

DESIGN STATEMENT  
ROOFS 5 & 6

41 - 43 HAY'S MEWS, LONDON

## Introduction

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The roofs have now been stripped as consented in 22/08168/LBC and 23/02878/LBC, fully exposing the condition of the existing roof timbers. All roof surfaces were exposed to inspect existing roof timbers and replace where necessary. During the works all roofs are to be insulated, felted and battened and existing roofing materials to be reinstated where possible.

The roof structures are fully covered by a temporary roofing.

Hutton + Rostron have been commissioned to undertake surveys on the existing timber condition and provide their assessment and proposals for the roofs.

From the investigations undertaken on site, the following items have been raised in terms of the condition of the existing roof:

- Historic alterations to rooms below roofs 5 and 6 have weakened the roof to the extent it could collapse.
- Roofs 5 and 6 have significant decayed timber due to historic water ingress, condensation and wood boring beetle infestation.
- Slates are in a poor condition generally across all roofs, and have been reused too many times to allow reinstatement. Refer to roof slate condition report for further information.

### Key Concerns

The current condition of roof 5 and 6 and structural issues have raised safety concerns of their stability. Immediate interventions and repair works are required prior to recladding.

The key safety concerns with roofs 5 and 6 are:

- Areas of the existing roof structure have been historically removed and the roof structure is no longer tied causing the untied roof to push out on the external walls. The external walls have been caused to lean and crack at lintel level.
- The purlin span is too large with no intermediate supports, due to historic changes in the layout of the walls beneath.
- The entire roof 5 structure is visibly racked, and the ridge board no longer secured off the masonry party wall to No42.
- Existing timbers are rotten to the extent that rafters have no fixings and limited bearings, purlins no longer have bearing ends and ridges are severely deteriorated beyond repairs.

There are safety concerns that roofs 5 and 6 are not adequately supported and as a result are pushing out on the external walls. This lack of support could lead to the roof and facades collapsing, potentially causing injury to people inside the building and also persons directly outside the property.

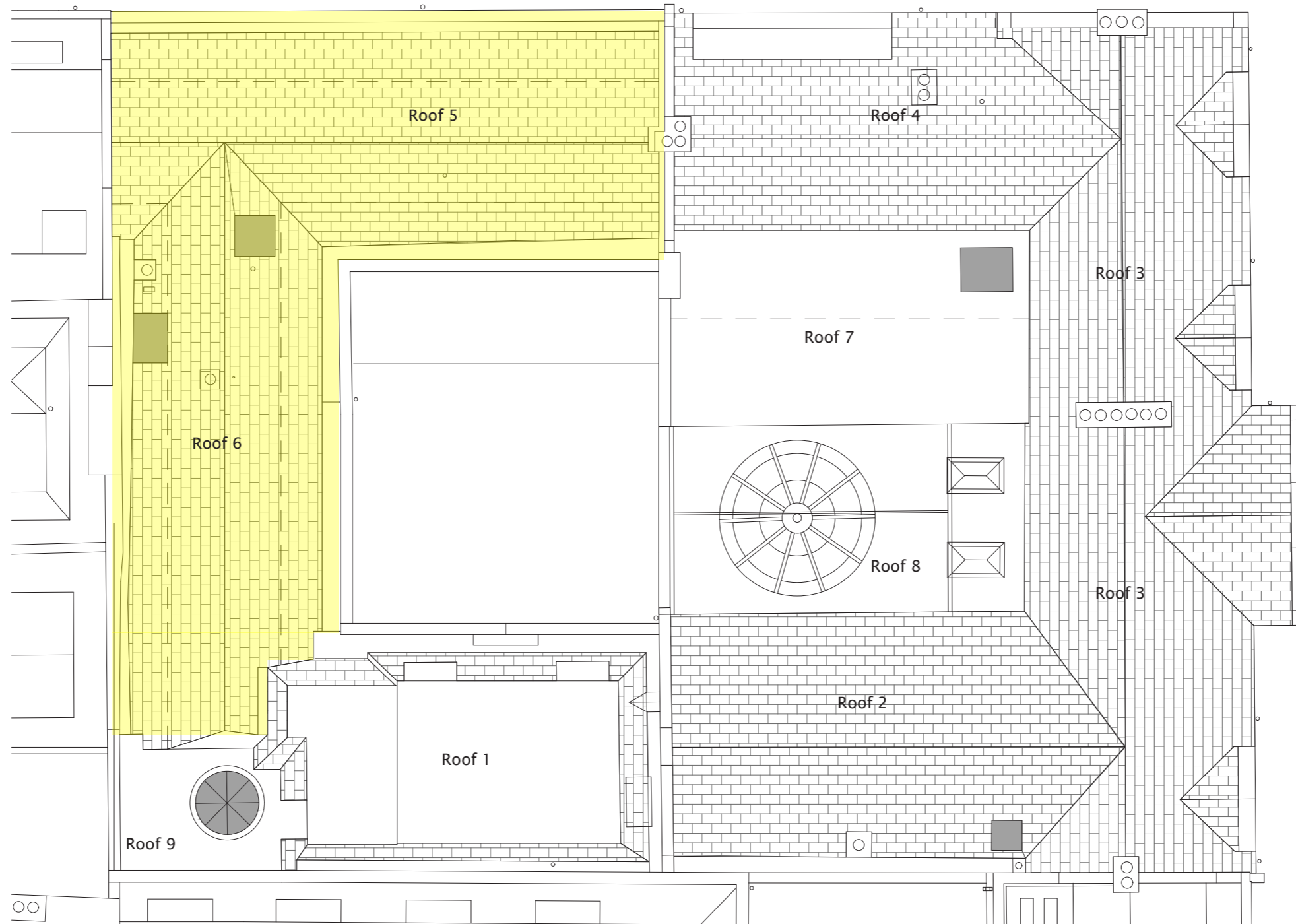
Structural interventions are therefore required to resupport the roof structure, as well as timber repairs to the existing roof. The structural proposals are attached to this application.

### Proposals

The proposed works are to repair the decayed timber elements, improve performance and resupport roofs 5 and 6 due to structural issues caused by historic works.

- The decayed timbers will be repaired where possible, with intermediate/ partner rafters installed where repairs cannot be made.
- Works to improve the performance of the roof are proposed to improve longevity of the repaired roof structure. This includes the introduction of sufficient ventilation to the roofs as consented in 23/02499/ADLBC.
- New structural steels are proposed to be installed to support the roof where historic alterations have weakened the structure and is causing safety concerns.

Application area  
Roof 5 and 6



Existing roof plan

## History of No43 Hay's Mews of roof 5 and 6

Roofs 5 and 6 are situated over No43 Hay's Mews and are of a 1930s construction. There are two late-20th century rooflights within roof 6 which are extremely bulky and there is already consent to replace the rooflights for slimmer, heritage style rooflights within 22/08168/LBC.

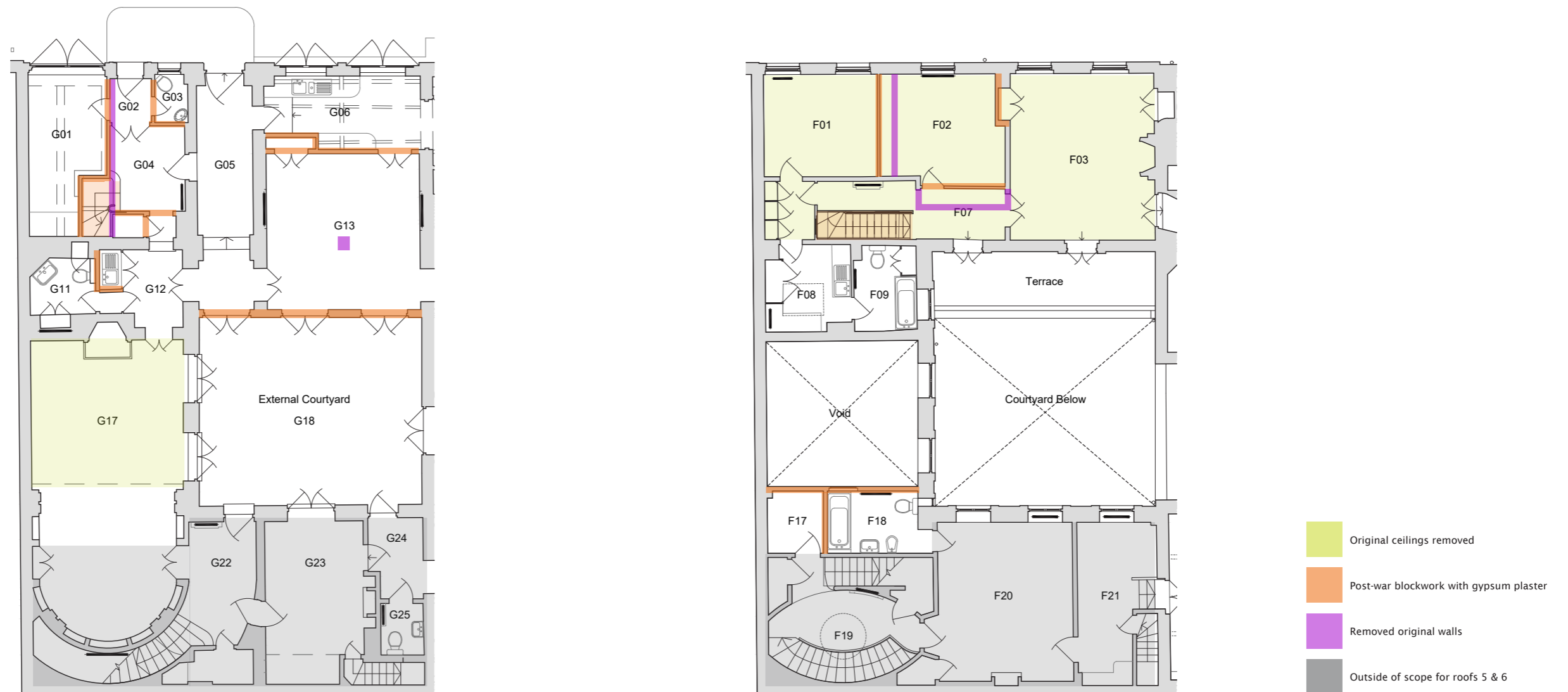
The rooms within No43 below roofs 5 and 6 have undergone substantial alterations as part of the late 20th century interior schemes. These included the 1980's works to form the double height drawing room space below roof 6, removal of the garage space and formation of kitchen and dining room at G06 and G13, and the reconfiguration of the maisonette flat to the front of No43 including the raising of original ceiling levels.

Historic structural alterations include the removal of the existing column from the existing garage to allow for the formation of the dining room (G13) during the 1980's amalgamation of 41-42 and 43 Hay's Mews. The amalgamation works also included the internalising of corridor G05 and creating the courtyard window doors from G05 and G13. This introduced a new transfer beam in lieu bringing additional load on the adjacent walls without sufficient foundations.

The staircase indicated on Hill's 1937 plan near its current location (stair 2), appears to have been altered as part of the 1950's Fowler scheme to improve circulation. The new double height space in the drawing room removed the link between the two first floor areas of No43. Originally the drawing room was a single height space with a room above, where partitions and flooring were removed to allow for the double height space. Staircase 2 is a mid 20th century insert into the building, which was carried out at the same time as converting the existing garage into an office space (G01) and the inclusion of a small WC (G03) adjacent to the entrance door.

The interior schemes of F01, F02 and F03 date from the mid 20th century. The ceiling level was raised in these rooms and existing tie beams cut. This affects the roofs ability to act as a trussed roof. The roof now thrusts outward, causing the external walls to lean and crack at lintel level. The presence of post-war blockwork walls in place of historic lath and plaster walls suggests the layouts have been altered, this can be seen in the partition between F02 and F03.

The historical alterations and their effect on the structure is evident now that the consented ceilings have been removed above F01, F02, F08 and F09 and the roofs fully stripped. There are supports for the purlins missing where historic walls were removed in previous schemes. As a result the purlins are spanning up to four times longer than their capacity. It has also been noted that the historic works undertaken at No43 Hay's Mews did not have sufficient underpinning works carried out, and as much the structure is now failing in these areas.



## Roof condition

Hutton + Rostron were commissioned to undertake a number of surveys, including roof timber condition investigations and visual roof timber strength grading. Following the consented removal of ceilings and fully stripping of the roofs, Hutton + Rostron were able to finalise their surveys and detailed inspection of rafters, purlins, collars and plate sections which revealed significant defects, most of which are structural.

The investigations determined that the roof timbers within roofs 5 and 6 were softwood, most likely to be European Redwood (*Pinus sylvestris*).

There is evidence of water penetration and wood-boring beetle infestation within the roof timbers. This is seen to be generally confined to the timbers of the earliest structures, roofs 5 and 6, where there are a number of structural concerns identified. There were a number of historic common rafters which were noted to have lost sapwood content resulting in structurally significant loss of the effective cross-section. There is no evidence of active wood-boring beetle within the timbers and the moisture readings are below 12%, however the structural damage remains. It is estimated that 40-50% of the common rafters within roofs 5 and 6 are effected.

There is structurally significant timber decay to the purlin bearing ends in roof 5 detected, where the purlins were fully embedded into the masonry. The decay does not extend beyond the embedment and the moisture readings were too low for further decay to occur. This is evident of historic issues with water penetration, likely from defective flashings above.

Significant issues to both the upper and lower rafters in both roof 5 and 6 were noted by Hutton + Rostron following their survey in December 2023, once the roof had been fully exposed. This includes loose and defected rafter ends, loss of cross sections and splitting.

There is evidence of historic rafters previously being replaced, assumed to be due to poor condition of the original rafters. This is mainly seen to the lower rafters in roof 6, but is also evident within roof 5.

### Ridge boards

The situation of the roof timbers creating conditions for mould, decay and infestation are likely due to poor detailing in the 1980s. This led to a lack of ventilation in the roof causing significant condensation on the roof timbers. The lack of sarking, racking boards, or diagonal timbers has likely led to the structure deforming under racking.



Historic rafters previously replaced, mainly to lower rafters in roof 6



Defected and splitting rafter ends, seen throughout roofs 5 & 6

## Existing timbers condition

The existing timbers in roofs 5 and 6 have evidence of historic decay and structural defects, leading to the requirement for a large number of timber repairs/ partnering repairs to be carried out.

The main issues with the existing roof timbers include:

- Historic alterations to the roof structure
- Decay to upper and lower timber rafters due to condensation, historic water ingress and wood-boring beetle infestation
- Decay to bearing ends of purlins where they are fully embedded into masonry walls
- Splitting to undersized ridge beam
- Racking and deformation of the structure

These issues are causing structural concerns to the building in roofs 5 and 6 and the areas below and structural interventions are required to support the roof and ensure the longevity of the building.



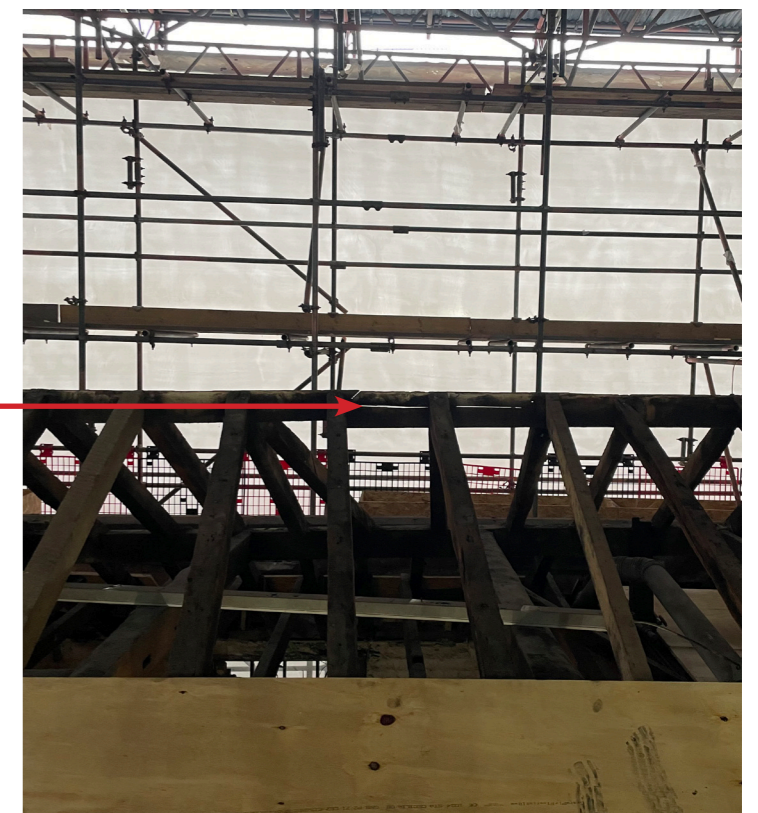
Bearing ends of the rafters have decayed in many areas, this is seen in rafters above and below purlins.

Historic partner repairs to rafters



Historic alterations to the roof, including ceiling raising and layout alterations

Ridge beam is in very poor condition and requires replacement.



## Existing slate tile condition

The existing slate tiles have been carefully removed from all roofs and are being stored on site. The majority of the existing slates have 4-5 holes up to 6mm diameter indicating that these have been reused multiple times already. These are no longer suitable for reuse as that would introduce further holes weakening slates to the extent they would snap and leak.

It has been advised that only a small number of the existing slate tiles would be able to be reused, and this would be limited to cuts at valleys and ridges.

The existing slate tiles are a mix of historic Welsh and newer Spanish slate tiles, with the majority being Welsh Penryhn Heather Red slates. This leads to a roof with an inconsistent appearance of browns, purples and greys.

The key issues with the existing slate tiles include:

- Most slates are seen to have 3-4 holes, indicating they have been reused multiple times already
- Delamination and fracturing is evident on the majority of the slate tiles around the holes
- Some slates have significant damage and are no longer full slate tiles.

Hutton +Rostron do not believe the existing roof finishes would be capable of providing an acceptable further service life in their current format and condition. They advise that the total refurbishment of roof finishes is to be considered.

*Refer to roof slate condition report carried out by Coniston Ltd for sample selection of existing slate condition.*



Existing Welsh slates with multiple holes



Proposed new Penryhn slate tiles

Roofs 5 and 6 require both timber repairs and additional structural works carried out to ensure the roofs are properly supported, do not pose a safety risk and protect the listed interiors.

### Repair proposals

Roofs 5 and 6 have evidence of historic decay, including water penetration and wood boring beetle infestation within the roof timbers. Where there are decayed timbers present, repair works are to be carried out.

The repair works proposed are as follows:

- Introduction of sufficient ventilation to the roof timbers through the use of deeper counter battens, ridge and layboard ventilators. A vapour control layer to reduce the quantity of vapour that can condense in the roof timbers. A low resistance breather membrane (felt) to allow vapour to escape and prevent rain ingress in the roof timbers.
- Existing terracotta ridge tiles are to be cleaned and reused on ridge ventilator as these are in a good condition. These are currently being carefully stored on site.
- Lower rafters are to be retained/repared, with partner/ intermediate rafters to be installed where required. Where ceilings are retained below, the rafters will be repaired in position to maintain soffit support. Any salvaged lower rafters removed will be numbered and re-positioned.
- Upper rafters are generally in a very poor condition, widespread replacement of rafters will be required. Any new timber rafters will be of Pinus Sylvestris to match existing timber.
- The existing ridge board is in a very poor condition with areas of splitting and disconnection recorded, the ridge board is also under sized which is potentially causing structural issues. It is proposed to replace the ridge board with an increased thickness to better support the re-instated roof coverings. The ridge beam thickness is to be to structural engineers calculations and details.
- Introduction of new purlin support frame with steel beam and props to tie the roof back together and mitigate the lateral strain on the building facades. All steel will be hidden above the ceiling finishes and within the partition finishes. Refer to structural engineers drawings for full information.
- Roof 6 purlins need re-supporting at bearing ends. Where purlin timbers have decayed, timber is to be cut back to sound material and re supported on steel brackets/shoes.
- New Penryhn Welsh slate tiles to be installed to all slate roofs to match existing, Penryhn Welsh slates.

### Structural proposals

Expedition have submitted structural proposals to deal with the structural issues caused by the current roof structure. The structural engineer's drawings and structural statement are submitted as part of this application.

The existing layout at ground and first floors below Roofs 5 and 6 have been historically altered and as such the roof structure is not sufficiently supported and this is causing structural damage to the facades. The structural proposals within roof 5 and 6 mitigate the issues caused, whilst working within the consented layouts.

General structural repairs and proposed support:

- Ridge board replacement with 150x50 C24 timber with strong-tie flat steel strap.
- Rafter replacement where required, to be agreed on site between structural engineer and main contractor. Replacement rafters to match existing.
- Ceiling joist replacement where required, to be agreed on site between structural engineer and main contractor.
- Replacement new Penryhn Heather Red slates to match existing slate thickness and therefore be weight neutral.
- Racking board screwed to top face of each rafter.
- New PFC fixed to existing purlins and new saddle beam and posts to support existing purlins. The new steel beams and columns will be concealed within ceiling and wall finishes, this allows for the current listed room form to be retained.
- Underpinning works for additional structure.

Underpinning is required for the proposed structural frame, This is highlighted on Expeditions drawing SK 209. The historic building works undertaken at No43 Hay's Mews did not have sufficient underpinning works carried out, and as such these are now required to allow for the support of the roofs above.

Where existing floor finishes need to be removed to allow for underpinning works, these will be carefully removed and re-instated following the works.

### Summary

The proposals outlined above aim to sympathetically repair the existing timbers, with existing rafters remaining in situ where there is a requirement for intermediates/ partner rafters. Where the existing roofing materials can be retained and reused, such as the terracotta ridge tiles, these will be reinstated. Any new materials will be like for like in materiality to match the existing.

The proposed works to improve the performance of the roof by introduction of sufficient ventilation has been consented in 23/02499/ADLBC, this will improve the roof performance and also reduce the risk of condensation within the roofs, and therefore help to prevent future timber decay.

Undertaking like for like repairs to the roof only will not fix the structural issues with roof 5 and 6 which have been discovered on site. To protect the building users and ensure the longevity of the building, structural interventions are required to support the roof where historical works have compromised the structural integrity of the roof. The proposed new steels will be hidden within the ceiling and wall finishes, therefore will not detract from the listed interiors.



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