Emtec Products Ltd, Unit L Turnpike Way,
High Wycombe, Bucks, HP12 3TF

Telephone: 020 8848 3031 Fax: 020 8573 3605
Web: www.emtecproducts.co.uk Email: sales@emtecproducts.co.uk

RESULTS OF A 24-HOUR NOISE LEVEL SURVEY CARRIED OUT ON THE ROOF OF THE OFFICE BUILDING LOCATED AT 150-152 CLERKENWELL ROAD, CAMDEN AND A REPORT ON THE NOISE CONTROL MEASURES REQUIRED TO MITIGATE THE IMPACT OF THE PROPOSED NEW EXTERNAL PLANT

Test Engineer : M G Roberts

Report Author : M G Roberts

Authorised for
Release by : I J Marchant

Client: Conditioned Environment (Mechanical Services) Ltd.
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RESULTS OF A 24-HOUR NOISE LEVEL SURVEY CARRIED OUT ON THE ROOF OF THE OFFICE BUILDING LOCATED AT 150-152 CLERKENWELL ROAD, CAMDEN AND A REPORT ON THE NOISE CONTROL MEASURES REQUIRED TO MITIGATE THE IMPACT OF THE PROPOSED NEW EXTERNAL PLANT

1.0. INTRODUCTION

This report details the results of a 24-hour noise survey carried out on the roof of the office building located at 150-152 Clerkenwell Road, London EC1.

The objectives of this survey were as follows:

- To assess the proposal to install new external plant on the roof of the building
- To establish the existing background noise level outside the nearest noise sensitive properties.
- To recommend noise limits and any necessary measures to ensure that the operation of the new plant does not disturb the occupants of the nearest affected properties.

This report has been divided into the following sections for ease of analysis:

2.0. SITE DESCRIPTION

The property at 150-152 Clerkenwell Road is located on the corner of Clerkenwell Road and Eyre Street Hill and consists of a 4/5 storey building with a rendered outer structure and metal windows.

It is proposed to create a roof terrace on the front, fourth floor roof area and locate mechanical plant next to this roof terrace within a suitably screened area.

The front of the building is shown on the attached Photo A and an aerial view of the roof is shown on the attached photo B.

3.0. TEST INSTRUMENTATION

All measurement equipment used during the survey complied with the requirements of BS4142:2014 "Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas". Details of the equipment are as follows:

Integrating Sound Level Meter:	Rion type NL-52 class 1 Sound Level Meter fitted with a Rion type UC-59 ½ inch condenser microphone. Serial No. 01121378
Statistical Analysis Modules:	Built in module capable of computing the percentile levels L1, L10, L50, L90 and L99 and also the Leq level.
Acoustic Calibrator:	Bruel & Kjaer type 4231 electronic calibrator. Serial No.: 1934160

Calibration was performed before and after the surveys and found to be, in all cases, +/- 0.1 dB from the reference source.

3.1. Existing Noise Climate

Road traffic travelling on Clerkenwell Road could be clearly heard during the manned periods at the start and the end of the survey, so the noise levels measured will include contributions from road vehicles.

Commercial jet aircraft were observed at medium and high altitude during the manned periods at the start and the end of the survey, so it is possible that the noise levels measured could include contributions from medium altitude jet aircraft.

There are no overland railways nearby, so the noise levels measured will not include contributions from rail noise.

The building was being refurbished and so daytime noise levels will have been affected by construction activities and will not be representative of normal daytime background noise levels.

We judged that traffic noise will be the dominant noise source throughout the daytime and night time periods.

4.0. TEST PROCEDURE

The survey was conducted during a continuous 24-hour period from 10.34 am on Tuesday the 30th of January 2018 to 10.34am on Wednesday the 31st of January 2018.

Data was continuously acquired throughout the measurement period with the individual averaging time for statistical noise data set to 15 minutes. The following 'A' weighted statistical measurements were recorded concurrently: -

LA_1 - The Sound Pressure Level exceeded for 1% of the measurement period.

LA_{10} - The Sound Pressure Level exceeded for 10% of the measurement period.

LA_{50} - The Sound Pressure Level exceeded for 50% of the measurement period.

LA_{90} - The Sound Pressure Level exceeded for 90% of the measurement period. LA90 is considered to represent the "background noise level" during the measurement period and is used for the assessment of noise to determine the likelihood of complaints (See BS 4142:2014).

LA_{99} - The Sound Pressure Level exceeded for 99% of the measurement period.

LA_{eq} - The continuous steady state Sound Pressure Level that has the same acoustic energy as the real fluctuating level.

4.1. Measurement Position

Noise levels were measured at a position on the fifth floor roof of the building as indicated on the attached aerial Photo B and the microphone was attached to a boom that was strapped to the railing that was around the fifth floor roof.

The microphone can be seen on the attached Photo C.

The microphone was strapped to the handrail and the rest of the measurement equipment was located in a weatherproof enclosure with a low impedance cable running from the microphone to the instrumentation.

4.2. Weather Conditions

The weather conditions prevailing during the measurement period were generally in line with those recommended in BS 4142:2014: -

Weather daytime: -	Clear and Bright	Weather night time: -	Overcast
Wind daytime: -	Calm	Wind night time: -	Calm

The microphone was protected throughout the tests by an acoustically transparent wind balloon.

5.0. RESULTS AND EVALUATION OF NOISE CRITERIA

The raw test data, gathered during the noise survey, is given in Appendix 'A 'of this report.

The 'A' Weighted Leq levels measured over each 15 minute interval throughout the 24-hour period (denoted by LA_{eq}, (15 mins)) are displayed as a bar graph on the attached Sketch No QF/9303/T1 at the back of this report.

The 'A' Weighted percentile levels measured over each 15 minute interval denoted by LA_{10} (15 mins), LA_{50} (15 mins) and LA_{90} (15 mins) are displayed as line graphs on the attached Sketch No QF/9303/T2 at the back of this report.

5.1. Summary of Results

The table QF/9303/D1 below summarises the noise levels taken over the 24-hour period in terms of the maximum and minimum Sound Pressure Levels recorded.

Table QF/9303/D1 – Summary of Maximum and Minimum Noise Levels

	LA_{eq}	**LA_{1}**	**LA_{10}**	**LA_{50}**	**LA_{90}**	**LA_{99}**
Minimum	51.9 dBA	56.3 dBA	55.2 dBA	49.7 dBA	46.4 dBA	45.9 dBA
Maximum	80.0 dBA	78.0 dBA	73.6 dBA	61.2 dBA	56.8 dBA	56.4 dBA

Table QF/9303/D2 – Minimum LA90 Noise Level – Daytime (07.00 to 23.00)

	LA_{90}
Minimum daytime	48.9dBA

Table QF/9303/D3 – Minimum LA90 Noise Level – Night time (23.00 to 07.00)

	LA_{90}
Minimum night time	46.4dBA

5.2. Summary of the Local Authority's planning requirements regarding noise for noise sensitive properties

The local planning authority is the London Borough of Camden.

The Camden Local Plan sets out the Council's planning policies and replaces the Core Strategy and Development Policy planning documents (adopted in 2010). It ensures that Camden continues to have robust, effective and up-to-date planning policies that respond to changing circumstances and the borough's unique characteristics and contribute to delivering the Camden Plan and other local priorities.

The Local Plan will cover the period from 2016-2031. Policy A4 of The Local Plan is entitled Noise and Vibration and states:

The Council will seek to ensure that noise and vibration is controlled and managed. Development should have regard to Camden's Noise and Vibration thresholds (Appendix 3). We will not grant planning permission for a) a development likely to generate unacceptable noise and vibration impacts or b) a development sensitive to noise in locations which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses. We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity. We will also seek to minimise the impact on local amenity from deliveries and from the demolition and construction phases of development.

The parts of Appendix 3 that we have identified as relevant to this application are as follows:

Appendix 3: Noise thresholds

The significance of noise impact varies dependent on the different noise sources, receptors and times of operation presented for consideration within a planning application. Therefore, Camden's thresholds for noise and vibration evaluate noise impact in terms of various 'effect levels' described in the National Planning Policy Framework and Planning Practice Guidance:

- *NOEL – No Observed Effect Level*
- *LOAEL – Lowest Observed Adverse Effect Level*
- *SOAEL – Significant Observed Adverse Effect Level*

Three basic design criteria have been set for proposed developments, these being aimed at guiding applicants as to the degree of detailed consideration needed to be given to noise in any planning application. The design criteria outlined below are defined in the corresponding noise tables. The values will vary depending on the context, type of noise and sensitivity of the receptor:

- *Green – where noise is considered to be at an acceptable level.*
- *Amber – where noise is observed to have an adverse effect level, but which may be considered acceptable when assessed in the context of other merits of the development.*
- *Red – where noise is observed to have a significant adverse effect.*

Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

Existing Noise sensitive receptor	*Assessment Location*	*Design Period*	*LOAEL (Green)*	*LOAEL to SOAEL (Amber)*	*SOAL (Red)*
*Dwellings***	*Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)*	*Day*	*'Rating level' 10dB* below background*	*'Rating level' between 9dB below and 5dB above background*	*'Rating level' greater than 5dB above background*
*Dwellings***	*Outside bedroom window (façade)*	*Night*	*'Rating level' 10dB* below background and no events exceeding 57dBL_{Amax}*	*'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB L_{Amax}*	*'Rating level' greater than 5dB above background and/or events exceeding 88dBL_{Amax}*

**10dB should be increased to 15dB if the noise contains audible tonal elements (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.*

***levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.*

The periods in Table C correspond to 0700 hours to 2300 hours for the day and 2300 hours to 0700 hours for the night. The Council will take into account the likely times of occupation for types of development and will be amended according to the times of operation of the establishment under consideration.

There are certain smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units and condensers, where achievement of the rating levels (ordinarily determined by a BS:4142 assessment) may not afford the necessary protection. In these cases, the Council will generally also require an NR curve specification of NR35 or below, dependant on the room (based upon measured or predicted Leq (5mins) noise levels in octave bands, 1 metre from the façade of affected premises, where the noise sensitive premise is located in a quiet background area.

5.3. Determination of noise sensitive property design criteria

We believe that the new plant, which will consist of eight number heat pump condensing units will not emit noise that has a distinguishable discrete continuous note, or emit noise that that has distinct impulses. The condensers will be inverter controlled and will slowly ramp up to their operating condition. To comply with a green rating from the table above the new units should have a combined Sound Pressure Level 10dB below the lowest LA90 background noise level at 1 metre from the nearest noise sensitive window.

The lowest background noise level measured during the survey was 45.9dBA, which occurred during the time period starting at 5.50am. The lowest daytime LA90 noise level was 47.4dBA. Applying a rating level that is 10dB below the daytime/nightime noise levels would give limiting daytime/nightime rating levesl of 37.4 and 35.9dBA.

We therefore propose that the following rating levels be applied to this project:

Table QF/9303/D4 – Proposed Design Rating Levels

Existing Noise sensitive receptor	*Assessment Location*	*Design Period*	*Lowest measured background level*	***Proposed rating level***	*Proposed Local Authority criteria*
Dwellings	*Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)*	*Day*	*48.9dBA*	***38.9dBA***	*Green*
Dwellings	*Outside bedroom window (façade)*	*Night*	*46.4dBA*	***36.4dBA***	*Green*

5.4. Determination of commercial design criteria

The uses of the commercial premises on the other side of Eyre Street Hill consist of offices. It is therefore proposed that the recommendations given in BS8233:2014 and that Table 2 be considered.

	Good	Reasonable
Open Plan offices: $L_{Aeq,T}$	45dBA	50dBA

We propose that the lower of these rating levels is adopted, i.e. 45dBA.

Assuming a 10dB noise reduction due to a partially open window the rating level at 1 metre external to the nearest affected office windows would be 45dBA + 10dB = 55dBA.

5.5 Summary of external noise criteria

Based upon the results of the survey and the above design criteria we summarise the actual design rating levels to be adopted for this project in table QF/9303/D5: -

Table QF/9303/D5 – recommended design rating levels $L_{Ar,T}$

Type of premises	**$L_{Ar,T}$ (Daytime 7am – 11pm)**	**$L_{Ar,T}$ (Nightime 11pm – 7am)**
Noise sensitive	38.9dBA	36.4dBA
Commercial	55 dBA	-

6.0. DISCUSSION OF RESULTS

It is proposed to install an Air Handling Unit, seven air cooled condensers and a toilet extract fan adjacent to the roof terrace area on the fourth floor roof at the front of the building.

Five number Heat Recovery Air Handling Units, one on each floor of the building, will also be installed with fresh air and exhaust louvres located at the rear of the building.

The Ground Floor HRU will intake and discharge into the low level light well at the back of the building opposite office windows. The First, Second and Third floor HRUs will intake and discharge into the void between the rear of the building and the offices located directly behind. The fourth floor HRU will intake and discharge into the small light well directly below the roof plant area.

The Heat Recovery Units will be mounted internally with ducted connections to the outside. All of this plant is as indicated on the attached part drawings No.4424 M 04 MEC 01T.

We will first analyse the noise from the roof mounted plant items. The tables QF/9300/D6 and -/D7 below show the unattenuated noise levels, at one metre from the nearest residential property on the other side of Eyre Street Hill together with the degree of attenuation required in order to achieve a noise level that is below the limiting daytime LAeq level of 38.9dBA.

Table QF/9303/D6 – Noise Levels of Condensers and Natural and necessary attenuation to operate between 7am and 11pm for adjacent residential property

Source/Attenuation	Sound Pressure Level (dB ref 2 x 10^{-5} N/m^2) 63	125	250	500	1k	2k	4k	8k	dBA
Daikin REYQ16T @ 1m free field	69	68	67	62	57	53	47	42	
Daikin REYQ18T @ 1m free field (2 off units)	69	68	69	67	62	58	53	47	
Daikin REYQ12T @ 1m free field	59	65	60	61	53	50	44	37	
Daikin REYQ10T @ 1m free field (2 off units)	65	68	60	61	54	52	44	38	
Daikin ERQ250AW1 @ 1m free field	55	58	56	54	48	42	35	29	
Overall SPL of Condenser at 1m free field	73	74	72	70	64	60	55	49	71
Reverberation of surroundings	+3	+3	+3	+3	+3	+3	+3	+3	
Distance correction 10 log A_{28}/A_1 at 29 metres	-24	-24	-24	-24	-24	-24	-24	-24	
Unattenuated SPL at 1m from residential windows	52	53	51	49	43	39	34	28	50
Solid screen around units 2.6m high with 1200mm acoustic plenum (barrier effect of 1200mm)	-10	-12	-14	-17	-20	-20	-20	-20	
Attenuated SPL at 1m from residential window	42	41	37	32	23	19	14	8	33

Table QF/9303/D7 – Noise Levels of AHU and necessary attenuation to operate between 7am and 11pm for adjacent residential property plus overall SPL at neighbour's window

Source/Attenuation	Sound Pressure Level (dB ref 2 x 10^{-5} N/m^2) 63	125	250	500	1k	2k	4k	8k	dBA
AHU Fresh Air Sound Power Level	61	68	70	66	65	63	58	50	
SWL to SPL	-8	-8	-8	-8	-8	-8	-8	-8	
Reverberation of surroundings	+3	+3	+3	+3	+3	+3	+3	+3	
Distance correction to nearest residential (10 log 26) at 27m	-14	-14	-14	-14	-14	-14	-14	-14	
Unattenuated SPL at 1m from residential window	42	49	51	47	46	44	39	31	51
Attenuation – Emtec RAAC/25/900CL	-7	-11	-18	-32	-40	-40	-36	-33	
Attenuated SPL at 1m from residential window without screen	35	38	33	15	6	4	3	-	26
AHU Exhaust Sound Power Level	64	70	70	73	74	72	67	60	
SWL to SPL	-8	-8	-8	-8	-8	-8	-8	-8	
Reverberation of surroundings	+3	+3	+3	+3	+3	+3	+3	+3	
Distance correction to nearest residential (10 log 22) at 23m	-13	-13	-13	-13	-13	-13	-13	-13	
Unattenuated SPL at 1m from residential window	46	52	52	55	56	54	49	42	
Attenuation – Emtec RAAC/38/1500CL	-5	-13	-24	-34	-43	-42	-35	-22	
Attenuated SPL at 1m from residential window without screen	41	39	28	21	13	12	14	20	27
Combined SPL of AHU at 1m from residential windows without screen	42	41	34	22	14	13	14	20	30

Toilet Extract Fan Sound Power	72	67	59	53	43	46	41	39	
SWL to SPL	-8	-8	-8	-8	-8	-8	-8	-8	
Reverberation of surroundings	+3	+3	+3	+3	+3	+3	+3	+3	
Distance correction to nearest residential (20 log 23) at 24m	-27	-27	-27	-27	-27	-27	-27	-27	
Attenuation of screen (1500mm)	-12	-14	-16	-19	-20	-20	-20	-20	
Overall SPL of Toilet Fan without screen	42	41	34	22	14	13	14	20	30
Attenuation of screen (200mm)	-5	-7	-9	-11	-13	-15	-17	-20	
Overall SPL of condensers, AHU & Toilet Extract Fan at 1m from neighbour's window	43	42	37	32	23	19	14	8	33

Based upon the above calculations It will be possible to operate the Air Handling Unit, the Toilet Extract Fan and the seven new Daikin air cooled condensers on full duty between the hours of 7am and 11pm. The noise levels during the day, at 1 metre from the nearest residential flat's window on the opposite side of Eyre Street Hill, will achieve a Green LOAEL noise level.

If the above resultant noise level is adjusted to a distance of 18 metres, to a point 1 metre from the office window on the other side of Eyre Street Hill, the resultant noise level will be 4dB greater than at the residential windows. The resultant noise level will therefore be 37dBA which is still below the residential Green LOAEL noise level and should therefore be more than acceptable for an office window.

We will now analyse the noise level to the office windows at the rear of the building.

The Heat Pump Units, within the building, will be fitted with fresh air inlet and exhaust air outlet silencers and the table QF/9303/D8 below shows that the resultant noise level within the small rear void between the rear of the building and the office building directly behind. The inlets and discharges of the first, second and third floor Heat Recovery Units are mounted onto this rear wall of the building.

Table QF/9303/D8 – Sound Power Levels of Heat Recovery AHUs on the 1st, 2nd and 3rd Floors and the Required Attenuation to Achieve less than 55dBA Externally

Source/Attenuation	Sound Pressure Level (dB ref 2 x 10^{-5} N/m^2) 63	125	250	500	1k	2k	4k	8k	dBA
Sound Power Level of VAM 350 (1 off)	62	56	52	48	45	42	35	30	
Sound Power Level of VAM 650 (2 off)	67	63	57	53	50	46	39	32	
Intake and Outlet adjacent	+3	+3	+3	+3	+3	+3	+3	+3	
SWL to SPL	-8	-8	-8	-8	-8	-8	-8	-8	
Reverberation of lightwell	+5	+5	+5	+5	+5	+5	+5	+5	
Sound Pressure Level in rear void									
Due to VAM350S	62	56	52	48	45	42	35	30	
Due to VAM650S	67	63	57	53	50	46	39	32	
Combined SPL in rear void due to HRU's (unattenuated)	68	64	58	54	51	47	40	34	57
Emtec RAAC/38/600 silencer	-3	-6	-13	-21	-28	-29	-25	-15	
Attenuated SPL in rear void	65	58	45	33	23	18	15	19	45

The table QF/9303/D9 below shows the calculation of the noise level of the ground floor Heat Recovery Unit which will intake and discharge air into the light well at the rear of the building.

The tables QF/9303/D10, -/D11 and -/D12 indicate the noise levels of the roof plant and the fourth floor Heat Recovery Unit which will affect the penthouse office window of the adjacent building.

Table QF/9303/D9 – Sound Power Level of Heat Recovery AHU on the Ground Floor and the Required Attenuation to Achieve less than 55dBA Externally

Source/Attenuation	Sound Pressure Level (dB ref 2 x 10^{-5} N/m^2) 63	125	250	500	1k	2k	4k	8k	dBA
Sound Power Level of VAM 350	62	56	52	48	45	42	35	30	
Intake and Outlet adjacent	+3	+3	+3	+3	+3	+3	+3	+3	
SWL to SPL	-8	-8	-8	-8	-8	-8	-8	-8	
Reverberation of lightwell	+5	+5	+5	+5	+5	+5	+5	+5	
Sound Pressure Level in rear area	62	56	52	48	45	42	35	30	51
Emtec RAAC/38/600 silencer	-3	-6	-13	-21	-28	-29	-25	-15	
Attenuated SPL in rear void	59	50	39	27	17	13	10	15	38

Table QF/9303/D10 – Sound Power Level of Heat Recovery AHU's on the Fourth Floor and the Required Attenuation to Achieve less than 55dBA Externally

Source/Attenuation	Sound Pressure Level (dB ref 2 x 10^{-5} N/m^2) 63	125	250	500	1k	2k	4k	8k	dBA
Sound Power Level of VAM 350 (1 off)	62	56	52	48	45	42	35	30	
Intake and Outlet adjacent	+3	+3	+3	+3	+3	+3	+3	+3	
SWL to SPL	-8	-8	-8	-8	-8	-8	-8	-8	
Reverberation of light well	+5	+5	+5	+5	+5	+5	+5	+5	
Sound Pressure Level in lightwell	62	56	52	48	45	42	35	30	51
Emtec RAAC/25/900 silencer	-7	-11	-18	-32	-40	-40	-36	-33	
Attenuated SPL in rear void (a)	55	45	34	16	5	-	-	-	33

Table QF/9303/D11– Noise Levels of Condensers and Natural and necessary attenuation to operate between 7am and 11pm for adjacent commercial property

Source/Attenuation	Sound Pressure Level (dB ref 2 x 10^{-5} N/m^2) 63	125	250	500	1k	2k	4k	8k	dBA
Daikin REYQ16T @ 1m free field	69	68	67	62	57	53	47	42	
Daikin REYQ18T @ 1m free field (2 off units)	69	68	69	67	62	58	53	47	
Daikin REYQ12T @ 1m free field	59	65	60	61	53	50	44	37	
Daikin REYQ10T @ 1m free field (2 off units)	65	68	60	61	54	52	44	38	
Daikin ERQ250AW1 @ 1m free field	55	58	56	54	48	42	35	29	
Overall SPL of Condenser at 1m free field	73	74	72	70	64	60	55	49	71
Reverberation of surroundings	+3	+3	+3	+3	+3	+3	+3	+3	
Distance correction 10 log A_4/A_1 at 5 metres	-8	-8	-8	-8	-8	-8	-8	-8	
Directivity (90 degrees)	-2	-4	-6	-8	-10	-10	-10	-10	
Unattenuated SPL at 1m from commercial windows	66	65	61	57	49	45	40	34	58
Solid screen around units 2.6m high (barrier effect of 1200mm)	-10	-12	-14	-17	-20	-20	-20	-20	
Attenuated SPL at 1m from commercial window (b)	56	53	47	40	29	25	20	14	43

Table QF/9303/D12 – Noise Levels of AHU and necessary attenuation to operate between 7am and 11pm for adjacent commercial property

Source/Attenuation	Sound Pressure Level (dB ref 2 x 10^{-5} N/m^2) 63	125	250	500	1k	2k	4k	8k	dBA
AHU Fresh Air Sound Power Level	61	68	70	66	65	63	58	50	
SWL to SPL	-8	-8	-8	-8	-8	-8	-8	-8	
Reverberation of surroundings	+3	+3	+3	+3	+3	+3	+3	+3	
Distance correction to commercial window (10 log 9) at 10m	-10	-10	-10	-10	-10	-10	-10	-10	
Directivity (180 degrees)	-4	-8	-10	-10	-10	-10	-10	-10	
Unattenuated SPL at 1m from commercial window	42	45	45	41	40	38	33	25	51
Attenuation – Emtec RAAC/25/900CL	-7	-11	-18	-32	-40	-40	-36	-33	
Attenuated SPL at 1m from commercial window without screen	35	34	27	9	-	-	-	-	21
AHU Exhaust Sound Power Level	64	70	70	73	74	72	67	60	
SWL to SPL	-8	-8	-8	-8	-8	-8	-8	-8	
Reverberation of surroundings	+3	+3	+3	+3	+3	+3	+3	+3	
Distance correction to nearest residential (10 log 5) at 6m	-7	-7	-7	-7	-7	-7	-7	-7	
Directivity (45 degrees)	-1	-2	-3	-4	-5	-6	-7	-7	
Unattenuated SPL at 1m from commercial window	51	56	55	57	57	54	48	41	
Attenuation – Emtec RAAC/38/1500CL	-5	-13	-24	-34	-43	-42	-35	-22	
Attenuated SPL at 1m from commercial window without screen	46	43	31	23	14	12	13	19	30
Combined SPL of AHU at 1m from commercial windows without screen (c)	46	44	33	23	14	12	13	19	31

Toilet Extract Fan Sound Power	72	67	59	53	43	46	41	39	
SWL to SPL	-8	-8	-8	-8	-8	-8	-8	-8	
Reverberation of surroundings	+3	+3	+3	+3	+3	+3	+3	+3	
Distance correction to nearest commercial (20 log 2) at 3m	-6	-6	-6	-6	-6	-6	-6	-6	
Attenuation of screen (1500mm)	-12	-14	-16	-19	-20	-20	-20	-20	
Overall SPL of Toilet Extract fan without screen (d)	49	42	32	23	12	15	10	8	30
Overall SPL of condensers, HRU, AHU & Toilet Extract Fan at 1m from commercial window	60	55	48	40	29	26	21	20	44

Based on the calculations in the tables above the Sound Pressure Level at 1 metre outside the office windows at the rear of the building will be as listed below:

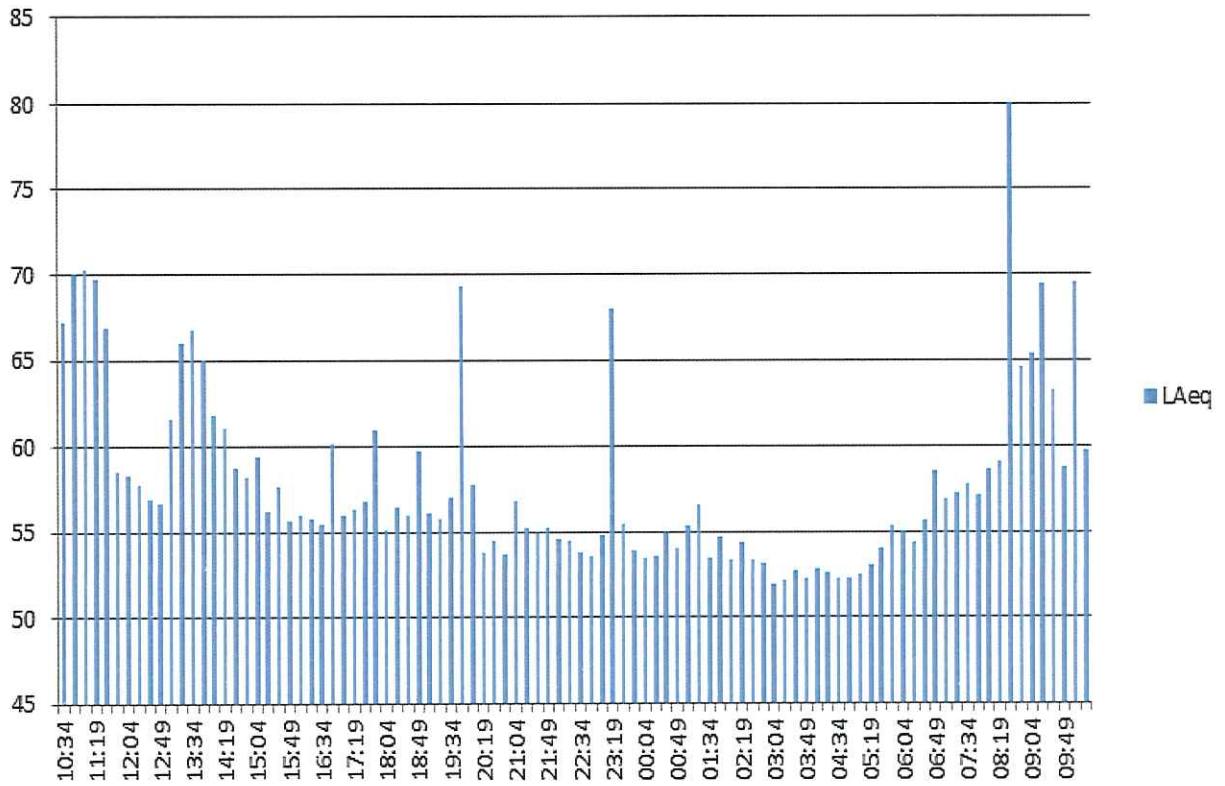
In rear void (opposite 1st, 2nd & 3rd floor inlets and outlets) – 45dBA
In Basement light well (Ground floor inlet and outlet) – 38dBA
At Penthouse Office windows (Roof plant & 4th Floor HRU) – 44dBA

All these attenuated noise levels are some 10dB below the limiting Commercial Premises limiting noise level of 55dBA and will give a noise level, in the adjacent offices of approximately 35dBA, which is equivalent to NR25, which is a very low noise level within an office environment.

In order to ensure that the operation of the Air Handling Unit or the Condensing Units do not transfer structural noise into the fabric of the building the Air Handling Unit, the toilet extract fan and the Heat Recovery Units should be placed onto neoprene pads such as Emtec/VMC Shearflex and each condenser should be supported off Emtec/VMC RD2 neoprene-in-shear anti-vibration mounts having a minimum static deflection of 6mm. The Toil

If the mitigation measures itemised above are installed then the new mechanical plant will operate within the recommended design rating levels laid down in table QF/9303/D5 above and should therefore be acceptable to the Camden planning authority.

EMTEC PRODUCTS LTD
13th July 2018



TITLE: LAeq Levels	ISSUE DATE: 31/1/18				DRAWN BY: MGR	A	B	C	D	E	F	G	H
CLIENT: Conditioned Environment (Mechanical Services) Ltd	PF No: 6138				APPROVED BY: MGR	REVISION							
PROJECT: Fordham University, 150-152 Clerkenwell Road, London	Q	A	M	I	DESIGN AUTH: MGR	SKETCH No. QF/9303/T1							

EMTEC
Unit L, Turnpike Way, High Wycombe
Bucks HP12 3TF
Tel: 020 8848 3031 Fax: 020 8573 3605

TITLE: *LA10; LA50 & LA90 Levels*	*ISSUE DATE:* 31/1/18				*DRAWN BY:* *MGR*	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*
CLIENT: Conditioned Environment (Mechanical Services) Ltd	*PF No: 6138*				*APPROVED BY:* *MGR*	*REVISION*							
PROJECT: Fordham University, 150-152 Clerkenwell Road, London	*Q*	*A*	*M*	*I*	*DESIGN AUTH:* *MGR*	*SKETCH No. QF/9303/T2*							

EMTEC
Unit L, Turnpike Way, High Wycombe
Bucks HP12 3TF
Tel: 020 8848 3031 Fax: 020 8573 3605

APPENDIX 'A'

Raw Data – Noise Survey

9th to 10th January 2018

RAW NOISE DATA - Fordham University, 150-152 Clerkenwell Road, London

Ref: QF9303/PF6138/RP1
Client: Conditioned Environmental (Mechanical Services) Ltd
Date: 30th to 31st January 2018

Address	Start Time	LAeq	LE	Lmax	Lmin	LA1	LA10	LA50	LA90	LA99
1	10:34	67.2	96.8	96.5	51.2	65.9	62.1	57.1	54.5	53.9
2	10:49	70	99.6	91	52.3	77.3	71.8	59.5	55.3	54.5
3	11:04	70.3	99.9	90.2	52.6	77.9	73.6	59.5	55.5	54.9
4	11:19	69.7	99.3	99.6	52.6	74.7	70.3	59.4	55.4	54.7
5	11:34	66.9	96.5	94.3	53.7	72.9	69.5	61.2	56.7	55.9
6	11:49	58.5	88.1	80.6	51.7	63.1	60.4	55.9	53.7	53.3
7	12:04	58.3	87.9	80.3	52.4	61.6	59.6	56.3	54.4	54.1
8	12:19	57.8	87.4	75.8	53.2	61.5	59.8	56.5	54.9	54.6
9	12:34	56.9	86.5	74.8	53.1	58.7	58	56.3	54.9	54.6
10	12:49	56.7	86.3	70.1	52.8	59.2	58.3	56.1	54.6	54.3
11	13:04	61.6	91.2	84.3	52.7	65.6	61.2	56.9	55.1	54.7
12	13:19	66	95.6	90.3	53.8	71.7	68.9	59.8	56.3	55.8
13	13:34	66.8	96.4	88.7	53.1	73.6	70.1	60.1	56.1	55.3
14	13:49	65	94.6	91.6	53.4	69	64.7	57.2	55.2	54.9
15	14:04	61.8	91.4	82	53.4	64.8	61.8	56.9	55.2	54.8
16	14:19	61.1	90.7	91.8	53.5	61.3	59.8	56.7	55.1	54.8
17	14:34	58.7	88.3	79.4	52.3	61.7	59.8	56.4	54.6	54.1
18	14:49	58.2	87.8	77.3	51.1	62.7	60.3	55.5	53.2	52.6
19	15:04	59.4	89	89.1	51.5	61.6	59.7	56	54	53.5
20	15:19	56.2	85.8	79.9	51.2	59	57.7	54.9	53	52.5
21	15:34	57.6	87.2	86.5	52	59.7	58.4	55.7	53.9	53.5
22	15:49	55.7	85.3	66.2	51.6	58.4	57.5	55.1	53.6	53.2
23	16:04	56	85.6	68.7	50.8	59.7	58.4	55	52.9	52.5
24	16:19	55.8	85.4	69.4	50.4	59.3	57.8	54.9	52.7	52.3
25	16:34	55.4	85	68.2	50.9	58.6	57.4	54.5	52.7	52.3
26	16:49	60.2	89.8	81.8	50.1	62.1	58.8	54	51.9	51.5
27	17:04	56	85.6	72.5	50.6	59.4	57.6	54.4	52.4	52
28	17:19	56.3	85.9	71.7	49.9	60.4	58.4	54.5	52.3	51.8
29	17:34	56.8	86.4	76.8	50.8	58.5	57.4	54.6	52.6	52.2
30	17:49	60.9	90.5	86	50.5	62.2	59.7	54.9	52.7	52.1
31	18:04	55.1	84.7	65.1	50	58.6	56.9	54.3	52.3	51.8
32	18:19	56.4	86	73.9	50.7	59.9	57.6	54.6	53	52.5
33	18:34	56	85.6	71	50.2	59.7	58	54.6	52.8	52.4
34	18:49	59.7	89.3	82.8	50.4	59.7	57.6	54.2	52.2	51.8
35	19:04	56.1	85.7	75.3	49.5	59.9	57.9	53.9	51.5	51
36	19:19	55.8	85.4	67.4	48.8	59.9	58	54.7	51.8	51.1
37	19:34	57	86.6	70.5	50.7	60.7	59.2	55.5	53	52.3
38	19:49	69.3	98.9	85.6	50.3	78	71.7	57.1	52.8	52.1
39	20:04	57.8	87.4	75.5	49.4	62.3	58.3	53.7	51.8	51.4
40	20:19	53.8	83.4	68.6	48	57.1	56	53.2	50.6	49.9
41	20:34	54.5	84.1	67.2	48.3	57.8	56.7	53.7	50.2	49.8
42	20:49	53.7	83.3	64.7	48.9	56.8	55.8	53.1	50.5	50.2
43	21:04	56.8	86.4	81.8	48.8	58.4	57.1	53.2	50.6	50.2
44	21:19	55.2	84.8	73.6	48.9	58	56.7	53.5	50.5	50.1
45	21:34	54.9	84.5	63.6	48.9	58.5	57.4	54	50.6	50.3
46	21:49	55.2	84.8	71.8	49	58.4	57.6	53.6	50.6	50.2
47	22:04	54.6	84.2	65.4	47.9	57.6	56.9	54	50.7	50.1
48	22:19	54.5	84.1	64.4	48.2	57.9	57.1	53.7	50.3	49.8
49	22:34	53.8	83.4	65.9	47.4	57	56.4	53.1	50.1	49.6
50	22:49	53.6	83.2	63.8	47.1	57.7	56.7	52.5	48.9	48.5

51	23:04	54.8	84.4	78.7	47	57.7	56.7	53.2	49.9	49.3
52	23:19	68	97.6	91.4	47.6	58.5	57.3	53.7	50.2	49.5
53	23:34	55.5	85.1	73.5	48	58.7	57.3	53.8	50.4	49.9
54	23:49	53.9	83.5	63.1	45.9	58.1	57.2	52.1	48.9	48.5
55	00:04	53.5	83.1	64.7	46.7	57.2	56.3	52.6	49.1	48.5
56	00:19	53.6	83.2	62.7	45.9	57.7	57	52	48.1	47.5
57	00:34	54.9	84.5	73.2	46.6	58.5	57.5	52.9	48.6	48.2
58	00:49	54	83.6	65.7	46.5	58.4	57.5	51.9	48.3	47.8
59	01:04	55.3	84.9	65	46.3	60.6	59.4	52.6	49.1	48.4
60	01:19	56.5	86.1	80.6	47.2	60.6	59.4	54	49.9	49.2
61	01:34	53.5	83.1	72.4	45.9	58.6	57.4	51.1	48	47.5
62	01:49	54.7	84.3	68.7	46.3	59.2	58	52.8	48.6	48
63	02:04	53.4	83	67.9	46.2	57.9	56.7	51.3	48.5	47.7
64	02:19	54.4	84	70.2	45.3	58.2	57.1	52.3	48.7	48.1
65	02:34	53.4	83	72	45.9	57.7	56.2	51.6	48.1	47.6
66	02:49	53.1	82.7	70.1	44.9	57.6	56	51.2	47.7	46.9
67	03:04	51.9	81.5	69.8	44.2	56.3	55.2	49.7	46.4	45.9
68	03:19	52.2	81.8	67.4	45.2	56.6	55.6	50.3	47.1	46.7
69	03:34	52.7	82.3	76.4	45.2	57.1	55.8	50.5	47.3	46.7
70	03:49	52.3	81.9	62.1	45.2	57.5	56.4	50	47.4	46.9
71	04:04	52.8	82.4	63	45.9	57	56.2	51.1	48.1	47.7
72	04:19	52.6	82.2	72.2	46.1	56.8	55.7	50.7	47.9	47.5
73	04:34	52.3	81.9	67.9	46.2	56.6	55.6	50.3	47.6	47.3
74	04:49	52.3	81.9	66.6	45.4	56.6	55.5	50.7	47.5	47.1
75	05:04	52.5	82.1	63.1	45.3	57.3	55.6	50.3	47.3	46.8
76	05:19	53	82.6	69.4	46	57.5	56.3	50.9	48.2	47.7
77	05:34	54	83.6	67.2	46.5	58	56.9	52.6	49.4	48.9
78	05:49	55.3	84.9	69.4	48.5	59.4	58	53.4	50.1	49.7
79	06:04	55	84.6	67.7	49.5	58.8	57.9	53.7	50.9	50.6
80	06:19	54.4	84	67	48.1	58.1	57.1	53.1	49.9	49.6
81	06:34	55.7	85.3	70.5	48.9	59.6	58.5	54.5	51.6	51.2
82	06:49	58.5	88.1	78.3	48.9	60.8	59.2	55.7	52.6	51.8
83	07:04	56.9	86.5	74.8	49.2	59.6	57.8	54.3	51.7	51.1
84	07:19	57.2	86.8	66.6	50.9	60.9	60	56.2	53.5	52.8
85	07:34	57.8	87.4	68	51.8	61.1	60	57.2	54.6	54.1
86	07:49	57.1	86.7	70.7	50.3	60.3	59.6	56.5	52.8	52.2
87	08:04	58.6	88.2	70.9	51.7	62.6	61.1	57.4	54.3	53.8
88	08:19	59.1	88.7	76.6	53	62.1	60.4	57.2	55.5	55
89	08:34	80	109.6	102.4	54.1	73.8	68.8	59.3	56.3	55.8
90	08:49	64.6	94.2	86.6	54.1	68.9	65.8	59.3	56.8	56.4
91	09:04	65.3	94.9	92.7	54.7	67.2	64.5	58.9	56.7	56.3
92	09:19	69.4	99	90.2	54.1	73.2	67.3	58	56.3	55.9
93	09:34	63.2	92.8	84.3	53.8	66.5	63.4	58.7	56	55.5
94	09:49	58.7	88.3	80.2	54	61.9	60	57	55.4	55.1
95	10:04	69.5	99.1	92.5	53.9	73	67.5	57.6	55.9	55.5
96	10:19	59.7	89.3	78.7	53.8	63.6	61.3	57.6	55.8	55.5

APPENDIX 'B'

Photos, Drawing and Sketch

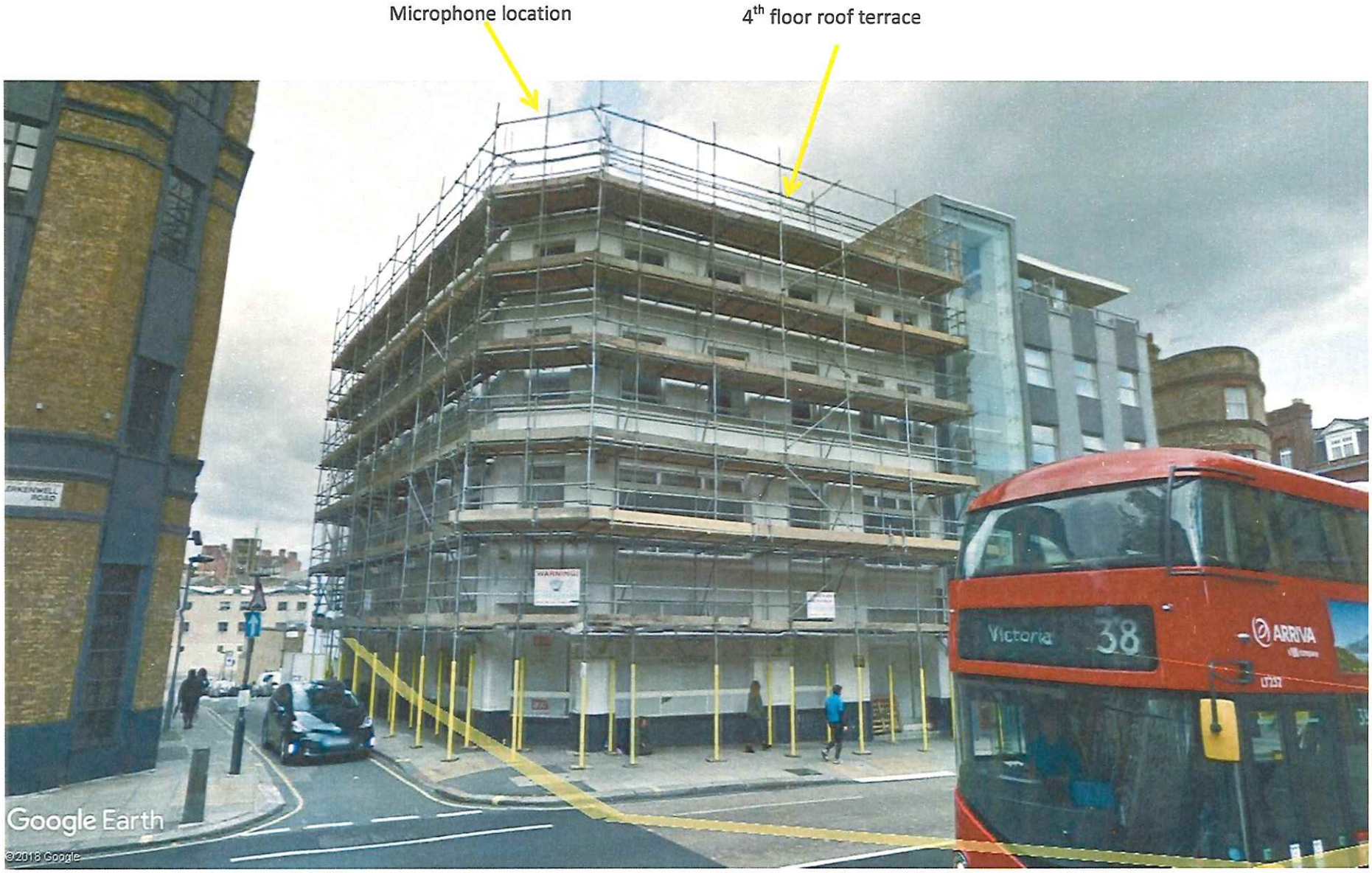


PHOTO A: Front of building at 150-152 Clerkenwell Road looking down Eyre Street Hill.

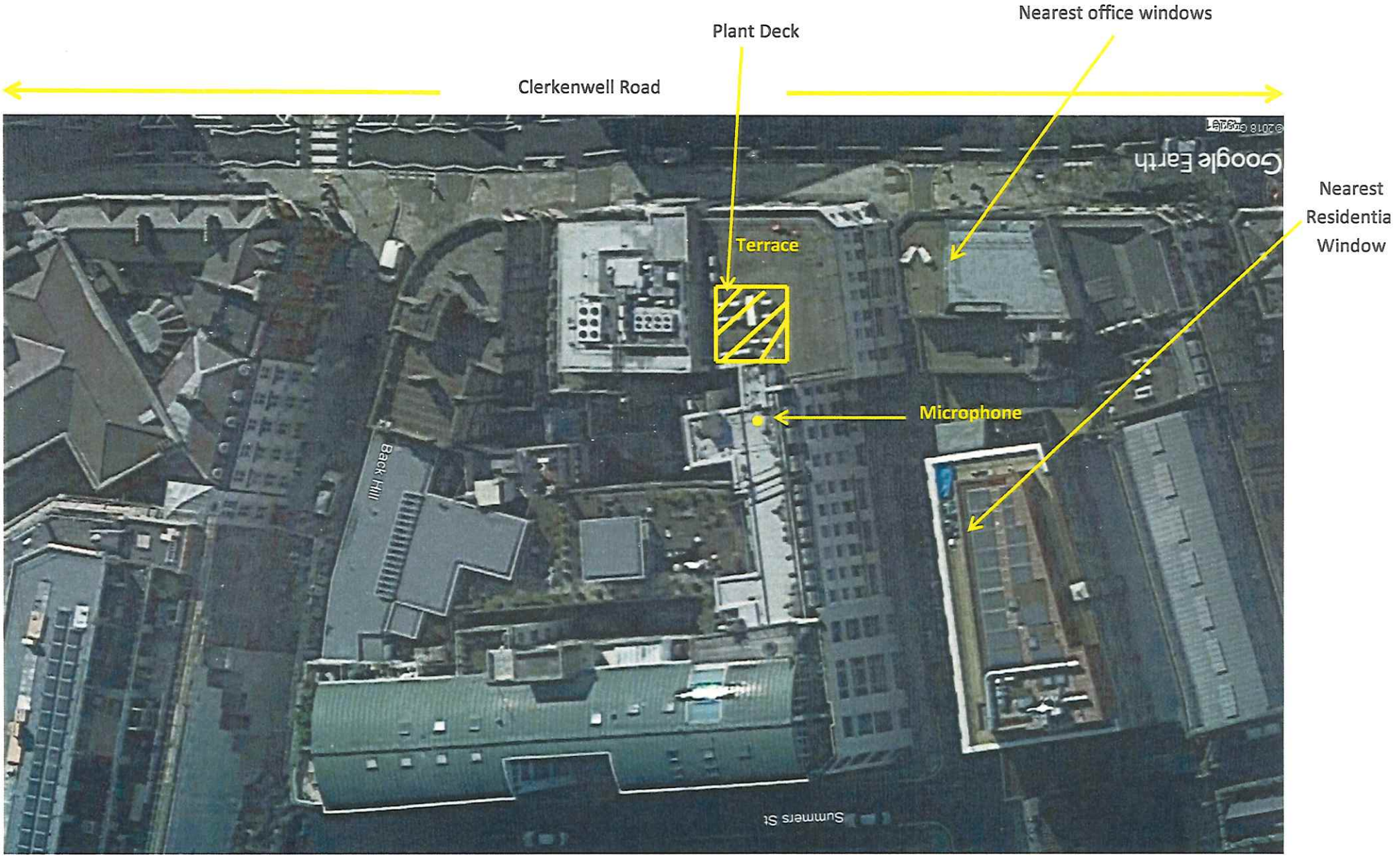


PHOTO B: Aerial view of 150-152 Clerkenwell Road showing terrace, microphone and plant locations

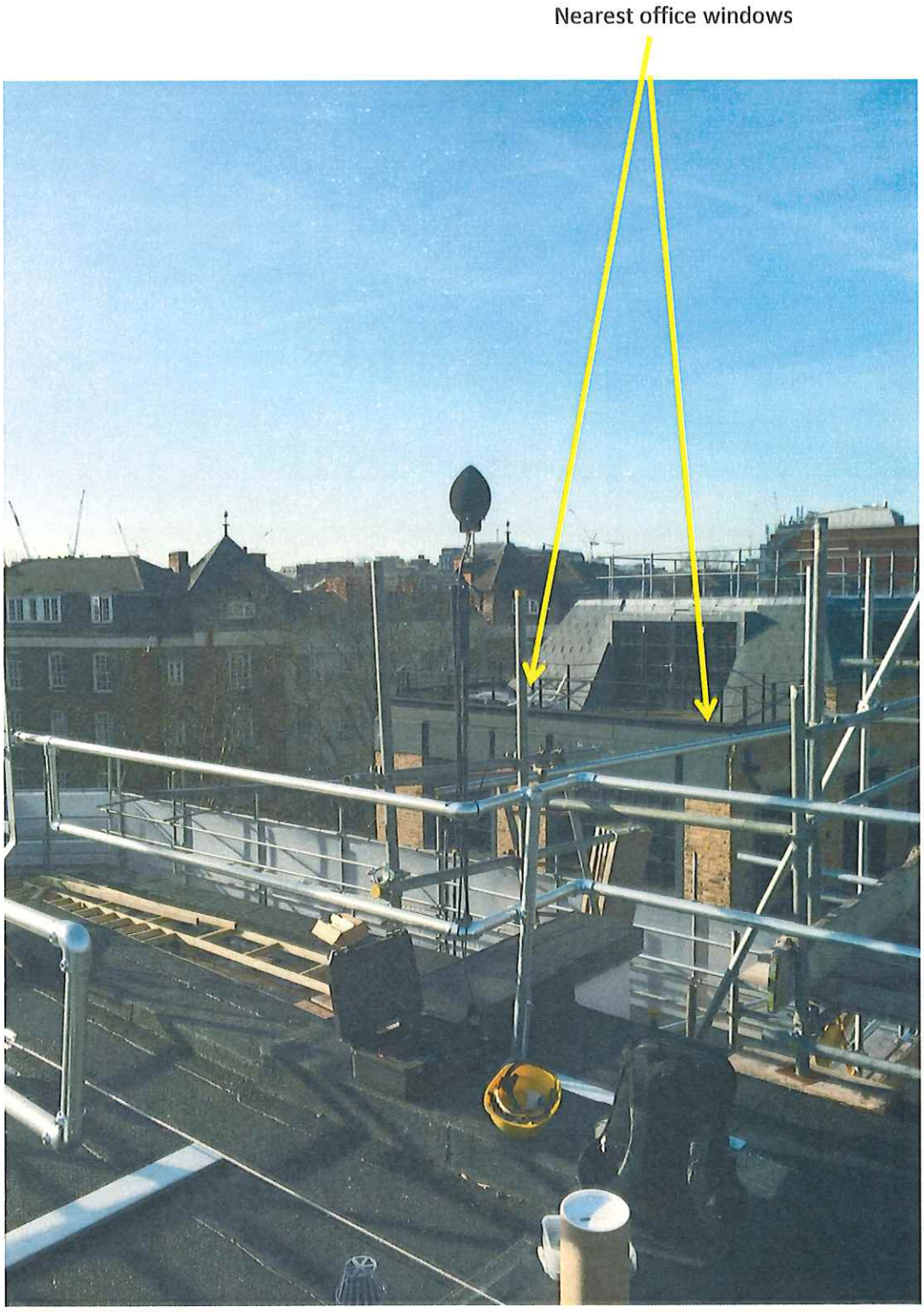


PHOTO C: Location of microphone on boom on 5th floor roof railings

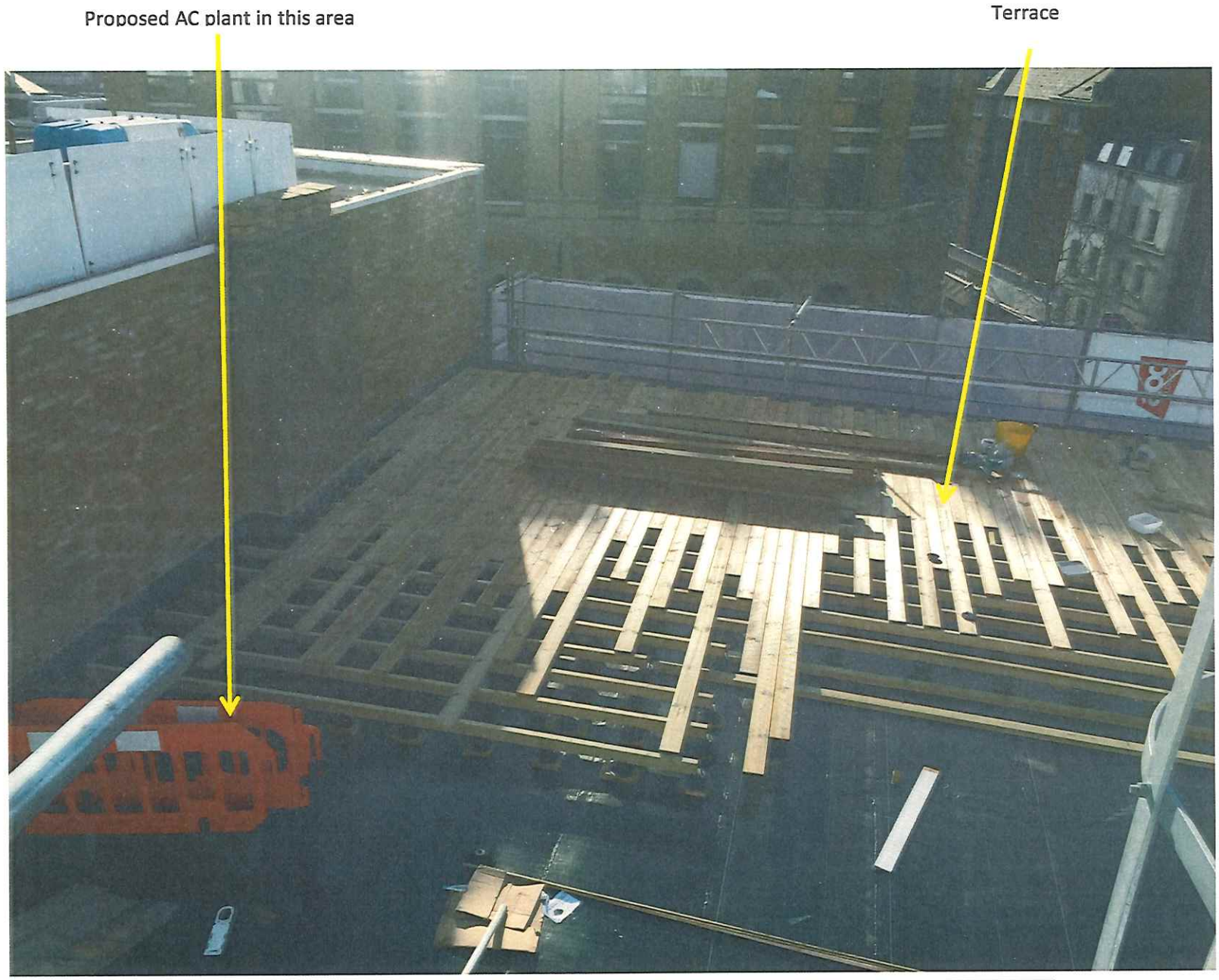


PHOTO D: View from 5th floor roof looking down onto front fourth floor terrace area

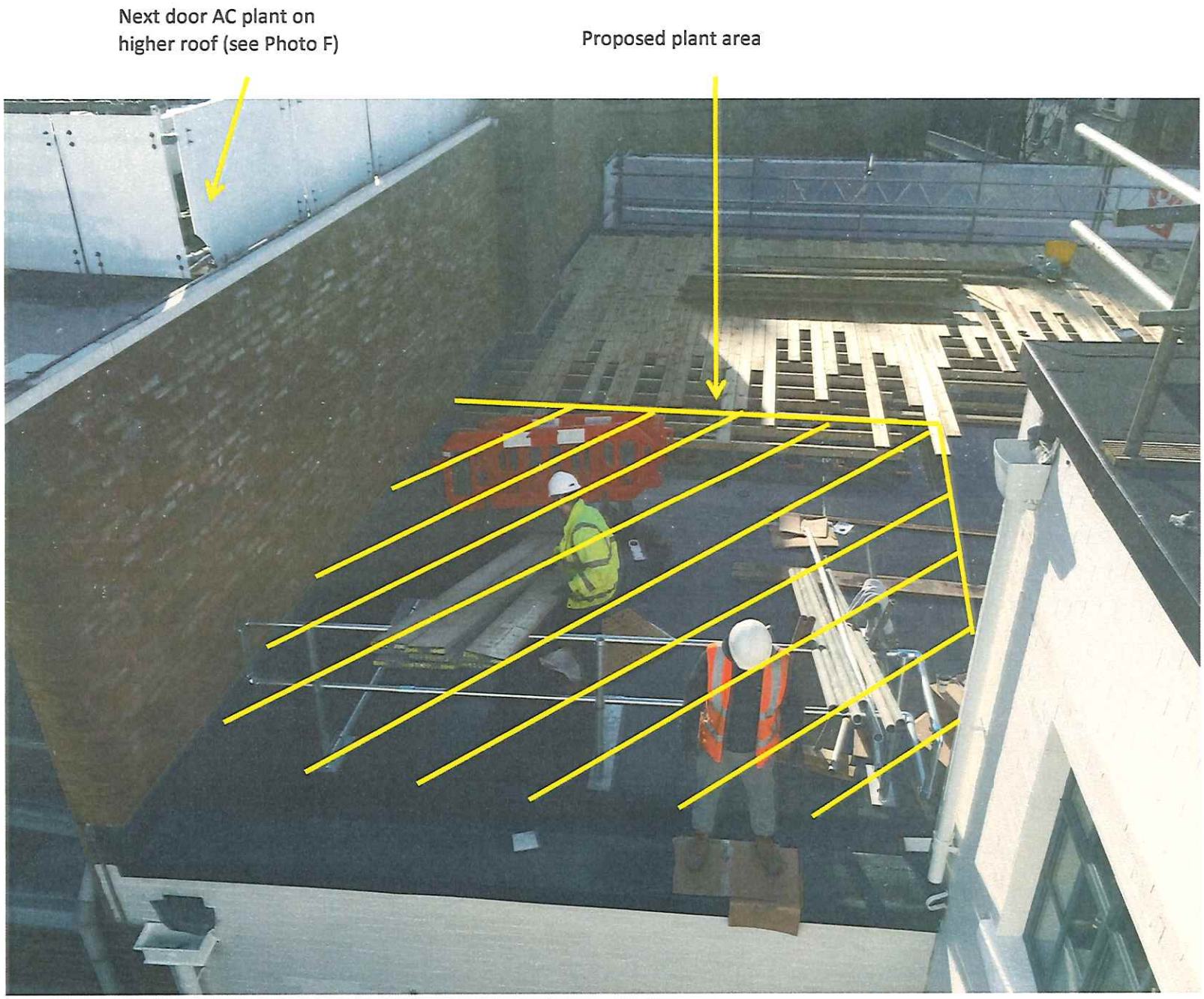
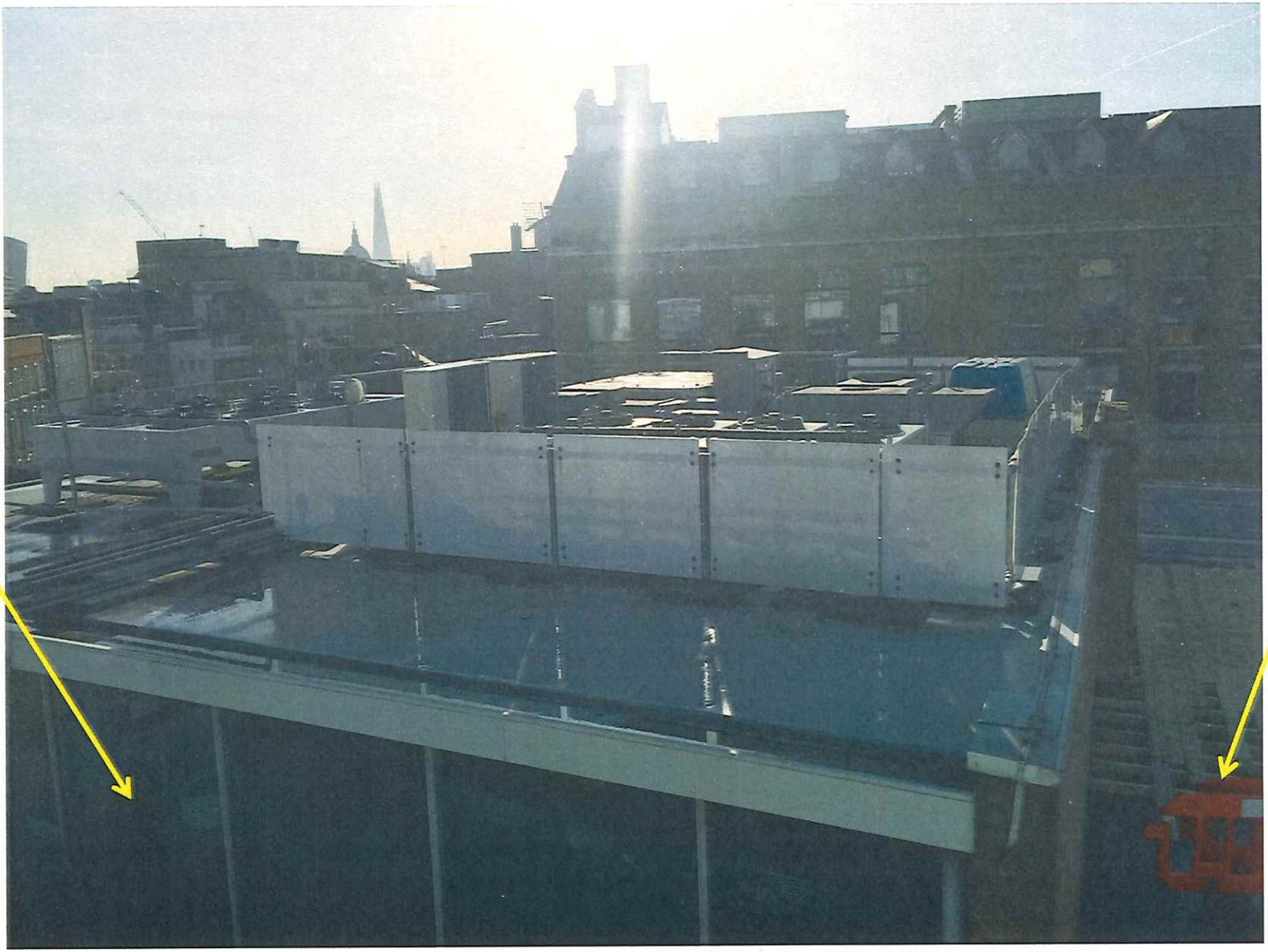


PHOTO E: View of plant area on fourth floor

Offices below (see Photo G)



Proposed 4th floor roof plant area

PHOTO F: Roof area of adjacent building with AC plant behind glass screens

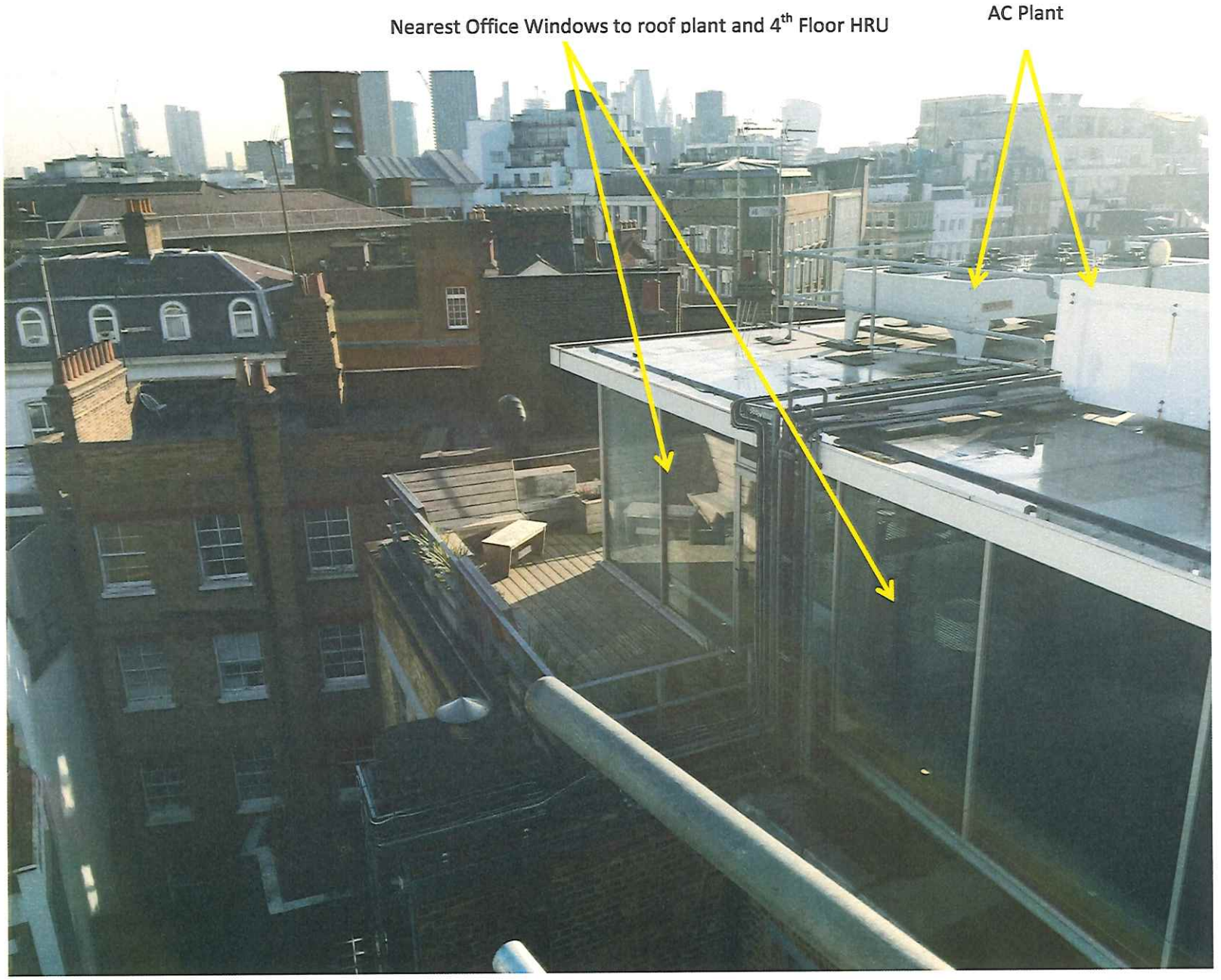


PHOTO G: Office windows below next door plant

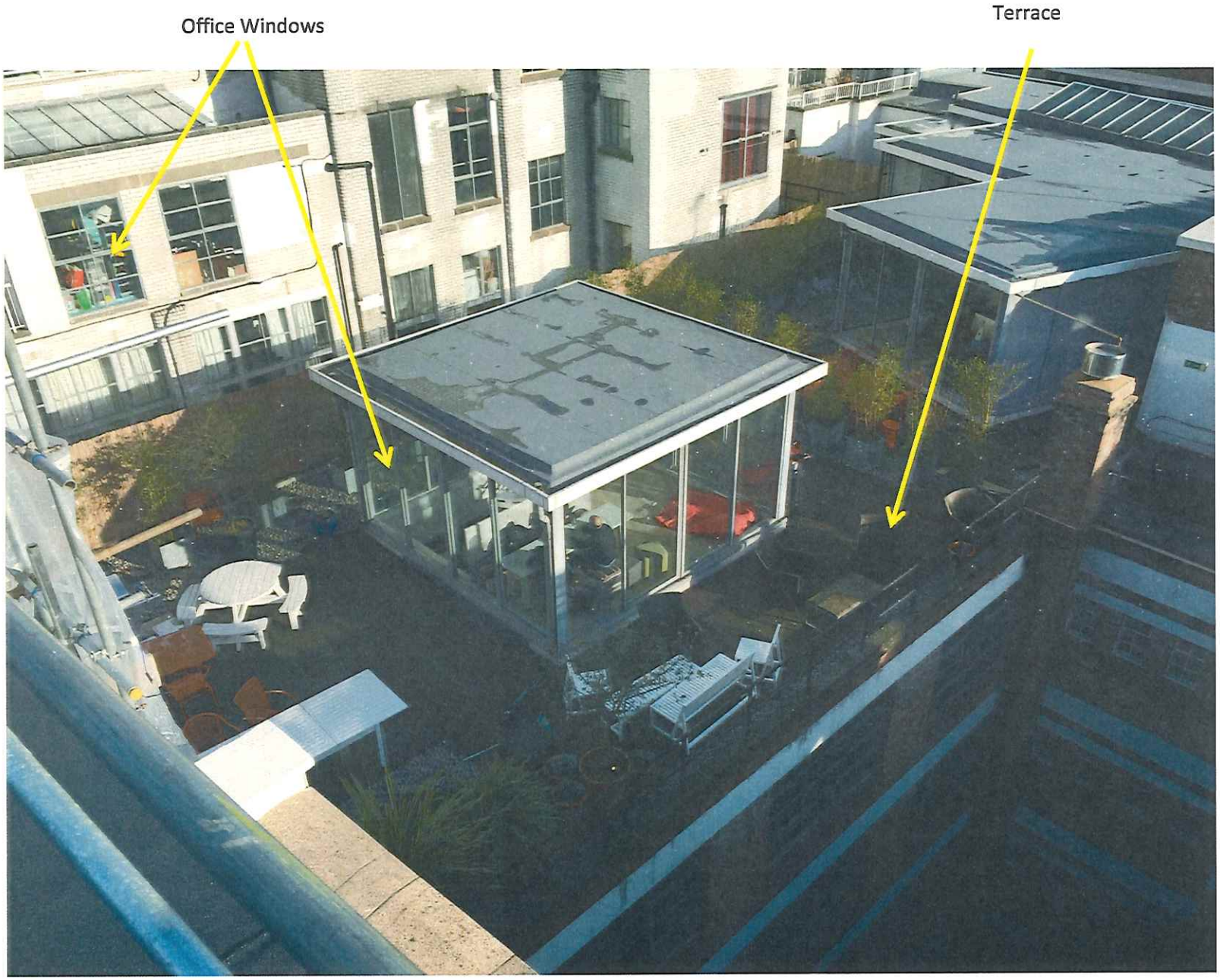


PHOTO H: Lower terrace area and offices behind

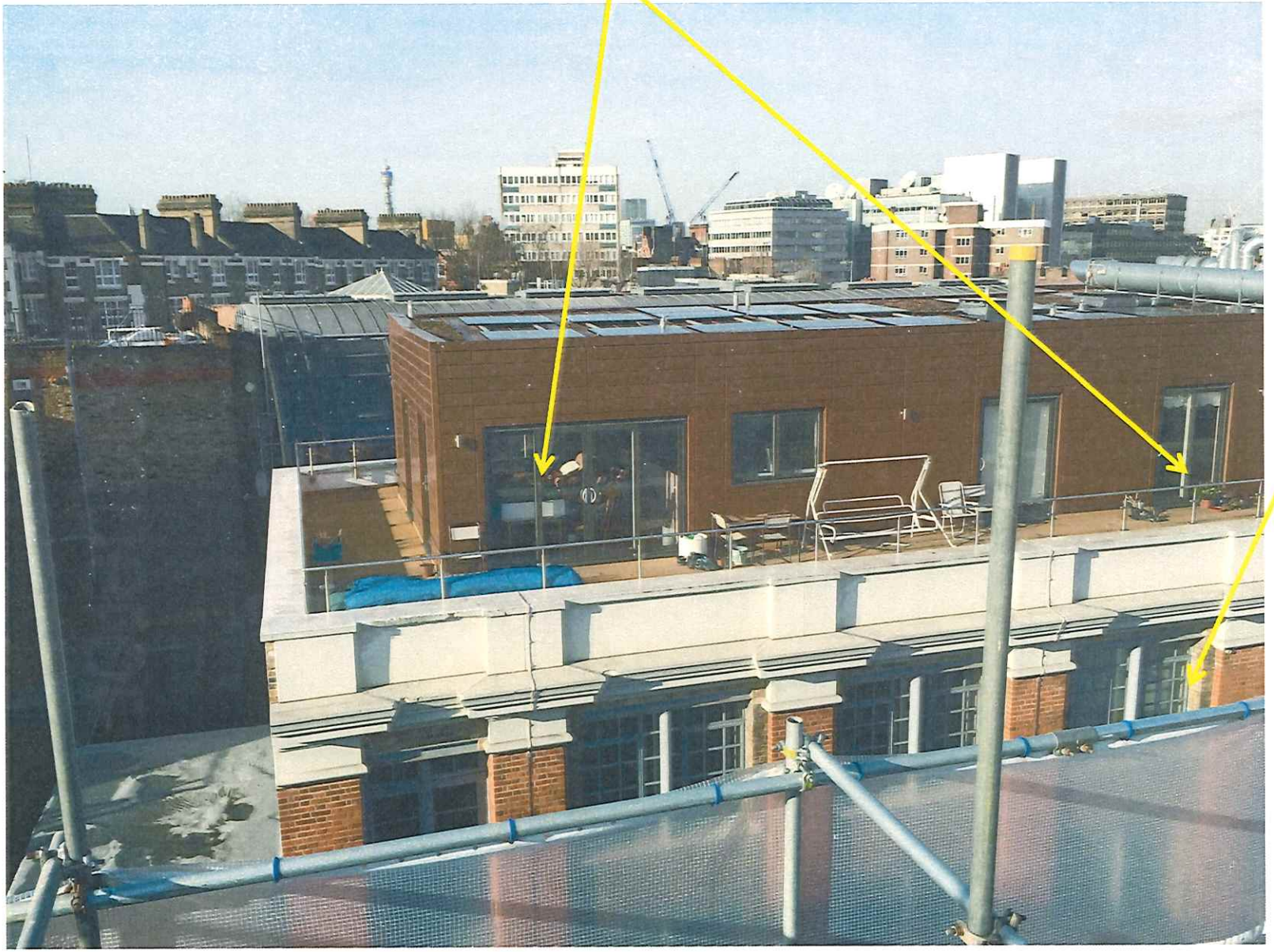


PHOTO J: View across Eyre Street Hill to residential units

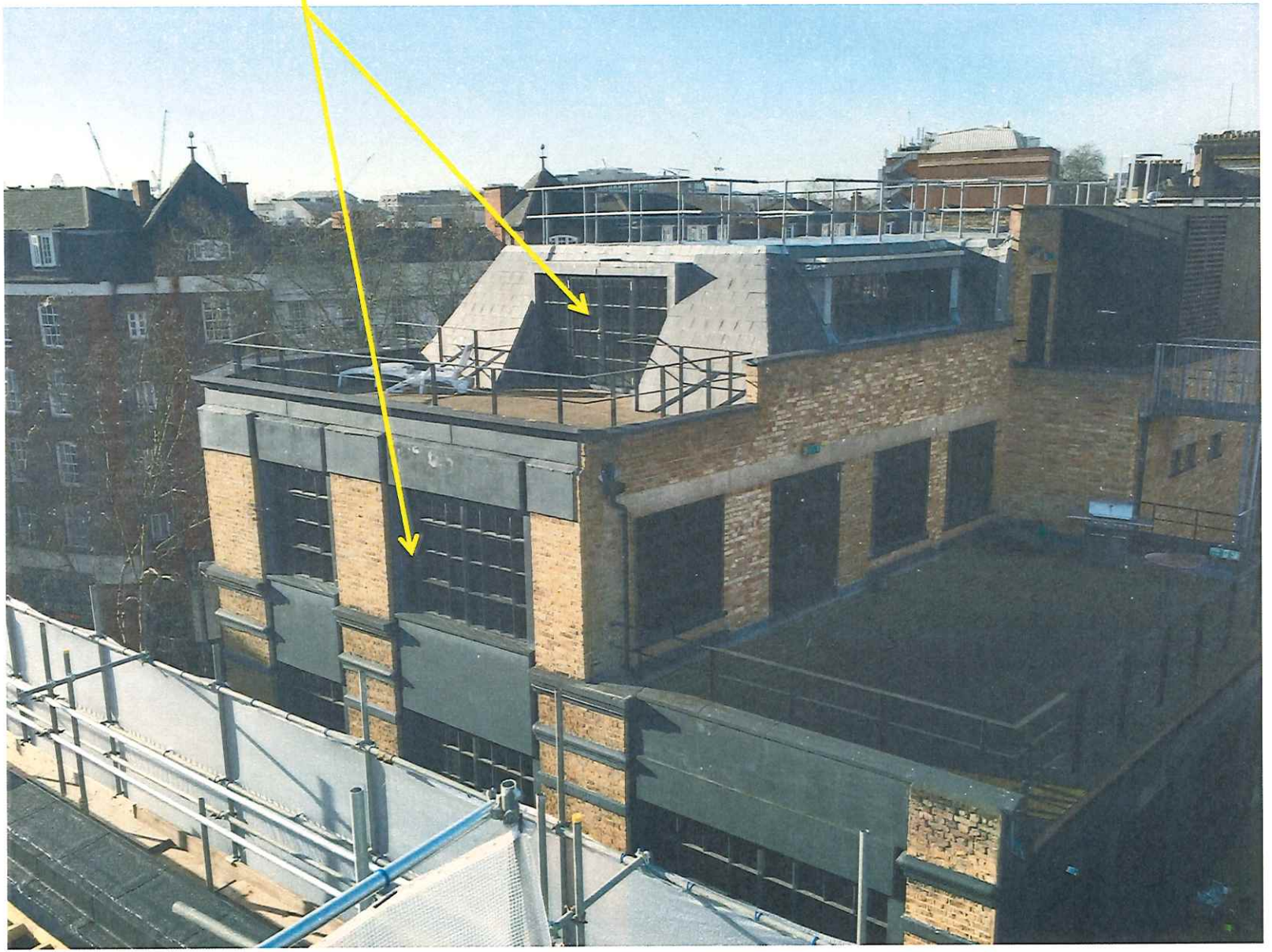


PHOTO K: View across Eyre Street Hill to offices at front of building

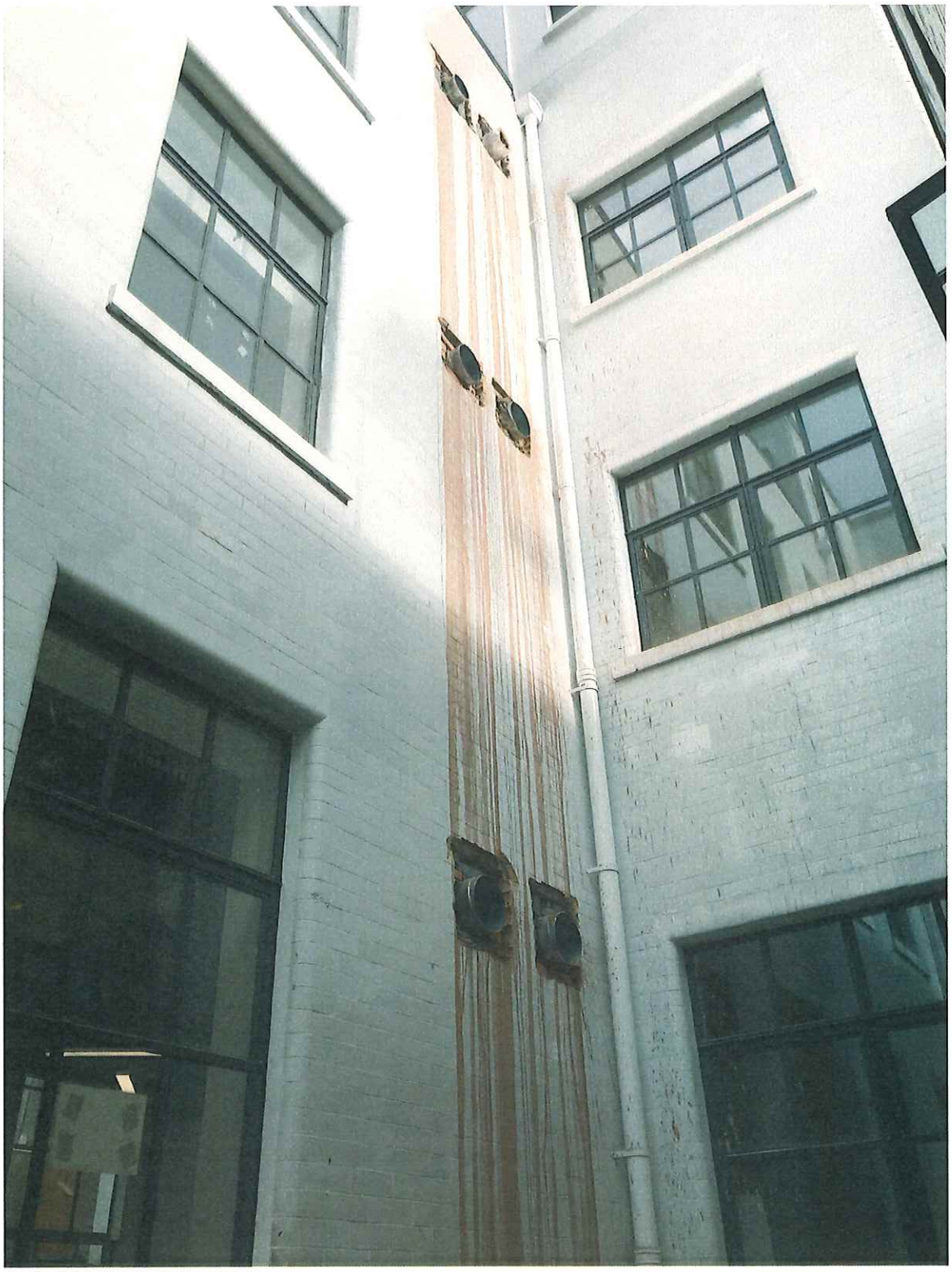


Photo L – Rear of Building with intake & discharges of 1st, 2nd & 3rd floor heat recovery units

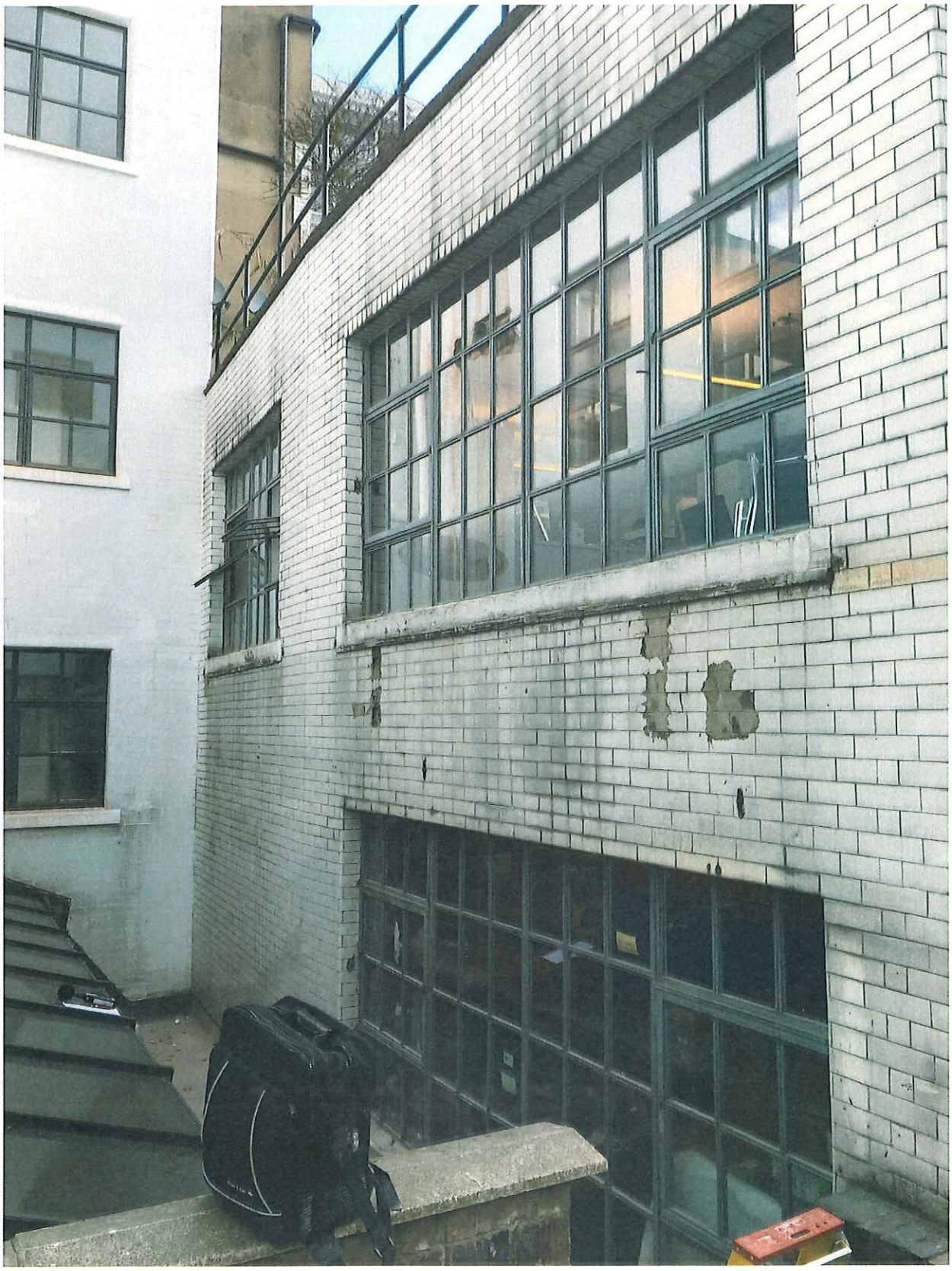
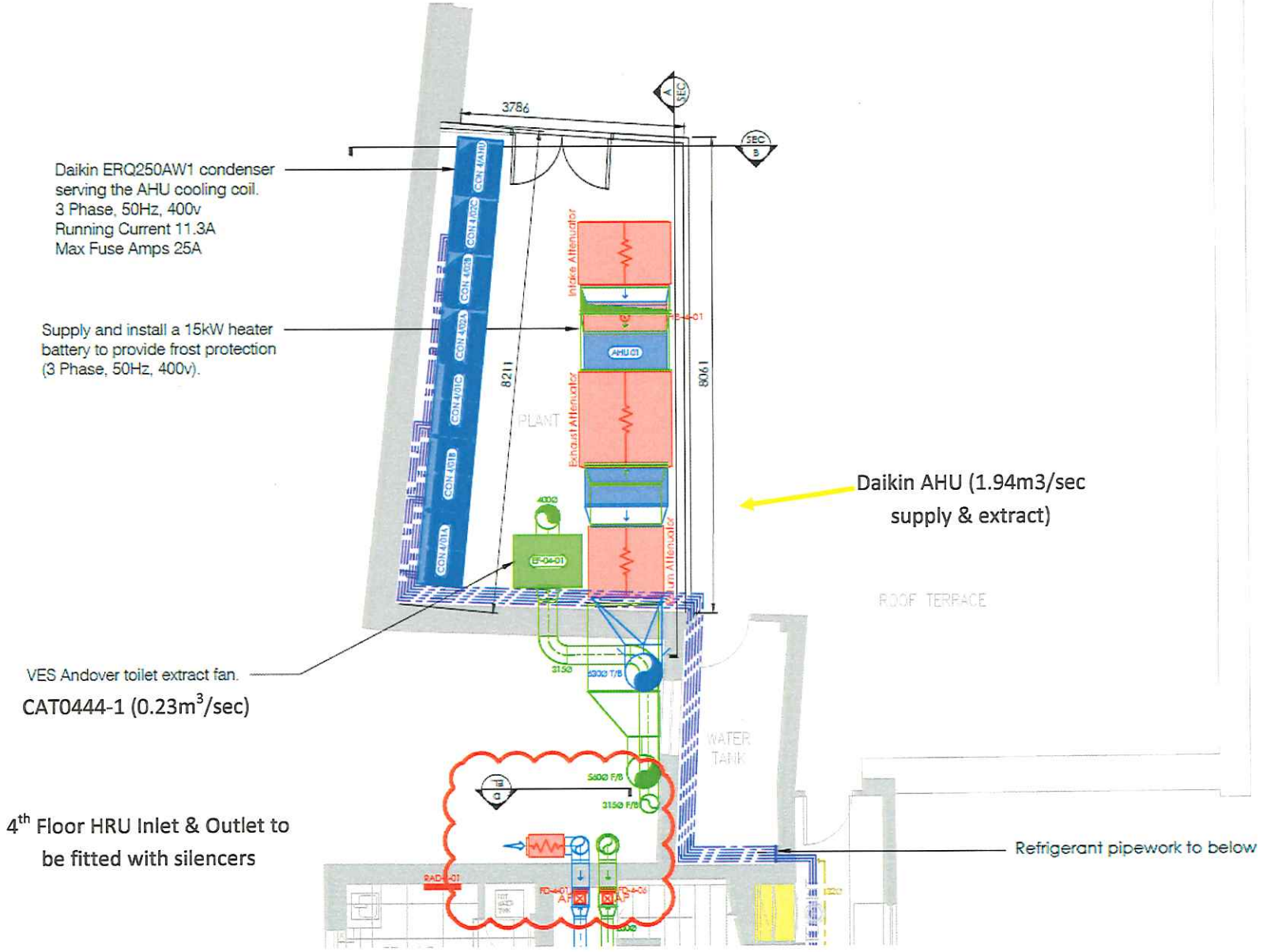
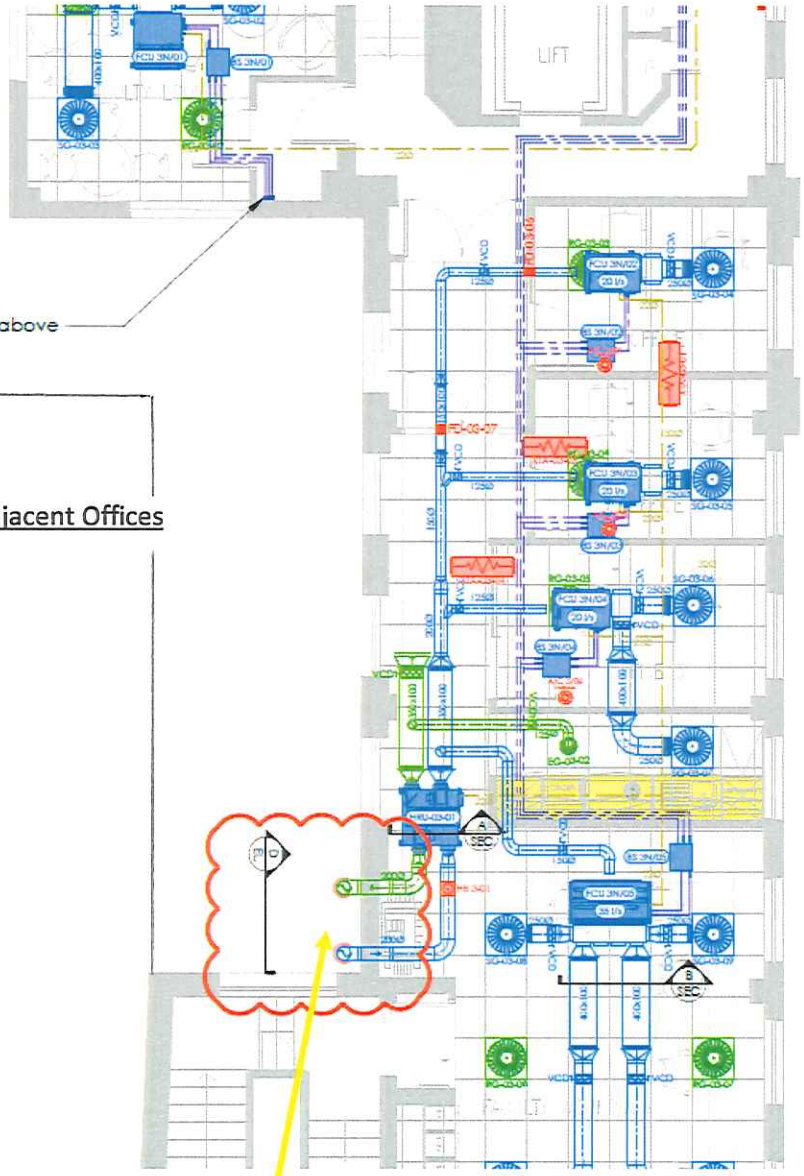


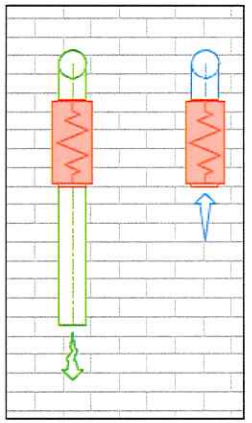
Photo M – Office windows immediately opposite 1st, 2nd & 3rd floor HRU intakes/discharges

Photo N – Ground Floor HRU intake & discharge in basement light well



Part of Conditioned Environment's Drawing
No.4424-M-04-MEC-01 U





Elevation D scale: 1:50

1st, 2nd & 3rd Floor HRU Intakes & discharges fitted with silencers

Part of Conditioned Environment's Drawing No.4424-M-04-MEC-01 U