REPORT

Yew Tree Farm House
Ward Green
Old Newton
Stowmarket
Suffolk
IP14 4EZ

NFM ENGINEERING LTD

Report

on

Inspection

of

Yew Tree Farm House
Ward Green
Old Newton
Stowmarket
Suffolk
IP14 4EZ

N.F. Moore CEng MICE MIStructE FFB
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Job No. 5002
Date March 2023

This Report dated March 2023 is prepared

for

Mr. & Mrs. S. Cadman

and elected representatives

and

shall not be used by any other party without prior written consent by

NFM Engineering Ltd.

Visual inspection was undertaken on 29th March 2023

Contents

1.0 Introduction

1.1

An email instruction was given by Mr. S. Cadman to carry out an inspection and provide a report on the building known as Yew Tree Farm House Ward Green Old Newton Stowmarket Suffolk IP14 4EZ.

1.2

The building is an historic detached timber frame dwelling with some brick infill, altered and added to since construction began with the front facing in a westerly direction on a flat site in a rural area.

1.3

The purpose of the inspection and report is to comment on the structure of the building as observed in relation to the structurally inadequate and disjointed arrangement of the later section of timber frame building to the south section of the dwelling and fracturing, cracking and displacement of masonry in the chimney and other infill panels and to offer relevant recommendations regarding removal of defective structure and rebuilding including temporary works and scaffold assemblies required. We have not inspected woodwork or other parts of the structure which are covered, unexposed or inaccessible and we are therefore unable to report that any such part of the property is free from defect. We have not inspected timber for insect attack or decay. However it is obvious from inspections carried out that a very significant proportion of the late southern section of the building constructed mainly of softwood is severely decayed.

1.4

Limited comments have been made with regard to subsoil conditions. A physical soil investigation at the site has not been carried out as part of this inspection. Geological information is available from the Geological Society of Great Britain for the Old Newton Stowmarket area. A desk top study of soil conditions has been carried out and is noted in Clause 2.3.

1.5

This survey will not provide detailed inspections on areas of wet or dry rot or active beetle attack and a specialist company should be appointed to advise on such matters.

1.6

A general visual inspection of the structure by examining distortions or fractures is a guide to assessing the overall stability of the structure to determine repairs, replacement and rebuilding as necessary.

1.7

At the time of inspection, repairs to the original earlier timber framed dwelling were progressing incorporating new timber where required and upgrading foundations. Some finishes and severely decayed timber had been removed on the southern more recent section of the dwelling. A description of which is outlined in Clause 2.0 Inspections and Findings

2.0 Inspections and Findings

2.1. External Inspections

2.1.1

The exposed brick chimney stack to the south elevation is located in approximately the centre of the gable wall. The base of the chimney is constructed directly on the topsoil fill material. Vertical and horizontal fractures in the masonry are evident on the south elevation of the chimney. Distortion of the stack has resulted in a lean outward of approximately 75mm at first floor level and from first floor level upwards, a lean in towards the dwelling of approximately 200mm creating a dog-leg shape when viewed from east/west elevations. The plan shape of the chimney is twisted anti-clockwise from ground floor level up to eaves of the building structure in line with the out of horizontal plane eaves positions of the gable. See photographs Nos. 9 & 10.

2.1.2

Render each side of the brick stack is of a cement based material, is loose and hollow in many places and shows signs of fracturing and cracking.

2.1.3

Existing exposed timbers on the west elevation where repairs were planned are significantly decayed at the base where most timber had rotted away. The decayed studs are presently propped and suspended above ground level. The connection of studs to the wall plate at underside of first floor are skew nailed with now severely corroded nails to the timber plate. Severe decay has affected the first floor wall plate particularly where mortices are present. The mortices in the timber plate do not contain tenons from the vertical studs and are randomly located along the wall plate. See photograph No. 7.

2.1.4

Cracking and fracturing of render is visible on the east elevation of the south part of the dwelling. Much of which is hollow when tapped. Outward movement of this section of wall is visible at mid-height between ground level and first floor level and above first floor level where there is eaves spread at roof level.

2.1.5

Render removed from the gable corners with the flank walls has revealed the corner studs to be severely decayed. Exposed lath shows signs of significant decay. See photographs Nos. 6, 7 & 8.

2.2 Internal Inspections.

2.2.1

At ground floor level the chimney breast on the south gable elevation has been altered and added to over time. Bricks used in the additions have been laid sideways down in a rat trap bond at the sides of the chimney breast increasing the width of the chimney and extending it into the room further. There are no visible foundations to the chimney internally, only shallow brickwork constructed on the topsoil/made ground.

2.2.2

Within the narrow first floor construction zone there is a precast concrete lintel supporting the first floor to loft area masonry of the upper chimney breast over the wider ground floor chimney construction. See photograph No. 14.

2.2.3

Above first floor level the chimney breast masonry is recent stretcher bond and exhibits vertical fractures on the three exposed sides internally. In one location the fracture is approximately 50mm wide. Where fractures have occurred, the brickwork is displaced laterally and elements of the chimney can easily be moved by application of some gentle pressure by hand. Fractures and horizontal cracking in bed joints extend into the loft space. Some timber members, mainly horizontal frame plates are supported on the chimney stack where the ends of timbers are built in. See photographs 19, 22, 23 & 24.

2.2.4

Displaced external walls are evident internally where discontinuous studs stop/start at mid height of the ground to first floor panel on the east elevation where a horizontal frame member has been used. The displacement has resulted in the wall bowing outwards at mid height. The vertical studs are, in a number of cases, not fixed to the wall plates and only a few are secured by cut nails skew driven into the timbers. See photographs 15, 17, 18 & 20.

2.2.5

First floor joists over the south addition are severely deflected and support on the east external wall is by a batten nailed to the studs. Bearing of the joists on the batten is less than 10mm in some instances. The floor joists support a timber first floor partition that follows the significant deflection in the floor joists.

2.2.6

Rafters are supported on a timber wall eaves plate but most are not fixed to the plate. Tying action across the building between rafter feet occurs at the gable wall, at the internal bedroom partition and then at the partition with the older original part of the dwelling. No direct tying of rafter feet is evident. Rafters are relatively steeply pitched and a timber collar is located high in the loft space. There is a degree of rafter spread meaning that the wall plate and studs below have been displaced outwards slightly. See photograph No. 33.

2.2.7

Rafters and collars in the southern more recent end of the dwelling are more modern timbers. Some timbers are historic but have clearly been recovered from earlier building structures.

2.3 Soil Investigation

2.3.1

A desk top study of the likely soil's condition was carried out by referring to The Institute of Geological Sciences and Geological Ten Mile Maps Quaternary Edition 1977 which indicates that the area is likely to be underlain by Boulder Clay underlain by Norwich Crag, Red Crag and Chillesford Clay beds.

2.3.2

Boulder Clay and Morainic Drift represents mainly ground moraine, the distinction between Boulder Clay and Morainic Drift being in places largely topographic. It also embraces undifferentiated glacial drift and the Contorted Drift of East Anglia.

2.3.3

A physical soil investigation was not carried out as part of this investigation. Although excavations have taken place indicating clay soil's at depths of approximately 1000mm. Historical Geological Survey Borehole records for investigations carried nearby are also attached in the Appendix.

2.4 Drain Investigation

2.4.1

Below ground drainage systems are being replaced.

2.5 Incoming Water Supply

2.5.1

Incoming water supply has been checked for watertightness.

3.0 Summary

3.1

Masonry chimney stack severely displaced and leaning in both directions south and north. No foundations present.

3.2

Masonry chimney fractured and cracked in every elevation externally and internally and is unstable when gentle lateral pressure applied.

3.3

Timber frame members bear onto the chimney stack.

3.4

Discontinuous and unstable external walls at ground and first floor levels resulting in severe deflection at approximately mid storey heights. No rafter feet ties resulting in lateral deflection of first floor walls.

3.5

Many decayed timbers mostly of modern softwood origin near ground level. Plaster internally and cement render externally have unintentionally become loadbearing. Decayed wall plate foundation placed directly on topsoil.

3.6

Severely deflected and overstressed first floor joists.

3.7

Timber frame in many instances not jointed with mortice and tenon joints. Many joints are single skew nailed (now severely decayed). Some timber joints have no fixings/nails and can be removed by hand.

4.0 Conclusions

4.1

The chimney stack is in poor condition and suffering from severe displacement/leaning in both southerly and northerly direction meaning it is 'dog-leg' shaped. There are many fractures in the chimney and each elevation displays cracking in bedjoints and through bricks. Timber plates and floor joists are supported on the masonry of the chimney in slots formed in the brickwork. There is no foundation below the chimney stack. Upgrading and repair of the stack would first require underpinning to match the depth of foundation being installed to the external walls and newer structure yet to be constructed. The very fragile nature of the stack would create an unstable structure during repair works and risks to operatives and the remaining building structure would be unacceptable. The stack should be removed and rebuilt.

4.2

The building has in the past been re-rendered with a cement based pebble dashed render. Cement based renders restrict moisture movement and trap moisture behind the render meaning that timbers can be become saturated. This is particularly relevant in unheated buildings where moisture levels can remain high and are unable to dry out. The moisture can form condensation on timber members that run down to timber plates resulting in decay of joints as can be seen throughout the south part of the building. It is most prevalent in the softwood timbers that make up most of the frame of this part of the building. Additionally rising damp as a result of a lack of damp proof course or any form of moisture barrier at ground level has caused the sole plates and base of the vertical studs to decay.

4.3

Each member of the timber frame elements is predominantly affected by decay, this is particularly relevant at the base of the timber studs and where studs are supported on wall plates at mid height of ground to first floor and at first floor level. The wall plate at first floor level, previously used in a former building, is decayed where mortices are present in the timbers. This has lead to decayed ends of studs above and below the wall plate. Once decayed sections of predominantly softwood timbers are removed in the more recent southern section of the building there will be very little remaining of the original timber frame. To repair these timbers requires significant labour and would leave potentially original timber that is at risk of continued decay in the long term. Structurally it would be prudent to replace the timber frame completely.

4.4

The building is to be extended and new foundations are to be cast to support the new construction. The majority of the existing building is to have new foundations, however attempting to install new foundations to the southern more recent section of the building will be a high risk operation and one that would be better achieved by removing the existing defective section of the building and completely rebuilding

4.5

Structural stability of historic timber framed buildings relied on joint details and specific timber orientation in orthogonal directions constructed by carpenters that were handed down accumulated knowledge from their forebears, Buildings that were constructed in this manner have generally lasted centuries.

4.5.1 Construction adopted in the later southern section of the building has not followed the good practices of experienced medieval builders and carpenters. Softwood timber has been used for construction in many cases and poor methods of assembly with inappropriately placed wall plates has significantly reduced inherent stability of the building.

4.5.2 Additionally over time successive unsympathetic alterations both structurally and aesthetically have lead to significant decay in timber members. This is particularly relevant where timber sole plates have been placed directly on the subsoil/topsoil with no preparation to reduce moisture uptake from the ground. And where a cement based render has been used throughout the building reducing the ability of the external wall to 'breath' and wick moisture away to the outside. The trapped moisture has increased the moisture content of the timber members above the 18% that is considered an upper limit before long term decay sets when this figure is exceeded in above this figure. This is more prevalent with softwoods as much higher moisture contents can develop.

4.6

The external wall to the east elevation is structurally unsound. In addition there are decayed timbers and joints between timbers and joints between timbers are insufficient. This elevation should be rebuilt.

4.7

Severely deflected first floor joists are of insufficient strength and are not adequately supported correctly. These should be removed and replaced.

4.8

In order to carry out the replacement works, the roof structure should be removed allowing safe and unimpeded access to the superstructure below to facilitate rebuilding on new foundations. This will include the chimney stack and repositioning of the stirs. It would also facilitate ease of construction of the new south addition.

5.0 Recommendations

5.1

Erect scaffold to surround south section of later building.

5.2

Install scaffold birdcage internally and fix OSB to end bay of original historic section of the dwelling to provide a measure of protection against wet weather.

5.3

Remove rafters and superstructure down to ground level, removing internal birdcage and external scaffold as removal progresses. Grub up any existing limited shallow foundations. Retain any suitable timbers for reuse if possible.

5.4

Excavate and cast new foundations and form new drainage as necessary.

5.5

Construct sub-structure masonry to underside of timber frame sole plate level. Install service ducts as required.

5.6

Compact sub-grade fill and compact sub-base, install damp proof membrane/damp proof course and cast floor slab.

5.7

Erect external scaffold.

5.8

Erect ground to first floor external walls and chimney stack.

5.9

Form internal birdcage and install first floor.

5.10

Install first floor external walls to wall plate.

5.11

Continue installation of first floor wall studs and plate to eaves level.

5.12

Install pitched roof: rafters, struts, purlins, collars and ceiling joists. Batten, felt and tile as Architect's details.

5.13

Install all fittings, services etc. and finishes.

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6.0 Appendix (separate documents)

6.1 British Geological Survey Information
6.2 Photographs