Appendix 1
Damp Investigation Report
for information purposes only

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DAMP INVESTIGATION

113 ALBERT STREET, LONDON

JOB NO. 148.30

ARISTEIA LTD

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CONTENTS

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1 INTRODUCTION

1.1 AUTHORITY AND REFERENCE

Hutton+Rostron Environmental Investigations Limited carried out a damp investigation at 113 Albert Street on 26 February 2018 in accordance with instructions received from Bree Oliver Moss by email dated 8 February 2018 at 09:10 on behalf of Aristeia Ltd. Reference was made to drawings supplied by Aristeia for the identification of structures. For the purpose of orientation in this report, the front of the property, facing onto Albert Street, was taken as facing east

1.2 AIM

The aim of this investigation was to identify damp and decay problems or relevant building defects and to give recommendations on any remedial works required to correct such problems and prevent damp or decay problems in the future using environmental means

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 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, except as described in this report

2 EXECUTIVE SUMMARY

2.1 OBSERVATIONS AND RECOMMENDATIONS

2.1.1 EXTERIORS

1 Risk of water penetration: Open joints around light well cover frames and at the base of the west façade were very likely to have allowed surface water to drain intermittently into the masonry at the base of the west elevation at ground level and into structures on the west side of the lower ground floor. This will have mobilised soluble salts contained within the structure, allowing them to migrate to internal surfaces and cause physical damage and staining to skim plasters and decorative finishes

Open joints and other masonry defects allowing surface water penetration below the terrace paving and into the base of the west wall should be inspected in detail and repaired or replaced in new materials as required. Consideration should be given to reducing the level of the terrace generally and to improving the provision for horizontal damp proofing at the base of the west elevation and around the covered and open light wells serving the lower ground floor

2 External ground levels and drainage: Paving at the base of the west wall a vulnerable to ponding and ground levels were level with floor finishes on the interior. This would have created generally damp conditions at the base of the wall, increasing the risk of timber decay in the floor structures at upper ground floor level, as was observed on the west side of the Boot Room

If the terrace level is to be maintained at its current level improvements to surface drainage will be required, to prevent wind-driven rainwater ponding at the base of the elevation from draining into masonry structures at and below ground level. Works to prevent surface water draining into structures below the terrace coverings will also be required, as described above

3 East (front) elevation: minor defects in render and external timber cladding were allowing surface water to drain into the structure of the east elevation and the access steps to the upper ground floor. There was a risk of timber decay in some external joinery and of damp penetration to the interior, affecting decorative timbers and finishes on the east side of the lower ground floor

Minor repairs are required to open joints and cracks in the façade masonry, to prevent water from draining into the structure. Consideration should be given to replacing some external timber components in decay resistant materials. Effective drainage of the base of the east light well should be maintained at all times

2.2 INTERIORS

2.2.1 Lower ground floor, West Bedroom

Wall and ceiling finishes were subject to widespread staining and deformation, consistent with intermittent condensation and water penetration at high level and from below ground. An unidentified source of water penetration had saturated the core of the west wall to full height close to the north-west corner. The existing provision for damp-proofing remained generally effective in resisting liquid water pressure but further damage arising from the irreversible concentration of chemical salts at the wall surface should be anticipated

A new water-proofing system based on drained cavity wall membranes should be installed on proposed refurbishment, accommodating changes to the structure of the west wall and works to the external terrace and light wells as required. All vulnerable materials should be fully isolated form salt and damp affected structures and the additional source of water penetration in the north-west corner should be investigated

2.2.2 Lower ground floor, East Bedroom

Minor damage had occurred to paint finishes on the east side, at low level and around the door to the external access lobby. These had been caused by damp conditions at the base of the wall where water collected on the floor of the external light well and intermittent condensation. Timber skirting boards at wall/floor junctions were vulnerable to decay

The base of the east wall should be detailed with a ventilated dry lining system, following removal of plaster to expose brickwork. Al timber and hygroscopic materials should be isolated from the wall masonry. Pipework in the external lobby/ boiler area should be tested for escape of water and repairs carried out as required

2.2.3 Upper ground floor, Boot Room

Skirtings, floor boards and shelving on the west side were subject to decay and the moisture content of timber in contact with the wet wall made further decay highly likely. Water draining into the west wall from the terrace on the exterior had damaged plaster and paint finishes at low level

Floor boards should be lifted to allow inspection of the timber floor structure. All decayed timber should be replaced in new materials, isolated for the wall masonry by an air gap or damp-proof material. The base of the west wall should be detailed with a ventilated dry lining system, following removal of plaster to expose brickwork as described above

2.2.4 Ventilation

Some informal ventilation was available around loose fitting doors and window sashes but the permanent provision of natural ventilation of habitable rooms was below the level recommended by current Building Regulations. The Boot Room and laundry area were not provided with mechanical extract ventilation and the extractor fan in the west en-suite shower room was not performing effectively

The provision for passive and mechanical ventilation should be reviewed during proposed refurbishment and remedial works, summarised above and described at Sections 3.1 and 3.2 below, to ensure effective control of airborne moisture and condensation on future occupancy

3 OBSERVATIONS AND RECOMMENDATIONS

3.1 EXTERIORS

3.1.1 East elevation

1 Roof drainage: No facilities for drainage were installed on the east façade. H+R understand that the roof design is a 'London' roof with discharge water draining to the rear

2 Façade: Minor defects, including a vertical crack through the upper ground floor window sill and render below, were allowing surface water to drain into the structure. The extent to which these defects would allow water penetration was mitigated by the sheltered easterly orientation. The upper ground floor was detailed with 'rusticated' render, with a plain textured render to the lower ground floor. Some cracks to the lower ground floor focused on the window reveal had been patch repaired on previous refurbishment, indicating a raised probability of surface water penetration to the loadbearing masonry at low level

Allowance should be made for patch repair in a flexible colour matched sealant to all cracks in the façade render and decorative finishes. Consideration should be given on future planned refurbishment and redecoration to specialist repair to the existing cracks, to reduce the risk of them opening up and admitting wind driven rainwater between normal redecoration cycles

3 Access stairs: The south side of the stair structure had been clad in timber boarding, which showed signs of decay around building services penetrations. This was likely to allow intermittent water penetration to structures behind, providing the conditions for decay in concealed timbers

Allow for piece-in repair of wholesale replacement of decayed timbers and for improvements to waterproof detailing, to prevent surface water from draining into the structure and interior around pipe penetrations and at the upper and lower edges of the timber cladding. Consideration should be given in future refurbishment to replacing the timber cladding in a suitable moisture and decay resistant material

4 Upper ground floor access steps: The steps linking the pavement to the upper ground floor appeared to have been refurbished recently, with bituminous (asphalt) coatings to the treads and risers. These were blistered in isolated locations, indicating trapped moisture within the structure. Minor cracks in the outer faces of the parapets may also be allowing water penetration

Blisters or splits in the bituminous coatings should be repaired on planned refurbishment. Cracks in render at the sides of the steps should be repaired as described at 3.1.1(2) above

5 External joinery: The bases of the door frame to the entrance lobby at lower ground floor level showed signs of decay and previous patch repair. Decorative finishes to upper and lower ground floor windows were in fair condition. The sealants around the

lower ground floor window had peeled away from the window frame at the lower north side, which may allow surface water to drain into structures beneath

Defective sealants should be replaced around window frames and all external joinery should be subject to a programme of effective routine maintenance and redecoration, to maintain a vapour permeable but waterproof 'skin' over all external timber surfaces. Consideration should be given to stripping non-permeable or 'alkyd' paints from external joinery and replacing in a breathable micro-porous paint system on planned future refurbishment. H+R can provide further advice if required

6 External ground levels and drainage: The base of the lightwell had been detailed with a concrete screed and waterproof paint coatings. The upper coat of black paint was subject to progressive wear and failure, exposing further layers beneath and evidence of cracking to the screed, notably around the drainage outlet towards the centre on the west side. This gulley was free of significant obstructions at the time of survey. The junction between the external hard standing and the façade was detailed with a cementitious fillet and falls to the drain appeared adequate to prevent ponding or surface water standing in contact with the structure

No urgent remedial works are required. Effective surface drainage should be maintained at all times and below ground pipework should be routinely inspected and cleaned or repaired as required, so as to direct surface water clear of the structure

3.1.2 West elevation

1 Roof drainage: The 'crown flat' roof and west facing mansard and parapet drained to a central outlet and vertical downpipe with a nominal diameter of 88mm. The downpipe dog-legged around horizontal waste water services above the upper ground floor window head and discharged to the roof of the extension at upper ground floor level. This in turn drained internally to what had previously been a courtyard at lower ground floor level that was now enclosed. No defects associated with intermittent blockage and overflow of the roof drainage system were identified on preliminary inspection from ground level

Allowance should be made for effective routine inspection and maintenance of the provision for roof drainage, to ensure that all water collecting on roof surfaces is discharged clear of the structure at all times

2 Façade: The property had been extended beyond the original elevation across the full width of the west elevation with a brick-built block for sanitary accommodation on the north side and a glazed façade with flat roof and skylight to the south. Exposed brickwork was subject to salt efflorescence at upper ground floor level, immediately below the parapet. Open joints in the concrete parapet copings were likely to be allowing water to drain into the structures beneath, particularly given the significant exposure to rain driven by prevailing winds from the west. Minor patch repairs had been undertaken elsewhere but no significant defects allowing water penetration into the structure were identified

Allowance should be made for patch repair to pointing mortars around the parapet brickwork and copings of the extension roofs. Consideration should be given to lifting the existing copings and for replacement in new masonry slabs, with drip rebates on the undersides of the projecting edges. Copings should be laid over a suitable horizontal damp-proof course

3 External joinery: Timber window frames on the north side were in good condition and appeared to have been installed on construction of the extension, perhaps 10-15 years prior to survey. Glazing on the south side was mounted in aluminium frames. No

defects associated with damp, corrosion or decay were identified

No remedial works are required, beyond normal periodic redecoration of exposed timber joinery

4 External ground levels and drainage: Stone paving abutting the façade did not appear to be laid to significant falls. Approximately 100mm width of paving had been laid to drain away from the threshold of the conservatory glazing where ground levels were approximately 20mm below finished floor level on the interior. The base of the brickwork elevation on the north side had been finished with a cementitious render skirting extending to 250mm above external ground level. Some salt efflorescence was noted on brickwork immediately above the skirting indicating the presence of excess residual moisture in loadbearing brickwork, increasing the risk of damage to decorative finishes on the interior. Pointing around the light well cover, from galvanised metal framing and a loadbearing grating, was damaged, allowing surface water to drain behind the render and tile finishes of the light well below. This will have increased the risk of detachment and progressive failure of the tiles. The north light well was covered by a structural glazed panel set in a steel frame. The base of the 'open' lightwell was also tiled with a central drainage gulley on the south side which was free of significant obstructions at the time of survey

The junction between the external paving and the west elevation should be inspected in detail and modified as required, to effectively exclude surface water and wind driven rain. Damaged joints in paving should also be repaired in a suitable water resistant and flexible mortar mix. If extensive refurbishment works are anticipated consideration should be given to reducing the level of the external paving to between 150mm and 200mm below internal finished floor level and to installing a continuous horizontal damp-proof membrane, laid over a suitable screed or tapered insulation to a minimum fall of 1:60 away from the west elevation. The abutment with the façade should be detailed with a 150mm membrane upstand, with a cover flashing, from sheet lead or other suitable material, chased and sealed into the elevation brickwork. The horizontal membrane should be detailed around the light well openings to drain water passing through the terrace coverings outside the provision for vertical damp-proofing around the light-wells. It may be possible to improve the provision for damp-proofing whilst maintaining the terrace surface at the existing level. This will require careful detailing and improvements to surface drainage, including a liner drain across the base of the west elevation to interrupt surface water that would otherwise drain into the base of the wall. H+R can provide further advice on remedial detailing of required

3.2 INTERIORS

3.2.1 Upper ground floor cloakroom (Boot Room)

1 Defects: Gypsum skim plaster was subject to failure across the full width of the west wall, typically extending to around 0.4m above floor level. Further detachment of skim coat plaster was noted in isolated locations up to 0.6m above floor level. External ground level was approximately 500mm above finished floor level increasing the risk of surface and ground water draining into the structure. Failure of decorative finishes and light brown 'tobacco' staining was consistent with the mobilisation of hygroscopic salts following water penetration from the exterior and intermittent efflorescence and deliquescence of salts driven by natural variations in internal humidity

Works are required to exclude penetrating damp from the exterior as described at 3.1.2 above. All timber components of the suspended floor, shelving, vulnerable finishes and hygroscopic materials should be fully isolated from the wall masonry by installing ventilated dry linings over studded plastic vertical separating membranes, as described below

2 Timber: The skirting board on the west side had bowed away from the wall and showed signs of decay at the centre and north ends. Decay was also noted in the west ends of the floorboards where these were assumed to be in contact with the damp affected structure of the west external wall. The shelf on the north side and the skirting on the south side were also likely to have been affected by damp and were at risk of decay. The indicative moisture contents of areas affected by historic decay were significantly above the decay threshold, indicating that further timber decay was probable. The skirting on the south side was saturated with moisture contents above 40 per cent up to 300mm from the south-west corner of the room. A corresponding section of skirting at the west end of the north dining room wall, on the reverse of the structure, had been replaced on previous refurbishment but the moisture content of this timber at time of survey was below the decay threshold

Allowance should be made for stripping the plaster of the west wall to level of the west window sill following removal of skirtings and other joinery at low level. The exposed area of brickwork should be extended a minimum of 1m from the north-west and south-west corners. Timber floor structure should be subject to detailed inspection and replacement or repair of decayed timber as required. New or retained timber should be fully isolated from masonry by a studded plastic vertical separating membrane, linked to membranes forming the cavity drain system at lower ground floor level; effectively extending the provision for lower ground floor damp-proofing up to around 1.0m above external ground level. The wall membranes should be closed in timber panelling or plasterboard dry lining as directed by the Architect, detailed with continuous ventilation slots at skirtings and 'dado level'. Wall membranes and dry linings should be extended across the exposed areas of brickwork on the north and south sides, to isolate timber and vulnerable materials from damp affected walls that abut the west elevation. Consideration should be given to extending the dry lining to the east to natural breaks in the wall surface, such as the vanity unit on the south side and the return wall adjacent to the WC to the north. This is likely to require adjustments to the central heating radiator on the south side

3 Ventilation: The sash window on the west side was not detailed with through frame trickle vents and the sashes were well fitted and partially draught stripped, reducing the availability of adventitious ventilation. No other provision for permanent ventilation to the exterior had been made and no mechanical extract ventilation was installed as currently required by UK Building Regulations

Consideration should be given to installing permanent ventilation to the exterior in excess of 4,000mm^2 open ventilated area, either by fitting trickle vents through the window frames or by forming a core to the exterior at high level on the west side and fitting a suitable passive ventilator, such as the 'AHT' range from Aereco or similar products from Passivent UK Ltd. Consideration should also be given to installing a mechanical extract ventilator, capable of discharging warm moisture laden air direct to the exterior at a rate of at least 7 litres per second. This should be positioned as far away as is practical from the passive ventilator. Adequate make-up air was available to the cloakroom beneath the door leaf on the east side and this should be maintained. The extract ventilator should be fitted with controls that operate with the room lighting, with the option for a humidistat override and an adjustable overrun period of at least 15 minutes

3.2.2 Lower ground floor, west side

1 Defects: Decorative finishes showed signs of iron oxide staining and 'tobacco' coloured staining associated with hygroscopic salt migration in isolated locations, notably around the suspended ceiling on the north side, the south side of the storeroom door at high level and the base of the French windows giving onto the open light well on the exterior. H+R were informed that more widespread staining and failure of decorative finishes

had been overpainted on recent refurbishment. Soluble hygroscopic salts and other minerals, such as 'free' lime form underpinning and concrete retaining walls, would have been mobilised by water draining into the head of the wall from the terrace on the exterior, through defects in the structure of the west elevation. Water also appeared to have tracked horizontally above ceiling boards, causing staining and failure of paint finishes in locations remote for the west wall/ ceiling junction. H+R understand that works are proposed to reduce internal floor levels and replace floor screeds, possibly incorporating the external light well into the habitable space

Allowance should be made for installation of a fully detailed cavity drain water-proofing system across the west wall, extending a minimum of 1m across the south and north walls, with base drainage channels discharging to gravity invert drainage levels if available or to a suitable sub-floor chamber, equipped with suitable pumps, back-up power supplies and alarms. Proposed reduction of floor levels towards the centre and south sides of the room may facilitate the installation of new floor structures, drainage channels and sumps. The design of the cavity drainage system should accommodate works to the external light well, where existing glazed tiling may require replacement. Door frames to the light well should be removed and reinstated over the cavity drain wall membrane to provide continuity of water-proofing from inside to outside. External ground levels in the light well should be reduced to a minimum of 150mm below finished floor level on the interior with adequate provision made for surface drainage if the light well is kept open to the sky. If the light well is to be enclosed, the cavity drain system should be extended around and beneath the light well wall and floor structures, carefully detailed at the upper edges to integrate with provision for horizontal damp-proofing below the external terrace (see 3.1.2(4) above). All damp-proofing should be designed in accordance with BS 8102:2009. The work should be undertaken by an experienced specialist contractor. The base and skim coat plaster should be removed in the areas to be dry lined. Should wall finishes prove difficult to remove without unacceptable levels of damage to historic fabric, or if the plaster has been applied direct to poured concrete earth retaining structures, dry lining could be installed over the existing wall coatings, which may result in some loss of floor area. The vertical edge of the damp-proofing installation on the north and south sides should be detailed with a cover strip or moulding, to mask shrinkage cracks which are likely to appear between new and old work following refurbishment. Alternatively, the boarding used to enclose the damp-proof membranes could be extended across the full width of the north and south walls, as directed by the Architect. Provisional allowance should be made for modifications to rainwater drainage passing downwards through the structure on the east side and to any provision for ground, waste or soil drainage that may be exposed by reductions in existing floor levels. H+R can provide further advice on remedial detailing or review design proposals when these are available and as required. Materials and fittings provided by the membrane manufacturer should be used throughout. Works should be subject to acceptable warranties of workmanship and materials. See sample remedial details at Appendix D

2 Timber: Decorative finishes had split at junctions in the door frames and between door frames and surrounding masonry in a number of locations, notably on the south side of the door frame to the light well. Moisture contents at low level, in the frames to the French doors to the light well and the door to the storage area on the north side, were in the range 17-19 per cent, providing marginal conditions for decay. No evidence of historic decay was identified. This was consistent with the frames having been effectively isolated from surrounding masonry by damp-proof strips on installation. The skirtings at the wall/floor junctions showed moisture contents in the range 25-40 per cent, indicating a high degree of vulnerability to decay. This was consistent with progressive failure of the previous waterproofing scheme allowing damp penetration behind the skirtings, at the vulnerable junction between the wall and floor render. Interstitial condensation between the skirting and the wall may also have contributed to the raised timber moisture levels that were identified

On refurbishment all door frame and skirting board timbers should be fully isolated from load bearing masonry walls and solid floor structures by continuous ventilated air gaps and plastic packing wedges or continuous strips of a suitable damp-proof material. These may include the vertical membranes installed as part of the cavity drain damp-proofing system dry lining system

3 External lightwell: Glass tile linings showed signs of detachment and deformation on the west side, extending to around 2m above the base of the lightwell at the south-west corner. Isolated areas of detachment, focused at low level, were also found on the north and south sides, with some salt or free lime deposits from previous structural works showing at tile joints. A pathway for water to drain behind the tiling system had been noted at ground level, around the frame of the light well cover

Allowance should be made for removal of the existing tiling and for extension of the cavity drain system described at paragraph 1 above around and below the light well. This may include the installation of any sump or pump arrangement that is required as part of the water-proofing system below the light well floor. The cavity drain membranes could be closed-in with a suitable moisture resistant cementitious board and tiling, with all materials suitable for external use and the range of ambient temperatures likely to be encountered in-service. If the light well is to be included in the internal space on proposed refurbishment, the drained cavity waterproofing system should be closed-in as directed by the Architect. In either case, the upper edges of the light well walls should be detailed so as to integrate the provision for horizontal water-proofing installed below the terrace paving with the lower ground floor damp-proofing installation

4 West storage area and lobby: Render and decorative finishes to the lobby and storeroom were in good condition with defects restricted to rust streaking above the entrance doorway on the east side and deformation of paint finishes by salt efflorescence above the door opening and below the skylight frame. These defects were consistent with damaged to the seals around the skylight allowing surface water to drain beneath and did not indicate a general or progressive failure of the provision for structural waterproofing. Door frames and sills all showed indicative moisture contents below the decay threshold, indicating that they had been adequately isolated from surrounding masonry on installation. No provision had been made for permanent ventilation to the exterior but surface temperatures were comfortably above the dew point at time of inspection and no defects associated with mould growth or condensation were reported to H+R by the occupants. Pale grey staining of the store room ceiling may indicate mould growth in the past which had subsequently been cleaned off

No specific remedial works are required. However, there may be a requirement to undertake works in this area in order for a warranty against water penetration to be provided by the installation contractor for the west bedroom. Provisional allowance should therefore be made for extending the drained cavity waterproofing system described at paragraph 1 above to the storeroom and lobby, or for the replacement of the existing cementitious membrane waterproofing in new materials. This may be required in any event if alterations are made on refurbishment which removed the structure dividing the storeroom lobby from the light well to the south. H+R can provide further advice on remedial detailing or review details provided by the Design Team or Architect as these become available and if required

5 Passive ventilation: No trickle vents were installed through door frames serving the ‘open’ light well and no other provision had been made for permanent ventilation to the exterior. This was likely to have increased the risk of intermittent condensation, which may support cyclical salt efflorescence and deliquescence, and may create the conditions for mould growth under certain circumstances, particularly those associated with intermittent occupancy. Sources of airborne moisture included the ensuite shower

room to the east of the bedroom and the laundry facilities at the base of the stairwell at the centre of the lower ground floor

Consideration should be given to installing through-wall passive ventilators (see 3.1.1(3) above), ducted ceiling vents to the exterior or trickle vents through door leaves or frames, to provide the equivalent of 8,000mm^2 of permanent ventilation to fresh external air

6 Utility area: A sink, washing machine and condenser tumble drier were installed in this location. No provision for mechanical extract ventilation had been made, as would generally be required by UK Building Regulations. The laundry area was open to the upper ground floor via the stairwell which may allow some warm moisture laden air to disperse via the stack effect. Moisture generated in the laundry room may also affect decorative finishes where cold-bridges exist to the exterior on the east side, notably around the external door (see 3.2.3 below)

No urgent remedial works are required, subject to improvements in the provision for passive ventilation to the rooms on the east and west sides. Provisional allowance should be made for future installation of ducted extract ventilation, capable of discharging air to the exterior through the shortest practical length of rigid ductwork at a rate of at least 30 litres per second. This fan should be detailed with an adjustable humidistat control and a timed over-run of up to 2 hours

7 West en-suite shower room: The ceiling mounted extract ventilator in the bathroom discharged at an air speed of approximately 0.4 metres per second, equivalent to an air volume discharge rate of approximately 3 litres per second. This was significantly below the 15 litres per second required by current UK Building Regulations. The extract fan controls were adjusted to allow for the fan to overrun by approximately 1 minute after room lights had been switched off. Current Building Regulations recommend an overrun of at least 15 minutes, to effectively discharge warm moisture laden air to the exterior. The door to the shower room showed a gap approximately 3mm wide at the base, limiting the availability of 'make-up' air for the effective operation of the mechanical extract ventilator. However, no evidence of mould growth was found

The extract ventilator should be serviced or replaced and tested in-situ, to ensure that air is discharged to the exterior at a rate of at least 15 litres per second. The base of the door should be modified to provide a 10mm gap above floor finishes across the full width of the door opening

3.2.3 Lower ground floor, east room

1 Defects: Decorative finishes showed signs of staining and damage to paintwork caused by interstitial efflorescence of hygroscopic salts on the east side, at low level within the window recess and on the south side of the door opening to the lobby and exterior in the north-east corner. Defects were focused on the plaster bead at the corner of the external door reveal, where the risk of surface condensation would have been highest. No provision for heating had been made in the lobby to the exterior, reducing surface temperatures around the door reveal

2 Timber: The moisture content of the skirting board to the south of the external door reveal was approximately 45 per cent, providing conditions for decay. The indicative moisture content of other skirtings at the wall/floor junction on the east side were in the range 17-25 per cent, also creating conditions where decay could occur. Defects were consistent with chronic interstitial condensation between the skirting boards and the wall behind, possibly combined with historic or active water penetration to the base of the structure

Allowance should be made for removal of skirting boards and installation of ventilated dry linings across the full width of the east wall, extending to, say, the height of the internal window sill. A continuous ventilation detail should be provided at the upper and lower edges of the dry lining, using details provided by the Architect, approved by H+R and similar to those shown at Appendix D. On reinstatement all timber and hygroscopic materials should be fully isolated from the structure behind by the studded plastic wall membrane included in the dry lining, a continuous air gap or a continuous strip of a suitable damp-proof material. H+R can advise further on remedial detailing if required

3 Ventilation: No through frame trickle vents had been installed on the east side but sashes were loose fitting in the box sash frames, providing adequate adventitious ventilation for the control of airborne moisture and condensation. Concentrations of hygroscopic salts following water penetration at low level may support intermittent condensation by drawing airborne moisture into the wall surfaces intermittently. Areas of wall at low level or behind furniture, where air movement would have been restricted should be considered the most vulnerable. Further adventitious ventilation was available around the external door at the north-east corner

No urgent remedial works are required. If further defects of condensation or mould growth occur the provision for space heating and natural ventilation should be reviewed and modified as required

3.2.4 Lower ground floor, lobby and boiler space to north-east

1 Defects: Floor finishes showed signs of damp and lining boards were affected by mould growth at low level in the south-east corner. This was consistent with water draining from the exterior into the structure, through defects in the external cladding combined with interstitial and surface condensation, where warm moisture laden air was able to migrate from the occupied spaces to the west, supporting intermittent condensation, mould growth and the cyclical efflorescence and deliquescence of hygroscopic salts. Impermeable paint finishes showed signs of salt damage at low level on the east side and around cold-water supply pipes from below ground to the east, which were reducing surface temperatures locally. Ceiling and wall finishes elsewhere were generally in good condition, indicating control of airborne moisture and condensation by the adventitious ventilation available around the external door and the residual heat supplied by the boiler mounted on the south side

No urgent remedial works are required. Consideration should be given to provision of additional ventilation to the exterior, say, 4,000mm^2 of open ventilated area and to improved provision for space heating, possibly mounting an electric panel heater on the east side, to raise surface temperatures locally. Consideration should also be given to exposing the floor structures in the south-east corner and for improvements to the provision for waterproofing at the wall/floor junctions. Vulnerable floor finishes should be replaced with moisture resistant materials, which may include ceramic tiles or other resilient floor finishes, laid over suitable moisture resistant isolating membranes, as directed by the Architect

3.3 RESIDUAL MOISTURE IN MASONRY

3.3.1 Sampling

A total of 28 No. samples were taken, from the west and east lower ground floor walls. The west wall was assumed to be earth retaining and was sampled at the base (floor +0.3m), mid height (floor +1.2m) and high level (floor +2.1m), in 4 No. representative locations. The east wall was not earth retaining and was sampled at low level only, in 2 No. locations. Pairs of

samples were extracted for the surface and core of the wall in each location, to differentiate between condensation moisture from the interior and penetrating damp from the exterior. Samples were double bagged on site and returned to H+R's laboratory for gravimetric analysis of available and hygroscopic moisture content, following procedures set out in BRE Digest 245. Results are shown on plans at Appendix B and in a table at Appendix C

3.3.2 Results – Available or 'free' moisture

1 West wall: All samples from around the glazed doors to the open light well (Sample Locations 1 and 2) were effectively dry, with the exception of the surface sample from low level on the north side, which had a moisture content of 2.1%; marginally above the 2% threshold below which H+R categorise masonry as dry. A cold bridge was likely to exist at the base of the wall, increasing the risk of condensation locally. At Location 3, on the south side of the door to the store room light well, the low and mid-height samples were also classified as moist (2-5% available moisture content) with a wet (5-8% available moisture content) sample at high level, immediately below the Boot Room floor which had been affected by damp and timber decay. All three deep samples were found to be dry. At Location 4, all three deep samples were classified as saturated, with available moisture contents above 8%. These results suggest that water was actively draining into the structure from above, possible from a plumbing leak at upper ground floor level, a drainage failure on the exterior or from defective plumbing or drainage in the neighbouring property. However, the surface samples the surface samples were either moist or dry, indicating that the existing damp-proofing system had been largely effective in containing the surplus liquid moisture in the structure

2 East wall: Results were variable but indicated problems of surface condensation around the base of the window recess, where the wall thickness was reduced and penetrating damp on the south side of the external lobby door. This may be due to external surface water draining below the lobby floor from the east light well, or escape of water from concealed plumbing

3.3.3 Hygroscopic or 'salt bound' moisture

All 28 No. samples were found to have hygroscopic moisture contents above 2%, a level at which H+R consider there is a significant risk of damage to decorative finishes caused by salt efflorescence and migration, driven by naturally occurring changes in internal temperature and humidity. These defects tend to be exacerbated where the provision for passive and extract ventilation is inadequate for the control of airborne moisture and condensation. Salts contained in the mortar and concrete used to build the load bearing walls and structures will have been concentrated at the inside surface by historic water penetration and cyclical condensation on occupancy. Once concentrations of salts have accumulated the typical yellow brown staining and blistering of paint finishes that were observed on site are highly likely to occur. The pattern of staining will vary as humidity and temperature change and as further water penetration occurs. Salts will tend to move or 'migrate' through the affected materials, generally travelling away for the dampest areas to parts of the structure where drying can take place. Salt concentrations cannot be reversed or removed without also discarding the materials that contain them

Works are required to exclude water penetration and improve ventilation as described elsewhere in this report. Salt affected materials should be discarded or encapsulated behind ventilated dry linings or the vertical membranes included in a cavity drain water-proofing system. All new hygroscopic materials, including cements, gypsum plaster and plasterboard, should be fully isolated from masonry wall and floor structures, to protect them against damage caused by movement of residual moisture and salts into the new materials, as described above and at sections 3.1 and 3.2. H+R can provide further advice on remedial detailing if required

Appendix A

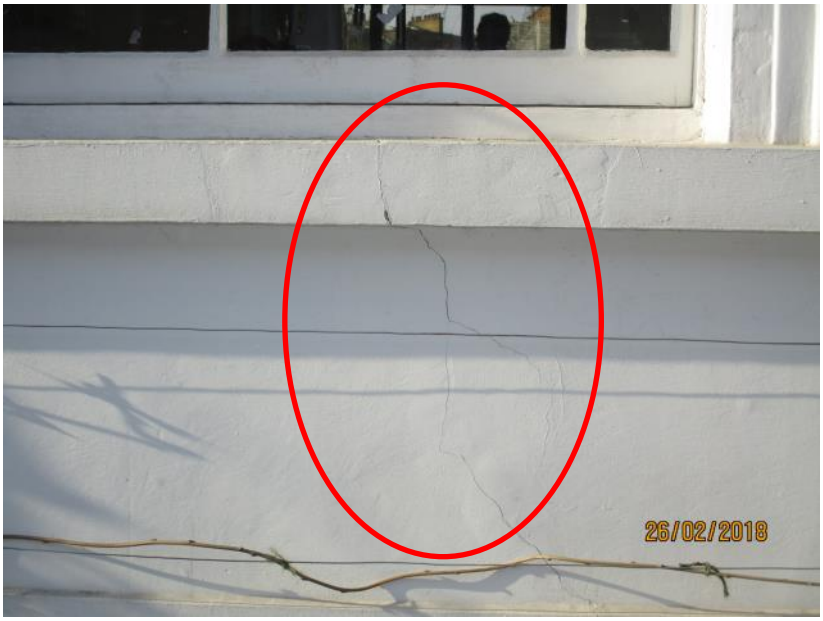

Fig 1:

East elevation, upper ground floor; showing vertical crack through render and decorative finishes, allowing water penetration into the structure

Fig 2:

East elevation, access stairs to upper ground floor; showing blistering to asphalt finishes indicating trapped moisture and a shortened service life

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Fig 3:

East elevation, access stairs to upper ground floor; showing blistering to asphalt finishes indicating trapped moisture and a shortened service life

Fig 4:

East elevation, upper south side of lower ground floor window; showing diagonal crack in render and decorative finishes, increasing the risk of water penetration

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Fig 5:

East elevation, lower ground floor window; showing minor failure of sealants and decorative finishes around the window frame on the north side

Fig 6:

East elevation, lightwell to lower ground floor; showing bituminous paint finishes to concrete hardstanding, laid to fall to a surface drainage gulley on the west side

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Fig 7:

East elevation, lower ground floor; showing minor decay to timber cladding on the south side of the access stair structure

Fig 8:

East elevation, lower ground floor; showing evidence of decay and previous patch repair to the entry door frame on the west side

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Fig 9:

West elevation, extension brickwork at upper ground floor level; showing salt efflorescence below coping stones, where pointing failure was allowing surface water to drain into the structures beneath. Flashings on the reverse may also require attention

Fig 10:

West elevation, base of extension façade on north side; showing cementitious render skirting that was likely to have been encapsulating residual moisture within the structure and allowing surface water to drain behind

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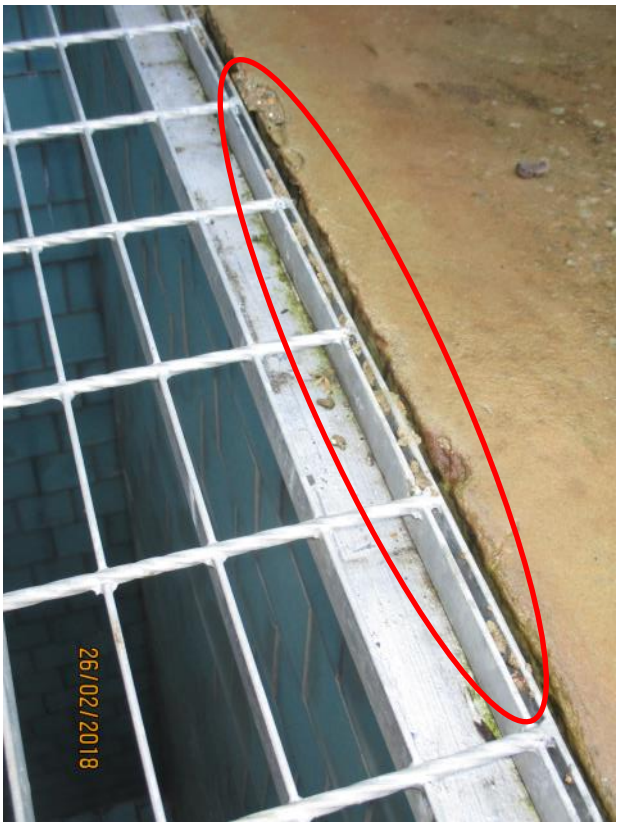

Fig 11:

West elevation, south side; showing failure of pointing between the lightwell cover and surrounding paving, allowing surface water to drain behind render and tiles applied to the lightwell wall beneath

Fig 12:

West elevation; showing stone paving not laid to significant falls or detailed with surface drains which may allow ponding against the base of the façade by rain driven by prevailing winds from the west. Water would then be able to drain into the walls at the base of the west elevation through defects in the external masonry, affecting decorative finishes on the interior

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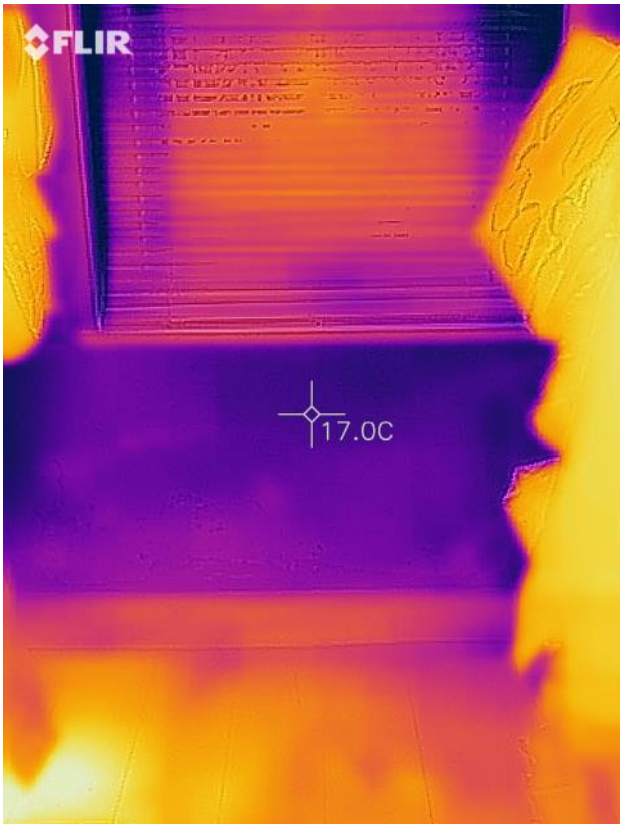

Fig 13:

Thermal image 1, upper ground floor cloakroom, base of wall on west side; showing surface temperatures significantly above dew point at time of inspection

Fig 14:

Upper ground floor cloakroom ('boot room'), west side; showing damage to surface plaster and decorative finishes at low level, consistent with chronic damp penetration from the exterior and intermittent efflorescence and deliquescence of hygroscopic salts

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Fig 15:

Upper ground floor cloakroom ('boot room'), west side; showing decay to the skirting board which had bowed away from the base of the wall and decay to the ends of the floorboards, which were assumed to be in direct contact with the damp affected external wall

Fig 16:

Upper ground floor cloakroom ('boot room'), west side; showing the mycelium of a timber decay organism behind the skirting board which was vulnerable to damp penetration from the exterior and showed signs of historic decay

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Fig 17:

Thermal image, lower ground floor, west bedroom; showing surface temperatures on south side of west wall with minimum 12°C above dew point at the time of inspection

Fig 18:

Thermal image, lower ground floor, west bedroom; showing surfaces on north side of west wall minimum 12°C above dew point at time of inspection

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Fig 19:

Lower ground floor, west bedroom, west side; showing iron oxide staining to plaster beads, consistent with damp conditions in masonry behind and intermittent surface condensation

Fig 20:

Lower ground floor, west bedroom, ceiling towards north-west corner; showing moisture damage around recess light fittings, consistent with water draining over top surface of the ceiling boards, from the west wall

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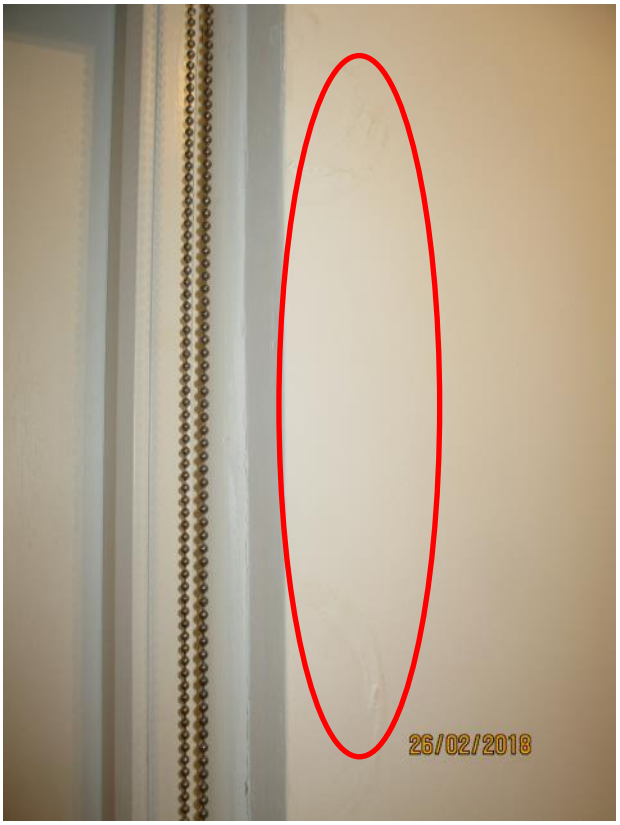

Fig 21:

Lower ground floor, west bedroom, upper north side of doorway to external lightwell; showing deformation of the wall surface, consistent with cyclical efflorescence and deliquescence of hygroscopic salts between the plaster skim and the paint coating. A cold-bridge was likely to exist around the door frame and the structure was vulnerable to damp penetration, where it was earth retaining and where surface water could drain into the structure from above

Fig 22:

Lower ground floor, west bedroom, west side; showing salt efflorescence and corrosion of plaster beads affecting decorative finishes at high level. H+R were informed that more severe damage has been apparent in the past but has been disguised by redecoration

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Fig 23:

Lower ground floor, west bedroom; showing section of skirting at south-west corner with moisture content significantly above the decay threshold

Fig 24:

Lower ground floor, lightwell on west side; showing soluble minerals draining through open joints in the structure, where the glass tiles had become detached

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Fig 25:

Lower ground floor, lightwell, south side; showing soluble minerals on glass tile surface where water drained below ground level through structures behind

Fig 26:

Lower ground floor, west side, lobby to north-west storeroom; showing generally good condition of wall render and decorative finishes

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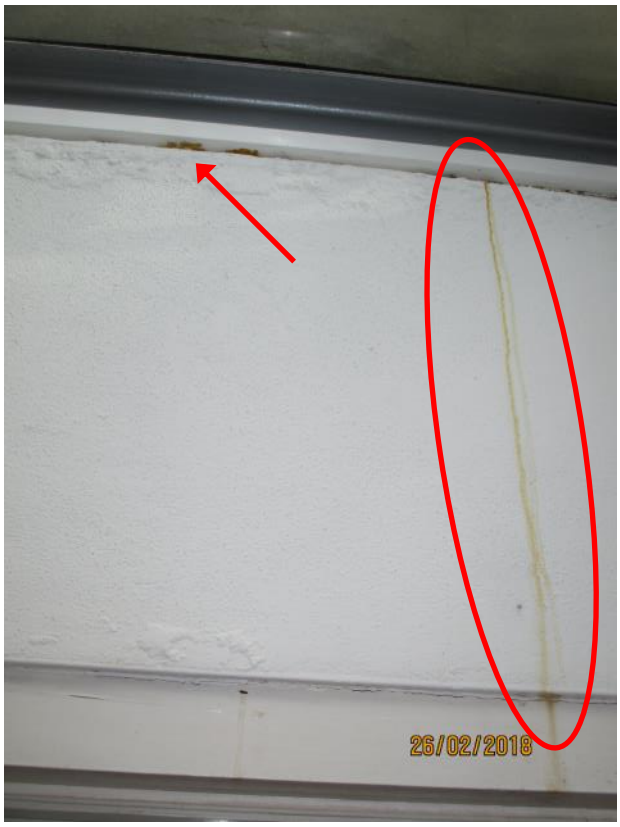

Fig 27:

Lower ground floor, lobby to north-west storeroom; showing isolated surface streaking of water contaminated iron oxide, indicating intermittent water penetration where seals around the skylight above had failed. Note blistered paint finishes at high level, indicating that water from outside was draining into the head of the wall around the skylight glazing

Fig 28:

Lower ground floor, north-west storeroom; showing generally good condition of wall and ceiling render and decorative finishes. The structure may be vulnerable to intermittent condensation but no defects associated with moisture or mould growth were reported to H+R by occupants

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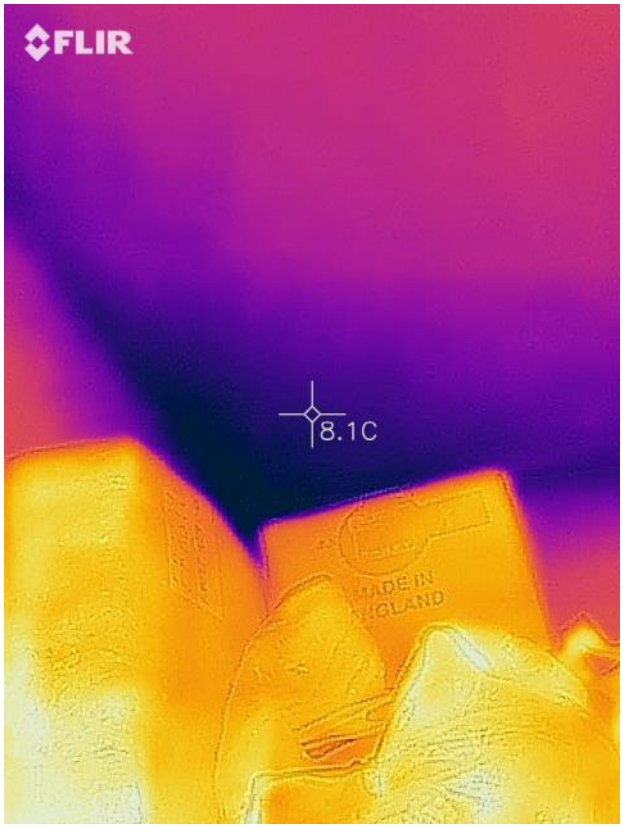

Fig 29:

Thermal image, lower ground floor, west side, south-west corner of north-west storeroom; showing surface temperatures within 4°C of dew point at time of inspection. The conditions for intermittent condensation may arise under specific circumstances including those associated with intermittent occupancy

Fig 30:

Lower ground floor, central area; showing utility room installation at base of stairwell with no provision for mechanical extract ventilation

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Fig 31:

Thermal image, lower ground floor, east room; showing surface temperatures a minimum 6°C above dew point around the doorway to the exterior via an entrance lobby, indicating that the conditions for condensation wee not present at time of survey

Fig 32:

Ground floor, east room, east side; showing damage to decorative finishes consistent with intermittent salt efflorescence adjacent to the external door in the north-east corner

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Fig 33:

Lower ground floor, east room, east side; showing 'tobacco' staining and failure of decorative finishes at the junction between the skirting and the wall, consistent with intermittent condensation at the wall/floor junction. The indicative moisture content of the skirting boards was above the decay threshold, indicating that water was draining into the base of the wall from outside or that cumulative condensation was taking place on the reverse of the skirting board

Fig 34:

Lower ground floor, east room, east side; showing failure of plaster skim and decorative finishes at low level, consistent with active or historic moisture penetration and intermittent surface condensation

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Fig 35:

Lower ground floor, entrance lobby and boiler space; showing evidence of damp affecting wall and floor finishes at low level in the south-east corner

Fig 36:

Lower ground floor, entrance lobby and boiler space to north-east; showing condensation affecting decorative finishes behind cold water supply pipes, where surface temperatures would have been reduced locally by proximity to the pipes

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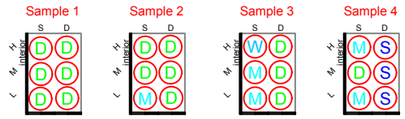
Appendix B



113 Albert Street
Damp Investigation
26 March 2018

Hutton + Rostron Environmental Investigations Ltd
Netley House, Gomshall, Surrey, GU5 9QA Tel: 01483 203221 Fax: 01483 202911
148-30 Report March 2018 -Not to scale-

Key:
- F Photograph location
- F Photograph location over
- 1 Masonry sample location

		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

Appendix C

Table of material moisture contents **Appendix C**

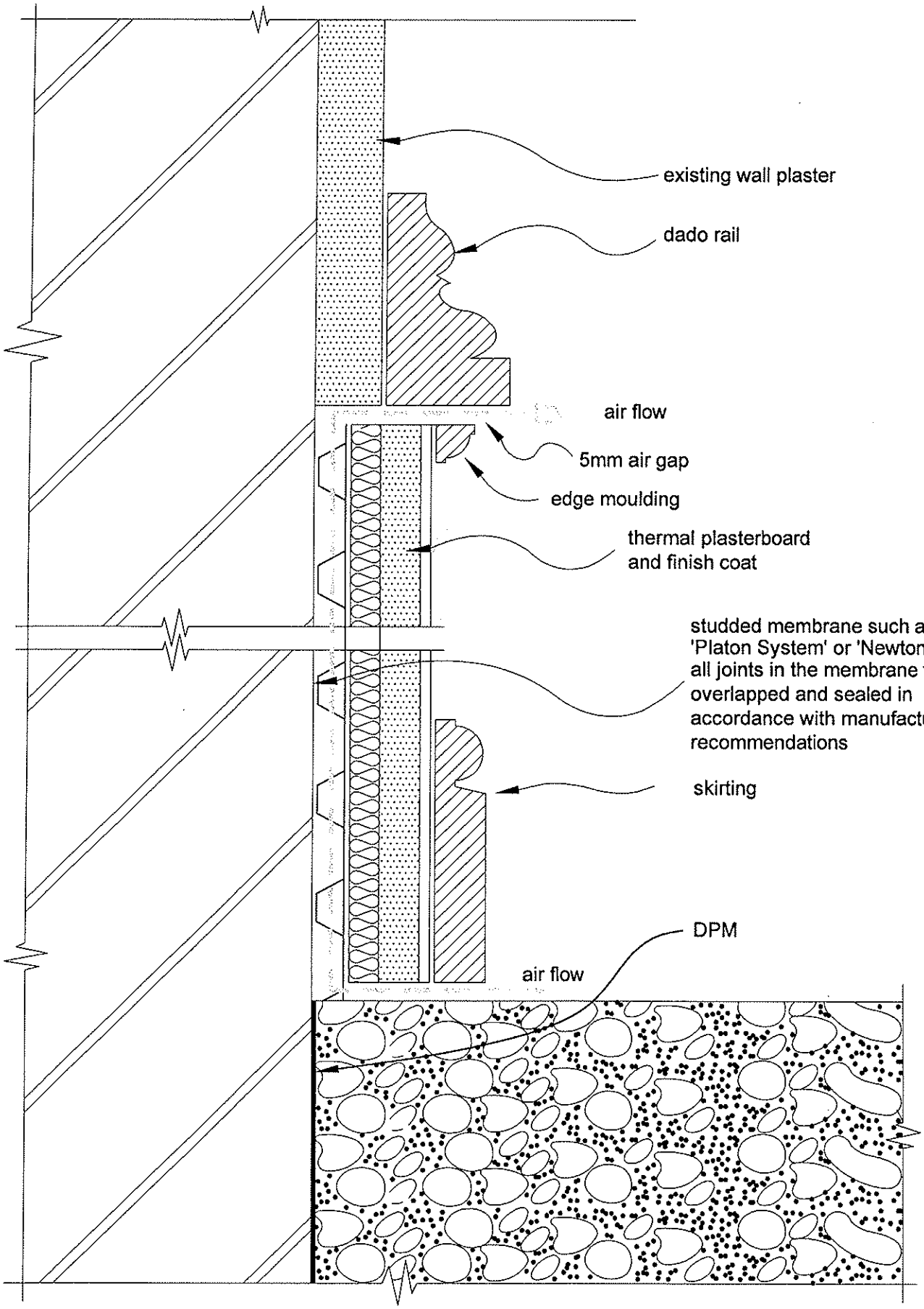
Samples of masonry were drilled from walls in areas vulnerable to damp penetration. The samples were placed in sealed containers and tested at the H+R laboratory in accordance with the procedure for gravimetric measurement of moisture content as described in the appendix to BRE Digest 245

Sample Number/Location	Moisture content % w/w			Hygroscopic moisture content % w/w	Available moisture content % w/w
1/l/s	2.63	D	H	2.46	0.17
1/l/d	3.51	D	H	3.28	0.23
1/m/s	2.65	D	H	2.61	0.04
1/m/d	3.38	D	H	3.48	-0.10
1/h/s	2.85	D	H	2.77	0.08
1/h/d	4.18	D	H	3.85	0.33
2/l/s	4.25	M	H	2.15	2.10
2/l/d	5.88	D	H	5.05	0.83
2/m/s	2.59	D	H	2.61	-0.02
2/m/d	4.96	D	H	5.10	-0.14
2/h/s	3.35	D	H	3.11	0.24
2/h/d	5.02	D	H	4.90	0.12
3/l/s	9.08	M	H	4.98	4.10
3/l/d	5.87	D	H	4.44	1.42
3/m/s	7.57	M	H	4.78	2.79
3/m/d	6.15	D	H	4.88	1.26
3/h/s	12.88	W	H	5.72	7.17
3/h/d	7.77	D	H	5.83	1.94
4/l/s	5.38	M	H	3.24	2.14
4/l/d	23.95	S	H	8.33	15.61
4/m/s	3.85	D	H	2.54	1.31
4/m/d	18.12	S	H	5.64	12.49
4/h/s	5.80	M	H	2.99	2.81

4/h/d	20.10	S	H	7.03	13.07
5/s	5.03	D	H	3.67	1.36
5/d	9.85	W	H	4.08	5.77
6/s	6.87	M	H	4.17	2.70
6/d	2.00	D		1.14	0.86

Hygroscopic moisture is the ‘air dry’ moisture content of the sample at 75 per cent relative humidity. High levels above, say, 3 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, 3 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

Appendix D



Ventilated dry lining

Floor to dado studded membrane detail - section

August 2002

Not to scale

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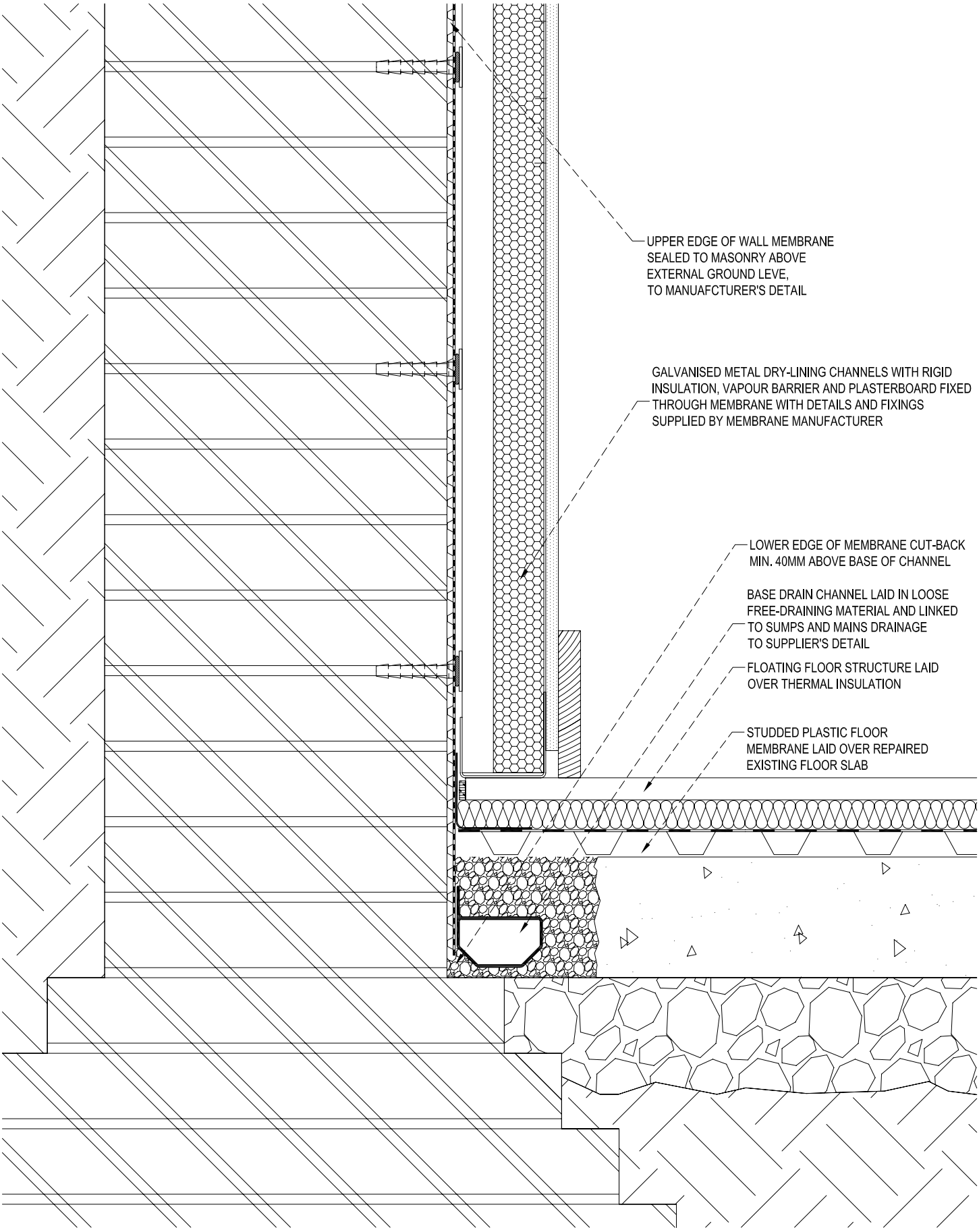
Tel: 01483 203221 Fax: 01483 202911 Standard Details FfoDDryline 0802.dwg



H+R

Drained Cavity System

Basement - Solid Floor (existing) with Dry Lining

Section - May 2008

NOT TO SCALE

SD-23

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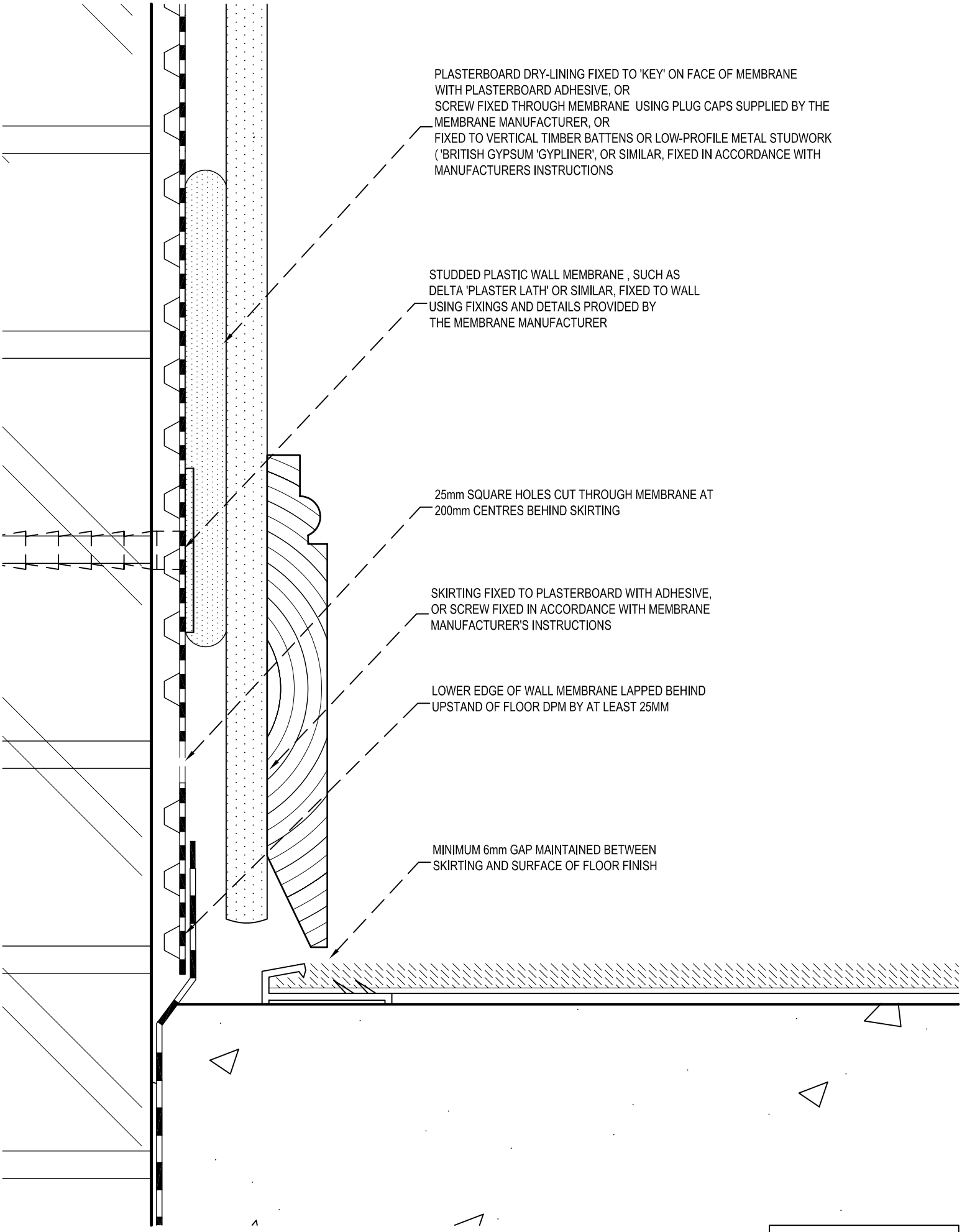

H+R

Ventilated Dry Lining

Ventilated skirting detail, to protect floor finishes and allow wall masonry to dry

NOT TO SCALE

SD-32A

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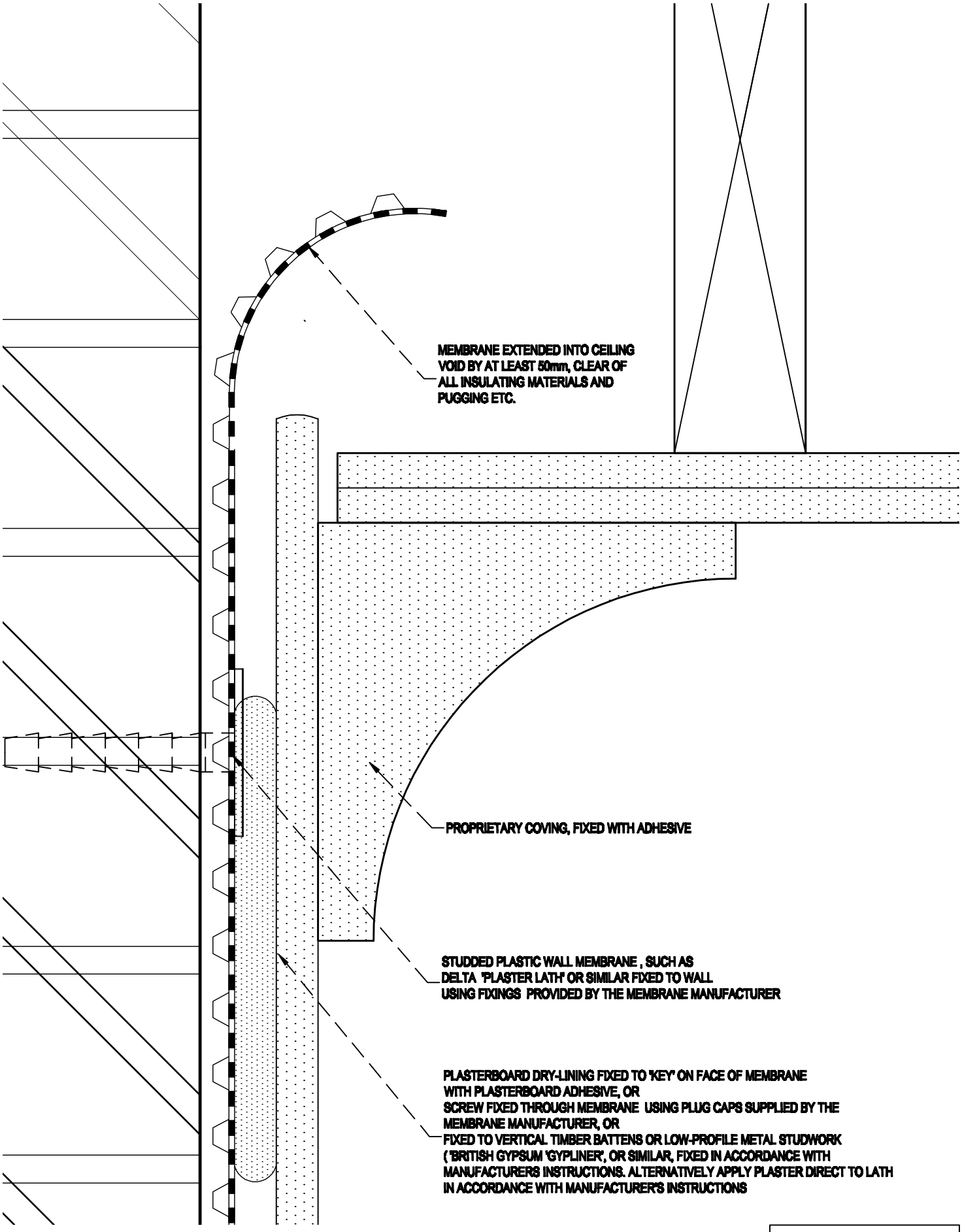

H+R

Ventilated Dry Lining

Full height studded plastic membrane extended into ceiling void

NOT TO SCALE

SD-38A

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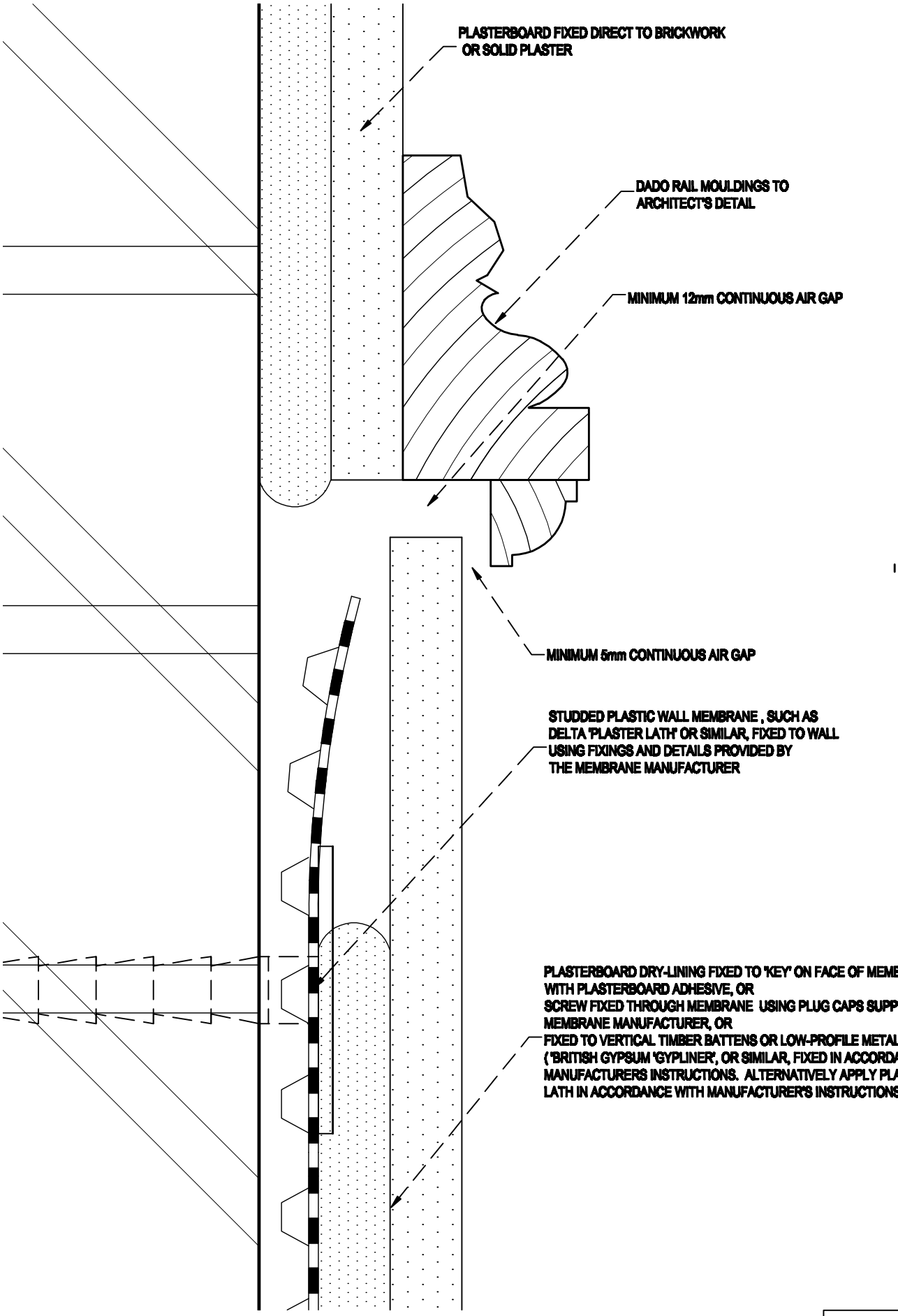

H+R

Ventilated Dry Lining

Dado rail detail to vent behind studded plastic wall membrane

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SD-84

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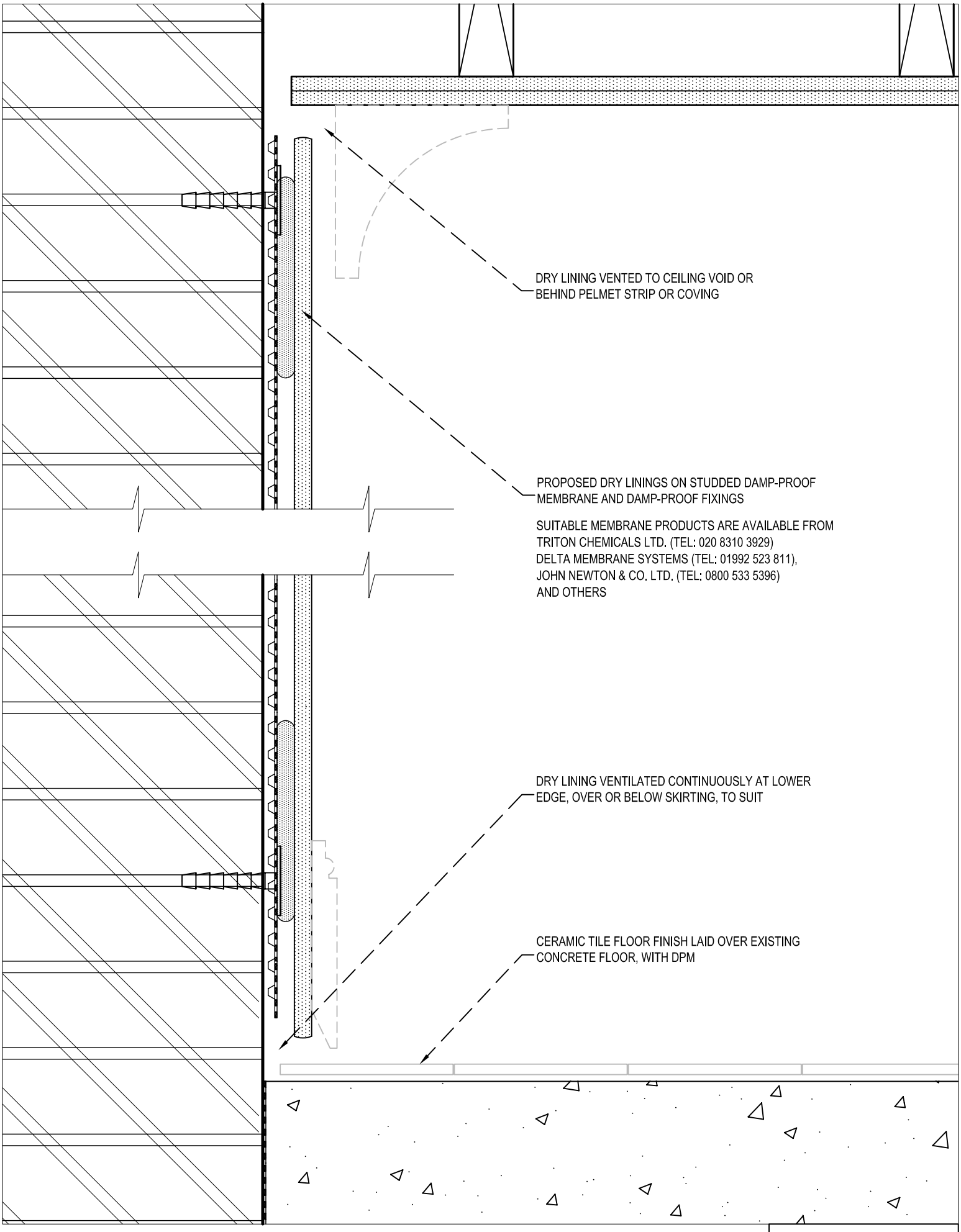

Ventilated Dry Lining

Internally ventilated dry lining, with studded plastic wall membrane

NOT TO SCALE

SD-94

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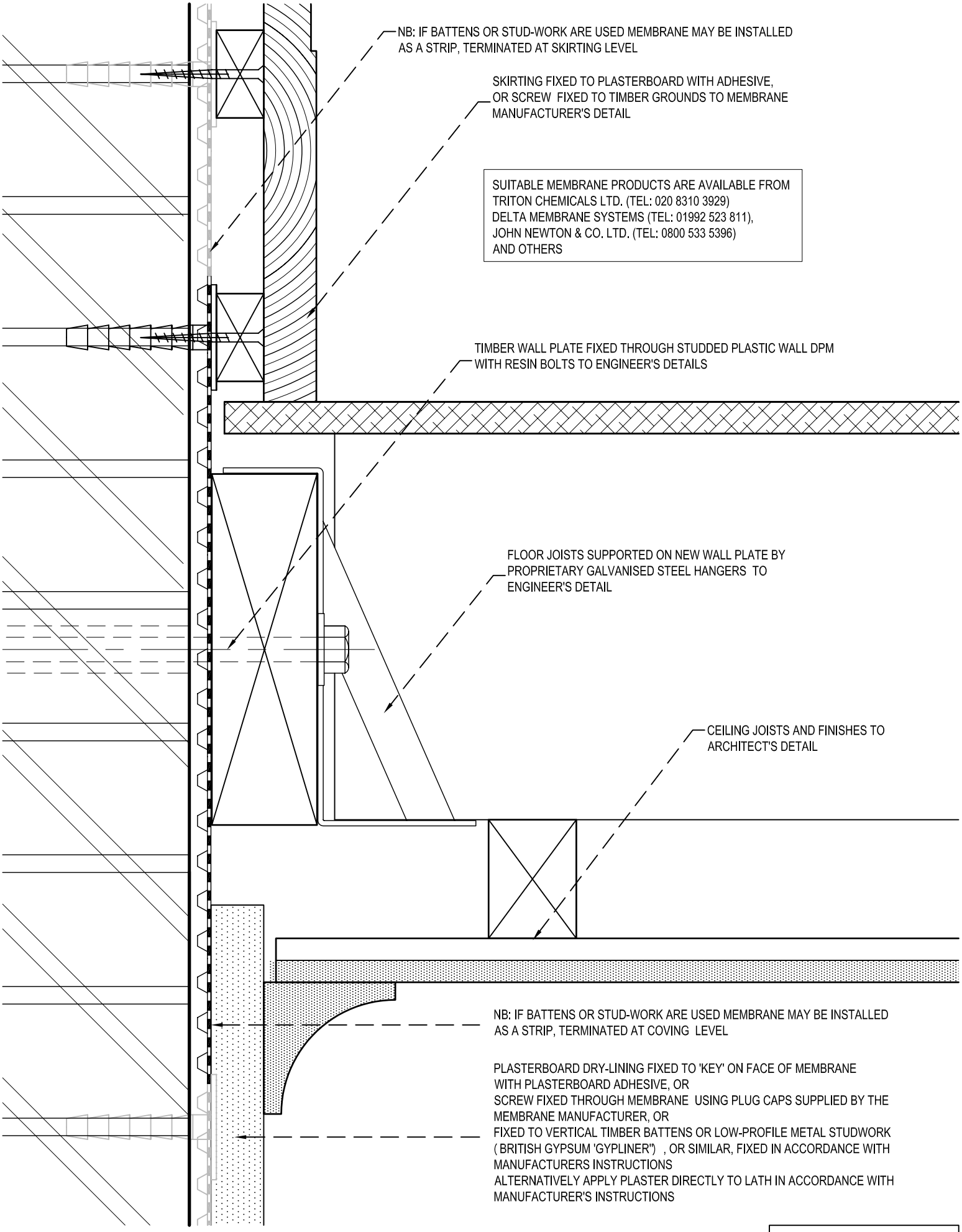

H+R

Ventilated Dry Lining

Vertical damp proof membrane, to isolate timber intermediate floor from damp wall masonry

NOT TO SCALE

SD-98

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