APPENDIX 3: DRYING OUT WORKS- SCOPE AND EXTENT OF WORKS

As part of the fire reinstatement works, drying out of the water damaged fabric was an essential initial phase. Hutton & Rostron (H&R) carried out a moisture survey for the masonry and timber elements in March 2020 and these reports have been expanded to include additional areas.

As advised by H&R, a phased Strip Out strategy was formulated and is presently being undertaken following agreement with the Local Authority over exchange of emails, a summary of which are included in Appendix 4 below. An initial soft strip out (Strip Out Phase 1) of the damp fabric was undertaken in April 2020 and a strip out of additional fabric (Strip Out Phase 2) commenced in August 2020 and is currently underway.

As preparation for the Strip out phase 2 works, decontamination of the site is currently being undertaken and this includes removal of pigeons & pigeon guano, removal of micro bacterial contaminants and asbestos removal from affected areas of the building.

Simultaneously, a strategy for enhancing natural ventilation was also devised through the selective opening of doors and windows throughout the building. The combination of phased strip out and warm summer weather induced natural ventilation has allowed significant drying out of the surface fabric. However, in the coming months, a phased drying our strategy utilising mechanical means is necessary. Hutton & Rostron have been therefore appointed to prepare a "Drying out Strategy" for the historic building.

The scope of works of the Drying out Consultant is as follows:

- *Perusal of documents provided by heritage team (SLHA, Hutton & Rostron, Locker & Riley, Catherine Hassall)*
- *Perusal of Strip Out Phase 2 package (including Asbestos, SLHA and M&E works)*
- *Site inspection*
- *Advice on any additional mould and contaminants removal to be undertaken prior to mechanical drying out works (test for chloride contamination, microbiological testing, etc)*
- *Moisture surveys on a room by room basis to indicate drying trends*
- *Perusal of natural ventilation strategy through strategic opening of doors/ windows*
- *Setting of performance targets for drying out*
- *Prepare sequential drying out programme- Advice on zoned drying out strategy undertaken in close conjunction with Strip Out works*
- *Undertake moisture survey on a room by room basis following strip out and advice on further strip out phases (if necessary)*
- *Preparation of document to include the type of drying equipment required for each area, the power requirements for the drying equipment and the estimated duration of the drying phase for each area.*
- *Liaise with lead, strip out contractors on access routes and strip out programme*
- *Liaising with cleaning and drying out contractors*
- *Inspect and oversee works of drying out contractors*
- *Undertake moisture survey post drying out and provide Certificate of Dryness*

APPENDIX 4: SUMMARY OF STRIP OUT PHASE 2 WORKS

HERITAGE ARCHITECTURE LTD.

Architects & Heritage Consultants

Colette Hatton
Planner (Conservation)
Camden Council
Via email: Colette.Hatton@camden.gov.uk

Dear Colette,

KOKO, Camden - Summary of Strip Out Phase 2 **19th May 2020**

Introduction

Strategies for the efficient drying out of KOKO including a phased strip out programme are currently being implemented. To prevent serious damage, it is important to dry the building slowly, first by natural ventilation and then, where required, with extractor fans, background heating and dehumidifiers.

As part of the drying out strategy, strip out of water damaged fabric is essential, in order to remove modern damp fabric and finishes; and to consolidate, protect and repair fabric of significance. Due to the complexity of the fabric on site, and the urgent need to undertake strip out works in the context of emerging mould growth in the building, a phased strip out strategy was formulated. As discussed during the past month, we have prepared, through the liaison of the whole team of specialists, a comprehensive method statement detailing the necessary events of the strip out phases, 1 and 2.

The first phase of Strip Out works as per the drawings and schedules emailed on 11.02.2020 was undertaken in February and March 2020. Following this initial phase of soft strip out, we have liaised with the specialist consultants - Hutton & Rostron (Timber, masonry), Locker & Riley (plaster) and Catherine Hassall (Paint) - who have advised the need to undertake a number of strip out works in addition to those in Phase 1. These works predominantly include to the removal of floor and ceiling finishes and fixed furniture (bar counters) in areas affected by the fire/ water damage.

This note provides an overview of the proposed Strip Out Phase 2 package. The aim of the additional strip out works is to carefully remove, record and store or discard water damaged elements which were uncovered during the original Phase 1 Strip Out.

Originally, an intermediate strip out phase- Phase 1+ was proposed, however this has been included within the scope of Phase 2, to permit for asbestos removal from the building in the interim period.

The works will be carried out with the utmost care and limited to the minimum amount necessary for the building's efficient drying out. The works will be carried out by a trained contractor and under the supervision of a Clerk of Works specialised in the conservation and restoration of the historic buildings, All site staff will be briefed and bound to cease works immediately if anything of significance is uncovered. All works will be done by hand or by using only small mechanical tools.

Extent of Strip Out Works

The proposed Strip Out Phase 2 works cover the entire area of the 'Fire reinstatement demise' (refer to Appendix 1)- which include all areas affected by the January 2020 fire and subsequent water infiltration during the firefighting efforts. As an outline, this area encompasses the front of house area (West side of the site) on all floors, corridors and staircases on the north and south side, roughly to the line of the proscenium arch. We conjecture that further areas may have been impacted by the fire/ water damage and further clarity on the extent will be possible only after completion of Strip Out Phase 2.

The works are largely internal, except for paint removal on the west (principal) elevation along Camden High Street and the returns to Crowndale Road and Bayham Place.

Scope of Strip Out Works

The scope of strip out works are lead by three separate but interdependent strategies

- Asbestos Removal and decontamination of the site

  Derisk UK- asbestos consultants were appointed to survey asbestos within the 'Fire reinstatement demise'. This survey concluded that asbestos was present in floor and ceiling voids, and concealed under partitions and modern boxing in most areas.

- Strip Out of redundant M&E fixtures and fittings

  Survey of the M&E fixtures and fittings by M&E consultants- R T King and Associates has concluded that all existing fittings and fixtures are affected and that it is cost and time effective to undertake a complete M&E rehaul of the building. This would also provide the opportunity to upgrade to current regulations and streamline services behind finishes, to allow for a better expression of architectural details and finishes of significance.

- Strip Out of building fabric

  The bulk of strip out works are necessitated by damp/ damaged finishes which inhibit drying out of the building. The scope of this strip out is guided by extensive surveys of the fabric undertaken by Hutton & Rostron, Locker & Riley and Catherine Hassall, as well as paint strip out trials undertaken by Artemis Conservation (specialist contractors)

Based on the advice received by the specialists, and further discussion with the Client Team, SLHA have prepared a package of information as required to enable Strip Out Phase 2. This includes :

- Schedules of all works, tabulated items by items to be cross-referenced with drawings;
- Marked up plans, elevations, sections, details to required scale;
- Specification of Works to include preliminaries, materials and workmanship.

A summary of the scope of strip out of building fabric (Phase 2) is provided below.

Enabling Works: Prior to commencement of any strip out works, elements of significance which may be vulnerable to damage are proposed to be protected on site.

Element/ Material	Proposed Works
Floor finishes: Damp/ wet floor finishes in affected areas are proposed to be stripped out. This is broadly divisible into the following types:	
Stairs/Steps (throughout) - Modern timber nosing from staircases	To be stripped out and discarded
Balconies (throughout) - Historic timber floorboards including asbestos boards below	To be stripped out and discarded. Representative samples (to be agreed with the conservation architect) is to be photographed, bagged and tagged with information regarding its original location and stored in the off-site storage.
Balconies (throughout) - Insert new plyboarding as temporary flooring	New plyboarding with perforations for ventilation to be installed temporarily
Bars and Toilets (throughout) - Modern raised floors with rubber/ vinyl tiles	Proposed to be stripped out including metal/ timber structure without damaging historic slab
Royal Box/ Director Box - Later cement screed applied over timber floorboards	Later cement screed and damp floorboards to be removed and discarded
Ground Floor Foyer - Historic stone tiles	Proposed to be carefully removed, catalogued and stored off site for reinstatement during refurbishmernt works.
Ceiling: Damp/ wet ceilings in affected areas are proposed to be stripped out	
Front Block and Balconies - Historic fibrous plaster ceilingincluding ceiling structure	Proposed to be protected and retained in ground floor entrance (G-13).
	In other areas, squeezes and samples are to be taken to inform reinstatement works; ceiling stripped out including ceiling structure. Representative samples of historic timber structure to be catalogues and stored off site for reference
Front Block (Basement), Second Floor Bar - Modern plain plasterboard ceiling including supporting structure	Proposed to be stripped out including framing structure; new ceiling to be provided as part of reinstatement works

Front Block (various areas), Stairs and Balconies (N and S walls) - Plastered ceiling (lime plaster)	Proposed to be stripped back to slab surface
Front Block (Basement, Second Floor Bar, Toilets) - Modern suspended ceiling including ceiling structure	Proposed to be stripped out including framing structure; new ceiling to be provided as part of reinstatement works
Wall finishes: Affected wall finishes to be stripped out	
Front Block, Stairs and Balconies (throughout) - Historic lime plaster with modern lining and patch repairs	Proposed to be stripped out and discarded retaining all moulded surfaces such as skirtings, border mouldings around openings, etc.
Front Block and Balconies (throughout) Historic fibrous plaster wall finishes including structure	Squeezes and samples are to be taken to inform reinstatement works; finishes proposed to be stripped out
Toilets- Modern cement plaster	Proposed to be stripped out and disposed
Toilets (throughout), service areas in basement (limited) - Modern dado tiles (ceramic/ vinyl) with tile/ stone skirting	Proposed to be stripped out and disposed
External elevations (Main Façade and Return) - Painted surfaces	Paint proposed to be carefully removed using a combination of paint removal methods
Joinery: Affected joinery/ furniture	
Throughout - Modern plywood boxing around columns, beams, walls and ceilings (modern)	Proposed to be stripped out and disposed
Throughout - Historic timber skirting	Plain skirting in low significance areas: Proposed to be stripped out and discarded. Representative samples (to be agreed with the conservation architect) is to be photographed, bagged and tagged with information regarding its original location and stored in the off-site storage.

	Moulded skirting in principal areas: Proposed to be carefully removed and stored off site for reinstatement
Throughout - Historic and modern timber dado rails	Modern plain dado rails in low significance areas: Proposed to be stripped out and discarded
	Historic moulded dado rails in principal areas: Proposed to be carefully removed and stored off site for reinstatement
Throughout - Modern partition walls	Proposed to be stripped out and disposed
Throughout - Modern Timber/ Ply furniture	Proposed to be stripped out and disposed
Front Block (First Floor, Room 1-14) - Timber panelling	Proposed to be carefully removed and stored off site for reinstatement after drying out
Miscellaneous: Other elements/ fixtures	
Modern WC partitions	Proposed to be stripped out and disposed
Modern bar counters and associated furniture	Proposed to be stripped out and disposed

Aside from the above, works to enable more natural ventilation in the building are also planned to be undertaken, to enhance and accelerate natural drying out in the warmer months. These consist of:

- Existing blocked up windows are proposed to be opened up/ perforated to allow air flow into the building.
- Modern glazing is to be removed from the window frames, and openings are proposed to be temporarily secured with steel mesh.
- Likewise, a number of external doors on the ground and first floor levels are proposed to be temporarily replaced by a metal grille to allow for enhanced air-flow while providing the required level of security, to be fixed on a new door frame to provide access where required.
- All internal doors will be to be wedged open. Historically significant internal doors in the entrance foyer (ground floor) are to be carefully unhinged, protected and stored off site.

We intend to commence these works mid/end of June 2020.

We anticipate a third phase of strip out works that will be informed by the findings of the previous phases and by the inputs received from different specialist consultants. We will provide you regular updates on the progress of works and findings.

I trust that this is acceptable considering the nature of the works and the importance of removing the water logged fabric for the expedient drying out of the building.

Considering the urgency of these strip out works, we would be grateful if this work can be consented over exchange of emails. We will include a record of the strip out works carried out as part of a retrospective listed building consent application.

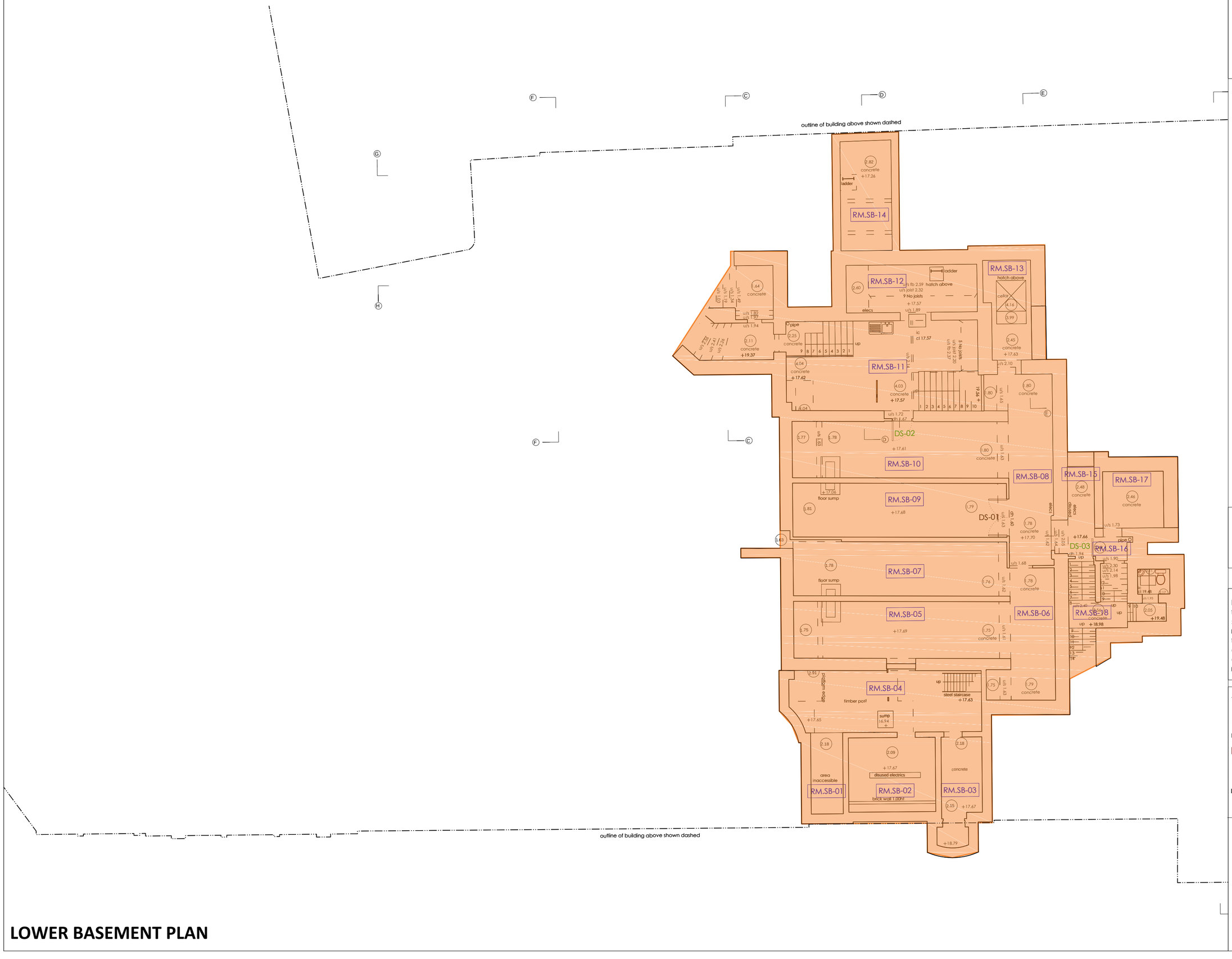
Please let me know if we can provide you with any further information, or if you wish to discuss these works in more detail. I look forwards to your response in due course, and would be most grateful if you could please confirm receipt and forward on to any further consultees at the Council.

Stephen Levrant

RIBA, AADip, Dip Cons (AA), FRSA, IHBC

Heritage Architecture Ltd.

Appendix 1: Fire Reinstatement Demise Drawings



INDEX

- Fire reinstatement demise
- Fire reinstatement demise (further survey required for confirmation)

Please note that information used to produce these drawing is based on measured survey supplied by others; Heritage Architecture can not be held responsible for any inaccuracies that may exist. Please do not scale from the drawings. All dimensions should be verified on site. Any inconsistencies should be reported to the project architect.

JOB TITLE
KOKO
Camden

JOB No
X0936

DRAWING TITLE
Fire Reinstatement Demise

DWG No
98_0

ROOM No

REV
A

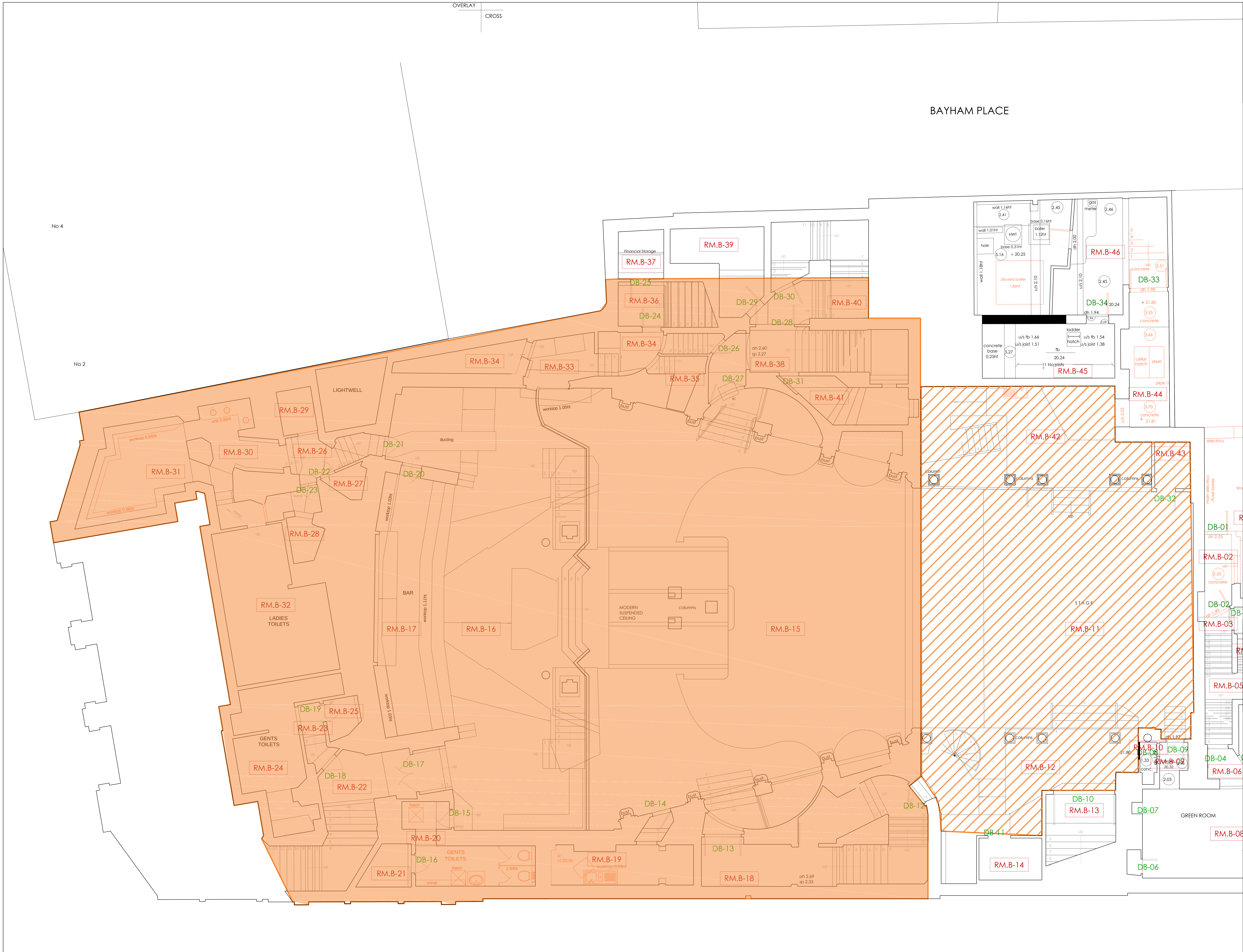
DRAWN BY

SCALE
1:100 @ A2

DATE
15/05/20

STEPHEN LEVRANT
HERITAGE ARCHITECTURE
62 British Grove, London, W4 2NL
E-mail: info@heritagearchitecture.co.uk
T: 020 8748 5501

LOWER BASEMENT PLAN



BASEMENT PLAN

INDEX

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- Fire reinstatement demise (further survey required for confirmation)

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KOKO Camden		X0936
DRAWING TITLE		
Fire Reinstatement Demise		
DWG No	ROOM No	REV
98_1		A
DRAWN BY	SCALE	DATE
	1:100 @ A2	15/05/20

STEPHEN LEVRANT
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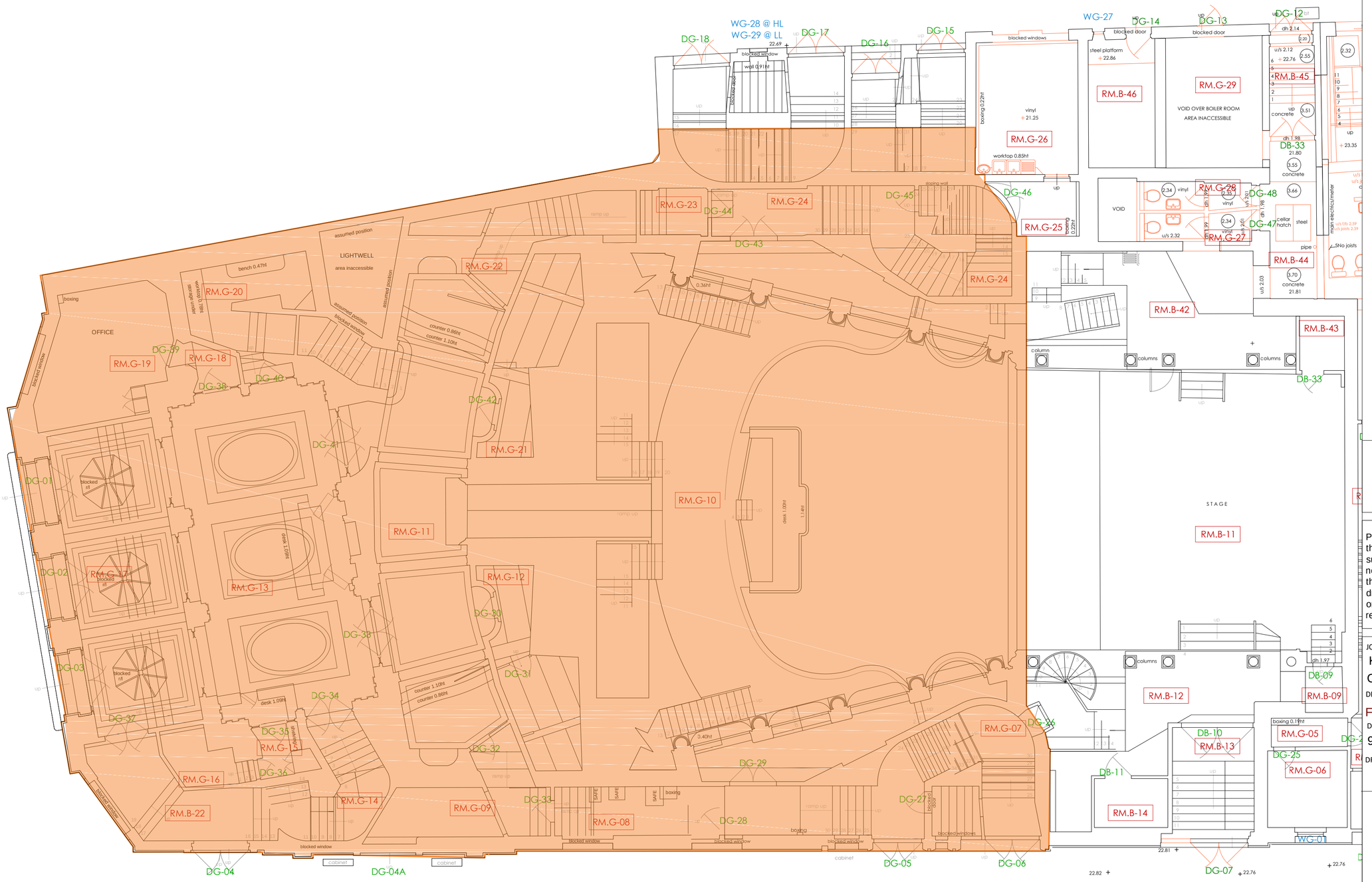

GROUND FLOOR PLAN

INDEX

- Fire reinstatement demise
- Fire reinstatement demise (further survey required for confirmation)

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JOB TITLE
KOKO
Camden

JOB No
X0936

DRAWING TITLE
Fire Reinstatement Demise

DWG No
98_2

ROOM No

REV
A

DRAWN BY

SCALE
1:100 @ A2

DATE
15/05/20

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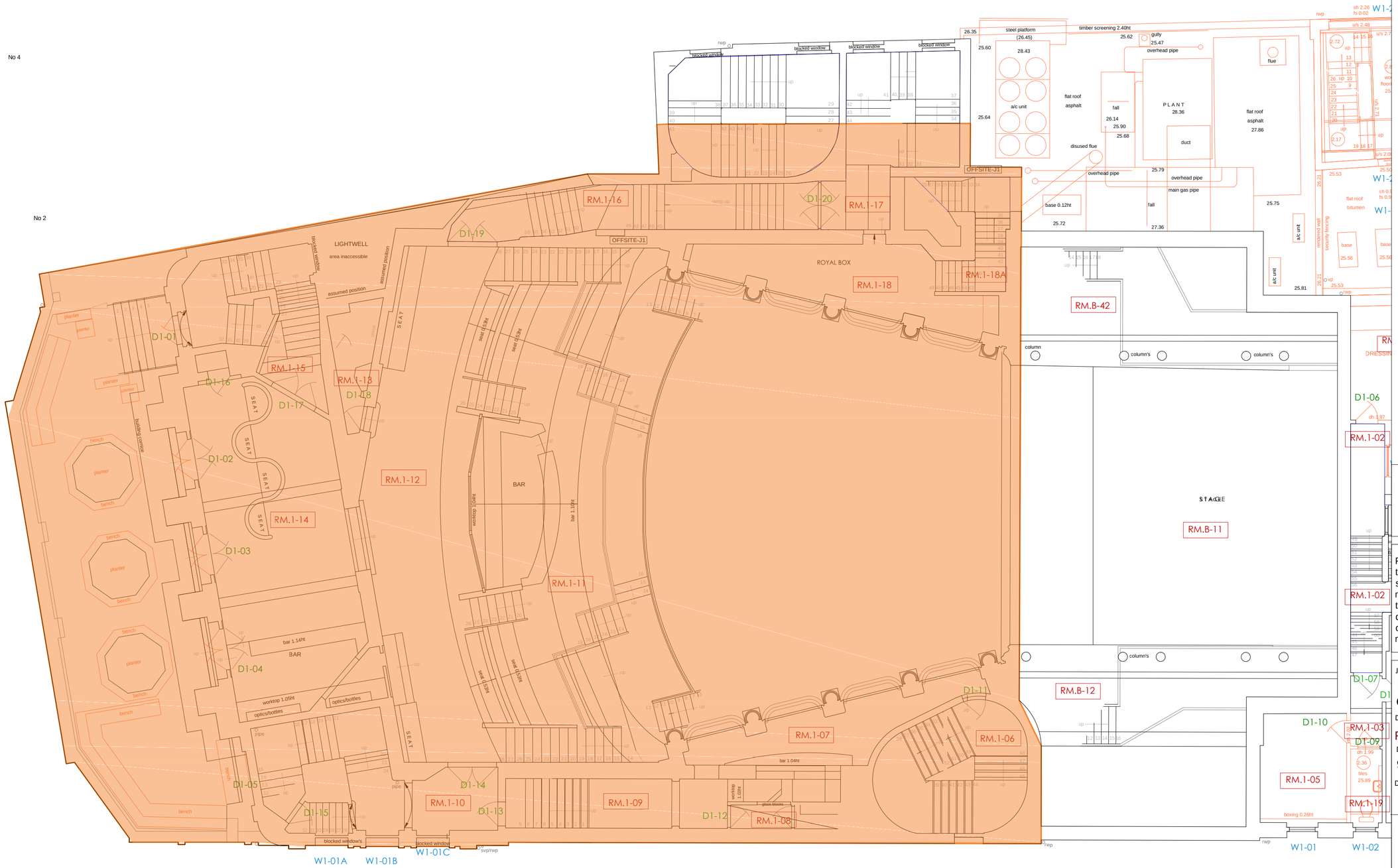
BAYHAM PLACE

No 4

No 2



FIRST FLOOR PLAN

INDEX

- Fire reinstatement demise
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JOB TITLE

KOKO

Camden

JOB No

X0936

DRAWING TITLE

Fire Reinstatement Demise

DWG No	ROOM No	REV
98_3		A

DRAWN BY	SCALE	DATE
	1:100 @ A2	15/05/20

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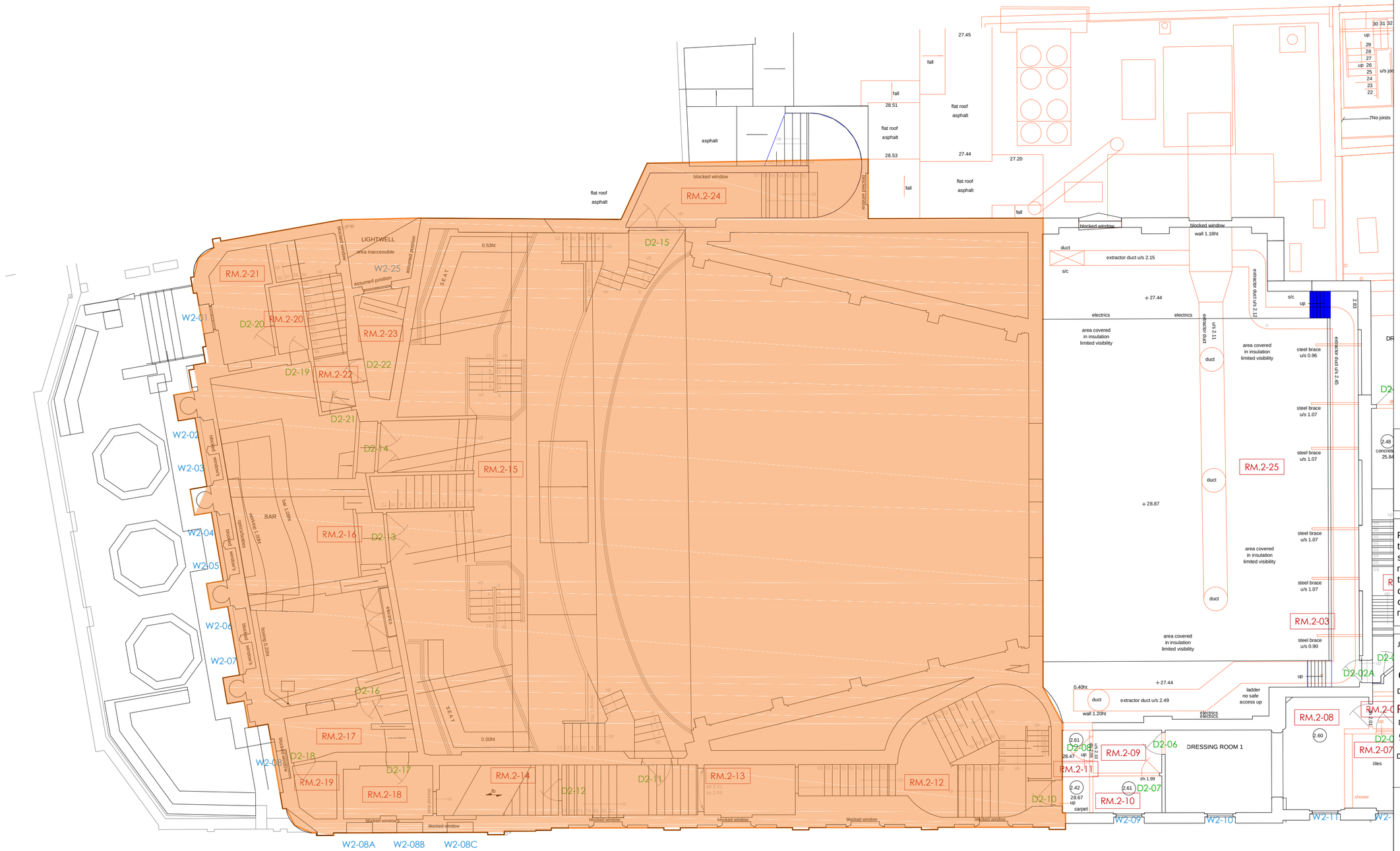
BAYHAM PLACE



SECOND FLOOR PLAN

INDEX

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KOKO
Camden

JOB No
X0936

DRAWING TITLE
Fire Reinstatement Demise

DWG No	ROOM No	REV
98_4		A

DRAWN BY	SCALE	DATE
	1:100 @ A2	15/05/20

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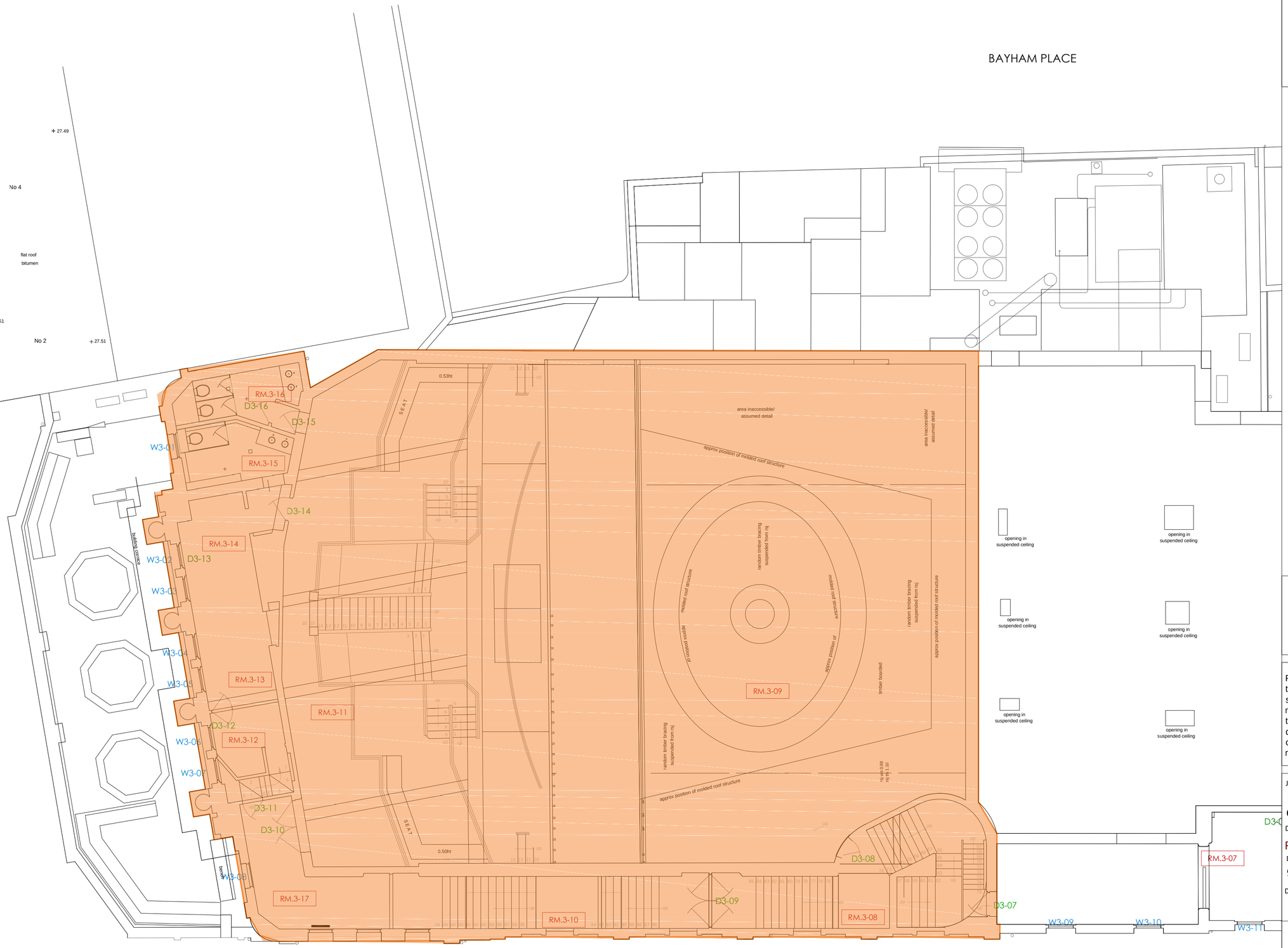

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JOB TITLE
KOKO
Camden

JOB No
X0936

DRAWING TITLE
Fire Reinstatement Demise

DWG No	ROOM No	REV
98_5		A

DRAWN BY	SCALE	DATE
	1:100 @ A2	15/05/20

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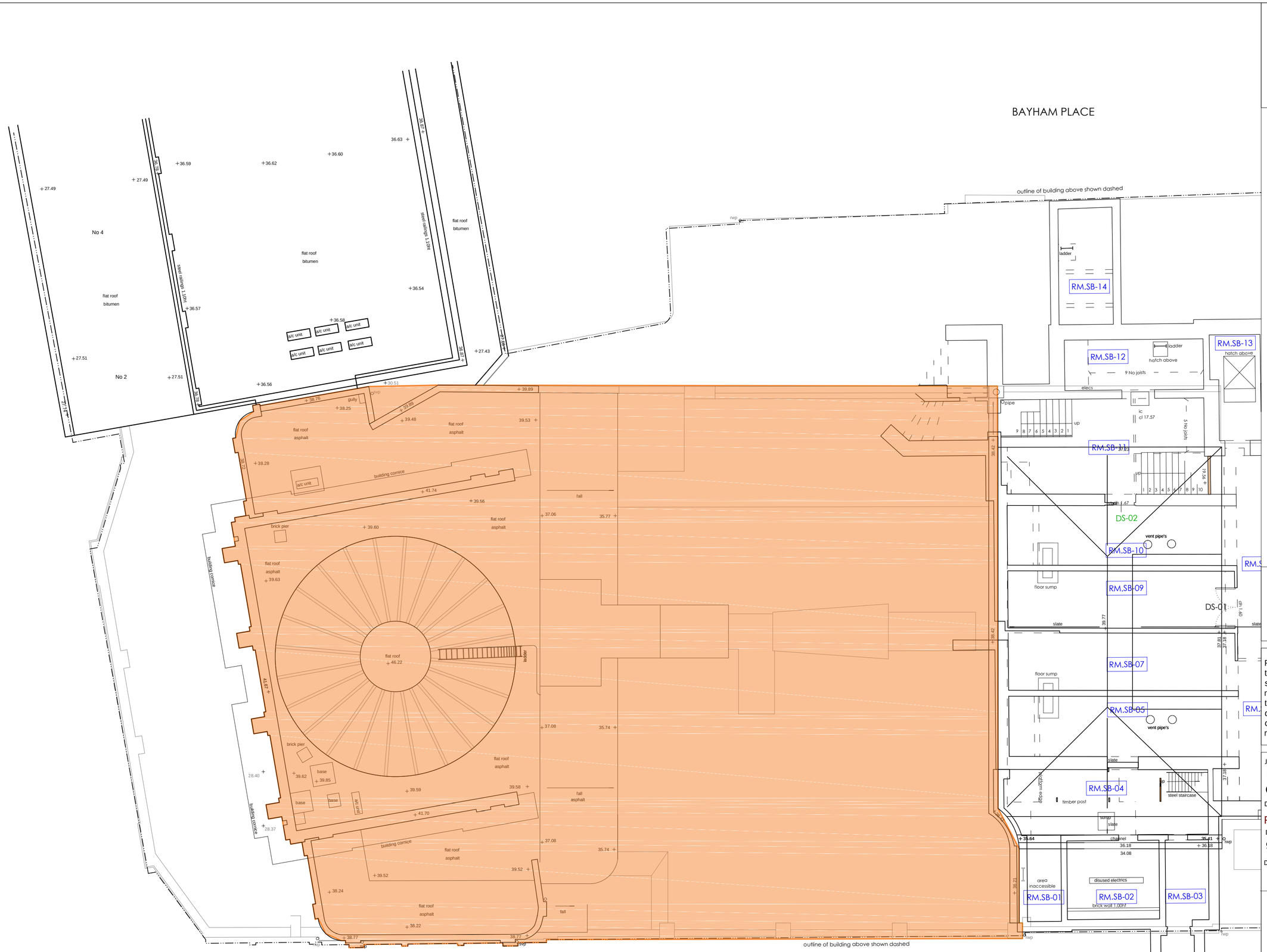
THIRD FLOOR PLAN



ROOF PLAN

INDEX

- Fire reinstatement demise
- Fire reinstatement demise (further survey required for confirmation)

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JOB TITLE

KOKO

Camden

JOB No

X0936

DRAWING TITLE

Fire Reinstatement Demise

DWG No	ROOM No	REV
98_6		A

DRAWN BY	SCALE	DATE
	1:100 @ A2	15/05/20

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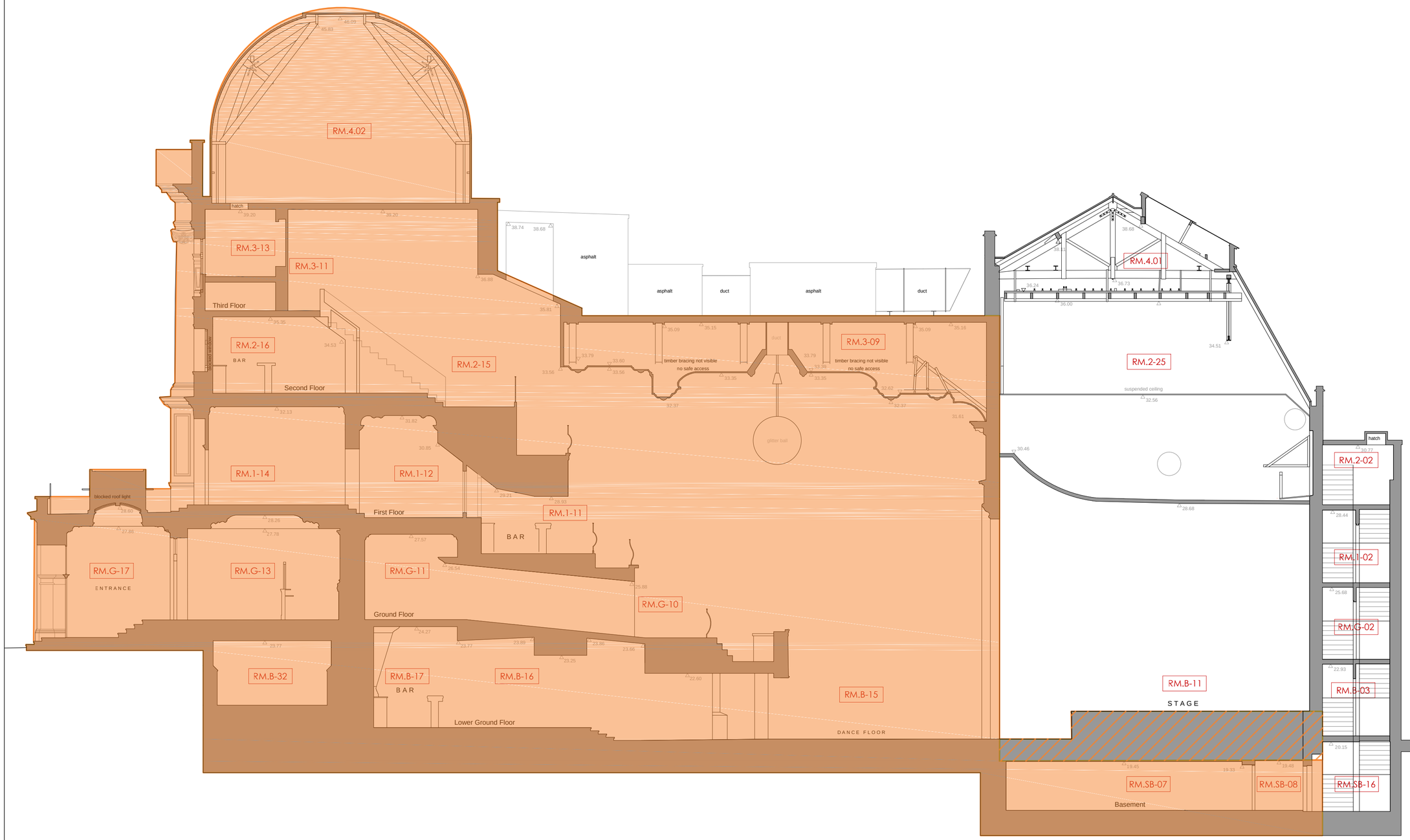

SECTION A-A'

INDEX

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- Fire reinstatement demise (further survey required for confirmation)

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JOB TITLE
KOKO
Camden

JOB No
X0936

DRAWING TITLE
Fire Reinstatement Demise

DWG No	ROOM No	REV
98_7		A

DRAWN BY	SCALE	DATE
	1:100 @ A2	15/05/20

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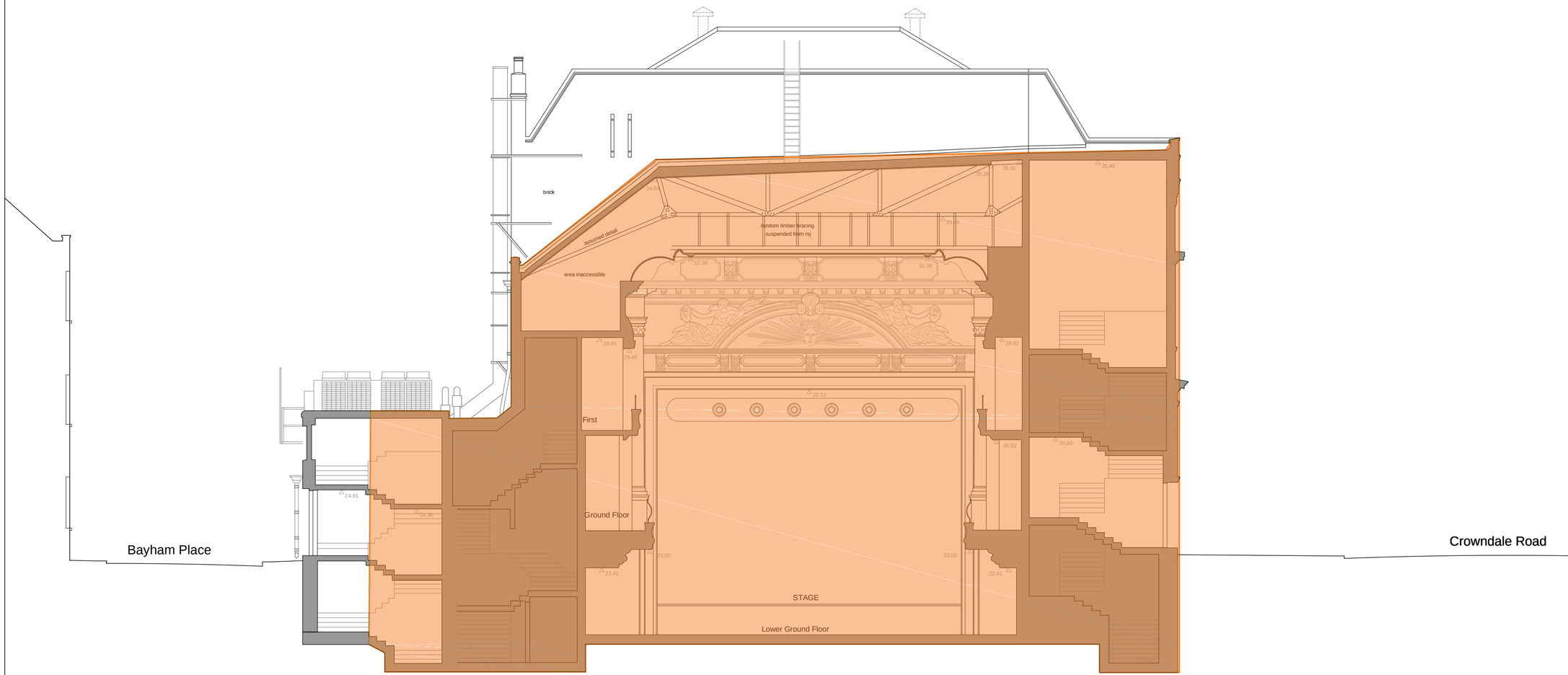

SECTION C-C

18.00m A.O.D

SECTION C-C'

INDEX

- Fire reinstatement demise
- Fire reinstatement demise (further survey required for confirmation)

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JOB TITLE

KOKO

Camden

JOB No

X0936

DRAWING TITLE

Fire Reinstatement Demise

DWG No

98_7

ROOM No

REV

A

DRAWN BY

SCALE

1:100 @ A2

DATE

15/05/20

STEPHEN LEVRANT
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APPENDIX 5: SPECIALIST REPORTS

Hutton & Rostron Reports

Site Note 7: Preliminary Damp Condition Investigation (Masonry)- March 2020

Site Note 8: Timber ceiling structures condition investigation- April 2020 (updated August 2020)

Site Note 9: Timber floor structures condition investigation- April 2020

Site Note 10: Secondary timber condition investigation- April 2020

Locker & Riley Report

Report on Fibrous Plaster- April 2020 (updated September 2020)

Paint Specialist Report (Catherine Hassall)

Paint survey- interiors

Historic paint schemes

Paint survey- External

Artemis (Specialist contractor) reports

Paint strip out- trials

Asbestos Survey Report

Report by Derisk UK

Hutton & Rostron

Environmental Investigations Ltd

Site Note 7: Preliminary Damp Condition Investigation (Masonry)

March 2020

Hutton + Rostron
Environmental Investigations Limited

The Hope Project (KOKO): Phase 1 of the preliminary damp condition Investigation

Site note 7 (Phase 1) for March 2020, job no. 146.89

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1 Introduction

2 Staff on site and contacts

3 Observations and *Recommendations*

4 H+R work on site

5 Administration requirements

Attachments

A Photographs

B Plans

C Table of moisture sample readings

D Standard methodology after fire

Distribution:

Andrew Bridge - Cotton Thompson Cole Ltd
Francesca Cipolla - Stephen Levrant: Heritage Architecture Ltd
Shantanu Subramaniam - Stephen Levrant: Heritage Architecture Ltd

File: 146.89

Prepared by:	**Technical review by:**	**Administration by:**
Michael Almond Dip Arch RIBA CSSW	Andrew Ellis BA(Hons) MSc	Jennifer Birchard BA(Hons)

Hutton+Rostron Environmental Investigations Ltd, Netley House, Gomshall, Surrey, GU5 9QA

Tel: 01483 203221 Email: ei@handr.co.uk Web: www.handr.co.uk

1 INTRODUCTION

1.1 AUTHORITY AND REFERENCES

Hutton + Rostron Environmental Investigations Limited carried out site visits to The Hope Project (KOKO Camden) during the March 2020 in accordance with instructions from Andrew Bridge by email, on 10 March 2020 (16:13). Drawings provided by Archer Humphryes Architects, Ref AHA/KKC/EX/ were used for the identification of structures. For the purpose of orientation in this report, the building was taken as facing west onto Camden High Street

1.2 AIM

The aim of this survey was to make an initial assessment of the extent and distribution of residual moisture in load bearing masonry structures, to make recommendations for further detailed investigation of residual moisture and to advise on short term remedial works, to promote drying of the structure and protect historically significant building fabric from damage and decay

1.3 LIMITATIONS

Structures were not examined in detail except as described in this report, and no liability can be accepted for defects that may exist in other parts of the building. We have not inspected any parts of the structure which are covered, unexposed or inaccessible and we are therefore unable to report that any such part of the property is free from defect or in the event that such part of the property is not free from defect it will not contaminate and/or affect any other part of the property. Any design work carried out in conjunction with this report has taken account of available pre-construction or construction phase information to assist in the management of health and safety risks. The sample remedial details and other recommendations in this report are included to advise and inform the design team appointed by the client. The contents of this report do not imply the adoption of the role of Principal Designer by H+R for the purposes of the Construction (Design and Management) (CDM) Regulations 2015

2 STAFF ON SITE AND CONTACTS

2.1 H+R STAFF ON SITE

Tim Hutton
Michael Almond
Andrew Ellis
Clive Stonehill

2.2 PERSONNEL CONTACTED

Mark Sullivan – Od Projects

3 OBSERVATIONS AND *RECOMMENDATIONS*

3.1 INTRODUCTION TO PHASE 1 DAMP CONDITION INVESTIGATION

Phase 1 represents an interim damp condition investigation report. Due to unforeseen circumstances; including the identification of Asbestos containing materials within vulnerable damp areas, constructional build-up such as dry-linings and wall cavities concealing vulnerable and damp masonry masses (and prohibiting masonry sampling), and due to implications relating to the national COVID 19 crisis, not all data analysis and masonry moisture sampling was feasible during the March 2020 investigations

Therefore, areas deemed inaccessible but vulnerable to damp and decay issues have been noted and designated for further investigations as a Phase 2 scope of works contributing to the preliminary damp investigation package. These have been highlighted on the Drawings at Attachment B

Following completion of pending Phase 2 investigatory works and masonry moisture sampling, fuller and more concise remedial recommendations can be generated, however our initial findings are conclusive evidence that as a result of fire and water related damage, localised areas of masonry are indeed saturated or even super-saturated. Evidence of which may be used to implement the intended and more robust phase 2 strip-out and as well as a vigorous drying strategy

Actions required to facilitate phase 2:

1 *Dry-lined walls: Areas of non-historic, damp, damaged or non-significant dry-linings which are concealing potentially damp affected masonry masses will require localised removal/opening works for access to the concealed masonry walls behind. Ideally this should include the recording, renewal or retention of skirtings, and/or the removal of a continuous 200mm high horizontal channel through the dry-lined walls at ~300mm above floor level to allow for moisture sampling. Failing this, single openings at 200x200mm and ~300mm above floor level to each distinct masonry mass (each wall) would also facilitate suitable minimum access for masonry sampling and drying*

2 *Asbestos containing materials: Health and safety requirements necessitate that zones containing hazardous levels of asbestos containing materials be cleared and certified full in accordance with the Control of Asbestos Regulations before further intrusive works may commence to these areas*

3.2 RESIDUAL MOISTURE IN MASONRY MASSES – INITIAL PHASE 1 ASSESSMENT

3.2.1 Sampling

A total of 67 No. deep masonry samples were extracted from representative load bearing masonry structures, distributed throughout the building where safe and convenient access was available. Samples were double bagged on site and returned to H+R's laboratory for gravimetric analysis of available and hygroscopic moisture content. Results are shown on plans at Attachment B and in a table at Attachment C

3.2.2 Results

1 Third floor: Samples from structures around the projection room were found to be generally wet or saturated, with available moisture contents above 5 per cent. Further saturated samples, with greater than 8 per cent available moisture content were extracted from the external wall of the south stair well, at low level. The inner wall of the stairwell and other isolated internal and external structures were found to be dry. Initial results indicated that saturation of masonry due to fire-fighting activities was localised but showed a tendency for water to drain downwards through the structure, directed by staircases and balcony structures

2 First floor: 4 No. isolated saturated samples were taken from multiple locations, including the stairwells on the north and west sides. Samples from intermediate structures were classified as dry, with available moisture contents below 2 per cent. Results indicated that some masonry structures at mid-level had been largely unaffected by inundation with fire-fighting water

3 Ground floor: Apart from an isolated saturated sample, from the south external wall, the majority of samples from the central area of the ground floor were classified as moist, with available moisture contents between 2 and 5 per cent. This was consistent with moisture draining downwards through masonry masses over time and dispersing laterally, resulting in surplus moisture being more widespread and more evenly distributed. The west end of the floor plan, below the balconies and in the main entrance area, was not accessible for sampling due to the presence of asbestos

4 Basement: 5 No. samples out of 6 No. from the structures around the auditorium were classified as saturated, with available moisture contents above 8 per cent. H+R understand that the basement floor had been partially flooded for a period immediately following the fire, which would have allowed standing water to drain into the bases of structures. The Bar and sanitation area to the west was not accessible for sampling due to the presence of asbestos

5 East of proscenium: Saturated samples were obtained from the south and east external walls at third floor level and from around the ground floor fire exits on the north side. All other samples were generally dry. These results confirmed the tendency for moisture to distribute laterally where flooding had occurred at low level as a result of substantial moisture ingress related to fire and water damage

6 Hygroscopic salts: Hygroscopic salts were accumulating in many of the masonry masses sampled, as shown on the table at Attachment C. These will result in damage to vulnerable materials built in contact with the affected masonry, and are likely result in apparent damp problems due to ‘cyclical efflorescence and deliquescence’ with fluctuating relative humidities above and below approximately 75 per cent on future occupancy. In particular, salts may result in corrosion to iron or steel elements, corrosion to electrical fixtures and fittings, and damage to vulnerable finishes; unless vulnerable materials are isolated from salt affected structures

3.2.3 Ventilation and drying

Ventilation and drying within the structure subject to water penetration before, during and after the recent fire had dramatically improved since the previous H+R site visit; especially with the ‘soft strip’ and conservation enabling works undertaken to date. In particular, through and cross ventilation with external air via window openings and openings formed for construction works adjacent to the original fabric was allowing through ventilation in conjunction with the ‘passive stack effect’ of air rising up through the building, through adventitious gaps in the provision for temporary roofing. Relative humidity, temperature and dew point was measured in representative areas around the site, and surface temperatures were measured with a thermal camera. This revealed no evidence of condensation at the time of survey and partial vapour pressures differentials between the existing fabric and the ambient air was sufficient to allow drying. This was likely to continue through April and/or May. However, the increased moisture content of warmer external air in the summer months was likely to reverse this process, resulting in condensation and preventing further drying in the absence of the introduction of accelerated drying measures. The drying of residual moisture in the fabric resulting in the crystallisation of hygroscopic salts mobilised from the fabric as a result of water penetration; as described at 3.2.2(6) above. This is likely to be an accelerating problem as this fabric dries, unless adequate conservation and remedial measures are taken. In particular, it is may result in accelerating corrosion of structural iron and steel elements in the reinforced concrete structure; especially in the original clinker ash reinforced concrete structures. However, construction and condition of the reinforced clinker slab supporting

the fire damaged dome structure was not the focus of this investigation. Reference should be made to the report prepared by Heyne Tillett Steel with regard to the slabs structural capacity and its likely behaviour in response to the implications of fire and water damage

Although creating a positive outcome for the currently damp/wet fabric of the building, ventilation and drying is also likely to eventually result in potentially irritant or hazardous materials in becoming part of 'airborne dust'; where they may represent an increasing and significant health hazard to those entering the building before, during and after refurbishment. In particular to mobilising mould spores, asbestos particles and pigeon guano into occupied air space

1 *Background ventilation: Through and cross ventilation should be provided to all areas and building voids as soon as possible, so as to minimise the risk of further condensation and mould growth, and so as to facilitate drying. However, potentially contaminated debris must be removed before further ventilation measures are taken, as described at 3.3.8 below*

2 *Mechanical ventilation: Preparation should be made for providing mechanical ventilation to poorly ventilated basement and cellar areas where it is not possible to provide through and cross ventilation by opening windows and the 'passive stack vent effect' up through the building. H+R can advise further if required*

3 *Conservation and remedial exposure: All building voids should be opened as part of conservation enabling works, so as to provide through and cross ventilation as described at 1 above. This may be done by carefully recording, removing and setting aside skirting details and/or opening continuous vent gaps at the base of dry lined or plastered walls; and by making openings to all suspended ceilings and suspended ceiling voids through non-decorative ceiling plaster. Alternatively, continuous ventilation slots may be formed at the top of lath and plaster or dry lined voids, so as to allow through ventilation and drying. H+R can advise further if required*

4 *Ventilation to sub-floor voids: Provision should be made for through and cross ventilation to all sub-floor voids; especially beneath suspended timber floors. This may be done by lifting floorboards adjacent to the walls on either side of each area of suspended floor; and/or by removing ceilings and soffits beneath. H+R can advise further if required*

5 *Monitoring: The residual moisture content of all structures subject to water penetration before, during and after the recent fire should be monitored, so as to ensure adequate drying measures are applied to allow completion of refurbishment to time and budget; and so as to minimise the risk of moisture or salt related problems during and after the latent defect period*

6 *Accelerated drying: Preparation should be made for the installation of specialist accelerated drying measures during summer and autumn months of 2020. These will require a dedicated power supply which may be provided with 3 phase electricity mains, or with dedicated silenced diesel powered generators, and are likely to include the use of 110V electrical radiant heaters, and desiccant dehumidifiers with warm dried air ducted into the voids behind dry linings around damp affected structures. H+R can advise further when required*

7 *Long term drying: Provision should be made for the isolation of vulnerable materials from original fabric with high residual moisture and/or hygroscopic salt content, and for provision of continued through ventilation to the building voids during and after the latent defect period. This may be done by making provision for 'trickle ventilation' and ventilation gaps on reinstatement of existing and new claddings; taking due regard to current Building Regulations with regard to fire and sound barriers. H+R can advise further when required*

8 *Corrosion to iron and steel elements: The corrosion state and structural adequacy of existing iron and steel elements should be determined by H+R and the Structural Engineer. Allowance should be made for repair or replacement as directed by the Structural Engineer, and for provision of 'cathodic protection' as necessary, so as to minimise further corrosion during and after refurbishment*

3.3 PHASE 2 STRIP- OUT

Following the completion of the preliminary Phase 1 strip-out, H+R understand that the majority of vulnerable non-structural elements have been removed, recorded and stored appropriately. However, due to reasons of poor access to hazardous areas, on-going construction works and scaffolding, should there still remain any heritage and non-heritage items vulnerable to damp and decay, these should be considered for removal prior to likely adverse effects as moisture inevitably travels down the property from roof level as a result of the January 2020 fire extinguishing efforts. Not only are these items likely themselves to be damaged by damp and decay but they are also likely to slow down the drying process of encapsulated surfaces and materials. Furnishings, fittings, wall coverings of plaster, paper and joinery will delay drying and joinery items, such as skirting, architraves and window surrounds are likely to distort and decay. As such, finishes below fire damaged areas, and especially at ground floor level and within basement areas will be very difficult to retain in-situ if the overall effects of the fire and subsequent water penetration are to be minimised

A thorough and robust approach be taken to removing vulnerable and non-essential elements from the building before they cause further damage or are damaged beyond reasonable economic repair. This may be carried out in specified locations as identified by H+R as being areas 'most vulnerable' to damp and decay (specific locations to be annotated on drawings post Phase 2 investigatory works when full and safe access is made available) due to the presence of significant residual moisture reservoirs in load bearing structures

3.3.1 Fixtures, linings and fittings

Allowance should be made for the removal of the following items to aid in the drying out of the remaining structures and so that items of heritage value may be preserved as far as is practical:

1 *All remaining carpets/linos floor coverings throughout the building at all levels. Any bespoke floor coverings or soft furbishing fabrics should be carefully tagged, recorded and set aside for specialist cleaning and storage, to allow for copying and possible reinstatement*

2 *All non-essential construction related items*

3 *Floorboards and Parquet flooring laid over solid floor structures*

4 *Dry linings and non-historic/relevant stud partition walls to be recorded and removed. This is particularly important at ground floor and basement levels and will be necessary for detailed investigation of masonry moisture distribution and subsequent monitoring*

5 *All relevant doors and door joinery. Removing doors also has the added advantage of removing a common factor in inhibiting airflow throughout a property as well as being inherently vulnerable to being damaged during the ensuing refurbishment works*

6 *Fixed and fitted furniture, including fitted cupboards, shelves, services enclosures etc.*

7 *Ticket booths, bar counters, box office related sub-divisions etc. should also be removed. These are considered to be of significant historic value and will be vulnerable to damage during the refurbishment works*

8 *Vulnerable and historic skirting boards and window architraves*

9 *Consideration should be given to removal of the most vulnerable windows and replaced with secure well-ventilated boarding. Windows not removed should remain open but secure, to promote cross ventilation and drying. (H+R understand that these works are already intended/being planned-for within the Heritage Teams Phase 2 strategy)*

NB. It should be noted that in regards to appropriate levels of strip-out in response to fire and water damage, an on-going assessment is advised. This should take into account changes in the environment and consider the implications of positive and negative developments. In this way, the costly comprehensive removal of all potential vulnerable items may be avoided and a more select approach adopted with rooms and specific items being revisited for strip-out consideration if required

3.3.2 Suspended timber floors

There were a number of suspended timber floors exposed during recent enabling works. However, although some adventitious ventilation and drying had occurred via gaps in ceilings and soffits beneath, no general provision for exposure and through ventilation had been made

Suspended timber floors do not require removal, however through-ventilation to the floor voids should be achieved by removing opposing floorboards at floor/wall junctions to promote air flow. Any residual pugging or deadening material should however be removed. Allowance should be made for these works to be undertaken in areas following H+R's timber condition investigation and detailed masonry moisture investigations

3.3.3 Storage

H+R understand that the majority of all Phase 1 heritage worthy materials to be conserved and retained on refurbishment have been set aside and stored since the previous H+R site visit. However, should developing situations create conditions in which any remaining historic non-structural items become vulnerable to damage or decay/distortion etc due to high or fluctuating moisture contents then the following advice should be followed

High quality storage of heritage items is essential. All removed material should be well marked/labelled and documented via photography and on drawings prior to removal. Labels should carry a code relating each item to its exact location. Items should be stacked in a drying pile with regularly arranged and carefully positioned spacer sticks. Stacks should be above ground level, ideally on pallets and there should be good access to walk around the stacks. The environment should be dry and well ventilated or controlled to 45-60%RH at 18-20°C. Wide variations in ambient humidity and temperature should be avoided and regular inspections of stored materials should be carried out. Inspections and any observations and actions taken should be recorded in a site diary, for insurance purposes

3.3.4 Temporary water-proofing

Temporary water-proofing was not the focus of this investigation and H+R understand that measures have been taken to protect vulnerable building fabric with a waterproof envelope

As general recommendations H+R advise that all temporary roofing be provided with appropriate roof drainage with good access to allow inspection and maintenance. It is imperative that further water ingress is prevented if retained historic building fabric is to be protected and if cost effective long-term drying is to take place in a controlled manner. The installation should be designed to carry surface water to ground level and discharge it clear of the structure at all times; and provision should be made for safe and convenient access for inspection and maintenance. Retained, refurbished and temporary roof coverings and drainage systems should be inspected regularly and repaired as necessary before closing the site each day. Any water ingress and any actions taken to correct defects should be recorded and countersigned by the Project Manager in the site diary, for insurance purposes, and H+R should be informed of any significant water penetration as a matter of urgency. A formal management system should be in place to allow this inspection, repair and recording to be 'escalated' for further assistance on site when required

3.3.5 Feral Pigeons

The significant resident population of feral pigeons represents an increased risk of roof drainage failure that could lead to further water ingress. Nesting materials and pigeon faeces generally also represents a significant potential health hazard to personnel and is likely to provide conditions for mould growth. Additionally, with the necessity for increased air-flow and ventilation to dry-out vulnerable damp areas, an increased health risk to persons occupying pigeon and guano infested air spaces raises significantly. Generally, feral pigeons that have been bred on a building will have a strong homing instinct to that structure, despite any practical pigeon exclusion or deterrent measures. As feral pigeons may live for over 30 years, they are therefore highly likely to return to site unless they are humanely removed

All feral pigeons with a homing instinct to the building should be humanely culled as soon as practical. This may be done with a live baiting and trapping programme with the pigeons humanely culled off site by a specialist pest control sub-contractor. The use of specialist pigeon exclusion and deterrent measures is unlikely to be cost effective or even practical in the circumstances on site. H+R can advise further if required

3.3.6 Access

Scaffolded and other access had been improved since previous H+R site visit; especially with the removal of debris and contents. Existing provision for access was still likely to limit inspection and maintenance; especially of roofs and roof drainage systems. Interiors of the building were also heavily contaminated locally with potentially irritant or hazardous materials; including mould, pigeon faeces, and asbestos containing materials

Safe and convenient access should be provided to all areas, so as to facilitate security, inspection and maintenance; especially while the site is 'mothballed' during the current Covid 19 crisis. In particular, provision should be made for safe access to areas related to developing 'hazardous' zones such as; ACM zones, mould contaminated voids and pigeon infested areas as well as the more general safe and convenient access to all roofs, temporary roofs and roof drainage systems, so as to facilitate inspection and maintenance as described at 3.3.4 above. Consideration should be given to decontaminating the site for potentially irritant or hazardous materials as soon as possible, as described at 3.3.8 below

3.3.7 Mould and site hygiene

The site remained heavily contaminated with asbestos containing materials, especially in the lower levels at the centre of the auditorium and to balcony structures. There are also areas of heavy contamination by feral pigeon faeces and localised heavy superficial mould growth. These represent a potential health hazard to those entering the building before, during and after refurbishment; and restricted access for inspection, maintenance

and refurbishment. In particular these areas represent a significant health risk as it becomes essential to ventilate vulnerable damp affected areas/voids previously closed-off from occupied air spaces and occupation

1 *Asbestos containing materials: Consideration should be given to removing all asbestos containing materials as soon as practical; fully in accordance with the current Control of Asbestos Regulations. Consideration should be given to undertaking these works while the building is effectively 'mothballed' during the current Covid 19 crisis*

2 *Pigeon faeces: All pigeon faeces should be removed as soon as practical. Those undertaking this task should be provided with appropriate respiratory protection, eye protection, gloves and protective clothing; and pigeon faeces and contaminated materials should be disposed fully in accordance with the requirements of the local authority. Consideration should be given to undertaking these works in conjunction with the removal of asbestos containing materials, as described at 1 above*

3 *Mould growth: All areas of visible superficial mould growth should be removed as soon as possible as part of routine site hygiene. This may be done by 'wet wiping' using a dilute (10%) solution of sodium hypochlorite or household bleach. Those undertaking this task should be provided with appropriate respiratory protection, eye protection, gloves and protective clothing. Consideration should be given to undertaking these works in conjunction with decontamination works as described at 1 and 2 above*

4 H+R WORK ON SITE

4.1 H+R made a limited initial visual inspection of the structure for defects liable to allow water penetration before and after refurbishment

4.2 H+R took samples from representative masonry masses, so as to determine their gravimetric and hygroscopic moisture content

5 ADMINISTRATION REQUIREMENTS

5.1 H+R require formal instructions for further investigations and consultancy on this project

5.2 H+R require confirmation of distribution of digital and printed copies of reports and site notes

Attachment A

Fig 1:

Roof scape at west end; showing roof coverings above the main auditorium, with new poured liquid waterproof membrane covering

Fig 2:

Roof to east of auditorium; showing typical temporary roof coverings over the west area of the auditorium roof and adjacent to the fire damaged dome floor structure during works

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Fig 3:

Retained structures at roof level; showing vulnerable parapet gutter to the south of RM.SB-04 vulnerable to blockage and overcharging

Fig 4:

Roofscape, east end, looking east; showing general arrangement of newly constructed roof structures prior to introduction of temporary roof

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Fig 5:

Interior, escape stair on north side, RM.2-24; showing damage to wall and ceiling structures where recent water penetration had drained through the soffit from roof level and exasperated/ accelerated conditions for decay

Fig 6:

Interior, third floor, RM.3-14; showing typical corrosion of embedded steel components now subject to accelerated decay/corrosion from chronic moisture penetration as a result of the recent fire and water damage

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Fig 7:

First floor escape stair on south side, accessed from RM.1-10; showing surface mould growth sustained by enhanced humidity and restricted through ventilation exasperated by the retained moisture within the fabric of the property from the recent substantial water penetration

Fig 8:

Typical internal corridor, RM.1-16; showing failure of impermeable plaster and paint finishes and widespread mould growth exasperated by the recent chronic water penetration

Fig 9:

Escape stair, north side, RM.G-24; showing typical failure of impermeable paint finishes following recent chronic intermittent condensation

Fig 10:

Auditorium, north side; showing typical failure of film-forming paint finishes where the plaster substrate had been affected by damp

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Fig 11:

Escape stair at ground floor level on south side, RM.G-07; showing historic corrosion of embedded steel structure and salt efflorescence damage to ceiling and wall finishes now substantially exasperated and accelerated by recent fire related moisture penetration

Fig 12:

Escape stair on south side, RM.G-08; showing salt efflorescence damage and mould growth where water had drained through and across the stair soffit from structures. Decay onset related to recent fire related moisture penetration

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Fig 13:

Head of escape stair on south side, RM.3-17; showing salt damage to paint finishes focussed on brickwork joints to external wall

Fig 14:

Third floor balcony, RM.3-13; showing failure of plaster finishes where chronic fire related water penetration had drained through the structure from above

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Fig 15:

Basement, east side, RM.B-18; showing persistently damp conditions at low level where recent moisture penetration had collected/migrated at lower levels

Fig 16:

Basement, east side; showing residual load bearing masonry structure subject to water penetration

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Fig 17:

Escape and service corridor on ground floor north side, DG-18; showing surface efflorescence of hygroscopic salts in areas that also show high residual moisture contents in brickwork. Area highly likely to be exasperated by negative conditions brought on by migrating moisture from the recent fire related water penetration

Fig 18:

Escape and service stair on north side, ground floor, DG-18; showing widespread salt damage to impermeable paint finishes and detachment of ceiling plaster. Detachment highly likely to be exasperated by negative conditions brought on by migrating moisture from the recent fire related water penetration

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Fig 19:

Fire escape on north side, RM.B-40; showing salt and water damage to impermeable paint finishes trapping moisture within the masonry elements subject to chronic recent moisture penetration

Fig 20:

Lower basement, north side, RM.SB-12; showing structures subject to intermittent flooding at time of inspection as a likely result of migrating moisture from the many thousands of litres of water allowed to enter into the buildings fabric as a result of the fire fighting efforts

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Fig 21:

Lower basement, north side, RM.SB-11; showing generally damp conditions around structures at low level. However no active decay organisms detected

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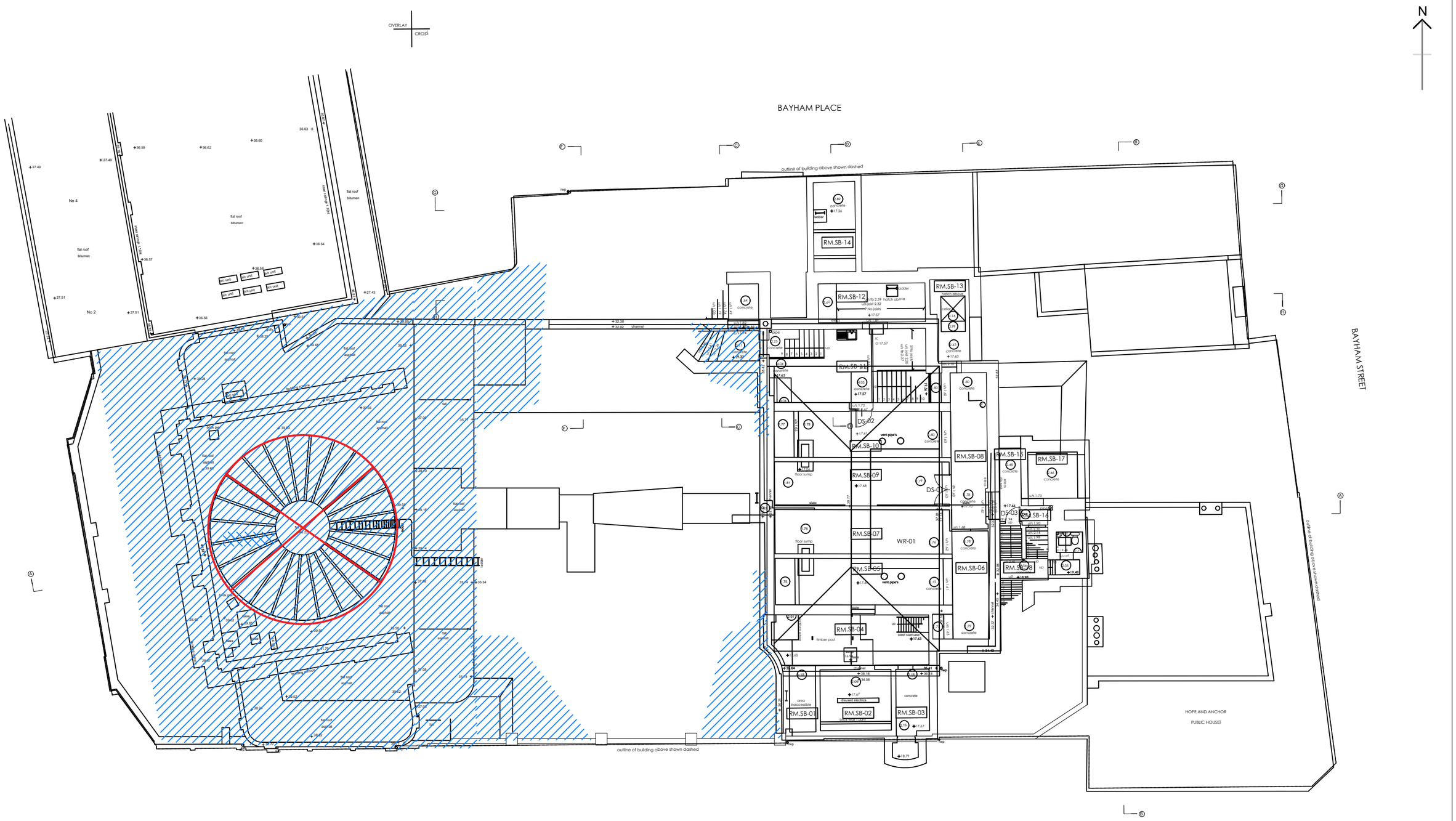
Attachment B



Roof areas subject to chronic water penetration during the 6 January 2020 fire fighting efforts

The Hope Project / KOKO - Roof

Damp Condition Investigation

11 March 2020

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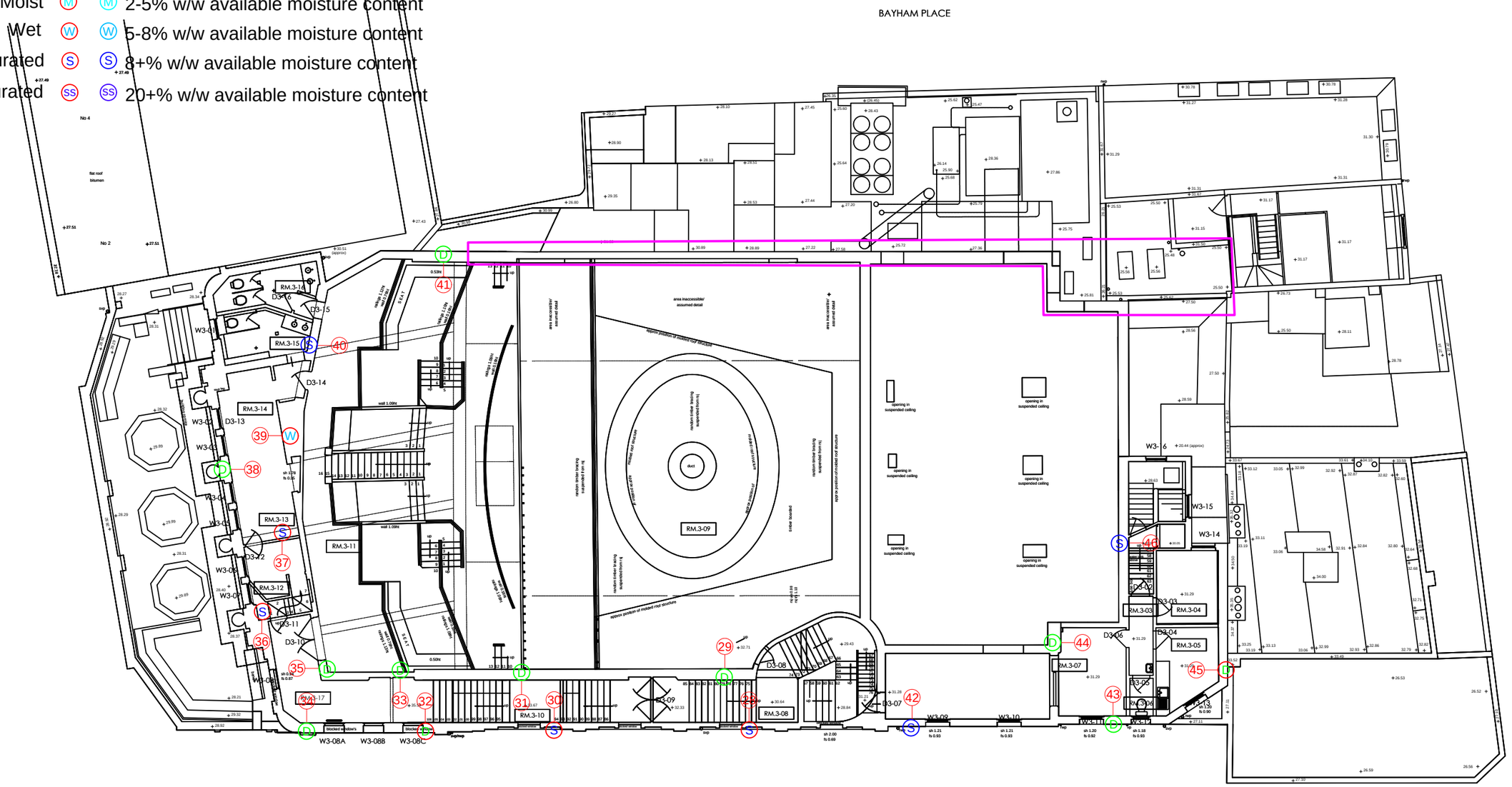
146-89 Site Note 7 March 2020 -Not to scale-

	High salt content	Low salt content
Dry	D	D 0-2% w/w available moisture content
Moist	M	M 2-5% w/w available moisture content
Wet	W	W 5-8% w/w available moisture content
Saturated	S	S 8+% w/w available moisture content
Super Saturated	SS	SS 20+% w/w available moisture content



Key: 1 Masonry sample location

PHASE 2 area of investigation/moisture sampling

H+R

The Hope Project / KOKO - Third Floor
Damp Condition Investigation
11 March 2020

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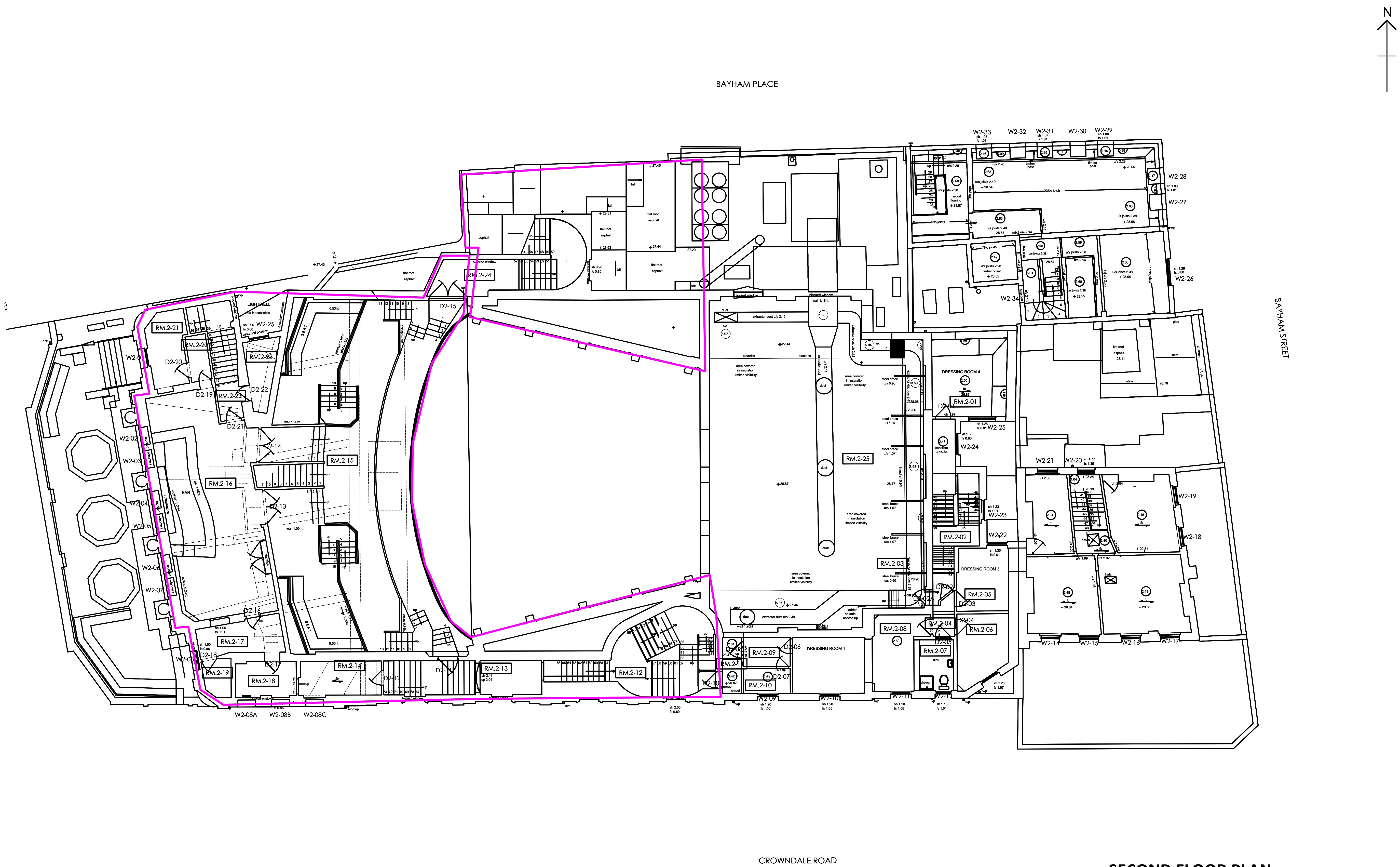

SECOND FLOOR PLAN

Key:
Masonry sample location
PHASE 2 area of investigation/moisture sampling

H+R

The Hope Project / KOKO - Second Floor
Damp Condition Investigation
11 March 2020

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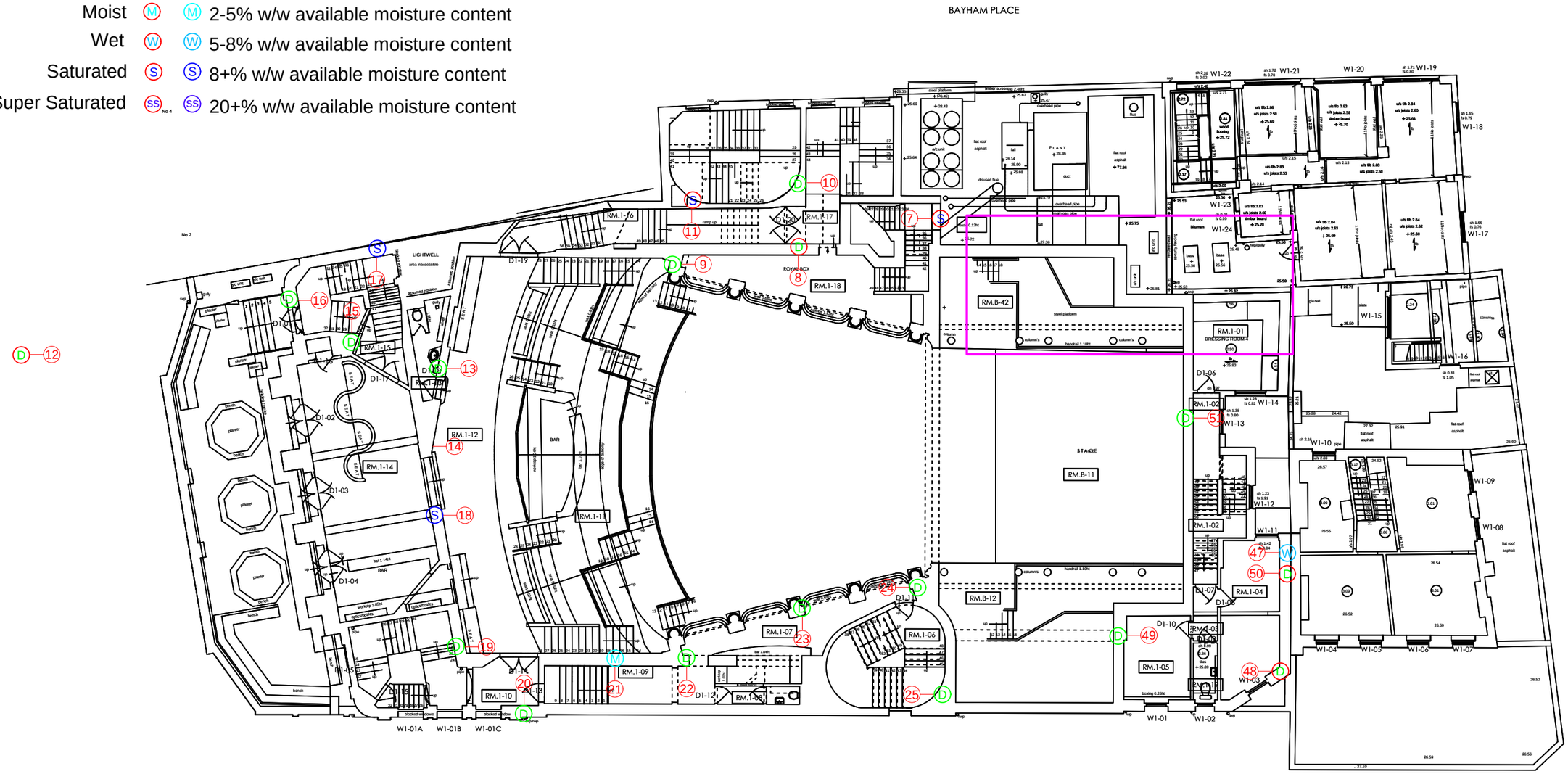
146-89 Site Note 7 March 2020 -Not to scale-

	High salt content	Low salt content	
Dry	D	D	0-2% w/w available moisture content
Moist	M	M	2-5% w/w available moisture content
Wet	W	W	5-8% w/w available moisture content
Saturated	S	S	8+% w/w available moisture content
Super Saturated	SS No 4	SS	20+% w/w available moisture content



FIRST FLOOR PLAN

Key: (1) Masonry sample location

PHASE 2 area of investigation/moisture sampling

H+R

The Hope Project / KOKO - First Floor
Damp Condition Investigation
11 March 2020

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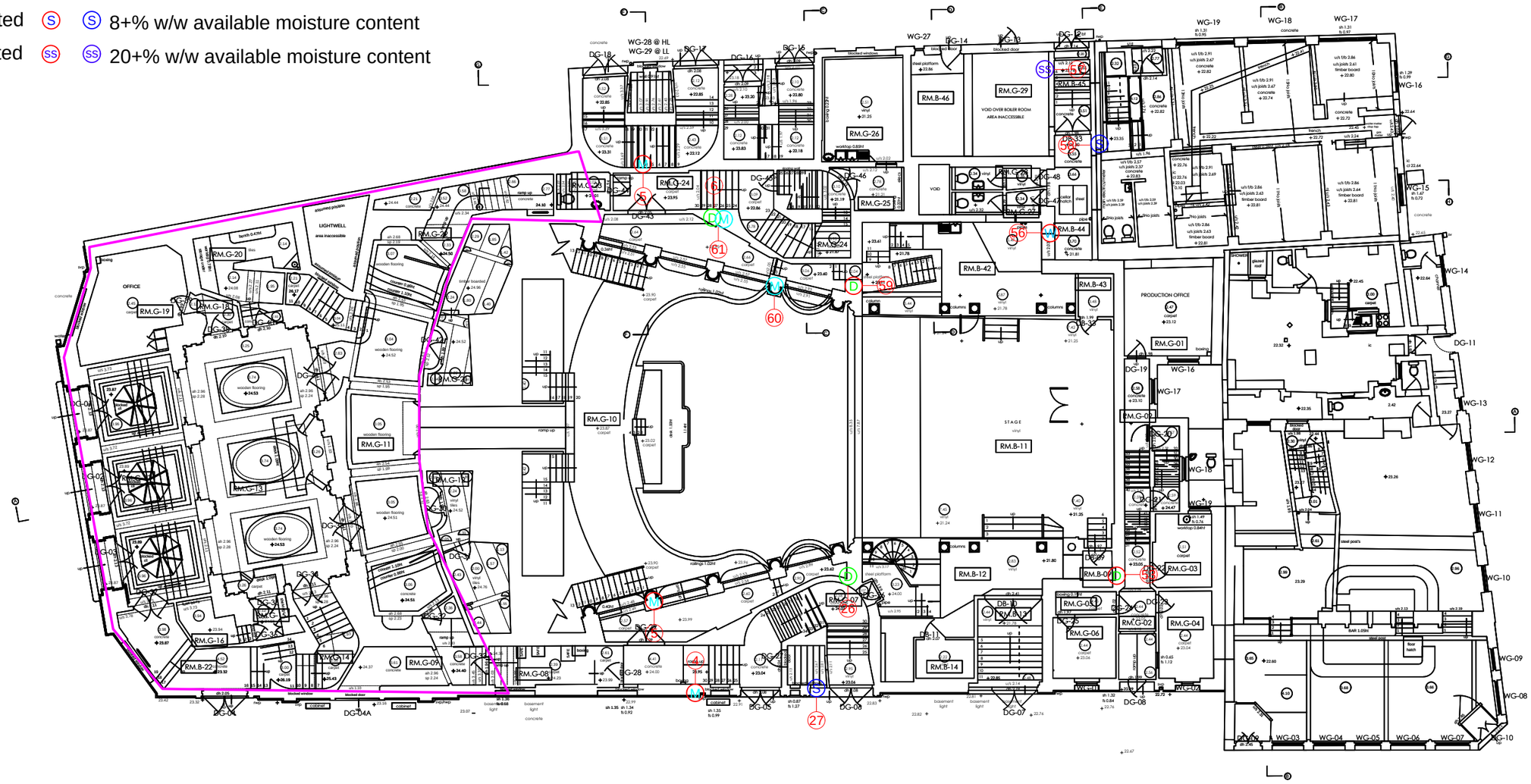
146-89 Site Note 7 March 2020 -Not to scale-

	High salt content	Low salt content
Dry	D	D 0-2% w/w available moisture content
Moist	M	M 2-5% w/w available moisture content
Wet	W	W 5-8% w/w available moisture content
Saturated	S	S 8+% w/w available moisture content
Super Saturated	SS	SS 20+% w/w available moisture content



GROUND FLOOR

H+R

The Hope Project / KOKO - Ground Floor
Damp Condition Investigation
11 March 2020

Key: 1 Masonry sample location
PHASE 2 area of investigation/moisture sampling

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146-89 Site Note 7 March 2020 -Not to scale-

	High salt content	Low salt content	
Dry	D	D	0-2% w/w available moisture content
Moist	M	M	2-5% w/w available moisture content
Wet	W	W	5-8% w/w available moisture content
Saturated	S	S	8+% w/w available moisture content
Super Saturated	SS	SS	20+% w/w available moisture content

Key: (1) Masonry sample location

PHASE 2 area of investigation/moisture sampling

H+R

The Hope Project / KOKO - Basement

Damp Condition Investigation

11 March 2020

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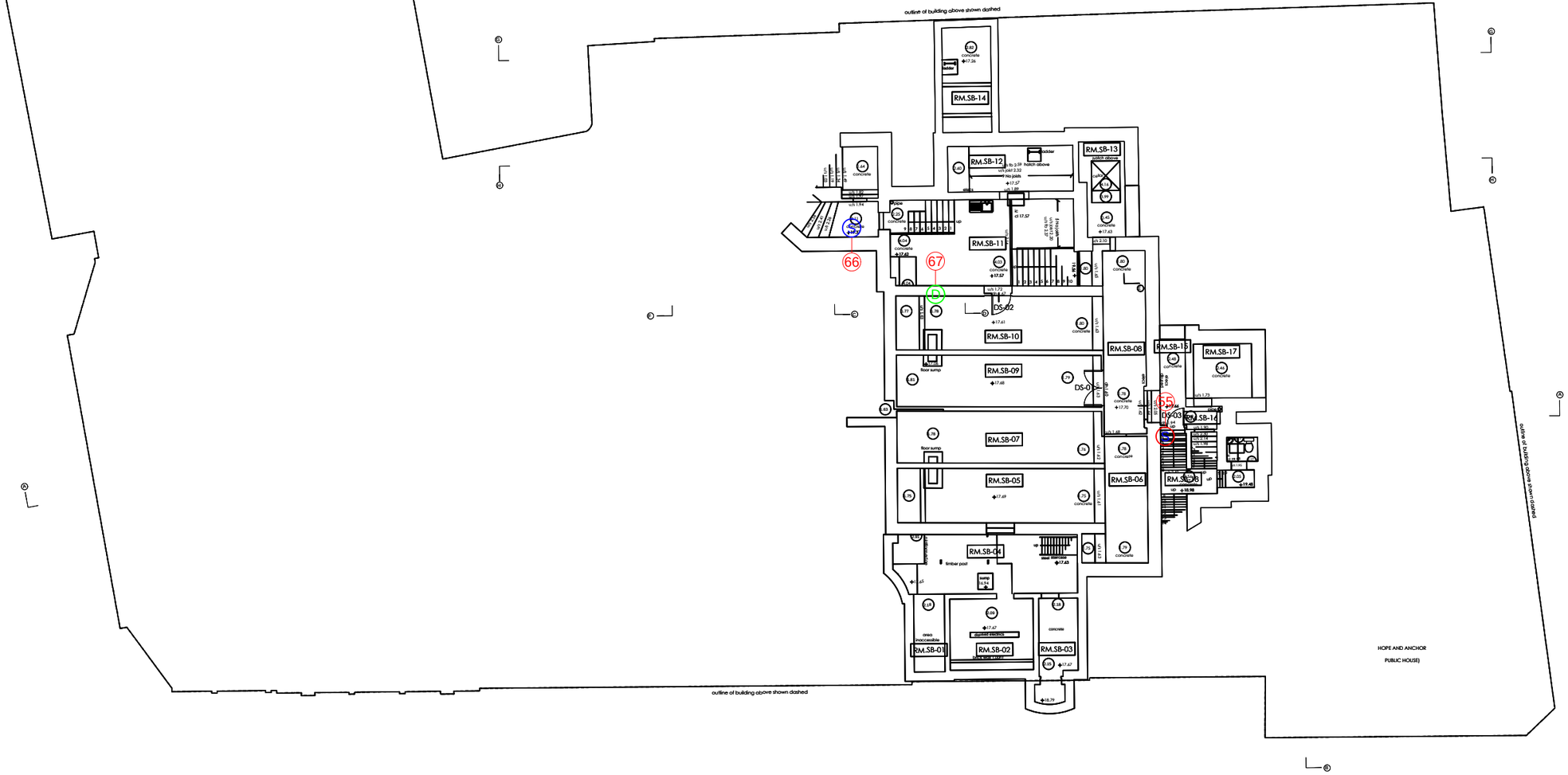
146-89 Site Note 7 March 2020 -Not to scale-

	High salt content	Low salt content
Dry	D	D 0-2% w/w available moisture content
Moist	M	M 2-5% w/w available moisture content
Wet	W	W 5-8% w/w available moisture content
Saturated	S	S 8+% w/w available moisture content
Super Saturated	SS	SS 20+% w/w available moisture content



LOWER BASEMENT

Key:
- 1 Masonry sample location
- PHASE 2 area of investigation/moisture sampling

The Hope Project / KOKO - Lower Basement

Damp Condition Investigation
11 March 2020

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146-89 Site Note 7 March 2020 -Not to scale-

Attachment C

Table of material moisture contents **Attachment C**

Samples of masonry were drilled from walls in areas vulnerable to damp penetration. The samples were placed in sealed containers and tested at the H+R laboratory in accordance with the procedure for gravimetric measurement of moisture content as described in the appendix to BRE Digest 245

Sample Number/Location	Moisture content % w/w			Hygroscopic moisture content % w/w	Available moisture content % w/w
1	14.61	S	H	3.56	11.05
2	18.79	S		0.68	18.10
3	0.97	D		0.81	0.15
4	6.57	M	H	2.69	3.88
5	7.38	M	H	4.16	3.22
6	1.07	D		0.98	0.09
7	20.44	S	H	2.97	17.47
8	2.36	D	H	2.35	0.01
9	1.15	D		0.94	0.21
10	0.95	D		1.04	-0.09
11	18.66	S	H	2.01	16.65
12	2.92	D	H	3.97	-1.06
13	1.15	D		0.98	0.17
14					
15	0.84	D		0.67	0.17
16	2.15	D		1.11	1.04
17	14.23	S		1.09	13.15
18	18.67	S		0.74	17.93
19	2.09	D		1.16	0.93
20	1.06	D		0.77	0.30
21	5.07	M		1.49	3.57
22	0.81	D		0.75	0.06
23	1.33	D		0.96	0.37

24	1.27	D		1.36	-0.09
25	0.87	D		0.59	0.28
26	0.73	D		0.47	0.25
27	10.48	S		1.75	8.72
28	12.24	S	H	2.43	9.81
29	1.56	D		1.44	0.12
30	12.82	S	H	2.41	10.41
31	2.50	D		1.69	0.81
32	1.98	D	H	2.08	-0.10
33	1.64	D		1.54	0.10
34	1.66	D		1.76	-0.10
35	1.81	D		1.66	0.15
36	11.66	S	H	2.49	9.17
37	17.05	S	H	3.54	13.51
38	1.80	D		0.57	1.23
39	12.88	W	H	6.56	6.32
40	10.17	S		1.35	8.82
41	2.07	D		1.59	0.49
42	11.90	S		1.18	10.72
43	1.46	D		1.31	0.15
44	0.77	D		0.42	0.35
45	2.16	D	H	2.11	0.05
46	20.59	S		1.47	19.11
47	7.31	W		0.53	6.78
48	2.15	D	H	2.05	0.11
49	0.54	D		0.54	0.00
50	1.75	D	H	2.04	-0.29
51	1.72	D		1.39	0.33
52					
53	2.07	D	H	2.14	-0.06
54	2.01	D		1.56	0.45
55	12.14	S	H	2.96	9.18
56	7.51	W	H	2.01	5.50
57	24.82	SS		1.90	22.93
58	11.40	S		1.29	10.11
59	2.01	D	H	2.27	-0.26
60	2.84	M		0.78	2.06
61	5.89	M		1.78	4.11
62	15.16	S		0.70	14.46
63	11.49	S	H	2.46	9.03
64	11.89	S	H	3.28	8.60

65					
66	19.07	S		1.56	17.51
67	1.14	D		0.84	0.29

Hygroscopic moisture is the ‘air dry’ moisture content of the sample at 75 per cent relative humidity. High levels above, say, 2 per cent are attributable to salt contamination. Hygroscopic salt commonly accumulates in old plaster and masonry that has been subject to dampness penetrating from the ground over many years. High levels above, say, 2 per cent of available moisture (liquid water) in the sample indicate continuing dampness due to liquid water in the sample usually resulting from faulty rainwater and plumbing goods

Attachment D

AFTER THE FIRE

TIM HUTTON

FIRE IS the most destructive and alarming thing that can happen to a historic building and has resulted in the destruction of many listed buildings, from terraces to palace apartments. Recent examples have been widely studied and well publicised. Based on this work, a number of useful observations can be made that should promote cost-effective early refurbishment of fire-damaged buildings with the maximum retention of original fabric.

IMMEDIATE MEASURES AFTER FIRE

In the UK, fires brought under control by the local fire brigade may be treated as a potential crime scene. Access to the affected building may therefore be strictly controlled until the authorities have completed their work, but a number of measures can be taken.

Obviously the insurer should be contacted as a matter of urgency so that a loss adjuster can be appointed, but uncertainty over insurance cover can result in delays in this critical period, postponing refurbishment and re-occupancy, and resulting in further loss of historic fabric. It is therefore important for the building owner or manager to take all reasonable measures to mitigate these losses ahead of any final settlement. Consideration should be given to obtaining independent specialist advice as soon as possible, and the insurers should be advised of all measures being undertaken ahead of any settlement.

It is important to keep all key information on site, from the contact details of the fire brigade and local authorities, to the contacts with insurers or loss adjusters and the condition of structures and materials. Fortunately the general availability of digital cameras and email will help in this. Backup records should also be rigorously maintained and stored off site.

The factors to be considered in planning remedial measures include structural stability, safe access, electrical safety, contamination by hazardous materials such as asbestos, and water penetration. It is also important to contact the local planning and conservation authorities as soon as possible for advice. Keeping them informed will help to ease the process of obtaining listed building consent when necessary.

WATER PENETRATION

Far more damage is caused to a historic building by water penetration into the building during and after a fire than is caused by the fire alone. Not only does this water cause physical and chemical damage to materials, it also provides the conditions for decay and mould growth during and

The burnt out and saturated remains of the House of Fraser furniture store in Croydon after the riots in August 2011, surrounded by the water from the fire hoses (Photo: Press Association Images)

MEASURES TO REDUCE WATER PENETRATION

- Establish effective ground and surface drainage, including checking and clearing existing drains
- clear surviving roof drains, including those of any adjoining structures, and provide effective temporary roofing and roof drainage as soon as possible
- disconnect and drain down any water pipes on site.

MEASURES TO PROMOTE VENTILATION AND DRYING

- Remove saturated materials and contents from the building as soon as possible to prevent moisture migrating into other materials, including all damp furnishings, fittings, carpets, rubbish, damp infill and collapsed building materials (listed building consent may be required for this work)
- demolish or otherwise remove all parts of the structure not to be retained on refurbishment, including masonry masses and floor in-fills in particular (again, consent may be required)
- provide through-ventilation to all parts of the structure, including all structural cavities such as sub-floor voids, chimney stacks and wall cavities and fix all doors, windows, cupboards, etc in a partially open position
- identify all residual moisture in the structure using specialist moisture profiling of representative structures
- wherever possible, remove all impermeable finishes from structures containing residual moisture and strip all water and salt damaged plaster and finishes to expose structures behind
- detail refurbishment of the building to include moisture sinks such as through-ventilated dry-lining systems, permeable or microporous finishes and structural heating systems so as to allow continued drying during and after refurbishment (this will require specialist advice on detailing)
- if required, consider the installation of accelerated-drying machinery (the use of indirect heaters, high capacity desiccant dehumidifiers, tenting and fans is recommended but should be specified by an independent specialist); and consider the use of mechanical ventilation systems (the cost of both electrical power and the specialist on-site supervision required to accelerate drying successfully is always a limiting factor).

after refurbishment. The control of water penetration, the removal of damp materials and the drying out of the structure are therefore the most important factors in the cost-effective conservation, refurbishment and early re-occupancy of the building.

Unfortunately, most of the existing measures for controlling water penetration into buildings, roofs and roof drainage systems are destroyed or compromised by fire. Water penetration should therefore be controlled as a matter of urgency using the measures highlighted in the checklist (previous page).

HAZARDOUS MATERIALS

Fires can result in the production or exposure of hazardous materials, and a fire-damaged historic building may contain residues of asbestos, lead oxides, chromium, nickel and arsenic, as well as combustion products from more modern materials such as dioxins and isocyanates. These will form potentially hazardous dust particles and must be removed from the building and disposed of in accordance with current health and safety regulations, prior to any accelerated drying measures.

Independent specialist professional advice will be required to identify any significant hazards from materials such as these, as well as from hazardous spores and other metabolites introduced by mould growth. Failure to specify appropriate risk management measures can result in significant hazards to health during and after refurbishment, causing delays to the refurbishment programme and even affecting the capital value of the building.

VENTILATION AND DRYING

Many thousands of litres of water can penetrate into a building during and after a fire, and drying out the structure can create ideal conditions for mould growth and decay. The techniques to be used must therefore be carefully considered to ensure that the process is both cost-effective and efficient. It is particularly important to identify all areas of residual moisture in the building by taking moisture profiles through representative structures, and to provide through- and cross-ventilation into all affected areas and building voids.

Specialist accelerated drying measures such as the use of dehumidifiers provided by specialist sub-contractors are often used. However, the equipment is often poorly specified and improperly used, resulting in little or no accelerated drying and causing unnecessary delays.

If not properly managed, damp and decay problems can persist for many years after a fire, and fungal or mould growth can result in health hazards to occupants and/or the unnecessary loss of original fabric and structures. Conversely, appropriate measures as outlined in the prioritised checklist of drying measures, can allow refurbishment in less than six months, even after the most severe fires.

It should be noted that accelerated drying in the UK is more cost-effective in the winter and early spring and very much harder in the summer months due to the external air being relatively warm and moisture laden. Timely and appropriate advice can therefore make a difference of over six months in a refurbishment programme.

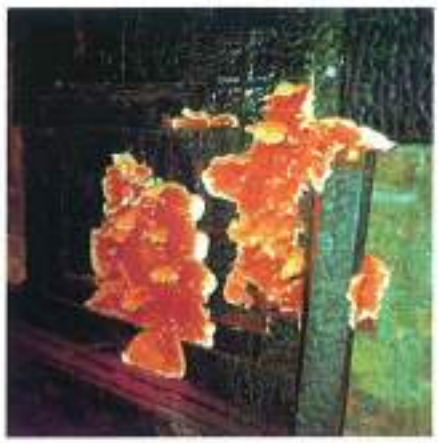
The floor of this fire damaged building was found to be constructed of reed and lime plaster. Failure to expose the underside had promoted mould growth, and further remedial treatment was required to promote drying prior to decontamination. (Photo: Hutton + Rostron)

DRY ROT AND TIMBER DECAY

Water penetration during and after a fire can produce the ideal conditions for infection and decay by dry rot (*Serpula lacrymans*) or the related *Donkioporia expansa*, which often decays oak. This is often the result of the reactivation of pre-existing infections beneath valley gutters or other vulnerable roof drainage details. No chemical remedial timber treatments or wall irrigations should be required. However, all timbers built in contact with damp or potentially damp structures should be investigated by an independent expert to determine their decay state and deep moisture content, in conjunction with the moisture profiling described above. Appropriate repairs and/or accelerated drying measures can then be undertaken. These may include the isolation of vulnerable materials from damp structures with damp-proof materials and/or through-ventilated air-gaps, so as to allow long-term drying after re-occupancy.

CONSERVATION AND REMEDIAL EXPOSURE

A policy of radical remedial exposure is often the most cost-effective way of conserving the maximum amount of historic material. For example the early lifting and removal of panelling, skirtings and floor boards and the early removal of salt- and water-damaged plaster and pugging materials should be considered. This requires that the conservation authorities are kept closely involved and that listed building consent is obtained as necessary. It is also important to employ appropriately skilled craftsmen, and to set up a robust and well managed system of recording and storage. An advantage of this approach is that valuable information on the history and archaeology of the building is often discovered, allowing previously unknown features to be conserved and incorporated into the refurbished building.



Dry rot fruiting bodies on fire damaged panelling: water penetration had reactivated an old infection and enabled it to spread. (Photo: Hutton + Rostron)

TIM HUTTON MA MSc VetMB MRCVS is a building pathologist and environmental scientist, and the CEO and scientific director of Hutton + Rostron Environmental Investigations Limited (see page 149). H+R has provided specialist independent advice after fire to occupants and insurers of all types of buildings for over 30 years, including after the fires at Hampton Court Palace and Windsor Castle.

Site Note 8: Timber ceiling structures condition investigation

April 2020 (updated August 2020)

Hutton + Rostron
Environmental Investigations Limited

The Hope Project (KOKO): Timber ceiling structures condition Investigation

Site note 8 for 14 April 2020, job no. 146.89

DRAFT

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1 INTRODUCTION

1.1 AUTHORITY AND REFERENCES

Hutton + Rostron Environmental Investigations Limited carried out site visits to The Hope Project (KOKO Camden) on the 8-14th April 2020 in accordance with instructions from Andrew Bridge by email, on 10 March 2020 (16:13). Drawings provided by Archer Humphryes Architects, Ref AHA/KKC/EX/ were used for the identification of structures. For the purpose of orientation in this report, the building was taken as facing west onto Camden High Street

1.2 AIM

The aim of this survey was to make an initial assessment of the construction and condition of remaining timber ceiling structural elements. The extent and distribution of residual or interstitial moisture/condensation build-up within ceiling voids has been commented upon. Recommendations for effective 'drying-down' and further detailed investigation of residual moisture and advice on short term remedial works are given, to promote drying of the structure and protect historically significant building fabric from damage and decay

1.3 LIMITATIONS

This survey was confined to the accessible structures. The condition of concealed timbers was investigated with the use of high power fibre optics and thermal imaging. The condition of concealed timbers may be deduced from the general condition and moisture content of the adjacent structure. Only demolition or exposure work can enable the condition of timber to be determined with certainty, and this destroys what it is intended to preserve. Specialist investigative techniques are therefore employed as aids to the surveyor. No such technique can be 100 per cent reliable, but their use allows deductions to be made about the most probable condition of materials at the time of examination. Structures were not examined in detail except as described in this report, and no liability can be accepted for defects that may exist in other parts of the building. We have not inspected woodwork or other parts of the structure which are covered, unexposed or inaccessible and we are therefore unable to report that any such part of the property is free from defect or in the event that such part of the property is not free from defect it will not contaminate and/or affect any other part of the property. Any design work carried out in conjunction with this report has taken account of available pre-construction or construction phase information to assist in the management of health and safety risks. The sample remedial details and other recommendations in this report are included to advise and inform the design team appointed by the client. The contents of this report do not imply the adoption of the role of Principal Designer by H+R for the purposes of the Construction Design and Management (CDM) Regulations 2015. No formal investigation of moisture distribution was made

2 STAFF ON SITE AND CONTACTS

2.1 H+R STAFF ON SITE

Andrew Ellis
Joe Lovelock

2.2 PERSONNEL CONTACTED

Russell Higson – Od Projects

3 OBSERVATIONS AND *RECOMMENDATIONS*

3.1 INTRODUCTION TO TIMBER CEILING STRUCTURES CONDITION INVESTIGATION

This investigation was only interested in areas previously identified within *146-89, Site Note 7- Damp Condition Investigation* as being subject to moisture penetration and vulnerable to damp and decay issues as a result of the firefighting efforts of the 6 January 2020 fire. Broadly, this may be summarised as all structures beneath the fire damaged dome roof to the west facing onto Camden Hight Street, the main auditorium and the north and south areas of the main auditorium

Regrettably, due to the recent identification of significant asbestos containing materials (ACMs) within vulnerable damp areas, as well as areas still deemed unsafe post the January 2020 fire, not all intended areas were safely accessible for inspection. These areas have been marked clearly on the Plans at Attachment B and are pending further investigation when safe access is made available. However, assumptions have been made upon the condition and construction of these areas based upon the evidence gained from safely accessible adjacent and similarly constructed areas. Broadly, this may be summarised as the second, first and ground floor balcony structures where ACMs were identified within the floor/ceiling voids. The Basement and lower basement were not accessible for investigation

Following completion of the pending investigatory works to the inaccessible areas, fuller and more concise remedial recommendations may be generated, however our initial findings are conclusive evidence that significant moisture entrapment, as well as issues relating to interstitial condensation and an inadequate airflow is widespread within vulnerable historic ceiling voids. This has already led to the presence of significant surface mould growth and spores in areas, which left unchecked will lead to further and more damaging/significant damp and decay issues and widescale deterioration of decorative moulded plaster ceilings beneath

Actions required to facilitate investigation of inaccessible areas:

1 *Asbestos containing materials: Health and safety requirements necessitate that zones containing hazardous levels of asbestos containing materials be cleared and certified full in accordance with the Control of Asbestos Regulations before further intrusive works may commence to these areas. This may necessitate the removal of all compromised timber elements that can not be effectively 'cleaned' of ACM particles. Specialists asbestos consultants to comment*

2 *Areas currently inaccessible due to structural works relating to fire damaged issues, such as the second-floor balcony RM.2-15 should be made available for investigation by H+R when suitable and safe access is achievable*

3.2 TIMBER CONDITION

3.2.1 Recent water penetration providing the conditions for decay

Representative and vulnerable timber bearing ends and central spans were deep drilled and moisture probed to ascertain the presence of decay and the relative moisture content of specific timber elements. Other than at the north-west stair landing staircase at second floor level, No active decay was detected, however, in general timbers (such as the wall /ceiling plates and embedded ceiling joist ends) in contact with masonry structures showed highly elevated surface and superficial moisture content readings of up to 30 per cent and raised deep moisture contents of between 16-18 per cent in places. This supports the findings from *146-89, Site Note 7- Damp Condition Investigation* in that a proportion of the masonry structural elements are acting as moisture 'reservoirs' and creating the correct conditions for damp and decay to vulnerable timber elements. However, these recorded high moisture contents, combined with the current evident lack

in active decay organisms suggests that recent and potentially chronic levels of moisture which had been allowed to penetrate the building's fabric during recent firefighting efforts to combat the blaze to the west domed roof structure, was the primary cause of the adverse findings

If left unchecked, such sudden and overwhelming water penetration to the property is highly likely to create significant latent building defects as the retained moisture within the masonry masses progressively migrates, gaining access to vulnerable timber elements, creating the conditions for damp and decay

3.2.2 Timber decay

1 General: There was little to no evidence of historic or current widespread fungal decay and insect infestation affecting timber ceiling structures. However, there was evidence of what appeared to be both historic and potentially active dry rot fungus (*Serpula lacrymans*) affecting the north-west second floor staircase area. This included the north masonry wall and elements of the north bearing ends of ceiling structures where they meet this wall. Although decayed plaster appeared largely historic within this area, the dry rot infection may become 'reactivated' with the recent and substantial amount of water that has penetrated the property

2 Access: Not all the available ceiling timbers were inspected in detail at the time of investigation. Previous repairs to ceiling timbers were noted, these were commonly made as alterations, repairs or in addition to the original timbers to support ceiling elements beneath

3 Dry rot: Dry rot (Serpula lacrymans) is a geophilic fungus that lives in damp masonry subject to chronic water penetration, and decays softwood timber elements built in contact with or in close proximity to the infected masonry. Dry rot mycelium can also grow behind impermeable surfaces, such as polythene or linoleum flooring and into unventilated building voids with high relative humidity's. Dry rot infection can persist in infected masonry for many decades or even centuries, and will spread or die back depending on the environmental conditions. When stressed, the fungus produces 'fruiting bodies' and many millions of fine light brown spores which spread to new locations through the atmosphere. However, very few spores ever germinate and grow to result in further infection. Dry rot in buildings is therefore almost always found associated with chronic problems of water penetration from defective roof drainage; but may persist or spread locally due to water penetration from other sources; such as floods, firefighting efforts, defective ground and surface drainage, failure of damp-proofing and plumbing leaks. Problems with dry rot are therefore often found 12 to 24 months after refurbishment of previously infected structures, even when 'chemical remedial or preservative treatments' have been undertaken; sometimes as a result of remobilisation by renewed water penetration during works and inadequate provision for ventilation and drying of affected structures

No chemical remedial timber treatments or wall irrigations are required. All timber elements in areas subject to chronic water penetration and/or indicated as infected by dry rot (Serpula lacrymans) as shown on plans at Attachment A. All practical measures should be taken to maintain the external envelope so as to minimise further water penetration into the structure, during and after the refurbishment. This should include repair and re-detailing of external masonry and the rainwater drainage system. In particular allowance should be made for access and inspection to the enclosed and inaccessible lightwell to the east of the suspected dry rot affected area for masonry and rainwater goods condition investigation. Remedial measures should be subject to detailed investigations. Provisionally allow for specific decayed/vulnerable timber elements to be repaired/replaced and re-supported in isolation from damp affected and/or dry rot infected masonry using a damp-proof material, to a detail approved by H+R

3.2.3 Wood boring beetle

There was minimal evidence of wood boring beetle damage to structural ceiling timbers. However, from limited initial access 'common furniture beetle/woodworm' (*Anobium punctatum*) was identified within limited historic timbers in contact with damp masonry. In the view of H+R, beetle damage in itself was unlikely to be ongoing to any significant degree and was unlikely to be structurally significant. However, should timbers and timber surfaces be allowed to remain damp (See 3.2.1 above) the likelihood of increased wood boring insect activity is probable, especially to remaining vulnerable sapwood bands

No chemical remedial timber treatments are required or necessary. Allowance should be made for superficially wet timbers and timbers conducive to insect attack to be dried-out in order to holistically create an environment which may not support wood boring insect activity. Additionally, upon further exposure work during the planned refurbishment, and subject to approval of the Conservation Team, timbers with significant proportions of remaining vulnerable sapwood bands should be cut out and replaced with heartwood only variants. All newly inserted timbers should be of external grade pre-treated stock in order to withstand moderate wood boring insect attack

3.2.4 Hazardous mould growth within ceiling voids

1 Surface mould growth was found to be widespread within both historic and non-historic ceiling voids investigated. In general mould growth and mould spores were predominantly judged to be superficial. Affecting only the timbers vulnerable surfaces. However high concentrations of these mould spores may cause allergic reactions upon exposure to sensitive individuals and lead to long term health issues. The type of available mould was not verified at the time of investigation. However, should black mould or *Stachybotrys* be present, it can produce mycotoxins- A toxic chemical compound which may cause a wide range of symptoms upon exposure from asthma to neurotoxicity

2 Mould growth and mould spores within ceiling voids are likely being caused by the effect of trapped or retained moisture within the concealed timber elements and/or from interstitial condensation build-up as a result of 'thermal inertia' between the moist trapped air within the ceiling void meeting the relatively cold clinker concrete floor slab above. This then condenses leading to a moisture sink within the building's fabric and a high potential of condensation and potentially hazardous mould growth

No chemical remedial timber treatments are required. Timbers subject to surface mould growth and active mould spores should be tested for the type and toxicity of mould to ascertain potential health hazard and a suitable response/remedial action. H+R can conduct such tests if instructed to do so

Cleaning of mould surfaces: Prior to the introduction of increased ventilation, mould affected surfaces should be scrubbed with a dilute solution of sodium hypochlorite or household bleach at 1:4 parts. Using a soft brush, the mould should be scrubbed until it disappears. After scrubbing the surfaces, allow the bleach solution to continue to penetrate the surfaces and dry. For particularly badly affected areas perform this action twice with the surfaces being hoovered between bleach applications. Those undertaking this task should be provided with appropriate respiratory protection, eye protection, gloves and protective clothing. Consideration should be given to undertaking these works while the building is effectively 'mothballed' during the current Covid 19 crisis

NB. Ceiling voids vulnerable to damp and with evidence of surface mould growth cannot be safely ventilated until cleaned. Although air flow across the damp affected areas will undoubtably have the positive effect of drying down structures and reduce further risk of decay, the possible negative health implications of those working and occupying areas where the mould spores would be mobilised towards does not warrant the benefit

3.2.5 Asbestos hazard affecting ceiling voids and structures

Asbestos sheet boarding was identified within floor structures. Particularly to suspended timber balcony floor structures at ground and first floor level. The asbestos sheeting had been previously laid as a fire prevention method between the floor joists and the tongue and groove floorboards. This would have inadvertently allowed loose and damaged asbestos particles and debris to settle at the bottom of the void and upon plaster and timber ceiling elements. Furthermore, it is highly probable that all timber elements used as fixing timbers for ACMs will have had their surfaces punctuated by asbestos particles by the nail and screw fixings

These structures should not be subject to inspection, remedial works or increased ventilation/air flow until the relevant specialists have certified the voids as clean. Timbers judged to be too heavily contaminated or compromised by the penetrating of ACM particles into their sections by nail and screw fixings are likely to be beyond reasonable and practical cleaning. In such instances and under the direction of the Conservation Team and the specialist cleaning contractors, consideration should be given to the removal of all hazardous materials impracticable for deep cleaning

Once hazardous materials (including timbers impractical for cleaning) have been removed and voids suitably cleaned of asbestos and mould contaminants, consideration should be given to the opened voids and cavities being sprayed with hydraulic limewash to stabilise all remaining dust and hazardous loose material. This will also have the added advantage of encapsulating all remaining mould and effectively killing it, lime wash being an effective biocide. Note that the hydraulic limewash recipe should not include caseins or tallow as these are known to feed moulds

It should be noted that, although the ACMs within floor and ceiling voids are an historic and encapsulated issue, the widespread mould growth to timbers trapped within these voids has come about as a result of sudden and mass moisture penetration to structures as a result of the 6 January 2020 fire. If left unchecked, the damp and mould affected timbers will likely lead to significant decay issues. Ventilation to these voids is vital to check the damp issues and safeguard the remaining building fabric. However, these voids cannot be safely ventilated until suitably cleaned of mould and asbestos contaminants

3.2.6 Ventilation and drying

As mentioned in *146-89, Site Note 7;* Ventilation and drying within the general structure subject to water penetration before, during and after the recent fire had dramatically improved since H+Rs initial site visits; especially with the ‘soft strip’ and conservation enabling works undertaken to date. In particular, through and cross ventilation with external air via window openings and openings formed for construction works adjacent to the original fabric was allowing through ventilation in conjunction with the ‘passive stack effect’ of air rising up through the building, through adventitious gaps in the provision for temporary roofing

However, relative humidity, temperature and dew point was measured in representative ceiling voids, and surface temperatures were measured with a thermal camera. These tests revealed evidence of condensation at the time of survey (see 3.2.4(2) above), however partial vapour pressures differentials between the existing fabric and the ambient air was deemed sufficient to allow drying, albeit at a moderate pace. This positive drying

balance is likely to continue through April and/or May. However, the increased moisture content of warmer external air in the summer months was likely to reverse this process, resulting in condensation and preventing further drying in the absence of the introduction of accelerated drying measures. However as discussed previously, increased ventilation and drying would also eventually result in potentially irritant or hazardous materials in becoming part of 'airborne dust'; where they may represent an increasing and significant health hazard to those entering the building before, during and after refurbishment (see 3.2.4 and 3.2.5 above)

1 *Background ventilation: Through and cross ventilation should be provided to all areas and building voids as soon as possible, so as to minimise the risk of further condensation and mould growth, and so as to facilitate drying. However, potentially contaminated debris must be removed before further ventilation measures are taken, as described at 3.2.5 above*

2 *Mechanical ventilation: Preparation should be made for providing mechanical ventilation to poorly ventilated ceiling voids where it is not possible to provide through and cross ventilation by opening windows and the 'passive stack vent effect' up through the building. H+R can advise further if required*

3 *Conservation and remedial exposure: All building ceiling voids should be opened as part of conservation enabling works, so as to provide through and cross ventilation as described at 1 above and to protect as much historic building fabric as possible. In particular vulnerable decorative moulded plaster elements. This may be done by carefully recording, cutting open and setting aside continuous vent gaps at or close to the cornice/soffit juncture and nearest to damp affected masonry walls, to all suspended ceilings and suspended ceiling voids through the non-decorative and more easily repaired ceiling plaster. Care should be taken to not cut or damage the existing ceiling joist elements during this process. Continuous vent gaps should always have corresponding and opposing vent gaps for the effective movement of air. Alternatively, continuous ventilation slots may be formed at the top of lath and plaster or dry lined voids, so as to allow through ventilation and drying. H+R can advise further if required*

4 *Ventilation to ceiling structures from above at sub-floor voids: Should minimal remedial works be desired to historic plaster elements, provision should be made for through and cross ventilation to all accessible ceiling voids from suspended timber floors above; This may be done by lifting floorboards adjacent to the walls on either side of each area of suspended floor; H+R can advise further if required*

5 *Monitoring: The residual moisture content of ceiling structures subject to water penetration before, during and after the recent fire should be monitored, so as to ensure adequate drying measures are applied to allow completion and refurbishment of decorative plaster finishes to time and budget; and so as to minimise the risk of moisture or salt related problems to timber and plaster elements during and after the latent defect period*

6 *Accelerated drying: Preparation should be made for the installation of specialist accelerated drying measures during summer and autumn months of 2020. These will require a dedicated power supply which may be provided with 3 phase electricity mains, or with dedicated silenced diesel powered generators, and are likely to include the use of 110V electrical radiant heaters, and desiccant dehumidifiers with warm dried air ducted into the voids behind dry linings around damp affected structures. H+R can advise further when required*

7 *Long term drying: Provision should be made for the isolation of vulnerable materials from original fabric with high residual moisture and/or hygroscopic salt content, and for provision of continued through ventilation to the building voids during and after the latent defect period. This may be done by making provision for 'trickle ventilation' and ventilation gaps on reinstatement of existing and new claddings; taking due regard to current Building Regulations with regard to fire and sound*

barriers. H+R can advise further when required

3.3.7 Corrosion affecting historic fixings

Corrosion to steel fixings: It was noted at the time of investigation that continuous ceiling plate timbers, fixed to the clinker ash solid floor structures above and supporting suspended timber and plaster ceiling structures beneath were particularly vulnerable to damp and decay issues. In particular the steel fixings, usually at ~600mm centres, were visibly corroded and blue ferrous staining to the surrounding timber prevalent, suggestive of prolonged historic corrosion and potential weakening of the fixings grounding. With the sudden increase in trapped moisture within the property, it is highly probable that retained and migrating moisture, as well as the build-up of interstitial condensation within the ceiling voids will degrade the already evident corrosion leading to eventual possible failure of the structural ceiling plates

The corrosion state and structural adequacy of existing steel fixings within ceiling plate structures should be determined by H+R, Structural Engineer and the specialist Plaster restorers. Allowance should be made for repair or replacement as directed by the Structural Engineer, and for provision of 'cathodic protection' as necessary, so as to minimise further corrosion during and after refurbishment. In addition to this, H+R recommend that should the ceiling plate timbers subject to fixings corrosion be deemed retainable upon refurbishment, additional non-corrosive fixings be introduced to provide adequate structural adhesion should the existing historic fixings fail

3.3.8 Pidgeon and site hygiene

The site and within some floor and ceiling voids remained contaminated with areas of heavy contamination by feral pigeon faeces. These represent a potential health hazard to those entering the building/voids before, during and after refurbishment; and restricted access for inspection, maintenance and refurbishment

Pigeon faeces: All pigeon faeces should be removed as soon as practical. Those undertaking this task should be provided with appropriate respiratory protection, eye protection, gloves and protective clothing; and pigeon faeces and contaminated materials should be disposed fully in accordance with the requirements of the local authority. Consideration should be given to undertaking these works in conjunction with the removal of asbestos containing materials, as described at 1 above

3.3.9 Retention of historic fabric

It was understood by the H+R site team, that during the April investigatory works, substantial areas of historic decorative lath and plaster ceiling elements were deemed 'beyond reasonable retention'. In particular to areas RM.1-14, RM.1-12, RM.G-11 and to the western bay of the main auditorium roof RM.3-09. As discussed within this report, the majority of these areas featured significant damp and mould issues which, though salvageable, require specific and time consuming/costly remedial action for their effective safeguarding. Additionally, consideration should be given to the likelihood of accidental and inherent wear/damage to these remaining timber elements upon the 'strip-out' of the unsalvageable plaster and lath elements beneath

Consideration should be given by the Conservation and Design Team to the wholesale replacement of timber ceiling elements within these specific areas as the most likely cost effective and practicable option. Not only does this represent the clear advantage of removing potentially decay-vulnerable structural elements, it also provides the Plaster Specialists and Design Team opportunity to introduce improved design specifications (such as the separation of vulnerable timber elements from damp masonry structures via a ventilated air gap or damp proof membrane, increased section sizes and decreased centre spacings of joist and plate elements) and a clean canvas from which to begin again. Although a subjective point, it could be argued that the remaining sound and

undamaged timber ceiling elements, post removal of the unsalvageable plaster and lath, do not in themselves constitute much historic value

4 H+R WORK ON SITE

4.1 H+R made a limited initial visual inspection of the structure for defects liable to allow water penetration before and after refurbishment

4.2 H+R took samples from representative masonry masses, so as to determine their gravimetric and hygroscopic moisture content

5 PROPOSED ACTION BY H+R

5.1 H+R will return to site to investigate the timber structures for damp and decay when access is available

5.2 H+R will return to site to make further investigations to determine the extent of residual moisture and salts within the existing fabric

5.3 H+R will return to site to monitor progress of natural and accelerated drying when instructed

5.4 H+R will investigate and advise further on the chemical composition of original clinker ash concrete, and its effect on the structural adequacy of concrete matrix and corrosion to reinforcements in conjunction with the Structural Engineer, when instructed

5.5 H+R will advise on repair and conservation of timber elements, so as to minimise the risk of decay after refurbishment if instructed

5.6 H+R will advise on remedial detailing, so as to minimise the risk of damp and decay problems after refurbishment if instructed

5.7 H+R will advise on conservation of original fabric with regard to damp, decay and salt damage, as necessary and if instructed

5.8 H+R will review proposed remedial details as these become available if instructed

5.9 H+R will return to site to inspect sample remedial details if instructed

5.10 H+R will liaise with conservation and historic building authorities, if instructed, so as to ensure the cost-effective conservation of original fabric

5.11 H+R will advise further on cost effective accelerated drying and forced ventilation when required and when instructed

5.12 H+R will advise further on pigeon control measures if required and when instructed

5.13 H+R will liaise with loss adjustors and/or insurers if required when instructed

6 INFORMATION REQUIRED BY H+R

6.1 H+R should be advised when access is available for further site investigations as described at 5 above

6.2 H+R require up-to-date copies of project programmes, as these become available

6.3 H+R require copies of up-to-date lists of project personnel and contact lists as these become available

6.4 H+R require copies of proposed remedial details for comment as these become available

6.5 H+R should be informed as a matter of urgency if further significant water penetration occurs onto site; so that advice can be given on cost-effective remedial measures, to minimise the risk of cost or programme overruns and so as to minimise the risk of damp or decay problems during the latent defect period

7 ADMINISTRATION REQUIREMENTS

7.1 H+R require formal instructions for further investigations and consultancy on this project

7.2 H+R require confirmation of distribution of digital and printed copies of reports and site notes

Attachment A

Fig 1:

Auditorium ceiling structures; showing general view from below looking south. Note west area inaccessible from below and supported with scaffold structures, historic plaster understood to be severely damaged to this area

Fig 2:

Auditorium ceiling structures; showing auditorium void accessed from 3rd floor level. View showing west flat ceiling area as described in Fig 1. from above. Area severely 'wetted' during fire fighting efforts and during period partial exposure post fire. Note trays placed to catch leaks still in place

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Fig 3:

Auditorium ceiling structures; showing structural deck at south-west corner with visible damp. Note area was exposed to severe moisture penetration during fire fighting efforts and during renovation/exposure works after

Fig 4:

Auditorium ceiling structures; showing typical image of what appears to be original former board section to solid roof structure above, still in place and subject to decay

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Fig 5:

Auditorium ceiling structures; showing south-west corner where area had been exposed to chronic moisture penetration. Note south wall plate partly embedded and concealed by loose building debris and vulnerable to decay

Fig 6:

Auditorium ceiling structures; showing south-west partially embedded wall plate with saturated surface moisture content

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Fig 7:

Auditorium ceiling structures; showing south-west partially embedded wall plate with a raised deep moisture content of ~16 per cent

Fig 8:

Auditorium ceiling structures; showing void beneath south-west structural deck. Note visible mould growth as a result of moderate interstitial condensation during periods of high humidity

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Fig 9:

Auditorium ceiling structures; showing west elevation plate timber with visible mould growth below timber element suggestive of chronically damp plaster. If left unchecked this may lead to severe plaster fungus. Timber deep moisture content raised but stable at ~15 per cent

Fig 10:

Auditorium ceiling structures; showing deep moisture content reading of noggin, plaster joist elements raised at ~18 per cent

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Fig 11:

Auditorium ceiling structures; showing west area with visible mould growth suggestive of damp plaster. If left unchecked this may lead to severe plaster fungus

Fig 12:

Auditorium ceiling structures; showing typical detail of plaster retaining battens concealed with a reinforced plaster and hessian mesh which may hinder the drying of entrapped moisture

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Fig 13:

Auditorium ceiling structures; showing deep moisture content of west elevation plaster retaining batten concealed with a reinforced plaster and hessian mesh. Timber reading dry at ~11%

Fig 14:

Auditorium ceiling structures; showing typical detail of recently repaired plaster retaining batten concealed with a reinforced plaster and hessian mesh which may hinder the drying of entrapped moisture

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Fig 15:

Auditorium ceiling structures; showing deep moisture content of west elevation plaster retaining batten concealed with a reinforced plaster and hessian mesh. Timber reading dry at ~13%

Fig 16:

Auditorium ceiling structures; showing typical detail of recently repaired plaster battens concealed with a reinforced plaster and hessian mesh which may hinder the drying of any entrapped moisture

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Fig 17:

Auditorium ceiling structures; showing west flat ceiling area. Note ceiling void visibly damp with significant loose debris and litter within void which will significantly slow the drying process

Fig 18:

Auditorium ceiling structures; showing typical detail of top face of suspended RSJ with significant debris trapping moisture and subject to continuing corrosion

Fig 19:

Auditorium ceiling structures; showing ineffective leak containing tray at north-west area over-spilling onto vulnerable plaster and timber elements beneath and causing the conditions for damp and decay. Leak judged to be still active to this area

Fig 20:

Auditorium ceiling structures; showing area of ponding water beneath ineffective leak containing tray at north-west area over-spilling onto vulnerable plaster and timber elements beneath and causing the conditions for damp and decay. Leak judged to be still active to this area. All timbers showing high surface and deep moisture contents to this area

Fig 21:

Auditorium ceiling structures; showing area of raised west flat ceiling structures in general. Note west flat ceiling area defined as area between two western (north-south running) trussed bay RSJ division structures

Fig 22:

Auditorium ceiling structures; showing view in general of bay to the east of the most vulnerable/water damaged west bay. Timbers in this area were representatively tested for surface and deep moisture contents. Results showed timbers to overwhelmingly have raised but not alarming surface moisture contents but dry deep moisture contents

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Fig 23:

Auditorium ceiling structures; showing typical upright timber stud element between most vulnerable west bay and the adjacent bay to the east. Note evident mould growth to timber surface suggesting of past chronic moisture penetration and subsequent ineffective ventilation/drying of area

Fig 24:

Auditorium ceiling structures; showing east bay and the furthest from the most vulnerable west bay. Timbers in this area were representatively tested for surface and deep moisture contents. Results showed timbers to overwhelmingly have dry surface moisture contents as well as dry deep moisture contents

Fig 25:

Auditorium ceiling structures; showing east bay and the furthest from the most vulnerable west bay. Timbers in this area were representatively tested for surface and deep moisture contents. Results showed timbers to overwhelmingly have dry surface moisture contents as well as dry deep moisture contents

Fig 26:

Auditorium ceiling structures; showing roof void temperature at the time of investigation recorded at ~10 degrees centigrade. Outside temperatures at the same time were recorded as ~22 degrees centigrade. A ~12 degree difference suggestive of thermal inertia and a high potential for condensation conditions between varying internal and external temperatures leading to surface mould growth

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Fig 27:

Second floor ceiling structures, RM.2-16; showing area in general. All ceiling structures of solid construction apart from north bay where ceiling joists were discovered. These appeared to have originally formed (or replaced) a now defunct floor level, now concealed by a newer division solid floor structure from above

Fig 28:

Second floor ceiling structures, RM.2-16; showing damaged non-historic gypsum and plasterboard finished ceiling revealing ceiling joists above

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Fig 29:

Second floor ceiling structures, RM.2-16; showing large amounts of debris between ceiling joists trapping moisture and promoting the conditions for damp and decay

Fig 30:

Second floor ceiling structures, RM.2-16 showing active mould growth to undersides of ceiling joists due to moisture being retained within wet ceiling plaster elements

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Fig 31:

Second floor ceiling structures, RM.2-16; showing typical image of water ponding damage to underside of boxed beam RSJ. Plaster and concealed boxing timbers likely to be wet and highly vulnerable to damp and decay in these areas

Fig 32:

Second floor ceiling structures, RM.2-16; showing exposed wet timber element within typical boxed beam RSJ structure. Plaster and concealed boxing timbers were found to be wet and highly vulnerable to damp and decay in these areas

Fig 33:

Second floor ceiling structures, RM.2-16; showing exposed wet timber element within typical boxed beam RSJ structure. Plaster and concealed boxing timbers were found to be wet and highly vulnerable to damp and decay in these areas

Fig 34:

Second floor ceiling structures, RM.2.21; showing exposed RSJ structure which may resemble those still boxed and concealed/vulnerable to damp and decay within the adjacent room RM.2.16. Note infill bonding timbers still in situ

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Fig 35:

Second floor ceiling structures, RM.2.22; showing historic timber and plaster ceiling structures above main access north-west stairs subject to damp and decay

Fig 36:

Second floor ceiling structures, RM.2.22; showing ceiling timber element with surface mould growth and a wet surface moisture content at ~25 per cent

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Fig 37:

Second floor ceiling structures, RM.2.22; showing decayed ceiling timber element taken from the historic timber and plaster ceiling structure above main access north-west stairs subject to damp and decay

Fig 38:

Second floor ceiling structures, RM.2.22; showing large void above stair access ceiling with visible solid floor structures above

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Fig 39:

Second floor ceiling structures, RM.2.22; showing central ceiling joist element free from mould growth. Also note rubble build-up adding weight to historic plaster ceiling and potentially trapping moisture

Fig 40:

Second floor ceiling structures, RM.2.22; showing rendered masonry wall to main access north-west stairs subject to what appeared to be active dry rot mycelium

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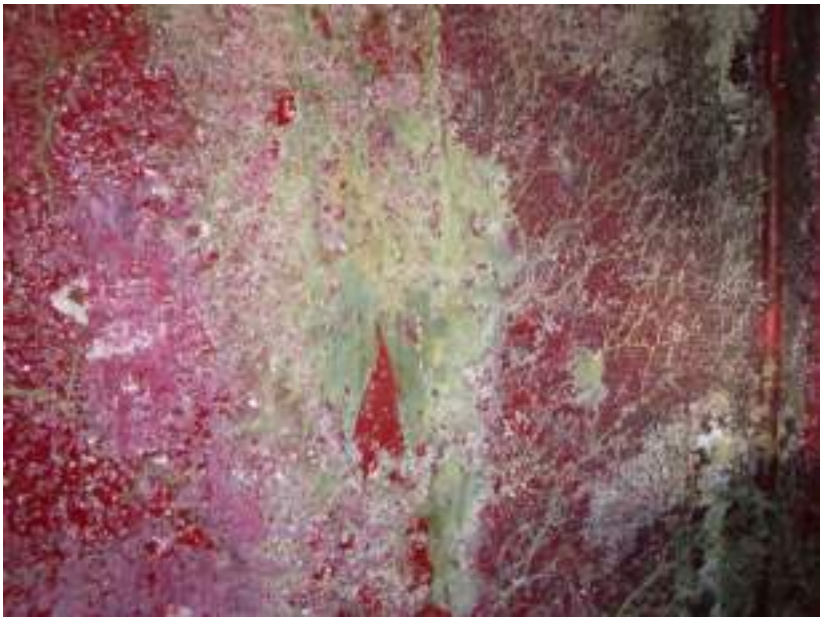

Fig 41:

Second floor ceiling structures, RM.2.22; showing rendered masonry wall to main access north-west stairs subject to what appeared to be active dry rot mycelium

Fig 42:

First floor ceiling structures, RM1-14; showing room in general looking north. Note significant damage to historic plaster in areas as a result of moisture damage from the January 2020 firefighting efforts

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Fig 43:

First floor ceiling structures, RM.1-14; showing ceiling void at approximately 180mm depth beneath a solid floor structure above of clinker ash concrete. Note ceiling joists suspended from RSJs

Fig 44:

First floor ceiling structures, RM.1-14; showing internal view of false/hollow beam boxing. Note relatively simple construction of horizontal timber battens at ~600mm centres, suspended from perpendicular ceiling joists

Fig 45:

First floor ceiling structures, RM.1-14; showing internal view of false/hollow beam boxing. Note beam boxing acting as a moisture well/reservoir leading to conditions for damp and decay

Fig 46:

First floor ceiling structures, RM.1-14; showing ceiling void structure. Note ~80x55mm plate set perpendicular to ceiling joists and nailed into clinker slab above. Its role was to support the mid-span of the ceiling joists structure

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Fig 47:

First floor ceiling structures, RM.1-14; showing typical image of partially exposed embedded RSJ within clinker slab. Note evident corrosion and relatively poorly formed concrete delaminating from the steel element

Fig 48:

First floor ceiling structures, RM.1-14; showing internal view of false/hollow beam boxing. Note beam boxing acting as a moisture well/reservoir leading to conditions for damp and decay . Also note relatively simple construction of horizontal timber battens at ~600mm centres, suspended from perpendicular ceiling joists above

Fig 49:

First floor ceiling structures, RM.1-14; showing detail where the ceiling elements meet the west masonry wall and are supported onto a timber plate nailed to the masonry wall

Fig 50:

First floor ceiling structures, RM.1-14; showing detail where the ceiling elements meet the west masonry wall and are supported onto a timber plate nailed to the masonry wall. Note timber plate subject to surface mould growth and vulnerable to damp and decay issues being in contact with a damp masonry wall

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Fig 51:

First floor ceiling structures, RM.1-14; showing ceiling plate element supporting central span of ceiling joists structure. Note surface mould growth as well as evident corrosion to nail fixing into suspected wet masonry slab. Corrosion likely to worsen as moisture migrates down the structures from the upper levels

Fig 52:

First floor ceiling structures, RM.1-14; showing ceiling plate element supporting central span of ceiling joists structure. Note evident corrosion to nail fixing into suspected wet masonry slab. Also note split/compromised wood as a result of fixing location

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Fig 53:

First floor ceiling structures, RM.1-14; showing non-historic plastered south bay with newer addition 2no. RSJs

Fig 54:

First floor ceiling structures, RM.1-14; showing ceiling void at ~120mm above non-historic plastered south bay. Note void without provision for ventilation and highly vulnerable to interstitial condensations and entrapment of moisture leading to increased surface mould growth and the conditions for damp and decay

Fig 55:

First floor ceiling structures, RM.1-14; showing north-east corner above bar/ historic entry point into auditorium now containing small non-historic suspended timber ceiling

Fig 56:

First floor ceiling structures, RM.1-12; showing large ceiling void above north-east corner above bar. Note void continues up to plastered solid floor structure above which is also vulnerable to damp and decay

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Fig 57:

First floor ceiling structures, RM.1-12; showing area in general looking north. Note significant damage/demolition works to historic ceiling elements as a result of remedial propping to balcony solid structures above

Fig 58:

First floor ceiling structures, RM.1-12; showing suspended ceiling structures supporting non-historic and poorly executed ceiling reproduction

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Fig 59:

First floor ceiling structures, RM.1-12; showing large ceiling void and detail where the ceiling joists meet the east solid balcony structures and are supported on/nailed to vertical timber studs

Fig 60:

First floor ceiling structures, RM.1-12; showing large ceiling void and detail where the ceiling joists meet the west partition masonry wall and are supported on/nailed to a horizontal timber plate

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Fig 61:

First floor ceiling structures, RM.1-12; showing central area in general looking north. Note significant damage/ demolition works to historic ceiling elements as a result of remedial propping to balcony solid structures above. 2no. ceiling joists compromised in this area

Fig 62:

First floor ceiling structures, RM.1-12; showing north area. Note significant damage/demolition works to historic ceiling elements as a result of remedial propping to balcony solid structures above. 2no. ceiling joists compromised in this area

Fig 63:

First floor ceiling structures, RM.1-12; showing sloped balcony ceiling structures compromised by remedial and demolition works, Note 2no steel T -bar ceiling joists cut through in this location

Fig 64:

First floor ceiling structures, RM.1-12; showing central area sloped balcony ceiling structures significantly structurally compromised by recent remedial and demolition works, Note 16no steel T-bar ceiling joists cut through in this location

Fig 65:

First floor ceiling structures, RM.1-12; showing south area sloped balcony ceiling structures compromised by remedial and demolition works, Note 2no steel T-bar ceiling joists cut through in this location

Fig 66:

First floor ceiling structures, RM.1-12; showing sloped balcony ceiling void. Note ceiling joist construction of steel T -bars with timber battens infill for plaster fixing locations

Fig 67:

First floor ceiling structures, RM.1-12; showing central area of unventilated sloped ceiling void beneath the second floor balcony structures. Note evidence of interstitial condensation forming mould spores to timber battens which may cause potential health hazards to those working on or occupying the structure

Fig 68:

First floor ceiling structures, RM.1-12; showing south area of unventilated sloped ceiling void beneath the second floor balcony structures. Note evidence of interstitial condensation forming mould spores to timber battens which may cause potential health hazards to those working on or occupying the structure

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Fig 69:

First floor ceiling structures, RM.1-08; showing area to the south of the south auditorium balcony. WC with suspended ceiling beneath what appeared to be an artex ceiling possibly containing ACMs

Fig 70:

First floor ceiling structures, RM.1-08; showing area to the south of the south auditorium balcony. WC with suspended ceiling beneath what appeared to be an artex ceiling possibly containing ACMs

Fig 71:

First floor ceiling structures, RM.1-07; showing view looking east along the south auditorium balcony. Note ceilings of solid construction

Fig 72:

First floor ceiling structures, RM.1-07; showing view of the south auditorium balcony subject to damp and decay. Note ceilings of solid construction

Fig 73:

First floor ceiling structures, RM.1-10; showing view looking west towards the principal south-west staircase. Ceilings in this area were of solid construction

Fig 74:

First floor ceiling structures, D1-15; showing suspended ceiling above principal south-west staircase suspected to be clad in fibrous ACMs

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Fig 75:

Second floor ceiling structures, RM.2-17 (accessed from first floor D1-15); showing what appears to be an artex ACM decorative ceiling above a modern suspended ceiling structure

Fig 76:

Ground floor ceiling structures, RM.G-17; showing main entrance area beneath 3no. Large octagonal ceiling lights surrounded with decorative ceiling plaster and timber elements now subject to damp and decay issues from moisture penetration likely caused by the January 2020 fire fighting efforts

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Fig 77:

Ground floor ceiling structures, RM.G-17; showing ceiling void at ~120mm depth to decorative plaster ceiling around octagonal ceiling light. Note timbers recorded as wet with moisture content readings of ~22 per cent. Ceiling voids require ventilation

Fig 78:

Ground floor ceiling structures, RM.G-17; showing ceiling void at ~120mm depth to decorative plaster ceiling around octagonal ceiling light. Note tested timbers recorded as wet with moisture content readings of ~22 per cent. Ceiling voids require ventilation

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Fig 79:

Ground floor ceiling structures, RM.G-17; showing ceiling void above entrance lobby incorporating 3no. octagonal ceiling lights. Note timber battens visibly damp with soft frassy areas of remaining sapwood highly vulnerable to decay

Fig 80:

Ground floor ceiling structures, RM.G-17; showing ceiling void above entrance lobby incorporating 3no. octagonal ceiling lights. Note balcony flat roof structure above formed of clinker concrete with embedded RSJs subject to superficial corrosion

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Fig 81:

Ground floor ceiling structures, RM.G-13; showing grand entrance/ticket office with fine decorative plaster ceiling subject to damp and decay issues caused by the January 2020 fire fighting efforts

Fig 82:

Ground floor ceiling structures, RM.G-13; showing decorative plaster scroll with visible red or terra-cotta 'bole' suggesting some areas of possible historic gold leaf still remain

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Fig 83:

Ground floor ceiling structures, RM.G-13; showing moisture damaged collapsed ceiling area at south-west area revealing 3no. RSJ structures within ceiling void supporting west elevation

Fig 84:

Ground floor ceiling structures, RM.G-13; showing moisture damaged collapsed ceiling area at south-east area revealing ceiling void and perimeter ceiling joists structures beneath solid clinker floor structure above

Fig 85:

Ground floor ceiling structures, RM.G-13; showing ceiling void at south-east corner. Note constructional detail of ceiling joists supported on a horizontal timber plate nailed to the masonry brick wall. Also note timbers subject to widespread surface mould growth as a result of trapped moisture and interstitial condensation with no provision for suitable ventilation

Fig 86:

Ground floor ceiling structures, RM.G-13; showing ceiling void at south-east area looking west. Note constructional detail of stepped ceiling timbers fixed to the solid clinker floor structure above via continuous timber plates. Also note timbers subject to widespread surface mould growth as a result of trapped moisture and interstitial condensation with no provision for suitable ventilation

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Fig 87:

Ground floor ceiling structures, RM.G-13; showing ceiling void at south-east area looking west. Note constructional detail of stepped ceiling timbers fixed to the solid clinker floor structure above via continuous timber plates. Also note significant mould growth to all visible timber elements

Fig 88:

Ground floor ceiling structures, RM.G-13; showing ceiling void at south-east area. Note area of ceiling joist subject only to superficial surface mould spores/growth with area of mould easily removed. Timbers suitable for cleaning and mould removal

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Fig 89:

Ground floor ceiling structures, RM.G-13; showing ceiling void at south-east area. Representative and vulnerable timbers were deep drilled and moisture probed. Sample areas showed surface moisture contents were wet at ~22+ per cent. However deep moisture contents were dry at ~14 per cent. Suggesting timbers were only superficially wet, but highly vulnerable to further damp and decay issues without proper drying down/ventilating

Fig 90:

Ground floor ceiling structures, RM.G-11; showing area in general looking north. Note historic ceiling structures have been heavily compromised by recent remedial and demolition works

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Fig 91:

Ground floor ceiling structures, RM.G-11; showing south bay area in general. Note historic ceiling structures in this area have been heavily compromised by recent remedial and demolition works. Estimated ~4-5 no. ceiling joists lost to this location

Fig 92:

Ground floor ceiling structures, RM.G-11; showing ~150mm ceiling void beneath solid floor clinker concrete structures above

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Fig 93:

Ground floor ceiling structures, RM.G-11; showing detail of ceiling joists supported by horizontal RSJ at east auditorium boundary wall

Fig 94:

Ground floor ceiling structures, RM.G-11; showing detail of ceiling joists supported by horizontal timber plate, nailed to west partition entrance lobby wall

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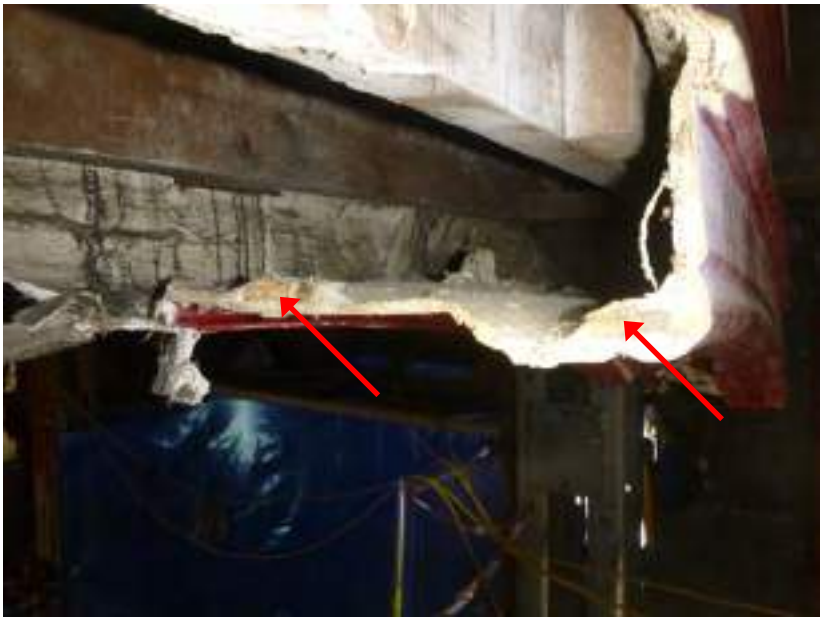

Fig 95:

Ground floor ceiling structures, RM.G-11; showing detail of boxed bressumer decorative plaster detail. Note section revealing size and location of embedded softwood lathes highly vulnerable to moisture entrapment and damp and decay issues

Fig 96:

Ground floor ceiling structures, RM.G-11; showing detail of boxed bressumer decorative plaster detail. Note section revealing size and location of embedded softwood lathes highly vulnerable to moisture entrapment and damp and decay issues. Moisture content reading showing 'wet' at ~20 per cent

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Fig 97:

Ground floor ceiling structures, RM.G-11; showing damaged ceiling plaster element revealing mould to ceiling joist element within void. Surface moisture content showing high moisture retention at ~20 per cent

Fig 98:

Ground floor ceiling structures, RM.G-11; showing revealed stud element within boxed decorative arch subject to significant mould growth and onset of decay organisms. Surface moisture content showing high moisture retention at ~25 per cent

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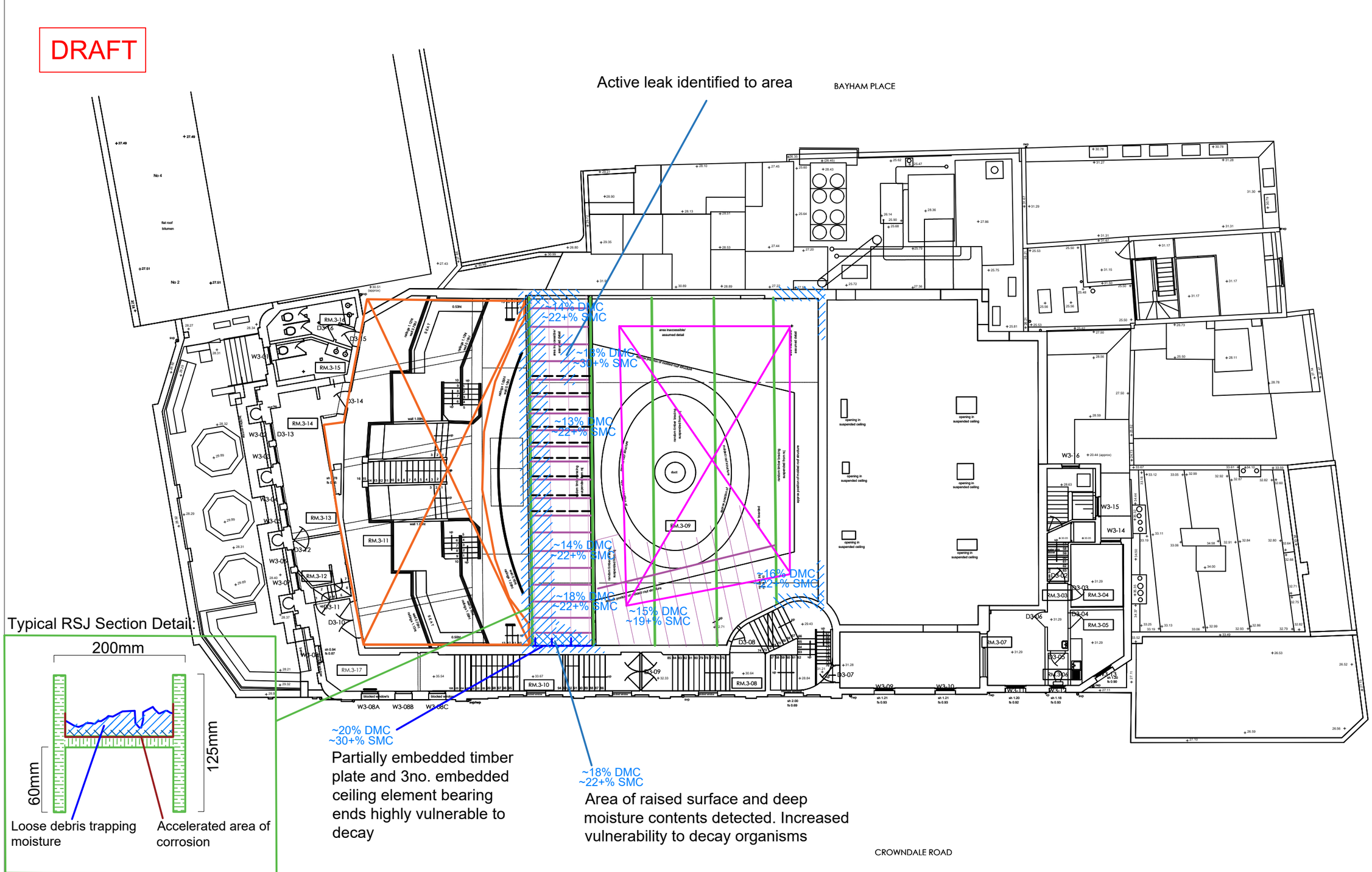
Fig 99:

Ground floor ceiling structures, RM.G-11; showing no access to balcony ceiling structures at the time of investigation due the clearing of ACMs

Attachment B

DRAFT



Typical RSJ Section Detail:

~20% DMC
~30+% SMC
Partially embedded timber plate and 3no. embedded ceiling element bearing ends highly vulnerable to decay

~18% DMC
~22+% SMC
Area of raised surface and deep moisture contents detected. Increased vulnerability to decay organisms

Key:

- Area of no access at time of survey
- No access. Area containing suspected or identified ACMs
- Trussed RSJ structure supporting suspended ceiling elements
- Ceiling joist/plate element
- Independent RSJ over ceiling elements
- Area subject to water penetration providing the conditions for damp, decay and surface mould growth

~12% DMC Deep Moisture Content reading
~20% SMC Surface Moisture Content reading
SCS Sold Ceiling Structures

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The Hope Project / KOKO - Third Floor
Timber Ceiling Structures Condition Investigation
14 April 2020

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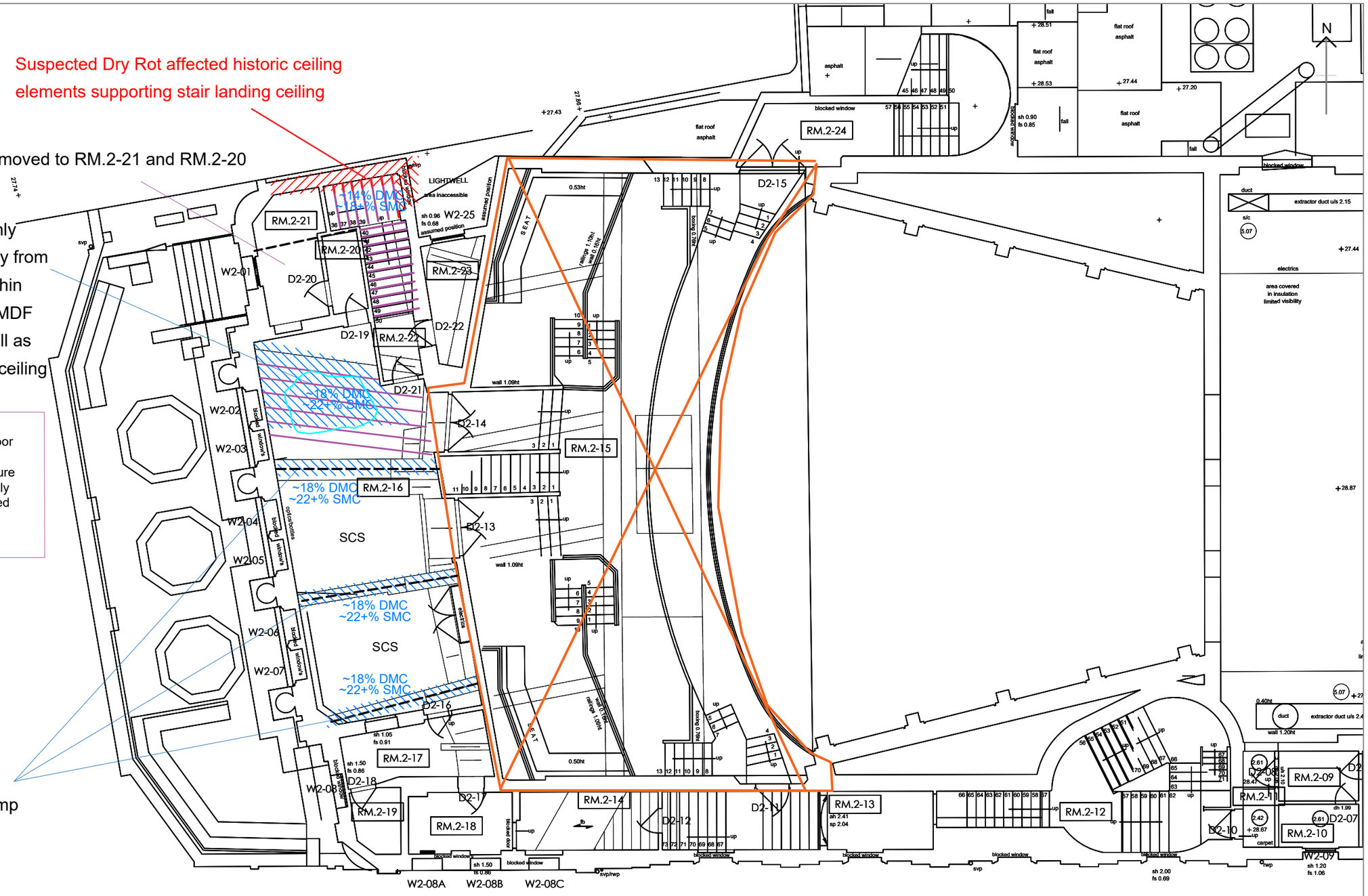
Suspected Dry Rot affected historic ceiling elements supporting stair landing ceiling

All timber ceiling elements removed to RM.2-21 and RM.2-20

Non-historic ceiling joists highly vulnerable to damp and decay from retained/trapped moisture within plaster ceiling elements and MDF ceiling boards beneath as well as from excessive debris within ceiling void

Ceiling structures suspected to have originally formed location of historic floor level above. Now defunct with newer addition intermediate solid floor structure above. Significant quantity of potentially historically interesting artifacts identified within ceiling void. Eg. old film real's, cigarette and match boxes etc

Timber elements to boxed RSJs highly vulnerable to damp and decay



Key:

- Area of no access at time of survey
- No access. Area containing suspected or identified ACMs
- Area subject to dry rot infection *(Serpula lacrymans)* / timber decay
- Ceiling joist/plate element
- Boxed RSJ beam element
- Area subject to water penetration providing the conditions for damp, decay and surface mould growth

~12% DMC Deep Moisture Content reading
~20% SMC Surface Moisture Content reading
SCS Sold Ceiling Structures

The Hope Project / KOKO - Second Floor
Timber Ceiling Structures Condition Investigation
14 April 2020

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~6no. compromised historic ceiling joists due to recent demolition/remedial propping works

Suspected asbestos within 2nd floor balcony structures above (No current access). Possibly affecting 1st floor ceiling void under investigation

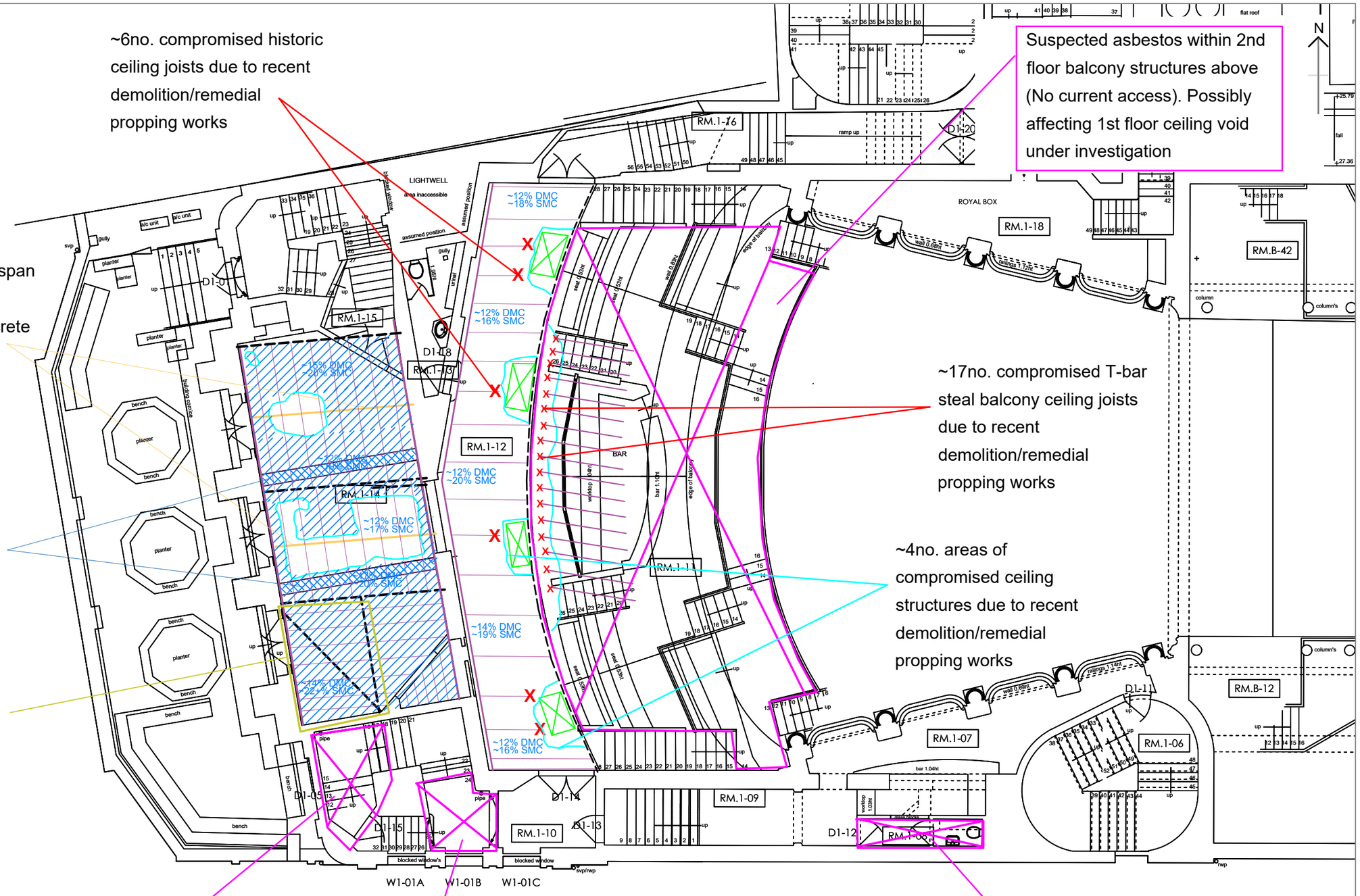
Timber plate supporting mid-span of ceiling joists. Fixed to suspected damp clinker concrete via nails at ~600mm centers. Nails subject to corrosion

~17no. compromised T-bar steal balcony ceiling joists due to recent demolition/remedial propping works

False beam decorative plaster boxing trapping moisture. Suspended timber battens highly vulnerable to damp and decay

~4no. areas of compromised ceiling structures due to recent demolition/remedial propping works

Non historic ceiling structure. Highly vulnerable to interstitial condensation and increased mould growth



Artex ceiling above non-historic suspended ceiling structure

Potential ACM cladding ceiling boards identified

Artex ceiling above non-historic suspended ceiling structure

The Hope Project / KOKO - First Floor
Timber Ceiling Structures Condition Investigation
14 April 2020

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Key:

- Area of no access at time of survey
- No access. Area containing suspected or identified ACMs
- X Removed or structurally compromised ceiling element
- Ceiling joist/plate element
- Ceiling plate element fixed to clinker slab above
- Area subject to water penetration providing the conditions for damp, decay and surface mould growth

- ~12% DMC Deep Moisture Content reading
- ~20% SMC Surface Moisture Content reading
- SCS Sold Ceiling Structures
- Boxed RSJ beam element

DRAFT

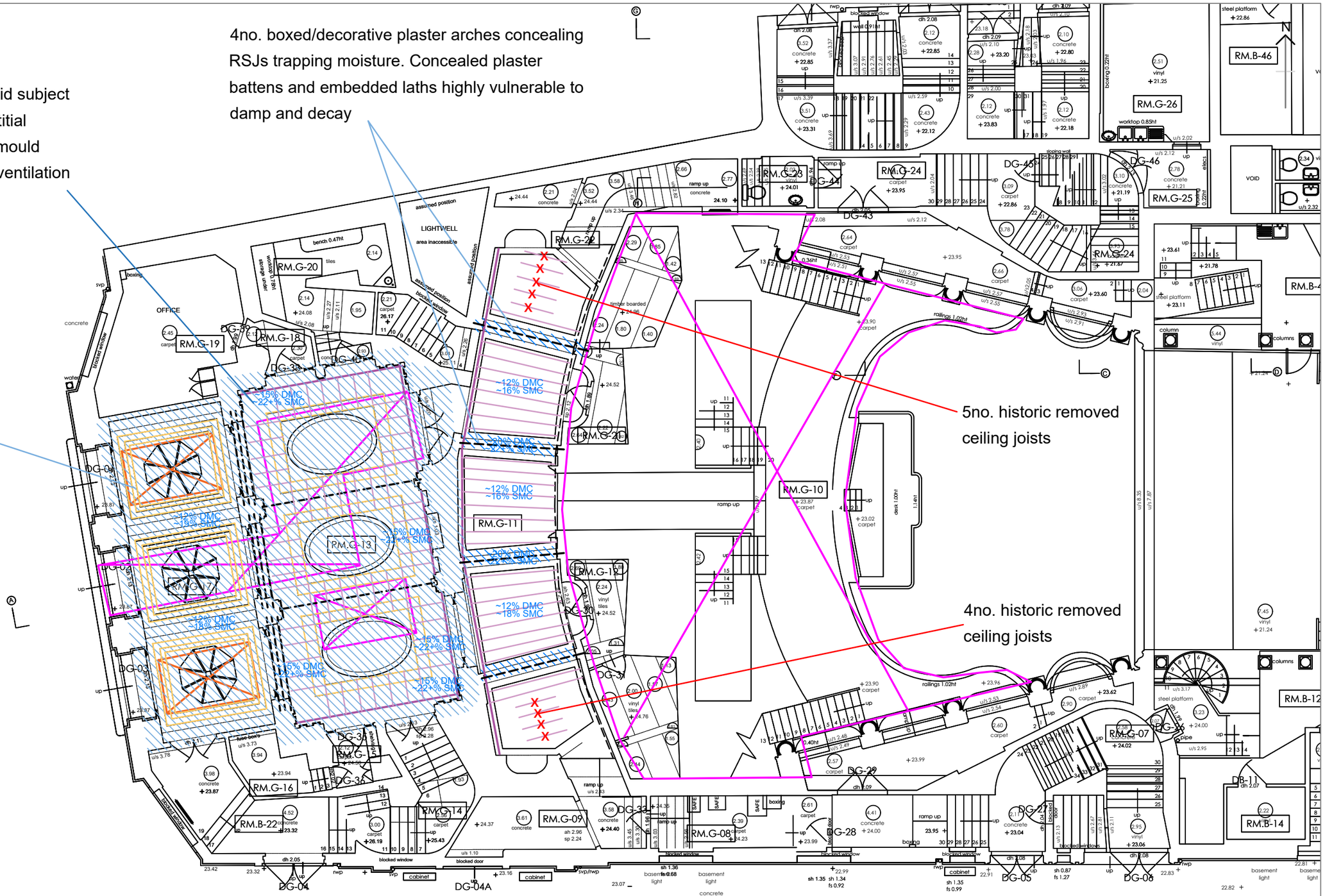
RM.G-13 ceiling void subject to significant interstitial condensation and mould growth. Increased ventilation required

4no. boxed/decorative plaster arches concealing RSJs trapping moisture. Concealed plaster battens and embedded laths highly vulnerable to damp and decay

Limited access to ceiling voids within RM.G-17. Voids subject to moderate levels of surface mould growth

5no. historic removed ceiling joists

4no. historic removed ceiling joists



The Hope Project / KOKO - Ground Floor
Timber Ceiling Structures Condition Investigation
14 April 2020

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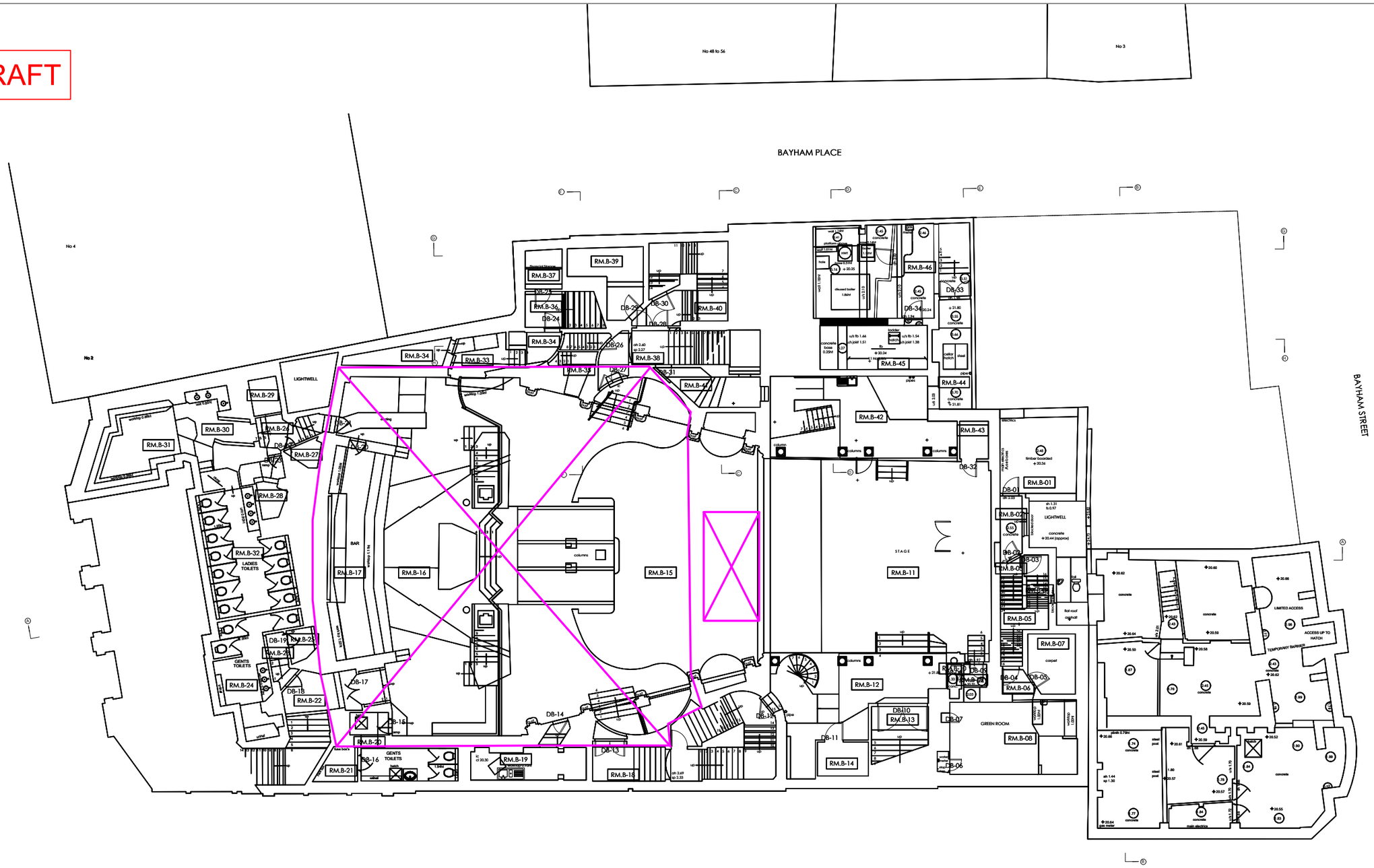

Key:

- Area of no access at time of survey
- No access. Area containing suspected or identified ACMs
- X Removed or structurally compromised ceiling element
- Ceiling joist/plate element
- Ceiling plate element fixed to clinker slab above
- Area subject to water penetration providing the conditions for damp, decay and surface mould growth

~12% DMC Deep Moisture Content reading
~20% SMC Surface Moisture Content reading
SCS Sold Ceiling Structures
Boxed RSJ beam element

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The Hope Project / KOKO - Basement

Timber Ceiling Structures Condition Investigation
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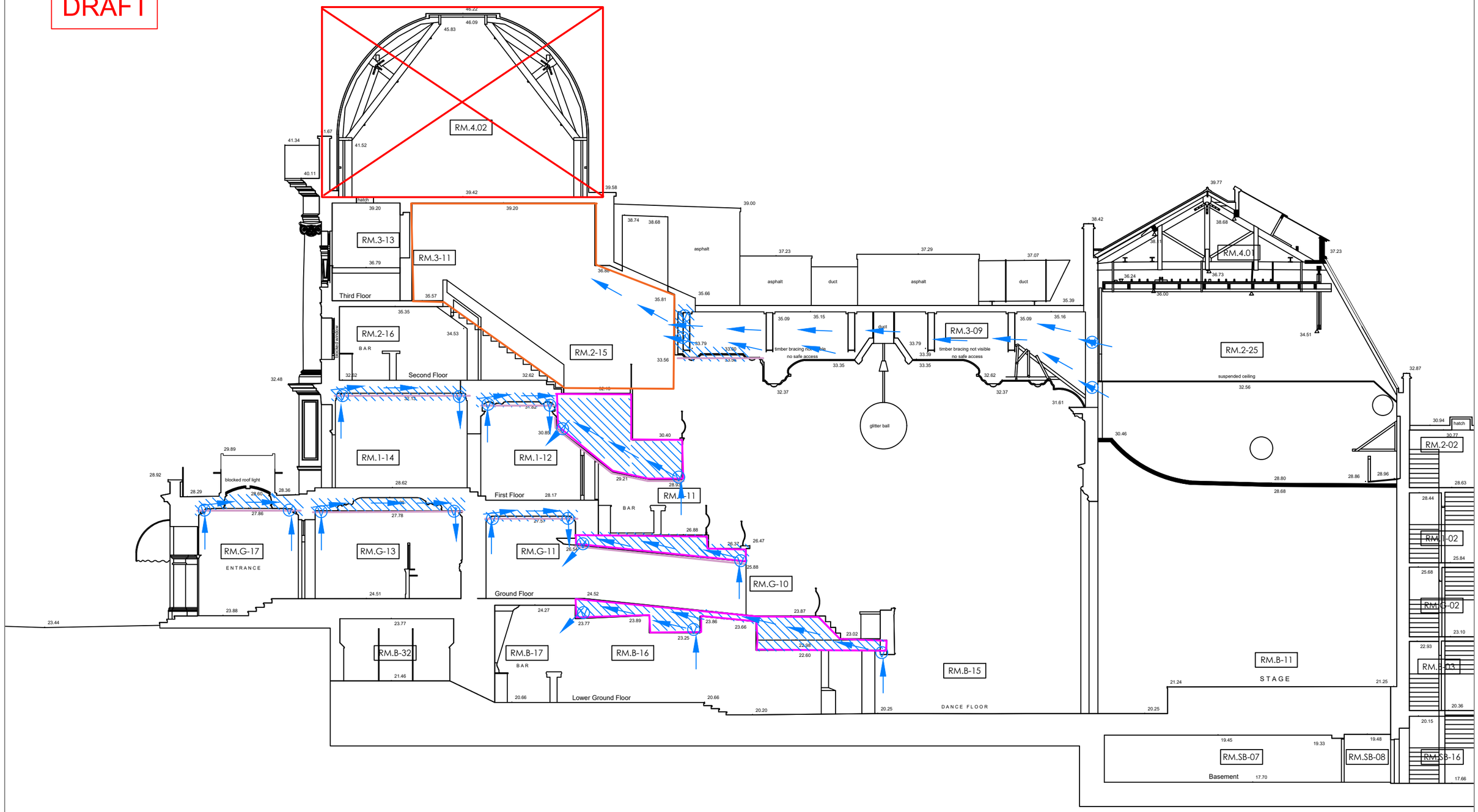

SECTION A-A

16.00m A.O.D

Key:

- Area of no access at time of survey
- No access. Area containing suspected or identified ACMs contaminating ceiling void
- Damp compromised ceiling void
- Ceiling void subject to conditions for damp, decay and surface mould growth
- Indication of suggested ventilation/mechanical air flow direction at plaster ceiling soffits/cornices and adjacent masonry structures
- Ⓥ Approximate location of vent cut into plaster masonry structures to introduce air flow from convection

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The Hope Project / KOKO - Section A-A

Proposed Air Flow Scheme to Damp Affected Ceiling Voids

14 April 2020

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Attachment C

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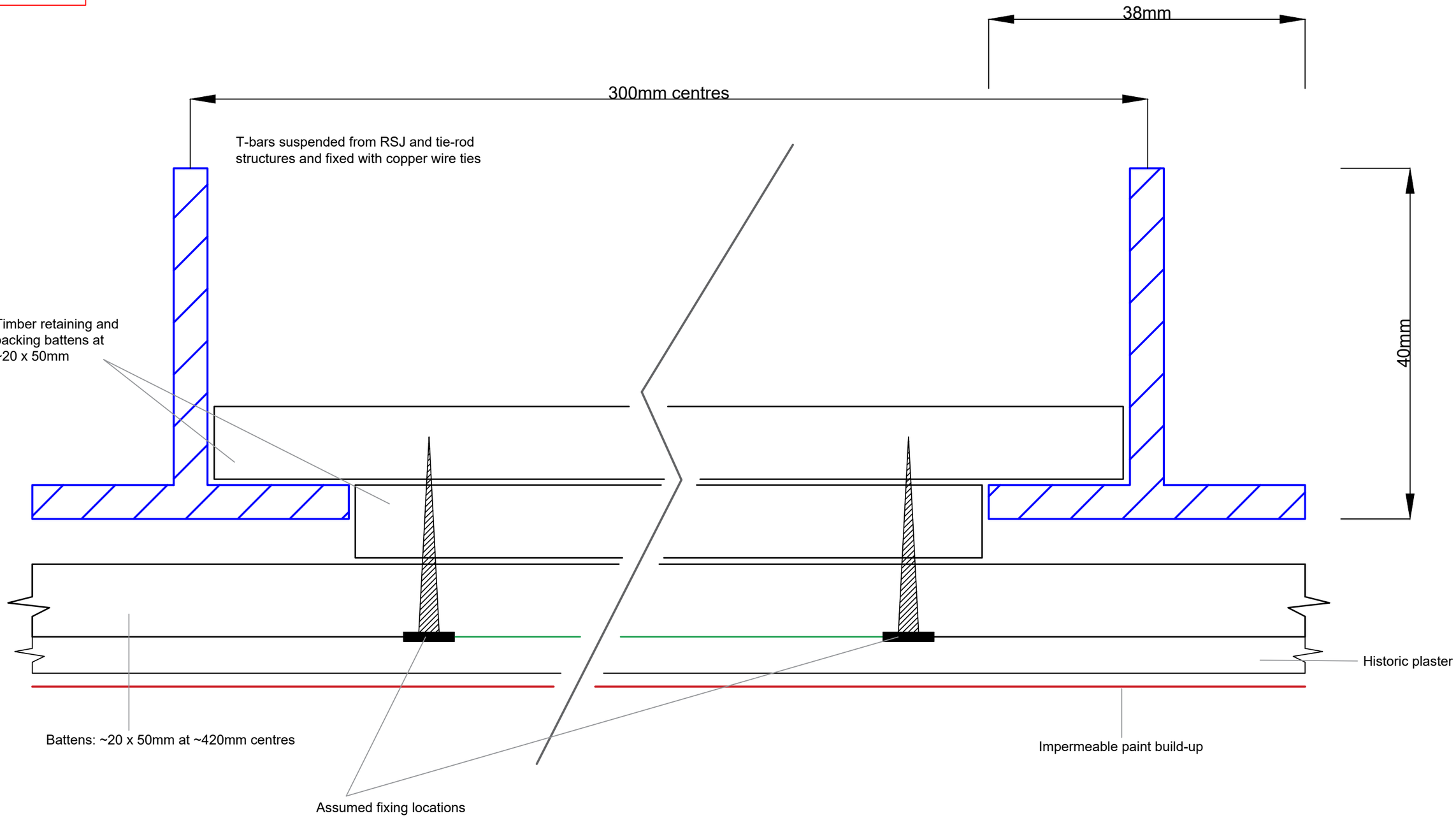

The Hope Project / KOKO, Sketch
Balcony Ceiling Structure Detail
April 2020

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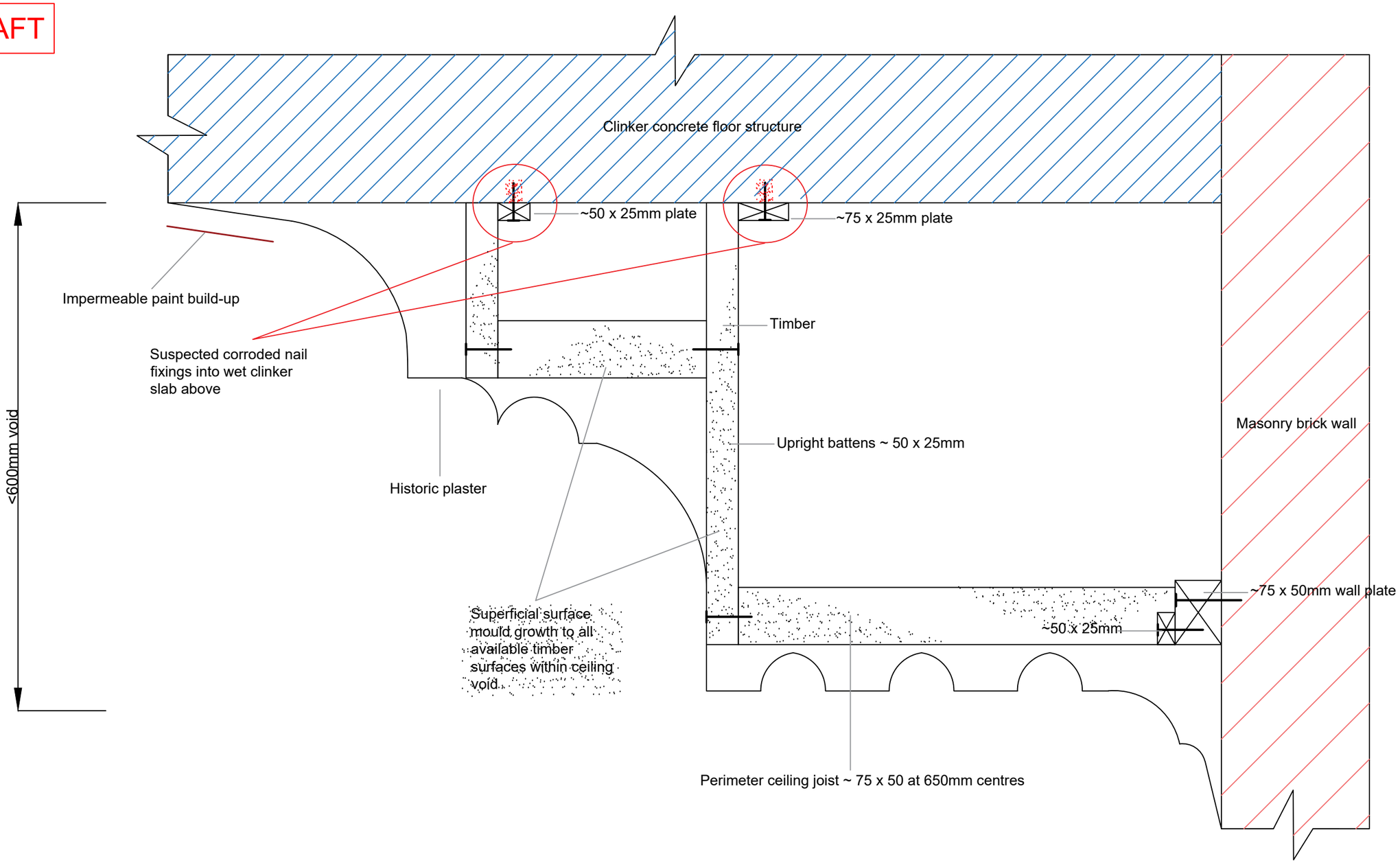

The Hope Project / KOKO, Sketch
Ground floor lobby ceiling structure detail
April 2020

Key: Nail fixing
Corrosion

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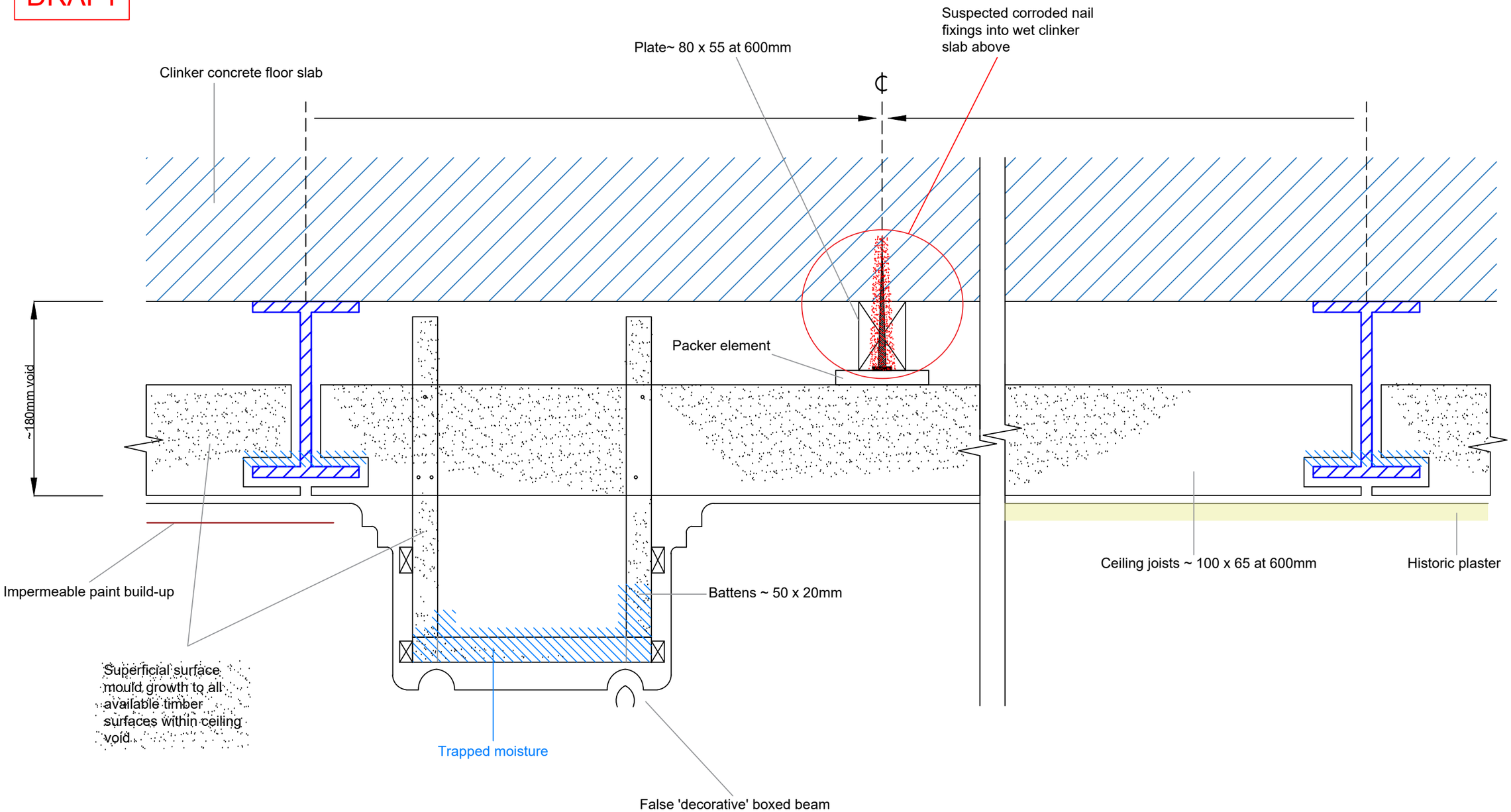

The Hope Project / KOKO, Sketch
RM-1-14 Ceiling structure detail
April 2020

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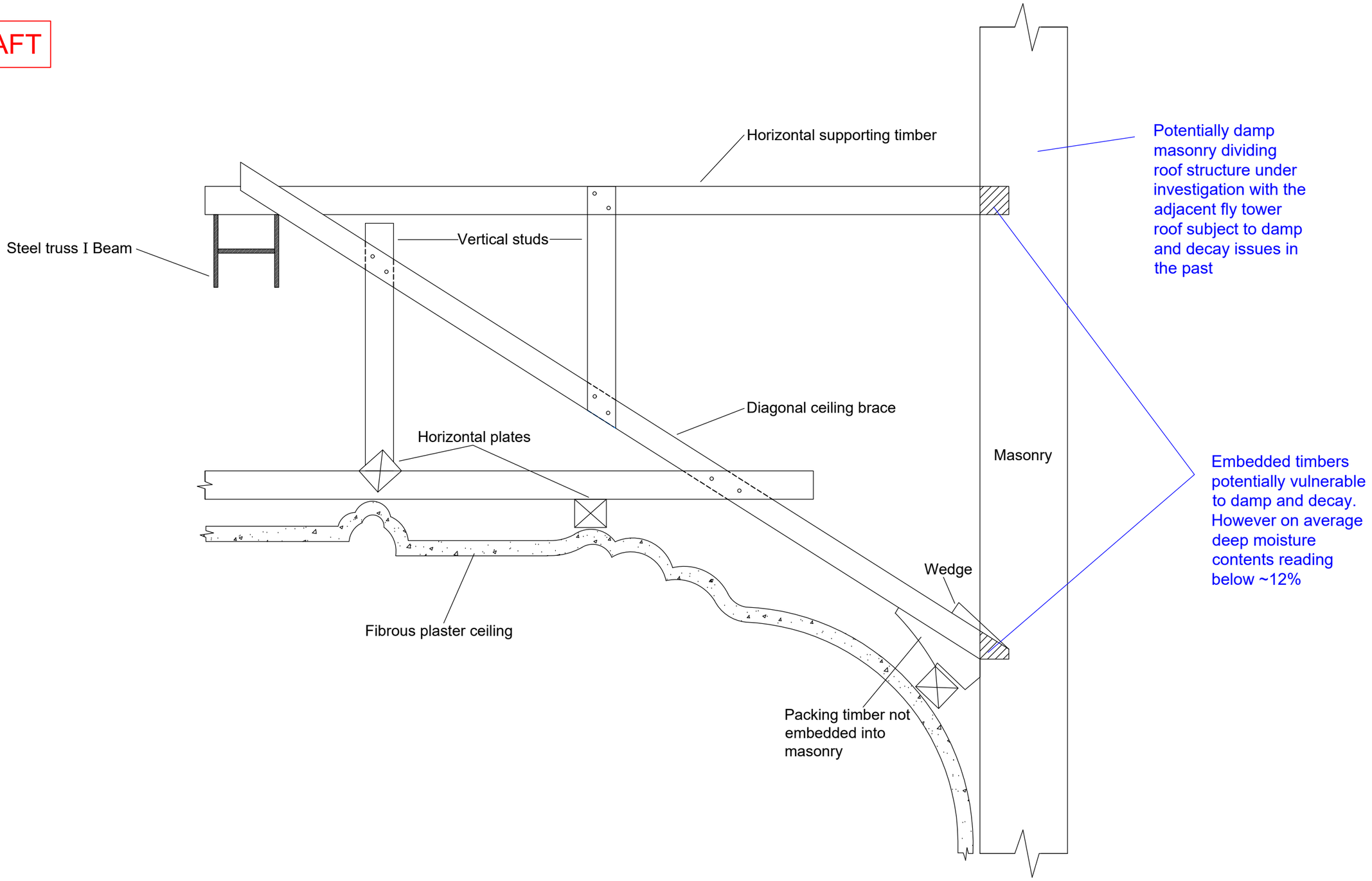

The Hope Project, Ceiling Timbers Detail - RM.3-09 Sketch

East Ceiling Structures Detail

April 2020

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Attachment D

SCHEDULE OF OBSERVATIONS AND RECOMMENDATIONS

REFERENCE	ITEM	OBSERVATIONS	RECOMMENDATIONS	CLIENT COMMENTS
THIRD FLOOR				
RM.3-09	Main auditorium ceiling structure, West Bay: Comprising; Historic decorative plaster ceiling suspended between 2no. north-south trussed RSJ structures- RSJ section size ~60x125mm ~20no. ceiling joists ~55x70@750-900mm centres Main longitudinal plates ~100x50mm Secondary longitudinal plates ~55x75mm Beams ~80x220mm Embedded plaster battens (Historic)~50x20mm Embedded plaster battens (Modern)~20x75mm ~8no. RSJ elements over (and parallel to) ceiling joists	**No active or structural decay detected** Available timbers were surface and deep resistance drilled and moisture probed; Typical recordings of elevated (wet) surface moisture contents at ~16-22 per cent Typical recordings of stable (dry) deep moisture contents at ~12-15 per cent Visible active leak at north area affecting decorative plaster and timber elements at 3m² Vulnerable partially embedded timber plate at south wall and 4no. associated embedded timber elements Available structures subject to widespread surface mould growth which may represent a health hazard to those working in and occupying related air space It was understood that the majority of the west bay lath and plaster elements which had been extensively damaged by chronic fire related moisture penetration and were supported by the timbers under investigation were 'beyond reasonable retention' and consideration was being given to the wholesale replacement of plaster and lath to this area	*No chemical remedial timber treatments are required* *Allowance should be made for the increased provision of background ventilation: Natural or mechanical through and cross ventilation should be provided to the entire auditorium ceiling void, so as to minimise the risk of further condensation and mould growth, and so as to facilitate drying* *Timbers subject to surface mould growth and active mould spores should be tested for the type and toxicity of mould to ascertain potential health hazard H+R can conduct such tests if instructed to do so* *Cleaning of mould surfaces: Prior to the introduction of increased ventilation, mould affected surfaces should be scrubbed with a dilute solution of sodium hypochlorite or household bleach at 1:4 parts. Using a soft brush, the mould should be scrubbed until it disappears. After scrubbing the surfaces, allow the bleach solution to continue to penetrate the surfaces and dry. Those undertaking this task should be provided with appropriate respiratory protection, eye protection, gloves and protective clothing. Consideration should be given to undertaking these works while the building is effectively 'mothballed' during the current Covid 19 crisis* *Consideration should be given by the Conservation and Design Team to the replacement of all corresponding timber ceiling elements to planned intended plaster removal within the west bay as the most cost effective and practicable option. This would allow decay-vulnerable structural elements to be removed, and opportunity to introduce improved design specifications and a uniform 'clean' surface from which to re-plaster*	
RM.3-11	No access at time of investigation due to remedial propping works to fire damaged dome roof floor structure above	-	-	
SECOND FLOOR				

REFERENCE	ITEM	OBSERVATIONS	RECOMMENDATIONS	CLIENT COMMENTS
RM.2-15	No access at time of investigation due to remedial propping works to fire damaged dome roof floor structure above	-	-	
RM.2-16	North bay area features timber ceiling elements. All other bays of solid ceiling structures Comprising: Ceiling void depth ~300mm Floor/ceiling joists ~50x200@480mm Additional MDF ceiling panels ~22mm	**No active or structural decay detected** Available timbers were surface and deep resistance drilled and moisture probed; Typical recordings of elevated (wet) surface moisture contents at ~22+ per cent Typical recordings of elevated (damp) deep moisture contents at ~16-19 per cent Significant moisture was being trapped within ceiling timber elements at the time of investigation and preventing effective drying. Factors trapping and retaining moisture include; water logged gypsum plaster, plaster board, MDF boarding and significant debris/loose matter within ceiling voids Available structures subject to widespread surface mould growth which may represent a health hazard to those working in and occupying related air space Timber elements forming (and concealed within) the 3no. boxed RSJ structures, and dividing the solid ceiling areas, were found to be highly vulnerable to damp and decay issues. Partial exposure of representative areas to these structures revealed surface moisture contents of 30+ per cent	*No chemical remedial timber treatments are required* *Subject to approval by the Heritage Team, provision should be made for the removal of all water logged non-historic elements currently trapping moisture within the timber ceiling and promoting the conditions for damp and decay* *Allowance may then be made for the increased provision of background ventilation: Natural or mechanical through and cross ventilation should be provided to the ceiling void, so as to minimise the risk of further condensation and mould growth, and so as to facilitate drying* *Timbers subject to surface mould growth and active mould spores should be tested for the type and toxicity of mould to ascertain potential health hazard H+R can conduct such tests if instructed to do so* *Cleaning of mould surfaces: Prior to the introduction of increased ventilation, mould affected surfaces should be scrubbed with a dilute solution of sodium hypochlorite or household bleach at 1:4 parts. Using a soft brush, the mould should be scrubbed until it disappears. After scrubbing the surfaces, allow the bleach solution to continue to penetrate the surfaces and dry. Those undertaking this task should be provided with appropriate respiratory protection, eye protection, gloves and protective clothing. Consideration should be given to undertaking these works while the building is effectively 'mothballed' during the current Covid 19 crisis* *Allowance should be made for the removal of all non-essential/historically significant plaster coverings to boxed RSJs in order to promote drying*	
RM.2-17	Solid ceiling structures	-	-	
RM.2-18	Solid ceiling structures	-	-	
RM.2-19	Solid ceiling structures	-	-	
RM.2-20	Suspended timber ceiling elements removed. Solid ceiling structures above	-	-	

REFERENCE	ITEM	OBSERVATIONS	RECOMMENDATIONS	CLIENT COMMENTS
RM.2-21	Suspended timber ceiling elements removed. Solid ceiling structures above	-	-	
RM.2-22	Suspended timber ceiling over stairs and stair landings: Comprising; Ceiling void depth~ 2-3M Ceiling joists ~55x115@320mm centres	Available timbers were surface and deep resistance drilled and moisture probed; Typical recordings of elevated (wet) surface moisture contents at ~16-22 per cent Typical recordings of elevated (damp) deep moisture contents at ~14-19 per cent Historic plaster finishes visibly damp over upper quarter stairs landing Likely historic structural decay detected to up to ~4 no. ceiling joists within upper quarter stairs landing ceiling where they contact the north and east masonry walls North and east masonry walls suspected to be infected by dry rot (*Serpula lacrymans*) decay. Likely as an historic issue relating to failed rainwater goods to the enclosed and inaccessible lightwell to the east. Dry rot highly likely to be re-activated by recent fire related water penetration	*No chemical remedial timber treatments are required* *Allow for increased provision of background ventilation to vulnerable timber elements to prevent re-activation of historic decay issues* *No chemical remedial timber treatments or wall irrigations are required. All timber elements in areas subject to chronic water penetration and/or indicated as infected by dry rot (Serpula lacrymans) are shown on plans at Attachment A. Care should be taken to maintain the external envelope so as to minimise further water penetration into the structure, during and after the refurbishment. This should include repair and re-detailing of external masonry and the rainwater drainage system. In particular allowance should be made for access and inspection to the enclosed and inaccessible lightwell to the east of the suspected dry rot affected area for masonry and rainwater goods condition investigation. Remedial measures should be subject to detailed investigations. Provisionally allow for specific decayed/vulnerable timber elements to be repaired/replaced and re-supported in isolation from damp affected and/or dry rot infected masonry using a damp-proof material, to a detail approved by H+R*	
RM.2-23	Solid ceiling structures	-	-	
FIRST FLOOR				
RM.1-08	Suspected artex ceiling over modern suspended ceiling structures	-	-	
RM.1-10	Solid ceiling structures	-	-	
RM.1-10	Modern suspended ceiling structure beneath solid clinker concrete floor slab	-	-	
RM.1-12	Decorative non-historic plaster ceiling structures supported on historic ceiling joist timbers: Comprising; Ceiling void depth ~1M Ceiling joists ~55x75@900mm centres. West wall plate ~50x75mm East plate of RSJ construction	**No active or structural decay detected** Available timbers were surface and deep resistance drilled and moisture probed; Typical recordings of elevated (wet) surface moisture contents at ~16-22 per cent Typical recordings of stable (dry) deep moisture contents at ~12-15 per cent Structures generally believed to be superficially damp with inadequate provision for ventilation to assist in drying	*No chemical remedial timber treatments are required* *When safe to so. Allowance should be made for the increased provision of background ventilation: Natural or mechanical through and cross ventilation should*	

REFERENCE	ITEM	OBSERVATIONS	RECOMMENDATIONS	CLIENT COMMENTS
			be provided to the ceiling void, so as to minimise the risk of further condensation and mould growth, and so as to facilitate drying. In particular to the vulnerable west wall plate where it meets the damp masonry division wall	
		~6no. ceiling joist bearing ends cut through/compromised by recent remedial structural propping at their east bearing ends. See plans at Attachment B for specific locations	Allow for the replacement of ~6no. compromised ceiling joists to be either partner repaired or replaced in like-for-like post the structural remedial works completion	
RM.1-12 Balcony ceiling structures	A sloped historic plaster ceiling supported on steel and timber structures: Comprising; Steel T-bars ~38x40mm@370mm centres X3 build-up of timber battens ~20x50mm	Void heavily compromised by identified ACM's No access at time of investigation	*Health and safety requirements necessitate that zones containing hazardous levels of asbestos containing materials be cleared and certified full in accordance with the Control of Asbestos Regulations before further intrusive works may commence to these areas. This may necessitate the removal of all compromised timber elements that cannot be effectively 'cleaned' of ACM particles. Specialists asbestos consultants to comment*	
		~17no. T-bar ceiling joists bearing ends compromised/cut through by recent remedial structural propping at their west bearing ends. See plans at Attachment B for specific locations	Allow for the replacement of ~17no. compromised steel T-bar ceiling joists to be either partner repaired or replaced in like-for-like post the structural remedial works completion	
		Structures generally believed to be superficially damp with inadequate provision for ventilation to assist in drying	*When safe to do so. Provision should be made for through and cross ventilation to dry/protect as much historic building fabric as possible. In particular vulnerable historic plaster elements which are intended to remain in situ should be carefully recorded and continuous vent gaps at or close to the cornice/soffit junctures and nearest to damp affected masonry walls, cut open and set aside to all suspended ceilings and suspended ceiling voids through the non-decorative and more easily repaired ceiling plaster. This may be achieved by cutting vent gaps at the lowest east point soffits of the balcony structures and to corresponding upper west soffit ventilation gaps, creating positive air-flow through convection of warm air so as to allow through ventilation and drying. See proposed air flow plan diagram at Attachment B*	
RM.1-13	Modern suspended ceiling structure beneath solid clinker concrete floor slab	-	-	
RM.1-14	Decorative historic moulded plaster and timber ceiling structures: Comprising; Ceiling void depth ~180mm Ceiling joists ~100x55@600mm centres suspended from RSJs supported from solid clinker ash floor slab above.	**No active or structural decay detected** Available timbers were surface and deep resistance drilled and moisture probed; Typical recordings of elevated (wet) surface moisture contents at ~19-22 per cent	*No chemical remedial timber treatments are required*	

REFERENCE	ITEM	OBSERVATIONS	RECOMMENDATIONS	CLIENT COMMENTS
	Ceiling plates ~80x55mm supporting joist mid-spans and with fixing at ~600mm centres into clinker concrete slab Also featuring 2no false 'decorative' boxed beam structures dividing the ceiling into 3no bays. Constructed with battens at ~25x50mm nailed and suspended from ceiling joists	Typical recordings of stable (dry) deep moisture contents at ~12-15 per cent RH@15.5=11.9ºC Structures generally believed to be superficially damp with inadequate provision for ventilation to assist in drying Available structures subject to widespread surface mould growth which may represent a health hazard to those working in and occupying related air space The continuous ceiling plate steel fixings, usually at ~600mm centres, were visibly corroded with blue ferrous staining to the surrounding timber. Although likely of historic origin, the prolonged historic corrosion and potential weakening of the fixings grounding is likely to be exacerbated by the sudden increase in trapped moisture within the property, as well as the build-up of interstitial condensation within the ceiling voids will degrade the already evident corrosion leading to eventual possible failure of the structural ceiling plates	*When safe to so. Provision should be made for through and cross ventilation to dry/protect as much historic building fabric as possible. In particular vulnerable decorative moulded plaster elements which are intended to remain in situ should be carefully recorded and continuous vent gaps at or close to the cornice/soffit juncture and nearest to damp affected masonry walls, cut open and set aside to all suspended ceilings and suspended ceiling voids through the non-decorative and more easily repaired ceiling plaster. Continuous vent gaps should always have corresponding and opposing vent gaps for the effective movement of air. Alternatively, continuous ventilation slots may be formed at the top of lath and plaster or dry lined voids, so as to allow through ventilation and drying* *Timbers subject to surface mould growth and active mould spores should be tested for the type and toxicity of mould to ascertain potential health hazard H+R can conduct such tests if instructed to do so* *Cleaning of mould surfaces: Prior to the introduction of increased ventilation, mould affected surfaces should be scrubbed with a dilute solution of sodium hypochlorite or household bleach at 1:4 parts. Using a soft brush, the mould should be scrubbed until it disappears. After scrubbing the surfaces, allow the bleach solution to continue to penetrate the surfaces and dry. Those undertaking this task should be provided with appropriate respiratory protection, eye protection, gloves and protective clothing. Consideration should be given to undertaking these works while the building is effectively 'mothballed' during the current Covid 19 crisis* *The corrosion state and structural adequacy of existing steel fixings within ceiling plate structures should be determined by H+R, Structural Engineer and the specialist Plaster Restorers. Allowance should be made for repair or replacement as directed by the Structural Engineer, and for provision of 'cathodic protection' as necessary, so as to minimise further corrosion during and after refurbishment. In addition to this, H+R recommend that should the ceiling plate timbers subject to fixings corrosion be deemed retainable upon refurbishment, additional non-corrosive fixings be introduced to provide adequate structural adhesion should the existing historic fixings fail*	

REFERENCE	ITEM	OBSERVATIONS	RECOMMENDATIONS	CLIENT COMMENTS
		It was understood that the majority of RM.1-14 lath and plaster elements which had been extensively damaged by chronic fire related moisture penetration and were supported by the timbers under investigation were 'beyond reasonable retention' and consideration was being given to the wholesale replacement of plaster and lath to this area	*Consideration should be given by the Conservation and Design Team to the replacement of all corresponding timber ceiling elements to planned intended plaster removal within the west bay as the most cost effective and practicable option. This would allow decay-vulnerable structural elements to be removed, and opportunity to introduce improved design specifications and a uniform 'clean' surface from which to re-plaster*	
GROUND FLOOR				
RM.G-11	Decorative historic plaster ceiling structures supported on historic ceiling joist timbers: 5no. distinct ceiling areas divided by decorative plaster arches concealing/boxing structural RSJs Comprising; Ceiling void depth ~1M ~32no. ceiling joists ~50x110@390mm centres West wall plate ~50x120mm East wall plate of RSJ construction Decorative RSJ boxed arches constructed from variable dimension timbers at ~25x50mm	**No active or structural decay detected** Available timbers were surface and deep resistance drilled and moisture probed; Typical recordings of elevated (wet) surface moisture contents at ~16-20 per cent Typical recordings of stable (dry) deep moisture contents at ~12-13 per cent Structures generally believed to be superficially damp with inadequate provision for ventilation to assist in drying Decorative boxed RSJ arches highly vulnerable to moisture entrapment and accelerated conditions for decay. In particular to embedded timber battens/laths within plasterwork Available structures subject to widespread surface mould growth which may represent a health hazard to those working in and occupying related air space	*No chemical remedial timber treatments are required* *When safe to so. Allowance should be made for the increased provision of background ventilation: Natural or mechanical through and cross ventilation should be provided to the ceiling void, so as to minimise the risk of further condensation and mould growth, and so as to facilitate drying. In particular to the vulnerable west wall plate where it meets the damp masonry division wall* *When safe to so. Provision should be made for through and cross ventilation to dry/protect vulnerable decorative plaster and timber elements. In particular vulnerable boxed decorative moulded plaster elements, which are intended to remain in situ should be carefully recorded and corresponding ventilation gaps cut out at their lowest and highest points for the effective movement of air* *Timbers subject to surface mould growth and active mould spores should be tested for the type and toxicity of mould to ascertain potential health hazard H+R can conduct such tests if instructed to do so* *Cleaning of mould surfaces: Prior to the introduction of increased ventilation, mould affected surfaces should be scrubbed with a dilute solution of sodium hypochlorite or household bleach at 1:4 parts. Using a soft brush, the mould should be scrubbed until it disappears. After scrubbing the surfaces, allow the bleach solution to continue to penetrate the surfaces and dry. Those undertaking this task should be provided with appropriate respiratory protection, eye*	

REFERENCE	ITEM	OBSERVATIONS	RECOMMENDATIONS	CLIENT COMMENTS
			protection, gloves and protective clothing. Consideration should be given to undertaking these works while the building is effectively 'mothballed' during the current Covid 19 crisis	
		~6no. ceiling joists removed from north bay for recent remedial structural works. See plans at Attachment B for specific locations ~4no. ceiling joists removed from south bay for recent remedial structural works. See plans at Attachment B for specific locations	Allow for the replacement of ~8no. removed ceiling joists to replace in like-for-like to match existing examples post the structural remedial works completion	
RM.G-11 Balcony ceiling structures	A sloped historic plaster ceiling supported on steel and timber structures: Comprising; Steel T-bars ~38x40mm@370mm centres X3 build-up of timber battens ~20x50mm	Void heavily compromised by identified ACM's No access at time of investigation Structures generally believed to be superficially damp with inadequate provision for ventilation to assist in drying	*Health and safety requirements necessitate that zones containing hazardous levels of asbestos containing materials be cleared and certified full in accordance with the Control of Asbestos Regulations before further intrusive works may commence to these areas. This may necessitate the removal of all compromised timber elements that cannot be effectively 'cleaned' of ACM particles. Specialists asbestos consultants to comment* *When safe to do so. Provision should be made for through and cross ventilation to dry/protect as much historic building fabric as possible. In particular vulnerable historic plaster elements which are intended to remain in situ should be carefully recorded and continuous vent gaps at or close to the cornice/soffit junctures and nearest to damp affected masonry walls, cut open and set aside to all suspended ceilings and suspended ceiling voids through the non-decorative and more easily repaired ceiling plaster. This may be achieved by cutting vent gaps at the lowest east point soffits of the balcony structures and to corresponding upper west soffit ventilation gaps, creating positive air-flow through convection of warm air so as to allow through ventilation and drying. See proposed air flow plan diagram at Attachment B*	
RM.G-12	Area inaccessible due to the known presence of ACMs	-	-	
RM.G-13	Decorative historic moulded plaster and timber ceiling structures surrounding 3no. oval domed decorative plaster recesses: Comprising; Ceiling void depth ~600mm Primary horizontal ceiling plate ~75x25mm supported from solid clinker ash floor slab above	**No active or structural decay detected** Available timbers were surface and deep resistance drilled and moisture probed; Typical recordings of elevated (wet) surface moisture contents at ~22+ per cent Typical recordings of elevated (damp) deep moisture contents at ~16-19 per cent	*No chemical remedial timber treatments are required*	

REFERENCE	ITEM	OBSERVATIONS	RECOMMENDATIONS	CLIENT COMMENTS
	Secondary horizontal ceiling plate ~50x25mm supported from solid clinker ash floor slab above Wall horizontal plate ~50x25mm Vertical ceiling battens ~50x25mm suspended from horizontal members	RH@15.5=11.9ºC Significant moisture was being trapped within ceiling timber elements at the time of investigation and preventing effective drying Available structures subject to widespread surface mould growth which may represent a health hazard to those working in and occupying related air space The continuous ceiling plate steel fixings, usually at ~600mm centres, were visibly corroded with blue ferrous staining to the surrounding timber. Although likely of historic origin, the prolonged historic corrosion and potential weakening of the fixings grounding is likely to be exacerbated by the sudden increase in trapped moisture within the property, as well as the build-up of interstitial condensation within the ceiling voids will degrade the already evident corrosion leading to eventual possible failure of the structural ceiling plates	*When safe to so. Provision should be made for through and cross ventilation to dry/protect as much historic building fabric as possible. In particular vulnerable decorative moulded plaster elements which are intended to remain in situ should be carefully recorded and continuous vent gaps at or close to the cornice/soffit juncture and nearest to damp affected masonry walls, cut open and set aside to all suspended ceilings and suspended ceiling voids through the non-decorative and more easily repaired ceiling plaster. Continuous vent gaps should always have corresponding and opposing vent gaps for the effective movement of air. Alternatively, continuous ventilation slots may be formed at the top of lath and plaster or dry lined voids, so as to allow through ventilation and drying* *Timbers subject to surface mould growth and active mould spores should be tested for the type and toxicity of mould to ascertain potential health hazard H+R can conduct such tests if instructed to do so* *Cleaning of mould surfaces: Prior to the introduction of increased ventilation, mould affected surfaces should be scrubbed with a dilute solution of sodium hypochlorite or household bleach at 1:4 parts. Using a soft brush, the mould should be scrubbed until it disappears. After scrubbing the surfaces, allow the bleach solution to continue to penetrate the surfaces and dry. Those undertaking this task should be provided with appropriate respiratory protection, eye protection, gloves and protective clothing. Consideration should be given to undertaking these works while the building is effectively 'mothballed' during the current Covid 19 crisis* *The corrosion state and structural adequacy of existing steel fixings within ceiling plate structures should be determined by H+R, Structural Engineer and the specialist Plaster Restorers. Allowance should be made for repair or replacement as directed by the Structural Engineer, and for provision of 'cathodic protection' as necessary, so as to minimise further corrosion during and after refurbishment. In addition to this, H+R recommend that should the ceiling plate timbers subject to fixings corrosion be deemed retainable upon refurbishment, additional non-corrosive fixings be introduced to provide adequate structural adhesion should the existing historic fixings fail*	
RM.G-17	Decorative historic moulded plaster and timber ceiling structures surrounding 3no. octagonal ceiling lights:	**No active or structural decay detected**	*No chemical remedial timber treatments are required*	

REFERENCE	ITEM	OBSERVATIONS	RECOMMENDATIONS	CLIENT COMMENTS
	Comprising; Ceiling void depth ~120mm Horizontal ceiling battens ~50x25mm@~350mm centres supported from solid clinker ash floor slab above Vertical ceiling battens ~50x25mm suspended from horizontal members	Available timbers were surface and deep resistance drilled and moisture probed; Typical recordings of elevated (wet) surface moisture contents at ~16-22 per cent Typical recordings of elevated (damp) deep moisture contents at ~14-19 per cent RH@15.5=11.9ºC Access to ceiling structures limited by Hazardous materials clearing zones and building debris Structures generally believed to be superficially damp with inadequate provision for ventilation to assist in drying Available structures subject to moderate surface mould growth which may represent a health hazard to those working in and occupying related air space	*When safe to so. Provision should be made for through and cross ventilation to dry/protect as much historic building fabric as possible. In particular vulnerable decorative moulded plaster elements which are intended to remain in situ should be carefully recorded and continuous vent gaps at or close to the cornice/soffit juncture and nearest to damp affected masonry walls, cut open and set aside to all suspended ceilings and suspended ceiling voids through the non-decorative and more easily repaired ceiling plaster. Continuous vent gaps should always have corresponding and opposing vent gaps for the effective movement of air. Alternatively, continuous ventilation slots may be formed at the top of lath and plaster or dry lined voids, so as to allow through ventilation and drying* *Timbers subject to surface mould growth and active mould spores should be tested for the type and toxicity of mould to ascertain potential health hazard H+R can conduct such tests if instructed to do so* *Cleaning of mould surfaces: Prior to the introduction of increased ventilation, mould affected surfaces should be scrubbed with a dilute solution of sodium hypochlorite or household bleach at 1:4 parts. Using a soft brush, the mould should be scrubbed until it disappears. After scrubbing the surfaces, allow the bleach solution to continue to penetrate the surfaces and dry. Those undertaking this task should be provided with appropriate respiratory protection, eye protection, gloves and protective clothing. Consideration should be given to undertaking these works while the building is effectively 'mothballed' during the current Covid 19 crisis*	
RM.G-21	Area inaccessible due to the known presence of ACMs	-	-	

Hutton + Rostron
Environmental Investigations Limited

The Hope Project (KOKO): Timber ceiling structures condition Investigation

Site note 8 for 14 April 2020, job no. 146.89

ADDENDUM - 5 August 2020

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A Photographs

B Drawing

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1 INTRODUCTION

1.1 AUTHORITY AND REFERENCES

Hutton + Rostron Environmental Investigations Limited carried out site visits to The Hope Project (KOKO Camden) on the 8-14th April 2020 in accordance with instructions from Andrew Bridge by email, on 10 March 2020 (16:13). An additional 'addendum' site visit was carried out on the 5 August 2020 in accordance with instructions from Hannah West by email, on 4 August 2020 (12:31). Drawings provided by Archer Humphryes Architects, Ref AHA/KKC/EX/ were used for the identification of structures. For the purpose of orientation in this report, the building was taken as facing west onto Camden High Street

1.2 AIM

1 The aim of this survey was to make an initial assessment of the construction and condition of remaining timber ceiling structural elements. The extent and distribution of residual or interstitial moisture/condensation build-up within ceiling voids has been commented upon. Recommendations for effective 'drying-down' and further detailed investigation of residual moisture and advice on short term remedial works are given, to promote drying of the structure and protect historically significant building fabric from damage and decay

2 The aim of the addendum survey was to investigate and ascertain the present condition of ceiling timbers within the ceiling voids of rooms R.M.G-13 and R.M.G-17 and to make comparisons between the findings and the previous investigation

1.3 LIMITATIONS

This survey was confined to the accessible structures. The condition of concealed timbers was investigated with the use of high power fibre optics and thermal imaging. The condition of concealed timbers may be deduced from the general condition and moisture content of the adjacent structure. Only demolition or exposure work can enable the condition of timber to be determined with certainty, and this destroys what it is intended to preserve. Specialist investigative techniques are therefore employed as aids to the surveyor. No such technique can be 100 per cent reliable, but their use allows deductions to be made about the most probable condition of materials at the time of examination. Structures were not examined in detail except as described in this report, and no liability can be accepted for defects that may exist in other parts of the building. We have not inspected woodwork or other parts of the structure which are covered, unexposed or inaccessible and we are therefore unable to report that any such part of the property is free from defect or in the event that such part of the property is not free from defect it will not contaminate and/or affect any other part of the property. Any design work carried out in conjunction with this report has taken account of available pre-construction or construction phase information to assist in the management of health and safety risks. The sample remedial details and other recommendations in this report are included to advise and inform the design team appointed by the client. The contents of this report do not imply the adoption of the role of Principal Designer by H+R for the purposes of the Construction Design and Management (CDM) Regulations 2015. No formal investigation of moisture distribution was made

2 STAFF ON SITE AND CONTACTS

2.1 H+R STAFF ON SITE

Andrew Ellis

2.2 PERSONNEL CONTACTED

Russell Higson – Od Projects
Simon Wilcox- Locker & Riley

3 OBSERVATIONS AND *RECOMMENDATIONS*

3.1 INTRODUCTION TO TIMBER CEILING STRUCTURES CONDITION INVESTIGATION

This investigation was only interested in areas previously identified within *146-89, Site Note 7- Damp Condition Investigation* as being subject to moisture penetration and vulnerable to damp and decay issues as a result of the firefighting efforts of the 6 January 2020 fire. Broadly, this may be summarised as all structures beneath the fire damaged dome roof to the west facing onto Camden Hight Street, the main auditorium and the north and south areas of the main auditorium

Regrettably, due to the recent identification of significant asbestos containing materials (ACMs) within vulnerable damp areas, as well as areas still deemed unsafe post the January 2020 fire, not all intended areas were safely accessible for inspection. These areas have been marked clearly on the Plans at Attachment B and are pending further investigation when safe access is made available. However, assumptions have been made upon the condition and construction of these areas based upon the evidence gained from safely accessible adjacent and similarly constructed areas. Broadly, this may be summarised as the second, first and ground floor balcony structures where ACMs were identified within the floor/ceiling voids. The Basement and lower basement were not accessible for investigation

Following completion of the pending investigatory works to the inaccessible areas, fuller and more concise remedial recommendations may be generated, however our initial findings are conclusive evidence that significant moisture entrapment, as well as issues relating to interstitial condensation and an inadequate airflow is widespread within vulnerable historic ceiling voids. This has already led to the presence of significant surface mould growth and spores in areas, which left unchecked will lead to further and more damaging/significant damp and decay issues and widescale deterioration of decorative moulded plaster ceilings beneath

Actions required to facilitate investigation of inaccessible areas:

1 *Asbestos containing materials: Health and safety requirements necessitate that zones containing hazardous levels of asbestos containing materials be cleared and certified full in accordance with the Control of Asbestos Regulations before further intrusive works may commence to these areas. This may necessitate the removal of all compromised timber elements that can not be effectively 'cleaned' of ACM particles. Specialists asbestos consultants to comment*

2 *Areas currently inaccessible due to structural works relating to fire damaged issues, such as the second-floor balcony RM.2-15 should be made available for investigation by H+R when suitable and safe access is achievable*

3.2 TIMBER CONDITION

3.2.1 Recent water penetration providing the conditions for decay

Representative and vulnerable timber bearing ends and central spans were deep drilled and moisture probed to ascertain the presence of decay and the relative moisture content of specific timber elements. Other than at the north-west stair landing staircase at second floor level, No active decay was detected, however, in general timbers (such as the wall /ceiling plates and embedded ceiling joist ends) in contact with masonry structures showed highly elevated surface and superficial moisture content readings of up to 30 per cent and raised deep moisture contents of between 16-18 per cent in places. This supports the findings from *146-89, Site Note 7- Damp Condition Investigation* in that a proportion of the masonry structural elements are acting as moisture 'reservoirs' and creating the correct conditions for damp and decay to vulnerable timber elements. However, these recorded high moisture contents, combined with the current evident lack in active decay organisms suggests that recent and potentially chronic levels of moisture which had been allowed to

penetrate the building's fabric during recent firefighting efforts to combat the blaze to the west domed roof structure, was the primary cause of the adverse findings

If left unchecked, such sudden and overwhelming water penetration to the property is highly likely to create significant latent building defects as the retained moisture within the masonry masses progressively migrates, gaining access to vulnerable timber elements, creating the conditions for damp and decay

3.2.2 Timber decay

1 General: There was little to no evidence of historic or current widespread fungal decay and insect infestation affecting timber ceiling structures. However, there was evidence of what appeared to be both historic and potentially active dry rot fungus (*Serpula lacrymans*) affecting the north-west second floor staircase area. This included the north masonry wall and elements of the north bearing ends of ceiling structures where they meet this wall. Although decayed plaster appeared largely historic within this area, the dry rot infection may become 'reactivated' with the recent and substantial amount of water that has penetrated the property

2 Access: Not all the available ceiling timbers were inspected in detail at the time of investigation. Previous repairs to ceiling timbers were noted, these were commonly made as alterations, repairs or in addition to the original timbers to support ceiling elements beneath

3 Dry rot: Dry rot *(Serpula lacrymans*) is a geophilic fungus that lives in damp masonry subject to chronic water penetration, and decays softwood timber elements built in contact with or in close proximity to the infected masonry. Dry rot mycelium can also grow behind impermeable surfaces, such as polythene or linoleum flooring and into unventilated building voids with high relative humidity's. Dry rot infection can persist in infected masonry for many decades or even centuries, and will spread or die back depending on the environmental conditions. When stressed, the fungus produces 'fruiting bodies' and many millions of fine light brown spores which spread to new locations through the atmosphere. However, very few spores ever germinate and grow to result in further infection. Dry rot in buildings is therefore almost always found associated with chronic problems of water penetration from defective roof drainage; but may persist or spread locally due to water penetration from other sources; such as floods, firefighting efforts, defective ground and surface drainage, failure of damp-proofing and plumbing leaks. Problems with dry rot are therefore often found 12 to 24 months after refurbishment of previously infected structures, even when 'chemical remedial or preservative treatments' have been undertaken; sometimes as a result of remobilisation by renewed water penetration during works and inadequate provision for ventilation and drying of affected structures

No chemical remedial timber treatments or wall irrigations are required. All timber elements in areas subject to chronic water penetration and/or indicated as infected by dry rot (Serpula lacrymans) as shown on plans at Attachment A. All practical measures should be taken to maintain the external envelope so as to minimise further water penetration into the structure, during and after the refurbishment. This should include repair and re-detailing of external masonry and the rainwater drainage system. In particular allowance should be made for access and inspection to the enclosed and inaccessible lightwell to the east of the suspected dry rot affected area for masonry and rainwater goods condition investigation. Remedial measures should be subject to detailed investigations. Provisionally allow for specific decayed/vulnerable timber elements to be repaired/replaced and re-supported in isolation from damp affected and/or dry rot infected masonry using a damp-proof material, to a detail approved by H+R

3.2.3 Wood boring beetle

There was minimal evidence of wood boring beetle damage to structural ceiling timbers. However, from limited initial access 'common furniture beetle/woodworm' (*Anobium punctatum*) was identified within limited historic timbers in contact with damp masonry. In the view of H+R, beetle damage in itself was unlikely to be ongoing to any significant degree and was unlikely to be structurally significant. However, should timbers and timber surfaces be allowed to remain damp (See 3.2.1 above) the likelihood of increased wood boring insect activity is probable, especially to remaining vulnerable sapwood bands

No chemical remedial timber treatments are required or necessary. Allowance should be made for superficially wet timbers and timbers conducive to insect attack to be dried-out in order to holistically create an environment which may not support wood boring insect activity. Additionally, upon further exposure work during the planned refurbishment, and subject to approval of the Conservation Team, timbers with significant proportions of remaining vulnerable sapwood bands should be cut out and replaced with heartwood only variants. All newly inserted timbers should be of external grade pre-treated stock in order to withstand moderate wood boring insect attack

3.2.4 Hazardous mould growth within ceiling voids

1 Surface mould growth was found to be widespread within both historic and non-historic ceiling voids investigated. In general mould growth and mould spores were predominantly judged to be superficial. Affecting only the timbers vulnerable surfaces. However high concentrations of these mould spores may cause allergic reactions upon exposure to sensitive individuals and lead to long term health issues. The type of available mould was not verified at the time of investigation. However, should black mould or *Stachybotrys* be present, it can produce mycotoxins - A toxic chemical compound which may cause a wide range of symptoms upon exposure from asthma to neurotoxicity

2 Mould growth and mould spores within ceiling voids are likely being caused by the effect of trapped or retained moisture within the concealed timber elements and/or from interstitial condensation build-up as a result of 'thermal inertia' between the moist trapped air within the ceiling void meeting the relatively cold clinker concrete floor slab above. This then condenses leading to a moisture sink within the building's fabric and a high potential of condensation and potentially hazardous mould growth

No chemical remedial timber treatments are required. Timbers subject to surface mould growth and active mould spores should be tested for the type and toxicity of mould to ascertain potential health hazard and a suitable response/remedial action. H+R can conduct such tests if instructed to do so

Cleaning of mould surfaces: Prior to the introduction of increased ventilation, mould affected surfaces should be scrubbed with a dilute solution of sodium hypochlorite or household bleach at 1:4 parts. Using a soft brush, the mould should be scrubbed until it disappears. After scrubbing the surfaces, allow the bleach solution to continue to penetrate the surfaces and dry. For particularly badly affected areas perform this action twice with the surfaces being hoovered between bleach applications. Those undertaking this task should be provided with appropriate respiratory protection, eye protection, gloves and protective clothing. Consideration should be given to undertaking these works while the building is effectively 'mothballed' during the current Covid 19 crisis

NB: Ceiling voids vulnerable to damp and with evidence of surface mould growth cannot be safely ventilated until cleaned. Although air flow across the damp affected areas will undoubtably have the positive effect of drying down structures and reduce further risk of decay, the possible negative health implications of those working and occupying areas where the mould spores would be mobilised towards does not

warrant the benefit

3.2.5 Asbestos hazard affecting ceiling voids and structures

Asbestos sheet boarding was identified within floor structures. Particularly to suspended timber balcony floor structures at ground and first floor level. The asbestos sheeting had been previously laid as a fire prevention method between the floor joists and the tongue and groove floorboards. This would have inadvertently allowed loose and damaged asbestos particles and debris to settle at the bottom of the void and upon plaster and timber ceiling elements. Furthermore, it is highly probable that all timber elements used as fixing timbers for ACMs will have had their surfaces punctuated by asbestos particles by the nail and screw fixings

These structures should not be subject to inspection, remedial works or increased ventilation/air flow until the relevant specialists have certified the voids as clean. Timbers judged to be too heavily contaminated or compromised by the penetrating of ACM particles into their sections by nail and screw fixings are likely to be beyond reasonable and practical cleaning. In such instances and under the direction of the Conservation Team and the specialist cleaning contractors, consideration should be given to the removal of all hazardous materials impracticable for deep cleaning

Once hazardous materials (including timbers impractical for cleaning) have been removed and voids suitably cleaned of asbestos and mould contaminants, consideration should be given to the opened voids and cavities being sprayed with hydraulic limewash to stabilise all remaining dust and hazardous loose material. This will also have the added advantage of encapsulating all remaining mould and effectively killing it, lime wash being an effective biocide. Note that the hydraulic limewash recipe should not include caseins or tallow as these are known to feed moulds

It should be noted that, although the ACMs within floor and ceiling voids are an historic and encapsulated issue, the widespread mould growth to timbers trapped within these voids has come about as a result of sudden and mass moisture penetration to structures as a result of the 6 January 2020 fire. If left unchecked, the damp and mould affected timbers will likely lead to significant decay issues. Ventilation to these voids is vital to check the damp issues and safeguard the remaining building fabric. However, these voids cannot be safely ventilated until suitably cleaned of mould and asbestos contaminants

3.2.6 Ventilation and drying

As mentioned in *146-89, Site Note 7; v*entilation and drying within the general structure subject to water penetration before, during and after the recent fire had dramatically improved since H+Rs initial site visits; especially with the ‘soft strip’ and conservation enabling works undertaken to date. In particular, through and cross ventilation with external air via window openings and openings formed for construction works adjacent to the original fabric was allowing through ventilation in conjunction with the ‘passive stack effect’ of air rising up through the building, through adventitious gaps in the provision for temporary roofing

However, relative humidity, temperature and dew point was measured in representative ceiling voids, and surface temperatures were measured with a thermal camera. These tests revealed evidence of condensation at the time of survey (see 3.2.4(2) above), however partial vapour pressures differentials between the existing fabric and the ambient air was deemed sufficient to allow drying, albeit at a moderate pace. This positive drying

balance is likely to continue through April and/or May. However, the increased moisture content of warmer external air in the summer months was likely to reverse this process, resulting in condensation and preventing further drying in the absence of the introduction of accelerated drying measures. However as discussed previously, increased ventilation and

drying would also eventually result in potentially irritant or hazardous materials in becoming part of ‘airborne dust’; where they may represent an increasing and significant health hazard to those entering the building before, during and after refurbishment (see 3.2.4 and 3.2.5 above)

1 *Background ventilation: Through and cross ventilation should be provided to all areas and building voids as soon as possible, so as to minimise the risk of further condensation and mould growth, and so as to facilitate drying. However, potentially contaminated debris must be removed before further ventilation measures are taken, as described at 3.2.5 above*

2 *Mechanical ventilation: Preparation should be made for providing mechanical ventilation to poorly ventilated ceiling voids where it is not possible to provide through and cross ventilation by opening windows and the ‘passive stack vent effect’ up through the building. H+R can advise further if required*

3 *Conservation and remedial exposure: All building ceiling voids should be opened as part of conservation enabling works, so as to provide through and cross ventilation as described at 1 above and to protect as much historic building fabric as possible. In particular vulnerable decorative moulded plaster elements. This may be done by carefully recording, cutting open and setting aside continuous vent gaps at or close to the cornice/soffit juncture and nearest to damp affected masonry walls, to all suspended ceilings and suspended ceiling voids through the non-decorative and more easily repaired ceiling plaster. Care should be taken to not cut or damage the existing ceiling joist elements during this process. Continuous vent gaps should always have corresponding and opposing vent gaps for the effective movement of air. Alternatively, continuous ventilation slots may be formed at the top of lath and plaster or dry lined voids, so as to allow through ventilation and drying. H+R can advise further if required*

4 *Ventilation to ceiling structures from above at sub-floor voids: Should minimal remedial works be desired to historic plaster elements, provision should be made for through and cross ventilation to all accessible ceiling voids from suspended timber floors above; This may be done by lifting floorboards adjacent to the walls on either side of each area of suspended floor; H+R can advise further if required*

5 *Monitoring: The residual moisture content of ceiling structures subject to water penetration before, during and after the recent fire should be monitored, so as to ensure adequate drying measures are applied to allow completion and refurbishment of decorative plaster finishes to time and budget; and so as to minimise the risk of moisture or salt related problems to timber and plaster elements during and after the latent defect period*

6 *Accelerated drying: Preparation should be made for the installation of specialist accelerated drying measures during summer and autumn months of 2020. These will require a dedicated power supply which may be provided with 3 phase electricity mains, or with dedicated silenced diesel powered generators, and are likely to include the use of 110V electrical radiant heaters, and desiccant dehumidifiers with warm dried air ducted into the voids behind dry linings around damp affected structures. H+R can advise further when required*

7 *Long term drying: Provision should be made for the isolation of vulnerable materials from original fabric with high residual moisture and/or hygroscopic salt content, and for provision of continued through ventilation to the building voids during and after the latent defect period. This may be done by making provision for ‘trickle ventilation’ and ventilation gaps on reinstatement of existing and new claddings; taking due regard to current Building Regulations with regard to fire and sound barriers. H+R can advise further when required*

3.2.7 Corrosion affecting historic fixings

1 Corrosion to steel fixings: It was noted at the time of investigation that continuous ceiling plate timbers, fixed to the clinker ash solid floor structures above and supporting suspended timber and plaster ceiling structures beneath were particularly vulnerable to damp and decay issues. In particular the steel fixings, usually at ~600mm centres, were visibly corroded and blue ferrous staining to the surrounding timber prevalent, suggestive of prolonged historic corrosion and potential weakening of the fixings grounding. With the sudden increase in trapped moisture within the property, it is highly probable that retained and migrating moisture, as well as the build-up of interstitial condensation within the ceiling voids will degrade the already evident corrosion leading to eventual possible failure of the structural ceiling plates

The corrosion state and structural adequacy of existing steel fixings within ceiling plate structures should be determined by H+R, Structural Engineer and the specialist Plaster restorers. Allowance should be made for repair or replacement as directed by the Structural Engineer, and for provision of 'cathodic protection' as necessary, so as to minimise further corrosion during and after refurbishment. In addition to this, H+R recommend that should the ceiling plate timbers subject to fixings corrosion be deemed retainable upon refurbishment, additional non-corrosive fixings be introduced to provide adequate structural adhesion should the existing historic fixings fail

3.2.8 Pigeon and site hygiene

The site and within some floor and ceiling voids remained contaminated with areas of heavy contamination by feral pigeon faeces. These represent a potential health hazard to those entering the building/voids before, during and after refurbishment; and restricted access for inspection, maintenance and refurbishment

Pigeon faeces: All pigeon faeces should be removed as soon as practical. Those undertaking this task should be provided with appropriate respiratory protection, eye protection, gloves and protective clothing; and pigeon faeces and contaminated materials should be disposed fully in accordance with the requirements of the local authority. Consideration should be given to undertaking these works in conjunction with the removal of asbestos containing materials, as described at 1 above

3.2.9 Retention of historic fabric

It was understood by the H+R site team, that during the April investigatory works, substantial areas of historic decorative lath and plaster ceiling elements were deemed 'beyond reasonable retention'. In particular to areas RM.1-14, RM.1-12, RM.G-11 and to the western bay of the main auditorium roof RM.3-09. As discussed within this report, the majority of these areas featured significant damp and mould issues which, though salvageable, require specific and time consuming/costly remedial action for their effective safeguarding. Additionally, consideration should be given to the likelihood of accidental and inherent wear/damage to these remaining timber elements upon the 'strip-out' of the unsalvageable plaster and lath elements beneath

Subject to approval of the Conservation and Design Team, we recommend the wholesale replacement of timber ceiling elements within these specific areas as the most likely cost effective and practicable option. Not only does this represent the clear advantage of removing potentially decay-vulnerable structural elements, it also provides the Plaster Specialists and Design Team opportunity to introduce improved design specifications (such as the separation of vulnerable timber elements from damp masonry structures via a ventilated air gap or damp proof membrane, increased section sizes and decreased centre spacings of joist and plate elements) and a clean canvas from which to begin again. Although a subjective point, it could be argued that the remaining sound and undamaged

timber ceiling elements, post removal of the unsalvageable plaster and lath, do not in themselves constitute much historic value

3.3 ADDENDUM INVESTIGATION

3.3.1 Summary of findings

1 Decay: No superficial or structural decay was detected at the time of investigation. Typical deep and surface moisture contents were too low to support decay organisms (see 3.3.1(2) below)

2 Moisture contents: Representative and vulnerable timbers were deep drilled and moisture probed to determine their decay state and relative moisture contents. Typically, deep moisture contents were stable/dry at 8-10 per cent which is an average drop of ~5-7 per when compared against the average deep moisture content (DMC) readings recorded during the initial April investigation. In addition to this the typical surface moisture content (SMC) reading was between 14-17 per cent, which although still elevated is below the decay threshold and a ~5-7 per cent drop when compared against the average surface moisture content readings recorded during the initial April investigation. This evidence suggests that the intervening summer months, along with increased ventilation had provided the conditions for passive drying of available structures

3 Ventilation: H+R noted that increased ventilation to the ceiling voids had been provided to room R.M.G-13 via ~27 no. ventilation holes of varying sizes, cut through the unmoulded flat fibrous panels at relatively frequent intervals to provide uniform through ventilation. See Addendum Ground Floor Drawings at Attachment B for locations of existing vented holes. However, discernible vulnerable areas of historic plaster ceilings were noted as being still without ventilation house. In particular, at the north and east perimeters of the room where cold air is likely to be collecting. Furthermore, it appeared that there had been no formal provision for ventilated air-holes to be cut into the flat panels to room R.M.G-17

4 Mould growth: Surface mould growth was assessed within the ceiling void and compared to previous findings during the April investigation. In general, it appeared that surface mould growth had not worsened in the intervening months, however the airborne spores still represent a possible major health hazard to those occupying and sharing the associated airspace

5 Debris within ceiling voids: A large amount of debris was noted at the south-east corner of the ceiling void. Similar deposits of debris may exist to other currently inaccessible areas of the ceiling voids. It was judged that the collected debris was effectively retaining moisture within the vulnerable timber and fibrous plaster elements and slowing down the process of drying

6 Corroded fixings; representative cut nail fixings between 50-75mm were salvaged from available timber plate structures fixed to the clinker ash concrete floor structures above. Sample nails were found to be subject to heavy corrosion and were judged to be reaching the ends of their service lives

3.3.2 Recommendations

1 *Decay: No action required currently*

2 *Moisture contents: Deep and surface moisture contents should continue to be monitored to assess drying down of structure, particularly during the coming winter months and periods of low temperatures and higher rainfall less conducive to natural ventilation and drying. Mechanical ventilation may be required to assist during these periods*

3 *Ventilation: Allowance should be made for an additional ~10 ventilation holes to be cut into the flat panel areas to room R.M.G-13 to assist in additional effective through passive ventilation of the ceiling void. Allowance should also be made for more extensive ventilation holes to be cut into room R.M.G-17 to increase ventilation to the ceiling void at say 16 no. locations. Care should be taken to not damage or cut away decorative moulded plaster detailing during openings. See Addendum Ground Floor Drawings at Attachment B for recommended areas of additional openings*

4 *Mould growth: No chemical remedial timber treatments are required. Timbers subject to surface mould growth and active mould spores should be tested for the type and toxicity of mould to ascertain potential health hazard and a suitable response/remedial action. H+R can conduct such tests if instructed to do so. See 3.2.4(2) above for advice on how to effectively clean mould effected timbers*

5 *Debris within ceiling voids: Allowance should be made for complete removal of all moisture retaining debris within the accessible roof voids. Those doing this work should wear appropriate PPE for the task*

6 *Corroded fixings; An effective plan for reinforcing the current provision for fixings between the ceiling plates and the clinker concrete slab above should be implemented. This may provisionally include increased access to the perimeter plates via removal of the non-decorative external perimeter rectangular panels. This should allow sufficient space into the void to add supplementary fixings at say ~400mm centres*

4 H+R WORK ON SITE

4.1 H+R made a limited initial visual inspection of the structure for defects liable to allow water penetration before and after refurbishment

4.2 H+R took samples from representative masonry masses, so as to determine their gravimetric and hygroscopic moisture content

5 PROPOSED ACTION BY H+R

5.1 H+R will return to site to investigate the timber structures for damp and decay when access is available

5.2 H+R will return to site to make further investigations to determine the extent of residual moisture and salts within the existing fabric

5.3 H+R will return to site to monitor progress of natural and accelerated drying when instructed

5.4 H+R will investigate and advise further on the chemical composition of original clinker ash concrete, and its effect on the structural adequacy of concrete matrix and corrosion to reinforcements in conjunction with the Structural Engineer, when instructed

5.5 H+R will advise on repair and conservation of timber elements, so as to minimise the risk of decay after refurbishment if instructed

5.6 H+R will advise on remedial detailing, so as to minimise the risk of damp and decay problems after refurbishment if instructed

5.7 H+R will advise on conservation of original fabric with regard to damp, decay and salt damage, as necessary and if instructed

5.8 H+R will review proposed remedial details as these become available if instructed

5.9 H+R will return to site to inspect sample remedial details if instructed

5.10 H+R will liaise with conservation and historic building authorities, if instructed, so as to ensure the cost-effective conservation of original fabric

5.11 H+R will advise further on cost effective accelerated drying and forced ventilation when required and when instructed

5.12 H+R will advise further on pigeon control measures if required and when instructed

5.13 H+R will liaise with loss adjustors and/or insurers if required when instructed

6 INFORMATION REQUIRED BY H+R

6.1 H+R should be advised when access is available for further site investigations as described at 5 above

6.2 H+R require up-to-date copies of project programmes, as these become available

6.3 H+R require copies of up-to-date lists of project personnel and contact lists as these become available

6.4 H+R require copies of proposed remedial details for comment as these become available

6.5 H+R should be informed as a matter of urgency if further significant water penetration occurs onto site; so that advice can be given on cost-effective remedial measures, to minimise the risk of cost or programme overruns and so as to minimise the risk of damp or decay problems during the latent defect period

7 ADMINISTRATION REQUIREMENTS

7.1 H+R require formal instructions for further investigations and consultancy on this project

7.2 H+R require confirmation of distribution of digital and printed copies of reports and site notes

Attachment A

Fig 1:

Timber condition investigation; showing ceiling void at south-east corner of Room RMG13. Note historic ceiling timbers supporting plaster and lath ceiling structures subject to surface mould growth. However, surface mould growth does not appear to have worsened considerably since previous site visit at '14 April 2020'. See Fig. 2 beneath from previous site investigation

Fig 2:

Timber condition investigation; showing identical areas as depicted in Fig.1. taken approximately ~4 months previously. Note localised mould contamination/growth unchanged

The Hope Project, KOKO
Photographs
05 August 2020
Not to scale

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Fig 3:

Timber condition investigation; showing detail of timber plate supporting historic lath and plaster ceiling. Note localised damage to concrete clinker floor structures above have revealed depth and condition of cut nail fixings

Fig 4:

Timber condition investigation; showing void looking north. Note structures appear to be visibly dry and mould activity lessening

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Photographs
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Fig 5:

Timber condition investigation; showing significant amount of debris still within ceiling void which is helping to trap moisture and prevent drying out of structure

Fig 6:

Timber condition investigation; showing typical surface moisture contents elevated at 18%. However, significantly drier than previous surface moisture contents at 21-22% and above. Structures apparently are drying out

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Fig 7:

Timber condition investigation; showing surface moisture content of vertical timber batten supporting historic decorative plaster ceiling with surface moisture content at 17-18%, which although elevated, is too low to support active decay organisms

Fig 8:

Timber condition investigation; showing horizontal plate supporting decorative plaster and lath ceiling running parallel with central spine RSJ

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Fig 9:

Timber condition investigation; showing wall plate supporting external perimeter of ceiling structures with elevated surface moisture content at 16.5%, which was too low to support decay organisms

Fig 10:

Timber condition investigation; showing ceiling void subject to what appears to be no longer active surface mould growth during recent summer months and a period of drying out

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Fig 11:

Timber condition investigation; showing failed timber connection between vertical and horizontal members possibly due to the increased weight of plaster during periods of saturation post firefighting efforts. Timber connection requires strengthening/making good

Fig 12:

Timber condition investigation; showing fairly extensive surface mould growth. However, mould growth deemed relatively in-active and surface and deep moisture contents too low to support further mould growth at the time of investigation

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Fig 13:

Timber condition investigation; showing example of plate fixtures to clinker concrete slab above. Note that plate can be relatively easily removed suggesting typical failure and corrosion of embedded fixings

Fig 14:

Timber condition investigation; showing retrieved embedded fixing subject to fairly extensive corrosion

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Fig 15:

Timber condition investigation; showing retrieved fixing from plate into clinker floor structure above. Note fixing heavily corroded and liable failure

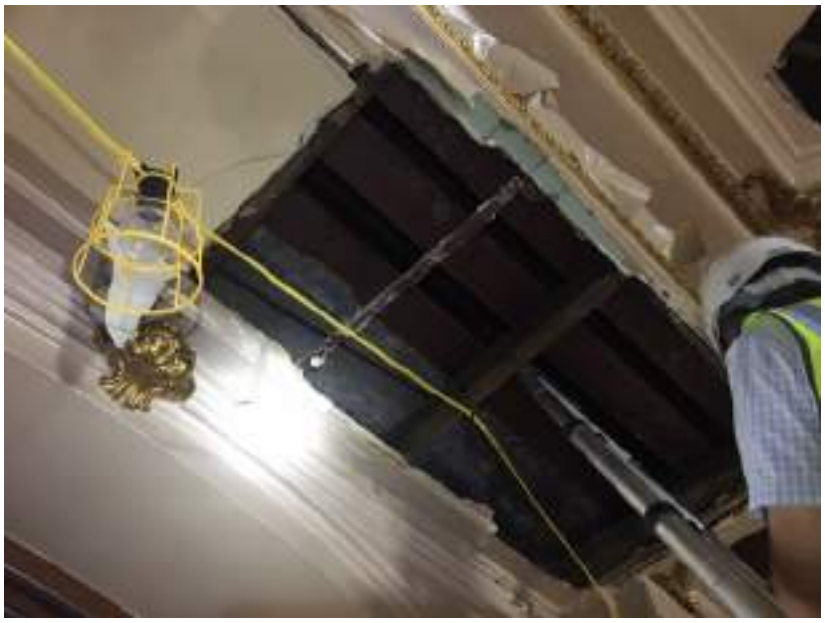

Fig 16:

Timber condition investigation; showing west perimeter wall of Room RMG13 supported via 3 no. north/south RSJ structures which in turn support west perimeter decorative plaster and lath ceilings

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Fig 17:

Timber condition investigation; showing typical area of exposure to ceiling voids for increased ventilation and drying out

Fig 18:

Timber condition investigation; showing room in general looking north. Note previous efforts at exposure to blank panel areas to avoid damage to decorative areas. However, multiple areas remain which still require opening to aid in additional through ventilation of ceiling voids

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Fig 19:

Timber condition investigation; showing complete separation of previous inappropriate film forming paints

Fig 20:

Timber condition investigation; showing surface moisture content of ceiling plate at central south area at 16%. Note visibly corroded nail heads

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