Cooper & Withycombe

CONSULTING ENGINEERS & BUILDING SURVEYORS

Dickhurst Farm Barns
Petworth Road
Haslemere
Surrey
GU27 3BG

Condition of Existing Barn

Structural Survey and Remedial Repair Schedule

December 2021

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INTRODUCTION

1. This Structural Statement and Remedial Repair Schedule for the existing barn on the site of Dickhurst Farm Barn, Petworth Road, Haslemere, Surrey, GU27 3BG has been prepared on the instructions of the owner of the property.

2. The purpose of this Statement is to describe the structural nature and condition of the existing main barn to be converted into a residential dwelling together with reviewing the structural aspects in the context of proposed alterations. It also reviews the remedial repairs necessary for the building to be retained and re-used.

3. The Statement has been prepared to accompany a response to conditions applied to the Planning/Listed Building Consent and should be read in conjunction with the Planning Consent Drawings, prepared by Stedman Blower Architects together with the detail design development drawing prepared by Stedman Blower Chartered Architects in response to the Planning Conditions.

4. Planning Consent and Listed Building Consent, Reference SDNP/20/01665/FUL and LIS, has been given for the conversion and extension of the existing Grade 2 Listed Barn into a residential dwelling. Condition 4 of the Consent requires a full repair schedule and method statements together with details of proposed methods to stabilise the structure during the works to be provided and approved before work commences.

DESCRIPTION OF BUILDING STRUCTURES

5. Dickhurst Farm Barn is a semi-detached Grade II Listed building located approximately 20 metres to the north-west of the farmhouse, which is to the north of Petworth Road, Haslemere, Surrey. It is accessed by a driveway from the Petworth Road via the access to the farmhouse.

6. The Barn is likely to be 'a late 17th Century or early 18th Century weatherboarded barn of four bays on brick plinths and base. It has a half-hipped asbestos cement sheeted roof.' It is likely the roof was originally covered with clay tiles. The bays have braced beams which have struts supporting purlins. There are intermediate posts splitting three of the bays, on the north and south elevations.

7. The weatherboarding was substantially removed to aid this inspection.

8. The Barn has a hay loft, consisting of boards on 8" deep by 2$^{1/4}$" wide joists, over three of the bays, grids 1 to 2 and 4 to 9, which is supported off the external walls and a central 9" by 3" spine beam, supported off the columns. On the external wall lines a supporting rail has been used which is either cut into the posts or bracketed off the posts and wall studs. There is a loft hatch adjacent to grid A7.

9. At present the Barn has two gable walls with suppressed half hips. The three intermediate frames all have beams with struts over supporting purlins. The frames on grids 3 and 5 are similar with a knee brace between the post and beams, albeit that one brace on grid 5 is missing. On grid 7 there is a central post below the beam which has a mid-rail between it and the outer posts. There is also a knee brace to the top of the mid rail and the outer posts. There is no ridge beam with rafters being joined supporting modern battens, to support the sheeting. The rafters are continuous over the purlins. The purlins are propped apart in the bay between grids 1 and 3, the bay between grids 5 and 7 and the bay between grids 7 and 9.

10. Overall stability to the roof is provided by bracing fixed to the undersides of the rafters. The bracing coincides with the eaves rail and purlin between grids 3 and 5. Stability for the building is provided by knee braces to the roof support beams, on grids 3 and 5, and by braces to the mid-rail on grids 1, 7 and 9. Braces from posts to the mid-rails is also provided on grids A and C.

11. The Barn is set slightly above ground levels to the east but the ground to the west is at plate level over part of this elevation.

12. The sole plate to the Barn structure is supported on a masonry plinth of 9" brickwork, generally laid in Flemish bond with a lime mortar, although some repairs have used a hard cement rich mortar. The walls do widen, at lower levels, to spread loads and restrain against lateral pressures by differing ground levels.

13. As noted, at present, most of the cladding has temporarily been removed from the building, to aid a visual survey. On grid 7, at ground floor there is a braced wall, which is boarded both sides, sat on a masonry plinth. A doorway has been added, which cuts through one of the braces. There are 9" brick walls on grids 4 and 5, interrupted in the middle, by a doorway. These walls are approximately 1.30m high.

14. The overall stability to the side walls is provided by bracing in the planes of the walls from the corner posts to the mid-rail and in the internal bay which would have been the original end bay to the building.

15. The floor presents as soil but may conceal cobbles, at a lower level. Between grids 4 to 5 brick cobbles are visible.

16. Local geological information suggests the site is underlain by Weald clay.

STRUCTURAL OBSERVATIONS AND CONCLUSIONS

17. In December 2018, a structural appraisal, for planning purposes was prepared by Clive Hudson Associates to accompany the Planning Application for the

development. This report was compiled before cladding to walls was removed. In relation to the reports, observations, and conclusions, it is noted:

(i) Decay of wall plates has occurred due to build-up of manure and bedding.
(ii) Concrete repair has been carried out due to loss of section at the base of some posts and studs.
(iii) Water ingress has caused advanced localised decay.
(iv) Damp was affecting the brick plinth substructure walls.

In the discussion and conclusion, it was considered:

(a) The building was generally in reasonably good structural condition for its age and nature.
(b) The foundations and ground floor slab would need to take account of the subsoils being of shrinkable material.
(c) Damp had affected the foundation plinth and soil plate sitting on it.
(d) The building had swayed historically due to lack of stiffness of connections, splitting of posts and decay of wall plates/post bases.

Removal of cladding has shown that external faces of principle members and studs have suffered extensively from decay, due to rot and beetle attack.

18. This Planning Stage Report on the existing main barn structure, which is to be retained as part of the development is a substantial and permanent structure and remains capable of being converted without the need for rebuilding but repair and strengthening will be necessary. Retention of it will ensure its condition is maintained and hence preserve its structural integrity and character.

19. To review the overall condition of the barn structure, accumulated materials/debris within the barn together with removing the external cladding, to expose the main barn structure has been carried out.

20. The appended drawings 21-2152/01-12 in Appendix 4 record the present structural condition of the building elements.

21. In relation to these, the following is noted:

(i) The substructure plinth wall below the frame sole plate is generally in a poor condition with eroded and loose brickwork.
(ii) Loss of section and decay of timber is evident to the sole plate around the building.
(iii) Decay of principle members has allowed the frame to drop along grid 1, requiring some temporary support to be provided.
(iv) Purlins display significant deflection.
(v) General erosion due to decay to timber principal members, i.e., mid-rail, posts, and eaves rail.
(vi) Displaced joints between principal members and braces.

(vii) Some original bracing has been supplemented or replaced with modern softwood. There is a missing brace on grid 5.
(viii) Cracking to the head of posts, due to frame movement or eaves spread.

22. In conclusion, whilst the barn remains capable of conversion, without rebuilding, remedial repairs and strengthening are required, to address the defects noted on the drawings.

ALTERATIONS

21. It is proposed to retain the existing barn buildings as part of the works.

22. The extent of proposed alterations and extension are shown on the Planning Consent drawing, together with Stedman Blower's architectural drawings. The structural works generally will include:
    i) Remedial repair and strengthening to the building to enable its re-use.
    ii) Potential underpinning of external walls to enable remedial repair/replacement of ground floors and substructure plinth wall below the sole plate together with replacement of the sole plate where required.
    iii) Formation of new openings in existing walls.
    iv) Re-cladding of the walls and roof of the building, which may require the addition of a new external timber skin. Foundations may need to be adapted to accommodate this.
    v) Insertion of ceiling between grids 7 and 9, to form a bat loft.
    vi) Insertion of new access stairs.

    Overall, the structural integrity and stability of the existing building structure will be enhanced and maintained because of these works and the insertion new internal walls.

23. The outline structural proposals for the new structure are shown on drawings 20-2104/30-32 in Appendix 4.

REMEDIAL REPAIRS

24. In addition to alterations to suit the development, remedial repairs are required to the building as noted on the drawings 21-2152/20-28 in Appendix 4.

25. The remedial action to the building and frame is anticipated to comprise:
    1. Replace or repair where the opportunity arises to the timber frame.
    2. Replace frame and wall studs to first floor level on grid 1.
    3. Re-fix any detached or poorly connected members.
    4. Strengthen and repair connections where appropriate.
    5. Enhance the structural bracing by plywood sheathing to walls.
    6. Remedial repairs and strengthening to the roof structure, including: -
        - Ensuring continuity of eaves rail
        - Enhancing connection between rafters and eaves rail

- Partnering purlins where overstressed
- Structural bracing by ply sheathing to supplement present bracing.

26. The extent and nature of the remedial repairs are described in the Schedule included in Appendix 3. The Specification of the remedial repairs is also included in Appendix 2.

27. The contractor is to develop Method Statements for the remedial repair and alteration work, taking account of:
    - The nature of the building.
    - Conservation methods of working and to comply with any environmental conservation aspects.
    - Use of appropriate materials.
    - The requirement for appropriate hazard and risk assessments to be incorporating into the Method Statements before work commences.
    - Temporary support requirements to the existing frame during the works.

    An Outline Method Statement describing the preliminary sequence of works is included in Appendix 4.

28. In addition to the remedial repairs indicated, the following will also be required:
    - Checking rafters and any fixings.
    - Reviewing the condition of the timber frame/elements once residual cladding is removed.
    - Replacing the foundations to the substructure plinth walls to mitigate risk of foundation movement due to ground conditions, where required.

Appendix 1
Photographs

P1 North elevation (Grid A)

P2 West elevation (Grid 1)

P3 East elevation (Grid 9)

P4 South elevation (Grid C)

P5 East elevation (Grid 4)

P6 West elevation (Grid 5)

P7 Post and stud (Grid A1)

P8 Post mid-rail (Grid A1)

P9 Post and tie (Grid A1)

P10 Corner post (Grid A1)

P11 Central post (Grid B1)

P12 Mid-rail tie (Grid B1)

P13 Corner post (Grid C1)

P14 Corner post base (Grid C1)

P15 Mid-rail to post (Grid C1)

P16 Post and tie (Grid C1)

P17 Corner post (Grid C1)

P18 Corner post to mid-rail (Grid C1)

P19 Spine floor beam end (Grid B1)

P20 Post base (Grid A2)

P21 Mid-rail (Grid A2)

P22 Floor support (Grid A2)

P23 Post to eaves beam (Grid A2)

P24 Post base (Grid C2)

P25 Floor support (Grid C2)

P26 Eaves splice (Grid C2)

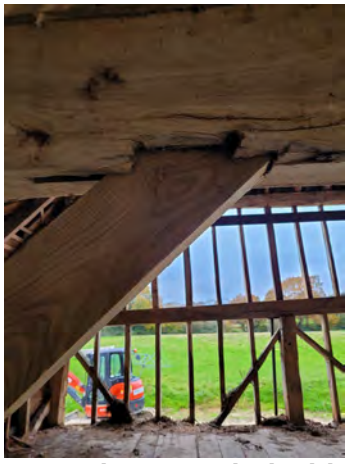
P27 Post (Grid A3)

P28 Mid-rail (Grid A3)

P29 Post to tie (Grid A3)

P30 Purlin strut (Grid A3)

P31 Purlin strut (Grid C3)



P32 Knee brace to tie (Grid C3)

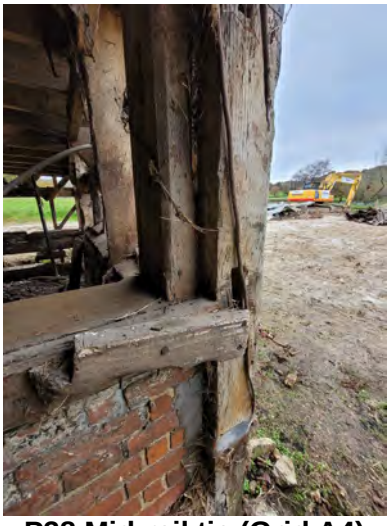
P33 Post to tie (Grid C3)

P34 Floor support (Grid A3)

P35 Floor support (Grid C3)

P36 Post base (Grid C3)

P37 Post base (Grid A4)



P38 Mid-rail tie (Grid A4)

P39 Spine floor beam (Grid B4)

P40 Door post (Grid B4)

P41 Door post support (Grid B4)

P42 Door post (Grid C4)

P43 Door post to eaves (Grid C4)

P42 Door post (Grid C4)

P44 Door post (Grid A5)

P45 Door post (Grid A5)

P46 Post to tie (Grid A5)

P47 Door post (Grid A5)

P48 Purlin strut (Grid A5)

P49 Post to tie (Grid C5)

P50 Tie hole for brace (Grid C5)

P51 Floor support (Grid C5)

P52 Door post (Grid C5)

P54 Floor support (Grid B5)

P56 Lean to post (Grid C6)

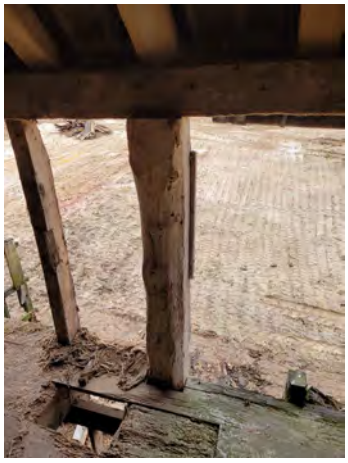
P53 Eaves splice (Grid 5C)

P55 Door post (Grid B5)

P57 Door post (Grid B5)

P58 Post base (Grid A6)

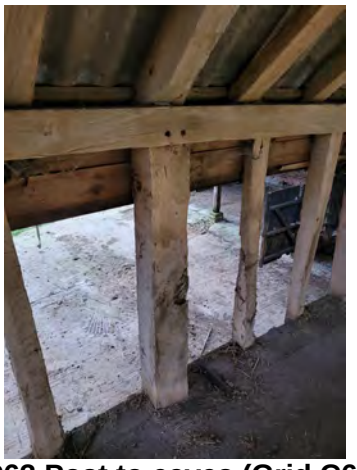
P59 Floor support (Grid A6)



P60 Post to eaves (Grid A6)

P61 Post base (Grid C6)

P62 Floor support (Grid C6)



P63 Post to eaves (Grid C6)

P64 Post to first (Grid A7)

P65 Post to eaves (Grid A7)

P66 Post base (Grid A7)

P67 Floor support (Grid A7)

P68 Post bracing (Grid A7)

P69 Post split and eaves crack (Grid A7)

P70 Purlin strut (Grid A7)

P71 Post split (Grid B7)

P72 Purlin strut (Grid C7)

P73 Post split (Grid C7)

P74 Post split (Grid C7)

P75 Floor support (Grid C7)

P77 Post base (Grid C7)

P79 Mid-rail (Grid B7)

P76 Mid-rail and brace (Grid C7)

P78 Bracket (Grid C7)

P80 Connection (Grid B7)

P81 Plate, cut brace (Grid A7)

P82 Post, strap (Grid A8)

P83 Floor support (Grid A8)

P84 Floor support (Grid C8)

P85 Eaves beam (Grid A8)

P86 Eaves beam (Grid C8)

P87 Post base (Grid A9)

P88 Mid-rail (Grid A9)

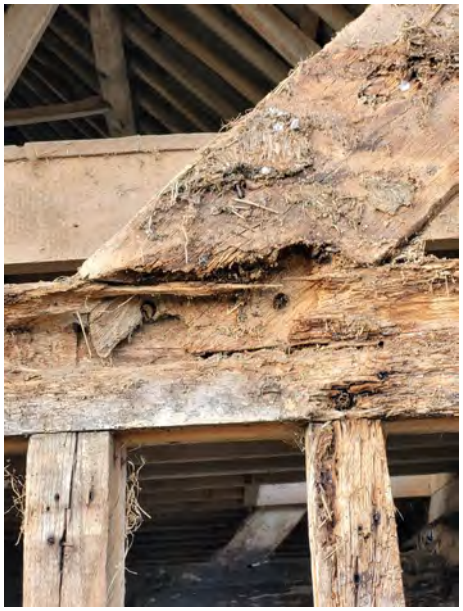
P89 Post base (Grid A9)

P90 Mid-rail (Grid A9)

P91 Tie and brace (Grid A9)

P92 Tie and eaves (Grid A9)

P93 Mid-rail (Grid A9)



P94 Mid-rail brace (Grid A9)

P95 Post base (Grid B9)

P96 Mid-rail (Grid B9)

P97 Post to tie (Grid B9)

P98 Mid-rail brace (Grid C9)

P99 Post base (Grid C9)

P100 Mid-rail (Grid C9)

P101 Tie and brace (Grid C9)

P102 Mid-rail and brace (Grid C9)

P103 Tie and eaves (Grid C9)

P104 Studs (Grid A6 to 7)

P105 Packing, deflection of purlin

P106 Purlin, brace decay

Appendix 2
Specification for Remedial Repairs

1.0 SCAFFOLD

1.1 General

1.1.1 The scaffold is to be erected around and over a Grade II Listed structure in addition to the present covering scaffolding to provide temporary support and working access during construction. The present condition of the building will need to be taken into account in both the design of the scaffold and its installation.

1.1.2 The scaffold and the protection are required for: -

- Maintaining the building condition.
- Working access for inspection and construction.
- Propping to the building.

1.1.3 Putlog scaffolds will not be permitted.

1.1.4 The scaffolds shall be designed, detailed, and installed in accordance with BS EN 12811-1 (and BS 5973 where appropriate) and must be designed by a competent person taking account of the requirements of NASC TG20 and BS5975.

1.2 Scaffold

1.2.1 Except where the scaffold is expressly required to provide lateral support to the building structure, the scaffold is to be designed as independent of the building structure, where local contact cannot be avoided.

1.2.2 It is to be designed to resist the most adverse combination of vertical and lateral loads to be applied by the dead load of the scaffold structure and imposed construction loads, together with wind loadings calculated using BS EN 1990 Eurocode 1 and BS 6399.

1.2.3 Except in the circumstances where it is essential the scaffold needs to locally bear directly onto the existing structure as no other direct load path is available to ground, no forces resulting from vertical or lateral loads or wind loading are to be exerted on the existing structure. All lateral and wind forces are to be resisted by appropriate buttressing using kentledge and/or ground anchors where appropriate. Water will not be permitted for kentledge.

1.2.4 Face sheeting is to be lapped to a fully boarded lift and that lift is to be properly secured to scaffold.

1.2.5 Roof sheeting, where required, is to be solid corrugated or sheet steel fully secured with hook bolts or equivalent proprietary system such as Hakitec 750 with Hakitec sheeting to the scaffold supports, lapped only over supporting members. Sheeting loads are to be applied to the scaffold in accordance with the scaffold design requirements.

1.2.6 The contractor is to supply fully detailed drawing showing layout of scaffold system and roof coverings giving the location, magnitude and direction of **all** forces exerted from the scaffold and particularly those that need to be applied to the existing structure by the scaffold 14 days before the programmed commencement of scaffold erection. Where scaffold needs to bear onto, or come into contact with adjacent properties / buildings, sufficient detail information shall be provided.

1.2.7 Erection of the scaffold shall not commence until the drawing has been agreed with the Contract Administrator and Client.

1.2.8 The building is a part-timber-framed Grade II Listed historic structure and bolted, or similar fixed ties, will not be permitted to structure unless there is no alternative to fixing to historic fabric and specific permission is obtained from the Contract Administrator/Client. Where such fixings are specifically permitted and agreed, all fixings to existing structure to be Hilti Grade 316 stainless steel threaded anchors in Hilti Hit C-50 or Hilti Hit C-100 polyester resin anchor grout, or screw in fixings such as Excalibur, as appropriate.

All fixing points shall be made good or removal on removal of the scaffold to the agreement the Contract Administrator.

1.2.9 Where such fixing points are determined as essential and are agreed, the location and loading of all anchors in existing structure (where specifically agreed and permitted) must be agreed with the Contract Administrator and Structural Engineer prior to commencement of erection of the scaffold. It should not be assumed in the scaffold design that such fixings will be accepted.

1.2.10 Stair and ladder together with material lift accesses shall only be in agreed via the Contract Administrator. All stairs and ladders must be fully secure and provide a clear and safe access route to all scaffold levels and also to the roof level.

1.3 **Materials**

1.3.1 All scaffold to be steel type to BS EN 39.

1.3.2 All scaffold fitting to be steel to BS EN 39.

1.3.3 Side sheeting to be plain, new Monarflex or similar. No contractors' name or sign will be permitted on side sheeting. Sheeting to be white or pale grey.

1.3.4 Roof sheeting is to be corrugated or sheet steel or proprietary scaffold sheeting fixed to trusses such as Hakitec. Colour to be agreed with the Contract Administrator.

1.4 Erection

1.4.1 Contractors shall be members of The National Access and Scaffolding Confederation or The Scaffolding Association.

1.4.2 Method Statements for the scaffold erection shall be provided including details of:

- Unloading / loading areas
- Equipment/material handling
- Storage area
- PPE to be used
- Protection of the public and building users

2.0 DESIGN

Design Requirements

2.1 The scaffold will be designed by a competent person.

2.2 The purpose of the scaffold is to:

- Provide weather protection to the exposed historic building and working area particularly to ensure work can continue in adverse weather conditions.
- Provide contractor access for personnel and materials to the working areas.
- Provide access for inspections.
- Provide buttressing support to unstable elements of the building façade.

2.3 The contractor shall submit a detailed design to the Contract Administrator 14 days prior to the proposed erection of the scaffold.

2.4 The contractor shall be responsible for ascertaining the requirement of all sub-contractors including the following:

- Fixing for drills, etc.
- Number of fully boarded lifts.
- Location and use of hoists.

- Storage requirements for stone at upper levels and associated materials.
- Requirements for protection, fans, etc.
- Ventilation requirements for the works.

2.5 The scaffold contractor shall be responsible for ascertaining the suitability of ground conditions and bearings to support the proposed scaffold loadings and informing the Structural Engineer of any deficiency and the proposed action to ensure adequate support is provided. It should be noted that there is an existing cellar to the building.

2.6 The scaffold contractor is to satisfy himself of the suitability of the proposed bearings for the scaffold.

Specific Requirements

2.7 All scaffold elements in contact with or close proximity to the historic structure shall be provided with adequate protection. All horizontal tubes shall have plastic end caps.

2.8 The scaffold must not bear on existing structure except where it is required to provide support to the building. Where absolutely necessary and agreed, timber bearers and lead sheet shall be provided.

2.9 The contractor is responsible for all Highway Licences that may be required.

2.10 Access to the adjacent premises shall be maintained at all times.

2.11 Safe access to the building shall also be maintained at all times.

3.0 MAINTENANCE

3.1 The contractor shall be responsible for maintaining the scaffold including:

- Inspections
- All ties
- Monarflex
- Roof sheeting
- Ladders
- Boarded lifts
- Lighting
- Hoardings
- Alarm system
- Drainage

4.0 PROTECTION AND SECURITY

4.1 All scaffolds shall have suitable lightning protection and be suitably earthed.

4.2 All ladders giving access to scaffold shall be removed and secured at the end of each working day.

4.3 Heras fencing or boarding shall be provided to minimum 3 metres height, to prevent uncontrolled access to the scaffold.

4.4 All windows at scaffold board lifts shall be protected.

4.5 Identified access routes shall be provided with suitable effective protection to allow safe access and egress at all times.

4.6 An alarm system shall be fitted if required by the Client.

5.0 HEALTH AND SAFETY

5.1 The main contractor is to be responsible for safety standards during the erection, working life and dismantling of all scaffolds and to ensure all statutory checks are carried out and proper records kept of the scaffold.

F: HISTORIC MASONRY – STRUCTURAL ELEMENTS

GENERAL

1. Project Specification

This Specification should be read in conjunction with the Specification for the Works and schedules proposed by Stedman Blower Chartered Architects. It should also be read in conjunction with the requirements of the Planning Application documents together with any subsequent consents received.

2. British Standards

All masonry work is to comply with the following British Standards unless otherwise specified: -

BS.5628: Structural use of Masonry
BS.8000: Workmanship on Building Sites
Part 3: Code of Practice for Masonry

3. Advisory Guides

Re-pointing for historic / building conservation work should follow the recommendations / guidance of Local Authority Historic Building Officers and guidance notes provided by English Heritage and SPAB Leaflet No. 5 and BRE Good Repair Guide 28.

Technical information produced by specialists such as the Lime Centre and St Astier should be referred to in the selection of lime-based materials, mixing and applications. Relevant data sheets for NHL mortars and grounds are appended.

MATERIALS

4. Bricks

4.1 Bricks shall be hard, sound, square and clean. Clay bricks shall be well burned and in respect of size shall comply with BS:3921: 1974.

4.2 Common bricks shall be flettons (clay pressed or wire cut) with a minimum characteristic crushing strength 20 N/mm^2 shall be obtained from an approved manufacturer.

4.3 Clay facing bricks and bricks used shall be to match existing.

5. Stonework

5.1 Where replacement required it is to match existing.

6. Mortar Constituents – Brickwork

6.1 a) Cement: Ordinary Portland Cement to BS 12.

b) Lime: Hydraulic lime to conform to requirements of EN459 selected to meet mix and durability requirements.

Natural Hydraulic Lime to be obtained from the Lime Centre or equivalent. St Astier NHL 5 or 3.5 (to suit location and exposure).

(c) Sand: Well washed sharp, course and graded sands or grits preferably from local sources complying with the requirements of BS1200.
The grading shall provide a good graduation of course to fine particles (6mm to 0.075mm) to suit the joint width and to match the existing mortar and its colour. Maximum particle size should be one third of the joint height. 20% of the proportions of sand mass should be in the range of 0.15mm to 0.075mm. No clay or silts should be present. (Refer also to St. Astier 'Sand for Lime Mortars – General Guidance') Sand which has been in contact with sea water shall not be used unless the engineer is satisfied that it is washed adequately and with no trace of deleterious salts remaining.

(d) Water: Clean and free from any harmful impurity. Where the quality of the supply is doubtful, water shall be tested in accordance with BS.3148.

7 Mortar Constituents – Stonework Mortar and Grout

a) Lime: Lime to conform to requirements of EN459 selected to meet mix and durability requirements for a strength factor of 2 or 3.5 for feebly or moderately hydraulic lime subject to mortar testing by the Lime Centre. Natural Hydraulic Lime (NHL). Manufacturers and reference: St. Astier NHL 2 or 3.5 or equivalent.

b) Sand: Well washed sharp, course and graded sands or grits Preferably from local sources complying with the requirements of BS1200.

The grading shall provide a good graduation of course to fine particles (6mm to 0.075mm) to suit the joint width and to match the existing mortar and its colour. Maximum particle size should be one third of the joint height. 20% of the proportions of sand mass should be in the range of 0.15mm to 0.075mm. No clay or silts should be present.

(Refer also to St. Astier 'Sand for Lime Mortars – General Guidance'). Sand which has been in contact with sea water shall not be used unless the engineer is satisfied that it is washed adequately and with no trace of deleterious salts remaining.

c) Water: Clean and free from any harmful impurity. Where the quality of the supply is doubtful water shall be tested in accordance with BS3148.

8. Polyester Resin Anchor Grout

Non-shrink two-part polyester-based resin suitable for securing anchors and wall tie systems in masonry.

Manufacturer and Reference:
Hilti Hit – C100
Harris & Edgar Ltd Resifix 3 Plus System
Rawplug Co Ltd Kemfast Chemical Anchor
Helifix Polyplus Resin or equivalent

9. Cementitious Bonding Grout

Non shrink thixotropic cementitious grout suitable for injection and bonding of metal components into masonry substrates able to flow under pressure to fill voids with rapid compressive strength development.
Manufacturer and reference
Helifix Heilibond Grout or equivalent.

10. Masonry Reinforcement for Crack Repairs / Stitching

4.5mm or 6mm dia Helical Grade 316 Stainless Steel bars suitable for remedial

reinforcement of existing walls.
Manufacturer and Reference:
Helifix Helibar or equivalent

11. Stitch Anchors

8mm – 12mm diameter Grade 316 Austenitic Stainless-Steel threaded studding. Length to suit.

12. Remedial Wall Tie

Proprietary grouted tie system for stabilising solid masonry using 6mm diameter Helical Grade 316 Stainless Steel with grout filled sock suitable for stabilising solid masonry walls.
Manufacturer and reference
Helix CemenTie or equivalent.

13. Joint Filler

Rot proof expanded polyurethane or polyethylene joint fill.
Manufacturer and Reference:
Fosroc – Expandafoam
or equivalent.

14. Restraint straps/ties

Proprietary galvanised mild steel restraint straps, minimum section 5mm x 30mm. length to suit location.
Manufacturer: Expamet/BAT or equivalent.

15 Wall Ties

To be proprietary stainless-steel ties complying with The Building Regulations Part E, BS 5628 and DD140 Type 4.
Manufacturer and Reference: Ancon Building Products Staifix HRT4 or equivalent

16. Lintels

To be proprietary galvanised mild steel lintels to suit location and loadings.

WORKMANSHIP

17. All work on site is to be executed in accordance with BS.8000: Part 3 and BS.5628: Part 3.

18. Mortar Group Designations and Constituents

To match existing.

19. Pointing

To match existing. For lime aggregate the pointing should match existing together with the style of pointing with clean brick arrises.

20. Masonry Reinforcement / Crack Stitch Repairs

Helical Helibar or equivalent stainless-steel bars are to be installed into disc cut slots cut in bed joints to 500mm each side of crack unless otherwise directed. 25-35mm deep for single skin, 35-40mm for solid wall (215m). Bars to be placed in continuous length on even bed Helibond of bonding compound or equivalent. Reinforcement to be pushed into grout bed. A further bead of bedding compound to be placed over the bar finishing approximately 10-15mm from the face. This is then to be 'ironed' in. Fill mortar joint to normal thickness. Fill crack with lime mortar and re-point reinforced joints as directed by OSP Architecture.

21. Stitch Anchors

Drill hole to appropriate size (diameter and length) to suit Anchor / Tie allowing Adequate space for anchor grout and recommended by Supplier using appropriate drilling equipment and bits (Note: Impact drills may not be appropriate for all resin grouts – refer to Supplier).
Blow / clean out hole.
Inject resin grout working from rear of hole.
Embed stitch Anchor / Tie.

22. Remedial Wall Ties

Where it is necessary to stabilize the masonry or stone walls horizontally a Helifix CemeTie or equivalent shall be installed in accordance with the manufacturer's recommendations and guidance. A clearance hole should be drilled to the required dimension and depth and then flushed clean. The ties should be inserted using proprietary equipment with a grout nozzle inserted to the back of the hole. The grout will then be injected pushing the tie fully into the depth of the hole. The grout nozzle should then be discharged from the hole leaving a fully grouted tie.

23. Decayed Timber Wall Plate Voids and Voids in Brickwork

In conjunction with the licenced bat worker, ensure no bats are present in the holes / voids to be filled. Work is to be carried out sequentially to ensure stability of masonry or timber components over is maintained at all times. Temporary propping may be necessary.

Where timber is to be removed from within brickwork ensure hole is thoroughly cleaned out and all decayed timber residues removed. Prepare using SBR Masonry Primer. Infill and pack hole with Brickwork (min. strength 35N/m² and absorption ≤ 12%) using a 1:3 cement, sand.

24. Mortar

For stone replacement and repair use 1:2 – NHL 2: sand mixed in accordance with suppliers' recommendations or as otherwise directed following mortar testing.

25. Stitch Anchor Ties Between Wall Leaves

Drill hole to appropriate size (diameter and length) to suit anchor / tie allowing adequate space for anchor grout as recommended by supplier using appropriate drilling equipment and bits. The drill hole should stop slightly downwards towards the outside face to assist in grouting. (Note: Rotary drills, not impact drills should be used). Blow / clean out hole. Inject grout working from rear of hole.

Embed 6mm diameter stitch anchor / tie in hole – minimum 100mm embedment (greater if achievable) in each wall leaf.

26. Re-pointing Brickwork

Joints to be raked out to a minimum 25mm depth in stone and 15mm in brickwork and proportionately to joint width.

Re-point using lime mortar to match existing, taking care not to smudge over adjacent stonework, to form a clean, compacted joint.

27. Wall Ties

Density and positioning of ties to be in accordance with BS 5628, generally:

- Minimum 900mm horizontal and 450mm vertical centres.
- Should be evenly distributed, except around openings, and preferably be staggered.
- Positioned at 225 mm vertical centres around openings and adjacent to movement joints.
- Maximum 450mm horizontal centres over openings.
- Minimum 50mm embedment each end.

28. Lintels

To be installed strictly in accordance with manufactures recommendations on mortar bed. Minimum 150mm bearing unless otherwise directed or required by manufacturer.

G20: STRUCTURAL TIMBER

GENERAL

1. Project Specification

This Specification should be read in conjunction with the Specification for the Works and schedules proposed by Stedman Blower Chartered Architects. It should also be read in conjunction with the requirements of the Planning Application documents together with any subsequent consents received.

2. British Standards

All masonry work is to comply with the following British Standards unless otherwise specified: -

BS.5628: Structural use of Masonry
BS.8000: Workmanship on Building Sites
Part 3: Code of Practice for Masonry

MATERIALS

3. Graded Softwood.
To be stress graded and marked to current National and European Standards.
Grade strength class to be as indicated on the Project Drawings. Minimum C16 (SC3)
Regularised surface finish.
Preservative treatment as British Wood Preserving and Damp-proofing Association Commodity Specification C 8. Type/desired service life: CCA, 40 years.
Moisture content at time of erection: As clause 14.

4. Graded Oak
To be visually stress graded Seasoned European Oak where required for replacement to current National and European Standards and current BRE guidance. Grade strength as indicated on the Project Drawings, TH1/THA minimum. Green steady oak may be used for new components / members. All pegs shall be air dried oak with a moisture content less than the members in which it is being used.

5. Ungraded Softwood for Non-Structural Use
To be free from decay, insect attack (except pinhole borers) and with no knots wider than half the width of the section. Surface finish: Sawn.
Preservative treatment as British Wood Preserving and Damp-proofing Association Commodity Specification C 8. Type/desired service life: CCA 40 years.
Moisture content at time of erection: As Clause 14.

6. Plywood
11 ply Finnish birch plywood nominal 18mm for floors, 10mm or 12mm for walls and roofs, as indicated on the Project Drawings.

7. Cleats/Plates
Where specified to be manufactured out of Grade 304 Austenitic Stainless steel. Proprietary cleats where specified to be galvanised or stainless-steel BAT Angle Cleats or equivalent.

8. Fixing Generally
All fixings to be as indicated on the Project Drawings.
Nails, screws, and bolts to be stainless steel subject to Project Requirements and preservative treatment used.

9. Threaded Bar
Austenitic stainless-steel min Grade 316 threaded bar to diameter shown on Project drawings cut to suit connection detail.

10. Resin Fixing
Proprietary injected polyester resin anchor system suitable for use in timber fixings or repairs.
Manufacturer and Reference:

Rotafix – Resiwood System – Timberset or equivalent
Hilti – Hit series of resins.
Rawlplug – Kemfast series of resin or equivalent.

WORKMANSHIP

11. Ensure all work to insitu timber be carried out in accordance with the modified Method Statement attached to the Bat Licence.

12. Fixings – Generally
Only stainless-steel fixing shall be used in Oak components connections / fixings.

13. Section
Cross section dimensions of timber to be as shown on drawings. Timber replacement in oak structures to be seasoned oak to an equivalent size of existing.

14. Use of Timber.
Do not use timber members which are damaged, crushed or split beyond the limits permitted by their grading. Ensure that notches and holes are not so positioned in relation to knots or other defects that the strength of members will be reduced. Do not use scarf joints, finger joints or splice plates without approval.

15. Use of Timber – Oak

Selection and conversion of oak to be used in structural components shall be such that the heart runs steadily down the length of the member and does not have shakes or significant knots at positions which seriously affect the strength of the member in bending, shearing or at joint positions.

16. Processing of Oak Members

The oak for structural members shall be converted by boxing, halving, or quartering as appropriate, but generally they shall be as follows:

Tie beams	Boxed or halved
Main posts	Boxed (plus jowl)
Plates	Quartered or halved
Tie beams	Boxed
Intermediate posts	Halved
Corner posts	Halved
Principal rafters	Halved

All external members shall be positioned in the works with the heart facing outwards and upwards or to cill plates downwards as appropriate.

17. Processing Treated Timber

Carry out as much cutting and machining as possible before treatment. Retreat all treated timber which is sawn along the length, ploughed, thicknessed, planed, or otherwise extensively processed. Treat timber surfaces exposed by minor cutting and drilling with two flood coats of a solution recommended for the purpose by main treatment solution manufacturer.

18. Timber Moisture Content

At time of erection moisture content should not exceed:

- Under cover in generally unheated spaces: 24%
- Under cover in generally heated spaces: 21%
- Internal in continuously heated spaces: 19%

19. Jointing/Fixing Generally

Where not specified otherwise, select fixing and jointing methods and types, sizes and spacings of fastenings in compliance with the relevant British and European Standards.

20. Jointing / fixing of Oak Members

Al joints and connections and details shall be shown on the project drawings or agreed to suit the location and type of joint, or if specified as existing of the building, or as separately approved standards prepared by specialist framing carpenters.

All standard tenons at critical positions to be 38mm thick by the width of the timber and 112mm long minimum. Pegs shall be 38mm from the shoulder and draw bored by 3mm-4mm for 19mm diameter and 4mm-5mm for 25mm diameter. Where structurally required, such as to arched braces, tenons shall be increased as necessary and specially detailed.

All structural pegs shall be nominally 19mm diameter, and with a moisture content noticeably of less than the timber members and shall be driven tight through the complete member.

21. Bolted Joints
Locate holes accurately and drill to diameter as close as practical to the nominal bolt diameter and not more than 2mm larger. Place washers under all bolt heads and nuts which bear directly on timber. Use spring washers in locations which will be hidden or inaccessible in the completed building. Tighten bolts so that washers just bite the surface of the timber and at least one complete thread protrudes from the nut. Check at agreed regular intervals up to Practical Completion and tighten as necessary to prevent slacking of joints.

22. Plywood
Butt joint plywood over lines of joists or solid noggins. Screw fix at 100mm centres through packers and firings into original joists.

23. Temporary Bracing
To ensure complete stability during construction provide temporary bracing as necessary to maintain structural timber components in position.

24. Infilling Mortice Holes / Voids
Ensure in conjunction with the Bat specialists that holes are clear and can be filled. Subject to the nature of the hole / void, infill with seasoned hardwood wedges, glued and pinned in place. Alternatively, where timber infill is not appropriate, a suitable resin such as Timberset should be applied.

25. Additional Supports
Where not indicated on Project Drawings, position and fix additional studs, noggins or battens for appliances, fixtures, edges of sheets, etc in accordance with manufacturer's recommendations. Any additional studs, noggins, or battens to be of adequate size and have the same treatment, if any, as adjacent timber supports.

26. Stitch / Pin Connection
Auger drill hole to fill depth of connection. Clean hole and inject resin. Install threaded bar to full depth of hole. For connections into masonry see Section E.

Appendix 3
Schedule of Remedial Repairs

Schedule of Structural Repair Works

The following is the outline scope of structural works identified in relation to the structural conditions identified on Drawings 21-2152/20-28.

	General
1.	Design and install temporary support and working platform access to frame before remedial repairs commence.
2.	Remove loose and redundant timber elements that are not part of or to be retained as part of the development.
3.	Fix lower studs to midrail to ensure their retention during the remedial repairs. Minimum 2 No. Ledgerlok screws on 10mm dia. stainless-steel resin anchored fixings.
	Substructure
4.	Check extent of decay to sole plate. Remove elements where there is significant loss of section or severe fracturing.
5.	Set aside sole plate section to be re-used.
6.	Remove substructure plinth wall, clean, and set aside brickwork for re-used.
7.	Construct new foundation and substructure wall as shown on architectural drawings.
8.	Replace sole plate utilising existing fixings where appropriate or use 2 No. 12mm dia. resin-fixed stainless-steel dowels.
9.	Secure sole plate with stainless-steel resin-fixed bolts into substructure wall. Note: d.p.m. to architectural details.
	Superstructure
10.	Replace west frame on grid 1 up to first floor level including a replacement post on grid 1C. (Note: sequence of works to be determined by contractor). Re-fix all braces and rails.
11.	Pin all joists between principal members as shown on the project drawings.
12.	Enhance rafter fixings to eaves rail. 2 No. Ledgerloks/rafter.
13.	Supplement rafters as required to suit roof coverings.
14.	Undertake local repairs to damaged/fractured timber elements with

	stainless-steel pins.
15.	Infill redundant mortice holes with hardwood fillets/wedges glued and pinned in place.
16.	Replace local sections of timber with scarfed in air dried oak glued and pinned in place.
17.	Ply sheath external faces of building to enhance overall stability.
18.	On Grid 9A provide a replacement post in oak.
19.	On Grid 9 Cut back defective timber on face of posts and beams, to be replaced with oak section glued and pinned into position. Also, on grids A, 3 and 7.
20.	Replace purlin and brace between grids 3 and 5 as shown on Grid C elevation.
21.	Remove existing first floor and boarding including side supporting rail and brackets. Glue and pin in new oak section where rail has been cut in and removed from posts.
22.	Repair cracks in walls on grids 4 and 5 with stainless steel bed joint reinforcement or rebuilding. Repoint, as necessary.
23.	Replace internal door posts on grids 4 and 5 so that they can be secured to the proposed new floor level.
24.	Bottom of main frame posts to be cut out and replaced with new oak, with scarfed joint, glue, and pins. (Approximately 7No.) Smaller posts/studs may need replacing.

Appendix 4
Outline Method Statement

Dickhurst Farm Barns
Petworth Road
Haslemere
Surrey
GU27 3BG

Outline Method Statement for Remedial Repairs and Structural Improvements

December 2021

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METHOD STATEMENT FOR REMEDIAL REPAIRS AND STRUCTURAL IMPROVEMENTS

Introduction

1. This Method Statement is provided to describe the scope of work and methods/sequence to be employed. It is also provided to give information and direction to the appointed contractor undertaking the remedial repairs to the building as part of the restoration works described on the project drawings prepared by Stedman Blower Chartered Architects together with Cooper & Withycombe in ensuring the work can be undertaken safely.

2. This Method Statement should be read in conjunction with all project information including Project Drawings, Specification and Design Risk Assessments

3. Under the Health & Safety at Work Act (The Construction Design and Management) Regulations, it will remain the contractor's responsibility to develop this specific method statement to be incorporated into the Construction Stage Health and Safety Plan, taking into account:
   - The nature and condition of the existing building structure.
   - Adherence to the proposed scope and nature of the structural works including Standard and Methods.
   - Use of appropriate materials in accordance with the specification.
   - Resources available.
   - Their own assessment of site conditions following any necessary opening up works. The designers should be advised should any situation different to that anticipated be found.
   - Contractors own risk assessments for the handling and installation of the structural elements
   - Timing and programme
   - Building Control/Approved Inspector requirements.
   - Conservation Officer's requirements in relation to preserving the existing historic structure.

Scope of Work

4. The remedial works generally comprise works to restore and repair existing frame, structure and masonry walls before conversion works commence to Dickhurst Farm Barn.

5. Installation of new structure to support external cladding and roof.

Works Sequence

6. The present condition of the residual building structure should be reviewed in relation to the proposed remedial works and proposed conversion works.

7. Temporary propping and protection should be provided to adequately support the building structure and as required to suit the contractor's work sequence.

8. The area of the works should be checked and cleared of remaining services that may affect the works.

9. Appropriate access such as scaffolding to upper work areas should be designed and installed in addition to that required for temporary support.

Remedial Repair Works

10. The remedial structural repair works should be carried out in accordance with drawing numbers 21-2152/20-28 and the appended Specification. These should be read in conjunction with Stedman Blower architectural drawings for the conversion works.

11. The intention is to repair and consolidate the structural frame of Dickhurst Farm Barn in preparation for the residential conversion works.

12. The works should be undertaken in a sequence and methods to avoid de-stabilising the framed structure. Where sections are found to be potentially unstable, the Project Architect should be advised.

New Structure

13. The proposed new structural elements are to be constructed in accordance with the outline details shown on drawing numbers 21-2152/30-34.

14. The new substructure is to be constructed in conjunction and co-ordination with the superstructure repairs.

15. Foundations are to be sequenced and temporary support required to ensure that stability of the Barn structure is not compromised.

16. Foundations should all be completed before superstructure works are commenced.

Appendix 4

Structural Drawings