REPORT FOR LBC - ROOF STRUCTURE

Project name	4-6 Bedford Place, London		
Design note title	Structural Statement in Support of Listed Building Consent – Existing Roof		
Document reference	24973_BP_HYD_XX_RP_S_001		
Author	Jerry King (Director) MIStructE, B.Eng (Hons) C.Eng		
Revision	P3		
Checked	Roger Bareham MICE MIStructE, B.Eng (Hons) C.Eng (CARES registered engineer)		
Date	27th September 2022	Approved	✓

Introduction

Hydrock have been engaged by SAV Group Ltd as part of a wider design team, to undertake a survey of the existing roof structure at the above former hotel property in Bloomsbury with a view to;

- Assessing its current condition and safety
- Providing proposals for strengthening where the existing structure is shown to be inadequate for the current loadings
- Design of refurbishment works taking due consideration of all sensitive heritage fabric, its legibility and reversibility as far is possible

The building is grade 2 listed and is believed to date from the early 19th century. It consists of 3 former Georgian terraced houses constructed in traditional timber and masonry in a regular arrangement for that period. The buildings have been adapted and linked to form a 36-bed hotel that was last used in March 2020.

Description of Roof Structure

Minimal opening up works as shown in Appendix C have been carried out in order to understand the structure and its condition. These have been undertaken in as few locations as necessary and are reversible.

Hydrock inspected the opening up works and roof structure on 29th July and 8th August 2022.

The form of the structure is described on the enclosed sketch SK-S-104 and consists of;

- 100*50 Softwood rafters (at varying centres but typically 350mm average) spanning approximately 3.5m from the party walls onto a central valley beam
- Hip members to form the roof fall down to the front and rear gutter lines
- 160 wide x 250 deep valley beams located on the centre-line of each building - probably intended to span from front/rear walls onto the stair walls

Please note;

- We have assumed the valley beam is of good grade softwood for the purposes of this report and would highlight that it is suffering from wet rot in at least 2 locations above number 4 Bedford Place. In addition, the beam above 6 Bedford Place has been strengthened for part of its length with a modern 180x75PFC which possibly infers further decay somewhere along that particular member.

- The valleys collect all of the rainwater from the roofs before discharging down onto the flat roof above the main staircases. Both areas are prone to water ingress and we anticipate further extent of wet rot to the existing valley beams when fully opened-up.
- The valley-beams are partially aligned with timber stud partitions for part of their length although the head detail does not infer that continuous support is provided.
- The valley beam takes support at the stair walls but also appears to bear onto the modern stud corridor wall within number 6.
- A 15mm-20mm thick asphalt layer has been laid across the slate roof which represents a significant additional roof load that has been in place for a number of years across all three roofs
- There is localised strengthening to the rafters at the rear of number 4 with modern softwood rafters installed alongside the original timbers

Structural capacity of existing timber elements

Our calculations have shown that;

- The rafters are undersized for the current loading condition and are showing signs of significant deflection on a number of the roof planes. This potentially compromises the safety of the roof and the existing heritage features immediately below.
- Even with the asphalt removed the calculated deflection is 24mm which is greater than 2x the acceptable deflection according to modern building standards (and hence could cause disturbance of heritage features at lower levels).
- The valley beams are undersized for the larger span for both the current and original load condition. This manifests as further deflection onto the both new and original partitions below creating unintended load paths down through the rest of the building

Conclusions and Recommendations

The current situation is unsafe given the identified overstress and the lengths of decayed timber (both identified and expected in other locations) within the valley beams.

We would recommend the following course of action to protect and strengthen the original structure in-situ;

- Install temporary roof and complete soft strip works to expose full length of valley-beams
- Temporary prop valley beam to enable strengthening works
- Carefully remove asphalt, slates and sarking boards (safely storing any slates that can be reclaimed)
- Repair sections of decayed valley beam using a Rotafix based detail, refer to enclosed sketch SK-S-106, with the following method tbc by manufacturer and full extent of timber decay following soft strip works:
  - » Remove section of decayed timber
  - » Splice with new timber section
  - » Form slot to allow for Rotafix TRS stainless steel rebar rods and apply Rotafix P8 paste for the full extent of the new timber section and existing timber section either side to suit actual site conditions.

- Cut existing valley beam to enable insertion of new trimming beam
- Install padstones as per enclosed sketch SK-S-106 to take strengthened valley beams and trimmer beams
- Install trimming beams to relieve load from unintended load-paths as per enclosed sketches SK-S-105 and SK-S-106.
- Install strengthening channels either side of valley beams as shown on enclosed sketches SK-S-105 and SK-S-106.
- Remove temporary propping
- Install new rafters and ceiling joists alongside existing rafters
- Replace roof build-up as per architectural proposals
- Remove temporary roof

This scope of works represents the minimum intervention that is required to make the roofs safe.

Appendix 1; photographs




Photos 1- 4; No.6 Bedford Place – showing valley-beam and localised valley beam strengthening

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Photos 5; typical flat roof and roof-light feature at 3rd floor level
Photo 6; typical sagging roof due to overstress of original rafters
Photos 7 and 8; asphalt covering across slates

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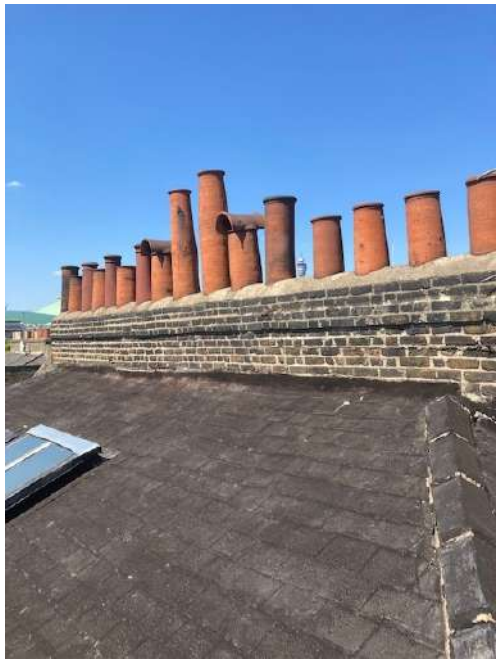
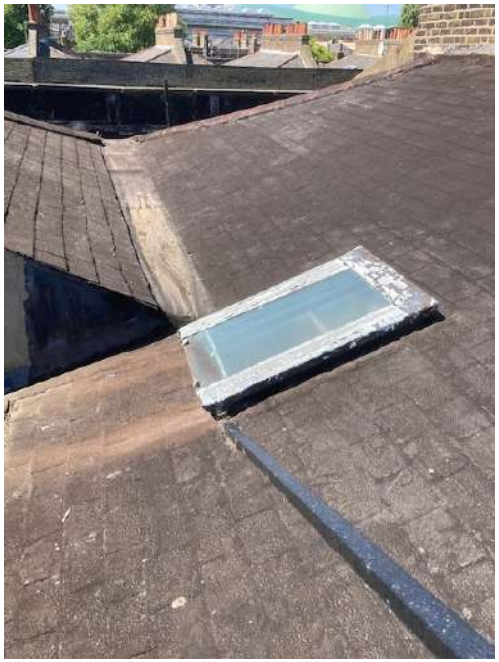



Photos 9; hip beam and rafter arrangement
Photo 10; rear gutter showing hip on adjacent roof
Photo 11; party wall chimneys - typical arrangement
Photo 12; view showing cut-out for 3rd floor flat roof (note all rainwater drains into this section of roof)

Hydrock



Photos 13; modern (inadequate) sw rafter strengthening and ceiling hanger
Photo 14; wet-rot decay of valley beam above number 4 Bedford Place
Photo 15 and 16; adjacent roof-light showing source of water ingress

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Photos 17-19; various additions typical of all 3 flat-roof areas
Photo 20; 4 Bedford Place valley beam showing rafter relationship

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Appendix 2; sketches SK-S-104 and SK-S-106

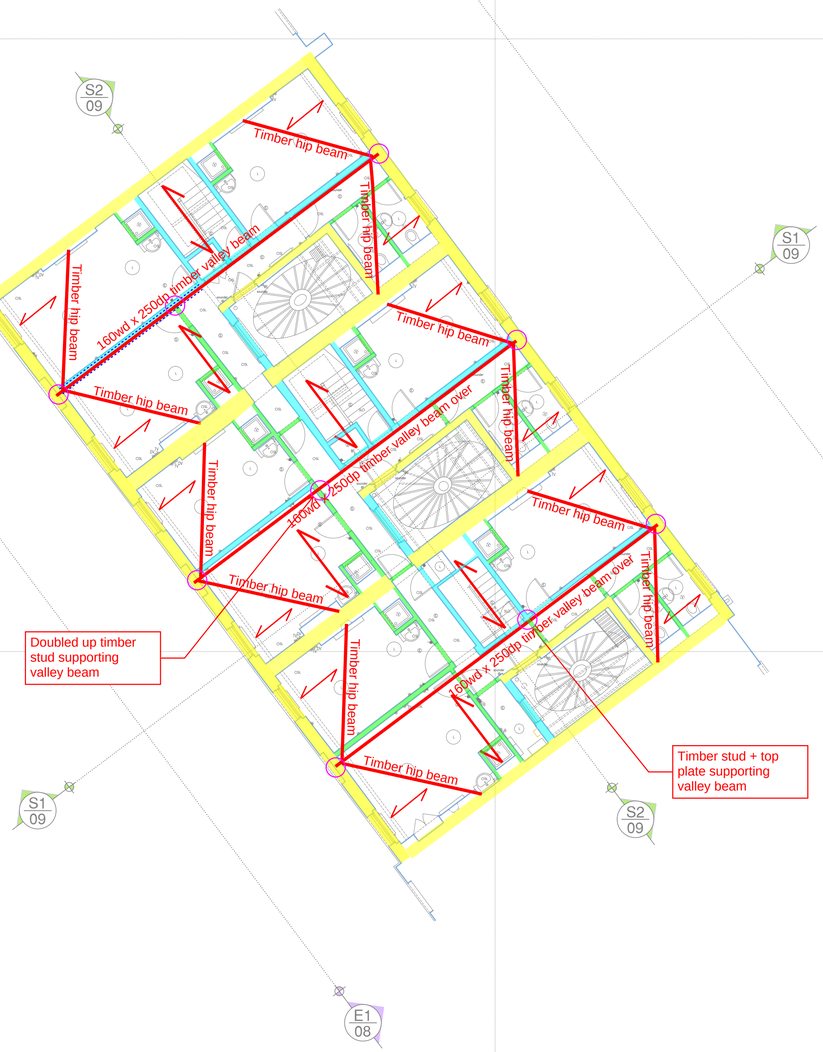
Legend

- Solid Masonry Load Bearing Wall
- Modern stud partition wall (50x100 studs @ 400 c/c typ.)
- Lath and plaster timber stud partition wall (55x90 studs @ 400 c/c typ.)
- 50x100 rafters @ 350 c/c typ.
- Valley beam support locations

530260 E | 530280 E | 530300 E

181800 N | 181780 N | 181760 N

North



0 1 2 3 4 5 10

Scale in Metres @ 1:100

Abbreviations

AB	Air Brick	IR	Iron Railings
AV	Air Valve	JB	Junction Box
BB	Belisha Beacon	KO	Kerb Outlet
BGP	Break Glass Point	LB	Litter Bin
BK	Brick	LP	Lamp Post
BO	Bollard	LW	Light Well
BS	Bus Stop	MH	Manhole
BT	British Telecom cover	MK	Marker
C	Floor to Cill height	MT	Meter
C/B	Close Board	MY	Mercury
CL	Cover Level	OH	Overhead
C/L	Chain Link	PM	Parking Meter
CO	Column	PB	Post Box
CONC	Concrete	P/R	Post & Rail
CP	Catch Pit	PT	Post
CPL	Coping Level	P/W	Post & Wire
CPS	Concrete Paving Slabs	RE	Rodding Eye
CTV	Cable Television Cover	RET	Retaining
DK	Drop Kerb	RS	Road Sign
DH	Door Height	RSS	Rolled Steel Stansion
EP	Electricity Pole	RSJ	Rolled Steel Joist
ER	Earthing Rod	RWP	Rain Water Pipe
FB	Flower Bed	SC	Stop Cock
FC	False Ceiling	SVP	Soil Vent Pipe
FE	Fire Escape	TCB	Telephone Call Box
FH	Fire Hydrant	TBM	Temp. Bench Mark
FHR	Fire Hose Reel	TP	Telegraph Pole
FL	Floor Level	TL	Traffic Light
FP	Flag Pole	TK	Tank
GP	Gate Post	UTL	Unable To Lift
GU	Gully	V	Vent
GV	Gas Valve	VP	Vent Pipe
H	Cill to Head height	WM	Water Meter
HT	Height	WP	Waste Pipe
IC	Inspection Cover	WSC	Water Stop Cock
IL	Invert Level	WV	Water Valve

Notes

Ceiling Height	3050	Arch	
Level	+20.00	Radiator	
Floor Level	+20.00 FL	Station	
Ceiling Level	+20.00 CL	Hedge	
Soffit Level	+20.00 SL	Steep slope	
False Ceiling Level	+20.00 FCL		
Floor to cill height	c=1234	Fence	
Cill to head height	h=1234	Foul pipe	
Door height	DH 2000	Storm pipe	

Survey Coordinates and Grid

Please note that the grid shown on this drawing is as follows;

- ☐ Arbitrary
- ☐ Arbitrary but related to building line
- ☐ Arbitrary but approx. related to North
- ☐ Best fit to an Ordnance Survey Digital Sheet
- ☒ Related to the Ordnance Survey National Grid

Levels

Please note that the levels shown on this drawing are as follows;

- ☐ Arbitrary and related to a temporary bench mark
- ☐ Related to an Ordnance Survey Bench Mark
- ☒ Related to the Ordnance Survey National GPS Network

Level positions are indicated by a cross or the decimal point

Bench Mark

Type	*Ordnance Survey*
Position	*N/A*
Value	*N/A*

Trees

All trees sizes are approximate and should be checked on site before using information. Where guaranteed tree species become important the services of a tree expert should be employed

Notation : diameter of trunk / Height / Spread

Drainage

Where drainage covers have been lifted data has been recorded for each individual manhole from the surface and connections to other manholes, pipes or gullys are assumed. Where information is required by accessing the manhole or tracing to other manholes then a services trace will be needed.

Revision	Date	By

CADPLAN PRECISION MEASUREMENTS

Land Surveys , Measured Building Surveys , 3D Laser Scanning
Utility Surveys , Lease Plans , 3D Models , Rights of Light Surveys

Cob Tree House Oldbury Lane Ightham Kent TN15 9DA
Tel : 01732 469100 Fax : 01732 469101 E : post@cadplan.co.uk

Client: Dexter Moren Associates

Project: 4-6 Bedford Place, London, WC1B 5JD

Drawing Title: Third Floor Plan

Sheet/Scale	Date	Drawn	Checked
A1@1:100	16/06/22	P.R.	C.S.D.
Project No.	Drawing No.	Preliminary	Revision
13643	05		

Merchants' House North, Wapping Road, Bristol, BS1 4RW
t: 0117 945 9225

Drawn: ML

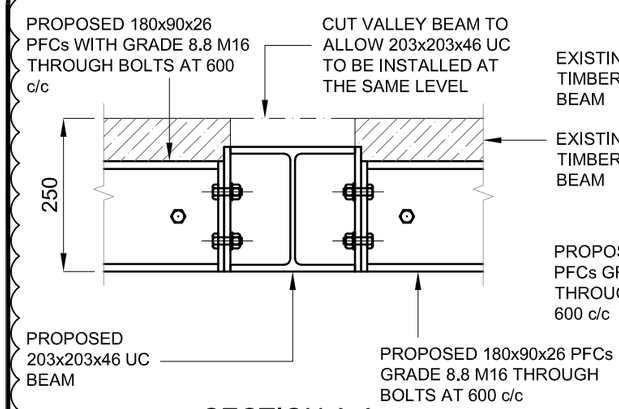
Job: 4-6 Bedford Place

Title: Roof Mark-up

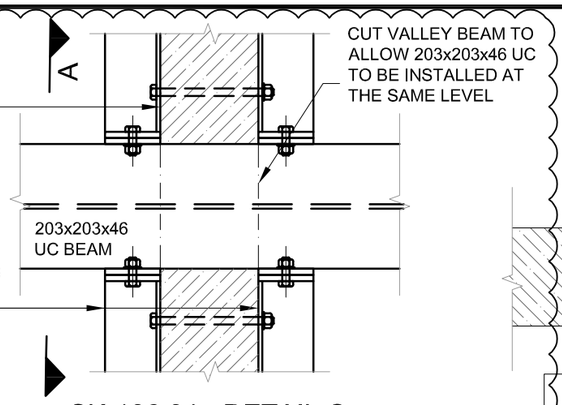
Sketch No.: SK-S-104-P1

Date: 18/08/22

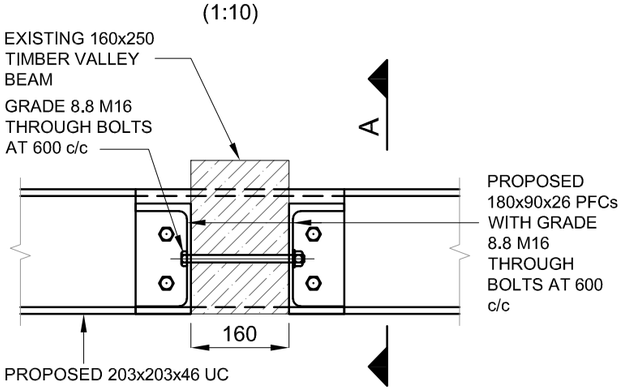
Hydrock



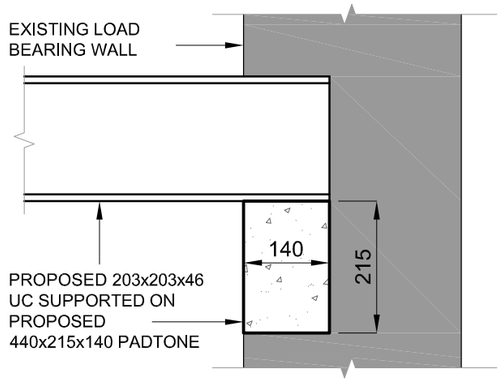
SECTION A-A
(1:10)



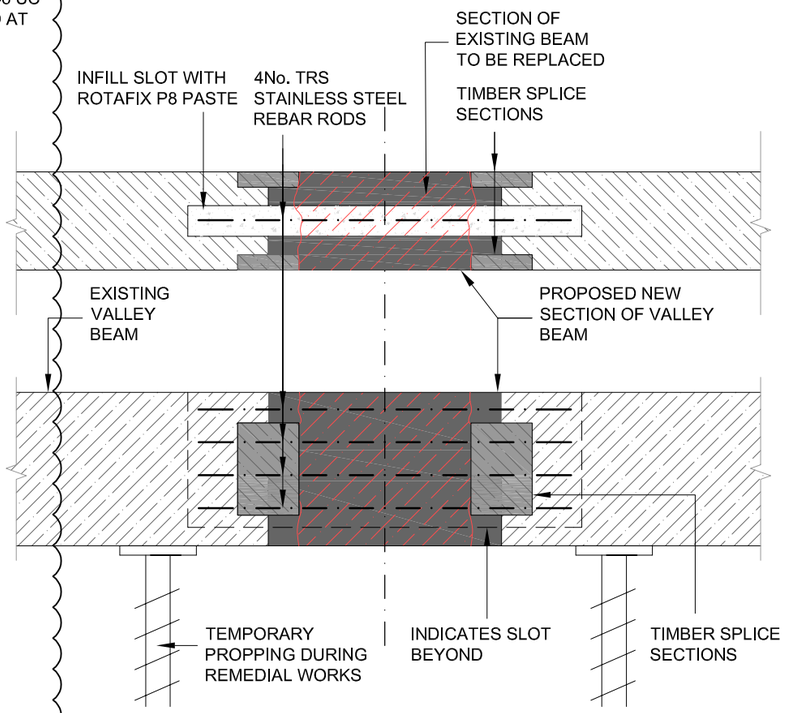
SK-106.04 - DETAIL C
(1:10)



SK-106.01 - STRENGTHENING DETAIL OF EXISTING TIMBER VALLEY BEAM
(1:10)



SK-106.02 - PROPOSED 203UC STEEL PADSTONE DETAIL - A
(1:10)



WET ROT DAMAGED SECTION OF TIMBER BEAMS REPLACEMENT DETAIL - TO MANUFACTURERS DESIGN
(1:10)

Notes:

1. REFER TO HYDROCK REPORT 24973_BP_HYD_RP_S_001 FOR FURTHER INFORMATION

* - INDICATES TEMPORARY PROPPING REQUIRED TO SUPPORT EXISTING ROOF STRUCTURES DURING VALLEY BEAM STRENGTHENING WORKS TO CONTRACTOR DESIGN

- DENOTES AREA AFFECTED BY WET ROT, SHOWN INDICATIVELY

- DENOTES EXISTING LOAD BEARING WALL

Rev	Date	Description	By	Ckd
P02	27.09.22	STEEL BEAM POSITION UPDATED	FB	ML
P01	05.09.22	PRELIMINARY ISSUE	FB	ML

Hydrock
Merchants' House North
Wapping Road
Bristol BS1 4RW
t: +44(0)117 945 9225
e: bristolcentral@hydrock.com
or visit www.hydrock.com

Client: SAV GROUP

Project: 4-6 BEDFORD PLACE, LONDON

Title: ROOF STRENGTHENING DETAILS

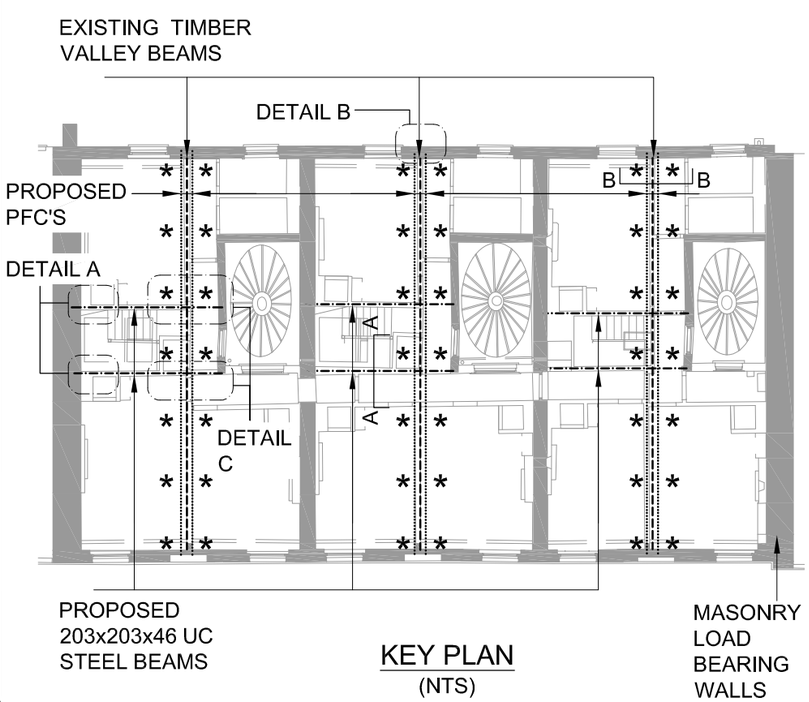
Drawing Status: PRELIMINARY

Job No.: 24973

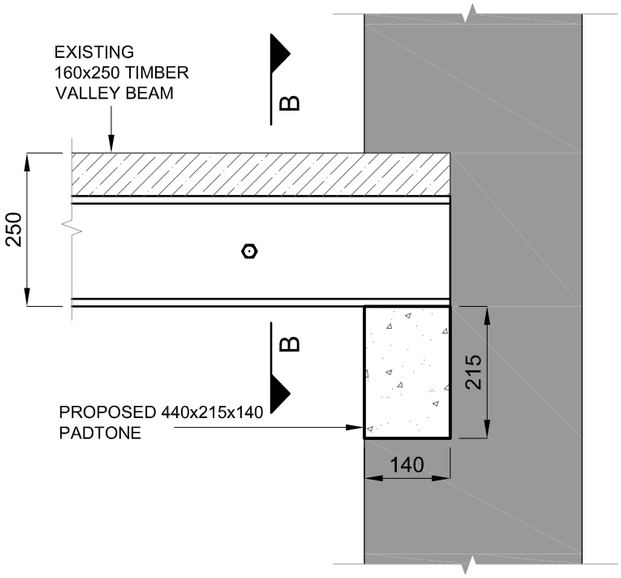
Drawn	Checked	Scale at A3	Date	Issue Date
FB	ML	1:10	01.09.22	27.09.22

Drawing No.: BPL-HYD-XX-03-SK-S-106

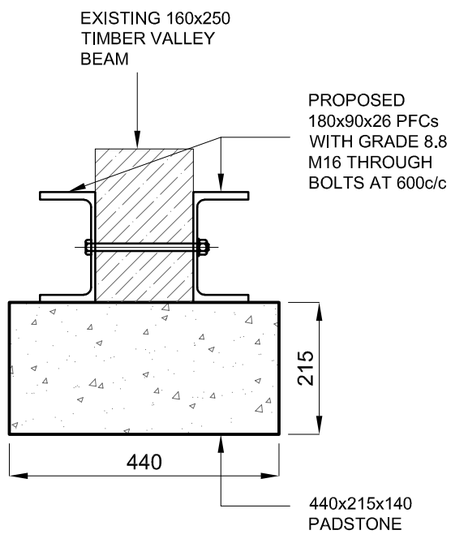
Revision: P02



KEY PLAN
(NTS)

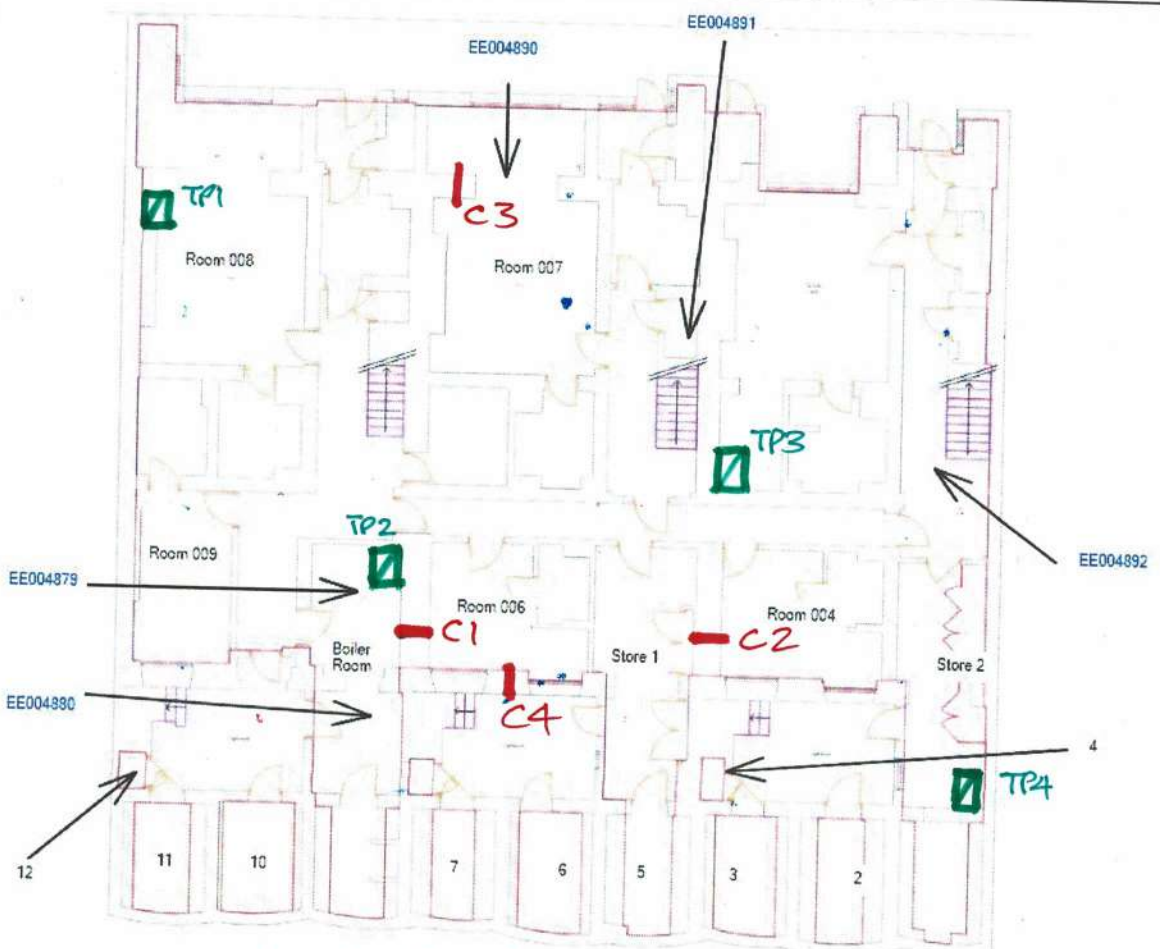


SK-106.03 - EXISTING TIMBER VALLEY BEAM & PFC STRENGTHENING PADSTONE DETAIL - B
(1:10)



SECTION B-B
(1:10)

Appendix C; Proposed opening-up works



TP1 → TP4 : Trial pits to determine exg. slab thickness + foundation detail/depth adjacent to the party walls.

C1 → C4 : core drill to determine wall thickness and make-up (solid brick expected but TBC)

GENERAL KEY

AREAS NOT ACCESED/OUTSIDE OF SCOPE

TEXT APPROXIMATE LOCATION OF ASBESTOS SAMPLES

TEXT APPROXIMATE LOCATION OF NON ASBESTOS SAMPLES

DETAIL KEY

APPROXIMATE LOCATION OF ASBESTOS CONTAINING MATERIALS

FULL CIRCLE COMPLIANCE
32 Writtle Road
Chelmsford
Essex
CM1 3BX
Phone: 01245 690606

CLIENT

Sav Development Ltd

This drawing must be viewed and read in conjunction with the Asbestos Survey Report for:

PROPERTY TITLE
4-6 Bedford Place
London

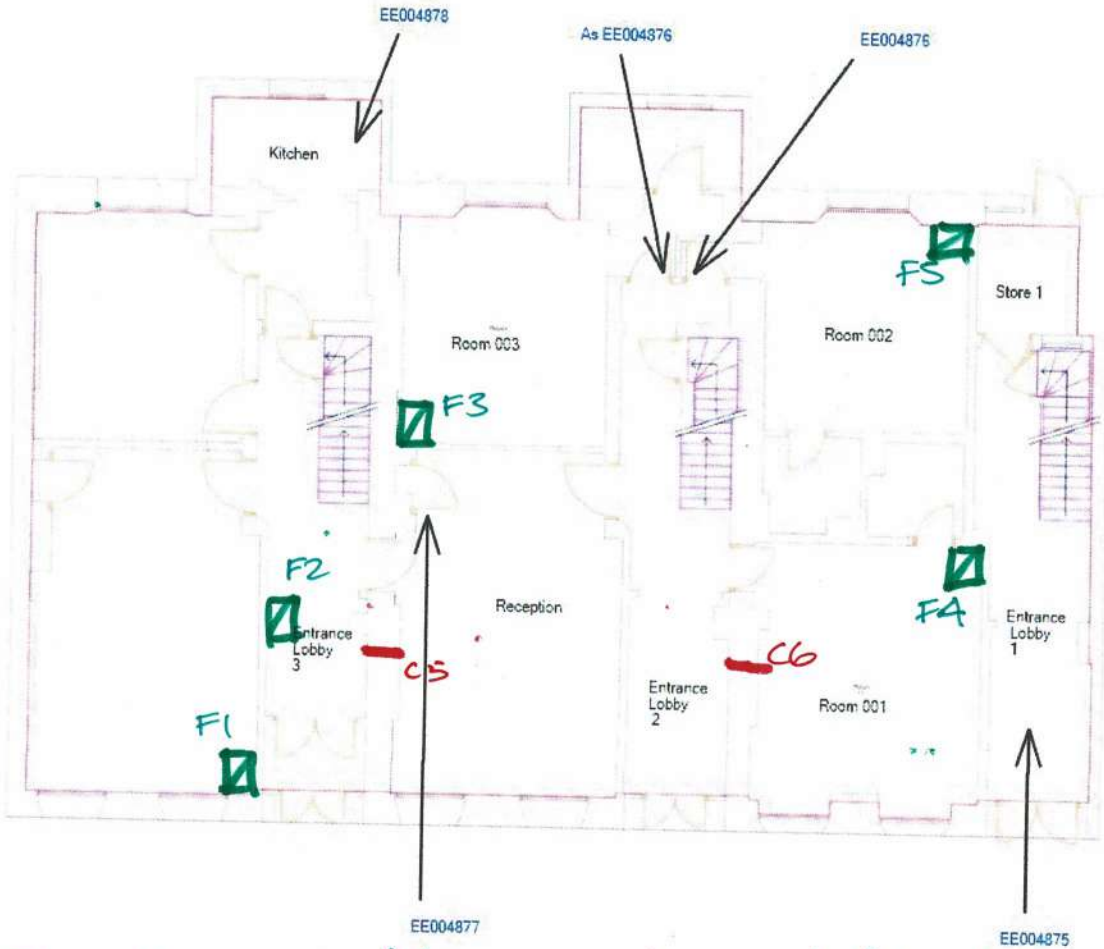
Ref. No.	J025269	DRAWN DATED	10 Jun 2022
Nos.	1/5	UPDATED	10 Jun 2022

BASEMENT.

HYDROCK INVESTIGATION REQUIREMENTS

SK.01.

26.07.22.



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London

Ref. No.	J025269	DRAWN DATED	10 Jun 2022
Nos.	2/5	UPDATED	10 Jun 2022

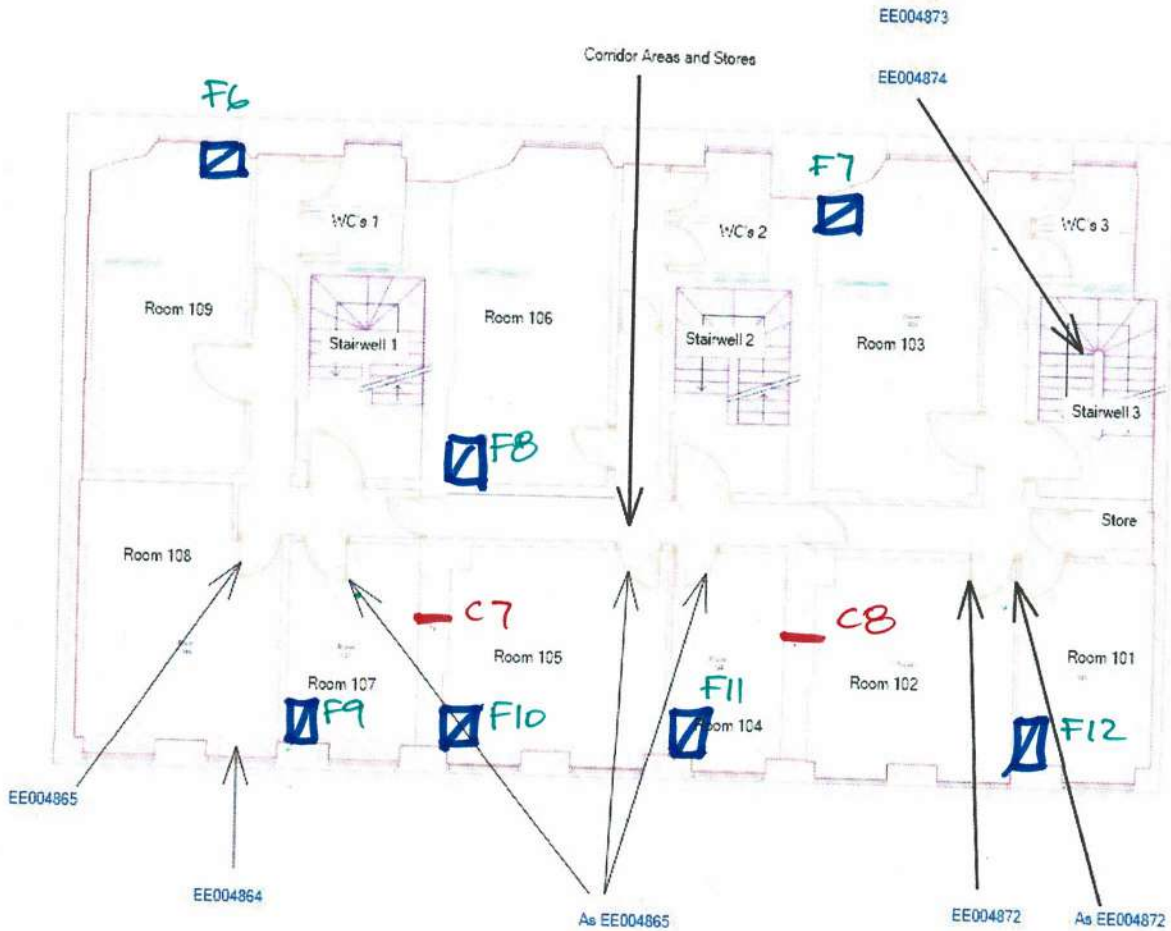
GROUND FLOOR

☑ F1 → F4; open-up flooring to establish joist sizes, centres and condition.

— C5 → C6; core-drill to determine wall thickness and make-up (solid brick expected TBC).

SK.02

HYDROCK INVESTIGATION REQUIREMENTS 26.07.22



F6 → F12; open-up flooring to establish joist sizes, span direction, centres and condition.

C7 → C8; core drill to determine wall thickness and make-up. (solid brick expected TBC)

GENERAL KEY

AREAS NOT ACCESED/OUTSIDE OF SCOPE

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TEXT APPROXIMATE LOCATION OF NON ASBESTOS SAMPLES

DETAIL KEY

APPROXIMATE LOCATION OF ASBESTOS CONTAINING MATERIALS

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32 Writtle Road
Chelmsford
Essex
CM1 3BX
Phone: 01245 690606

CLIENT

Sav Development Ltd

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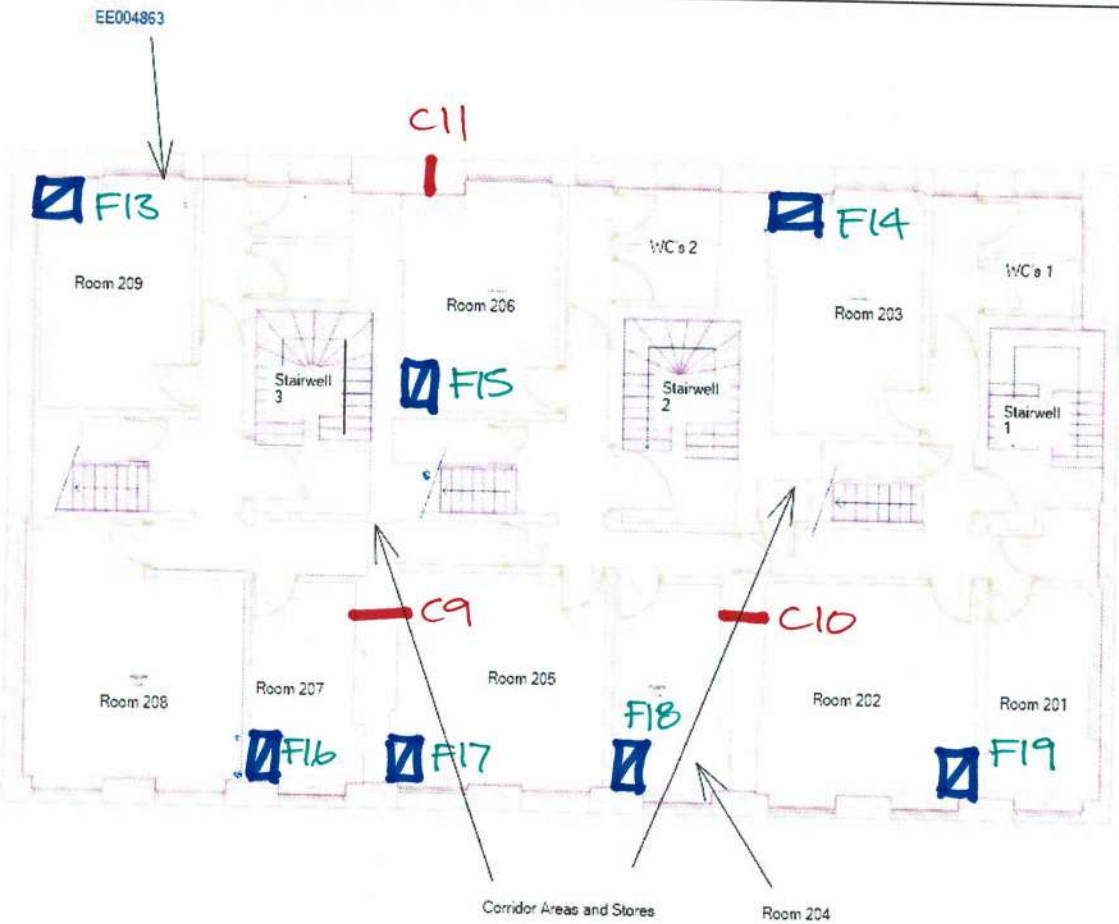
London

Ref. No.	J025269	DRAWN DATED	10 Jun 2022
Nos.	3/5	UPDATED	10 Jun 2022

1ST FLOOR

HYDROCK INVESTIGATION REQUIREMENTS

SK.03
26.07.22



GENERAL KEY

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TEXT APPROXIMATE LOCATION OF NON ASBESTOS SAMPLES

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32 Writtle Road
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CM1 3BX
Phone: 01245 690606

CLIENT

Sav Development Ltd

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London

Ref. No.	J025269	DRAWN DATED	10 Jun 2022
Nos.	4/5	UPDATED	10 Jun 2022

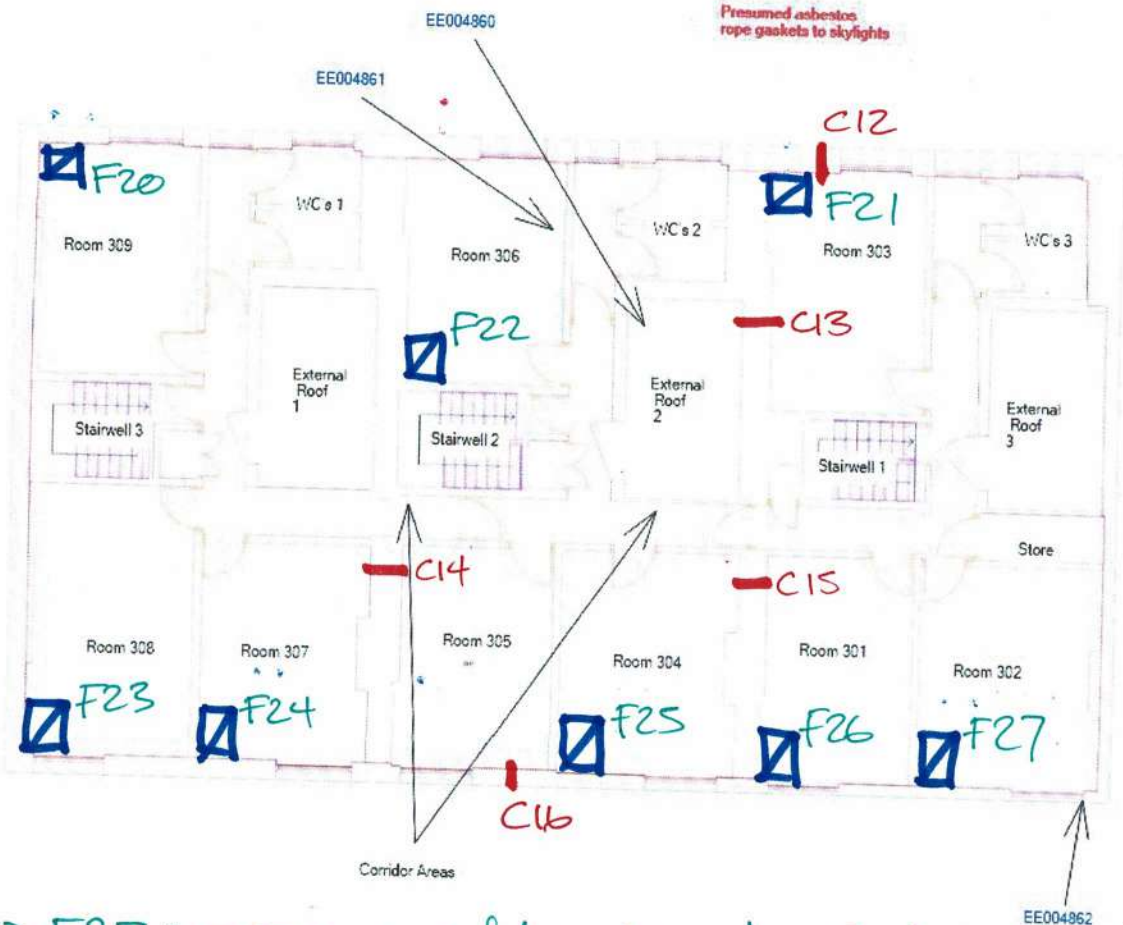
2ND FLOOR

F13 → F19; ~~to establish~~ Open-up flooring to establish joist sizes, centres, span-direction + condition.

C9 → C11; core-drill to determine wall thickness and make-up.

SK. 04

HYDROCK INVESTIGATIONS REQUIREMENTS 26.07.22.



GENERAL KEY

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TEXT APPROXIMATE LOCATION OF NON ASBESTOS SAMPLES

DETAIL KEY

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Essex
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CLIENT

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This drawing must be viewed and read in conjunction with the Asbestos Survey Report for:

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London

Ref. No.	J025269	DRAWN DATED	10 Jun 2022
Nos.	5/5	UPDATED	10 Jun 2022

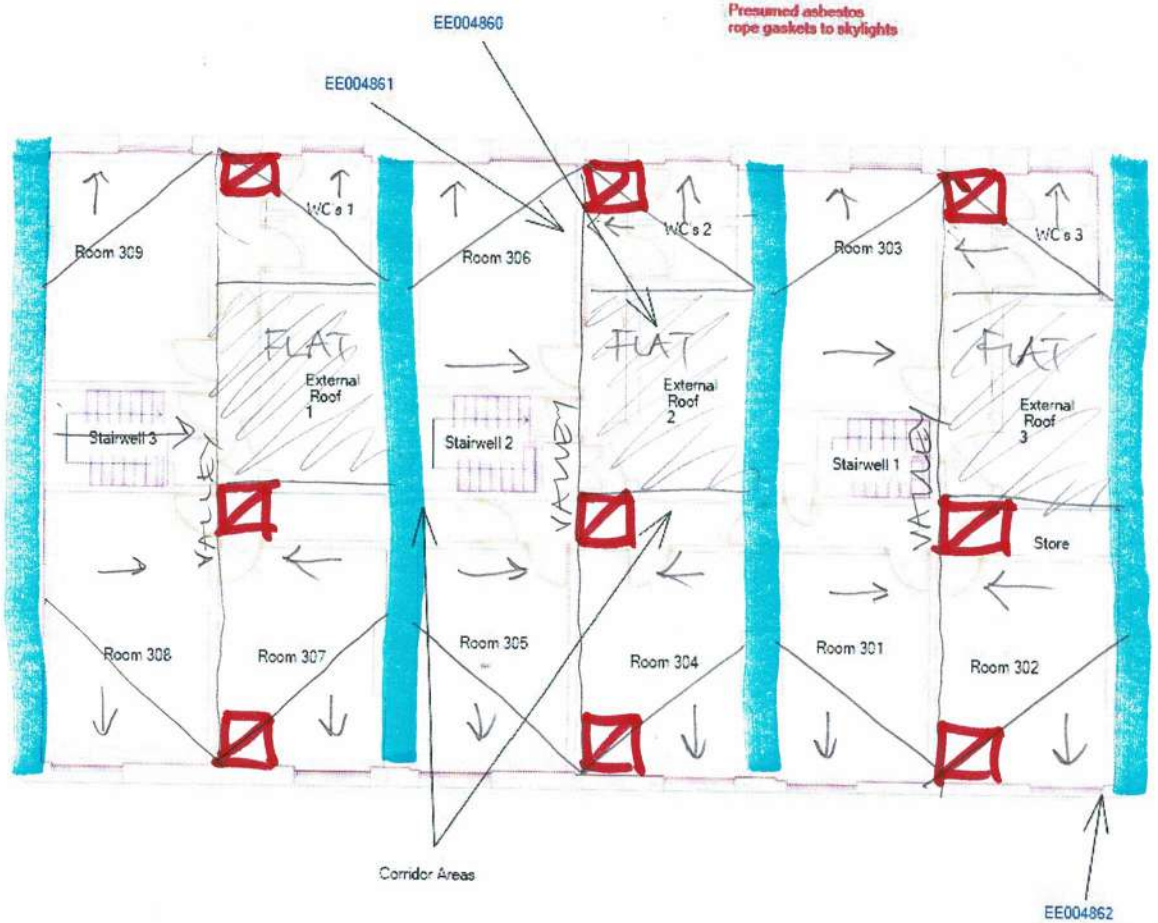
3RD FLOOR

SK.05

☑ F20 → F27; open-up flooring to determine joist sizes, centres, span-direction + condition.

— C12 → C16; core-drill to determine wall thickness and build-up.

HYDROCK INVESTIGATION REQUIREMENTS 26.07.22



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CLIENT

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London

Ref. No.	J025269	DRAWN DATED	10 Jun 2022
Nos.	5/5	UPDATED	10 Jun 2022

ROOF

☑ Expose u/side roof and ceiling joists where permissible (to determine rafter, valley beam, and ceiling joist sizes, condition and centres).

SK.06

HYDROCK INVESTIGATION REQUIREMENTS 26.7.22