Visual Structural Assessment Report

For

Alana Marie Chalmers

Church Cottage
Market Place
Castle Coombe
Wiltshire
SN14 7HT

PRO Structures Ltd
The Old Bakery
11a Canford Lane
Westbury-on-Trym
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BS9 3DB

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Report Q3033 – R01

1.0 Brief

PRO Structures Limited was instructed by Alex Hoda of Studio Hoda (the client's agent) to undertake a visual structural assessment report survey of Church Cottage, Market Place, Castle Coombe making particular attention to the existing loft area structural integrity which the client proposes to refurbish.

The site visit was carried out on Thursday 10th August 2023 by Ron O'Connor, Managing Director and Cedric Wierzchowski, Senior Engineer, of PRO Structures Limited. The time of inspection was 14:30hrs.

2.0 History of the building and local site conditions

Church Cottage is a Grade II listed building located adjacent to the parish church and opposite the fourteenth-century market cross in the heart of the village of Castle Coombe.

3.0 Description of the building

This three-storey residential building is visually unique from the other residential buildings in the area as it does not have a historic split stone roof tile cover but strangely utilises double roman clay roof tiles. (Photo 1) It utilises predominantly suspended timber floors (bar the kitchen area), loadbearing masonry walling and a cut timber roof with some historic timber roof trusses. There is a catslide roof to the rear elevation above the dining room and kitchen.

In recent months, a burst pipe below the loft bathroom floor area occurred which has caused severe water ingress to the building below bedroom 3's ceiling. This defect has been rectified via internal drying out of the water affected structural elements.

At the time of our visit, the structural timbers which had experienced this water damage had adequately dried out so as not to affect the current structural integrity. The client proposes to modify the current loft area for guest accommodation and to this end they are requesting us to review the current structural integrity of the roof to address the proposed modifications.

4.0 Structural Observations

4.1 It is clear from our evidence of the timber loft structure support, that the existing roof has been made up of a variety of different timbers of very historic green oak truss support members (3No. at an average of some 2.7m centres) and roof purlins, with historic timber rafters and relatively new stress graded cut timber floor purlin and rafter members.

It is also noticeable that historic roof member/modifications have been attempted to try and strengthen some historic members so they may remain part of the roof support mechanism (Photos 2, Photo 3 and Photo 4). In addition, roof member/modifications have been attempted to alleviate load from members (Photo 5).

We were unable to clarify where precise truss/purlin/rafter member strengthening had been historically attempted as, to enable us to see the structural support elements, the entire existing plasterboard loft lining would need to have been stripped. From the roof areas that could be viewed, there were areas of varied 75mm to 100mm wide x 100 deep historic rafters alongside which new stress grade 50 x 80mm deep timber rafters were located alongside.

Other viewed roof areas utilised what appears to be only new 50 x 80mm deep rafters at 400 centres. There were locations where these new rafters appeared not to be supported at wall plate level and this will need to be further investigated. The historic purlin sections viewed varied in cross section from 100x150mm to 175x100mm to 180x200mm deep and some were severely bowed in profile.

4.2 The current raised section of loft floor support is undertaken using new 50 x 75mm stress graded cut timber floor joists at 400 centres which we believe span onto 1No. existing green oak roof truss bottom boom member of 180 x 200mm depth in size (Photo 6). There is an existing 1st floor ceiling support level with support timbers below this level. The remaining approximate 2/3rds loft floor area and the lower level to the raised floor area are supported via historic 70 x 100mm floor joists at 400 centres which are recessed into the supporting green oak truss bottom booms. The loft floor both raised and lower levels appear to be fit for purpose and have timber boarding which also appears fit for purpose.

4.3 The first-floor master bedroom 1 has a marked depression in the level of floor joists and boarding. The existing 100 x 250mm deep historic first floor joists at approximate 400 centres span into a central historic 250 x 400mm shaped green oak floor support beam. It is not known if the client is considering trying to make the existing floor level in the refurbished condition. Some existing floor joists have an insufficient end bearing detail into the central support floor beam, and this will need to be rectified as part of the remedial works (Photo 7).

First-floor bedrooms 2 and 3 and the bathroom structural support floor joists and timber floorboards also appeared fit for purpose. Bedroom 3's water leak ingress has now been dried out and the joists and floor boarding now appear to be fit for purpose. (Photo 8)

4.4 The ground floor study's ceiling incorporates a front bay first floor green oak historic support beam that is trying to rotate at the location where it bears onto the front bay walls masonry wall. There is visible hairline cracking in the masonry support wall at the timber support beam bearing. It is logical that this current defect be further inspected to ensure that the situation does not get progressively worse in the future (Photo 9).

The ground floors timber structural support floor joists and the chimney lintel appear fit for purpose.

The ground floor dining room currently incorporates exposed feature historic trusses with flying ends and purlins which appear to be non-structural, but we were not able to confirm this (Photo 10). The ground floor kitchen's historic feature trusses support beams and purlins were not exposed and visible, due to the provision of a low-level ceiling.

All other visible structural support members to the other ground floor rooms appear to be fit for purpose.

5.0 Discussion on proposed loft alteration

The client proposes to refurbish the loft to try and maximise the internal roof area with better insulation and to reinstate split stone roof tiling in-keeping with the rest of the village. The proposed stone roof cladding change we feel will increase the current dead load of the roof

tiles by 70% to 90% and as such this could well have structural timber and truss member design implications.

To alleviate this situation, it will be logical (if accepted by the conservation architect) not to try and use the historic roof trusses but rather introduce new steel roof framing at, or adjacent to, these existing feature timber truss locations with new rafters and purlins which can lie within the roof's profile thickness. More robust rafter to wall plate and rafter to purlin detailing can then be provided. It will then be possible to retain historic feature truss and purlin elements for aesthetic purposes as non-structural elements.

It should be possible to retain the existing sawn timber loft floor joists and the floorboards as part of the refurbishment works.

6.0 Recommendations

- It is strongly recommended that the entire loft roof is stripped to expose the existing structural members to determine their suitability to be used in the proposed revised scheme.
- Further exploratory investigations are required to determine the adequacy of the current bearing detail for the first-floor green oak historic support beam where it is trying to rotate at the location where it bears onto the study's front bay masonry wall.
- Some existing floor joists have an insufficient end bearing detail into the central support floor beam in bedroom 1. This will need to be suitably rectified as part of the remedial works.
- Clarification is sought to determine whether the client is considering trying to make the existing floor level to bedroom 1 predominantly level in the refurbished condition, as there is currently a marked depression in the level of floor joists and boarding.
- The project management team is to liaise with the conservation architect over the proposal to introduce new steel roof framing at, or adjacent to, these existing feature timber truss locations with new rafters and purlins which can lie within the roof's profile thickness. The former exposed historic timber truss and purlin members can then be expressed as non-structural internal members.
- Ground floor dining room and kitchen currently incorporates exposed feature historic trusses with flying ends and purlins which appear to be non-structural – this will need to be confirmed at a later date due to the potential for increased roof tile dead loads.

We trust that this document helps you with your refurbishment deliberations.

Signed on behalf of PRO Structures Limited



Ronald O'Connor - Director
BSc (Hons) CEng MIStructE



Photo 1

Front elevation of the building showing the current non-historic double roman clay roof tile covering to the building's roof, but historic split stone roof tiling to the front bay.



Photo 2

Existing 100x175mm deep purlin to the loft toilet showing excessive deflection as it is timber strutted back as a rafter support medium.



Photo 3

View under another existing 100x175mm deep purlin in bedroom 4 loft again showing excessive deflection as it is timber strutted back to the rafters and front dormer trimmers above.



Photo 4

Close up view under of a rear roof elevation existing 130x175mm deep purlin in bedroom 4 showing new and existing rafters' side by side. From a brief assessment of the insect infestation that is visible to the historic timbers, it appears to us as though the common furniture beetle and lyctus powder post beetle have historically attacked them. The use of a sharp probing instrument confirmed the relatively good condition of these existing historic timber members. Infestations caused by these common beetles (when timber is older than 20 years) do not generally affect the members structural integrity.



Photo 5

View on the roof ceiling area over the raised platform area showing a relatively new central 100x175mm deep replacement purlin that has non-standard 175x100mm steel angles as a connection detail back to the existing trusses. This non-standard purlin is on the front elevation behind the existing chimney.



Photo 6

View on the truss roof support member to the raised platform area (rear elevation).



Photo 7

Timber floor joists at first-floor level has occasional discontinuities (poor bearing detailing) at the junctions with the main timber floor support beam (bedroom 1). This will need to be addressed by the contractor with consultation with the Conservation Officer regarding the proposed method of fixing (saddle connection or similar).



Photo 8

View on Bedroom 3’s water leak ingress. The ceiling joists above bedroom 3 have been dried up by the contractor and upon our inspection we believe there is minimum loss of durability as a cause of the water damage.



Photo 9

First Floor support beam at ground floor ceiling level - the end support detail at the front elevation bay needs to be further inspected as we viewed hairline masonry cracking plus visible beam end rotation. We are concerned that might be some form of progressive end settlement in this location or beam rotation.



Photo 10

The single-storey lean-to roof part of the building appears to utilise non-loadbearing historic triangulated trusses. We believe that there is structure within the cat slide roof profile to support the roof tiles and plastered ceiling below. But this still needs to be confirmed.