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Building Services Engineering | Sustainability | Acoustics

Camden Karma Kitchens – Arches E4, 5, 6 & 7

LabTech

Kitchen Ventilation Design Report

P02

20/11/2020

Scotch Partners LLP
Building Services Engineering | Sustainability | Acoustics

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Project Particulars

Client Name: LabTech

Project Name: Camden Karma Kitchens – Arches E4, 5, 6 & 7

Project Number: 5269

Document Reference: SP-ZZ-ZZ-RP-M-002

Disclaimer

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Revision History

Revision	Description	Date	Prepared By	Checked By
P01	Issued for Planning	17/11/20	TC	JQ
P02	Incorporating GE comments	20/11/20	TC	JQ

Contents

1 Introduction

This document has been prepared in support of the change of use application in connection with the Karma Kitchen development within the Hawley Wharf complex in Camden.

The proposed development comprises of the refurbishment of 4 Number Artisan Railway Arches (E4, E5, E6 & E7) to provide shared kitchens at Ground floor and Mezzanine levels within each arch. There will be a total of 13 shared kitchens divided between the 4 arches.

Arch E4

Comprises of six shared kitchens, three located at Ground Level and three located at Mezzanine Level, each between 19 to 25 m^2 in floor area and will each include cooking, preparation, and wash-up facilities.
Cooking equipment for all areas will initially comprise multiple of 4 burner gas ranges on gas ovens along with gas combination steamer ovens.

Arch E5

Comprises of two shared kitchens, one located at Ground Level @ 15 m^2 in floor area and one kitchen located at Mezzanine Level @ 30 m^2 in floor area and will each include cooking, preparation, and wash-up facilities.
Cooking equipment for all areas will initially comprise multiple of 4 burner gas ranges on gas ovens along with gas combination steamer ovens.

Arch E6

Comprises of three shared kitchens, one located at Ground Level and two kitchens located at Mezzanine Level, each between 19 m^2 and 44 m^2 in floor area and will each include cooking, preparation, and wash-up facilities.
Cooking equipment for all areas will initially comprise multiple of 4 burner gas ranges on gas ovens along with gas combination steamer ovens.

Arch E7

Comprises of two shared kitchens, one located at Ground Level @ 20 m^2 in floor area and one kitchen located at Mezzanine Level @ 21 m^2 in floor area and will each include cooking, preparation, and wash-up facilities.
Cooking equipment for all areas will initially comprise multiple of 4 burner gas ranges on gas ovens along with gas combination steamer ovens.

This document is intended to set out Scotch Partners proposed approach to ensuring no nuisance, disturbance or loss of amenity is caused by odour, fumes, food droplets or noise from our ventilation systems to nearby properties.

2 Information on Premises

A total of thirteen kitchen are proposed in the four Arches, all of which may be shared between different users at different times.

Information on each proposed kitchen is provided in the table below. We understand that the kitchens will operate 24 hours/day across 3 8-hour shifts, although capacity at night is significantly reduced at circa 20% of full daytime capacity.

Unit	End user	Kitchen Area m^2	Cooking Equipment	Meal type(s)
E4-A Gnd.	Various	25	4 burner gas range on gas oven. Gas combi steamer.	Unknown
E4-B Gnd.	Various	19	4 burner gas range on gas oven. Gas combi steamer.	Unknown
E4-C Gnd.	Various	19	4 burner gas range on gas oven. Gas combi steamer.	Unknown
E4-A Mezz	Various	22	4 burner gas range on gas oven. Gas combi steamer.	Unknown
E4-B Mezz	Various	22	4 burner gas range on gas oven. Gas combi steamer.	Unknown
E4-C Mezz	Various	20	4 burner gas range on gas oven. Gas combi steamer.	Unknown
E5 Gnd.	Various	15	4 burner gas range on gas oven. Gas combi steamer.	Unknown
E5 Mezz	Various	30	4 burner gas range on gas oven. Gas combi steamer.	Unknown
E6 Gnd	Various	44	4 burner gas range on gas oven. Gas combi steamer.	Unknown
E6-A Mezz	Various	21	4 burner gas range on gas oven. Gas combi steamer.	Unknown
E6-B Mezz	Various	19	4 burner gas range on gas oven. Gas combi steamer.	Unknown
E7 Gnd	Various	20	4 burner gas range on gas oven. Gas combi steamer.	Unknown
E7 Mezz	Various	21	4 burner gas range on gas oven. Gas combi steamer.	Unknown

3 Risk Assessment for Odour

3.1 Risk Assessment Methodology

The EMAQ Guide (Control of Odour and Noise from Commercial Kitchen Exhaust Systems) advises that a risk assessment for odour to be carried for each premise to determine the level of odour control required.

The risk for each premises has been assessed using the following scoring methodology.

Impact Risk	Odour Control Requirement	Significance Score
Low to Medium	Low level of odour control	Less than 20
High	High level odour control	20 to 35
Very High	Very high level of odour control	More then 35

Criteria	Details	Score
A. Dispersion	Low level discharge	20
	Not low level but below eaves, or discharge < 10 m/s	15
	Discharging 1m above eaves Between 10 m/s and 15 m/s	10
	> 15 m/s	5
B. Proximity of receptors	< 20m	10
	Between 20 and 100m	5
	> 100m	1
C. Size of kitchen	> 100 covers	5
	Between 30 and 100 covers	3
	< 30 covers	1
D. Cooking type (odour and grease loading)	Fried food, fish and chips	10
	Indian, Chinese, steakhouse	7
	Gas fired	4
	Mainly reheating and sandwiches	1

3.2 Risk Assessment Results

The risk assessment results for each food and beverage outlet are set out in the table below.

Unit Served	End User	A	B	C	D	Total Score	Impact Risk
E4-A Gnd.	Various	15	10	5	4	34	High
E4-B Gnd.	Various	15	10	5	4	34	High
E4-C Gnd.	Various	15	10	5	4	34	High
E4-A Mezz	Various	15	10	5	4	34	High
E4-B Mezz	Various	15	10	5	4	34	High
E4-C Mezz	Various	15	10	5	4	34	High
	Various						
E5 Gnd	Various	15	10	5	4	34	High
E5 Mezz	Various	15	10	5	4	34	High
	Various						
E6 Gnd	Various	15	10	5	4	34	High
E6-A Mezz	Various	15	10	5	4	34	High
E6-B Mezz	Various	15	10	5	4	34	High
	Various						
E7 Gnd	Various	15	10	5	4	34	High
E7 Mezz	Various	15	10	5	4	34	High

3.3 Risk Assessment Findings

3.3.1 High Impact Risk

The units identified with high impact risk incorporate cooking methods with moderate to high odour potential, grease content and smoke content.

On this basis we have proposed an odour abatement system providing a high level of grease and odour control using:

- Grease filters in canopies
- In-line single pass electrostatic precipitator (ESP) in combined ducts
- Second stage control: Activated Carbon filters

This package of measures will provide a high level of odour and grease control in accordance with the EMAQ guidance.

4 Extraction Canopies

All kitchens within each arch are to be served by a common extraction and make-up air mechanical ventilation systems, capable of maintaining the internal working environment within comfortable temperature, moisture, and air quality levels. The extraction systems are also to be designed to avoid contributing more than 70dB of noise at the operator location in accordance with the Control of Noise at Work Regulations 2005.

The extract fans will have VSD (Variable Speed Drive) operation and will ramp up and down dependent upon kitchen demand and extract vent use. Each Extract hood duct branch will have a VAV (Variable Air Volume) damper which will close and open upon demand. This will assist noise control as the main Kitchen Extract Fans will run on lower speed if/when kitchens are not in use.

Each kitchen is to be provided with one or more extraction canopies to suit the number and sizes of cooking equipment.

4.1 Determining Flow Rates

Estimated extract air flow rates for each kitchen have been determined by Scotch Partners using industry standard methods.

These rates provided will be the greater of:

a) a rate calculated on 40 air changes per hour for commercial kitchens.
b) a rate calculated the air using the thermal convection method.

Calculated in this way the thermal convection method is the greater with an estimated total extract air-flow rates for each kitchen at 0.558m³/s. Note that each kitchen will have the same number and type of heat generating Appliances.

4.2 Canopy Type and Dimensions

Each extraction canopy is to be an overhead wall type and is to be designed to achieve the following.

- A maximum internal depth of 600mm
- A minimum 250mm exceedance of the plan dimensions of the catering equipment on each free side.
- A minimum canopy height of between 2000 and 2100mm.
- A minimum distance of 1000mm between the lowest edge of the grease filter and the cooking surface. (This is above 450mm minimum to minimise the risk of fire in the grease filter).

Canopies are generally to be in multiples, each canopy being approximately 1.8 m long x 1.3 m deep in plan area, to suit the cooking area below.

5 System Operation

5.1 Units with High Impact Risk

The extraction systems are to operate in the following stages.

- Cooking pollutants/emissions captured by kitchen canopy baffle type grease filters
- Particulate containments removed using in line ESP in combined extract ducts
- Second stage of control: Site Safe activated Carbon filters to remove malodorous gases through the process of chemical absorption
- Centrifugal fans provide pressure rise to match system resistance
- Discharge attenuators to attenuate noise to meet Local Authority noise criteria

5.2 Extract System Component Details

5.2.1 System Layouts

Refer to the provided sketch drawings in Appendix D of this document for the layout and locations of equipment, ductwork, and exhaust discharge points.

5.2.2 Cooker Hood (Incorporating Grease Filters & UV system)

Product data for the cooker hood and grease filters is to be supplied by the kitchen consultant as standalone appendix to this document.

5.2.3 Electrostatic Precipitators (ESPs)

Single pass ESP units will be provided, specifically designed for kitchen extract usage, and will incorporate integral sumps to collect the oil, grease and smoke particles filtered out of the exhaust. The ESPs will operate to separate particles down to 0.01 micron at an operating efficiency of up to 98%.

An indicative schedule for the proposed ESPs is provided in appendix A.

5.2.4 Activated Carbon Filters

Activated carbon filters with a residence time of 0.2-0.4 seconds will be provided will be provided to reduce odorous gaseous molecules in the exhaust air stream via chemical adsorption.

The provision of the ESPs ahead of the carbon filter bank will maximise filtration performance and lifespan by removing larger particulates from the airstream ahead of the filter ban.

5.2.5 Fans

The kitchen extract fans are to be selected in accordance with the following general requirements.

- Backward curved centrifugal impellers
- Out-of-airstream motors
- Mounted within acoustically lined box frame
- Frequency inverter speed control

Fan noise (breakout and induct) has been considered in the selection of the fans to ensure that the noise emissions of the systems do not exceed the levels set out in Noise Impact Assessment

5.2.6 VAV controllers

Duct branch from each canopy to have a Variable Air Volume control damper that will open and shut to the dictates of the kitchen operation. This will send a signal back to the Extract Fan VSD controller to ramp up and down fan speed accordingly.

5.2.7 Anti-vibration Mountings

All fixed building services equipment associated with the kitchen extract systems are to be provided with suitable anti-vibration mountings selected in accordance with CIBSE Guide B4. All fans will be installed with spring type anti-vibration mounts achieving a minimum 25mm static deflection.

5.2.8 Acoustic impact assessment

Noise emissions from the plant need to be controlled to manage the risk of nuisance to the adjacent sensitive receptors, including adjacent residential neighbours and new residential units located within the development.

There is a condition stipulated within the planning decision notice for the wider scheme (reference 2020/0362/P) that is considered relevant to the proposals, as below.

"Condition 53.

Noise levels at a point 1 metre external to the sensitive facades shall be at least 5dB(A) less than the existing background measurement (L_{A90}), expressed in dB(A) when all plant/equipment (or any part of it) is in operation unless the plant/equipment hereby permitted will have a noise that has a distinguishable, discrete continuous note (whine, hiss, screech, hum), then the noise levels from that piece of plant/equipment at any sensitive facade shall be at least 10dB(A) below the L_{A90}, expressed in dB(A).

Reason: To safeguard the amenities of [adjoining] premises [and the area generally] in accordance with policy CS5 of the London Borough of Camden Local Development Framework Core Strategy and policies DP26 and DP28 of the London Borough of Camden Local Development Framework Development Policies."

Hoare Lea have previously provided advice pertaining to the above condition, based on the results of an external noise survey they conducted around Camden CLV site. From their *Noise Assessment for Planning (Revision 03 – 05.02.2018)* the following noise emission limits have been derived, as they would be applicable to the proposed works:

- Daytime (07:00-23:00): 43 dB $L_{Aeq,T}$
- Night (23:00-07:00): 40 dB $L_{Aeq,T}$

These limits would apply at the façade of the nearest noise sensitive buildings that existed around the site, prior to the completion of the wider development. These limits are based

on plant that has no distinguishable, discrete continuous note. If any such note exists, then noise emission from that specific item of plant would need to be 5 dB lower still. To control noise to properties within the new wider development, Hoare Lea proposed that plant noise emission be controlled to not exceed a level of 45 dB $L_{Aeq,T}$ at 1m from any new residential facades built as part of the development (i.e. Building C, and D/E).

Noise emission from the new building services plant, including the kitchen extract fans, will be controlled to satisfy these same design targets.

6 Inspection, Cleaning & Maintenance Requirements

6.1 General

The inspection, cleaning and maintenance regimes for the extraction systems shall follow the guidance set out in B&ES DW/172, TR/19 and the manufacturers recommendations. Some of the key maintenance activities and service intervals are set out below and should be incorporated into the operation & maintenance manuals for the systems.

6.2 Electrostatic Precipitators (ESPs)

The manufacturer requires that the ESP units are internally inspected and cleaned at an interval ranging between 1 week and 3 months dependent on the operating conditions. We would propose that the units are initially inspected on a frequent (weekly) basis which can be relaxed to suit the actual operating conditions as they become apparent for each unit.

6.3 Activated Carbon Filters

Carbon filters protected by an electrostatic precipitator should be replaced on an interval between 6-12 months based on typical wear and industry best practice guidance. We would propose that the carbon filters are inspected on the same inspection schedule as the ESPs to ensure they are frequently inspected for signs of grease and particulate build-up.

6.4 Extract Canopies & Ductwork

All exposed metal surfaces of the ductwork and extract canopies within the kitchen area should be inspected at least weekly to ensure that there is no accumulation of grease or dirt, or surface damage.

The baffle type grease filters contained within the canopy should be removed and cleaned on a minimum weekly basis.

Specialist cleaning of the internal surfaces of the ductwork surfaces will be required on a periodic basis which should be advised by a specialist cleaning contractor based on the intensity of usage, however initially this is likely to be on a 3 monthly basis.

6.5 Extract Fans

The internal surfaces of the extract fans should be inspected and cleaned at the same intervals as the ductwork to prevent any build-up of grease or dirt.

7 Conclusion

The risk of nuisance odours, fumes, food droplets and noise pollution arising due to the proposed Karma Kitchen development has been assessed in accordance with the EMAQ guidance.

Prior to any treatment measures being applied the risk of nuisance was assessed to be high, primarily due to the proximity to adjacent sensitive receptors.

A package of measures has been proposed to reduce the odour, fume, food droplet and noise emissions from the development to acceptable levels in accordance with industry best practice guidance and the requirements of the Local Authority. This includes electrostatic precipitators (ESPs) and activated carbon filters to remove odours, fumes, and food droplets from the exhaust air and in-line duct attenuators to reduce noise emissions.

The recommended inspection, cleaning and maintenance intervals for the equipment have been defined and following these recommendations will help to ensure the effective and efficient ongoing operation of the plant.

8 Appendix A – Equipment Details

Refer to separate appendices for details of the following equipment:

- ESP'S – manufacturers data
- Activated Carbon Filters
- Extract Fans – manufacturers data

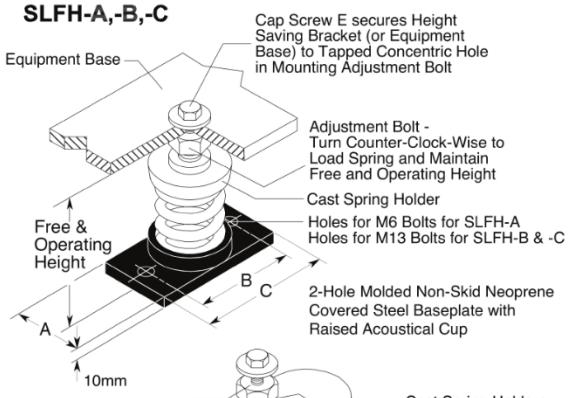
9 Appendix B - Typical Anti-vibration Mount for Fans

MASON INDUSTRIES, Inc.
Manufacturers of Vibration Control Products
350 Rabro Drive, Hauppauge, NY 11788, 631/348-0282, FAX 631/348-0279, Info@Mason-Ind.com
2101 W. Crescent Ave., Suite D, Anaheim, CA 92801, 714/535-2727, FAX 714/535-5738, Info@MasonAnaheim.com
www.Mason-Ind.com

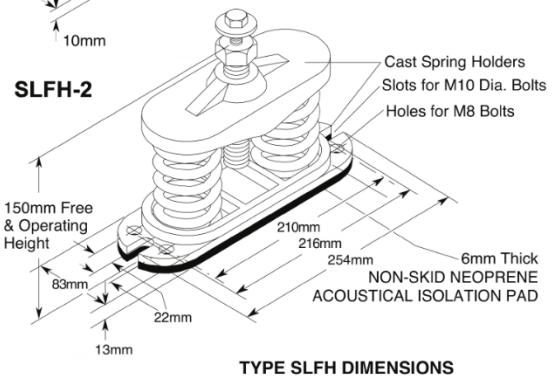
JOB NAME _____
CUSTOMER _____
CUSTOMER P.O. _____
MASON M.I. _____
DWG. NO. _____

TYPE **SLFH**
25mm Deflection A, B, C & 2 Series Mountings

SLFH-A,-B,-C



SLFH-2



TYPE SLFH RATINGS

Size	Rated Capacity (kg)	Rated Defl. (mm)	Mount Constant (kg/mm)	Spring Color/Stripe
SLFH-A-45	20	41	0.5	Blue
SLFH-A-75	34	38	0.9	Orange
SLFH-A-125	57	34	1.7	Brown
SLFH-A-200	91	29	3.1	Black
SLFH-A-310	141	25	5.5	Yellow
SLFH-A-400	181	25	7.1	Green
SLFH-A-510	231	25	9.1	Red
SLFH-A-625	283	25	11.2	White
SLFH-B-65	29	53	0.6	Brown
SLFH-B-85	39	53	0.7	White/Black
SLFH-B-115	52	51	1.0	Silver
SLFH-B-150	68	51	1.3	Orange
SLFH-B-280	127	41	3.1	Green
SLFH-B-450	204	33	6.1	Red
SLFH-B-750	340	28	12.0	White
SLFH-B-1000	454	25	17.9	Blue
SLFH-C-1000	454	25	17.9	Black
SLFH-C-1350	612	25	24.1	Yellow
SLFH-C-1750	794	25	31.3	Black*
SLFH-C-2100	953	25	37.5	Yellow*
SLFH-C-2385	1082	25	42.6	Yellow**
SLFH-C-2650	1202	25	47.3	Red*
SLFH-C-2935	1331	25	52.4	Red**
SLFH-2-2700	1225	25	48.2	Yellow
SLFH-2-3500	1588	25	62.5	Black
SLFH-2-4200	1905	25	75.0	Yellow*
SLFH-2-4770	2164	25	85.2	Yellow**

* with RED core spring ** with GREEN core spring
All springs have additional travel to solid equal to 50% of the Rated Deflection. Solid Spring Height = Free Height minus 1.5 times the Rated Deflection.

TYPE SLFH DIMENSIONS

Size	Free & Oper. Height	A	B	C	Locking Cap Screw
SLFH-A-45-400♦	108	57	76	92	3/8 x 1
SLFH-A-510-625	117	57	76	92	3/8 x 1
SLFH-B	150	70	105	133	1/2 x 1 1/4
SLFH-C	150	76	121	152	1/2 x 1 1/4
SLFH-2	-	-	-	-	1/2 x 1 1/4

SPRING DATA

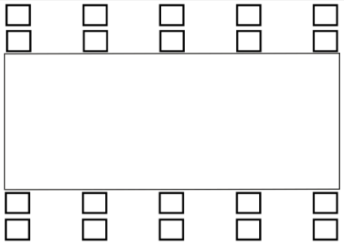
Spring OD	Free HT	Ratio K_x/K_y	Ratio OD/OH
45	76	0.70-0.90	0.88-1.25
45	79 -86	0.50-0.60	0.74-0.82
60	102	0.70-0.90	0.80-1.25
60	105	0.90-1.00	0.92-0.94
73	105	0.90-1.00	0.92-0.94

Multiple spring Mounts have C-size springs.
SLFH-2 indicates 2 springs.

♦ If using 45 thru 400 with 510 or 625, Free & Operating Height is 118.

PLAN VIEW OF MOUNT LOCATIONS

TAG : _____
UNIT : _____



_____ **inch SPECIFIED DEFLECTION**

1 :	6 :
2 :	7 :
3 :	8 :
4 :	9 :
5 :	10 :
Material for One Set :	Sets Required

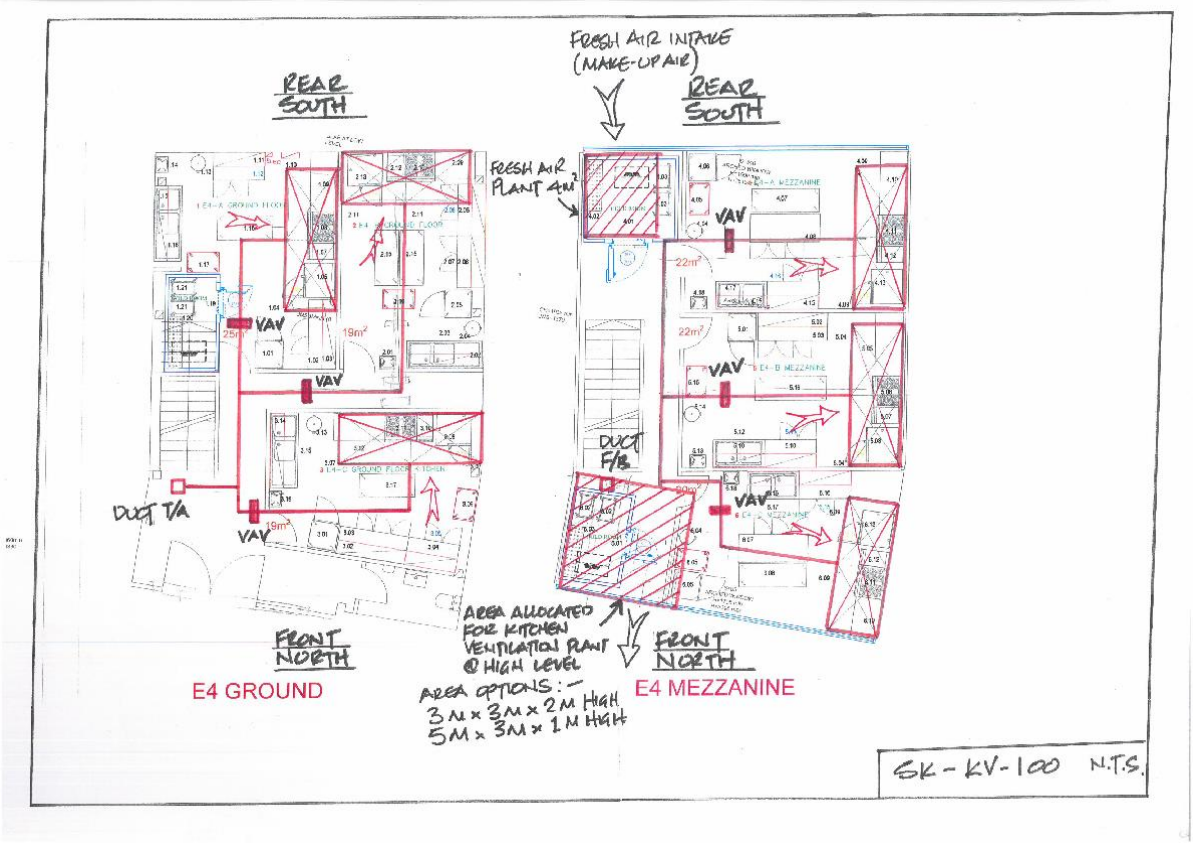
FORM S-201m 09/2010	DWN:	CHKD:	DATE:	DWG. No.

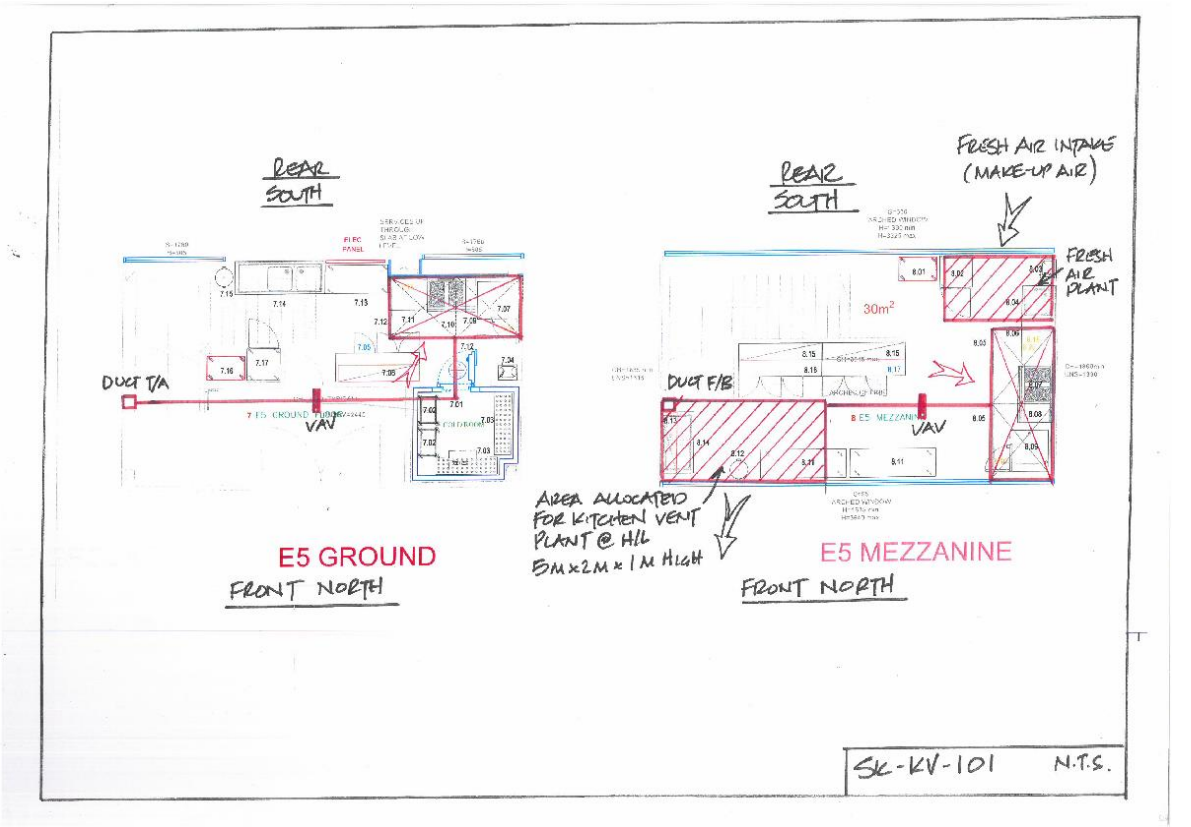
10 Appendix C - Schedule of Electrostatic Precipitators (ESP)

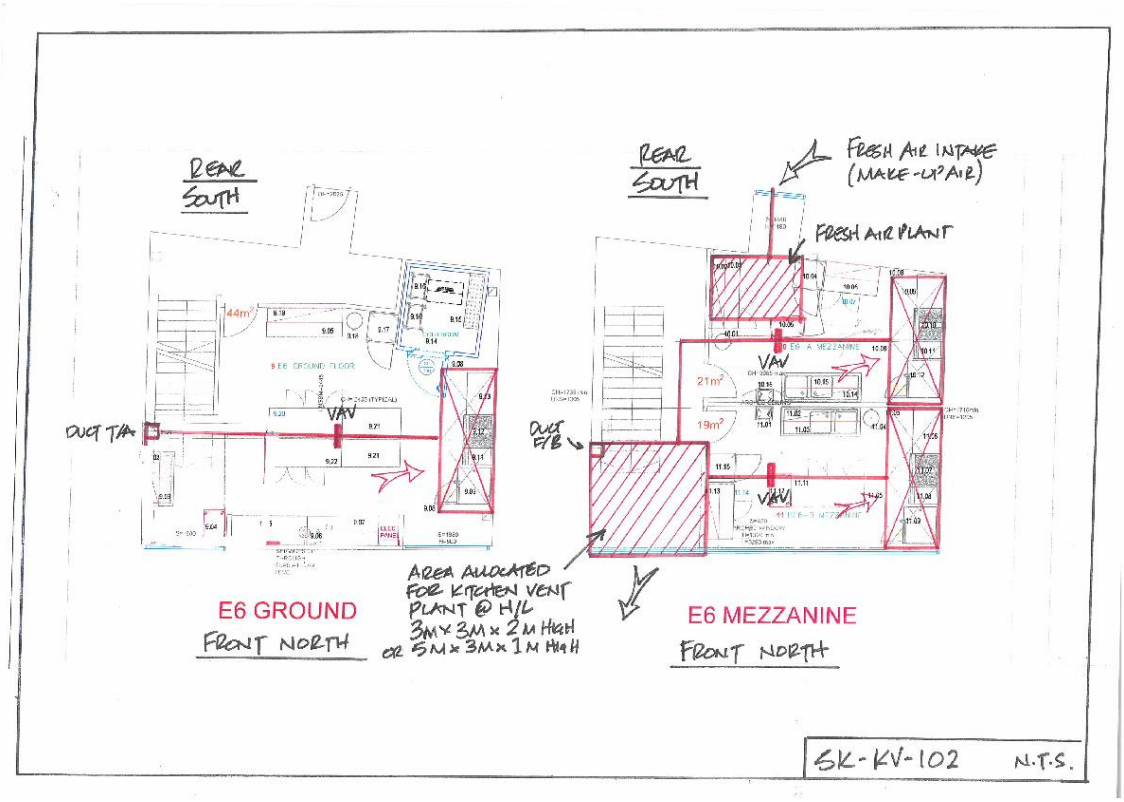
Ref	System	Manufacturer's Reference	Dimensions W/H/D (mm)			Max AirFlow (m^3/s)	Pressure Drop (Pa)	Power Consumption (W)	Electricity Supply
ESP E4-01	E4 - G	PurifiedAir ESP6000El	1800	630	640	1.80	200	30	220/240V 50Hz 1ph
ESP E4-02	E4 - M	PurifiedAir ESP6000El	1800	630	640	1.80	200	30	220/240V 50Hz 1ph
ESP E5-01	E5- M	PurifiedAir ESP6000El	1800	630	640	1.20	200	30	220/240V 50Hz 1ph
ESP E6-01	E6-G	PurifiedAir ESP6000El	1800	630	640	0.6	200	30	220/240V 50Hz 1ph
ESP E6-02	E6-M	PurifiedAir ESP6000El	1800	630	640	1.20	200	30	220/240V 50Hz 1ph
ESP E7-01	E7-M	PurifiedAir ESP6000El	1800	630	640	1.20	200	30	220/240V 50Hz 1ph

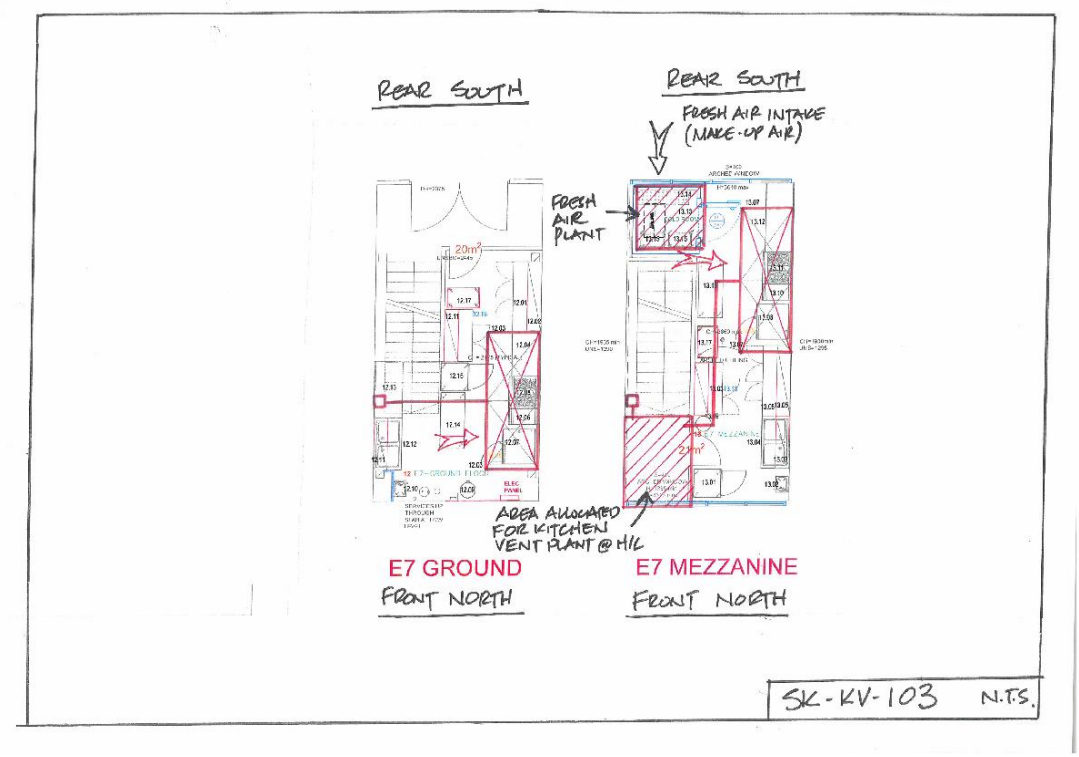
11 Appendix D – Sketches

SK-KV-100	Kitchen hood layout Arch E4
SK-KV-101	Kitchen hood layout Arch E5
SK-KV-102	Kitchen hood layout Arch E6
SK-KV-103	Kitchen hood layout Arch E7


FRESH AIR INTAKE (MAKE-UP AIR)
REAR SOUTH
REAR SOUTH
FRESH AIR PLANT 4M²
VAV
22m²
22m²
VAV
VAV
DUCT F/B
VAV
DUCT T/A
VAV
19m²
AREA ALLOCATED FOR KITCHEN VENTILATION PLANT @ HIGH LEVEL
FRONT NORTH
FRONT NORTH
E4 GROUND
AREA OPTIONS:-
3M x 3M x 2M HIGH
5M x 3M x 1M HIGH
E4 MEZZANINE
SK-KV-100 N.T.S.


REAR SOUTH
REAR SOUTH
FRESH AIR INTAKE (MAKE-UP AIR)
FRESH AIR PLANT
30m²
DUCT T/A
VAV
DUCT F/B
VAV
AREA ALLOCATED FOR KITCHEN VENT PLANT @ HIGH
5M x 2M x 1M HIGH
E5 GROUND
FRONT NORTH
E5 MEZZANINE
FRONT NORTH
SK-KV-101 N.T.S.


REAR SOUTH
REAR SOUTH
FRESH AIR INTAKE (MAKE-UP AIR)
FRESH AIR PLANT
44m²
VAV
DUCT T/A
DUCT T/B
21m²
19m²
VAV
VAV
AREA ALLOCATED FOR KITCHEN VENT PLANT @ H/L
3M x 3M x 2M HIGH
OR 5M x 3M x 1M HIGH
E6 GROUND
FRONT NORTH
E6 MEZZANINE
FRONT NORTH
SK-KV-102 N.T.S.


REAR SOUTH
REAR SOUTH
FRESH AIR INTAKE (MAKE-UP AIR)
FRESH AIR PLANT
20m²
AREA ALLOCATED FOR KITCHEN VENT PLANT @ H/L
E7 GROUND
FRONT NORTH
E7 MEZZANINE
FRONT NORTH
SK-KV-103 N.T.S.

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