

**BRIAN CLANCY HIGBY PARTNERSHIP**  
CHARTERED STRUCTURAL & CIVIL ENGINEERS

**INSPECTION REPORT**

by

**BRIAN CLANCY HIGBY PARTNERSHIP**

for

**BOOT HALL**

**TOLLGATE ROAD**

**HORTON**

**LEEK**

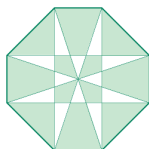
**ST13 9PJ**

With respect to

**STRUCTURAL CONDITION OF BARN**

*Prepared For:*

Mr F Kirkham  
Boot Hall  
Tollgate Road  
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## **1.0 INTRODUCTION & BRIEF**

- 1.1 We are instructed by Mr Frank Kirkham to carry out an inspection and prepare a report with respect to the structural condition of a barn at Boot Hall, Horton, Leek.
- 1.2 The report is prepared in connection with proposals to convert the buildings to form domestic accommodation.
- 1.3 The report is prepared for Mr Kirkham as our client and the content must not be disclosed to third parties without our express permission in writing. This will not be unreasonably withheld. The content of this report may be disclosed the local planning authority.
- 1.4 The report is prepared on the basis of a visual inspection of the buildings on 11 March 2014 by Mr R. E. Atkinson.
- 1.5 It is advised that at the time of our inspection we did not cut into the fabric of the buildings and our findings and recommendations must be considered in this light.
- 1.6 Directions with respect to location of elevations and accommodation are given as facing the barn from the farmyard.
- 1.7 Specific defects are described as facing each particular elevation.

## **2.0 DESCRIPTION OF PROPERTY**

- 2.1 The main structure is a two storey barn of traditional construction. Part of the building is believed to be contemporary with Boot Hall, which is believed to date from the 17<sup>th</sup> Century and is Grade II listed.
- 2.2 The main barn is rectangular on plan measuring approximately 5m wide by 12m long. The building has a pitched gable roof covered with Staffordshire blue tiles. The roof construction comprises timber purlins spanning between timber trusses.
- 2.3 External walls are constructed of a coursed rubble sandstone masonry, approximately 450mm thick.
- 2.4 First floors are of suspended timber construction and ground floors solid construction.
- 2.5 To the right hand side of the building is a relatively modern single storey lean-to extension with external walls constructed in blockwork. We are advised that it is intended to demolish this building and this structure is not included in this survey.
- 2.6 To the left hand side of the building are a series of lightweight structures measuring overall approximately 5m by 20m on plan. These have pitched roofs covered with corrugated asbestos cement sheeting on timber purlins supported on a combination of brick piers and timber posts.
- 2.7 To the rear of the building and centrally located is a timber framed store. This has a pitched roof covered with corrugated iron sheeting.

- 2.8 To the rear left hand side is a timber framed wood store. This similarly has a mono-pitched roof covered with corrugated iron sheeting supported on timber framed walls. The floor is constructed of stone setts.
- 2.9 The building complex occupies a sloping site with a natural ground rising at a steady gradient of approximately 1 in 10 from Tollgate Road.

### **3.0 MAIN BARN**

#### **EXTERNAL ELEVATION**

##### ***Front Elevation***

- Sandstone masonry is laid in a relatively weak lime mortar. The elevation generally is free from evidence of cracking.
- Individual masonry blocks are in reasonably good condition. There is local erosion of the surface of some of the stonework. The cill to the left hand first floor opening is particularly weathered as are the quoins to the left hand side of the central door opening.
- Pointing to much of the elevation is reasonably sound and without a requirement for further work. There is open jointed masonry to the left hand quoin where pointing is required.
- There is prominent distortion to the stone arch and masonry above the double door opening to the right hand side of the elevation. This movement is possibly associated with twisting of the supporting timber beam. Masonry leans outwards. There is a prominent crack above the top right hand corner of the opening. This commences at the springing of the arch and continues upwards and to the left following the course of the masonry joints. The maximum outward distortion is in the order of 50mm.
- At eaves level is a course of sandstone flags. These exhibit at least superficial erosion.
- The oak beam below the brick arch exhibits insect damage. This is believed to be superficial.

##### ***Right Hand Gable Elevation***

- It is evident that historically the elevation has been subject to alterations believed to be associated with reducing the pitch of the roof. It is assumed that the building was originally thatched.
- There is evidently a steel angle below the stone lintol above the window opening. There is a fracture at mid-length of the lintol.
- There is open jointed masonry and possible evidence of outwards movement to the left hand side of the elevation. This is assumed to be associated with the local rotation of the front wall.
- To the rear of the lean-to the elevation is rendered. There are vertical cracks to the render believed to be associated with shrinkage.

- The panel of masonry to the right of the lean-to is reasonably true to line and level up to the first floor window opening. Pointing is in good condition. There is local bulging of masonry in the vicinity of the head of the window opening.

#### ***Rear Elevation***

- The left hand section of the wall is constructed in relatively massive sandstone blocks of similar construction to Boot Hall. The right hand section is constructed in a pink coursed rubble sandstone similar to the front elevation.
- The elevation is free from significant cracking. The face of the sandstone masonry is locally weathered. Pointing is in reasonably good condition. There is locally open jointed masonry.
- Masonry to the left hand side is re-pointed in what is believed to be a strong cement mortar. This has shrunk and is partially detached.

#### **INTERNAL ELEVATIONS**

##### **Ground Floor**

##### ***Right Hand Side Store***

- Masonry forming the gable elevation and rear wall is free from significant evidence of structural movement.
- The left hand cross wall is of brickwork construction and 200mm thick. Brickwork is free from significant evidence of structural movement. There is localised mechanical damage to brickwork at low level which requires to be made good. It would appear that this wall is supported on the concrete floor.
- There is evidence of structural movement between the front elevation and the brick cross wall. The front elevation tends to lean outwards with a gap of approximately 60mm below first floor level.
- Floors joists measure 150mm deep by 75mm wide at 450mm centres. Joists span 3.9m, parallel with the front elevation.
- The timber beam forming the inner lintol to the door opening has a substantial split to the underside. It is probable that sufficient timber remains intact, however, further investigation is necessary.
- The ground floor is generally constructed in part stone setts and part brick paviers.

##### ***Central Store – Cow Byre***

- There is no significant evidence of structural movement affecting the brick cross wall.
- There is a significant gap between the rear wall and the brick cross wall. The detail at low level would indicate that brickwork as initially constructed was not tight up to the masonry.

- The timber first floor is partially intact. This comprises twin rough-hewn timber beams spanning parallel to the front elevation supported on an oak beam spanning front to back. This is evidently a reclaimed section of timber with numerous notches to receive joists or horizontal members. The timbers exhibit varying degrees of worm attack.
- The floor is of brick pavements to the right hand side and stone slabs to the animal pens.

#### ***Left Hand Side Store***

- Masonry forming the gable wall is reasonably true to line and level and free from significant evidence of recent movement. This acts in part as a retaining structure with approximately 1.5m of ground retained.
- The masonry forming the rear wall is free from significant evidence of recent movement.
- The timber first floor is partially intact and of similar construction to the central area.

#### **First Floor**

##### ***Left Hand Side***

- There is a general absence of floor boarding.
- Masonry forming the gable, front and rear walls is free from significant evidence of recent movement.
- The roof is supported on a truss mid-way between the cross wall and the left hand gable. The truss is of a simple form of construction with wrought timber members. This supports substantial wrought timber purlins. The truss is free from significant evidence of movement at the joints and significant splits or shakes.
- There is a truss above the cross wall part hidden with timber boarding. The cross wall does not appear to support roof loading.

##### ***Right Hand Side***

- The floor boarding is partially rotted and the area unsafe to access.
- There is a gap between the floor boarding and the front elevation in the order of 50mm. This is associated with the outward distortion to the arch.
- The brickwork cross wall is free from evidence of distress. There are gaps at front and rear as previously identified.
- Masonry forming the front elevation and the front rear and gable elevation is free from significant evidence of structural movement.
- The roof structure is of wrought timber purlins supporting common rafters.
- There is considerable decay in the lintol supporting the opening over the first floor entrance.

##### ***Left Hand Gable Elevation***

- The elevation is constructed in coursed rubble sandstone. The elevation is generally concealed by stored timber. In the areas visible there is no significant evidence of distress.

#### **4.0 LEAN-TO STORE – LEFT HAND SIDE**

##### ***Front Wing***

- This section of the building is fully timber framed with oak posts supporting small sectioned soft wood beams. The roof is mono-pitched and clad with asbestos cement or similar sheeting. The floor is of earth. The structure is relatively lightweight with small section purlins. The structure is free from significant distortion. The timber posts exhibit at least superficial worm attack.
- There is a dry stone retaining wall, approximately 1m high to the right hand side elevation. This is free from significant evidence of structural movement and masonry reasonably true to line and level. Above the wall the elevation is clad with vertical timber boarding.

##### ***Central Section – to rear of Main Barn***

- This has a gable roof with purlins supported on the left hand gable elevation of the barn and spanning to a truss, assumed to be oak, supported on brick piers. The roof covering is asbestos cement sheets.
- The purlins are rough-hewn timber poles and appear reasonably sound.
- The brick piers are substantial and of a colliery brick or similar.
- The oak truss exhibits at least superficial worm attack although believed to remain reasonably sound.
- The floor is of earth.

##### ***Rear Store***

- This is of relatively lightweight timber construction in part supported on reused telegraph poles and with relatively light timber purlins supporting corrugated steel sheets.
- The brick piers are reasonably plumb.

#### **5.0 TRIAL HOLE INVESTIGATION**

- A single trial hole is excavated to determine the type and depth of foundation to the front elevation and the nature of the underlying strata. The trial hole is located 4m from the left hand gable. This reveals the wall to be founded at a depth of 300mm below ground level without a spread. The underlying strata is a firm grey clay proved to a depth of 500mm below ground level.

## **6.0 CONCLUSIONS & RECOMMENDATIONS**

We have carefully considered the findings of our visual inspection and conclude under the following headings;

### **MAIN BARN**

#### ***Foundations and Foundation Related Movement***

- 6.1 Masonry coursing is reasonably level and the building free from evidence of distress such as diagonal cracking of masonry that might be associated with foundation related movement.
- 6.2 A single trial hole reveals the building to be founded on a firm clay without spread at a depth of 300mm below ground level. We understand that consideration has been given to lowering the floor level to the left hand side of the building. The trial hole investigation reveals that in order to gain any significant increase in head room it would be necessary to resort to underpinning. It is our experience that underpinning of stone masonry walls can be difficult due to lack of bond between masonry blocks and the requirement for support. Underpinning would lead to a requirement for the provision of facing masonry below the existing ground level.
- 6.3 On the basis of the limited investigation the ground is identified as being of good bearing capacity and self-supporting and otherwise underpinning might be expected to be a reasonably straight forward undertaking.

#### ***External Walls***

- 6.4 External walls are generally constructed in sandstone coursed rubble masonry. There are stone throughs as the openings and it presumed that elsewhere there are ties between the inner and outer leaves. The inspection does not identify evidence to indicate a failure of bond between the inner and outer leaves of masonry.
- 6.5 In general stonework presents a reasonably good appearance with relatively small area of eroded masonry.
- 6.6 There is significant distortion to the front elevation above the arch over the double door opening. This affects both leaves of masonry and is possibly associated with shrinkage and distortion of the supporting timber beam. It is our opinion that this area could be stabilised by tying the arch into the first floor. It is our opinion that ideally this area should be locally rebuilt. The area involved is approximately 8m<sup>2</sup>.
- 6.7 There is distorted masonry to the right hand gable elevation at high level. Masonry in this area has been subject to historic alterations. There is a fractured lintol above the widow opening which requires to be either replaced or repaired. This would provide the opportunity for re-aligning the small area masonry above and to the right of this opening. It is assumed that the construction detail associated with the former thatched roof would be retained.
- 6.8 In general, pointing is in reasonably good condition and with a requirement for localised repointing.



### ***Ground Floors***

- 6.9 Ground floors are of solid construction and generally of either stone setts or brickwork. Floors are free from significant evidence of settlement. It is assumed that as part of the conversion these floors would be removed and replaced with concrete floors with insulation.
- 6.10 The timber forming the first floor to the right hand section of the building is in reasonably good condition and in our opinion can be satisfactorily incorporated into the conversion.
- 6.11 It is our understanding that it is intended to raise the level of the floor to the left hand side of the building to improve head room. The principal structural members, i.e. beams, remain intact although not the joists. Much of the timber in this area is significantly affected with worm attack and the previous use has resulted in many notches. It is assumed that the floor will be removed in its entirety. It is our opinion that some of the timber could be reused with shorter spans.

### ***Roof Structure***

- 6.12 The roof profile is reasonably true to line and level. There is very slight distortion to the roof profile associated with deflection of purlins.
- 6.13 The roof structure is not contemporary with the original building with trusses and purlins in wrought timber. From the limited access available the trusses would appear to be structurally intact and without a requirement for significant repair. Purlins are of substantial cross-section.
- 6.14 It is assumed that as part of the conversion process the property would be re-roofed incorporating insulation and a modern felt. This would give an opportunity for inspection of the trusses, particularly at the bearings.

### **LEFT HAND SIDE WING**

- 6.15 These are of a relatively simple form of construction with timber frames and brick piers supporting asbestos cement and corrugated iron covered roofs. It is our opinion that the structures are reasonably sound.
- 6.16 The extent of remedial work will depend upon the proposed use.

Signed:

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