South Lincs Consulting

Structural Appraisal

The Steel Construction Institute

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Structural Appraisal

of

Existing Barn

Charlton house
Goochgate
Sutton St James
SPALDING
Lincs PE12 OHE

Client Mr & Mrs C Trowbridge

Date 10 June 2006

Engineer S P Kidd BSc, CEng.,MIStructE
job No 06-0176

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a company registered in England, Registration Number 5356709

Directors M Kidd, S Kidd BSc, CEng, MIStructE

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1.0 Synopsis and terms of Reference

The client commissioned the present report to determine the best way to stabilize the existing structure which has been made unstable by a combination of storm damage and long term subsidence. The report is focused on reinstatement of an adequate margin of stability. Other aspects such as damp-proofing, timber-rot and drainage are not covered here. Specialist advice on these items should be sought where appropriate.

Apart from a soil test adjacent existing footings, the report is based on a visual inspection of the property carried out on a single visit. No materials where tested or calculations carried out. However access to all sections of the barn was possible.

Finally the report should be copied without the clients permission.



2.0 SURVEY

2.1 Introduction

As shown by photographs given in the Appendices the existing barn is a Victorian solid brick structure in hand made bricks in lime mortar supports on pantiled roof. The roof has suffered recent storm damage which has prompted the owners to carry out repair works before further deterioration sets in. The photographs also show extensive subsidence cracking in the gable walls and full height dividing wall. The client advises this is at least 20 years old, having been in evidence since they first came to live here 20 years ago. The site is in open farmland surrounded locally by mature trees. The barn is in two sections; a low eaves (1.9m) and a high eaves(3.5m). The lower section being overgrown with Ivy on the gable.

2.2 Dimensionally the Barn is 15m long x 6.5m wide internally, the low section taking up 6m of the overall

length. The high eaves section is divided further by a 2m high division wall which connects to a full height 1½B internal wall running at right angles to the division wall and going up to the main roof. This internal wall appears to have been constructed more recently than the barn structure itself, and forms the boundary wall to an internal mezzanine.

2.3 Walls

2.4 The front and back sidewalls are relatively crack free except where the main door lintol has deflected.

2.5 However all gable walls and main internal cross walls are showing severe subsidence cracks up to 50mm wide. The main crack patterns have developed below the eaves tile level indicating the ground below these walls has subsided downwards. It is believed that this subsidence of the original cross-walls occurred at least 20 years ago when the heavy internal spine wall was constructed.

2.6 The fractures which have occurred exceed the width that would normally be repaired by stitching (ref Institution of Structural Engineers Guidelines "Subsidence of Low Rise Building"). Rebuilding sections of wall will therefore be required (see conclusions and recommendations).

2.7 Although the roof was originally tied into the cross walls the only remaining external tie plates remaining are on the external gable. However even here despite the tie being in place subsidence has taken place below the tie level, indicating a downward movement formed a significant part of the movement.

2.8 The internal cross wall has also bulged as well as settled to a point where it is clearly unstable. A temporary acrow has been put in place to resist this instability.

2.9 Foundations and Subsoil

2.10 A profile of the existing foundation and soil profile is shown in the Appendices. It was noted the foundations go down 700mm which is unusual for a barn of this age. More usually the foundations are at ground level, therefore it may be assumed either the ground levels have been built up or the foundations were taken down in an attempt to gain a firmer footing.

2.11 A hand auger taken down 1m below the existing footing indicated a layer of made ground below the footing over soft grey clay. This may in part explain the observed movement of the walls.

3.0 Conclusions and Recommendations

3.1 It is evident that category 3 subsidence has occurred according to the Institution of Structural Engineers report "Subsidence of Low rise Buildings—2nd Edition". This is severe requiring rebuilding sections of the cross walls. However a stable foundation must first be established.

3.2 To strengthen the subsoil under the Barn foundations it will be necessary to remove the trees and introduce a system of land drainage around the property.

3.3 Underpinning is not recommended due to the soft nature of the underlying subsoil. The preferred method of stabilising the walls is to cast a reinforced concrete raft inside the barn which is keyed into the external walls also. A sketch of this proposal is given in the Appendices

3.4 It is further recommended the massive 1½B internal wall is removed first to relieve the subsoil of its dead-eight.

3.5 The outward thrust onto the external walls by the roof should be reduced by introduction of steel ridge beams spanning between gable walls and the division wall between low and high eave sections.

3.6 External tie-plates at each wall junction should be re-instated to couple the walls together.

3.7 When the repair work is completed a Certificate of Structural Adequacy may be issued on this report if required for a nominal fee.

S P Kidd BSc, CEng, MIStructE

Appendices

1 Photographs

View on Barn
Close view on Gable
Internal view of Roof

2 Soil test/Existing foundation

3 Proposed Foundation


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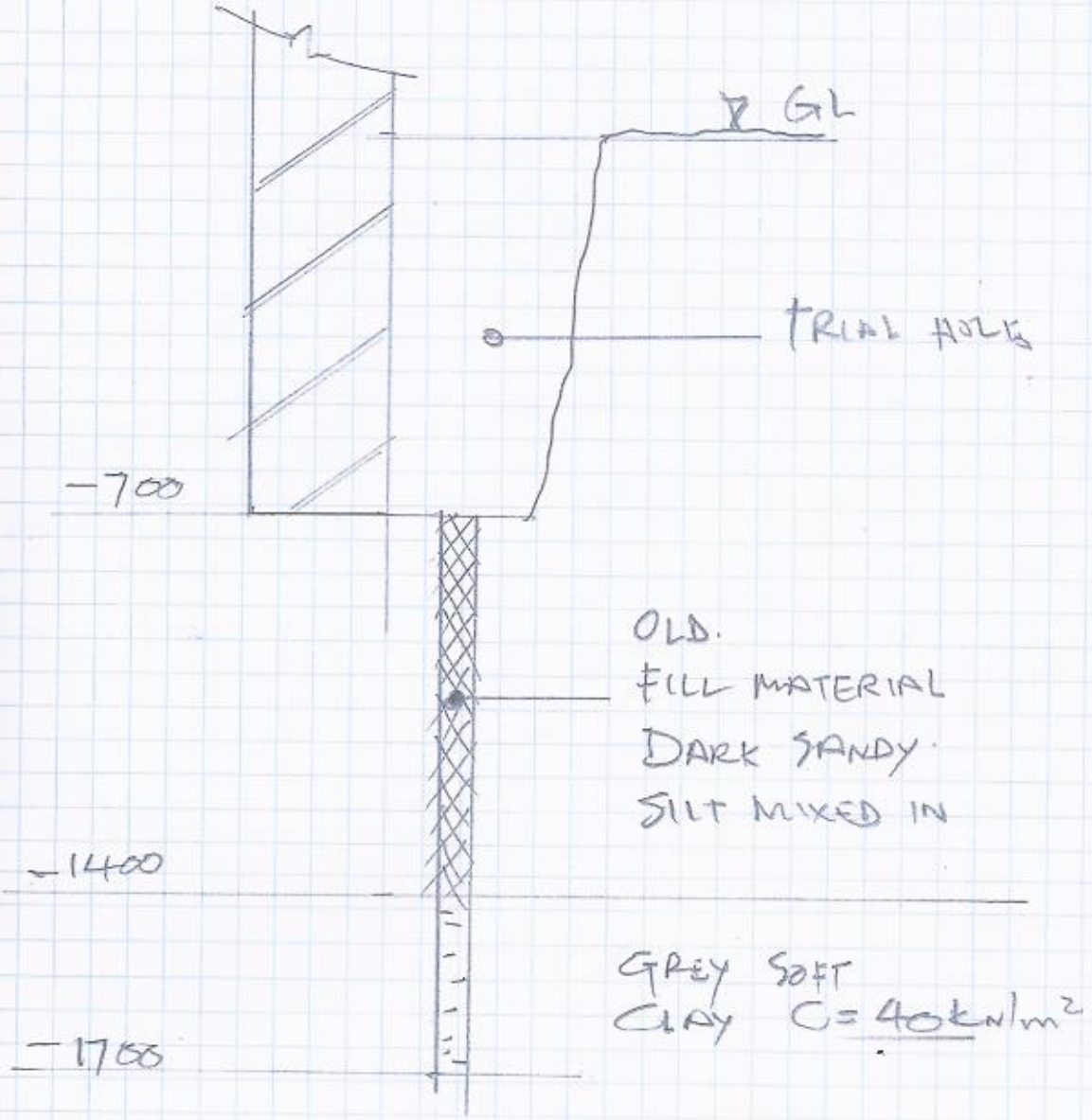

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EXISTING FOUNDATION



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PROPOSED FOUNDATION :

