# STRUCTURAL APPRAISAL

## ON THE PROPERTY:

**'The Barn',**
**Rear of 8 High Street,**
**Prospect Yard,**
**Kirton in Lindsey,**
**Lincolnshire**
**DN21 4LU**

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## 1.0 INTRODUCTION

1.1 This report has been prepared for Mr E. Court of 8 High Street, Kirton in Lindsey, Lincolnshire DN21 4LU, following instructions received on Thursday 21st August 2008.

1.2 A visual structural inspection report has been requested in connection with the current condition of 'The Barn' Prospect Yard at the rear of 8 High Street, Kirton in Lindsey, Lincolnshire DN21 4LU. It is proposed that the barn structure be converted to create a new dwelling.

1.3 The property was visually inspected on Tuesday 26th August 2008. This report has been prepared on information available on site only.

1.4 Details within this report are confined to structural aspects as detailed in item 1.2 above. This report does not constitute a full building survey and specifically excludes items generally considered in a Surveyors report such as those listed below:-

The decorative condition of the property.
The condition of the property with regard to dampness, dry rot, timber infestations and the like.
The condition of services.
The condition of roof, floor and wall and ceiling coverings.
The location of the property, it's value and other aspects including boundaries, searches, etc.

1.5 No testing of materials, monitoring, breaking out or long term investigation has been undertaken. We have not inspected woodwork or other parts of the structure that are covered, unexposed or inaccessible and are therefore unable to report that any such part of the property is free from defect.

1.6 No comment is made in the report as to the presence of new or old mine-workings or tunnelling, heavy metals, chemical, biological, electromagnetic or radioactive contamination or pollution, or asbestos, or radon, methane or other gases, underground services or structures, springs or water courses, sink holes or the like, noises or vibratory nuisance/pollution.

## 2.0 GENERAL

2.1 The property at present comprises a double storey height barn structure (understood to be in the order of 200 years old), although the inner leaf of the rear wall, which abutted the boundary with the neighbours, had been reconstructed by the present owners some fifteen years ago. The barn, which has been under the present ownership for approximately thirty years, was derelict at the time of the survey. It is proposed that the barn be converted to residential dwelling accommodation, by the present owners.

2.2 The barn was ostensibly of stone construction (with the exception of the inner leaf of the rear wall – see above) with brickwork quoins around some of the door openings. The eastern end of the building was constructed in brickwork, which suggested that this portion of the barn may have been a later addition. The first floor was supported on timber joists; these had been propped in the relatively recent past with the introduction of a steel beam (plasterboard clad) at the underside of the ceiling (ground floor level). The roofing was of traditional timber construction supporting clay tiles. The window frames and doors were all of timber construction and will need to be replaced as part of the proposed conversion works. The rear (south) wall of the barn could not be inspected as it coincided with the boundary of the neighbouring property and was not, therefore, visible.

2.3 References to the orientation of the property in this report are generally as viewed from the direction of the High Street (taken as the north side).

2.4 Reference photographs and a location sketch of the building are included in the Appendix to this report.

## 3.0 OBSERVATIONS

### 3.1 EXTERNAL

3.1.1 On the north elevation of the barn (Plates 1 & 2), there was undulation in the clay pan tile roof and widespread distortion, particularly in the central section (as can be seen in Plate 6). There was also damage to individual tiles and visible settlement in the roof line. Below the left hand side of the left hand ground floor window, there was a 3-4mm wide vertical crack; this had occurred within previous mortar repairs, although these had longstanding origins. The major part of this elevation was of stone construction and whilst this was noted to be generally in a reasonable condition, the lime mortar joints were noted to be of a very friable nature. At the left hand edge of the window frame there was a 10-15mm wide separation crack and above the timber lintel (which formed both the door and window head member) the walls were bowed outwards. A patteress plate had been installed at this location, but with the lack of any localised damage at this point, it would appear that this distortion had historical origins and movement did not seem to be significantly progressive in nature. Above the lintel the wall was covered with climbing shrubbery that inhibited close inspection. Between this and the next door position, there was a longstanding vertical crack that propagated from ground level to a point approximately 2.0 metres up the wall. The width of this crack was somewhat difficult to assess due to mortar erosion, but again it had longstanding origins. The wooden lintel above the second door was distorted towards the central position and the presence of another patteress plate was noted above the door. The presence of past mortar repairs was again noted, but as previously there were no obvious signs of significant recent movement. At the junction of the right hand quoin brickwork with the stone there was a slight separation crack, which had manifested itself through past albeit longstanding mortar repairs. Significant vegetation growth from the joints was noted above the right hand door reveal and at high level, below the gutter line. Above the left hand reveal on the next door (second from the right and accessing Room 2) there was a further patteress plate over the stone lintel. There was further evidence of past mortar repair in the stonework joints and a patch of dampness over the left hand door reveal, but no obvious signs of any significant re-cracking. To the left over the first floor window over there was some outward bulging in the stonework wall and indeed some distortion around the patteress plate, but

there was no obvious significant cracking that might be associated with any recent movement. In the brickwork section to the right hand end of the building, there was efflorescence at low level below the ground floor window and some erosion. Climbing shrubbery again obscured part of the wall elevation at this point, but there were no further obvious signs of structurally significant cracking or distortion. The timber window framing and doors were generally in a poor state of repair.

3.1.2 On the east elevation of single storey barn (Plate 3), there was heavy ivy growth which again inhibited close inspection. Within the passageway (Plate 4), it was apparent that the ground was built-up against the building and there were several self-set trees growing against the building. Generally the stonework (even where visible through the shrubbery) appeared to be in reasonable condition with no obvious signs of structurally significant cracking) but there was erosion in the mortar joints. Above the brick infilled door position, the erosion in the joints was heavier.

3.1.3 On the west elevation of single storey barn (Plate 5), large parts of the brickwork were obscured by ivy growth and other vegetation. Where visible, the brickwork was again weathered and eroded, but there were no obvious signs of structurally significant cracking or distortion. A holly tree (5-6 metres high) and a further deciduous variety (approximately 7 metres high) were noted at distances of approximately 2 metres and 2-3 metres from the building respectively.

3.1.4 The south elevation of the barn, would only be visible from the grounds of the neighbouring premises and was consequently not inspected

3.2 INTERNAL

3.2.1 Inspection of Room 1 (the area adjacent the west elevation – see sketch in the appendix) revealed heavy efflorescence within the perished plaster at low level generally. On the internal (eastern) wall there was a 1-2mm separation crack at the junction with the front wall and in the central section there was a 2mm wide vertical crack that propagated up to the ceiling level. Crazing in the plaster was noted to each side of this crack. On the southern internal division wall there was an inwardly propagating 1mm crack above the left hand corner of the door opening (as viewed). The remaining walls (again comprising perished and uneven plaster) were in poor visual condition, but there were no obvious signs of structurally significant cracking or distortion. The tiled floor was uneven in places.

3.2.2 Inspection of Room 2 revealed a 3-4mm wide separation crack at the junction with the buttressing wall and a 4-5mm ostensibly vertical crack in the mid section. On the east wall perished plaster was again noted and there was a 1mm vertical crack adjacent to the door below a patch of repair blockwork. There were no further obvious signs of structurally significant cracking, but viewing was partially obscured by the presence of stored materials.

3.2.3 Inspection of Room 3 revealed areas of patched blockwork repair with some slight separation cracking at the junctions with the original masonry. On the front wall there was loss of mortar in the joints to each side of the door reveal. The western internal wall had been partially reconstructed in blockwork at high level, but this would seemingly be associated with the installation of the support beam. The blockwork rear wall (lining leaf) was again seemingly in good condition, but there was a patch of dampness (as viewed in the room over and visible in Plate 15 – see later) which will require further investigation. The solid floor again comprised a tiled finish.

3.2.4 Inspection of Room 4 revealed a floor comprising a concrete and tile finish that undulated in places. On the external end wall (east side), there was a void in the stonework and consequent loss of lintel bearing above the right corner of the left hand window as viewed. At low level there was a brick built animal feeding trough arrangement where mortar loss was prevalent. A 10mm wide separation crack had also developed at the left hand frame

junction with the reveal. Above the top right corner of the right hand window there was 1mm wide crack that propagated upto the ceiling over and in places had developed voids and below the same opening there was substantial mortar loss from the joints. Substantial vegetation growth through the window opening itself was noted. On the west wall there was a 4-5mm wide vertical crack in the wall to the left of the beam position (Plate 16 refers). At the beam bearing position the wall had been locally re-built. At the junction with the rear wall the masonry has been 'toothed in' and there were no obvious signs of any structurally significant cracking. On the front wall there was substantial loss of mortar below the right hand side of the window (as viewed). Above the line of the feeding trough there was a further vertical crack, but the level of erosion was such that the width was difficult to assess. There was also cracking and distortion in the right hand door reveal, particularly at low level.

3.2.5 Inspection of the room accessing the first floor area (off Room 1) the walls comprised perished plaster, with the exception of the south wall beyond the void which was constructed in exposed blockwork. The roof comprised raised tie trusses with a felted roof over. The trusses generally appeared to be in reasonable condition, although this would need to be verified by a Timber Specialist. The felt on the southern roof slope was damaged in one area with daylight visible behind. The floor had a concrete screed finish which contained a 2mm wide crack that ran north/south. The first floor area was only accessible by ladder. On the western (external) wall the chimney structure extended only to the eaves level (Plate 13). To the right of the chimney position there was crazed cracking in the perished plaster (up to 2mm in width) that propagated into the chimney also. At the right hand wall junction (with the front wall) there was a 2-3mm wide longstanding separation crack. An area of exposed plaster above this location revealed a timber wall inclusion. The window opening had again been inundated with vegetation (Plate 9 refers). On the eastern (internal dividing wall) there was an 8-10mm wide separation crack at the junction with the front wall and a series of low level vertical cracks (up to 3mm in width) to the left of the door opening. At the top left hand corner of the door there was a 10mm wide outwardly propagating diagonal crack in the mortar repairs (Plate 7) and above this location there was a further 5mm crack running in parallel that opened to 10mm in width as it travelled to the raised tie level. To the right of the door position as viewed there was a 2-3mm vertical crack that propagated

down from the raised tie level before diminishing to hairline width at the mid door height level. To the right hand side of this wall adjacent to the rear wall junction there were a series of diagonal cracks, generally up to 3-4mm in width but there was a single crack assessed as being approximately 10mm in width. Below this section of wall the plaster was partially exposed revealing friable joints beneath. The blockwork rear wall (built some fifteen years ago) was generally in good condition although some of the perpend joints had not been filled, but wall plate strapping was in place (presumably installed in advance of proposed renovation works). On the ground floor internal (north) wall there was perished plaster with some exposed brickwork. There was some cracking within the masonry joints, but the exact width was difficult to establish. On the north facing first floor wall there was a pair of longstanding 1-2mm diagonal cracks at the right hand edge adjacent to the gable return wall (Plate 8). There were no further obvious signs of structurally significant cracking or distortion.

3.2.6 In the first floor (large) room the blockwork south wall was again in reasonable condition. There was a damp patch in the central section with efflorescence extending from the edges. The source of this damp is unknown (but outside the scope of this report). On the internal dividing wall there was an area of detached plaster to the right hand side at the junction with the rear wall and below this position there was a 6-7mm wide diagonal crack through the perished plaster finishes. Again this appeared to have longstanding origins. Above the left hand corner of the door head there was an 8-9mm wide crack. On the long north wall there was an 8mm longstanding vertical crack in the plaster between the gable wall and the first left hand window (as viewed). Below this window plaster was missing, but there were no obvious signs of structurally significant cracking in this area. Between this and the central window position there was a 4mm wide ostensibly vertical crack that again seemingly had longstanding origins. The remaining section of the wall comprised a somewhat random construction of stone and breeze block panels; this area contained numerous longstanding cracks up to 2mm in width. On the eastern gable wall there was a 2mm vertical crack adjacent to the left reveal of the left hand window. Below this window there was a 2mm wide and a 2-3mm wide vertical crack of longstanding origins in the perished plaster. Similarly, below the right hand window (as viewed) there was a pair of 2mm mainly vertical cracks (again seemingly historical). At the junction with the rear blockwork wall, there was a 10-15mm separation crack.

## 4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 The barn was generally in a moderate condition from a structural viewpoint, bearing in mind its relative age and with the present 'practical' usage was obviously in poor decorative order, externally and internally. From anecdotal and visual evidence, the buildings have not been subject to substantive maintenance or repairs for several years although the rear blockwork inner leaf and some roof strapping were installed some fifteen years ago. Opinion in respect of necessity for refurbishment, repair and upgrading of finishes, decorations, joinery, plasterwork, services, etc., does not, however, come under the scope of our report. Our following comments, therefore, relate mainly to matters associated with structural stability/integrity.

4.2 With reference to the points raised in section 3.0, we are of the opinion that there has been some past rotational movement in the barn, which is particularly evidenced by the crack patterns in internal walls, separation cracks at wall junctions and the presence of patteress plates. The cracking appears ostensibly to be of historical origin and whilst there is substantial tree and vegetation growth around the barn, there is no evidence of significant ongoing progressive movement (i.e. no significant damage to the rear blockwork inner leaf installed some fifteen years ago, signs of recent cracking or ongoing problems around patteress plate positions). All new internal walls should be effectively tied to the existing, thus introducing the necessary stability and negating the need for wide-ranging substructure remedial work. When the property is refurbished it would be prudent to identify the nature of the foundation provision to the newer inner blockwork leaf on the rear wall, to establish final suitability. This is supporting first floor joists at present, but has not seemingly been subject to significant live load surcharge. Remedial work will be required to the passage area to the east of the property. Self-set trees and vegetation should be removed as a matter of course and we recommend that ground levels are reduced to prevent surcharge and potential problems with moisture ingress on the gable wall of the building. We assume that door openings at the front the building will be infilled as part of the proposed conversion works. Any new foundations will need to be designed sympathetically with any remaining existing footings. We also assume that internal ground floor will on the whole remain; it should be noted that these will contribute to load transfer to the substructure in addition to providing buttressing to the building.

4.3 For those cracks identified as being in excess of 2-3mm in width, we recommend that these should be stitched using proprietary resin injected repair ties (e.g. 'helibars'), prior to any decoration work. The separation cracking at interfaces with gable, masonry cross walls and in the worst cases over door heads should be tied using 30 x 5 x 1200 (min) galvanised straps. The observed cracking elsewhere within the building is in our opinion of lesser importance and is also essentially of an historical nature and would only be classified in the BRE Digest 251 (Assessment of damage in low-rise buildings) as category 1 or 2 (very slight to slight) and therefore aesthetic in nature. Consideration should therefore only be given to cosmetic repair only, for such items (and lintel replacement with localised rebuilding as necessary in the worst cases). Wall inclusions and indeed the several lintels were noted to be of timber construction. Independent of the need for replacement of the latter under perceived strength shortfalls or rot/insect attack, they should be removed as part of the refurbishment of the property where possible. If they were to be retained internally and simply plastered over, then introduction of heating into the new dwelling could lead to thermal volumetric change, which would in turn likely damage the new decorations. Widespread re-pointing will also be required externally; this will also involve the replacement of the more eroded or damaged stone/brick units. The gable walls should be securely tied to the roof rafters and new floor members via 30 x 5 x 1200 (min) galvanised straps at approximately 1500mm centres

4.4 It is our belief that a specialist timber consultant should be appointed to examine the condition of the roof timbers, wall plates and floor members in order to ascertain which timbers can be reused in the proposed renovation, the need for repairs or remedial work as necessary. The effects of rot, fungal or insect infestation will naturally have a weakening effect on the structural members over the years and from visual inspection, it appeared that some of the timbers might be affected. It is also highly likely that window/door framing (as appropriate) will have to be replaced, although specific advice on this matter is outside the scope of this particular report.

4.5 We recommend that the trees and shrubs around the building (including those within the neighbouring property) are maintained as part of any ongoing management scheme for the property. Although these trees do not appear to have been a major contributor to past movement in the building, they nevertheless lie within the influence zone of the foundations. If these

trees are allowed to mature within what could be a clay soil, it is entirely possible that their presence could become influential on the building in the future. As the trees postdate the original barn construction, we would not anticipate problems associated with soil rehydration following removal.

4.6 It would appear that the building storm water drainage either dissipates to soakaways (where guttering and down pipes exist) or discharges directly to the surrounding ground. It is possible that the rotational movement in the various parts of the building is related (at least in part) to the past inadequacy in the drainage system, which may have led to the washing away of fine materials from the soil matrix adjacent to the building foundations, it is therefore recommended that the condition and percolation potential of any new or existing soakaways is established. All guttering, downpipes etc, should be checked for integrity and if necessary replaced as part of the conversion works.

4.7 Notwithstanding the above comments, it is our opinion that the current scheme as proposed is practical and achievable provided that the recommended structural remedial repairs are incorporated within the scope of the works.

4.8 It should be appreciated that this report has been prepared on the basis of a single visual inspection of the premises and that we have not, to date, undertaken any monitoring, long-term investigation or testing of construction materials. Therefore, despite our suspicion that it is ostensibly of a historical nature, we cannot categorically state that no future movement of the property will arise.

Report undertaken by: _____

**J B E Kenny**

## APPENDIX 1 – Photographs

Plate 1 Front (north) elevation of the Barn (left hand side).

Plate 2 Front elevation of the Barn (as viewed from the north-east).

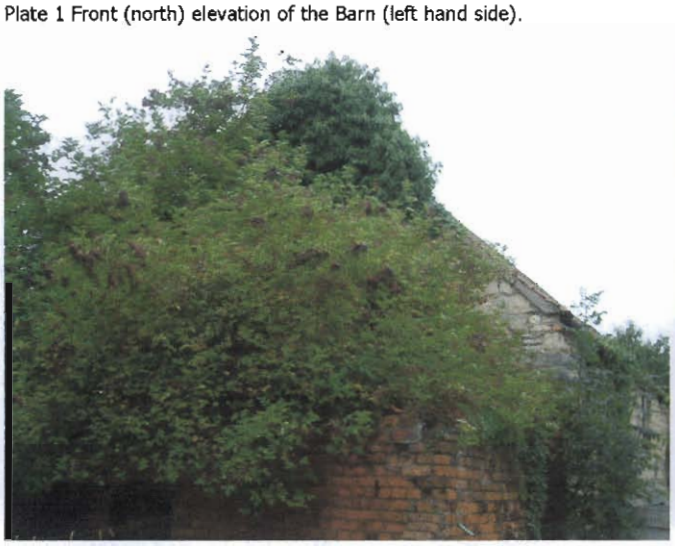


Plate 3 East Elevation of the barn (obscured by vegetation).

Plate 4 East Elevation of the barn (at low level within passageway).

Plate 5 West Elevation of the barn (again partially obscured by vegetation).

Plate 6 Undulation/distortion in the roof tiles.

Plate 7 Cracking above the door reveal between the first floor rooms (through previous repairs).

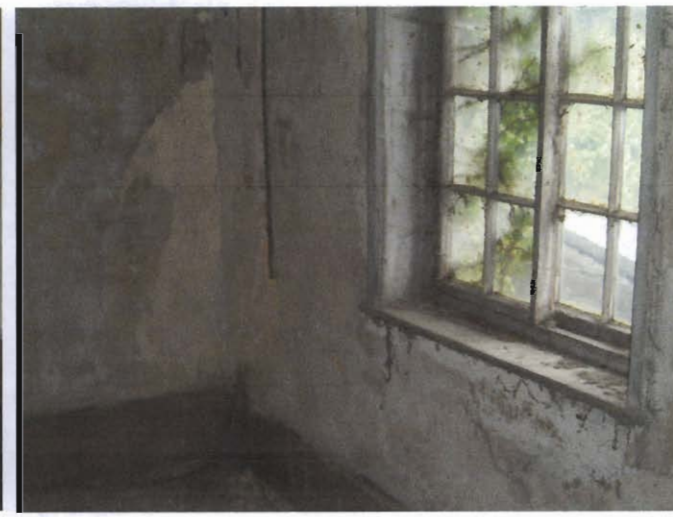


Plate 8 North-west corner of the first floor landing area.

Plate 9 First floor (view on western gable wall).

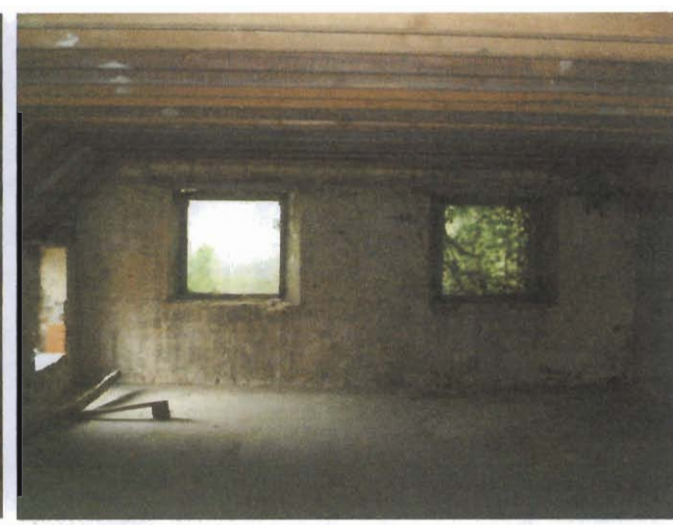


Plate 10 First floor (view on eastern gable wall).

Plate 11 First floor (north-east corner of main room).

Plate 12 Vegetation inundating the openings on the western gable.

Plate 13 Exposed roof timbers as viewed from ground floor level.

Plate 14 Room 2 (west wall)

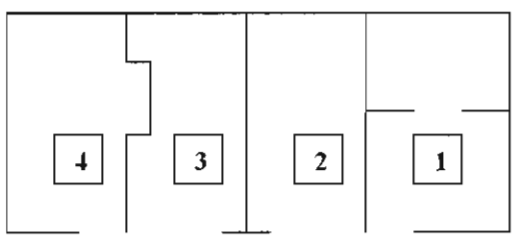
Plate 15 Damp staining in the rear wall of Room 3.

Plate 16 Vertical crack in the west (internal) wall of Room 4.

Plate 17 Growth of vegetation through the window of Room 4 (East Wall)

Plate 18 East wall of Room 4 (front section)


Location Plan




North Elevation

Ground Floor Room Layout