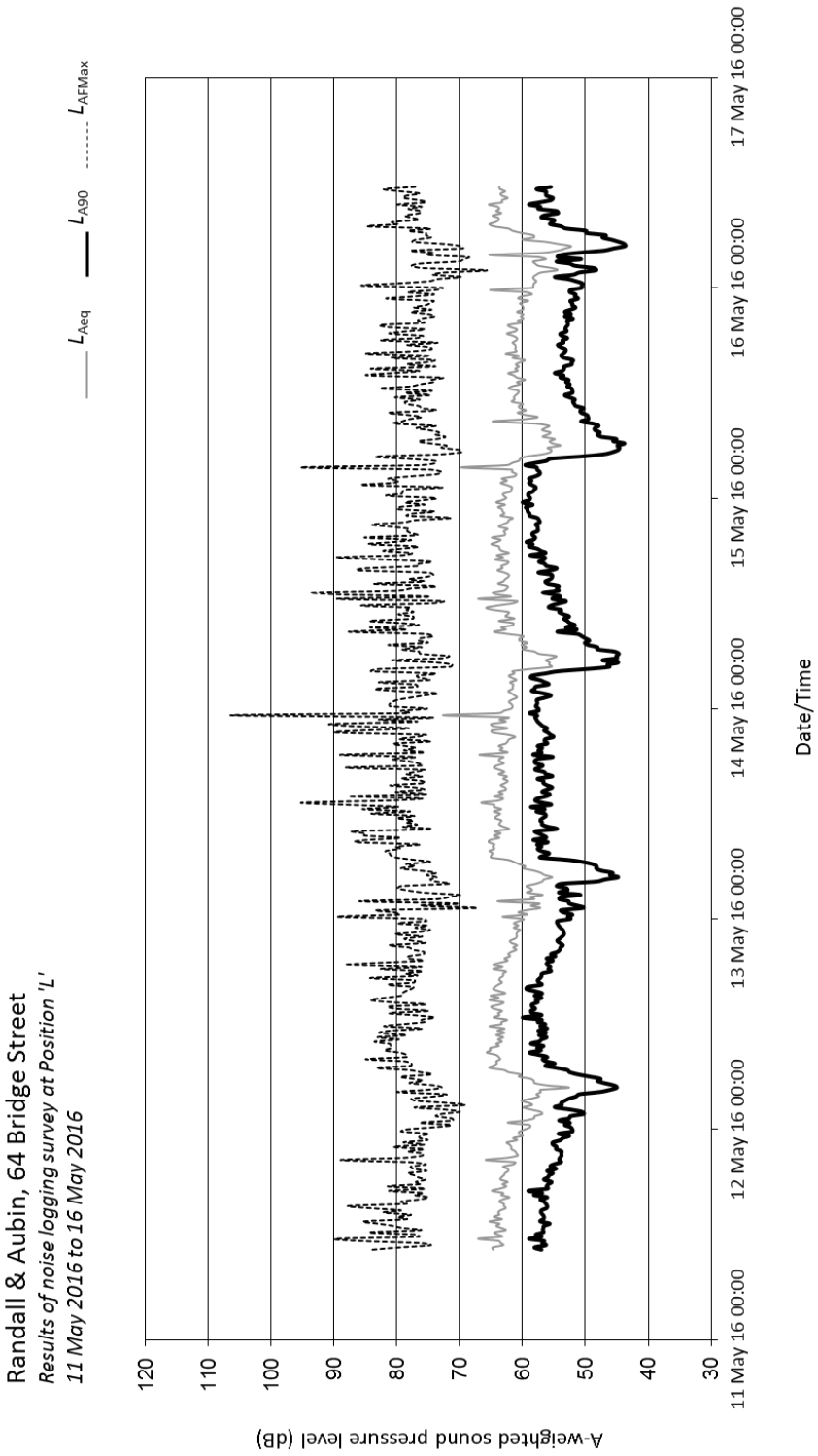
During the attended measurements carried out on 1 June 2016, the weather was clear and dry and no rain occurred. Wind speeds were low and did not affect measurements.

During the unattended noise measurements between 11 May 2016 and 16 May 2016, weather reports for the area indicated that temperatures varied between 2°C at night and 22°C during the day, and the wind speed was less than 9 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

Results of unattended measurements at Location *'L'*


Randall & Aubin, 64 Bridge Street
Results of noise logging survey at Position 'L'
11 May 2016 to 16 May 2016
L_{Aeq}
L_{A90}
L_{AFMax}
A-weighted sound pressure level (dB)
120
110
100
90
80
70
60
50
40
30
11 May 16 00:00
12 May 16 00:00
13 May 16 00:00
14 May 16 00:00
15 May 16 00:00
16 May 16 00:00
17 May 16 00:00
Date/Time

Appendix C

MEP drawings showing location of proposed plant

Ref	Make	Model	Location	Type	Electrical Requirement	Dimensions	Weight	Sound	Comments
Air Conditioning									
CU1	Daikin	AZQS125B8V1	Flat Roof	Condensing Unit	1ph 32A	990(h)x940(w)x320(d)	75kg	54dBA	See AC1 datasheet
CU2	Daikin	AZQS125B8V1	Flat Roof	Condensing Unit	1ph 32A	990(h)x940(w)x320(d)	75kg	54dBA	See AC1 datasheet
CU3	Daikin	AZQS125B8V1	Flat Roof	Condensing Unit	1ph 32A	990(h)x940(w)x320(d)	75kg	54dBA	See AC1 datasheet
CU4	Daikin	AZQS125B8V1	Flat Roof	Condensing Unit	1ph 32A	990(h)x940(w)x320(d)	75kg	54dBA	See AC1 datasheet
Kitchen Extract System									
KEF	Systemair	MUB/T 062 560EC	Restaurant	Kitchen Extract Fan	3ph 3.3A	800(h)x800(w)x800(d)	95.8kg	52dBA	See KEF datasheet. C/W:- • MTP10 Speed Controller • MUB/062 Inlet & Outlet Silencers (See ATT Data Sheet) • FGV/716-716 Flex Connection (See MUBFLEX Data Sheet) • Anti vibration mounts. See MUBVIB data sheet
ATT3	Systemair	MUB SIL 062	Restaurant	Attenuator	N/A	718(h)x718(w)x1200(l)	57Kg	N/A	See ATT datasheet
ATT4	Systemair	MUB SIL 062	Restaurant	Attenuator	N/A	718(h)x718(w)x1200(l)	57Kg	N/A	See ATT datasheet

NB: Condensing units are powder coated in a blend consisting of 50% RAL 7032 and 50% RAL 7044

Ref	Make	Model	Location	Type	Electrical Requirement	Dimensions	Weight	Sound	Comments
Fresh Air Supply									
SF1	Systemair	MUB 062 560EC	Restaurant	Fresh Air Supply	3ph 3.05A	800(h)x800(w)x800(d)	85.4kg	57dBA	See SF1 datasheet. C/W: • MTP10 Speed Controller • MUB 062 Inlet & Outlet Silencers (See ATT Data Sheet) • FGV/716-716 Flex Connection (See MUBFLEX Data Sheet) • Anti vibration mounts. See MUBVIB data sheet
ATT1	Systemair	MUB SIL 062	Restaurant	Attenuator	N/A	718(h)x718(w)x1200(l)	57Kg	N/A	See ATT datasheet
ATT2	Systemair	MUB SIL 062	Restaurant	Attenuator	N/A	718(h)x718(w)x1200(l)	57Kg	N/A	See ATT datasheet
Toilet Extract System									
TEF	Systemair	K200L Sileo	Restaurant	Toilet Extract Fan	1ph 0.631A	718(h)x718(w)x1200(l)	57Kg	N/A	See TEF datasheet
Odour Control									
OZ1	Plasma Clean	Xtract 2100	Kitchen	Odour Control	1ph 5A	307(h)x343(w)x185(d)	12Kg	N/A	To be interlocked with kitchen extract. See OZ1 data sheet
OZ2	Plasma Clean	Xtract 2100	Kitchen	Odour Control	1ph 5A	307(h)x343(w)x185(d)	12Kg	N/A	To be interlocked with kitchen extract. See OZ1 datasheet



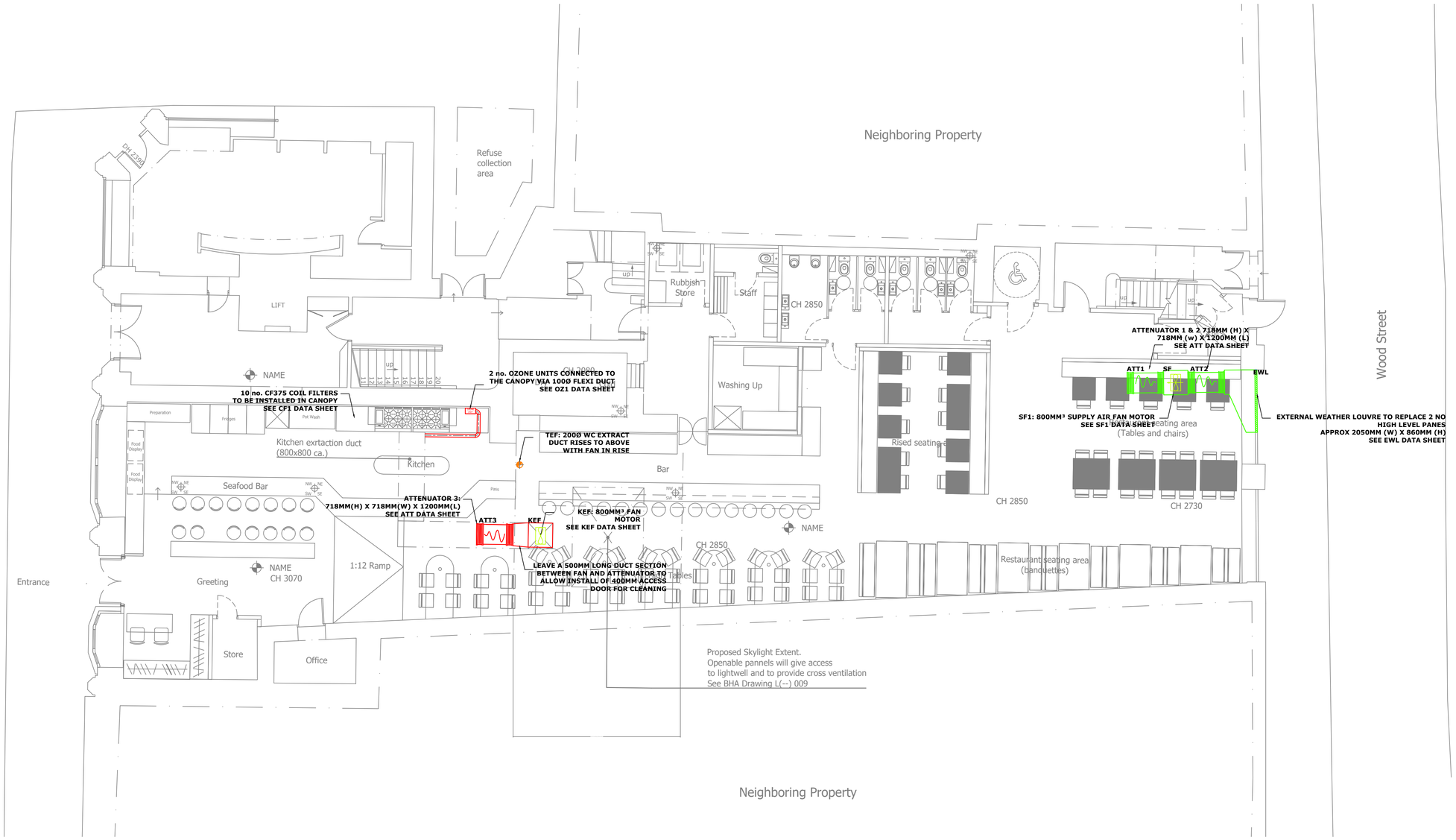
Image of AZQS125B8V1 Condensing unit powder coated in consisting of 50% RAL 7032 and 50% RAL 7044

NOT TO SCALE

NOTES :

ALL SETTING OUT MUST BE CHECKED ON SITE
ALL LEVELS MUST BE CHECKED ON SITE
ALL FIXINGS AND WEATHERINGS MUST BE CHECKED ON SITE
ALL DIMENSIONS MUST BE CHECKED ON SITE
THIS DRAWING MUST BE READ IN CONJUNCTION WITH THE RELEVANT

EXTRACT.
FRESH AIR DUCT.
KITCHEN EXTRACT DUCT.
EXTRACT DUCT.



revision	date	notes

PCPM refrigeration and air conditioning

Client
Randall and Aubin

Location
64 Bridge Street
Manchester
M3 3BN

Drawing
Proposed Air Conditioning and Ventilation Layout Ground Floor

Date
13/05/2016

Scale @ A1 = 1:75

Drawing No.
RA/Manchester/01

Rev.
-

Ref	Make	Model	Location	Type	Electrical Requirement	Dimensions	Weight	Sound	Comments
Air Conditioning									
CU1	Daikin	AZQS125B8V1	Flat Roof	Condensing Unit	1ph 32A	990(h)x940(w)x320(d)	75kg	54dBA	See AC1 datasheet
CU2	Daikin	AZQS125B8V1	Flat Roof	Condensing Unit	1ph 32A	990(h)x940(w)x320(d)	75kg	54dBA	See AC1 datasheet
CU3	**Daikin**	AZQS125B8V1	**Flat Roof**	**Condensing Unit**	**1ph 32A**	**990(h)x940(w)x320(d)**	75kg	54dBA	See AC1 datasheet
CU4	Daikin	AZQS125B8V1	Flat Roof	Condensing Unit	1ph 32A	990(h)x940(w)x320(d)	75kg	54dBA	See AC1 datasheet
Kitchen Extract System									
KEF	Systemair	MUB/T 062 560EC	Restaurant	Kitchen Extract Fan	3ph 3.3A	800(h)x800(w)x800(d)	95.8kg	52dBA	See KEF datasheet. C/W • MTP10 Speed Controller • MUB 062 Inlet & Outlet Silencers (See ATT Data Sheet) • FGV/716-716 Flex Connection (See MUBFLEX Data Sheet) • Anti vibration mounts. See MUBVIB data sheet
ATT3	Systemair	MUB SIL 062	Restaurant	Attenuator	N/A	718(h)x718(w)x1200(l)	57Kg	N/A	See ATT datasheet
ATT4	Systemair	MUB SIL 062	Restaurant	Attenuator	N/A	718(h)x718(w)x1200(l)	57Kg	N/A	See ATT datasheet

NB: Condensing units are powder coated in a blend consisting of 50% RAL 7032 and 50% RAL 7044

Ref	Make	Model	Location	Type	Electrical Requirement	Dimensions	Weight	Sound	Comments
Fresh Air Supply									
SF1	Systemair	MUB 062 560EC	Restaurant	Fresh Air Supply	3ph 3.05A	800(h)x800(w)x800(d)	85.4kg	57dBA	See SF1 datasheet. C/W • MTP10 Speed Controller • MUB 062 Inlet & Outlet Silencers (See ATT Data Sheet) • FGV/716-716 Flex Connection (See MUBFLEX Data Sheet) • Anti vibration mounts. See MUBVIB data sheet
ATT1	Systemair	MUB SIL 062	Restaurant	Attenuator	N/A	718(h)x718(w)x1200(l)	57Kg	N/A	See ATT datasheet
ATT2	Systemair	MUB SIL 062	Restaurant	Attenuator	N/A	718(h)x718(w)x1200(l)	57Kg	N/A	See ATT datasheet
Toilet Extract System									
TEF	Systemair	K200L Sileo	Restaurant	Toilet Extract Fan	1ph 0.631A	718(h)x718(w)x1200(l)	57Kg	N/A	See TEF datasheet
Odour Control									
OZ1	Plasma Clean	Xtract 2100	Kitchen	Odour Control	1ph 5A	307(h)x343(w)x185(d)	12Kg	N/A	To be interlocked with kitchen extract. See OZ1 data sheet
OZ2	Plasma Clean	Xtract 2100	Kitchen	Odour Control	1ph 5A	307(h)x343(w)x185(d)	12Kg	N/A	To be interlocked with kitchen extract. See OZ1 datasheet

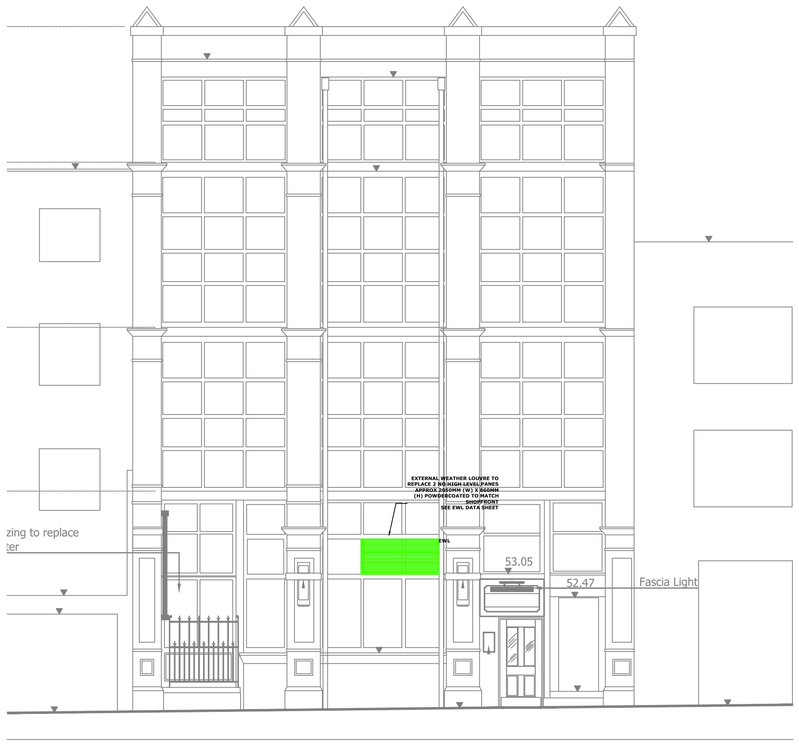


Image of AZQS125B8V1 Condensing unit powder coated in a blc
consisting of 50% RAL 7032 and 50% RAL 7044

NOT TO SCALE

NOTES :

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Photograph of rear elevation and proposed section of window to be replaced with EWL

revision note notes

PCPM refrigeration and air conditioning

Client
Randall and Aubin

Location
64 Bridge Street
Manchester
M3 3BN

Drawing
Proposed Air Conditioning
and Ventilation Layout
Rear Elevation

Date
13/05/2016

Scale @ A1 = 1:75

Drawing No.
RA/Manchester/02

Rev.
-

Ref	Make	Model	Location	Type	Electrical Requirement	Dimensions	Weight	Sound	Comments
Air Conditioning									
CU1	Daikin	AZQS125B8V1	Flat Roof	Condensing Unit	1ph 32A	990(h)x940(w)x320(d)	75kg	54dBA	See AC1 datasheet
CU2	Daikin	AZQS125B8V1	Flat Roof	Condensing Unit	1ph 32A	990(h)x940(w)x320(d)	75kg	54dBA	See AC1 datasheet
CU3	**Daikin**	AZQS125B8V1	**Flat Roof**	**Condensing Unit**	**1ph 32A**	**990(h)x940(w)x320(d)**	75kg	54dBA	See AC1 datasheet
CU4	Daikin	AZQS125B8V1	Flat Roof	Condensing Unit	1ph 32A	990(h)x940(w)x320(d)	75kg	54dBA	See AC1 datasheet
Kitchen Extract System									
KEF	Systemair	MUB/T 062 560EC	Restaurant	Kitchen Extract Fan	3ph 3.3A	800(h)x800(w)x800(d)	95.8kg	52dBA	See KEF datasheet. C/W: • MTP10 Speed Controller • MUB 062 Inlet & Outlet Silencers (See ATT Data Sheet) • FGV/716-716 Flex Connection (See MUBFLEX Data Sheet) • Anti vibration mounts. See MUBVIB data sheet
ATT3	Systemair	MUB SIL 062	Restaurant	Attenuator	N/A	718(h)x718(w)x1200(l)	57Kg	N/A	See ATT datasheet
ATT4	Systemair	MUB SIL 062	Restaurant	Attenuator	N/A	718(h)x718(w)x1200(l)	57Kg	N/A	See ATT datasheet

NB: Condensing units are powder coated in a blend consisting of 50% RAL 7032 and 50% RAL 7044

Ref	Make	Model	Location	Type	Electrical Requirement	Dimensions	Weight	Sound	Comments
Fresh Air Supply									
SF1	Systemair	MUB 062 560EC	Restaurant	Fresh Air Supply	3ph 3.05A	800(h)x800(w)x800(d)	85.4kg	57dBA	See SF1 datasheet. C/W: • MTP10 Speed Controller • MUB 062 Inlet & Outlet Silencers (See ATT Data Sheet) • FGV/716-716 Flex Connection (See MUBFLEX Data Sheet) • Anti vibration mounts. See MUBVIB data sheet
ATT1	Systemair	MUB SIL 062	Restaurant	Attenuator	N/A	718(h)x718(w)x1200(l)	57Kg	N/A	See ATT datasheet
ATT2	Systemair	MUB SIL 062	Restaurant	Attenuator	N/A	718(h)x718(w)x1200(l)	57Kg	N/A	See ATT datasheet
Toilet Extract System									
TEF	Systemair	K200L Sileo	Restaurant	Toilet Extract Fan	1ph 0.631A	718(h)x718(w)x1200(l)	57Kg	N/A	See TEF datasheet
Odour Control									
OZ1	Plasma Clean	Xtract 2100	Kitchen	Odour Control	1ph 5A	307(h)x343(w)x185(d)	12Kg	N/A	To be interlocked with kitchen extract. See OZ1 data sheet
OZ2	Plasma Clean	Xtract 2100	Kitchen	Odour Control	1ph 5A	307(h)x343(w)x185(d)	12Kg	N/A	To be interlocked with kitchen extract. See OZ1 datasheet



Image of AZQS125B8V1 Condensing unit powder coated in a blend consisting of 50% RAL 7032 and 50% RAL 7044

NOT TO SCALE

NOTES :

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EXTRACT.

FRESH AIR DUCT.

KITCHEN EXTRACT DUCT.

EXTRACT DUCT.

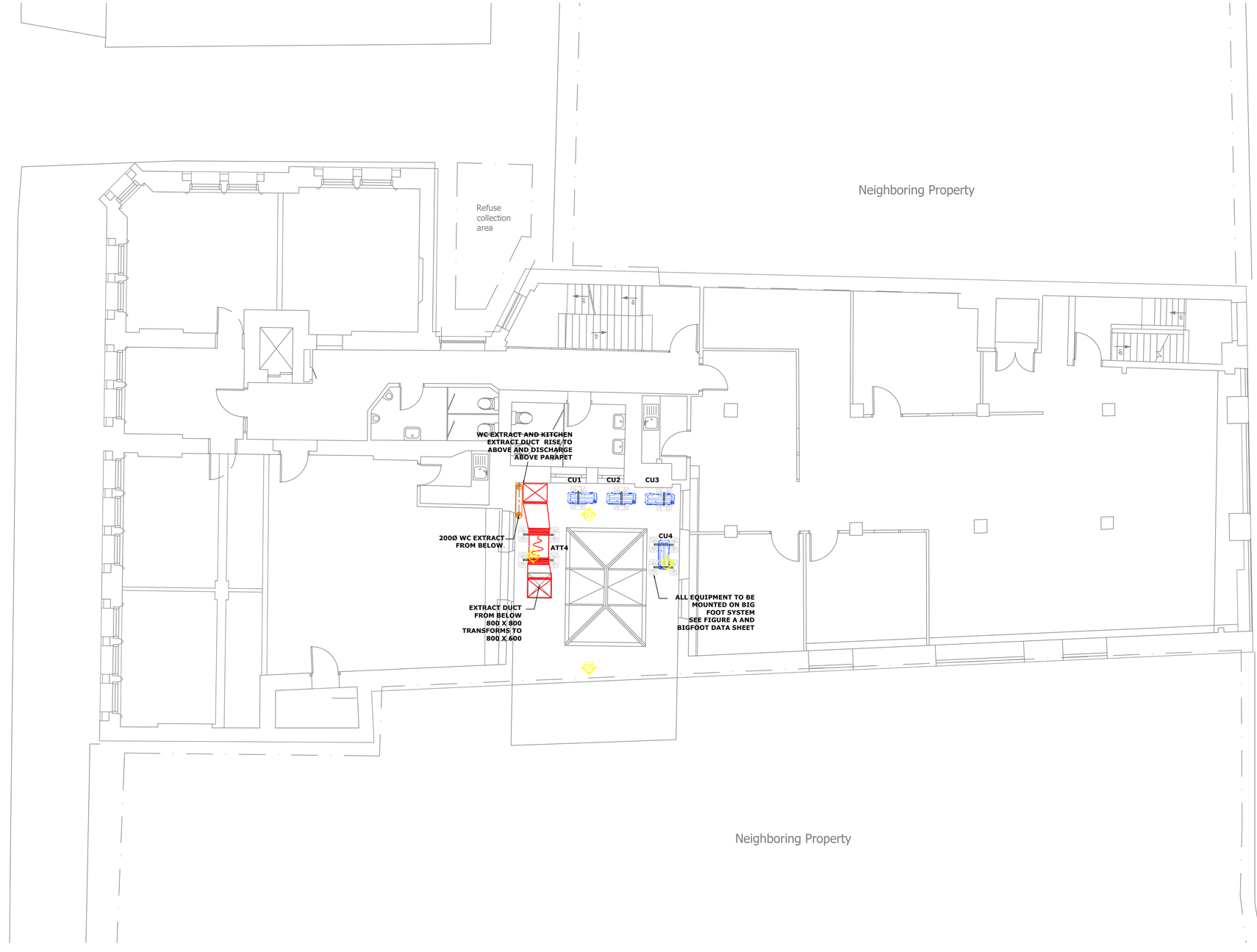




Figure A:
Example of Big Foot Support

NOT TO SCALE

revision date notes

PCPM
refrigeration and air conditioning

Client
Randall and Aubin

Location
64 Bridge Street
Manchester
M3 3BN

Drawing
Proposed Air Conditioning
and Ventilation Layout
First Floor Flat Roof

Date
13/05/2016

Scale @ A1 = 1:75

Drawing No.
RA/Manchester/03

Rev.
-

Ref	Make	Model	Location	Type	Electrical Requirement	Dimensions	Weight	Sound	Comments
Air Conditioning									
CU1	Daikin	AZQS125B8V1	Flat Roof	Condensing Unit	1ph 32A	990(h)x940(w)x320(d)	75kg	54dBA	See AC1 datasheet
CU2	Daikin	AZQS125B8V1	Flat Roof	Condensing Unit	1ph 32A	990(h)x940(w)x320(d)	75kg	54dBA	See AC1 datasheet
CU3	Daikin	AZQS125B8V1	Flat Roof	Condensing Unit	1ph 32A	990(h)x940(w)x320(d)	75kg	54dBA	See AC1 datasheet
CU4	Daikin	AZQS125B8V1	Flat Roof	Condensing Unit	1ph 32A	990(h)x940(w)x320(d)	75kg	54dBA	See AC1 datasheet
Kitchen Extract System									
KEF	Systemair	MUB/T 062 560EC	Restaurant	Kitchen Extract Fan	3ph 3.3A	800(h)x800(w)x800(d)	95.8kg	52dBA	See KEF datasheet. C/W: • MTP10 Speed Controller • MUB 062 Inlet & Outlet Silencers (See ATT Data Sheet) • FGV/716-716 Flex Connection (See MUBFLEX Data Sheet) • Anti vibration mounts. See MUBVIB data sheet
ATT3	Systemair	MUB SIL 062	Restaurant	Attenuator	N/A	718(h)x718(w)x1200(l)	57Kg	N/A	See ATT datasheet
ATT4	Systemair	MUB SIL 062	Restaurant	Attenuator	N/A	718(h)x718(w)x1200(l)	57Kg	N/A	See ATT datasheet

NB: Condensing units are powder coated in a blend consisting of 50% RAL 7032 and 50% RAL 7044

Ref	Make	Model	Location	Type	Electrical Requirement	Dimensions	Weight	Sound	Comments
Fresh Air Supply									
SF1	Systemair	MUB 062 560EC	Restaurant	Fresh Air Supply	3ph 3.05A	800(h)x800(w)x800(d)	85.4kg	57dBA	See SF1 datasheet. C/W: • MTP10 Speed Controller • MUB 062 Inlet & Outlet Silencers (See ATT Data Sheet) • FGV/716-716 Flex Connection (See MUBFLEX Data Sheet) • Anti vibration mounts. See MUBVIB data sheet
ATT1	Systemair	MUB SIL 062	Restaurant	Attenuator	N/A	718(h)x718(w)x1200(l)	57Kg	N/A	See ATT datasheet
ATT2	Systemair	MUB SIL 062	Restaurant	Attenuator	N/A	718(h)x718(w)x1200(l)	57Kg	N/A	See ATT datasheet
Toilet Extract System									
TEF	Systemair	K200L Sileo	Restaurant	Toilet Extract Fan	1ph 0.631A	718(h)x718(w)x1200(l)	57Kg	N/A	See TEF datasheet
Odour Control									
OZ1	Plasma Clean	Xtract 2100	Kitchen	Odour Control	1ph 5A	307(h)x343(w)x185(d)	12Kg	N/A	To be interlocked with kitchen extract. See OZ1 data sheet
OZ2	Plasma Clean	Xtract 2100	Kitchen	Odour Control	1ph 5A	307(h)x343(w)x185(d)	12Kg	N/A	To be interlocked with kitchen extract. See OZ1 datasheet



Image of AZQS125B8V1 Condensing unit powder coated in a blend consisting of 50% RAL 7032 and 50% RAL 7044

NOT TO SCALE

NOTES :

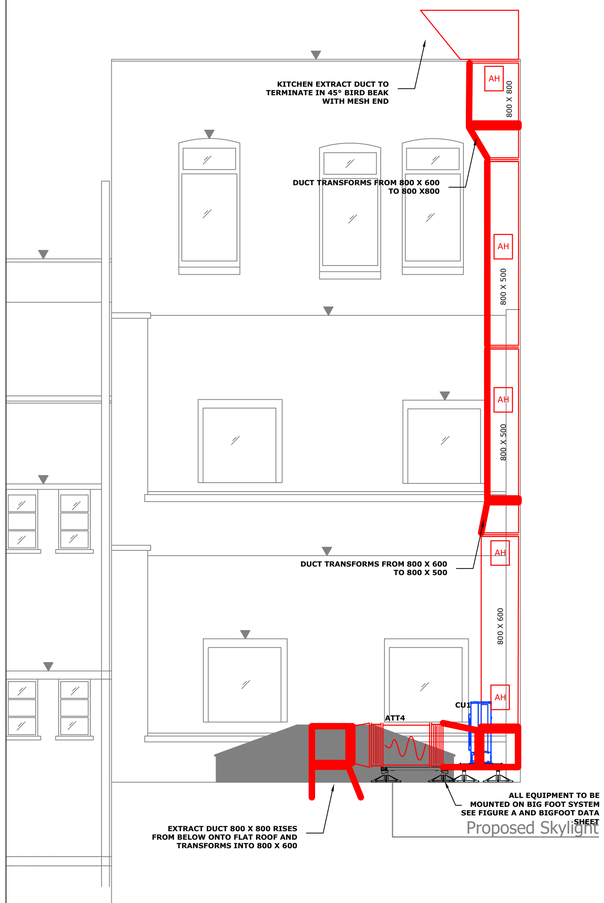
ALL SETTING OUT MUST BE CHECKED ON SITE
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EXTRACT.

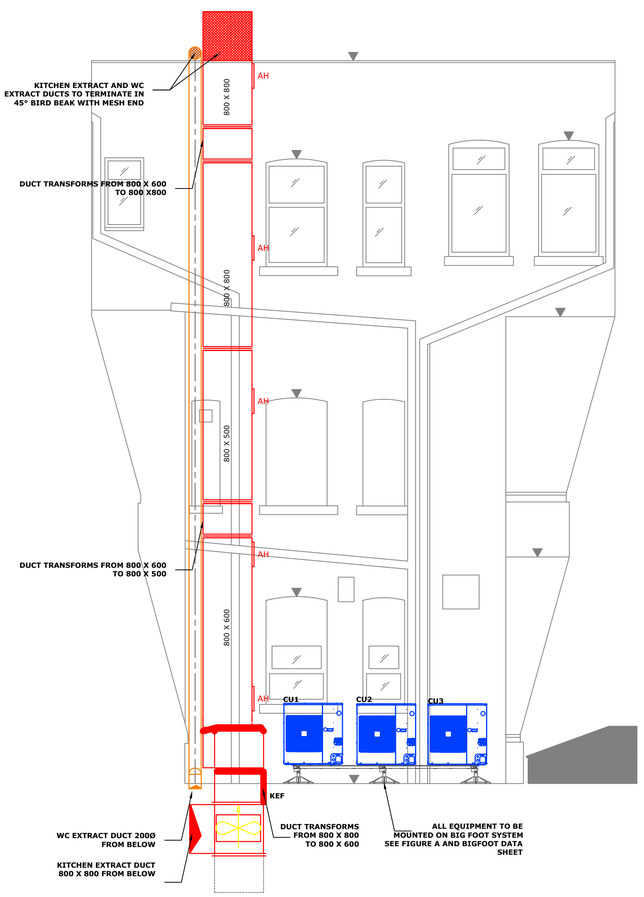
FRESH AIR DUCT.

KITCHEN EXTRACT DUCT.

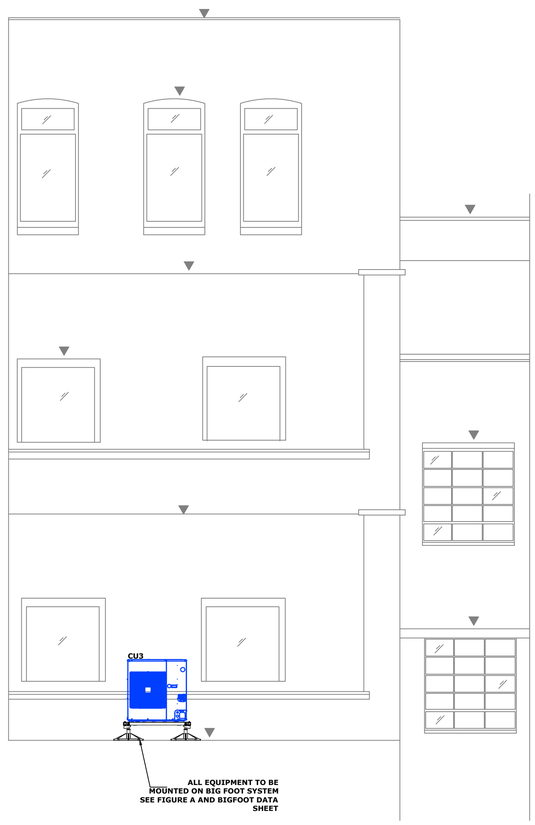
EXTRACT DUCT.



Elevation 6



Elevation 7



Elevation 8



Figure A:
Example of Big Foot Support

NOT TO SCALE

revision date notes

PCPM refrigeration and air conditioning

Client
Randall and Aubin

Location
64 Bridge Street
Manchester
M3 3BN

Drawing
Proposed Air Conditioning
and Ventilation Layout
First Floor Flat Roof Elevations

Date
13/05/2016

Scale @ A1 = 1:50

Drawing No.
RA/Manchester/04

Rev.
-