# BOB**JOHNSON**

consulting structural engineers

Second Floor 10b Shoplatch Shrewsbury SY1 1HL Tel: 01743 350893 Email: info@bjse.co.uk www.bjse.co.uk

# **Preliminary Structural Appraisal**

- Project: Lower Barns St Michaels Tenbury Wells
- Client: Mr & Mrs Yapp
- Ref: 17168
- Date: May 2017



### Background

Farming development in the twentieth century has led to a gradual redundancy of many traditional agricultural buildings. To avoid dereliction and inevitable loss an alternative use is frequently pursued. Potential uses include conversion to residential dwellings, holiday lets and commercial use.

Lower Farm is a former farmstead; with farming activities having ceased an alternative use is being sought for the older more significant agricultural buildings.

As the buildings no longer perform a specific function it is proposed to adapt the buildings (P1) (P2) for an alternative use. This proposal requires permission from the Local Authority for a 'material change of use' and as part of that process a 'Structural Appraisal' is required to assist in determining whether the buildings can be converted to that proposed use without significant reconstruction of the physical structure. Therefore, the aim of the 'Appraisal' is to record and assess the construction its new use i.e. structural safety, strength and stability.

In addition to the basic requirements of a building structure outlined above conservation of the building is desirable as many of these buildings represent a historical record of local construction vernacular. Reconstruction of structural elements is only recommended where all other economical and practical solutions have been exhausted. The application of traditional techniques to restore the structural fabric is also encouraged. We were instructed by the property Owner to appraise the 'Structural' condition of the timber frame with the purpose being to:

Inform Local Authority Conservation team of the structural strategy to preserve the historic building fabric whilst adapting the building for residential purposes.

This report should be read in conjunction with all Paul Hughes Architectural information.

#### Introduction

The following Report presents and discusses the findings of a 'Structural Appraisal. The report narrative describes the building construction and with the assistance of photographs provides an outline record of the current 'physical' condition. The concluding section discusses the findings of the survey identifying areas of the construction that require enhancement or reconstruction to address defects/instabilities and importantly to ensure that the buildings can meet the requirements for habitable use.

### Description

Agricultural buildings dating from the late eighteenth century. Two buildings under consideration:

**Barn** – Rectangular and gabled timber framed building supported off stone plinth. Framing organisation consistent with period practise. Building length divided into three equal bays defined by cross frames incorporating dual pitched roof trusses supporting side purlins. External elevations are completed with infill framing.



**Cart Shed** – Rectangular and gabled single storey building. Open almost entirely on the yard side and enclosed on two elevations by stone walling. Lightweight timber framed roof structure.



## **Key Element Review**

This section describes the current physical condition of the timber frame, commenting on material condition and apparent defects.

#### Barn

#### **Timber Framing**

<u>Side purlins:</u> Dual pitched roof is supported on one row of side purlins per slope. Approximate section size is 175mm square (7") in section. Ridge purlin: 125mm square.



- <u>Comment:</u> Current purlins are softwood, probably not contemporary with original framing. Material condition appears adequate however, section size may prove insufficient in terms of strength to support increased loads imposed by required domestic standard construction i.e. plaster, insulation, tiled/slated covering.
- <u>Cross Frame:</u> Triangular truss frame spanning the width of the building supported by large storey posts supporting purlins, member configuration, joints. Tie beam fractures with some displacement noted.

<u>Comment:</u> Material condition and section size appear adequate, localised repairs required.





- <u>Gable frames:</u> Triangular truss frames supporting side purlins. Primarily supported on storey posts with infill studs and mid rails.
- <u>Comment:</u> Generally, formed in large rectangular sections. Condition varies, whilst the storey posts are present there are numerous missing infill members and replacements. Generally, most members have experienced decay however, as section sizes are generously sized the decay has not reduced strength significantly.
- External Frame: Originally, full height sections (studs) were placed at regular position between cross frames with horizontal rails spanning between. The bottom and top wall plate act to connect the cross frames to the Cross/Gable frames.
- <u>Comment:</u> Framing is in adequate condition some missing member with alterations and replacements.

#### Masonry

- Walling:Plinth and walling forms support for the frame. Details were not available as much<br/>of it is concealed by the ground. Plinth construction is visible at the south east<br/>gable end where a change in ground levels raises the building platform.
- <u>Comment:</u> Plinth construction requires reconstruction.

### **Cart Shed**

#### **Timber Framing**

The roof construction is not suitable for retention as it consists of small sectioned timbers assembled in a rudimentary manner. The timbers are not part of the historic fabric being comparatively recent additions.

#### Masonry

<u>Walling:</u> Forms support for the frame on the rear elevation (P2). Contemporary with the walling elements to the barn.

Section of wall (P6) leans outwards with loss of bond/cohesion.



<u>Comment:</u> Like the barn, the stone is in adequate condition, it lacks an effective mortar to bond the construction. Masonry walling requires careful consolidation and repairs. Some section may need to be taken and rebuilt.

#### **Discussion:**

Overall, the building fabric is in gradual decline; the rate of deterioration is at a point where appropriate action is necessary to safe guard the buildings future.

Reasons for this decline can be primarily attributed to two primary factors. Firstly, the building is of significant age and secondly, as an agricultural building it does not receive the attention that a higher status building does. This is not an entirely fair interpretation as all materials have a life span and circumstances such as environment contribute to the lifespan of a material. In the specific case of masonry, here the walls have been formed in reasonable stone unit however, the mortar used to bond the stone had little in the way of mechanical binder i.e. lime. So, water ingress has gradually washed away the infill resulting in a gradual collapse.

Significantly, the principle structural timber framing is in reasonable condition and, has proved resilient to movement, alterations localised loss of members and support.

The structural strategy aims to retain and conserve as much of the historic fabric as possible. To achieve this, it will be necessary to restore the frame for support, and this will attract repairs and replacement.

In the case of the sole plate it is usual practise to replace the member with some splicing/repairs to vertical members in contact. Side purlins will need to be replaced.

Masonry, the random rubble stone walling requires careful repairs.

#### Barn Conversion.

Phase 1	Install temporary support – refer to sketch sheet
Phase 2	In stages, remove plinth wall and reinstate $(FN)$ $(MA)$ – see sketch sheet 02.
Phase 3	Cast ground slab ( <b>GS</b> ).
Phase 4	Undertake frame repairs/replacement, provide infill panel ( <b>SF</b> ) to support external framing.
Phase 5	Undertake reappraisal of roof members and reinstate wind braces and second lift to internal stud ( <b>IS</b> ).
Cart Shed	
Phase 1	Attach temporary support wall.
Phase 2	Remove roof.
Phase 3	Install foundation base and undertake wall repairs – refer to sketch sheet 03.



# TIMBER FRAME TEMPORARY SUPPORT

as directed, scaffold should support primary timber frame members to enable removal of roof covering and infill to enable timber frame repairs and excavation of new foundation/plinth.

# **TIMBER FRAME REPAIRS - 01**





#### Wall

to reinforce and bring stability to the stone walling, introduce a concrete blockwork wall with wall ties and cavity fill. Wall provides support for new roof structure.

#### $Ground \ Slab:$

150mm thick [min] with reinforced upstand abutting stone wall.





# CART SHED EXTERNAL WALL REPAIR 04