

STRUCTURAL APPRAISAL

**OF
BARN
AT**

**STARTIFANTS FARM
LONGRIDGE ROAD
CHIPPING**

FOR MR. & MRS. ROBINSON

Project No.: 2014-203
Date: September 2014

Structural Appraisal: Barn at Startifants Farm, Longridge Road, Chipping

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1.0 Introduction

- 1.1 On the instructions of Mr & Mrs Robinson, and their agent M.L. Planning Consultancy Ltd, a structural appraisal was carried out at the above property on Monday 19th May 2014.
- 1.2 The purpose of the appraisal was to assess the structural condition of the building as part of a planning application to convert the barn into a single dwelling.
- 1.3 This report is based on a visual inspection of relevant and readily accessible areas of the property only, carried out from ground level externally and internally.
- 1.4 This report is a structural survey only, and does not incorporate specialist timber, drainage or damp surveys.

2.0 Findings

2.1 General

- 2.1.1 The subject building is a detached building of stone construction, under a duo-pitched, slated roof. It occupies a generally level site in the middle of the farm curtilage, and is considered to face south.
- 2.1.2 The barn is estimated to have been constructed in the mid nineteenth century, and we are advised that the alterations which have been made to the barn were limited to the eastern end of the building to permit the installation of the ice cream manufacturing facility. Aside from this area, the barn is now unused.
- 2.1.3 A selection of photographs and sketches are included as Appendix A to this report.
- 2.1.4 Our report should be read alongside the proposed drawings for the project, as prepared by M. L Planning Consultancy Ltd.

2.2 External Observations

- 2.2.1 The slated roof of the barn pitches from front to back, with the ridge and eaves lines being noted as level. There is a void in the roof covering high on the pitch to the south elevation, at the junction with the western gable, which has been sheeted over as a temporary repair, however it has not been particularly well secured. There are a few other locally slipped slates across the pitch to both the front and rear aspects. Rainwater gutters are present for approximately three quarters of the elevation, but there is no downspout and the water is therefore permitted to run down the face of the masonry.
- 2.2.2 The barn is constructed of random rubble stonework, which although now weathered would originally have been flush pointed. The masonry to the west of the large barn door opening to the front elevation is very poor, having been badly weathered to the point of voids having developed across the stonework. An outward lean of this panel of masonry can also be detected, although being at its worst at high level, it is difficult to quantify accurately. It was estimated to be a maximum movement of 35mm in 1m, with the outward movement commencing at ground level. The barn door opening has been formed by a very shallow arch of stone voissours, which have a timber lintel below. The low level masonry to the eastern side of the barn door is in much better condition, although between the barn door and the pedestrian door at the eastern end of the elevation, evidence remains of what appears to be an old extension to the barn, with a visible step between the two panels of masonry of up to 50mm (see photograph 1). The quoins to what would have been the earlier barn to the west remain in place to approximately 2.5m above ground level, but the stonework above this level is continuous, with no quoins between. The high level masonry is again weathered, and that at eaves level bulges outwards.
- 2.2.3 The eastern gable of the barn is generally in better condition than that to the front elevation, being plumb, and exhibiting some signs of weathering of the mortar joints at low level. We are advised that some alterations were made to the ground and first floor level window openings when the ice cream parlour was created. The jambs and lintel to the first floor opening are concrete, with the remaining lintel, jambs and cills being stone. There is an infilled pedestrian door at the northern aspect of the gable, but with no bonding with the surrounding stonework, the opening may soon be reinstated. There is evidence of some patch pointing and repairs to the elevation, again considered to have been done as part of the works to the ice cream facility. There is a small diagonal crack limited to the mortar joints which commences at the eaves level with the front elevation and extends toward the ground floor window opening. It is no more than 10mm in magnitude and is not of a nature which is of structural concern. With no fascia boards at the roof line, it is considered to be the result of a small amount of freeze-thaw action from moisture which has been permitted into the joint.

- 2.2.4 The eastern aspect of the rear elevation is difficult to assess in close detail as there is a dilapidated lean to and numerous semi-mature trees in close proximity to the wall. The centre of the rear elevation has noticeably distorted, with the upper part particularly having a significant inward lean (see photograph 2). Again, it was not possible to measure the movement accurately, but the masonry is estimated to be as much as 300mm out of line at the eaves. Although the joints have not deteriorated with the movement, the panel is generally weathered. The pedestrian door opening at ground floor level is formed by stone voissours which are free from any movement. There are localized and isolated voids around the quoin stones at the corner with the western gable, but there is no associated movement between the voids.
- 2.2.5 The western gable has no openings across the elevation and despite it being one of the more exposed aspects, the flush pointed masonry remains in reasonable condition. The gable is dominated by a crack close to the south elevation which extends from approximately 1.5m above ground level up the eaves, and is estimated to be, at its most severe, 75mm in magnitude (see photograph 3). The movement has occurred between the quoins and the remaining gable stonework, and even extends over the uppermost quoin suggesting that the movement is entirely limited to the front elevation. Pockets were noted in the stonework at approximately 2m above ground level, where timbers were previously seated to form a lean-to adjacent to the barn. Again, no fascia boards are present along the roof line, and the stonework below the missing slates to the front elevation is particularly uneven.

2.3 Internal Observations

- 2.3.1 The roof of the barn is of timber rafters bearing onto two lines of timber purlins per pitch and a ridge board. The purlins in turn are supported off the gable walls and three timber kingpost-type trusses. Whilst close inspection of the timbers was not possible, the trusses do not appear to be suffering from wet rot or any noticeable wood boring insect damage. The purlins are slender, and although they are not noticeably deflecting, despite those below the void in the roof being wet, they are unlikely to be suitable for retention.
- 2.3.2 What was the gable wall of what is considered to be the original part of the barn has been removed to accommodate the eastern addition. The inward lean of the rear elevation is also pronounced internally, however the step in the masonry noted to the front elevation is not replicated to the internal aspect. The outward bulge at eaves level to the front elevation is also visible internally, but again it does not mirror the extent of the movement which has occurred to the rear elevation.
- 2.3.3 There is poor bonding of the perpendicular walls internally, and much of the internal masonry is formed from rounded cobble-type stones. The movement noted to the western gable is also visible internally, albeit not to the same extent. The installation of the timber lintel below the stone arch is an unusual arrangement, however given the shallow nature of the arch, it is unsurprising that an additional support to the opening was required. This lintel was noted to have wood boring insect damage, and diagonal cracking to the masonry above would suggest that some deflection of the lintel has occurred.
- 2.3.4 All of the timber lintels visible internally are suffering from wood boring insect damage, but are a good section size for the nominal spans (aside from that to the barn door already discussed), and none are displaying signs of being overstressed.
- 2.3.5 Only the central section of the dividing wall between the lounge and store remains at ground level, with evidence of where the wall was bonded to the rear elevation being visible. The lintel to the western side of the opening against the southern elevation bears onto a corbelled stone, and slopes noticeably northwards.
- 2.3.6 The internal walls within the ice cream facility are concrete blockwork, and are unlikely to have been bonded into the external stone walls.

3.0 Conclusions and Recommendations

- 3.10 From the findings summarized previously it is apparent that some structural movement has occurred to all but the eastern gable of the barn. The building is not particularly old, and given that it is in a relatively sheltered position, its poor condition is a little surprising. The nature of the movement which has occurred would lead us to suggest that it has not been particularly well constructed, or indeed respected when it was extended and that over time, those shortcomings have led to the condition in which the barn now exists.
- 3.11 Despite this, it is considered that enough integrity remains within the barn, that with some areas of rebuild, it can be satisfactorily converted.
- 3.12 It is difficult to know in just which order the deterioration noted occurred. The inward / outward bulges to the rear and front elevations respectively, are considered to be the result of the way in which the barn was extended eastwards. The removal of high level quoins, removal of at least part of the roof covering, and the removal of the first floor masonry would have left a very unstable structure, even in the short term. That said, the step in the stonework to the front elevation would suggest that that of the original barn may have moved forwards prior to it being extended. Also, the masonry to the front elevation to the west of the barn door would ordinarily be considered to be far enough away from the works at the eastern end of the barn to be relatively unaffected by the extension. The position of the crack to the eastern gable is further indication of poor tying between the perpendicular walls, and the outward movement is clearly limited to just the front elevation.
- 3.13 Appended to our report are a series of sketches illustrating the extent to which we envisage that parts of the three elevations of the barn will require rebuilding. It is felt that once suitably designed temporary works have been installed, to protect the rest of the building whilst works are underway to each elevation, the installation of the new structure will only serve to stabilize the barn further.
- 3.14 A new insulated, concrete ground bearing slab will need to be introduced into the barn, and this should extend into slab thickenings for the load bearing block walls. These new blockwork walls will form the load bearing element of the barn, and should be tied back into the stonework using proprietary remedial type ties at the standard 900/450mm centres. The new roof structure and first floor will also need to be adequately fixed, where bearing on, and strapped where parallel, to the blockwork in accordance with current Building Regulations.
- 3.15 We would recommend that the nominal arch to the main barn door opening be levelled, as shown on the proposed drawings. Although there is little evidence of the arch having dropped externally, the addition of the timber beam below is an unusual step, but probably a necessary one to support what is inherently a weak structure. The existing stone voissours could be reused if required, by the addition

- of a steel angle relieving lintel. Minimal rebuilding above the opening would be required on the basis that the masonry could be needle and propped immediately above the opening.
- 3.16 Consideration could be given at Building Regulations stage as to whether there is sufficient headroom to accommodate the retention of the existing trusses. Aside from requiring treatment for wood boring insects, the timbers do appear to be in good condition, and as they are supporting a slated roof now, there will be little increase in load on the structure once it is converted. Given that the purlins are slender (and some affected with wet rot) it is unlikely that these could be retained, and the rafters will require replacement in order to accommodate the necessary insulation.
- 3.17 Considering the barn generally, once the rebuilding works have been undertaken, we would recommend that all elevations are repointed with a suitable mix of mortar. The existing joints should be raked out to a minimum depth of 20mm prior to the application of the new mortar.
- 3.18 Whilst there is nothing to note in the property which leads us to conclude that there are any problems with the existing foundations, they will require exposing as part of the Building Regulation process, to confirm their adequacy both in terms of depth and load bearing capacity. Any shortcomings will require addressing by means of underpinning.
- 3.19 As a final note, we would recommend in the short term that the saplings adjacent to the rear elevation are removed.

Photo 1: Step in front elevation masonry



Photo 2: Inward lean to the rear elevation



Photo 3: Movement to front elevation as observed from west gable.

