MasonClark Associates

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For the attention of Ms Katrin Dietrich

Oakwell Hall, Batley
Design approach for the structural repairs of the roof and ceiling above room 105 GAL

Dear Katrin

Mason Clark Associates (MCA) was commissioned by AHR Architects Ltd., on behalf of Kirklees Council, to provide structural engineering services from RIBA Stage 2 to Stage 6 for Oakwell Hall, Nova Lane, Birstall, Batley WF17 9LF.

A visual, non-intrusive inspection of the timber roof and ceiling structure above the Main Hall, staircase 118 CIRC, corridors 101 CIRC and 104 CIRC, and rooms 119 GAL, 103 GAL, and 105 GAL was carried out on 24 February 2026. It was conducted with harnesses and ropes and accompanied by a technician trained in rope access.

Based on the new findings of the inspection, we can now propose more detailed repair solutions to address the defects observed in room 105 GAL.

Considering the addendum to the submission for Listed Building Consent, please find below the considerations included in the development of the proposed structural repairs of the roof and ceiling above room 105 GAL, including alternative solutions that were considered and then excluded from the design.

Overall, the proposed repairs to the roof structure concern mostly scarf joints and local steel plate repairs, with the exception of the repair proposed for the roof above room 105 GAL, which requires more intrusive interventions. The existing timber purlins exhibit significant deflection, and timber posts were added at a later stage (they do not appear to be original) to provide intermediate support. These posts transfer roof loads (point loads) to the existing ceiling beam.

Structural assessment of the ceiling beam, just considering the plastered ceiling weight and an imposed maintenance load, shows that the beam is compliant in terms of capacity, but it already exceeds serviceability limits (Span/250 and 14mm). Hence, the plaster will most likely crack from ceiling loads alone, and this is currently worsened by the ceiling beam carrying roof loads.

In addition, the ceiling beam shows decay at both bearings, and repairs will be required; however, the exact extent will be determined once the roof slates are removed and the bearings can be fully exposed and inspected.

There are several constraints to carefully consider, including the existing ceiling joists, the plastered ceiling, and the limited space at the eaves level due to the pitch and configuration of the roof.

We propose to form a king post truss using the existing ceiling beam as a tie beam to improve the structural performance of the existing purlins and ceiling beam. The other truss elements would also be in oak, with sections similar to the existing ones. The sizes of the new truss elements can be adjusted to better suit timber availability and reduce the risk of programme delays caused by procurement.

The truss can provide intermediate support for the purlins currently provided by the timber posts and can also mitigate the deflection of the ceiling beam. We believe this truss-based approach is preferable as it integrates more sympathetically with the existing structure, is less visually disruptive, and is reversible.

To address the ceiling beam bearing repairs, we propose a preferable solution and one alternative for consideration that will depend on the extent of decay at the bearing. These solutions have been developed to be carried out mostly from above, causing minimal disruption to the lath and plaster and ceiling joists, and with guidance from existing literature such as “Practical Building Conservation: Timber”, English Heritage, 2012.

In addition, the current proposal includes installing two additional purlins to reduce the load on the existing purlins. We also propose installing timber fillets on the top or sides of the existing ceiling beam, if required, to further mitigate deflection or improve the beam's bearing area.

Before reaching the current proposal, we considered alternative solutions and developed them to varying degrees to assess their feasibility in terms of construction and structural performance. The following solutions have been considered:

A. Installation of additional ceiling beams to mitigate deflection of the plastered ceiling – Although feasible, to install two additional ceiling beams parallel to the existing, the existing ceiling joists would have to be cut and then supported on the new ceiling beams by creating pockets or using joist hangers. This would most likely require extensive repairs to the lath-and-plaster ceiling.

   The new ceiling beams could not be installed above the existing ceiling joists because they would not have sufficient bearing length on the wall.

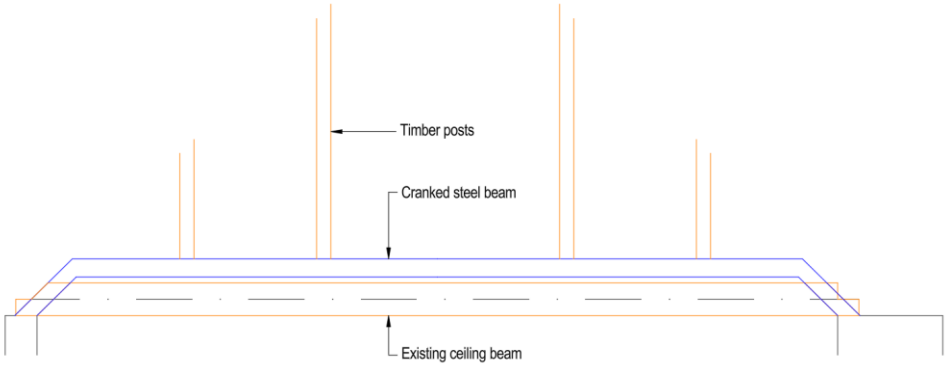
B. Strengthening of existing purlins and installation of additional purlins to allow the removal of the posts – In this configuration, the purlins would span between the SE gable and an existing truss without any intermediate supports.

   The excessive deflection of the existing purlins makes it challenging to strengthen them with side-by-side purlins; hence, they would most likely have to be strengthened with steel profiles on the underside, which would create challenges to connect them to the timber truss.

   The new additional purlins would also be deeper (more than 350mm deep) than the existing principal rafter of the truss. Therefore, the support of the purlins on the truss side would have to be provided using joist hangers. The significant size and length (approximately 5m) of the new purlins would make them difficult to manoeuvre and install.

C. A + B to mitigate deflection of the plastered ceiling and provide the roof structure with enough capacity

D. Installation of one or two cranked steel beams adjacent to the existing ceiling beam to support the posts and existing ceiling beam – The idea behind this solution was to minimise the disruption of the ceiling joists and lath and plaster ceiling by providing new raised steel beams spanning above the ceiling joists that could support the timber posts and ceiling beam. A preliminary assessment showed that the steel size required would not fit the available bearing length on the walls.



E. Installation of steel beams to provide support for the timber posts (and purlins) and ceiling beam – We started developing this solution since it had the advantage of addressing both the issues with the ceiling beam and purlins. Therefore, we have considered installing four new steel UB 203x133x30 ceiling beams, grade S355, spanning between the existing truss and the SE gable, approximately 5m long, and creating pockets at the truss and gable for the bearings. At this point, it is difficult to say, but creating the pockets in the truss could be particularly challenging due to timber diagonals and lath and plaster panels. In addition, further assessment showed that this would impose a significant load on the tie beam of the existing truss, and it would most likely require strengthening of the existing truss connections with steel plates.

   In this solution, the existing posts could be retained and cut to suit the level of the steel beams, then fixed with steel angles (2no. per post, total of 8no.). New posts could also be included to better distribute the load on the existing purlins and steel beams. To hang the ceiling beam from the new steel beams, 90x150x10 unequal-angle steel sections were being considered. They would likely have to be welded to the steel beam and bolted to the timber beam with 2no. M12 bolts.

   This solution would not interfere with the ceiling joists or the lath-and-plaster ceiling; Hence, it was carefully considered. However, there would be a loss of fabric and intrusive works to the existing truss and SE gable. In addition, there was the challenge of manoeuvring and installing the steel beams.

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I trust that the above is of use, and I would be pleased to review or discuss the details as required.

Yours sincerely

Susana Moreira PhD, CEng MICE
Senior Structural Engineer