



Lois Plaistow Structural Engineers Ltd

Report on Structural Inspection

Barn, Abbey Fields Farm, Newstead Abbey Park, NG15 8GE

13 Enfield Street
Beeston
Nottingham
NG9 1AL



Front (South) Elevation and (East) Gable

By Lois Plaistow BEng MPhil CEng MIStructE

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Introduction

Lois Plaistow Structural Engineers Ltd were asked to inspect and report on the Barn at Abbeyfield Farm, Newstead Abbey Park. Our client, Mr Duffin, commissioned the report to support a Planning application to convert the barn to a single dwelling.

This report is a summary of findings of the visual inspection of the barn, carried out on 19th April 2022, in respect of its overall current condition and the proposal to convert it to a single dwelling (AJA Ltd drawings 3944/12, 13, 14).

This was a visual inspection only. No opening up or material testing was carried out in the building other than a trial hole against the existing footings. Observations made relate to the structure only and not to condition of flashings, copings, gutters and the like. All observations were made from ground floor externally and internally. The existing lean-to garage rear extension, which has a very inadequate roof structure, is not included in this inspection because it would be demolished in the proposed scheme. Measurements were taken using a spirit level and tape measure. The weather was dry and overcast during the inspection.

This report is intended solely for use by Mr Duffin and his consultants.

Description of the Existing Building

The Barn occupies the South West corner of the site, which is relatively flat, adjacent to Abbeyfields Farm and The Malthouse. The single storey barn is approximately 15m long and 5.5m wide with a duopitch roof with height to eaves around 2.8m and gabled ends. The building is currently used as a stable. The barn rear wall (adjoining the garage extension) is built in coursed stone as is the East gable and return wall at the front. The West gable and return front wall is constructed in brick. An internal brick wall creates a small room to the West and a timber/plywood partition creates a room to the East. The remaining space is open fronted, with the eaves supported on a steel beam and steel post arrangement. There is a partial timber joisted mezzanine over the East room with loose ladder access.

In this report the elevations will be referred to as North, South, East and West, with the South elevation being the front (as shown in the cover photograph).

The site lies over land that was previously mined for coal in the Annesley Colliery.

Roof

The roof is duopitched with a ridge running East-West. The roof covering is concrete pantile.

Internally the structure is exposed. The timber rafters are supported on a single row of inclined timber purlins on each pitch. The purlins are supported on two raised chord A frame timber trusses, one above the timber partition and one a third way into the open central space. The purlins are supported on the internal brick wall. A steel splice and tie connect the

purlins in the central space where there is a butt joint where we assume there used to be a wall or truss. There was no diagonal bracing or sheathing in the roof.



Figure 1 Rafters, purlins, trusses and splice

Walls

The North wall, East gable and return wall on the South elevation are constructed in coursed stone topped with five brick courses below wall plate. The wall appears to have been pointed in sand/cement mortar. The wall thickness is approximately 370mm and height to the eaves on the North side is 2.8m.

The front elevation is mainly open, with return walls each end to enclose the partitioned rooms. The roof is supported over the opening by a steel beam on posts at each end of the opening and an intermediate post where the beam is interrupted.



Figure 2 Steel arrangement in front (South) wall

There appears to be an infilled doorway in the East gable where the sides have not been bonded in. There are scars of an old roof verge on the external face of the east gable.



Figure 3 East Gable

The West gable, front return and internal wall are constructed in solid 230mm thick brick. The gable adjoins a neighbouring farm yard but we were permitted access to inspect it. There is a timber plate buried in the gable above eaves level.



Figure 4 West Gable

A trial hole was dug inside the central open space, against the rear stone wall and internal brick wall. The hole was excavated to a depth of 1.15m and the base of the wall footing was not found. The brick wall was built off a stone wall, changing from brick to stone 450mm below floor level, which projected 130mm from the face of the brick. The ground floor slab is 120mm thick mass concrete cast on sandy made ground which appears to become natural sand at approximately 0.8m deep.



Figure 5 Trial Hole

The North wall is generally rendered/plastered internally but its construction can be seen from the garage extension side. There is a recess formed in the wall behind the shelving.



Figure 6 North wall seen from the garage

Observations

- The brick internal wall and gables are generally plumb;
- The rear (North) wall leans out approximately 50mm;
- The intermediate steel post leans out at its top;
- The truss joints have become dislodged indicating outward spread of the truss;
- The purlin splices are inadequate;
- The purlin bearings on the internal brick wall are inadequate;
- The roof has racked over;
- There is some weathering of the stone on the East gable where the wall has been pointed with sand/cement mortar;
- There are voids in the stone walls;
- The ridgeline is relatively straight;
- The mezzanine joists are not adequately supported by the minimal timber internal partition and the platform is not safe to use;
- The West gable does not look well built and has a timber plate built in it which is exposed externally;
- The existing footings are at least 1.15m deep onto natural sand strata, and therefore the ground floor formation could be lowered to accommodate a new slab, insulation and screed/finishes;
- There are cracks of around 10mm width in the North wall, seen from the Garage;
- Steel beams and columns supporting the front elevation are unpainted and have surface corrosion;
- There are vertical tapered joints at the ends of the internal wall, at the junctions with the external walls;

Recommendations and Implications of Proposed works

- The existing roof structure has a missing truss or support wall and has spread. We recommend that the roof structure is replaced. If the new roof is to be vaulted then a ridge beam could be used, with sheathing or bracing to the roof plane;
- Tie across cracks in the external walls with Helifix crack repair system;
- Reinststate the stone in the recessed area in the North wall;
- Introduce independent lintels over windows;
- Remove the steel beam and posts in the South elevation and infill with masonry built on a new footing;
- Replace timber lintels and embedded timber in walls, if found;
- Tie internal brick wall to walls each end and bond corners with insitu concrete corner bonders;
- Rebuild the West gable wall – in stone as proposed;
- Remove the cement based mortar pointing in the stone walls and replace with lime mortar. Fill voids in the wall where they are found;
- Generally repoint weathered joints in the masonry;

Summary

There has been some movement of the external walls but this is mostly due to roof spread. There is a missing truss to support the purlins and one of the remaining trusses has failed, resulting in the roof spread. We recommend that the roof structure is replaced and that some local strapping is undertaken to the external walls. The existing footings are sufficiently deep to allow for the ground floor to be lowered if required.

Provided that the above recommendations are implemented, the building is structurally suitable to be converted into a dwelling.