MASONRY DAMP INVESTIGATION OF LOWER GROUND FLOOR AT 7 WIMPOLE STREET

JOB NO. 153.75

LONDON PROJECTS

20 APRIL 2021

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1 INTRODUCTION

1.1 AUTHORITY AND REFERENCE

Hutton+Rostron Environmental Investigations Limited carried out a masonry damp survey at 7 Wimpole Street, London W1G 9SN on 20 April 2021 in accordance with instructions received from Patrick Roche by email dated 12 April 2021 on behalf of London Projects. Reference was made to drawings supplied by CAMM Architects, reference 7 Wimpole Street, London W1G 9SN 1918-01 for the identification of structures. For the purpose of orientation in this report, the front of the property facing onto Wimpole Street was taken as west. The terms "basement/lower ground floor" and "east extension/east wing" are used interchangeably in this report

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

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

1.4 H+R STAFF ON SITE

Michael Almond

1.5 PERSONNEL CONTACTED

Patrick Roche

2 EXECUTIVE SUMMARY

2.1 OBSERVATIONS AND RECOMMENDATIONS

2.1.1 Residual moisture in masonry

Samples from the lower ground and ground floors were found to be generally dry, indicating that the original provision for structural waterproofing remained effective in preventing damp penetration to load bearing masonry structures from below ground. Failure of external drainage systems had allowed residual moisture levels in masonry to rise in isolated locations and the wall of one lower ground floor room was found to be damp on the north side, indicating that it may be earth retaining

No general structural water-proofing works are required or recommended. Some localised drained cavity waterproofing and dry lining of damp and salt affected masonry is required, to protect internal finishes, timber and hygroscopic materials from damage during and after refurbishment

2.1.2 Defects associated with damp and decay

1 Lower ground floor: Damage to decorative finishes was noted in isolated areas of the lower ground floor, principally in the north-east and south-east rooms. Affected areas coincided with raised residual moisture levels in masonry as described above

2 Ground floor and above: Failure of roof coverings, external drainage and internal plumbing had allowed water to drain into the structure in isolated locations at all upper floor levels during and since previous occupancy. This was likely to have created the conditions for timber decay in some areas and increased the risk of salt damage to vulnerable decorative finishes after refurbishment

Decayed, damp and salt affected timber and wall finishes should be removed and reinstated in new materials, isolated where necessary from masonry structures and solid floors by continuous air gaps, ventilated dry linings or strips of a suitable damp-proof material. Consideration should be given to detailed investigation of masonry moisture content and timber condition throughout the property, to allow non-chemical, cost effective and fail safe remedial works to be accurately specified

3 OBSERVATIONS AND *RECOMMENDATIONS*

3.1 EXTERIORS

3.1.1 West elevation

1 Roof drainage: The parapet gutter below the mansard roof was served by 2 square section downpipes at the north and south ends of the elevation. These were in fair condition but surface 'streaking' on the south downpipe, immediately below the drip course above the first-floor windows, indicated intermittent escape of water, possibly from a hopper serving sanitary facilities on the interior mounted immediately above the drip course moulding. Downpipes passed through the pavement structures and bypassed the access staircase to the lower ground floor area and discharged below ground level. Adjacent to the entrance doorway the north downpipe was deformed, consistent with intermittent physical impact, which may reduce the downpipe capacity and increase the risk of blockage and overflow on future occupancy

H+R assume that the roof drainage system will be extensively overhauled on proposed refurbishment. Consideration should be given to repair or replacement of the damaged section of the north downpipe at upper ground level and for possible introduction of access eyes for inspection and maintenance. H+R also assumed that the secondary waste drainage systems associated with multiple sanitary facilities on the interior will be removed on proposed refurbishment. If additional sanitary connections are made to the mixed drainage system, these should be installed fully in accordance with Building Regulations and local authority bylaws and provided with adequate access for routine inspection and maintenance on future occupancy

2 External ground levels and drainage: Concrete hardstanding at the base of the lower ground floor 'area' was laid to fall to a central surface drain at the base of the access steps on the west side. Drainage was slightly obstructed by refuse but appeared to be operating effectively at time of survey. Moss growth and salt accumulation on the hardstanding surface immediately below the upper ground floor bay window was consistent with water draining over architectural features of the west elevation at high level and splashing onto the concrete surface in this area. This did not significantly increase the risk of water penetration to the structure

All below ground pipework serving surface drains should be inspected in detail, using CCTV as required and allowance should be made for all necessary cleaning, repair and upgrading to ensure that surface water is drained clear of the masonry and foundations of the structure at all times. The drainage system should be re-inspected and certified as free of damage or obstruction on completion and handover

3 Damp-proof course: A wide mortar band was identified at the base of the glazed brickwork of the lower ground floor façade, typically 60-90mm above external ground levels. This was in good condition and was not subjected to destructive investigation. The mortar band was assumed to cover the physical horizontal damp-proof course installed on original construction, probably from multiple layers of slate or a bitumen compound. The dpc continued across the west side of the area at the floor level of the vaults below the roadway

No urgent remedial works are required. If 'soft' landscaping materials are introduced on proposed refurbishment in place of the concrete hardstanding, care must be taken to maintain ground levels a minimum 150mm below the horizontal dpc. There is no requirement to adjust existing ground levels if the hardstanding is to be retained but reducing ground levels toa minimum 150mm below the dpc should be considered if re-paving is proposed

4 Vaults on west side: The central and north-western vaults had been partially 'tanked' with a cementitious render waterproofing system on a previous refurbishment. This system also extended across the vaulted section of the south-west vault and the horizontal soffit of the lobby to the central vault and WC. Cement render showed extensive surface efflorescence of hygroscopic salts and evidence of water from below ground draining through cracks and other defects, indicating that the existing waterproofing system was approaching or had exceeded the end of its service life. Exposed brickwork on the south side of the south-west vault was patently damp, where water appeared to be draining into the vault around the bearing end of a steel joist supporting the footway above. The joist was extensively corroded which may have reduced its strength

Allowance should be made for inspection of steel joists and other structural lintels etc. by a suitably qualified Structural Engineer. Subject to the proposed use of the vaults on future occupancy, provisional allowance should be made for installation of a fully detailed drained cavity waterproofing system, discharging to a sump equipped with duplex pumps and control switches, possibly located externally in the west 'area'. If the vaults are to be used solely for refuse storage, storage of items not vulnerable to moisture or condensation or as non-electrical plant rooms, it may be adequate to provide grade 2 waterproofing as described in BS 8102:2009. Works may include treating walls with a suitable salt resistant and vapour permeable decorative finish as directed by the Architect, providing adequate through and cross ventilation for the control of airborne moisture and condensation and the installation of floor drains. H+R can provide further advice on remedial detailing if required

3.1.2 East elevation

1 High level roof drainage: Roof surfaces at high level all appeared to discharge to a parapet hopper at the south-east corner of the structure, served by a cast iron rainwater downpipe with a nominal diameter of 110mm. This pipe had been replaced at ground level in pvc, discharging water onto a small flat roof on the south side of the lower ground floor elevation. This in turn discharged to a hopper and downpipe on the south side of the courtyard to the lower ground floor. The hopper at lower ground floor level was extensively obstructed by leaves and debris and appeared to have allowed water to overflow and drain over adjacent masonry structures. The window sill immediately below the flat roof area was also subject to biological growth, consistent with intermittent saturation due to surcharging of the roof drainage system and overflow from the north edge of the flat roof. Failures of routine maintenance since the property had been vacated were likely to have allowed water to drain into structures around downpipes and below gutters in a number of locations, increasing the risk of damage to internal finishes and the risk of decay in structural and decorative timbers in contact with masonry on the interior

H+R assume that the provision for roof drainage is to be extensively overhauled or replaced on proposed refurbishment. Consideration should be given to a general re-design of the roof drainage system to increase capacity and improve provision for access, cleaning and maintenance. Consideration should also be given to undertaking roof drainage calculations based on up-to-date meteorological data to ensure that adequate drainage capacity is provided to discharge surface water clear of the structure at all times

2 Lower-level roof drainage: The flat roof terrace of the east wing drained to a hopper and downpipe at the south-east corner. This discharged to a bunded surface gulley which was blocked by soil and vegetation at time of survey. Additional downpipes at the centre and west end of the south elevation of the extension appeared to be free of significant obstruction and operating effectively

Blocked drainage gullies around the base of the structure should be cleared as a matter of urgency. See 3.2.1(1) above

3 Masonry: The brickwork of the roof terrace parapet on the east side showed extensive salt efflorescence and deposition of soluble minerals, consistent with intermittent saturation of the wall masonry. The brickwork was of a different design and quality to other areas and may have been raised on a previous refurbishment, possibly when a flat roof was converted to a terrace. The walls were capped with a soldier course of brickwork but no horizontal dpc was identified. This was likely to have allowed water to drain into the parapet wall structures, mobilising hygroscopic salts and increasing the risk of water penetration to the terrace roof structure and masonry below. The western part of the terrace parapet was detailed with coping stones with lead flashings and dpcs beneath. This had protected the structure from significant water penetration but some surface 'streaking' of salts and soluble minerals was noted below open joints in the copings, where surface rainwater would have been able to drain through

If the raised parapet walls towards the east of the east extension are to be retained on proposed refurbishment, consideration should be given to re-detailing them with projecting copings and damp-proof courses as present elsewhere. Retained copings should be refurbished, raking out loose material from joints and replacing in a suitable lime mortar mix

4 External ground levels, drainage and damp-proof courses: A physical horizontal damp-proof course from multiple layers of slate was identified at the base of the east extension structure. This was protected by a wide mortar band, which had fallen away in isolated locations, notably around the east external doors to the extension. The level of planting beds to the sides of the east doorway had risen above the dpc on the north side and to the same level as the dpc to the south. This would have allowed ground water to bridge the dpc and penetrate brickwork above internal floor levels. Bridging of the dpc had also allowed brickwork immediately above to become saturated intermittently, resulting in frost damage associated with the sheltered easterly orientation. The dpc continued across the south elevation of the east extension approximately 400-600mm above external paving and planting beds on the east side. A glazed concrete framed walkway had been added at upper ground floor level on a previous refurbishment, approximately level with floor surfaces on the interior. This coincided with the level of the horizontal dpc. A cement render skirting had been added above the walkway, presumably in response to damage to brickwork where the dpc had been bridged. The walkway was exposed to wind driven rain from the south, which was likely to have ponded on the walkway surface and drained into the south elevation masonry of the east extension. This was consistent with the surface efflorescence of salts noted around the concrete render skirting

Allowance should be made for a general reduction of external ground levels to a minimum 150mm below the physical horizontal damp-proof course. Biological growth and salt deposit should be removed from masonry, if required for aesthetic reasons. If the walkway on the south side of the extension is to be retained, on future refurbishment the supporting steel structures should be inspected by a suitably qualified Structural Engineer and consideration given to improving surface drainage, including the addition of a gutter and downpipe to the leading edge

3.1.3 Lower ground floor east courtyard

1 External masonry: The external masonry sills below window openings were generally detailed with drip rebates to throw surface drainage water clear of structures beneath. However, these rebates were obstructed by decorative finishes or had weathered over time, reducing their effectiveness. Some sills also showed physical damage, notably below the central window on the south side, which was allowing surface water to drain into wall structures below. Glazed brick wall surfaces were generally in good condition, with no significant defects identified that were allowing direct water penetration to the structure. Some biological growth was noted on glazed surfaces to the east where water had been focused onto the courtyard wall, by structures supporting the walkway at upper ground floor level on the north side

Allowance should be made for insitu repair or replacement of damaged external masonry sills and for reinstatement of effective drip rebates, to throw surface water clear of structures below window glazing and openings. The provision for roof drainage at the south-west corner should be modified to include a gutter on the north side of the flat roofed area, to prevent surface water draining onto hardstanding at the base of the wall and splashing back onto the façade

2 Damp-proof courses: A wide mortar band was identified on all sides of the courtyard, set into the glazed brick façade finishes and typically 50-80mm above external ground level. This was assumed to conceal a physical damp-proof course, probably from multiple layers of slate, but this could not be investigated in detail without causing unnecessary damage. On the west side, the dpc was bridged by steps giving access to the interior to create a level threshold detail. This was likely to have increased the residual moisture content of loadbearing masonry structures locally and may support moisture and salt migration to the interior, which could damage historic finishes and support timber decay

Consideration should be given to removing the steps on the west side which were bridging the dpc, subject to Planning and Conservation consents and in combination with other drainage and landscaping alterations as described below

3 Ground and surface drainage: The base of the courtyard was finished with tarmacadam, laid to falls to 2 No. surface drainage gulleys on the north and south sides. Surface drainage was partially obstructed by vegetation and debris but appeared to be operating effectively

No urgent remedial works are required, subject to the general specification for refurbishment and landscaping proposals. If extensive refurbishment is undertaken, care should be taken to maintain external ground levels a minimum 150mm below the physical damp-proof courses installed in the surrounding walls and to provide effective ground and surface drainage, to direct water clear of the masonry and foundations of the structure at all times on future occupancy. All below ground drainage systems should be subject to routine inspection, maintenance and cleaning and should be certified as clear of obstruction by the Project Manager on competition and handover

3.2 INTERIORS

3.2.1 Lower ground floor

1 Electrical inlet room: Salt efflorescence and failure of decorative finishes were noted on the ceiling of the electrical inlet room to the north-west. This was consistent with cold-bridge condensation through the structure giving access to the main entrance doorway at upper ground floor level

No urgent remedial works are required, subject to the general specification for refurbishment. Adequate ventilation should be provided throughout the lower ground floor for the control of airborne moisture and condensation

2 South east room of main house: Staining and salt efflorescence were observed, affecting decorative finishes adjacent to the doorway leading to the east lower courtyard, where bridging of the horizontal dpc and defects in external drainage systems had created damp conditions in masonry locally. Some lining papers adjacent to the doorway had also blistered and lifted from the substrate on the west side, indicating damp conditions in the structures behind

Works described elsewhere in this report should be undertaken to restore the effectiveness of the existing horizontal wall dpc and to repair external drainage systems. Damp affected walls in the south-east room of the main building should be stripped of existing finishes to allow detailed inspection of the masonry behind, taking care to avoid impact and vibration damage to the historic tiling in the corridor on the south side. Allowance should be made for installing ventilated dry linings over exposed masonry, based on vertical studded plastic isolating membranes, to protect vulnerable materials and finishes during and after refurbishment. Details provided by the Architect, approved by H+R and similar to those included at Appendix D should be used throughout. H+R can provide further advice on remedial detailing if required

3 East room below east wing: Wall lining papers had blistered and fallen away on the north side. Exposed plaster was wet to the touch and masonry behind was found to contain surplus residual moisture on analysis of samples, as described at Section 3.3. below

Allowance should be made for installation of drained cavity waterproofing, generally as described in BS 8102:2009, with perimeter channels at the bases of the north and east walls discharging to gravity drainage systems below the east lower courtyard via a suitable external trapped gulley. If no gravity invert level is available allowance should be made for installing a pumped sump as directed by the Architect and specialist installation contractor

4 Wine store on north side: Wall surfaces were extensively eroded at the base of the north wall, which was assumed to be shared with the neighbouring property. Damage was consistent with chronic moisture migration from below ground to the wall surface and the effects of intermittent interstitial condensation during and since previous occupancy. The wine store was unventilated and this would have increased the risk of intermittent condensation where warm moisture laden air from other parts of the property tended to migrate to under ventilated and less frequented areas, including the wine store and other ancillary spaces of the lower ground floor

No urgent remedial works are required. No chemically injected horizontal damp-proof courses or cementitious render tanking systems are required or recommended. Allowance should be made for through and cross ventilation of all habitable rooms, service spaces and enclosed voids on future occupancy, as directed by the Architect, for the effective control of airborne moisture and condensation. The use of film forming paint systems should be avoided on masonry which is vulnerable to historic damp

penetration and salt migration. Mineral based 'clay paint' or vapour permeable silicate paint systems are preferred

5 Timber: Representative sections of timber skirtings at wall/floor junctions throughout the lower ground floor were tested using an electrical resistance moisture meter. Indicative moisture contents in excess of 20 per cent and providing the conditions for decay were found on the north side of the east room below the east wing, where the structure may have been earth retaining and was patently damp, as described above. Decorative lining papers had become detached from the wall surface immediately above the affected area of skirting

Skirtings should be removed from the perimeter of the east room below the east wing and reinstated after waterproofing works are complete, with timber fully isolated from wall masonry and solid floor structures. On refurbishment, all structural and decorative timbers, including skirtings and internal door frames, should be fully isolated from masonry identified as having an available residual moisture content in excess of 2%, as shown on plans at Appendix B. Isolation could be achieved by placing timber over vertical dry lining membranes or strips of a suitable dpc material, or by separating timber from masonry by a continuous ventilated air gap and plastic packing wedges

3.2.2 Ground floor and above

H+R's instructions did not extend to a detailed inspection of the superstructure, other than in relation to residual moisture levels in the masonry of the lower ground floor. However, a number of defects were identified that indicated active water ingress likely to have provided the conditions for timber decay. Failure of roof coverings, roof drainage and internal plumbing had also allowed water to drain into upper-floor masonry in the past, mobilising hygroscopic salts in solution and increasing the risk of damage to hygroscopic materials and vulnerable finishes during and after refurbishment, even in the absence of further water ingress. Structures around redundant and unventilated flues were also likely to contain raised concentrations of combustion chemicals, moisture and salts. Photographs illustrating an indicative selection of these defects are included at Appendix A, figs.40-54

3.3 RESIDUAL MOISTURE IN MASONRY

3.3.1 Sampling

A total of 28 No. samples were extracted from the load bearing masonry structures of the lower ground floor, taking care to avoid areas where historic finishes had been retained. A further 6No. samples were taken from the ground floor walls of the east wing, to investigate the upward extent of damp that appeared to be affecting the lower ground floor walls below. Samples were double bagged on site and returned to H+R's laboratory for gravimetric analysis of available and hygroscopic moisture content, following procedures described in BRE Digest 245. Results are shown on plans at Appendix B and in a table at Appendix C

3.3.2 Results

1 General distribution of residual moisture: 20 No. of the 28 No. samples from the lower ground floor were classified as dry, with available moisture contents below 2 per cent. This included all samples from internal walls, the west elevation and the party wall on the south side, indicating that the building was not inherently vulnerable to penetrating damp from below ground. It was highly likely, based on observations, that well detailed and robust provision for horizontal waterproofing had bene made on original construction and that this provision remained effective

No general remedial waterproofing works are required. No chemical injected or other remedial damp-proof course installations are required or recommended and the application of cementitious waterproofing should not be undertaken in any area. Some localised damp protection measures are required as described below

2 South east room: 3 No. samples from the east external wall were classified as moist, with available moisture contents of between 2 and 5 per cent. This was consistent with the damage to finishes that was noted, as described at 3.2.1(2) above

Allowance should be made for exposing and dry lining damp affected structures as described at 3.2.1(2) above

3 East room below east wing: 1 No. saturated (>8% available moisture content) and 1 No. moist sample were obtained from the north wall, which was visibly damp as described at 3.2.1(3) above. A further moist sample was taken from the east wall of this room, which may also have been earth retaining. The fact that the north and east wall masonry was not consistently wet or saturated indicated that voids or basement rooms may be present on the reverse sides or that some form of external waterproofing had been provided on original construction. A further saturated sample was obtained from the south wall, below the window. No immediate source of water ingress was identified but defects in the profile of the external sill may have allowed water from glazing to drain into the wall in the past

Works described at 3.2.1(3) are required to provide damp protection on the north and east sides. Allowance should be made for installing dry linings across the base of the south wall, to isolate vulnerable finishes and timber from damp affected masonry

4 Wine cellar on north side: the sample from the west side of the north wall, where impermeable paint finishes had become detached, was classified as moist. The corresponding sample from the east side, where an isolated brick was severely eroded was dry but had a raised hygroscopic salt content. Cyclical deliquescence and efflorescence of these salts in the press of the brickwork was highly likely to have caused the damage identified

See 3.2.1(4)

4 GENERAL RECOMMENDATIONS

All new and refurbishment detailing should be assessed for its effect on environmental and structural health. General principles are set out below. Special care is required when introducing new materials, moisture sources or heating and ventilation systems, for example air conditioning

4.1 ROOF AND SURFACE DRAINAGE

4.1.1 Maintenance

All guttering, hopperheads and outlets should be regularly checked and cleared to keep them free of debris, especially during the autumn months

4.1.2 Protection

Hopperheads, gutter outlets and ground gullies should be protected with metal mesh cages so as to prevent blockage and overflow. These should extend higher than the expected water level to reduce the tendency to block and should be easily removable to allow cleaning and maintenance

4.1.3 Overflows

Hopperheads, parapet gutter outlets and valley gutter outlets should be fitted with overflow pipes to drain water clear of the structure in case of blockage. These should be at a level below that at which water would overflow the roof flashings

4.1.4 Roof drainage calculations

Roof drainage calculations should be made to check the adequacy of gutters, drains and downpipes so that their capacities may be increased if necessary, during refurbishment. H+R can carry out these calculations if required

4.1.5 Monitoring

The installation of an automatic monitoring and alarm system should be considered to give warning of blockage or overflow in the roof drainage system

4.1.6 Access

Safe and convenient access ladders, safety points and walkboards should be installed to all roof areas to allow proper inspection and maintenance

4.1.7 Pigeons

Feral pigeons should be controlled. H+R can give advice on this if necessary

4.2 VENTILATION

4.2.1 Structural voids

All structural voids within the building should be provided with adequate through ventilation so as to prevent moisture build-up. This must be done with regard to the applicable fire regulations

4.2.2 Chimneys

All chimneys not in use should be capped so as to minimise water ingress but so as to allow maximum ventilation of the flues. Flues should be cleared and cleaned to remove blockages. Fireplaces and chimney breasts should be opened or vented to allow through-ventilation of the flues. This prevents moisture build-up in the flues and helps interior ventilation by the stack effect

4.2.3 Bathrooms and kitchens

All bathrooms and kitchens should be fitted with adequate extractor fan systems. These should run for at least fifteen minutes after occupancy to prevent condensation. The installation of floor drains should be considered in these rooms in case of overflow

4.2.4 Roof spaces

All roof spaces, including flat roof areas and gutter soles, should be provided with adequate through-ventilation. This may occur via the gaps between slates in unsarked pitched roofs. However, flat roofs and pitched roofs with sarking or insulation will require the installation of vents through the roof surfaces or at the eaves and ridges. Insulation material in roof spaces should be kept clear of external walls, gutter soles or timbers in contact with damp or potentially damp masonry

4.2.5 Windows

Windows should be refurbished so as to allow easy and convenient opening and closing by occupants in order to encourage proper ventilation of the building. This is important both for environmental and structural health. Windows should be fitted with security locks so as to allow secure locking in a partially opened position

4.3 STRUCTURAL DETAILING

4.3.1 New timbers

New timbers should be isolated from any damp or potentially damp masonry with a damp proof material or ventilated air gap

4.3.2 Timber repairs

Structurally decayed timbers should be removed or cut back to sound timber unless required for aesthetic reasons. Timbers should then be partnered or spliced as in section 4.3.1 above. If steel plates or hangers are used, they should be detailed so as to allow sufficient ventilated air gaps and drainage to prevent moisture build-up due to condensation. No timber preservation or remedial treatments should be required

4.3.3 Paint finishes

Moisture vapour permeable or 'microporous' paint finishes should be preferred for internal and external surfaces and woodwork. This is especially important on window timbers. To take advantage of the properties of such paints, the complete removal of old alkyd paint systems is recommended. Health and Safety: Special precautions should be taken during surface preparation of pre 1960's paint surfaces as they may contain harmful lead or other toxic materials

Appendix A

Fig 1:

West elevation, upper south side; showing ‘streaking’ on downpipe surface indicating intermittent escape of water from the roof drainage system and a hopper linked to the downpipe serving sanitary facilitates on the interior

Fig 2:

West elevation, south side; showing connection between small diameter drainpipe serving the first-floor balcony and the south downpipe. Note streaking on the small diameter pipe surface which may indicate water draining around the pipe from the balcony, indicating obstructed drainage and an increased risk of surface water draining into the structure

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Fig 3:

Upper ground floor, west elevation, north side; showing indentations in the box section downpipe, restricting the rainwater pipe cross section area and increasing the risk of blockage and overflow

Fig 4:

West ‘area’ at lower ground floor level; showing surface drain serving hardstanding free of significant obstructions. Note biological growth on the hardstanding surface below the upper ground floor bay window structure, where water drained from the façade above onto the area concrete paving

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Fig 5:

West elevation, north-west vault; showing progressive failure of the cementitious waterproofing system installed on a previous refurbishment

Fig 6:

West elevation, north-west vault below street level; showing exposed brick vaulted ceiling in fair condition, with evidence of intermittent water penetration through the structures above

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Fig 7:

West elevation, central vault below roadway; showing widespread damp staining where the cementitious waterproofing render applied on previous refurbishment had fallen away at the centre of the roof profile

Fig 8:

West elevation, WC below street paving; showing salt efflorescence and staining to ceiling finishes, indicating progressive failure of the cementitious waterproofing system installed on previous refurbishment

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Fig 9:

West elevation, south-west vault below paving; showing progressive failure of the cementitious waterproofing system, with extensive surface efflorescence of hygroscopic salts

Fig 10:

West elevation, south-west vault below paving, south side; showing patently damp brickwork and salt efflorescence at the brickwork 'drying band', where water was draining through the structure at the wall/ceiling junction

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Fig 11:

West elevation, south-west vault below paving; showing south bearing end of typical steel joists supporting ceiling structures and paving above. The degree of corrosion to the steel components may be structurally significant

Fig 12:

West side of lower ground floor 'area' on west side; showing biological growth colonising wall finishes, where rainwater was focused onto structures by the open tread access stair

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Fig 13:

Lower ground floor, area on west side; showing cracks in lintels and masonry above the door and window heads to the vaults and WC below paving to the west. These defects were allowing surface water to drain into masonry and may be structurally significant

Fig 14:

East elevation; showing parapet wall to east extension affected by biological growth and surface deposition of soluble minerals and salts

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Fig 15:

East elevation, south side of east extension; showing parapet wall masonry, assumed to have been added on a previous refurbishment, affected by intermittent water penetration and the surface deposition of soluble minerals and salts

Fig 16:

East extension, south side; showing ‘streaking’ of soluble minerals below open joints in parapet wall copings

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Fig 17:

East side of east extension, to north of entrance doorway; showing raised external ground levels bridging the horizontal damp-proof course and increasing the risk of the damp penetration to the interior

Fig 18:

East elevation of east extension to south of entrance doorway; showing external ground levels partially bridging the horizontal damp-proof course. Note staining and biological growth on brick surfaces consistent with water 'splashing back' onto the façade from the ground, having drained from projecting architectural features above

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Fig 19:

East extension, east side; showing multiple slate horizontal damp-proof course exposed adjacent to the entrance doorway. Note surface erosion of brickwork above the dpc following intermittent saturation and the action of frost

Fig 20:

East extension, south side; showing a wide mortar band concealing the multiple slate horizontal damp-proof course, typically 400-600mm above external ground levels

Fig 21:

East extension, south side; showing steps up to a raised walkway reaching the level of the dpc, increasing the risk of surface water draining into brickwork above. Note surface efflorescence of hygroscopic salts on brickwork, consistent with intermittent water penetration

Fig 22:

East elevation, south side; showing walkway at ground level formed from concrete framed glazed pavement lights, with a concrete render skirting at the base of the façade. Note salt efflorescence on brickwork above the skirting, indicating intermittent saturation of brickwork locally where there was exposure to wind driven rain from the south

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Fig 23:

East elevation at high level; showing salt efflorescence affecting brickwork below the copings of the bay window terrace. Copings were in poor conditions with open joints allowing surface water to drain into the structures beneath

Fig 24:

East elevation, south side; showing small area of lead covered flat roof, collecting discharge from the high-level roof drainage system. Note hopper to lower ground floor level largely obstructed by vegetation and debris

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Fig 25:

Lower ground floor east courtyard, east side; showing staining and biological growth to glazed brick surfaces where water had drained over the façade from ground level above

Fig 26:

Lower ground floor courtyard on east side, central window to south; showing damage to the external sill profile, allowing surface water to drain into structures beneath the window opening

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Fig 27:

Lower ground floor east courtyard, west side of south wall; showing biological growth on window sills where water drained from the edge of a small flat roof immediately above. See fig.24

Fig 28:

Lower ground floor east courtyard, west end of south wall; showing step structures providing level access to the interior bridging the horizontal damp-proof course. Note plant growth exploiting open joints in masonry and staining to the wall surface, where water splashing onto the facade would have drained from the edge of the flat roof immediately above

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Fig 29:

Lower ground floor east courtyard, north-west corner; showing erosion of drip profiles to external masonry sills, allowing surface water from gllazing to drain into structures beneath

Fig 30:

Lower ground floor east courtyard, west side; showing steps installed to provide level access to the interior, bridging the horizontal damp-proof courses installed in surrounding structures

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Fig 31:

Lower ground floor, north-west corner; showing salt efflorescence and failure of decorative finishes applied to the soffit of the electrical inlet room, where a cold-bridge was likely to be present to the exterior, supporting intermittent surface condensation

Fig 32:

Lower ground floor, corridor on north side; showing generally good condition of historic tiled wall finishes

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Fig 33:

Lower ground floor, service corridor to south-east; showing generally good condition of historic tiled finishes to external wall illustrated in fig.28 above. The structure behind the tiles was vulnerable to water penetration following the failure of the provision for roof drainage and bridging of the physical damp-proof course by raised external ground levels

Fig 34:

Lower ground floor, south-east room in main house; showing salt efflorescence damage and staining to the south of the French doors to the exterior, consistent with defective external drainage and bridging of the horizontal dpc

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Fig 35:

Lower ground floor, south-east room in main house; showing salt efflorescence damage and staining to the north of the French doors to the exterior, consistent with defective external drainage and bridging of the horizontal dpc

Fig 36:

Lower ground floor, wine cellar on north side; showing localised erosion of brickwork at low level in the south-east corner, consistent with ground water transit through the wall and intermittent interstitial condensation since construction

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Fig 37:

Lower ground floor, wine cellar on north side; showing damage consistent with interstitial salt efflorescence at low level in the north-east corner, with widespread detachment of film-forming paint finishes from the breathable lime render substrate

Fig 38:

Lower ground floor, east room of east wing/extension; showing detachment of decorative papers from the gypsum plaster substrate, where excess residual moisture was present in the wall behind and there was a vulnerability to intermittent condensation

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Fig 39:

Lower ground floor, east room of east wing/extension; showing blistering of decorative wallpapers where excess residual moisture was present in the wall behind and there was a vulnerability to intermittent condensation

Fig 40:

Fourth floor, west side; showing damage to decorative finishes consistent with water penetration below and around a window opening where there was significant exposure to wind driven rain from the west

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Fig 41:

Exterior of window opening shown in fig. 40 above, with external sill profile detached and decayed, allowing water penetration

Fig 42:

Fourth floor, north-west room; showing failure of ceiling finishes and linings consistent with water penetration through roof finishes, possibly due to failure of flashings around a chimney stack

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Fig 43:

Staircase between third and fourth floors, south-east corner; showing staining to decorative finishes, consistent with damp penetration and the action of decay organisms

Fig 44:

Third floor, south-east room; showing discoloration of ceiling finishes, consistent with intermittent water penetration through roof coverings above, assumed to be a failure of the junction between the roof/terrace over the bay window and the principal east elevation

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Fig 45:

Fourth floor, south-east room; showing structures likely to be allowing water penetration above the damaged ceilings illustrated in fig. 44 above

Fig 46:

Fourth floor, south-east room; showing structures likely to be allowing water penetration above the damaged ceilings illustrated in fig. 44 above

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Fig 47:

Third floor, north-west room; showing stained and detached ceiling linings, consistent with escape of water from plumbing systems on the floor above

Fig 48:

Third floor, south-west room, north-west corner; showing damage to decorative finishes consistent with water penetration, following failure of the parapet gutter linings or escape of water from building services. A duct box was installed in the north-west corner of the room to full height

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Fig 49:

Second floor, south-west corner; showing staining and discoloration of paint finishes, with mould growth on wall surfaces consistent with water penetration following failure of provision for roof drainage on the exterior, or escape of water from building services on the floor above

Fig 50:

West elevation, south end; showing sheet lead waterproofing to the first-floor balcony and outlet in generally good condition, with no defects identified that were allowing water to drain into the structures below

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Fig 51:

East terrace at first floor level, north side; showing asphalt waterproofing around concrete framed glazed skylights, where damage associated with water penetration was identified below

Fig 52:

Neighbouring property on north side at centre of north party wall; showing drainage systems to skylight glazing difficult to access and vulnerable to blockage and kitchen systems at ground floor level that may have been allowing escape of water from plumbing services, affecting the structure of the north party wall

Fig 53:

Ground floor, east corridor; showing damage to decorative finishes and plaster around the concrete framed skylight shown in fig. 51 above, consistent with intermittent water penetration through the terrace waterproofing system

Fig 54:

Upper ground floor, east room of east extension; showing damage to ceiling finishes and covings at the wall/ceiling junction on the west side, consistent with water penetration through the step structures in the terrace above

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Fig 55:

Upper ground floor, central room of east wing; showing failure of ceiling finishes and mycelium of timber decay organisms, consistent with intermittent failure of the provision for waterproofing to the terrace above

Fig 56:

Upper ground floor, north wall of east room; showing mould growth on wall surfaces, indicating intermittent condensation since vacancy

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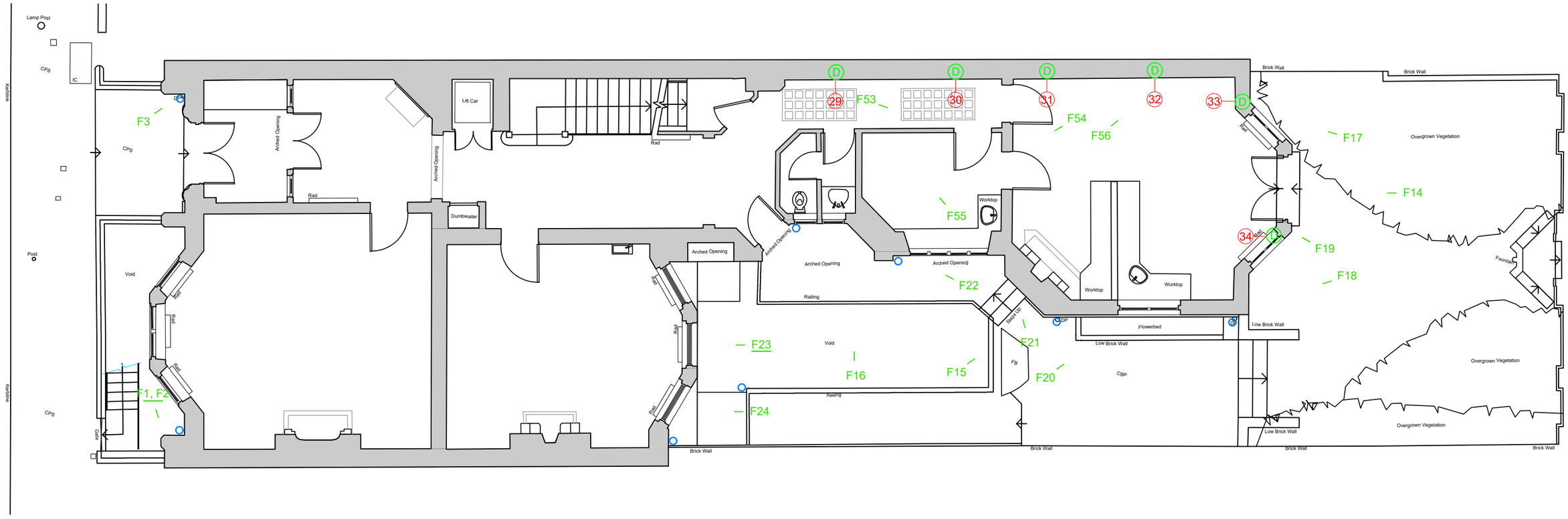
Appendix B

	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

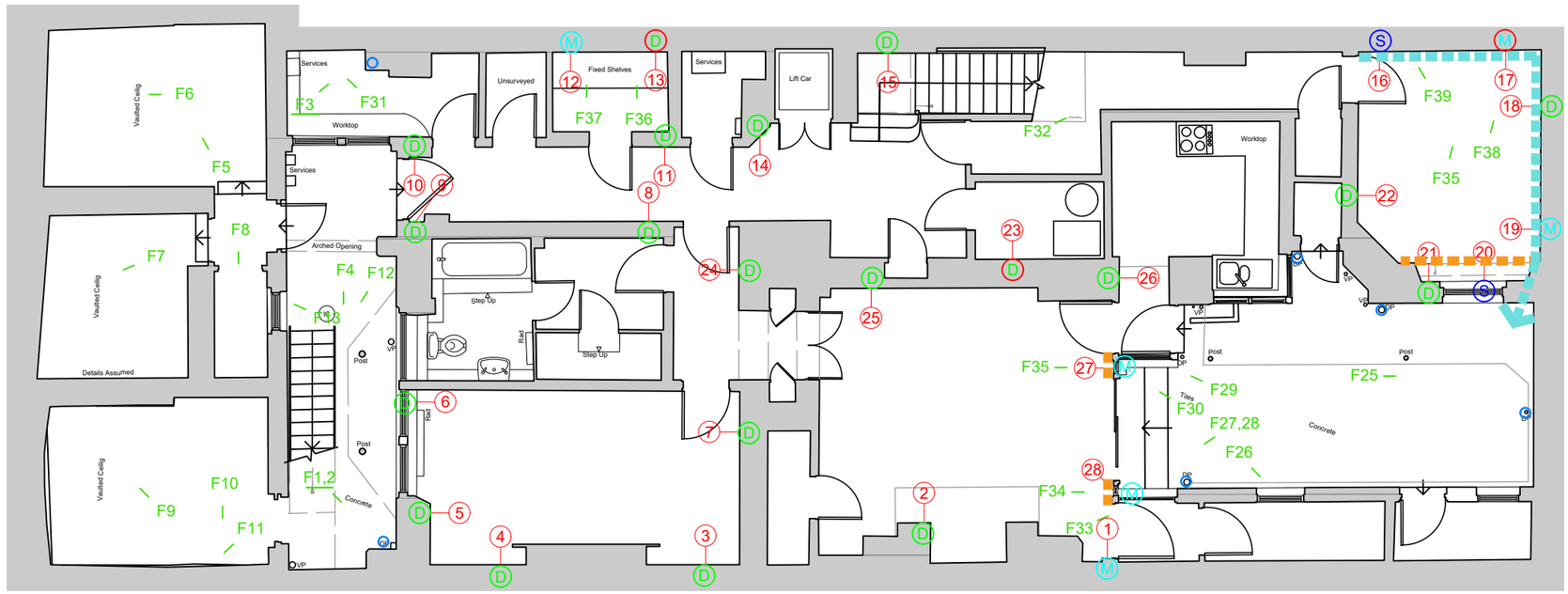


7 Wimpole Street, Ground Floor
Masonry damp investigation
20 April 2021

Hutton + Rostron Environmental Investigations Ltd
Netley House, Gomshall, Surrey, GU5 9QA Tel: 01483 203221
153.75 Report -Not to scale-

Key:
- 1 Masonry sample location
- F Approximate location of photograph
- F Approximate location of photograph over
- Approximate location of rainwater downpipe

	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



7 Wimpole Street, Lower Ground Floor
Masonry damp investigation
20 April 2021

Hutton + Rostron Environmental Investigations Ltd
Netley House, Gomshall, Surrey, GU5 9QA Tel: 01483 203221
153.75 Report -Not to scale-

Key:
- (1) Masonry sample location
- F Approximate location of photograph
- F Approximate location of photograph over
- Approximate location of rainwater downpipe

Recommended damp-proofing works:
- Ventilated dry lining to sill or dado height
- Ventilated dry lining to full height, or drained cavity waterproofing if wall is earth retaining

Appendix C

Table of material moisture contents **Appendix C**

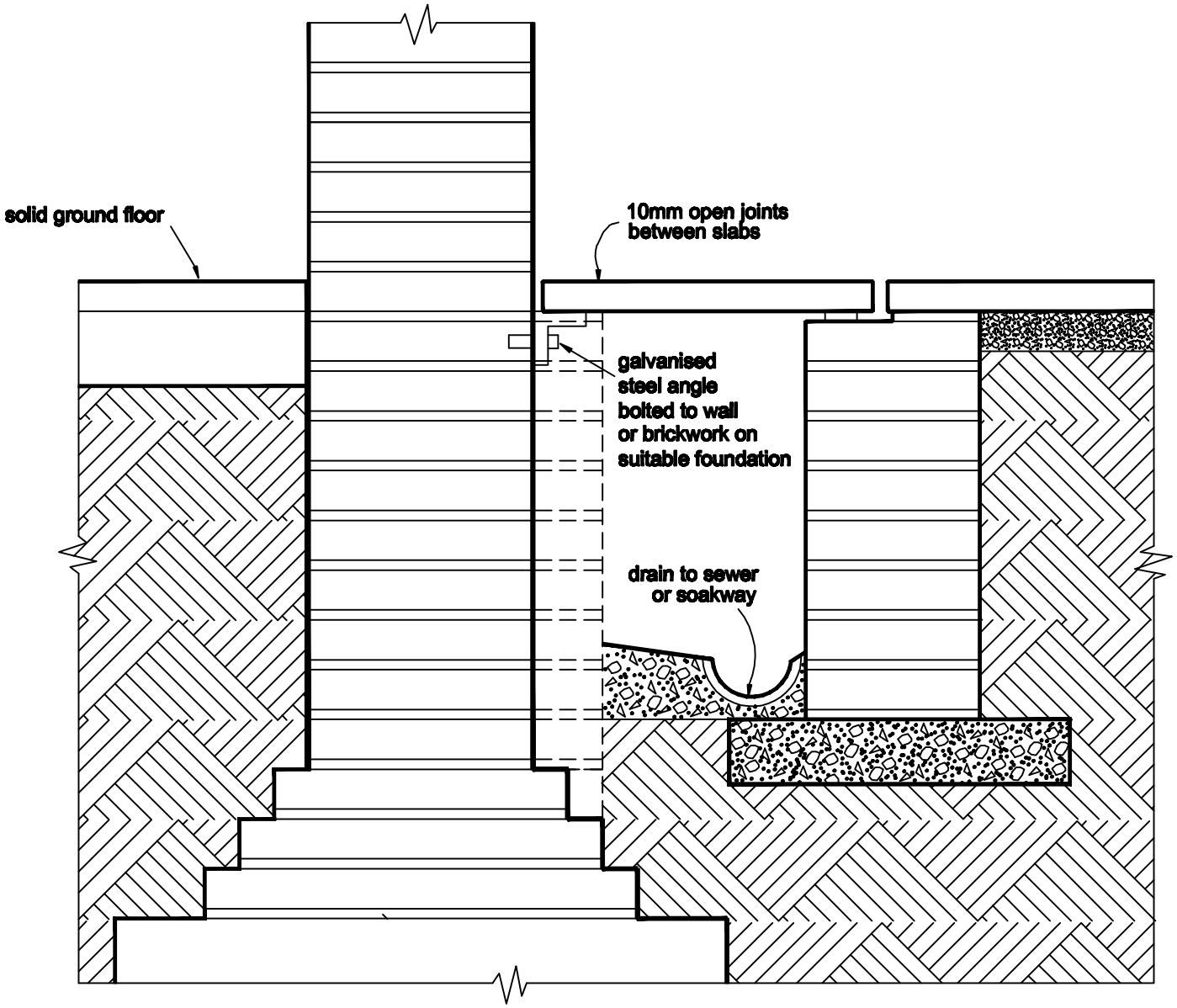
Samples of masonry were drilled from walls in areas vulnerable to damp penetration. The samples were placed in sealed containers and tested at the H+R laboratory in accordance with the procedure for gravimetric measurement of moisture content as described in the appendix to BRE Digest 245

Dish no.	Moisture content % w/w			Hygroscopic moisture content % w/w	Available moisture content % w/w
1	4.48	M		1.22	3.26
2	1.77	D		0.80	0.96
3	2.38	D		0.97	1.41
4	1.85	D		0.18	1.67
5	1.17	D		1.08	0.09
6	0.80	D		0.40	0.40
7	0.93	D		0.41	0.53
8	1.64	D		1.31	0.33
9	0.65	D		0.34	0.30
10	0.71	D		0.39	0.32
11	0.96	D		0.44	0.52
12	4.05	M		0.82	3.24
13	3.99	D	H	4.46	-0.48
14	0.93	D		0.58	0.35
15	0.96	D		0.41	0.55
16	16.57	S		0.68	15.89
17	14.62	M	H	10.99	3.63
18	0.56	D		0.20	0.36
19	4.92	M		0.80	4.13
20	9.62	S		0.29	9.33
21	0.58	D		0.31	0.26
22	0.60	D		0.22	0.38
23	4.28	D	H	4.17	0.11

24	2.11	D		0.83	1.28
25	0.58	D		0.29	0.29
26	1.42	D		0.48	0.94
27	4.43	M		1.78	2.66
28	3.36	M		0.63	2.73
29	1.05	D		0.80	0.24
30	0.77	D		0.30	0.47
31	0.44	D		0.31	0.13
32	1.64	D		0.73	0.91
33	0.64	D		0.32	0.32
34	0.96	D		0.76	0.20

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

Appendix D



Raised external ground levels

Air Drain - Typical Section Detail

November 2007

Not to scale

NOT TO SCALE

SD-13

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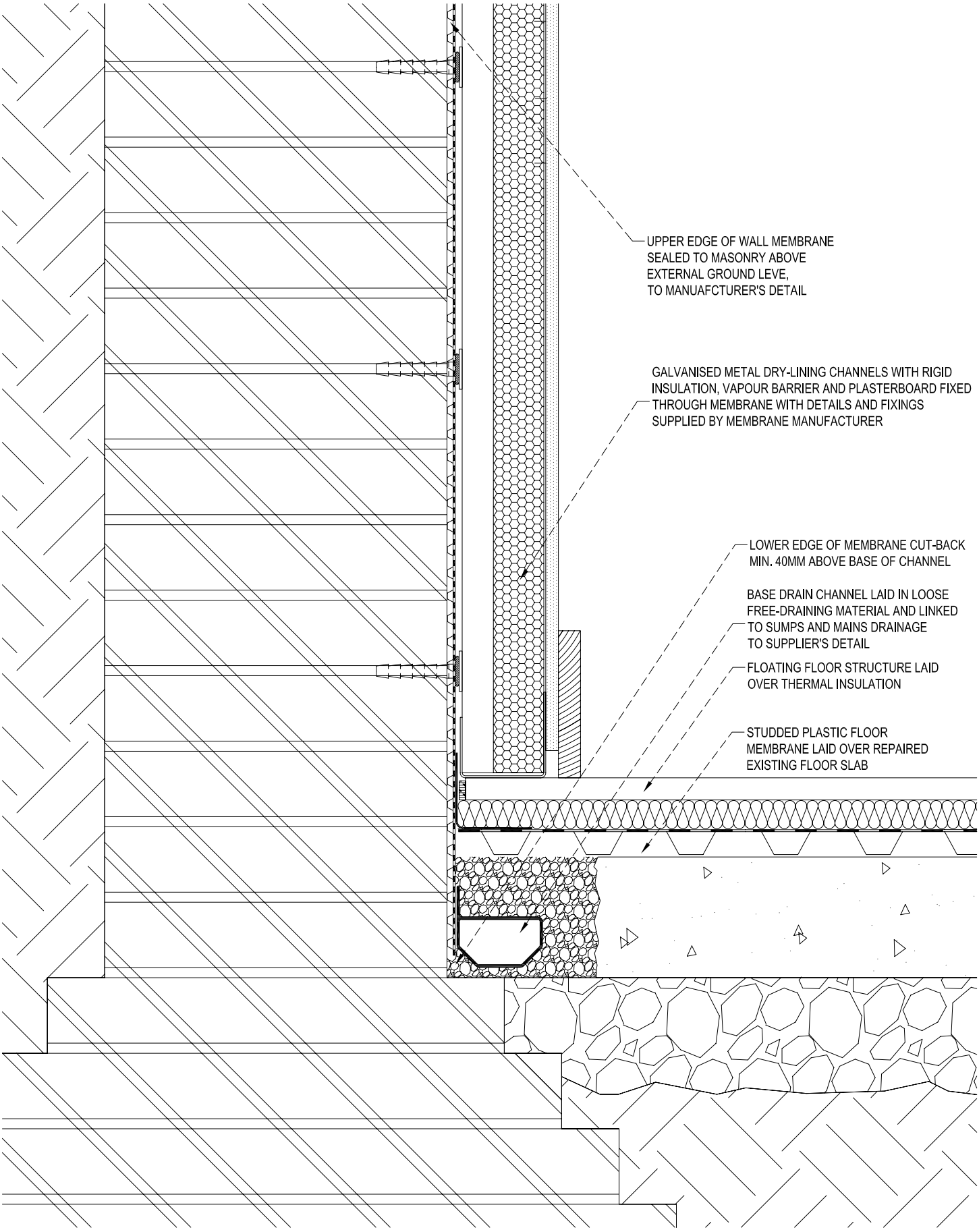
Tel: 01483 203221 Fax: 01483 202911 Standard detail - air_drain_211102.dwg



H+R

Drained Cavity System

Basement - Solid Floor (existing) with Dry Lining

Section - May 2008

NOT TO SCALE

SD-23

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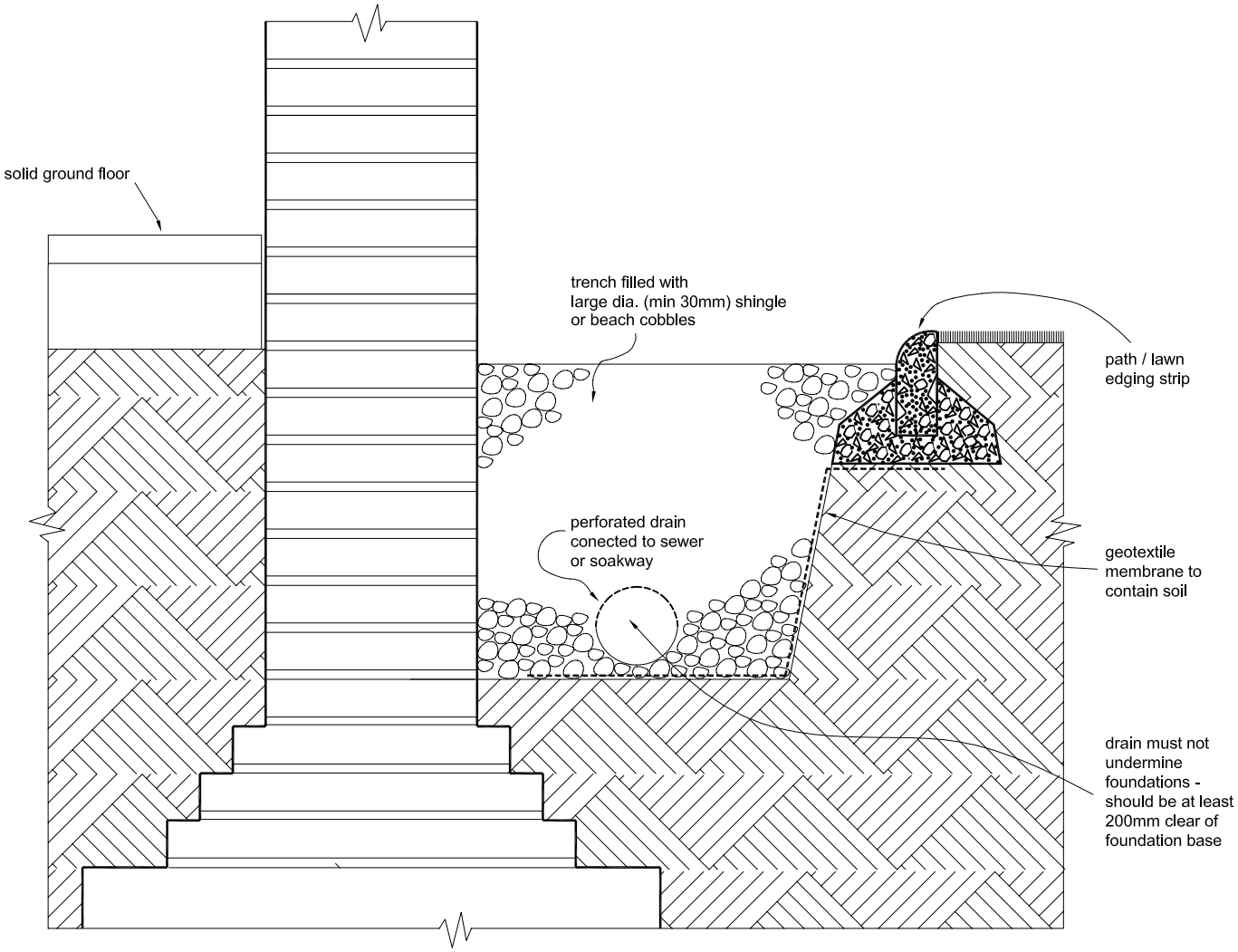

French drain

Typical ground drainage detail that may be adapted for use

July 2009

Not to scale

NOT TO SCALE

SD-37

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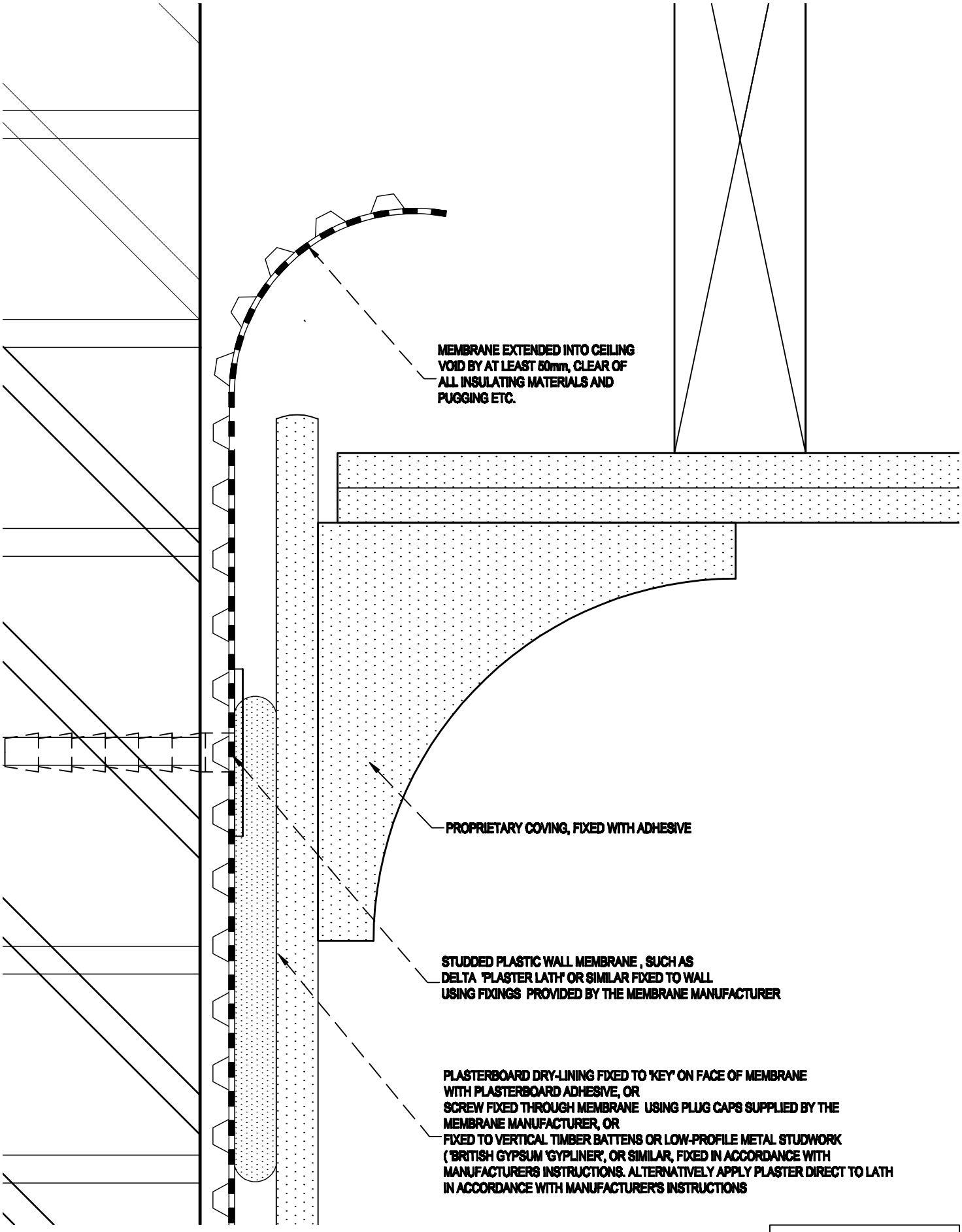
Tel: 01483 203221 Fax: 01483 202911 Standard detail - frenchDrain_060904.dwg



H+R

Ventilated Dry Lining

Full height studded plastic membrane extended into ceiling void

NOT TO SCALE

SD-38A

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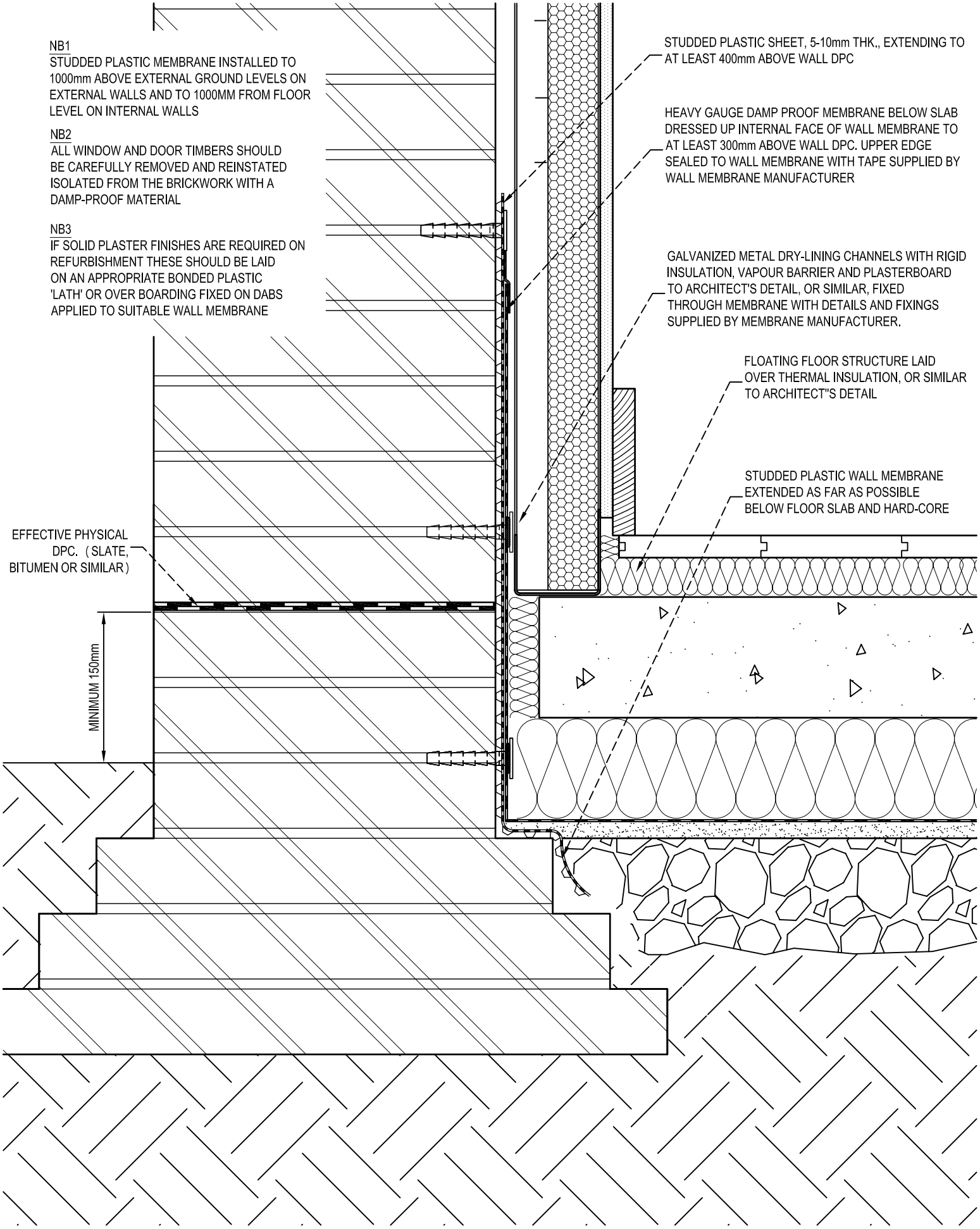

Vertical Damp-proof Membrane for Ground Floor Walls

Solid Floor (new) with Free Draining Ground

Section - June 2010 - Indicative Only - Not for Construction

NOT TO SCALE

SD-42

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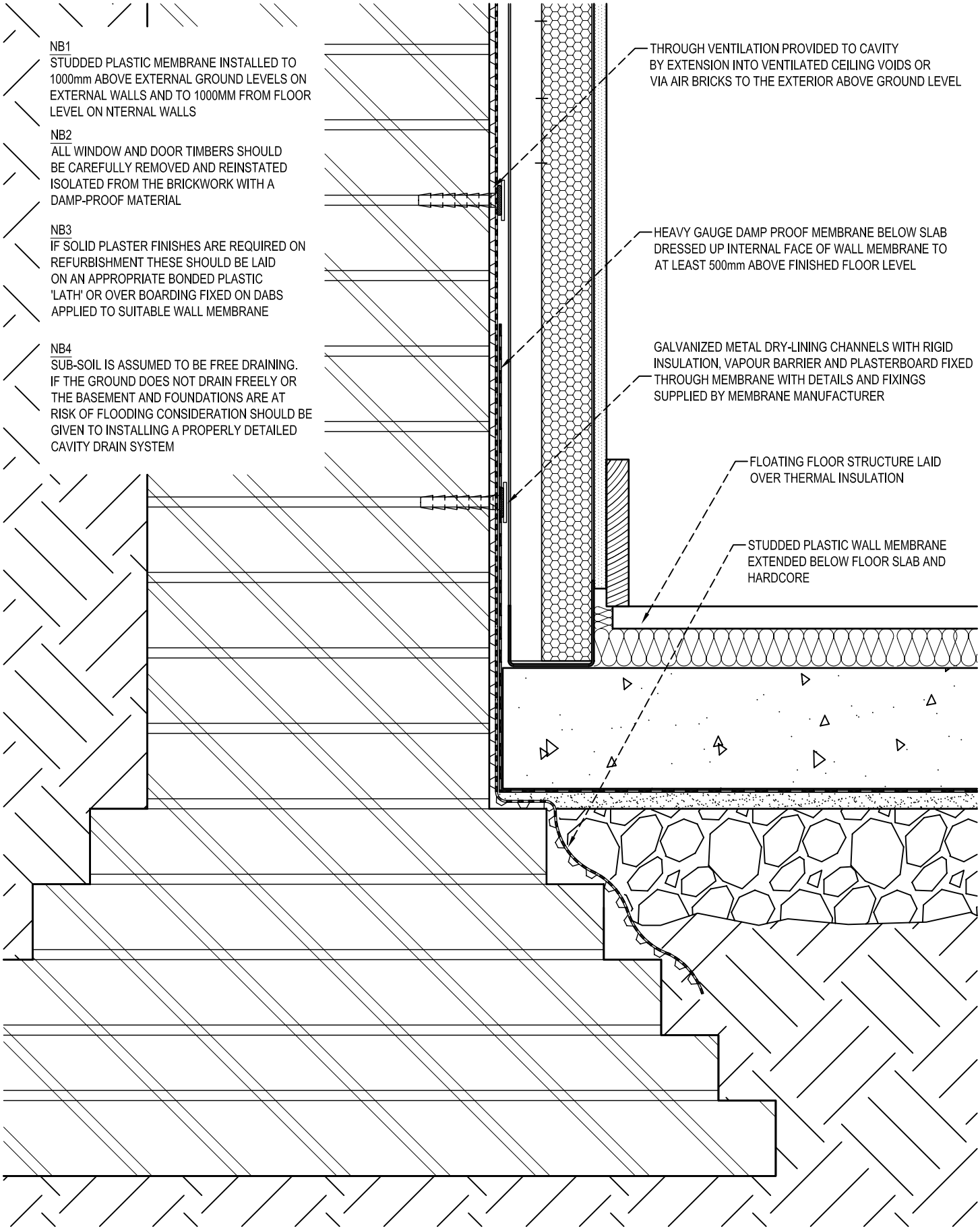

Ventilated Dry Lining for Basement Walls

Solid Floor (new) with Free Draining Ground

Section - July 2008 - Indicative Only - Not for Construction

NOT TO SCALE

SD-73

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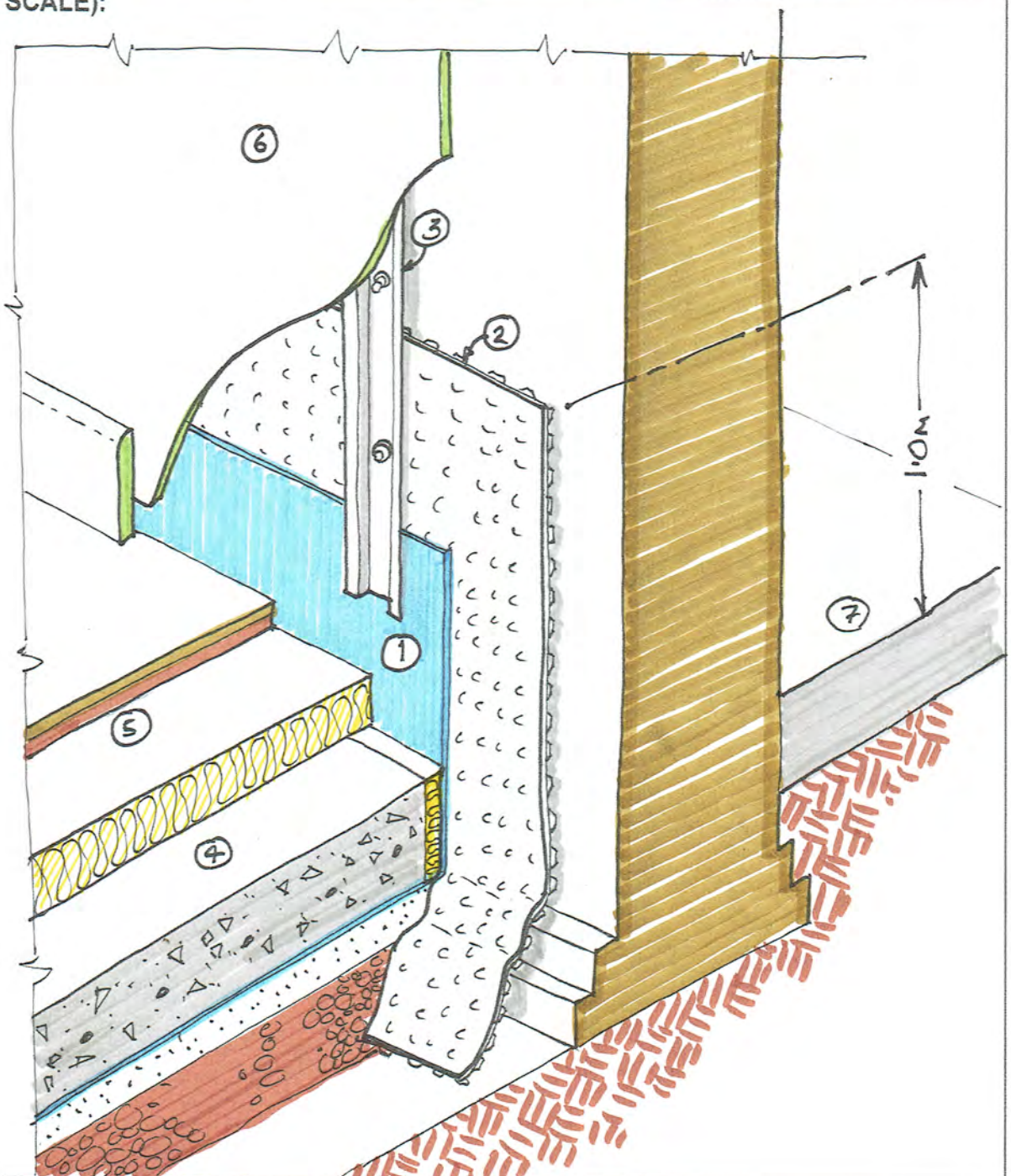
Property: STANDARD DETAIL - GROUND FLOOR	Date: NOV' 18	
Element / Location: 'NON-EARTH RETAINING' MASONRY WALL WHERE FLOOR STRUCTURES ARE TO BE REPLACED	Job No: —	Dwg No: SD-42-P

Sketch (NOT TO SCALE):



Notes:

1. POLYTHENE DPM BELOW CAST CONCRETE FLOOR SLAB, LAPPED UP FACE OF WALL
2. STUDDED PLASTIC SEPERATING MEMBRANE LAID OVER FOOTINGS BEFORE COMPACTED BEDDING MATERIAL IS PLACED
3. LOW-PROFILE METAL OR TIMBER STUDS FIXED THROUGH TO MEMBRANE PLUGS TO HOLD STUDDED MEMBRANE IN PLACE. EDGES OF MEMBRANE NOT TAPED
4. NEW GROUND-BEARING SLAB
5. FLOOR BUILD-UP TO SUIT
6. LINING BOARDS
7. ADJACENT EXTERNAL PAVING OR NEIGHBOURING FLOOR, LESS THAN 0.3 M ABOVE PROPOSED FLOOR LEVEL

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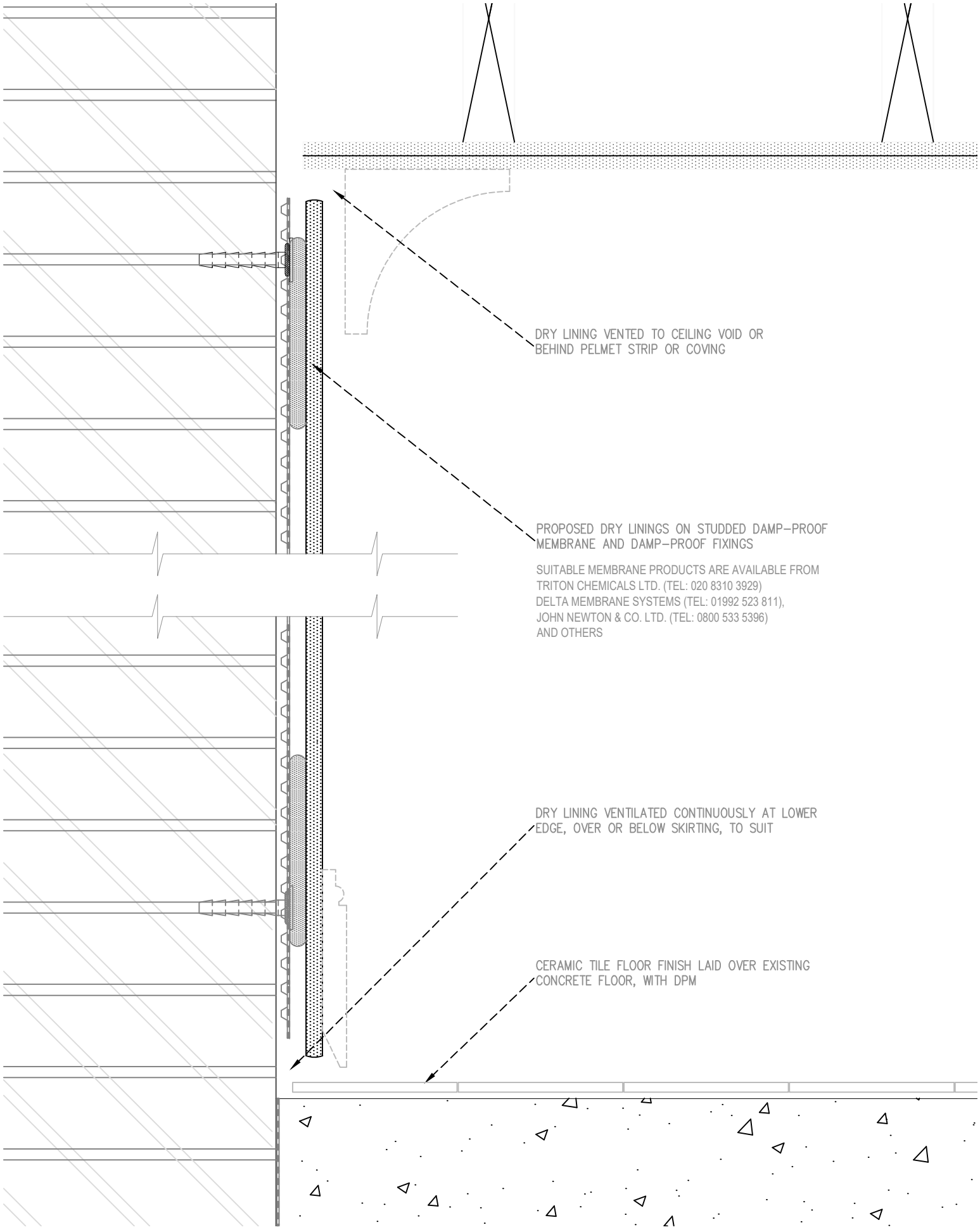

H+R

Ventilated dry lining

Internally vented, with studded plastic wall membrane

Indicative Only - Not for Construction

NOT TO SCALE

SD – 303F

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