SETCHFIELD ASSOCIATES LIMITED

STRUCTURAL INSPECTION REPORT



Client	Mr R Sainsbury
Property	The Shrubbery, Main Road, Deeping St Nicholas
Date	June 2020
Project Report	Structural Inspection Report

Contents

1.0	Introduction
2.0	Building Description
3.0	Inspection Procedures
4.0	Structural Inspection Findings
5.0	Recommendations
6.0	Conclusions
Appendix A	Photographs

1.0 Introduction

1.1 Client Brief

Setchfield Associates Ltd was engaged by Mr Richard Sainsbury to complete a structural inspection of The Shrubbery, Main Road, Deeping St Nicholas. The structural inspection was completed on 9 June 2020. The weather conditions were sunny and dry during the inspection. The purpose of this report is to document the structural condition of the existing buildings. The report was requested to support a future planning application.

1.1 Location

The Shrubbery, Main Road, Deeping St Nicholas, is located approximately 5.6km north east of Market Deeping along the A1175 Littleworth Drove towards Spalding.

1.2 History

It is estimated that the buildings in The Shrubbery date from around 1830 based on the age of the adjacent farmhouse. For ease of reference in this report the buildings are shown on the plan below in figure 1 as buildings A to F

Building F in the south west corner of the site was rebuilt by a local builder prior to 2002. The roofs of buildings A to F were replaced in 2002. Building C had been used as a car workshop before 2002. Building A was refurbished in 2004 and is currently used as living accommodation. It had previously been used as a workshop. Building D had a refurbished roof and supporting brick pillars in 2019.

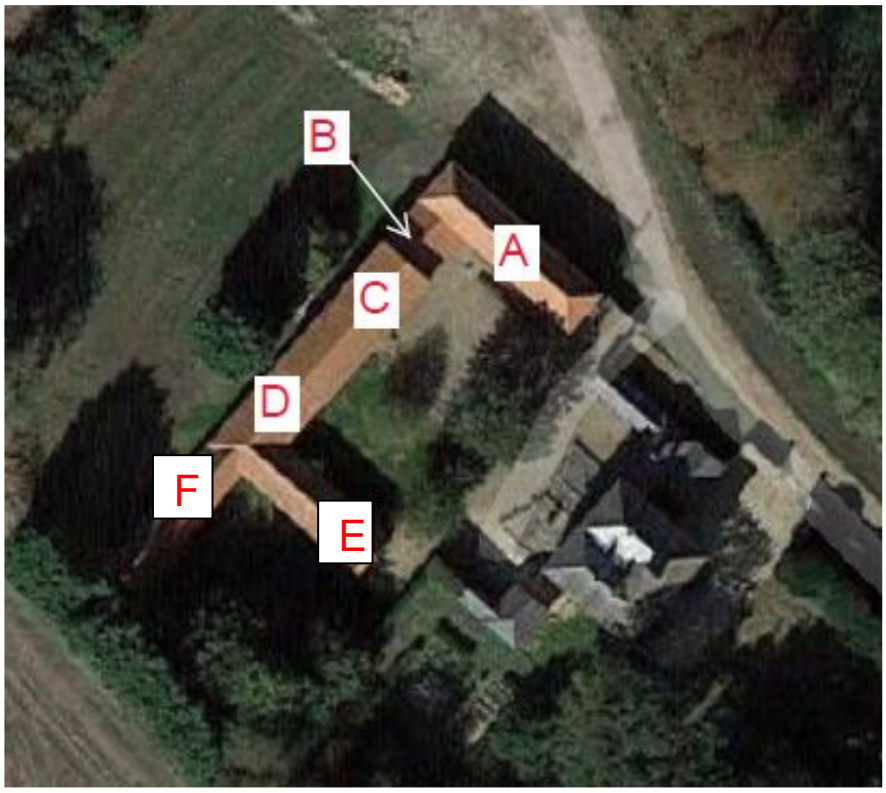


Figure 1 – Building references

2.0 Building Description

2.1 Building A

This is the only building considered in this report that has been converted into live/work accommodation.

Building A has a duo-pitched timber roof with hipped ends. It is covered with clay tiles, see photograph nos 1 to 4. Some of the existing roof structure is visible from the internal first floor level and it is formed by a series of king post trusses spanning transversely along with purlins, rafters and hipped rafters. All timber members appear to be formed from hardwood.

At the first floor level large hardwood beams are visible below the plasterboard ceiling line. It is assumed timber joists span between these beams. There is a fire escape staircase from first floor level at the eastern end of this building, see photograph no 2.

The walls are solid on the external elevations of the building. There is a band of stone above ground level visible on external elevations, see photograph nos 1 to 4. Above this level is a solid brick wall and below the stone the top of brickwork arches are present. These may be arches that transfer the wall loading to a lower foundation level.

2.2 Building B

Building B has a duo-pitched roof which is covered with clay tiles. The existing roof is formed from a central king post truss spanning in the north-south plane with purlins spanning from the truss to adjacent brickwork walls. The rafters span from wall plate to purlin and on to ridge level. All timber members appear to be formed from hardwood, see photograph nos 10 to 12.

This building is open on the northern elevation apart from a central solid brickwork pier, see photograph no 9. On the southern elevation it has a solid brickwork wall and there is a band of stone above ground level visible on the southern elevation, see photograph no 10.

2.3 Building C

Building C is a two storey structure which has a duo-pitched roof covered with clay tiles, see photograph nos 15 to 18. It is formed from six timber trusses spanning across the short plane of the building, along with timber purlins and timber rafters. The roof has a layer of felt in place above the rafters, see photograph no 19.

There is a partial first floor at the western end of the building supported on timber joists. This may have extended along the full length of the building based on the presence of pockets in the internal face of the external walls. The ground floor is formed from a concrete ground bearing slab apart from the central portion close to the main doors. This section has timber boarding present at floor level covering an inspection pit that was used previously as part of a car workshop.

The walls are solid brickwork on the external elevations of the building and there is a band of stone above ground level, see photograph nos 17 to 18. There are steel pattress plates visible on the outside of the northern and southern elevations but these do not run through the building to tie the elevations together, see photograph no15 to 18. There are steps up to the entrance door on the southern elevation.

2.4 Building D

Building D has a duo-pitched roof with one hipped end covered with clay tiles. This building is open on the northern elevation apart from two solid brickwork piers and it has a solid brickwork wall on the southern elevation, see photograph nos 20 and 21. The existing roof structure is formed from two king post trusses spanning in the north-south plane with purlins spanning from the trusses to adjacent brickwork walls. The rafters span from wall plate to purlin and on to ridge level. All timber members appear to be formed from hardwood. There is evidence of recent repairs to the trusses and a purlin in this building, see photograph nos 23 to 24.

There is a band of stone above ground level visible on the southern elevation, see photograph no 21. Above this level is a solid brick wall and below the stone the top of brickwork arches are present. These may be arches that transfer the wall loading to a lower foundation level.

There is evidence of historical repointing locally to this wall, see photograph no 21.

2.5 Building E

Building E has a duo-pitched roof and is covered with clay tiles. It has solid brickwork walls on the southern and western elevations. This building is open on the eastern elevation apart from two solid brickwork piers, a low level brickwork wall and two steel PFC columns. The low level brickwork wall and steel PFC columns appear to have been built more recently and are supported by a shallow concrete foundation. There is a band of stone visible above ground level with solid brickwork above. Below the stone the top of brickwork arches are present along the western and southern elevations. These may be arches that transfer the wall loading to a lower foundation level, see photograph no 25 to 29.

The existing timber roof structure is formed from four king post trusses spanning in the east-west plane. They are supported on the western elevation wall by two isolated brick piers and two steel columns made from PFC profiles as mentioned above. There are four eaves beams supporting the roof along the eastern elevation and the purlins span from the trusses into adjacent brickwork walls. The rafters span from wall plate/eaves beam to the purlins and on to ridge level. All timber members appear to be formed from hardwood.

2.6 Building F

This building was reconstructed over eighteen years ago.

Building F has a duo-pitched roof and is covered with clay tiles. It has a gable wall at the western end and intersects with building D at the eastern end to form a valley in the roof. The existing timber roof structure is formed from a series of trusses spanning in the north-south plane. The purlins span between the trusses and on to adjacent blockwork walls. The rafters span from wall plate level to the purlins and on to ridge level. All members appear to be formed from softwood, see photograph no 37. The roof has a layer of felt above the rafters.

The southern elevation has two window openings, two door openings and two arches present, see photographs 35 and 36. It has cavity walls on the northern, southern and western elevations, see photograph nos 34 and 46. There are three dividing blockwork walls 100mm wide that subdivide building F transversely.

This building has a shallow strip footing foundation which was visible along the northern elevation, see photograph no 39.

3.0 Inspection Procedures

A visual inspection of the buildings was completed, and they were viewed externally from ground level. Building A was inspected internally at ground and first floor levels.

4.0 Structural Inspection Findings

4.1 Building A

There is damage to the external brickwork on all elevations of this building. A large extent of the eastern elevation is damaged, see photograph no 1. The bricks are soft and have lost 30 to 40mm of depth along the eastern elevation at ground level, see photograph nos 5 and 6. Based on the visual inspection this depth of loss has been surpassed elsewhere. The loss of depth relates to the brick only and a large proportion of the surrounding mortar is in a serviceable condition.

The brickwork wall is in a poor condition locally at the south western corner of building A close to the base of the external fire escape staircase, see photograph no 7. Several bricks are missing at this location and many others are damaged. There are areas on the elevations where mortar loss has occurred around the bricks, see photograph no 8.

Internally there are some fine (0.2 to 2mm) wide cracks in the masonry walls at ground floor level above the single door openings.

4.2 Building B

There are a few timber rafters in the roof close to the ridge that may be saturated or rotten to some degree and there is no roof felt present. There are a few loose or cracked tiles that are allowing water to ingress into the roof space, see photograph no 12.

The brickwork directly below the bearing position of the king post truss is loose and may not be supporting the truss fully, see photograph no 13.

There is a crack in the party wall between building B and C. This is 35mm wide at the base and extends up the wall reducing in size along its length, see photograph no 14.

There is loss of depth to the external brickwork on the southern elevation of this building, see photograph no 10. The loss of depth relates to the brick only and the surrounding mortar is in a serviceable condition.

4.3 Building C

There is a significant loss of depth to the external brickwork on the northern elevation of this building, the worst of which is above the main door level, see photograph no 17. The loss of depth relates predominately to the brick, but the surrounding mortar has also deteriorated.

There are some cracks in the existing floor slab in the eastern corner of the building.

This building is in good condition.

4.4 Building D

The internal face of the southern wall, at the eastern end, is damaged, see photograph no 22.

There appears to be some rotting or decaying timbers in the section of the roof with the valley in it, see photograph no 24.

The area of the existing ground floor concrete slab visible is cracked and is in a poor condition.

There is loss of depth to the external brickwork on the western elevation of this building. There are some whole bricks missing and some loss of mortar across the elevation too, see photograph no 21.

4.5 Building E

There is localised damage to the external brickwork on the western and southern elevations of this building. There are areas where the facing bricks have lost depth and mortar. There is evidence of historical repointing with cement based mortar. The western elevation has five windows which have been infilled with brickwork. See photographs nos 25 to 27.

The brick piers on the eastern elevation have a few bricks and mortar missing in the lower sections. The eaves beam and king posts truss bearing locations have loose or inadequate bearing arrangements at the top of the brick piers. See photographs 28 to 33.

4.6 Building F

There is a 2mm wide vertical crack in the northern elevation of the building, see photograph no 38. There is a substantial amount of movement in the southern elevation brickwork wall and the internal dividing blockwork walls. The brickwork and blockwork walls have a series of moderate (2 to 5mm) wide cracks in many locations. Sections of masonry have: dropped in level, moved laterally, cracked through the whole bricks and door frames are badly warped, see photograph nos 35, 36 and 40 to 45.

The foundations are likely to be the reason for the movement and cracking in this building. The British Geological Survey geoindex borehole reference TF11SE26 is available via the BGS website and is the closest to this site. The borehole shows the ground profile as 0.8m of Nordelph peat over 0.8m of Clay over 1.9m of River Terrace gravel above Oxford Clay. It is likely that the shallow foundations have moved due to a combination of being founded on the upper peat layer and water volume changes in the lower clay layer, possibly influenced by the trees located nearby.

There is some minor tile damage to the roof on the southern face at the western gable, see photograph no 46.

5.0 Recommendations

5.1 Building A and C

Buildings A and C are suffering with a loss of brick depth and mortar loss in many locations on the external elevations but not to such an extent to endanger the overall structural capacity of the building. Replacement of all bricks with loss of depth would be a major construction activity. A level of acceptable brick depth loss could be set with consideration given to the thermal properties of the building and the possibility of damp penetration at the narrowest thickness of wall.

Option 1 (Preferred solution) – We recommend that a depth of acceptable loss is set and all bricks with loss above this level are replaced and local repointing completed once the new bricks are installed.

Option 2 (Alternative) - If option 1 is not viable then a repair strategy is formulated by consultation with a brick repair specialist. There may be a method of infilling the lost depth of brick with a material that colour matches the original bricks. A repair specialist such as JSBR in Sawtry (www.jbsrltd.com) should be consulted to develop a repair solution. We recommend where mortar has been lost that localised repointing of the brickwork is completed.

5.2 Building B

We recommend that the tiles are removed, rotten or damp rafters are replaced, new felt is installed and tiles laid to form a watertight covering.

The brickwork under the king post truss bearing should be made good. A repair specialist such as JSBR in Sawtry (www.jbsrltd.com) should be consulted to develop a repair solution. JSBR are an approved installer of Helifx masonry repair products and we have used them successfully on other projects.

Brick depth and mortar loss should be repaired as per the recommendations for Building A and C.

5.3 Building D

We recommend the damage shown in photograph no 22 to the south wall should be made good. The roof tiles should be removed to allow a new felt layer to be installed.

Brick depth and mortar loss should be repaired as per the recommendations for Building A and C.

5.4 Building E

Brick depth and mortar loss should be repaired as per the recommendations for Building A and C.

We recommend that the two brickwork piers and brickwork walls supporting the king post trusses and eaves beams need to be repaired to provide good bearing conditions below these structural elements.

5.5 Building F

We recommend that this building is dismantled and materials above ground level set aside where suitable for reuse. The tiles, roof structure and a large quantity of brickwork could potentially be reused. The foundations are inadequate and need to be enhanced to prevent a repeat of the current cracking and movement the building is exhibiting. The existing foundations should be removed and a new design solution considered as part of the overall redevelopment of the buildings.

6.0 Conclusions

Building A to E require localised repairs expected for a structure of this type and age. Building F requires more sigificant repair work as decribed in 5.5 above.

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Appendix A – Photographs



Photograph no 1 – East elevation Building A



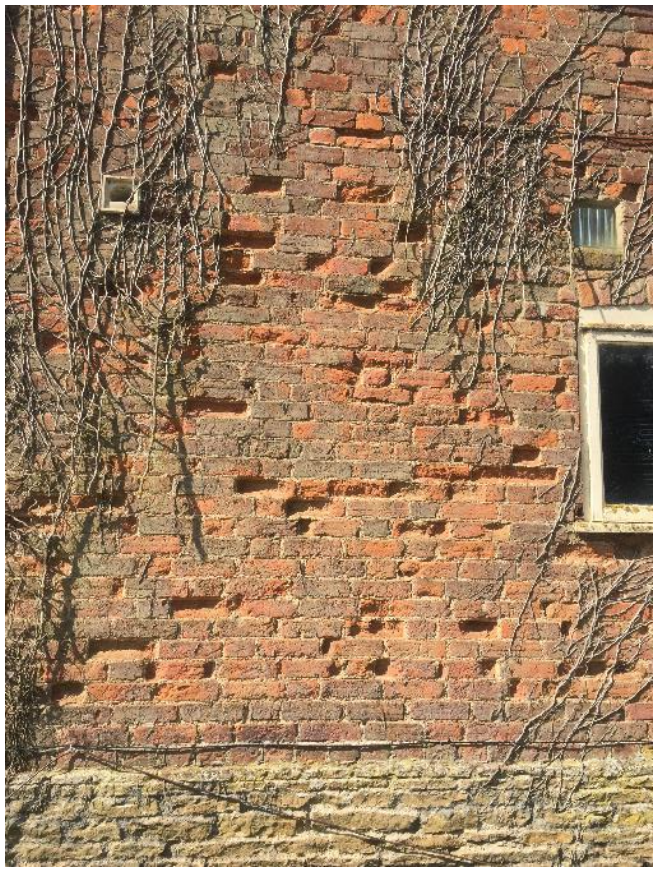
Photograph no 2 – South elevation Building A



Photograph no 3 – West elevation Building A



Photograph no 4 – West elevation Building A



Photograph no 5 – East elevation Building A brickwork damage



Photograph no 6 –30-40mm deep loss of bricks at ground level



Photograph no 7 – Brickwork damage west elevation Building A



Photograph no 8 – Brickwork damage west elevation Building A



Photograph no 9 – North elevation Building B



Photograph no 10 – South elevation Building B



Photograph no 11 – Roof structure Building B



Photograph no 12 – Roof structure Building B



Photograph no 13 – Loose brickwork at the top of the pier below the bearing of the king post truss



Photograph no 14 – 35mm wide crack in the boundary wall between building B and C



Photograph no 15 – South elevation building C.



Photograph no 16 – South elevation building C



Photograph no 17 – North elevation building C



Photograph no 18 – North elevation building C



Photograph no 19 – Roof structure building C



Photograph no 20 – North elevation building D



Photograph no 21 – South elevation building D



Photograph no 22 – Damaged wall to south elevation building D



Photograph no 23 – Existing roof structure building D



Photograph no 24 – Existing roof structure building D



Photograph no 25 – West elevation building E



Photograph no 26 – West elevation building E



Photograph no 27 – South elevation building E



Photograph no 28 – East elevation building E



Photograph no 29 – East elevation building E



Photograph no 30 – Limited brickwork under timber beam east/south elevation junction



Photograph no 31 – Left brick pier building E east elevation



Photograph no 32 – Right brick pier building E east elevation



Photograph no 33 – Limited brickwork under timber beams along east elevation



Photograph no 34 – North elevation building F



Photograph no 35 – South elevation building F



Photograph no 36 – South elevation building F



Photograph no 37 – Roof structure in building F



Photograph no 38 – Crack in the north elevation brickwork wall



Photograph no 39 – Existing shallow strip footings exposed



Photograph no 40 – Movement of the walls on the south elevation



Photograph no 41 – Movement of the walls on the south elevation



Photograph no 42 – Movement of the walls on the south elevation



Photograph no 43 – Movement of the walls on the south elevation



Photograph no 44 – Cracking in the blockwork dividing walls



Photograph no 45 – Cracking in the blockwork dividing walls



Photograph no 46 – Missing tiles building F western gable end