

Report 222398/Rushford Hall/ Murfitt-1

CJ Murfitt Ltd

Rushford Hall

EUSTON, THETFORD IP24 2SF (GB)

Report number: 222398/Rushford Hall/ Murfitt-1

Date: Monday, April 03 2023

3rd April 2023

1. Introduction

Thank you for inviting me (Harper Building Diagnostics) to visit Rushford Hall to assess the condition of a hip rafter. I was contacted by Neville Burniston of Andrew Firebrace Partnership Ltd and invited to provide a fee proposal for evaluating the extent and severity of decay affecting a hip rafter, and to assess the condition of any other timber components requested at the time of my visit. My Fee Proposal *222398/Rushford Hall/ Murfitt* was accepted and we arranged to meet at Rushford Hall on 24th March 2023.

2. Summary

I arrived on site on a clear and dry day during a period of unsettled and wet weather, where I was met by Neville Burniston and Russell Murfitt (CJ Murfitt LTD), who proceeded to show me the defective hip rafter and several other areas of potential concern.

I began with a visual assessment of the subject timber components before evaluating the wood moisture content of members and undertaking microdrill testing.

I used a resistance-type moisture measuring device to evaluate the wood moisture content (%WMC) of timber components and found most readings to be high, which is likely to reflect seasonal atmospheric conditions, due to the roof structure being currently exposed. I would expect moisture levels to recede as the seasons become drier and refurbishment works progress and the roof is recovered.

I noted Common Furniture Beetle damage (CFB) on the sapwood portion of some roofing components, however the activity was historical and is thought to be of no structural significance.

Timber Decay Guidance Note

For guidance, timbers with a wood moisture content above 20% are deemed at risk from fungal infection, although fungal initiation requires 27-30%WMC (approx. fibre saturation point, species dependent), and other aligning environmental factors (including temperature and air movement), to facilitate the fungal infection.

However, wood boring beetles are able to develop in timbers with much lower moisture levels, needing moisture levels to be maintained below 8-14% for eradication (species dependent). Therefore, although the environmental control of fungal infections is usually achievable, the environmental control of beetles can remain a more challenging proposition, especially for those sections of timber components embedded in masonry walls.

2.1 Northeasterly Hip Rafter, Wall Plate and Dragon Beam.

Hip Rafter

The lower section of the hip rafter (between earlier building and later addition), has suffered from an unidentified white rot infection and although the decay appears historical, it has caused significant cross-sectional loss. I tested the section of timber with a microdrill decay detection device and found low resistance (indicative of decay) in the lower 1100mm of the component, with the decay extending approximately 60% down the cross-section (from the upper face towards the bottom face). The component requires repair/support.

Dragon Tie

Although there was insufficient access to test the condition of the diagonal dragon piece (where the foot of the hip rafter connects), probing with a blade revealed that the end of the piece was severely decayed at its joint with the wall plate. This component will require repair.

Wall Plate

I also found the wall plate to either side of the hip rafter to have also decayed, with a section of the newer plate to the left of the hip rafter having decayed 450mm and an 800mm section of the older wall plate to the right of the hip rafter also having rotted. The decayed sections of the plates will require replacement.

2.1.1 Recommendations

As discussed, the lower section of hip rafter requires repair, as does a section of wall plate either side of the hip rafter connection. Also, the end of the dragon piece requires repair. Considering that these three components are interconnected, the repair needs to be also considered holistically.

While the hip rafter receives some support from a bedroom stud wall, further support may be necessary to ensure the rafter does not move and remains stable during repair.

Repair Options

Hip Rafter

Having considered the configuration of the hip in relation to access and realising a repair, the following repair options are provided for consideration.

i) Steel/Timber Reinforcement

As there appears insufficient sound material in the lower section of the hip rafter to be able to bolt/fix through, it seems that any steel support would need to cradle the rafter rather than working as a splint/partner.

ii) Timber-Resin Splice

Another option would be to remove the rot-damaged lower section and perform a timber-resin splice, that is to insert steel or glass fibre rods into the retained section of the hip rafter, which would then connect into a new section of species-matched timber to realise the repair. This repair method would optimise access for the repair of the wall plate and dragon diagonal piece.

iii) Steel-Resin Reinforcement

Cut a channel in the upper face of the existing beam, extending from the foot to approx. 1500mm (design dependant), insert steel bar or glass fibre rods and fill with structural pouring grout. This repair option retains most historical material.

Wall Plate Repair

The decayed sections of wall plate are actually two separate ends from different periods of the buildings development, and are different widths and appear to be nailed where they join rather than benefitting from a more robust carpenters joint. Consideration will need to be given to connecting new pieces to the retained sections of the respective wall plates and to the joint between the two plates (beneath the hip rafter/dragon piece).

Dragon Piece Repair

It appears that the outer end of the dragon piece will require repair (where it connects to the wall plate), however as this component is exposed to a thrust force, replacement may provide a more reliable solution.

2.2 Northwesterly Hip Rafter, Wall Plate and Dragon Beam.

I noted some surface decay towards the foot of this hip rafter, however access was limited here, and I was unable to test with the microdrill. That said, using a blade I was able to establish that a 65mm approx. band of decay had damaged the base of the hip rafter where it connects to the dragon tie.

Although I was unable to establish the condition of the adjacent wall plate or dragon tie components, it is thought likely that they have also been affected by the decay that caused damage to the foot of the hip rafter.

2.2.1 Recommendations

This area will require further investigation to establish condition. A common rafter may need to be removed and leadwork peeled back to facilitate access.

2.3 Rafter Repair

I noted the end of an intermediate rafter to have white rot damage towards the foot. The decay extended approximately 80mm deep into the easterly face and 180mm up from the rafter foot. The decay appears historical.

2.3.1 Recommendations

I recommend that a new section of timber is fixed to the side to partner the existing component.

Observations

Roof Structure

Significant Defect Encountered 1.1 Northeasterly Hip Rafter



Figure 1: Showing defective hip rafter.



Figure 3: Showing defective section of wall plate.



Figure 2: Showing defective section of wall plate.



Figure 4: Recording wood moisture content.



Figure 5: Recording wood moisture content.

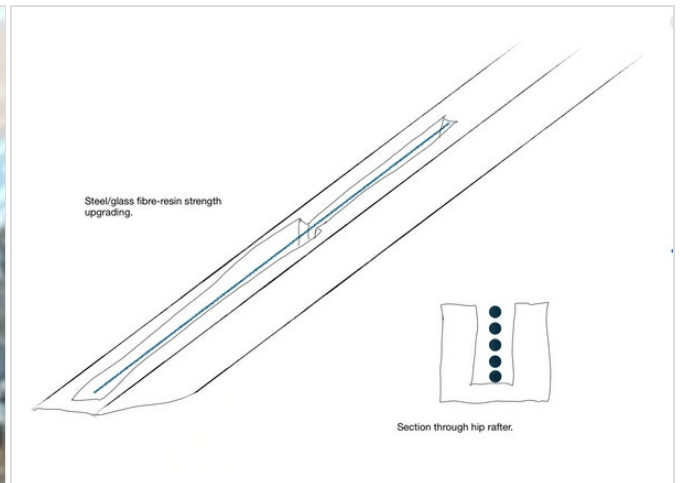


Figure 7: Showing example of steel-resin upgrade.

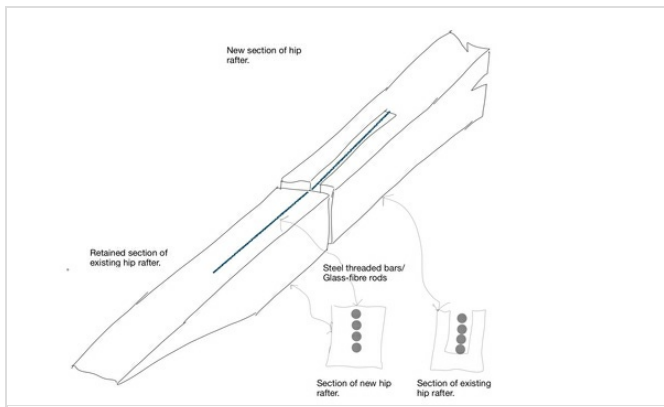


Figure 6: Showing example of timber-resin splice.

Significant Defect Encountered 1.2 **Northwesterly Hip Rafter**



Figure 8: Showing northwesterly hip rafter.



Figure 10: Showing position of decay identified thus far.



Figure 9



Figure 11: Identifying rafter.



Figure 12: Showing area of decay.

General conditions

Disclaimer: Site visits performed by Harper Building Diagnostics (HBD) under this contract have been conducted under the limited conditions described below:

While we employ the most appropriate and informative investigative techniques, no such techniques can be 100 per cent reliable.

Only those structures and components assessed are described in this Report, and no liability can be accepted for defects that may exist in other parts of the structure or elements not assessed. Therefore it must be accepted that defects could be present in any concealed, covered, or other inaccessible area, and anywhere not assessed.

HBD does not accept any liability for loss or costs associated with undertaking this instruction.

This Report does not constitute a remedial or repair specification.

Information contained in this HBD Report has been prepared to the best of our knowledge according to observable conditions at the site. This information will be approved record unless written notice to the contrary is received within seven (7) calendar days of the issue date of this document. Written corrections shall be reported to Lee Harper at HBD. Oral rebuttals will not be accepted.

Significant Defect Encountered 1.1 Northeasterly Hip Rafter



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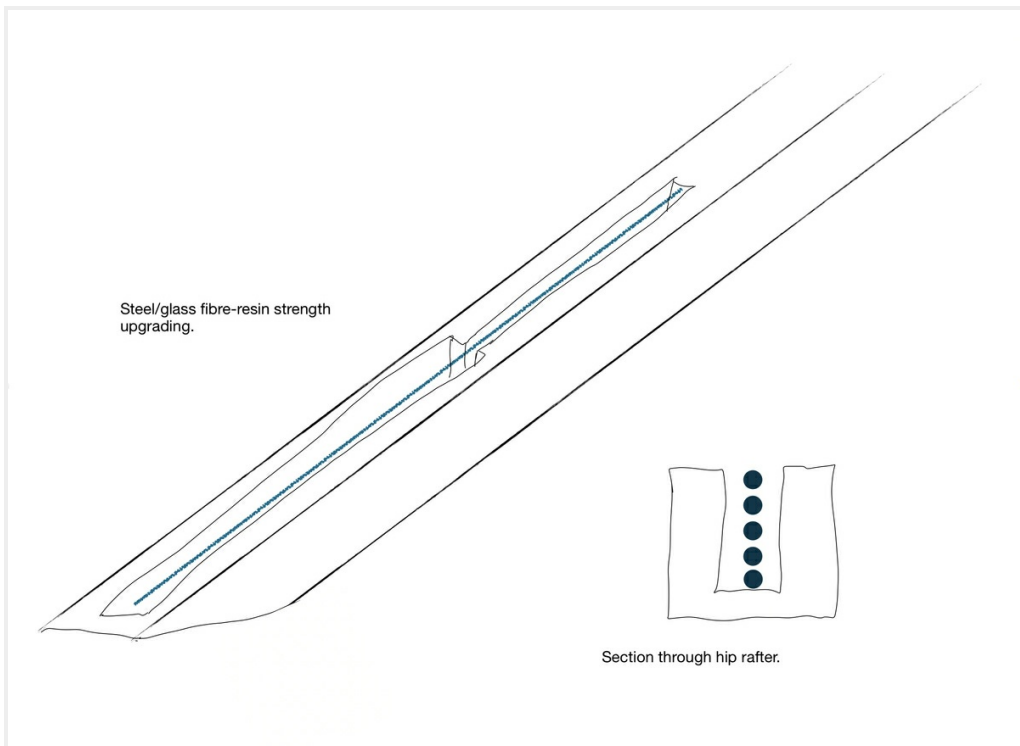


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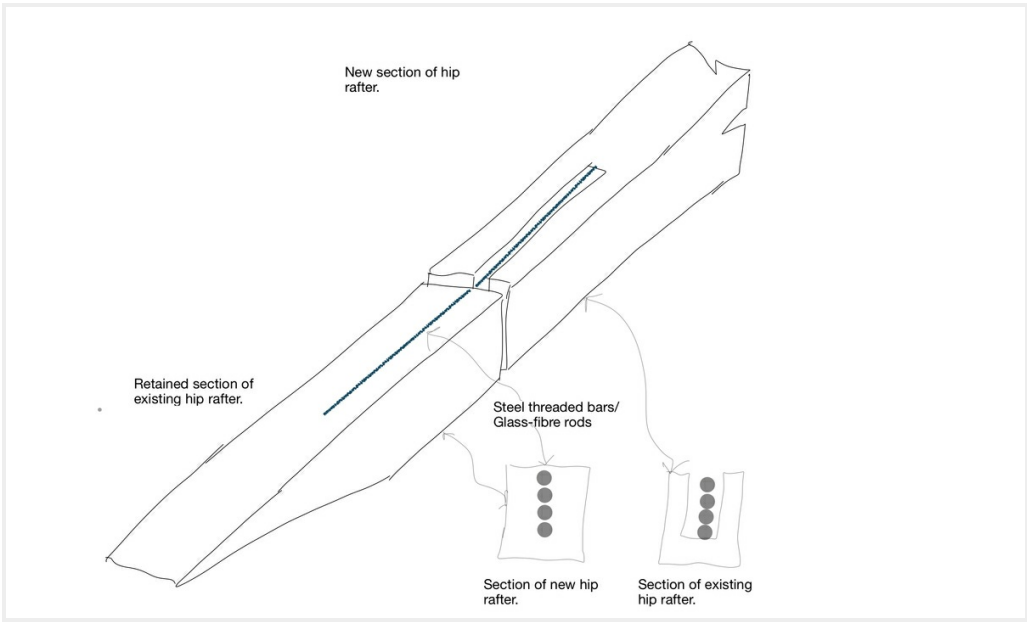


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Significant Defect Encountered 1.2 Northwesterly Hip Rafter



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Figure 9



Figure 11: Identifying rafter.



Figure 12: Showing area of decay.

Observation summary

Roof Structure

Significant Defect Encountered 1.1 Northeasterly Hip Rafter

Significant Defect Encountered 1.2 Northwesterly Hip Rafter

Significant Defect Encountered 1.3 Intermediate Rafter