


# STRUCTURAL ENGINEERS REPORT

<b>Subject</b>	Barn Report, Highfield House, Wellow
<b>Client</b>	Mr P Cook
<b>Our ref</b>	020_306
<b>Inspection Date</b>	16 <sup>th</sup> Sept. 2021
<b>Prepared by</b>	Andy Marlor BEng (Hons) CEng MICE MIStructE (Chartered Civil & Structural Engineer)
<b>Signature</b>	 For and on behalf of Intelligent Structural Solutions Ltd

## 1. Introduction

- 1.1. In accordance with your instruction, we confirm our inspection of the above property on Thursday 16<sup>th</sup> Sept. 2021 in order to investigate its general structural condition and stability.
- 1.2. All our observations and comments are related to the specific inspection date.
- 1.3. Our particular brief is to advise on whether the barn is suitable for domestic conversion without major demolition works being necessary.
- 1.4. In describing the property, all references to front, rear, left and right assume that it is viewed from the dirt track parallel to the long elevation of the barn.
- 1.5. We must stress that we have not inspected the woodwork or other areas of the property which are covered, unexposed or inaccessible and we are therefore unable to report that any such part of the structure is free from defect.

## 2. Topography and Geology

- 2.1. The site is predominantly flat with significant trees and established hedges in close proximity to the foundations.
- 2.2. The British Geological Survey website suggests that bedrock is the Chester Formation consisting of mainly sandstone. The overlying superficial deposits are described as River Terrace Deposits, consisting of sands and gravels.
- 2.3. No trial holes had been dug; hence we are unable to comment on the formation strata of the foundations.

## 3. External Inspection

- 3.1. At the far, left-hand end of the front elevation, there is a single storey lean too building, attached to the left-hand gable wall. The mono pitched roof and pantiles are in fair condition, the mono pitched roof appearing to be watertight.

- 3.2. Access into the single-story section is not available at the time of inspection although it was evident that the floor under the monopitch section is at a higher level than the floor of the main two storey barn.
- 3.3. The main two-storey barn has a duo pitched roof profile with pantiles.
- 3.4. The condition of the main two-storey barn roof is poor with numerous holes allowing water ingress
- 3.5. The ridge line is a little up and down suggesting issues with the roof structure.
- 3.6. The amount of lean, visible in the front elevation, suggests some historic roof spread has occurred but generally the 325 thick solid external walls have been able to resist the outward thrust from the roof.
- 3.7. The front elevation has been altered in the past with openings having been bricked up and smaller openings formed.
- 3.8. The front elevation has numerous openings. Above these openings are brick arch lintels.
- 3.9. These arches have slightly relaxed resulting in minor settlement of the arches and historic cracking above first floor level.
- 3.10. All of the external walls have areas where weathering has removed the mortar and repointing is required.
- 3.11. It is noted that the barn is located below ground level at both left and right-hand ends. The right-hand end the barn retains ground up to approximately 450 mm; evidence of damp, in the form of efflorescence, is clearly visible.
- 3.12. Close inspection of the right-hand gable wall does not identify any signs of structural distress or building movement.
- 3.13. The rear elevation has no significant openings just an occasional hole where a brick has been removed.
- 3.14. The height of the rear elevation appears slightly taller than the front elevation, suggesting ground level is lower against the rear wall.

- 3.15. The down pipes and gutters are not connected up on either the front or rear of the property. At the right-hand end of the rear elevation, the downpipe discharges into an already overflowing open topped storage tank.
- 3.16. Numerous self-set trees are in close proximity to the rear elevation foundations and are therefore a threat to the stability of the barn.

#### 4. Internal Inspection

- 4.1 Internal inspection of the barn confirms that the roof structure is unsuitable for retention throughout. Inspection of the roof structure is carried out from ground level.
- 4.2 The read and screed first floor is in very poor condition, particularly where water ingress has occurred through the large holes in the roof. Even the larger timber floor beams have suffered significant rot and decay . This is in addition to a number of collapsing floor Joists.
- 4.3 We consider the first floor to be dangerous. We recommend that no access onto the first floor is permitted without some form of temporary propping being introduced.

#### 5. Conclusions

- 5.1 The present structural condition of the barn has been adversely affected by water ingress through the less than watertight roof.
- 5.2 Although attempts have been made to strengthen/repair the roof, the roof has suffered roof spread. The roof spread has been aggravated by the positioning of roof trusses over openings. The structural layout of the roof, in cooperation with the condition of the timbers, leads us to the conclusion that the whole roof structure would need replacing as part of any development.
- 5.3 The resulting horizontal movement at the top of the walls has been drawn towards the front elevation. The reason for this being the back elevation is of heavier construction, with no window/door openings to weaken it, whilst the front elevation has numerous windows/doors which reduce its capacity to resist roof spread.
- 5.4 We consider the vast majority of the external walls to be suitable for retention as part of any possible development. The lean present in the front elevation is of

structural concern but we feel, with some crack repair and repointing, this too could be incorporated into the development without major demolition being necessary.

- 5.5 The stability of all external walls is governed by the restraint provided by the first floor. The condition of the first floor is poor and we consider it to be dangerous to access without additional support below.
- 5.6 Due to the poor state of the first floor we would strongly recommend the floor is replaced by new floor tied into external walls, as per modern construction.

## 6. Summary

- 6.1 The Barn has suffered from a lack of maintenance. in particular, the severely leaking roof and poor roof structure has resulted in outward lean of the front elevation.
- 6.2 The leaking roof has caused the timber beams and lime Ash first floor to decay
- 6.5 A new roof structure, that will prevent any horizontal thrust being transferred to the top of the walls, should be adopted
- 6.6 The geological survey maps suggest bedrock is sandstone and that the overlying superficial deposits are sands & gravels. This explains why the trees, which are in close proximity to the foundations, have not caused more structural movement or cracking.
- 6.7 Provided the above comments and advice are taken into consideration, we are of the opinion that the barn is suitable for conversion, without the need for 'whole scale' reconstruction.