

weston hall • weston on trent
discharge of planning condition 3:
confirmation of roof structure repairs and interventions



weston hall

30 August 2019

Rev A

WESTON HALL
WESTON ON TRENT

RE-ROOFING, STRUCTURAL REPAIRS & ASSOCIATED
WORK

**discharge of Planning condition 3:
confirmation of roof structure repairs and interventions**

Revision	Date	Clauses amended
First draft for comments	30/08/2018	
Rev A	02/10/19	2.3

C O N T E N T S

A	Introduction
B	Justifications and cross referenced material
C	Site photographs

A I N T R O D U C T I O N

- I.0 This document provides information relating to the confirmed scope of structural repairs and interventions proposed at Weston Hall, following on site discussions on the 29/08/19 between Alan Staley of ASBC, Jamie Mayers of Peter Rogan & Associates and James Bate, the Conservation Officer for South Derbyshire District Council.

B CONFIRMATION OF WORKS

2.0 Justification of works and repair/intervention types

2.1 *New structural supports and propping - steel supporting structure and concrete lintels/padstones*

repair type/references: new propping steels under attic floors

description: a new supporting steel 'armature' has been inserted beneath the existing attic floor – new primary steels have been inserted to split the span of the secondary beams spanning between the primary beams and prevent further deflection and movement in the structure. In addition to this propping timbers on top of the new steel beams have been installed to prop the roof purlins at mid span to prevent further deflection in the timber and increase the overall rigidity of the roof structure.

justification: the existing structure was found to be generally under sized for the spans and loadings of the building, this has been exacerbated by structural movement reducing the bearings of tenons into mortices at beam and joist/wallplate junctions. Insertion of a new steel structure, though drastic, is a legible and 'honest' method of stopping further movement and remedying the historic insufficient bearing capacity of the structure. A variety of ironmongery repairs already present at Weston Hall attest to previous phases of repairs of a similar nature.

repair type/references: steel plate bracket repairs to beam and joist junctions, wallplate bearings

description: new steel plate brackets at beam to beam junctions and joist to beam junctions

justification: beam tenons were losing their bearings in a variety of locations due to structural movement – in some cases half of the bearing of the tenons had been lost. In order to retain the structure in the current position but remedy the loss of bearing, steel plate fixings are proposed – this suits the structural aims of the project and forms a legible new set of repairs, following several previous stages of ironmongery repairs at Weston Hall. In a similar manner, saddle type repairs are proposed at joist to beam junctions, where the existing joist end tenons are losing bearing in the mortice into the secondary beams.

repair type/references: new steels to support stair cheek walls

description: new steel beams with a bearing plate above to bear the bases of the 'cheek' walls to the stair dormer – previously supported on timber rafters.

justification: the ends of the masonry walls were previously precariously balanced on timber beams – given the condition of the timbers and the fact that sufficient support was not really given it was decided that the cheek walls would be partially rebuilt to bear directly onto new steels at attic floor level. Though not as originally built and an intervention into the original fabric (though the exact date of this construction is hard to tell it is probably original) – the arrangement and condition of the construction as found is hazardous and threatened collapse if not remedied.

repair type/references: consolidation and structural tying of gable walls – rebuilding of poor condition masonry, high level stainless steel strapping to rafters

description: The engineer has specified a series of stainless steel straps that tie the high level gables back into the existing roof structure.

justification: the existing gable top masonry was found to be in a very poor condition, resulting from both poor initial construction in that the bricks are a poor quality and patchily fired, porous type and the workmanship was low quality; also structural movement and water ingress washing out original bedding mortar results in unstable fabric at the heads of the gables which needs to be rebuilt in order for new tying back works to be effective. The amount of lean on the high level gables from string course to gable top is pronounced and worrying, there is a lack of purlins etc in the existing roof structure currently tying the gables back and preventing further movement, given this a solution was urgently required, with metal plates rather than extending the existing historic purlins seen to be the most direct and legible manner of providing appropriate high level support to the gable walls.

repair type/references: pattress plates to tie gable walls in to new steelwork supporting attic floor.

description: the opportunity was taken to better tie back the structure of the end gables at attic floor level by introducing pattress plates tying into the new steels supporting the attic floor via pattress plates tied through the wall with metal bars. The pattress plates proposed by the engineer Redgwick 'Button' type plates - they occur in 7 no. locations adjacent where internal secondary steels supporting the attic floor are built into the gable walls. The plates are 250mm diameter and in black painted ductile iron. Indicative elevations and an engineer's detail are submitted with the application for information.

justification: the high level east gable has already had previous pattress plate repairs (in this case cross form) – so a precedent for similar ironmongery repairs to the structure is established, as well as evidence of historic movement. The amount of lean in the gables is noticeable and worrying given that all the gables are over busy areas of the venue below, so urgent structural stabilisation is required. Alternative methods of tying the masonry together using resin-fixed bars to create masonry beams and grout anchor stitching in the masonry were considered, however pattress plates were decided to be the most appropriate method of repair as they

are more reversible than creation of masonry beams/invasive grout anchors etc and they are an honest, legible repair of a type that has already historically been used at Weston Hall.

repair type/references: new concrete lintels to replace failed flat brick arches

description: Naylor pre cast concrete lintels have been used to replace failing flat brick arches

justification: the original depth of construction did not allow sufficient height between the window head and the floor beam above the whole assembly for a structurally sound arch (even a flat brick one) to transmit loads to the jambs efficiently – as it was the arches were noted to be in a perilous state and on the verge of failing. The solution to replace in concrete is an honest repair and one that remedies the defects of the previous construction – in that there simply wasn't space for an effective arch to be formed in the space allowed.

2.2 Timber to timber repairs, modifications and replacement

2.2.1 Wallplate replacements

description: replacement of external wall and spine wall wallplates where water ingress had caused extensive decay, particularly under the valley gutters.

justification: the extensive decay of the existing wallplates necessitated replacement – the most severe decay was under the valley gutters – wallplates here were entirely replaced due to the extent of the decay. Localised external wall wallplate repairs were also undertaken. Repairs were timber-to-timber repairs in air-dried Oak, with the profile of the new timbers to match the existing. Refer to the construction issue schedule of works for confirmation of quantities.

2.2.2 Truss bottom cord repairs and replacements

description: replacement of 2 no truss bottom cords

justification: the existing truss bottom cords were exposed to long term water ingress due to their position hard against the rear face of the gable walls – this lead to severe decay and required replacement of the timbers in their entirety. Replacement with timber to match as closely as possible the original timbers was decided as the most appropriate solution in order to best maintain the structural legibility and integrity of the end trusses. Air dried oak was sourced to replace the decayed truss cords.

2.2.3 Rafter end modification

description: the existing rafter ends had spliced on timbers at the external wall junction to suit the tile format roof.

justification: the insertion of new timbers allows the roof to drain effectively and enhances the robustness and weather proofing of the roof construction – which safeguards Weston Hall for continued occupation and use. The existing rafter format dates to the 19th century installation of a slate roof, as such modifying the 19th century rafters has an impact in a less noteworthy element of the structure.

2.2.4 Valley gutter board replacements

description: replacement of the existing valley gutter boarding

justification: The existing valley gutter boarding was unrecoverable due to damage from decay due to years of water ingress, thus will be replaced. Where possible the existing roof valley boards will be re used in order to preserve roof fabric in situ on site.

2.2.5 Attic gypsum plaster floor

description: The existing gypsum plaster floor at attic level was removed to allow access to repair the roof structure. A proportion of the material was crushed and store off site for re integration with a new gypsum plaster floor in future, as is best practice for this construction type.

justification: the beams supporting this floor were the bottom cords of the roof truss, so its removal was unavoidable. The priorities of the project are re roofing and urgent structural stabilisation, so unfortunately the project budget would not support the replacement of the floor in this phase.

2.3 New access roof lights

2 no new 'Keylite' in-line conservation top-hung access/emergency egress type roof lights are proposed to allow access to two parapet gutters and outlets that do not currently have safe access afforded to them by the roof arrangement. The proposed units are 550x980mm outer frame size, with a minimal protrusion (approx. 70mm) from the surrounding roof tiles.

2 no 'keylite' conservation rooflights with PPC aluminium external finish are proposed, fully weathered into the adjoining roof and gutter finishes – these will be hidden from ground level by the angle of the roofs and their height, as well as adjoining parapets and chimneys.

The new access routes via the rooflights are positioned to be invisible from ground level, thus do not affect the visual character of Weston Hall and provide an important access for maintenance for two parapets which are both inaccessible for safe routine maintenance currently and vulnerable to water damage when blockages of the outlets cause backed up water to master the gutter tops and adjacent flashings. Historical damage of this nature is evidenced by decayed wallplates and rafter ends below these gutters/outlets and general

rainwater staining to wall finishes inside the building below their positions. The new rooflights require the limited removal of existing rafters to allow framing out of the new hatch openings (the structural openings of the proposed hatches are 600x600mm) - however the machined, regular appearance of the rafters indicates these are later 19th century fabric, thus less significant than the primary timber structure and masonry walls. The smallest possible hatches have been selected and positioned such that loss of historic fabric is minimal.

3.0 Cross referring information

Please refer to the following information submitted with this application:

- ASBC Ltd schedule of works and variations: "ASBC Weston Hall Pay-App 06 redacted.pdf"
- Structural Engineer's details: 24-1166-100; 24-1166-200; 24-1166-201; 24-1166-202
- Capstone Engineer's structural report -
- Peter Rogan & Associates 'contract issue' drawings

