

STRUCTURAL APPRAISAL REPORT

**Barn Adj Adderley House,
London Road,
Long Sutton,
Spalding,
Lincolnshire.**



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Property:-	Barn Adj Adderley House;- London Road, Long Sutton, Spalding, Lincolnshire. PE12 9EA	Instructed;- Jun 2020 Surveyed;- Jul 2020
Client:-	API Limited c/o, Robert Bridgewater	Survey & Report by;- J C Consultancy Ltd Checked by J.C Ellington BSc. CEng MStructE MIOd
Reference:-	JC/20/06/5466	Issued:- Aug 2020

Directors

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STRUCTURAL APPRAISAL REPORT,

Barn Adj Adderley House;-

London Road,
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PE12 9EA

Our Ref;- JC/20/06/5466

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1.0 BRIEF

- 1.1 JC Consultancy Limited was requested by Mr R Bridgewater of API Limited, to assess and comment on the structural condition of an existing barn located adjacent to Adderley house, London Road, Long Sutton, Spalding, Lincolnshire PE12 9EA.

2.0 INTRODUCTION & SCOPE

- 2.1 The barn is located adjacent to Adderley House Residential Care Home, on the outskirts of the market town of Long Sutton in Lincolnshire.
- 2.2 The client currently owns the barn and has instructed a structural appraisal report to be carried out in order to assess the current structural condition and to evaluate the potential of future development / conversion.

This instruction to survey the barn was provided by the client on 9th June 2020.

- 2.3 This report should be read in-conjunction with documentation prepared and issued by the client's architect, Clayton Architecture Limited.
- 2.4 This report is solely for the purposes of the client, client's agent and no other third parties. Transfer of this report to a third party is not permitted.
- 2.5 JC Consultancy Limited visited the property on 16th July 2020, in order to carry out a structural appraisal survey.
- 2.6 Weather conditions at the time of the survey were bright and dry.
- 2.7 This report is limited to elements of the structural fabric of the property, i.e roof, walls and floors, and comments only upon their structural condition and performance.
- 2.8 The report does not contain observations, comments or recommendations to any non-structural items including, but not limited to drainage, electrical, heating and plumbing services, timber work and decorative plasters.
- 2.9 Decay associated to damp, fungal attack, insect infestation or contamination is outside the scope of our appointment or report. Any reference to decay associated to damp, fungal attack, insect infestation or contamination to either structural or non-structural items are observations only. As such we recommend that further advice is sought from specialists in the fields of damp, fungal attack, insect infestation or contamination in order to guarantee peace of mind from these potential defects.

- 2.10 The inspection was of a visual nature only. There has been no opening up works involved in this investigation. Wall finishes or floor finishes, where applicable have not been removed or lifted during the inspection.
- 2.11 Any part of the structure that was hidden, covered or otherwise inaccessible have not been inspected or commented upon. We therefore cannot guarantee that any such parts are free from defect. It should be noted that inspection of the fabric of the barn was limited in parts due to the presence of various goods internally.
- 2.12 The performance of foundations may be referred to within this report; however, the existing foundation system has not been exposed as part of this survey and as such we cannot guarantee that the foundation system is free from defect throughout.
- 2.13 The performance of the existing ground strata and general ground conditions may be referred to within this report; however the existing ground conditions have not been inspected therefore comments made will be based on analysis sought from indicative desktop sources including but not limited to the 'British Geological Society'. These sources generally provide sound interpretation, however local anomalies can occur, and as such we cannot guarantee their accuracy.
- 2.14 The observations and defects noted in order to prepare this report should not be considered as a comprehensive inventory of each and every single item witnessed during our survey. Instead the observations have been taken as an indication of the condition of the structure in general and should demonstrate the likely defects that may be present elsewhere in areas of the fabric that have not been surveyed or recorded.

3.0 GENERAL DESCRIPTION

- 3.1 The barn is a two storey, rectangular shaped structure in the style of a former Stable block. A single storey lean-to projection is present to the rear of the barn. The barn is predominantly traditionally constructed. The two storey element has approximate ground floor footprint area of 13.0m x 5.0m.

- 3.2 The construction date of the barn is understood to be approximately 1820.

The property is understood to be Grade II Listed.

The following description has been obtained via Historic England.

Listing NGR: TF4346222687

LONG SUTTON LONDON ROAD TF 4222-4322 (east side)

12/33 Stable block at Adderley House

G.V. II

Stable block. c.1820. Red brick. Corrugated roof. Colourwashed rendered plinth. 2 storeys, 5 bays. Central carriage entrance with basket arch, plank double door and blocked overlight. Either side are single cambered arched glazing bar sashes, that to the left part blocked. To the right is a single small fixed light and further left and right are single semi-circular arched doorways each with plank door and blocked fanlight. Above are 5 small casements all 2 light and cambered arched apart for the single left window of 3 lights and under a flat arch. Under the central window is a single carved head.

- 3.3 The general construction of the barn consists of; -

Roof

The roof over the main two storey barn is duo-pitched supporting a profiled corrugated sheet roof covering over a timber hand cut roof, consisting of a series of raised ties trusses, purlins and ties.

The roof over the single storey projection is mono-pitched supporting a combination of profiled corrugated sheet roof covering and a small area of slate roof finish over a timber hand cut roof, consisting of rafters and purlins.

Walls

Predominantly 330mm wide, traditional solid wall construction consisting of clay masonry units laid Flemish bond, in soft mortars. Some areas of infill panels using common brick units are present.

First Floor

Timber floorboards over timber floor joists spanning between external loadbearing walls and Unregularised timber support beams at mid span.

Ground Floor

There is no ground floor slab present. The floor consisted of tile presumably laid onto unprepared earth ground below. The floor level is recessed compared to external ground levels.

Foundations

Foundations were not inspected but are likely to consist of shallow corbelled masonry foundations bearing onto the ground strata below.

- 3.4 Published Geological records show the building to be within an area where the soil sequence consists of a solid formation of Ampthill Clay formation (Mudstone) at depth overlain by Superficial deposits of clays and silts (known as Tidal Flat Deposits).
- 3.5 There are no mature trees immediately adjacent the barn. A small tree (species unknown) and various Bramble / Buddleja / climbing shrubs are present adjacent the rear / gable elevations.

4.0 SUMMARY OF OBSERVATIONS

(Read in conjunction with Section 2.14 of this report)

4.1 Roof

- Lightweight corrugated roof finish in reasonable condition – no missing elements noted.
- Roof Structure only partially inspected due to access, but consists of raised tie trusses, rafters and purlins - no missing elements noted.
- Slight undulation of ridge line.
- Remainder of ivy growth present over parts over Rear / Gable.
- Defective guttering / downpipes throughout.
- Slight rotation of wall-plate noted at eaves – minor cracking to eaves brickwork with possible slight outward thrust of wall at front / rear elevation eaves.
- Part collapse of single storey lean-to roof supporting slate roof finish.

4.2 Walls

Front Elevation

- Minor fractures to masonry panels throughout.
- Settlement of masonry panel (adjacent London Road) – distorted masonry and significant cracking over left hand door opening and window above.
- Minor Cracking and distortion of arches over openings.
- Slight movement of masonry units below door threshold.
- Localised areas of displaced units.
- Localised areas of previous hard cement repointing.
- Evidence of defective guttering.
- Wall ties and pattress plates present at first floor level.
- Ivy growth present in parts.

Rear Elevation

- Only partial inspection possible due to access and abutting single storey element.
- Settlement of masonry panel (adjacent London Road).
- Minor Cracking and distortion of arches over openings.
- Slight movement of masonry units below door threshold.
- Vertical cracks noted at panel mid span.
- Localised areas of previous hard cement repointing.
- Evidence of defective guttering.
- Ivy growth present in parts.
- Single storey element partially collapsed.

Gable Elevation (Facing Residential Home)

- No major fractures to masonry panels.
- Minor Cracking and displaced units over arch of centrally located opening (Serves first floor).
- Perished / defaced units at lower level.
- Evidence of former pockets presumably to support timber steps (now removed).
- Localised areas of previous hard cement repointing close to eaves and mid panel.
- Pattress plates at centreline of gable.
- Ivy growth present in parts.

Gable Elevation (Facing London Road)

- Ivy growth prevented inspection of the majority of the left hand side of the elevation.
- No major fractures to masonry panels but the gable has suffered settlement.
- Minor Cracking and open mortar joints adjacent rainwater hopper.
- Perished / defaced units at lower level.
- Evidence of former pockets presumably to support timber steps (now removed).
- Localised areas of previous hard cement repointing at lower levels – possible previous part re-build / repair of lower panel.
- Pattress plates at centreline of gable.

4.3 First Floor

- First floor joists are relatively slender.
- Timber support beams Unregularised, deflecting and overstressed.
- Various elements of the floor have been subjected to continued wetting and decay appears to be prevalent.
- Floorboards covered with general debris – inspection limited.

4.4 Ground Floor

- No floor slab present – tiles present presumably over earth – undulations felt and noted.
- Floor covered with various stored material throughout – inspection limited.

4.5 Foundations

- Not inspected, but likely to be corbelled masonry.
- Evidence of settlement of gable wall panel (facing London Road) and part Front / Rear Elevation (adjacent London Road).

5.0 CONCLUSIONS

- 5.1 The existing two storey barn has survived reasonably well considering its age and previous use and is considered as being suitable for a sensitive restoration and conversion into a habitable dwelling. It is obvious that there has been a degree of movement and settlement of the barn fabric, however taking into account that the building is approaching 200 years old, we conclude that the majority of the movement appears to be long-standing and historic.
- 5.2 The buildings basic, rectangular shape and substantial external wall thickness, together with the presence of a cross wall, tie bars and a first floor, results in it being a reasonably robust structure which can be seen to have only lost a small amount of original fabric during its lifetime. No immediate structural intervention is deemed required to the two storey element at this stage in order to prepare the barn for accommodating a conversion scheme.
- 5.3 In structural terms many of the defects which have been highlighted in this report have little or no significance to the overall stability of the building. The majority of any original materials being lost is due to the materials being subjected to the elements and a lack of general maintenance. Ensuring the barn is weather-tight should be addressed even if a full conversion or restoration is not going to take place. Failure to do so will accelerate the decay and deterioration of the remaining fabric.
- 5.4 The main cause of any structural movement witnessed on the fabric of the barn is likely to have been contributed by the failure of the arches and lintels over and around openings, a slight degree of localised settlement over its lifetime and general stresses inflicted upon the fabric during previous uses. The prolonged softening of ground around the base of the walls and foundation from defective guttering and rainwater discharge is also a likely source of any movement witnessed. We predict these catalysts of movement can be addressed during the conversion stage via the installation of suitable strengthening elements and general low key repair where applicable in order to provide a durable structure.
- 5.5 Undoubtedly, there will be some loss of original fabric during any conversion process. This occurs in almost all conversions of this type, and generally cannot be avoided. The majority of loss is usually due to roof members being exposed to the elements during its period of non-use, or masonry walls accommodating significant levels of structural movement. However, having considered the existing arrangements, we envisage the overall loss of original fabric in this instance will be low. If the proposed conversion is carried out with care and a sympathetic approach to the existing materials, we see no reason why the barn will be subject to any long-term progressive movement in the future following the completion of a conversion.

- 5.6 The structural fabric forming the single storey, lean-to element located to the rear of the main barn is considered to be extremely fragile. The key elements of this part of the structure including roof and walls have suffered significant material fatigue. The roof structure has partially collapsed which has resulted in lateral movement of the supporting masonry walls. The overall structural stability of this element of the building appears to have been compromised and as such it is currently deemed to be unstable.

Whilst we always attempt to reinvigorate structures with sound and sensible repair solutions, sometimes it needs to be considered that the existing fabric of a building will not be able to accommodate such intrusive intervention. Stresses and changes to load paths imposed upon the materials 'temporarily' during stabilisation works, can have an exhaustive effect on their long-term performance. In our experience, enthusiastic repair schemes at Planning stage can often deviate dramatically once works commence, and it is not uncommon for extensive loss of original fabric to occur.

In this instance, having reviewed the existing condition of the single storey rear projection, we do not feel it is possible to provide a stabilisation and repair schedule to this element of the property. The degree of existing movement is too high and the extent of structurally sound materials remaining is minimal. We feel any attempt to strengthen the structure in a sound and sensible manner would likely lead to high losses of the remaining structure.

We therefore recommend that consideration is made to record the existing fabric of this part of the building to enable the careful demolition and construction of a replacement element, should local planning regulations provide this opportunity. The progression of any proposals for demolition and construction of a replacement dwelling should be done only following liaison with, and guidance from, the Local Authority Planning Department.

- 5.7 Architectural Schemes for the proposed barn conversion have yet to be produced or submitted. A schedule of any Structural Engineering works required as part of a conversion can be progressed upon receipt of suitable architectural schemes, which will usually be conducted during the preparation of a Local Authority Building Regulation submission. In order to assist with the progression of the architectural design, we have highlighted potential structural items to consider overleaf, in Section 6.0.

6.0 ITEMS TO CONSIDER AT CONVERSION DESIGN / BUILDING REGULATION STAGE (MAIN TWO SOTREY ELEMENT)

6.1 Roof Structure

The roof structure currently supports a lightweight corrugated sheeting material. It is unlikely that in its current arrangement the existing roof structure would be able to support additional slate / tiled roof coverings, insulation and ceilings envisaged as part of any conversion, without undue distortion.

Attempting to strengthen existing roof elements is possible, however a replacement roof would reduce the degree of stresses on the existing supporting walls and may prove to be the most practicable and cost-effective solution. We therefore recommend that consideration is made for a replacement roof structure as part of any conversion scheme.

Any proposed roof structure, or strengthening to existing roof structures, should be engineer designed to ensure that it does not exert any horizontal thrust upon the supporting walls. Support for the roof can be gained from a new inner leaf wall system that is recommended in item 6.2.9 of this report.

There is a lack of suitable rainwater guttering and discharge downpipes in various areas of the barn which has resulted in the localised weathering of masonry. Rainwater goods should be repaired and reinstated as part of any conversion to allow reliable discharge of rainwater

6.2 External Walls

6.2.1 The external walls have significant thickness and have reasonable height to thickness ratios. The walls will require a degree of sympathetic attention, but the amount of loss of original fabric is likely to be low.

6.2.2 Any fractures that have been observed require only low-key intervention and repair, and small areas of localised brick turning / replacement will be required where individual brick units have failed. Gable and rear elevations have been subjected to ivy growth and small areas of masonry panels at lower level have several defaced / perished units. A small degree of re-build may need to be considered should brick turning be deemed impracticable. Any vegetation / ivy growth that remain on the barn should be removed.

- 6.2.3 The performance of any masonry panels suffering fractures, localised cracking etc. can be improved by low key stitching using the 'Helifix' masonry repair system, which involves installing remedial 'Heli-bar' rods into the bed joint of the masonry at regular vertical centres. We recommend that allowance is made for the application of this system to localised areas of all masonry panels.

This technique can be used to stitch cracks, tie any partitions that have become disconnected from flank walls and repair masonry arches. In addition, the system can also be used to provide restraint between masonry walls and timber floors. More information can be seen at www.helifix.co.uk.

- 6.2.4 Any areas of hard cement re-pointing previously carried out on the elevations should be carefully removed and replaced with a sympathetic soft lime based mortar. Other areas of weathered masonry joints were prevalent amongst the elevations and should be repointed in a similar fashion. In this instance we do recommend that allowance is made for all elevations to be repointed at planning and tender stage, however, during conversion works each panel can be considered in its entirety and may only require localised areas of repointing upon further investigation.
- 6.2.5 Any defective masonry arches, timber lintels and arch backing timbers should be replaced throughout. The beams over the larger openings should be replaced. Any timber wall plates that are present within the walls should be removed and replaced with remedial brickwork infill.
- 6.2.6 Lower sections of the walls do accommodate localised areas of defaced units, predominantly caused by continued wetting as a result of surface water splashback off the adjacent ground level. Following a more in-depth inspection by a bricklayer / mason, general brickwork repair maybe required to lower panels, including replacing / turning decayed units.
- 6.2.7 Ideally, any proposed layout by the architect should introduce some cross walls as this will enhance the overall structural performance of the masonry panels and can be utilised to assist the support of roof structures should room layouts allow. Should openings be required within cross wall to enable access between rooms, we recommend that the openings are located away from the front / rear elevations to ensure that the cross walls continue to provide buttressing and restraint to the outer masonry panels.
- 6.2.8 A number of tie bars and pattress plates are present and where possible they should remain. These can be complimented with further additional tie bars should their requirement be needed.

- 6.2.9 In order to reduce the loading placed upon the existing perimeter walls, and to enhance the overall performance of the structural fabric, we would recommend that a new inner leaf wall is constructed within the inside of the perimeter walls, essentially forming a structural 'box within a box'. The new wall construction can be designed to accommodate the loadings from any replacement roof and floor structures. The new wall could be constructed using loadbearing blockwork, or alternatively a lightweight loadbearing timber studwork could be adopted. The new wall should be constructed off a remedial floor slab that is discussed further in Item 6.4.1 of this report.

6.3 First Floors

The first floor joists are relatively slender and are supported in parts by timber beams that appear to be overstressed. Various elements of the floor have been subjected to continued wetting and decay appears to be prevalent. Attempting to strengthen existing floor elements is possible, however a replacement floor would reduce the degree of stresses on the existing supporting walls and may prove to be the most practicable and cost-effective solution. We therefore recommend that consideration is made for a replacement floor structure as part of any conversion scheme. Support for the floor can be gained from a new inner leaf wall system that is recommended in item 6.2.9 of this report.

6.4 Ground Floors

- 6.4.1 No ground floor slab is present. A new floor slab is required throughout and therefore allowance should be made for the installation of a new ground bearing, concrete ground floor slab to typical architects' specification, incorporating suitable damp-proof systems, insulation and screeds as required. If the floor slab is to be utilised as providing support for the new inner leaf wall (as recommended in item 6.2.9 of this report) then it should be engineer designed as a reinforced concrete flat slab to ensure that it can safely accommodate and distribute the loadings applied.
- 6.4.2 We do not recommend that the floor slab levels are raised substantially higher than existing ground levels, as the process of raising the floor levels will undoubtedly place an increase in stress and outward force upon the lower levels of the wall panels.

6.5 Foundations

- 6.5.1 Based on our initial observations of the superstructure, there was little evidence to suggest that the foundations of the barns have suffered significant failure. All barns of this age and arrangement suffer from a degree of settlement, however considering its age and previous uses, the foundations appear to be performing satisfactorily. A small amount of settlement may have occurred in the past; however, it is envisaged that the movement highlighted is historic, and the defective superstructure fabric can be addressed and repaired without the need for invasive foundation repair in the form of underpinning.

- 6.5.2 The majority of the load being placed upon the foundations is resultant from the self-weight of the substantial walls that will not increase as part of any conversion. As a result it is likely that the additional loads being placed upon the foundation system from a proposed residential conversion is negligible compared to that of the existing arrangement and as such we do not foresee that any form of underpinning or foundation enhancement is required.
- 6.5.3 The existing foundations are likely to be shallow, therefore care will need to be taken when installing ground floor slabs to ensure that the existing foundations are not undermined. We recommend that sub-base excavation underneath proposed floor slabs should be kept to a minimum depth to assist. The specification of the slab build up can be designed as part of the proposed floor slab works recommended in item 6.2.9 of this report.
- 6.5.4 The external ground levels are variable around the rear of barn, and as such they should be landscaped and prepared to ensure that they do not exert pressures on the base of the walls. The remaining vegetation' climbing shrubs, trees etc. that are growing immediately adjacent to the fabric of the barn should be removed. Controlling surface rainwater and introducing a gravelled apron / French drain around the external perimeter of the walls will assist in reducing softening of the ground and subsequent foundation movement in the future.

6.6 General

- 6.6.1 Whilst reference to damp is outside the scope of this report (see 2.9), it can be seen that the structure, has suffered from a degree of water penetration over the years.

As such it is essential that advice and any required treatment from specialists in the field of damp and decay should be carried out in conjunction with the conversion, in order to ensure that damp and timber decay are not trapped within the fabric post completion.

- 6.6.2 Consideration of any conversion proposals should be done only following liaison with your Architect, and guidance from, the Local Authority Planning and Building Control Departments.

JC Consultancy Limited

Consulting Structural Engineers

August 2020

7.0 PHOTOGRAPHS.



Photograph # 1
(Front Facing Elevation)



Photograph # 2
(Gable Elevation – Facing London Road)



Photograph # 3
(Gable Elevation – Facing Residential Home)



Photograph # 4
(Part Rear Elevation / Single Storey Roof)



Photograph # 5
(Part Rear Elevation / Single Storey Roof)



Photograph # 6
(Part Rear Elevation)



Photograph # 7
(Single Storey Rear Projection)



Photograph # 8
(Single Storey Rear Projection)



Photograph # 9
(Typical Distorted Arch / Masonry over Arch)



Photograph # 10
(Typical Perished Masonry Arch / Pattress Plate)



Photograph # 11
(Typical Distorted Arch / Masonry over Arch)



Photograph # 12
(Pockets in Gable Wall)



Photograph # 13
(First Floor / Roof)



Photograph # 14
(Typical Roof)



Photograph # 15
(Roof / Eaves)



Photograph # 16
(Rear Elevation – First Floor)



Photograph # 17
(Rear Elevation – First Floor)



Photograph # 18
(Rear / Gable Elevation and First Floor)



Photograph # 19
(Underside of First Floor – Undersized Beams)



Photograph # 20
(Underside of First Floor – Overspanned Beams)



Photograph # 21
(Underside of First Floor – Water penetration / decay)



Photograph # 22
(Ground Floor / First Floor Support Beams)



Photograph # 23
(Typical Ground Floor / Tiles)

END OF REPORT