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STRUCTURAL ENGINEERS REPORT

ON

REDUNDANT BARN

MIDDLETON LODGE FARM

WARTER ROAD

MIDDLETON ON THE WOLDS

EAST YORKSHIRE

Y025 9DA

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Job No. 21-8863

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STRUCTURAL ENGINEERS REPORT ON REDUNDANT BARN, MIDDLETON LODGE FARM, WARTER ROAD, MIDDLETON ON THE WOLDS Y025 9DA

1.0 INTRODUCTION

1.1 On the instruction of Mr J Walker we visited the site known as Middleton Lodge Farm, Warter Road, Middleton on the Wolds on 1st February 2021.

1.2 We were commissioned to undertake a visual inspection of the redundant Barn, and associate projections, with regard to its potential conversion into alternative accommodation.

1.3 At this stage we have not had sight of any details relating to the original construction or the proposed conversion works. This report has therefore been prepared for incorporation within a Planning Application based solely upon the visual evidence available at the time of our visit.

1.4 The main 'Open' Barn is of combination of brick and chalk walls supporting a centre ridged pantile covered roof. It connects directly into a two-storey building, which in turn abuts the main house at the western end. There is a further single-storey projection at the eastern end of the southern elevation. This projection and the two-storey building are of more recent masonry construction.

1.5 The buildings occupy a gently sloping site falling towards the south eastern corner, reflecting the general ground profile within immediate area. The Buildings are surrounded by general hardstanding and the shared courtyard with the main house. There is significant vegetation along the eastern boundary, but the trees are generally in excess of 10 m from the load-bearing elements of the structures.

1.6 This report does not include the main farmhouse or the remaining outbuildings. Likewise the single-storey projection at the western end is not included as it understood that this is included within the proposed conversion.

1.7 This report is confined to the structural aspects as detailed above. This report does not constitute a full building survey and excludes certain items such as those listed below:

- The decorative condition of the property
- The condition of the property with respect to dampness, dry rot, timber infestation and the like
- The condition of services
- The condition of roof, floor, wall and ceiling coverings
- The location of the property, its value and other aspects such as searches and boundaries, etc.

1.8 At this stage we have not undertaken any testing of materials, monitoring, breaking out or long term investigation. No inspection has been made of timber or other parts which were covered, unexposed or inaccessible, and no comment can be made on the condition or quality of such materials.

2.0 EXTERNAL OBSERVATIONS

2.1 WESTERN GABLE ELEVATION

There is evidence is alterations to the brickwork suggestive of infilling of a first floor opening above the level of the flashing to the roof of the single story lean to. Within the brickwork to the main apex there is no significant cracking damage or evidence of lateral deformation. The return with the northern elevation remains relatively true and within the brick coursing there is little of recent significance.

The lower section of the Gable is covered in a render finish within which there is little signs of recent or continuing structural movement.

2.2 NORTHERN ELEVATION

The roof to the two-storey building does not exhibit significant undulation with only limited movement relative to the Gable returns. The deflection through the main body of the finishes is probably less than 25 mm, with no significant areas of dislodged or ill-fitting pantiles.

The timber frames to the main openings at both ground and first-floor level have suffered from deterioration as a result of the lack of maintenance, and there is spalling to the mortar packer above the window heads. This has exposed the leading edge of a steel support that continues through to the outer leaf.

The general brickwork does not exhibit significant rotational movement relative to the foundations, and there is little stepped cracking or fractures relative to the returns with the gables or the main openings. Indeed within the main body of the brickwork there is little that can be considered to be of recent structural significance. There are exposed steel plates within the first floor panels between the openings, but these appear to be decorative rather than of structural necessity.

Where the wall returns towards the main Barn there is again little evidence of structural movement through the new construction, or separation along the butt joint between the Barn and the two storey building. There is some spalling and erosion to bricks although this is generally on an individual basis.

Within the brick coursing between the bands of chalk wall there is a limited degree of settlement but no major structural cracking through the lower brickwork suggestive of a foundation problem. The wall has suffered from a limited degree of bowing and there is vegetation growing within the mortar joint, probably due to failure of the rainwater goods. This has caused localised damage although there is no major loss a section or structural movement through the panel between the central doorway and the two-storey section.

The brickwork and chalk above the doorway appear to have been locally rebuilt in a relatively ad hoc manner and some of the detailing is poor. The brickwork has bowed above the door and displaced slightly consistent with movement of the upper structure. It does not continue within the main panel leaning towards the southern end although there is again some weathering and damage to the chalk as a result of the failure of the rainwater goods.

At the eastern end the structure appears to have been extended with newer brickwork which does not exhibit significant out of level movement in the coursing. There is no major cracking damage leading to the return with the eastern Gable, where the wall remains relatively true. At the interface between the brick extension and the chalk section there is some untidy detailing but no major displacement or separation.

At lower level a door opening has been infilled within the chalk section, with an untidy detailing, and some spalling at the interface between the two materials. No major stepped cracking or fractures were visible, however. There is some bowing at the interface between extension and the main Chalk Barn, although this appears to have been allowed for during the construction of the extension.

The roof over the Barn exhibits a degree of rippling within the ridgeline consistent with the likely truss supports. Within the pantiles are no major areas of ill-fitting or dislodged finish, with the general deformation and deflection probably less than 75 mm overall.

2.3 EASTERN GABLE ELEVATION TO OPEN BARN

There is a substantial opening through the Gable with support provided by exposed beams which are not bolted together. Within the brick panels either side of the door opening there is little evidence of settlement or out of level movement. No major rotation was noted through the brickwork at low level and there is little sign of cracking around the bearing of the steel beam above the opening.

The upper apex contains a featured stone infill surrounded by decorative brickwork and there are tie bars presumably coinciding with the purlins. There is some weathering and erosion to the brickwork but no major signs of cracking damage. Where the apex could be viewed from ground level there is a small degree of bowing, but this is not been reflected by significant structural cracking.

2.4 SOUTHERN ELEVATION

The brickwork to the two-storey section does not exhibit significant out of level movement and there is only minor cracking around the exposed face of the support lintel over the double width doors. This does not extend through the panel on either side, nor this evidence of separation at the junction with the main house.

The roof over the two storey section is again reasonably true with little signs of significant movement. The roof to the main Barn reflects the rippling noted previously and there are a small the number of dislodged pantiles near to the interface with the open lean to. The deformation is not excessive, however.

Where the original farm meets the two-storey system we note a poor detail which has suffered from a small degree of displacement and there is 1 mm separation cracking. Through the brick panels on either side, however, there is little signs of significant stepped cracking or fractures suggestive of an active problem.

The wall to the two-storey section does not exhibit major rotational movement but there is a degree of movement through the older structure. This is generally in the region of 5-7 mm in a 600mm spirit level but is more onerous around the central doorway. Here movement of up to 12 mm in the 600mm spirit level was noted across the lower section, although the wall appeared more vertical nearer to the roof.

We note that this door is an alteration to the original structure and at the interface between the brick repairs and the main wall there is little of significance. Likewise where a door opening has been infilled towards the eastern end there is no major separation cracking between the infill and the original brickwork.

The lean to is constructed with rafters supported on purlins which in turn are restrained by ad hoc trusses that coincide with the four brick piers. A further support is provided along the eastern end onto a brick pier as part of the single-storey construction with the rafters fixed to a double timber eaves beam. Within the brick piers there is a small degree of rotation relative to ground level, but this is probably less than 25 mm across the height of the piers which are more than 440 mm thick. No significant cracking damage was noted within coursing to the piers indicative of an active problem.

Along the western wall of the lean to where it abuts the two-storey structure there has been some localised repairs and reconstruction works, but these are not suggestive of an active problem. Within the lean to, however, there is erosion and damage to the brickwork at lower level with loss of face to a number of bricks and extensive vegetation and algae growth. Loss of section was noted to a number of bricks, but generally the wall did not exhibit significant rotational movement of settlement. Where timbers are built within the wall there is some deterioration, however.

2.5 SINGLE-STOREY PROJECTION

This is a more modern alteration to the original structure and within the roof line there is little of significance. The general brick coursing to the side elevations remains level and true and there is no significant separation where it abuts the main Barn structure.

Within the southern Gable the coursing either side of the garage door opening remains relatively level and there is little around the bearings of the exposed lintel supporting the soldier arch. Minor cracking was noted but this does not extend to any significant degree and is probably associated with shrinkage.

The return with the Western elevation exhibits a small degree of movement but this is not reflected by structural cracking and there is little within the brickwork around the openings. Where the support to the lean to extends above the roofline there is no major deviation within the flashing and little through the brickwork leading up to the junction with the main Barn. Here there is a slightly untidy detail at lower level but no evidence of significant separation.

3.0 INTERNAL OBSERVATIONS

3,1 FIRST FLOOR OF TWO STOREY SECTION

The roof over is of gangnail trussed construction spanning the full width of the building. Internal walls are lightweight with only a limited degree of shrinkage cracking and minor separation at the solid perimeter construction.

Within the plaster finishes around the main openings there is little of significance and no major separation cracking where the wall is set back, presumably relating to its junction with the main Barn. There is some nominal undulation within the floor, but it is not subject to major spring.

Where the building abuts the house there appears to be a step back in the wall lining supported on a steel beam. This presumably relates to the ground for piers.

3.2 GROUND FLOOR OF TWO STOREY SECTION

The ground floor is 'open plan' with the exposed first floor constructed in joists spanning side to side supported on beams running parallel to the end gables. At the bearing of the steel beams within the plaster to the main walls there is little sign of cracking damage suggestive of inadequacy. Where there is minor cracking to the internal finishes this follows a predominantly vertical line consistent with shrinkage rather than an active foundation problem.

Within the solid floor there is some undulation around the jointing but no major displacement or evidence of movement relative to the perimeter construction.

3.3 MAIN OPEN BARN

The roof is constructed with rafters supported on mid height purlins and further purlins near eaves level. They span between trusses which are built within the chalk wall to the north side and on piers limited brick piers to the southern end. Within the roof there are

a number of areas of torn felt and associated light ingress. This has led to staining of some timbers and possible deterioration within the truss ends. When viewed from floor level we note limited splitting to the truss timbers and apparent infestation. Relative to the main bearings, however, there is little to suggest a major problem.

The gable internal wall with the two-storey section is of exposed blockwork within which there is little of significance. Where it abuts the main structure at either end there is little evidence of significant separation. The brickwork wall along the southern elevation reflects the limited movement noted externally with the rotation relative to ground level. Where the original plaster has been retained there is little of significance and no major cracking damage where steel plates coincide with the trusses to the lean to section.

The timber work over the infilled openings has suffered from notable infestation although there is little sign of recent cracking damage between the repairs associated with the alterations and the main wall. Where there is cracking through the older plaster it has a width of less than 3 mm and does not follow a significant stepped pattern suggestive of foundation problems. It is subject to notable weathering and discolouration to indicate that it is probably long-standing.

Along the northern end part of the wall has been covering in render at lower level within which there is little of structural significance. There is minor cracking within the chalk around the brick reveals to the windows, but this is relatively localised. No major stepped cracking or fractures were evident suggestive of instability of the structure.

There is some bowing consistent without noted externally and around the trusses as well as cracking damage and the deformation of the chalk above the central doorway. This coincides with the movement noted externally and we would highlight that the support is provided by a timber lintel orientated about week axis. This has deflected significantly towards the centre and is the likely cause of the cracking damage.

At the eastern end the structures been extensively rebuilt with blockwork inner leaf which butt joints the brickwork to the southern end and is loosely bonded in to the brick and chalk to the north. Within this blockwork, and at the interface with the original

structures, there is little to suggest a significant or progressive movement. No major cracking damage has occurred through the blockwork around the support to the apex above the large opening through the eastern gable.

2.4 SINGLE STOREY PROJECTION

The roof is consulted with rafters supported on purlins which in turn are restrained by three ad hoc timber trusses. At the bearing of these support within the main walls there is little of significance and no major cracking damage through the exposed masonry at the lower level.

We would note that there is no strapping of the wallplates down to the blockwork and there has been some weather prep penetration through the roof along the northern wall. This appears relatively limited but is probably continuing. Generally through the blockwork and solid floor slab there is little that can be considered indicative of a major structural issue.

4.0 COMMENTS, RECOMMENDATIONS AND CONCLUSIONS

4.1 The buildings that are to be converted have clearly been constructed in three different phases with the two-storey section and single-storey lean to having been built as extensions to the main Barn. These sections of the building are constructed in what appears to be load-bearing cavity masonry within which we have not identified significant signs of movement or distress. Indeed within their structural fabric the principal damage relates to weather penetration and the lack of maintenance rather than an ongoing structural issue.

4.2 The main Barn has also been subject to various alterations during its lifetime possibly including reconstruction of some external walls in solid brickwork as replacement to original chalk walls. The chalk is currently only evident along the northern elevation but may have been an original feature. The eastern end of the Barn has again been extended with brickwork and blockwork which is butt jointed to the original construction. There is little evidence of movement at the interface between the two constructions that can be considered to be of recent concern.

4.3 Within the chalk sections we have highlighted the effect of vegetation growth and some shattering as a result of the wetting/freezing cycle. The extent of this remains limited and has not resulted in significant loss of section or instability of the walls. There is an area of deformed and bowing chalk above the central doorway, but this is probably associated with the inadequacy of the timber lintel over the door and lack of buttress. It is a localised issue, however, with little evidence of major movement within the panels on either side of the opening or at high level.

4.4 Where the lean to element abuts the main brickwork to the Barn there has been a degree of movement and the southern elevation brickwork of the Barn has rotated to a limited degree from foundation level. The scale of this rotation is limited by comparison to the overall width of the brickwork to the main wall. We are reasonably satisfied that this movement is probably longs standing and has not resulted in eccentricity of the wall relative to the foundations.

4.5 The roof to the main Barn is constructed with midspan purlins and further purlins at eaves level supported on the main trusses. There does not appear to be any significant tie between the roof and the upper wall to the Barn. The purlins have distorted between the trusses which probably explains the degree of rippling that was noted through the external finish. Weather penetration has occurred through the Barn roof and we have highlighted the degree of staining and apparent infestation of the timbers when viewed from ground level.

4.6 In addition are number of timber plates built within the walls or acting as lintel support over the openings. The retention of these timbers within any conversion works is subject to specialist advice. The specialist should carry out an independent inspection of the structure to confirm the condition with regard to dampness, infestation and rot. The recommended repairs and treatments can then be incorporated within the conversion so that the long-term stability is not further compromised.

4.7 Within our general description of the main Barn we have referred to loss a section to a number of bricks as well as erosion of mortar joints. This appears to be a reasonably localised issue has not resulted in loss of section to significant areas of the elevations. As with the shattered chalk some localised replacement will be required during the inevitable treatment of the external envelope. This could probably be undertaken, however, on an individual brick or chalk basis.

4.8 General undulation and bowing of the brickwork and chalk was noted but this did not follow a pattern indicative of major instability. Some repairs will be required to both bricks and mortar joints as part of the cosmetic repair of the external elevations. The use of Thor Helical, or similar masonry reinforcements systems, may be required to we rebond the sections of masonry along the more onerous cracks but we must reiterate that these will be localised repairs rather than necessitating substantial reconstruction.

4.9 It should be appreciated that the above comments are all based upon a single visual inspection of the various parts of the above Barn structure without the benefit of any long-term assessment, investigations or testing of the materials used in construction.

We are therefore unable to categorically state that the various movement noted within the structures has ceased.

4.10 The two-storey section and single-storey projections are of more recent construction and we have not identified any significant problems with the structural fabric. There is little repair required to those structures, other than to correct the weathering and maintenance issues referred to within this report.

4.11 With regard to the main Barn we have not identified major structural distress or areas of significant cracking damage. Subject to the conversion the lateral stability of the main open Barn structure will be further enhanced by the provision of a partial or full first-floor diaphragm. We are therefore satisfied that, subject to the repairs and recommendations referred to above, the Barn can be incorporated within a sympathetic conversion without a requirement for extensive reconstruction works.

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For and on behalf of Dudley Consulting (Hull) Ltd