

Our Ref: 309581/AS

Architectural Association – Refurbishment – Lecture Hall Works

Structural Engineer Supporting Statement

This note relates to the proposed works at the Architectural Association in 34-35 Bedford Square for the Library and Lecture Hall refurbishment works. Harley Haddow have been appointed to provide structural engineering support and have conducted an appraisal of the existing structure for the new loading proposed to the library area and new high level acoustic panels and AV equipment within the lecture hall space.

Following our analysis of the existing structure we have determined strengthening works are required to the historic timber floor structure of the Grade 1 listed building. The strengthening works are required to the primary beams only to enhance structural capacity and control deflections.

The existing arrangement is understood to be a complex arrangement of primary timber beams spanning between the front façade and internal masonry walls. These beams support the floor joists which span perpendicularly to the primary beams. Secondary beams span parallel to the floor joists and are positioned at third points and are supported by the primary members. These secondary beams provide support to the ceiling joists which run parallel to the primary beams and under the floor joists.

The arrangement is illustrated below.

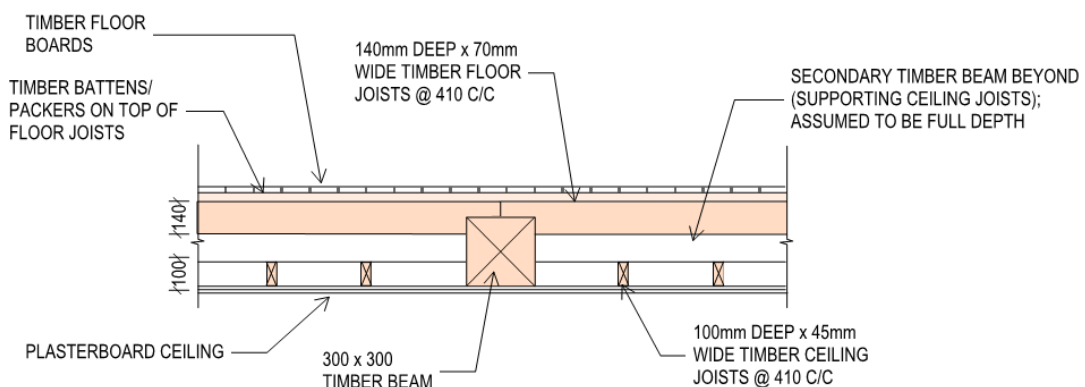


Figure.1 Typical arrangement of primary and secondary beams and floor and ceiling joists



We have undertaken an option appraisal for the required strengthening works which has considered the form and nature of the listed building, site constraints, design constraints and other factors present within the space and building. Options considered and presented follow good conservation practices which are reversible, can be read as modifications to the original historic fabric and are practical and constructable.

Several options considered were dismissed due to existing site conditions or design constraints. These included the introduction of plates to the side of the primary timber beams, which were too large to install without cutting into the existing floor joists, which in turn would require extensive temporary works and would be non-reversible. We also proposed the introduction of new downstands to support the existing beams, however this was not achievable due to the architectural impact and the impact to the acoustics within the lecture hall.

We have therefore proposed two options, for the strengthening works (see drawing 309581-HAH-XX-XX-SK-S-016 P01). The first which would require access from above the beams requiring strengthening would introduce a new steel plate fixed to the top of the existing timber beam. This robust solution would allow for a continuous element to be added to help control deflection, and the composite member would be uniform across the full length of the beam.

The second solution would introduce steel PFCs to be fixed to both sides of the existing timber beam, between the secondary timbers. The PFCs will not be continuous due to the existing full depth secondary timber beams which interrupt the new steelwork at approximately 1/3rd spans. We are proposing to link the PFCs with steel plates that under-sail the existing secondary beams to connect the tension flange of the PFCs to allow these members to work together.

There are examples of the same or similar strengthening techniques used in other buildings within the AA. Examples of timber beams strengthened with a top steel plate are present in 32 Bedford Square, as well as strengthening using PFCs bolted to the sides of timber beams. These examples are noted in record structural drawings of the building, as shown below.

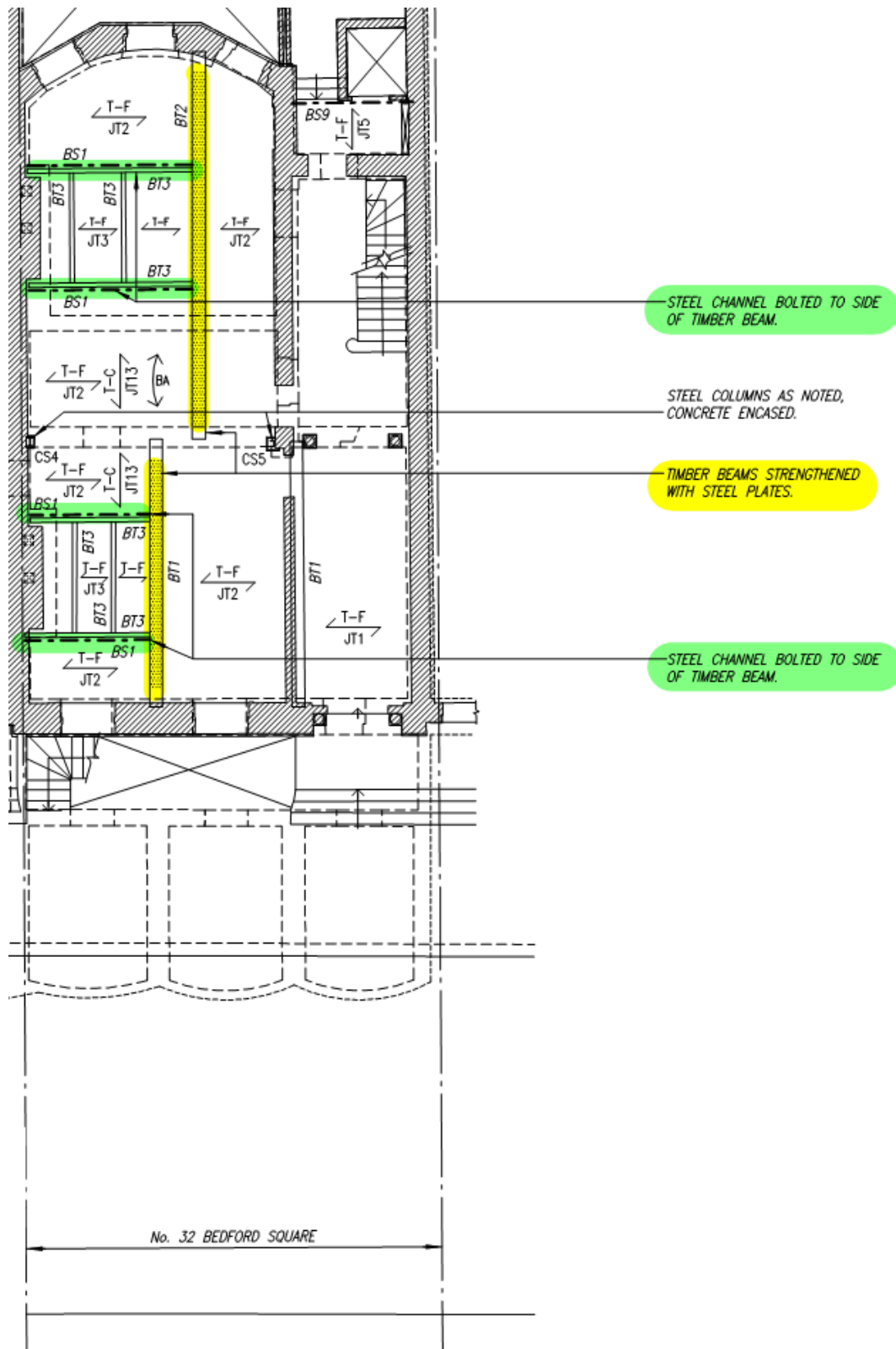


Figure 2 - Extract from record drawings of the AA