

JP Chick & Partners Ltd
Consulting Civil & Structural Engineers



Fring Barn Complex

VISUAL STRUCTURAL INSPECTION REPORT FOR PLANNING



DOCUMENT CONTROL

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1.0 INTRODUCTION

J P Chick and Partners Limited were requested by Oykel Farms Ltd to undertake a visual structural inspection report, and comment on any significant structural issues affecting the barns, and assess their suitability for conversion into habitable accommodation. We have therefore limited our report accordingly.

From the received drawings, we understand that the conversion is proposed to be undertaken in two distinct phases. For the purposes of this report we have solely inspected the phase 1 works, namely the long single storey barn to the south elevation, and the perpendicular west wing comprising a single storey section and two storey barn.

2.0 DATE & TIME OF INSPECTION

The inspection was undertaken on Tuesday, 29th September 2020. The weather on the day consisted of persistent light rain with temperatures in the region of 12°C.

3.0 GENERAL DESCRIPTION

The barns comprising phase 1 include the main single storey length of barns to the south of the site, as well as the adjoining western wing, which consists of single storey and two storey sections to the north west corner of the site.

We suspect that the majority of the barns date back to the late 19th / early 20th Century and are predominantly constructed utilising masonry quoins, with infill panels consisting of solid brick, flint and local carrstone.



The walls in turn support traditional cut timber roofs, comprising timber trusses at regular centres supporting a line of purlins to each elevation, with common rafters over. The roofs are then clad in clay pantiles.

4.0 SUMMARY & RECOMMENDATIONS

The first important point to raise is that by its very nature a visual structural inspection highlights the structural areas of concern of the building being assessed, as opposed to highlighting the majority of the elements in good condition.

Whilst the report rightly outlines the areas of structural concern, we do consider that overall the barns comprising the phase 1 works, namely the Southern, and West Wings, are generally in reasonable condition given their age and type of construction given the long term lack of maintenance. With the exception of the west wall of the West Wing, which is suffering from lateral movement, both to the single storey section, as well as locally to the two storey structure, the remainder of the barn walls are relatively plumb with only minor structural cracks, and horizontal distortion recorded.

External cracking will generally only require minor repairs, possibly incorporating proprietary Helifix products such as HeliBar and / or traditional lime flint / carrstone repairs, incorporating small pieces of stainless steel mesh, as specified in the SPAB document, Traditional Repairs of Flintwork Walls. The more significant vertical cracks will require similar repairs, albeit they may incorporate some localised reconstruction as well to ensure stability.

Localised failure of individual lintels is easily remedied through either replacement of the rotten elements, or the provision of HeliBars and Cementies. The significant cracking adjacent to the arched opening to the workshop of the two storey element will require a replacement beam and likely localised reconstruction of the section of masonry above.

As part of any re-roofing works additional ties can be introduced between the perimeter walls and the timber trusses, and can be considered standard repairs for structures of this age and type.



Generally it is considered that the roof structures, given their general lack of maintenance, are actually in reasonable to good condition. Fortunately in the main, the location of the localised leaks through the roof is away from the main structural elements, namely the roof trusses, and purlins supported by them. The exception to this is the bearing of the valley beam at the junction of the Southern and Western Wings, but this is a fairly common defect, and can easily be remedied through a replacement timber section. Whilst localised decay can be seen to a number of the timber elements, it won't be until the roof tiles are removed, allowing closer inspection, in particular of the upper sections of the common rafters where the percentage of timber replacement will be known. Given the relatively level roof slopes generally, hopefully this will be a relatively low percentage.

As stated within the report, we were unable to closely inspect the roof of the two storey element due to the presence of the suspended lathe and plaster ceiling. We suspect that the roof will be in a similar condition to that recorded elsewhere, with similar localised repairs required.

As part of the conversion works, the existing main timber structural elements, namely the trusses, purlins and common rafters will need to be checked for adequacy through calculation. Typically, traditional agricultural arrangements can be undersized by modern standards, particularly in terms of deflection, however dependent on the structural analysis any strengthening required usually takes the form of steel flitch plates, which are relatively inconspicuous and are typical of traditional strengthening undertaken to these types of structures.

The condition of the roof within the central lean-to, courtyard facing section of the Western Wing is in poor condition and will require a higher degree of strengthening / replacement of damaged timber elements.

The leakage through the roof was also more prevalent in this area and the vertical cracks of the dividing wall may require further investigation as we suspect that there may be some localised ground related movement evident. This can be investigated through trial pitting and if necessary localised foundation strengthening works can be undertaken if deemed necessary.



Included within the documentation supplied to us are the planning layouts, and we would comment as follows with regard to the proposed plans.

It can be seen that within the Southern Wing the majority of the lateral walls are to remain and where existing walls are proposed to be removed additional internal walls have been introduced which could be utilised to provide the replacement lateral restraint. As mentioned previously, we would expect additional lateral ties to be introduced to increase the overall robustness of the structure generally. Similarly to the southern end of the West Wing the majority of the existing walls are to remain, albeit an access corridor is to be provided. Simple additional ties will enable this to be achieved without losing existing lateral support.

Within the two storey barn there are plans for additional openings, in particular between the sitting room and proposed dining areas, and new steel beams / posts will be required constructed off suitable foundations to achieve this.

The proposed first floor structure can potentially have a beneficial impact on the existing structure. The new floor structure, suitably tied into all the existing walls will create a substantial increase in robustness due to the diaphragm action, and by effectively halving the effective wall height, ties between the wall and floor will prevent further localised bowing which is currently occurring.

As stated previously the west facing wall of the west wing is suffering from lateral movement and whilst the recorded 50mm is not insignificant, it is not uncommon for this type of structure. It would be prudent to undertake some localised trial pitting to confirm or otherwise whether ground movement is a contributory factor. We suspect extra provision for lateral ties, and external buttressing along the west elevation would prevent further progressive lateral movement occurring in this area.



There is a proposal to locally reduce ground levels to the church facing elevation of the southern wing, and trial pitting will be required to confirm that the depths of the existing foundations enable this to be achieved without the need for localised foundation strengthening.

Therefore it can be seen that generally the Southern Barn and West Wing barns included within the Phase 1 conversion works, in the main are suffering from minor structural issues which can generally be remedied by standard proprietary products, and traditional repairs. There are a number of localised areas which will require some reconstruction works, but overall we consider that the barns are in reasonable condition, and are eminently suitable for conversion into habitable accommodation.

5.0 INDIVIDUAL BARN DESCRIPTIONS

5.1 SOUTHERN SINGLE STOREY BARN

External Description

Courtyard Facing North Elevation

The walls generally appear fairly plumb along the entire length, with only some minor undulations recorded which is to be expected. At lower level there are a number of small voids caused by missing flint / bricks etc, and there is some minor weathering of joints between the flintwork and brick quoins surrounding the central entrance doorway. Further weathering of joints can be seen in the far internal southwest corner where rainwater pipes currently discharge to ground, as well as an additional small void adjacent to the penultimate pipe vent (see photograph 1).



Field Facing South Elevation

Of note to this elevation is the fact that the land significantly slopes up towards the church and thereby the walls as they extend up the hill effectively form retaining walls to the internal side the further up the hill you go.

The infill panels between the masonry quoins to this elevation are entirely constructed in the more decorative carrstone panelling.

To the courtyard facing elevation, the majority of the walls appear relatively plumb with only gentle undulations along their length evident.

General weathering of the original lime mortar is prevalent throughout, however there is evidence of some more recent cement repairs, which have actually shrunk back and are now loose to the touch, particularly over the central small window opening. Vegetation obscures the very low level sections of the wall, and it was noted that these areas have more extensive weathering of the lime mortar generally.

Of note is that there are no rainwater goods serving this elevation of the southern barn.

West Elevation

Of note is that this wall section continues past the hipped end to form part of the single storey element to the West Wing of the barn complex (detailed separately).

The hipped end wall, similar to the courtyard facing elevation comprises a mixture of flint, brick, and carrstone infill panels between the masonry quoins, and again these appear relatively plumb, however the undulation along the return is more pronounced than elsewhere.

The lower half of the wall is obscured by vegetation, but generally appears slightly more weathered than the upper sections. Again, no rainwater goods serve this section of the barn roof.

Internal Inspection

The inspection along this barn commenced from the eastern end.

The internal walls again consist of a combination of brickwork, flintwork, and also chalk blocks generally between the vertical masonry quoins. The internal faces are generally well weathered. Of note is that along the barn are a number of lateral walls extending up to eaves level only, and at the junctions with the perimeter walls there is evidence of historic lateral movement whereby diagonal cracks vary between 5mm and 15mm in width are present to the majority of the lateral walls. A number of them also have localised minor cracking within the infill materials themselves. The internal materials are generally of a poorer standard than those used externally (see photograph 2).

Towards the west corner there is more evidence of localised water ingress and this has caused some weathering of the infill panels immediately beneath. Some voiding and loss of section as a result is evident. Weathering is particularly poor at the bottom end of the internal valley (see photograph 3)

To the far south west corner, at the junction of the full height gable masonry of the West Wing there is evidence of more significant lateral movement of the eaves level wall, in the region of 30mm to 40mm. This does tie in with the distortions noted externally along this elevation (see photograph 4).

As mentioned, there are numerous holes and leaks through the roof structure. Fortunately, with the exception of the rotten end of the valley member, which has locally collapsed at its end and is supported on a timber prop, the remaining principle elements i.e. purlins and main trusses appear in reasonable to good condition as far as can be seen currently. Obviously the condition of all timbers, particularly the common rafters will need to be assessed when the roof coverings are removed.



Roof

The roofline, and slopes along the roof are generally straight with only minor undulations along the length of the building, again to be expected of a roof of this age and type of construction. There are a number of slipped tiles present, and the mortar pointing of the ridgeline and hips has cracked and is considered to be in relatively poor condition.

To the courtyard facing elevation there is localised displacement of tiles approximately $\frac{3}{4}$ of the way along its length towards the internal south west corner. The valley immediately above this corner is also in poor condition with slipped tiles and leakage through the filled in gutters generally. Of note is that the courtyard facing elevation does have guttering, but the downpipes can be seen to discharge direct to ground, or in overfilled galvanised troughs (see photograph 5).

5.2 External Description

West Wing

Courtyard facing East Elevation

The south east corner is a continuation of the southern wing and is constructed in a similar manner, i.e. brickwork quoins with infill flint, brick and carrstone panelling.

The walls do exhibit slightly more undulations along their length, and of note is that adjacent to the central lean-to, the closest panel has been replaced with more modern fletton infill.



Historic leakage of rainwater goods has led to weathering of the masonry, and infill panels, albeit the adjacent concrete hardstanding will have at least directed some of this surplus surface water away from the foundations of the building.

The central lean-to section is an open fronted cart lodge arrangement, whereby traditional timber posts bearing on plinths support eaves beams over. Of note is that the furthestmost beam has rotted away completely and this has led to localised deflections of the roof, and lateral movement of the eaves level masonry. Ingress of vegetation has also caused localised weathering (see photograph 6).

At the junction with the single storey section there is a historic vertical crack extending above eaves level to the underside of the lean-to roof. The crack is approximately 10mm in width.

The two storey barn can be found to the furthest north west corner of the barn complex. There is a small single storey lean-to on the courtyard facing elevation, and this has particularly weathered masonry around the window openings. The wall then continues to form part of the main boundary wall of the courtyard. This is in similar condition, albeit obscured by vegetation at low level (see photograph 7).

The remainder of the two storey section is constructed in part red brick masonry, part carrstone and flintwork infill. General weathering of the lime mortar to the infill panelling, as well as some minor cracks above the arched lintel were recorded, together with weathered / spalling of individual brick faces. There is a degree of lateral movement of the eaves level masonry outwards to the far north, courtyard facing elevation. Associated vertical cracking can also be seen at the east facing return and at the junction of the corner masonry quoin and the infill panel (see photograph 8).

Gable End North Elevation

This elevation is predominately constructed in knapped flint, particularly to upper window level. Above this carrstone infill panelling has been utilised.



When viewing the elevation there is a slight inward lean of the walls, particularly at high level, but no significant structural cracks were recorded. Weathering of the infill lime mortar is more prevalent at low level, and also to the north west corner where it abuts the corner masonry quoin. Historic cement repointing has been undertaken around the two window openings, but similarly to historic repairs undertaken elsewhere, the mortar has shrunk back from the original flintwork.

West Elevation

As previously mentioned, the south west end of the single storey section is a continuation of the southern barn return

Of note is that ground levels are built up against the low level flint panels, and there is more obvious lateral movement outwards of the panels as a whole. At the worst point we consider lateral movement at eaves level is 50mm. Historic ties have been inserted towards the two storey element, and there is localised damage visible to the eaves level corbelled masonry too (see photograph 9).

At the junction with the two storey section the lower level flintwork / carrstone panelling has also experienced localised washout, which we suspect is due to the adjacent downpipes discharging to ground. There is also cracking and a dislodged cement fillet between the single storey roof and the upper southern facing section of wall of the two storey structure.

Immediately adjacent to the south west corner there is an historic 10mm wide vertical crack extending down from eaves level to approximately 1m above ground level. There is also evidence of previous repairs, i.e. cement fillet repairs having been undertaken, which is again evidence of historic damage (see photograph 10).

Immediately above the arched timber lintel forming the main opening into this elevation there are large diagonal cracks, maximum 30mm in width extending upwards from both corners. There is evidence of



decayed and rotten timber post ends which have been partially remediated in the past, but we suspect these have dropped causing the localised lintel movement above (see photograph 11).

Similar lintel movement is recorded above the small window opening, and historic sand cement repairs have been undertaken. The cracking is approximately 10mm to 15mm width maximum, and localised above the window in question.

To the far north west corner there is evidence of voiding, and previous cracks adjacent to the corner brickwork quoin.

When viewing the two storey section of wall along the elevation, there is evidence of historic bulging outwards located centrally.

Roof

The condition of the roof is very similar to that elsewhere, albeit there are more significant horizontal displacements along the west facing elevation caused by the lateral movement of the walls.

To the central lean-to section the roof is in very poor condition with widespread displaced tiles, and localised collapsed sections of roof, particularly evident adjacent to the open entrance.

The roof to the main two storey element barn generally appears relatively straight along the ridgeline and roof slopes, with only minor undulations recorded.



5.3 Internal Description

The southern end of the single storey section of the west wing is a continuation of the main Southern Barn and exhibits similar defects, as recorded externally, namely the lateral distortions noted to the western facing masonry. Similar horizontal movement, in the region of 40mm to 50mm is recorded. Vertical and historical diagonal cracking can also be seen in the lateral walls forming the individual compartments and a number have had more modern cement repairs, which have subsequently reopened.

Further diagonal cracking and movement of the western eaves wall is evident at the junction with the central lean-to section. Cracks range in width between 5mm to 8mm.

Roof

The roof in this section is in a similar condition to that recorded to the Southern wing, namely the trusses generally appear in a reasonable to good condition, however there is some localised deterioration of timber elements where leakage has occurred.

Within the open cart section there are a number of large vertical cracks in the region of 15mm to 20mm extending virtually full height within the infill panels themselves, as well as at the junction between the corner masonry quoins (see photograph 12). Weathering has also occurred, particularly at low level due to historic water ingress. There may be a degree of localised ground related movement occurring as a result of the significant water ingress currently occurring.

When viewing the underside of the roof structure of this section, it is clear that widespread historic leakage has been ongoing, and as well as the rotten eaves beam, there is substantial decaying of the main purlin supporting beam centrally, together with damage to the lower purlin and a large number of common rafters.



Above the rotten curved beam the large diagonal cracks recorded externally are visible (see photograph 13). The large vertical crack recorded to the south west corner of the workshop mirrors that recorded externally.

When viewing the roof structure, widespread decay was noted internally to the internal dividing wall, and the common rafters above have split apart. Fortunately, the main internal truss supporting the purlins is in reasonable condition.

To the corner of the workshop, adjacent to the tanks, there are large historic vertical cracks, maximum width 20mm extending full height. Of note is that the lower level walls are in particularly weathered / poor condition. The bulging masonry of the main western facing wall is again evident with vertical cracks at the junction with the lateral walls.

Within the main far northern, two storey section, the cracking recorded above the window openings is mirrored internally, and there has been a large loss of the lime rendered finishes generally. Localised leaks down the walls, particularly to the west elevation were also evident.

Due to the presence of the lathe and plaster ceiling a close inspection of the roof structure was not visible, however, we expect similar to the remainder of the roofs of this section of the barns there will be localised roof leakage causing damage to the structural elements directly beneath.

6.0 LIMITATIONS

The structural inspection is a specialist survey, whose purpose is to enquire into the structural stability of the building.



The work of a structural inspection consists of a visual inspection of all accessible parts of the building, assisted by a check for abnormal distortions where practicable. Reference may be made to local geological conditions, and to records of structural damage to other houses in the vicinity.

The limitations of structural inspections are similar to those of most other similar barn surveys. We are not permitted to dig trial holes, lift floor coverings or remove decorations. We will therefore remain unaware of hidden defects or unusual construction details. In most cases, these limitations are not important, because structural problems are usually evident on the surface (walls, ceilings, door openings) before they become severe. But it does mean that we cannot detect problems that are latent or concealed. We always recommend, regardless of the structural condition of the building, that the owners maintain cover for all insurable perils, as these are never 100% predictable.

Except where specifically noted otherwise, our advice is concerned solely with current structural performance, and we do not report on the condition of finishes, waterproofing, damp penetration or timbers.

We recommend carrying out structural maintenance as part of good housekeeping, the most important tasks being:

- Ensuring drains remain free flowing and watertight
- Ensuring vegetation does not grow uncontrolled close to the building
- Ensuring the building remains weatherproof
- Repairing or replacing deteriorated materials
- Taking professional advice on any proposed alterations or extensions

We can provide detailed advice on structural maintenance if requested. We are not able to detect the presence of asbestos materials. We can provide standard literature on the risks associated with asbestos, if requested. This report is for our client's personal use, and is confidential, non-assignable and carries no admission of liability to any third party.



7.0 APPENDICES



Appendix 1 – Photographs



P1: Southern single storey barn: Small void at low level to courtyard facing north elevation



P2: Southern single storey barn: Typical cracking due to lateral movement is evident to a number of cross walls at junction with perimeter walls



P3: Southern single storey barn: Leakage through roof at bottom of rotten valley member causing localised washout of mortar to walls



P4: Southern single storey barn: Lateral movement of between 30mm to 40mm evident to internal gable masonry at junction within west wing





P5: Southern single storey barn: Poor roof detailing to valley of courtyard facing return



P6: West Wing: Rotten eaves beam to central lean-to section with localised cracking / voiding and vegetation growth



P7: West Wing: Cracking and weathered masonry to courtyard facing lean-to



P8: West Wing: Vertical cracking to north east corner of two storey barn



P9: West wing: Lateral movement and localised damage to eaves level corbelled masonry



P10: West Wing: Washout of masonry and debonded historical cement fillet repairs at junction between single and two storey sections of west elevation



P11: West Wing: Significant diagonal cracking above main arched opening into two storey barn section



P12: West Wing: Vertically cracking within flintwork panels and corner quoins within lean-to section



P13: West Wing: Diagonal cracking above arched timber lintel within workshop



Appendix 2 – Marked Up Drawings