

41, Eastern Avenue
Reading
RG1 5RX

Structural feasibility report

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1. Introduction

1.1 Appointment and brief

Clive Hudson Associates Ltd has been appointed by Mr Ali Akbar (the owner) to prepare a feasibility report for the proposed structural alterations to No. 41, Eastern Avenue, Reading (Figs. 1-2), with the proposals illustrated on Colony Architects Ltd.'s drawings:

- 1026-02-00 Site Location Plan – As existing
- 1026-03-00 Ground Floor Plan – As existing
- 1026-03-01 Floor Plans – As existing
- 1026-05-00 Elevations – As existing
- 1026-03-10 Ground Floor Plan – As proposed
- 1026-03-11 Floor Plans – As Proposed
- 1026-05-00 Elevations – As proposed



Figure 1. Partial view of the front and side elevations.

The report has been prepared for the sole use of our client and his professional advisors and is for the purpose of supporting a planning/listed building consent application.

The report is not to be relied upon by third parties or reproduced in whole or in part without our written consent. We accept no liability to any third party, or for this report being used for any other purpose.

1.2 Aims of the report

The aim of the report is to highlight and discuss the principal structural engineering issues involved with the proposed alterations.



Figure 2. Partial view of the side and rear elevations, with No. 39 on the right-hand side.

2. The Site

2.1 Location

No. 41 is located on the east side of Eastern Avenue, on the east side of Reading, approximately 450m to the south-south-east of 'Cemetery Junction' (National Grid Reference SU 73366 72781) (Figs. 3-4).

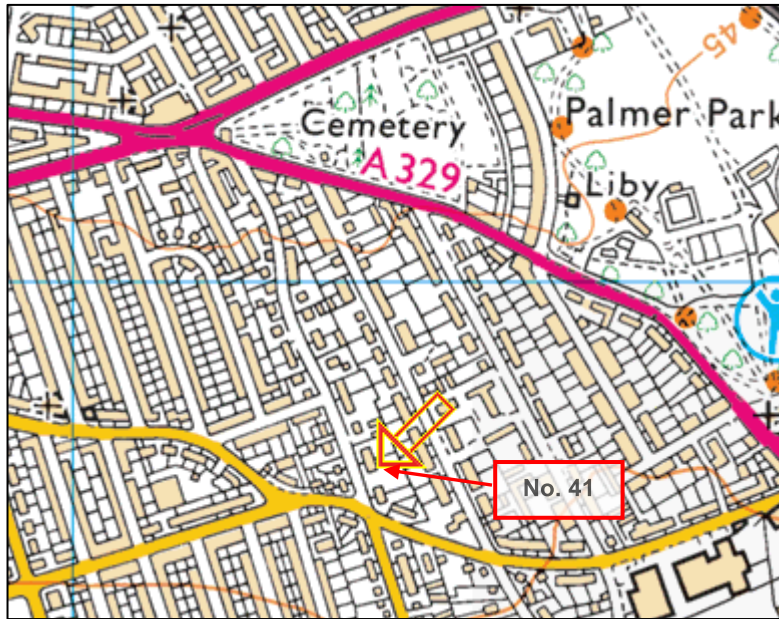


Figure 3.
Location of No. 41,
Eastern Avenue
(Extracted from
www.streetmap.co.uk)

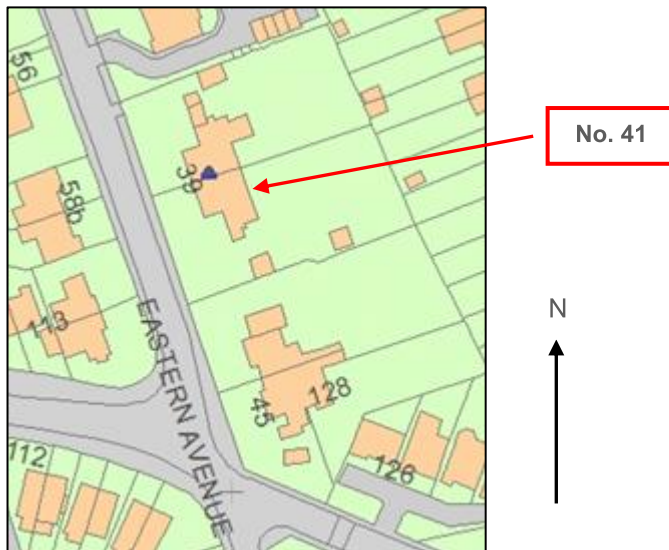


Figure 4.
Site location (extracted from
www.mapservices.historicengland.org.uk)

2.2 Geology & Topography

A preliminary review of the British Geological Survey's online 'Geology Viewer' indicates that the site geology consists of a Taplow Gravel Member – comprising sand and gravel – superficial deposits

overlying Lambeth Group – clay, silt and sand - bedrock. However, intrusive investigations will be necessary to confirm the actual ground conditions.

The ground immediately surrounding the property is generally level.

2.3 Trees

A preliminary Arboricultural Impact Assessment undertaken by SJ Stephens Associates, dated 6th October, has identified numerous trees on the plot. These include:

- a mature western red cedar at the front of the property,
- a mature cedar to the rear of the property, and
- mixed species (including a bay tree, Lawson cypress and cherry plum) on the southern boundary.

2.4 Brief Description

No. 41, together with No. 39, form a pair of Grade II listed, semi-detached houses, which we understand date back to the mid-19th century. The properties are oriented on an approximate north-north-west to south-south-east alignment with their front elevations facing west-south-west onto Eastern Avenue. However, for the purposes of this report, the properties are taken to be oriented on a north-south axis with their principal elevations facing west.

The properties were listed in 1987 when No. 41 was incorporated a chiropractic surgery on the ground floor. The listing description (L.E.N. 1248720) describes the properties as:

Nos. 39 and 41 (White House chiropractic surgery) Pair of semi-detached houses, no. 41 now surgery with flat above. 1845 (deeds) with C20 additions. Stuccoed brick, Welsh slate roof - 2 storeys, 6 bays with lower, set- back, side bays and an added lower bay to either end; rear range added 1923. Main range: narrow vertical recess divides properties; sashes with glazing bars in raised surrounds with ends of cills breaking forward on brackets; entrances at either end have internal porches with pilasters supporting entablature, narrow round-arched openings in return walls (no. 41's with Art Nouveau glazing) and, inside, 2 steps up to door of 4 flush panels under overlight with glazing bars (porch of no. 39 has black and white marbled floor); hipped oversailing roof with central, brick, cross- ridge stack. Side wings have a sash on each floor, of 12 panes to ground floor and 9 unequally-hung panes to 1st floor; roofs have hipped ends and brick stacks to rear. Additions to either side have monoclinical roofs, the left one blind the right one with C20 1st floor oculus. Interior: no.39 has panelled double-door between front and rear ground-floor rooms and open-string stair with moulding below treads, decorative newel and curtail to handrail.

It is clear that the property has evolved since it was first built. The property is currently subdivided into two flats: a ground-floor flat and a first-floor flat, with a storeroom which is accessed externally from the rear elevation. The property currently comprises:

- a partial basement,
- a ground floor, and
- a first floor.

From a structural perspective, No. 41 is generally of rendered brickwork construction, with evidence to suggest that the rear elevation of the single-storey accretion has been taken down and rebuilt in (rendered) blockwork.

Except for the single-storey rear accretion, which has a flat roof, the roofs are pitched and covered in slate.

The first floors are of traditional construction with timber joists. The ground floor over the basement comprises timber joists and timber beams. The floor in the basement and in the ground-floor storeroom comprises brick pavers. The floor in the southern wing is solid and is covered with carpet/finishes.

We understand that the storeroom was originally used as a stable.

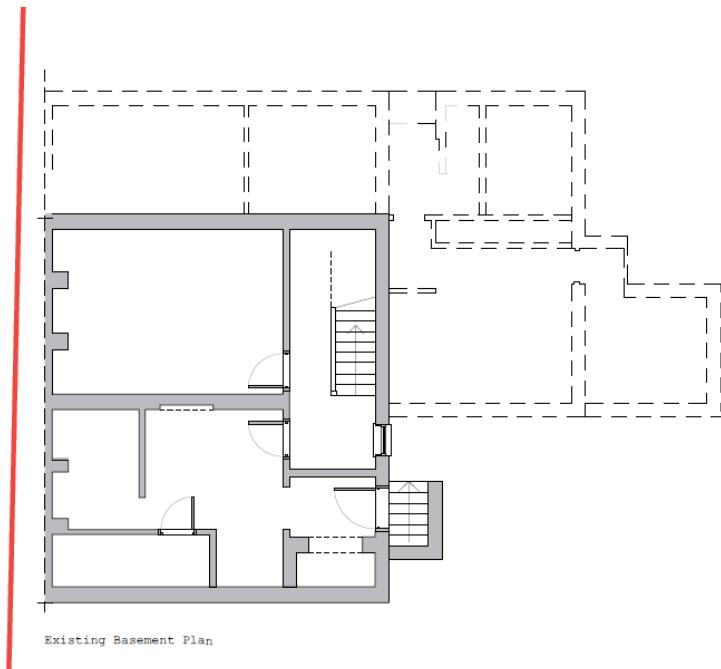


Figure 5.
Existing basement
plan – extracted from
Colony Architects
drawing 03-01.

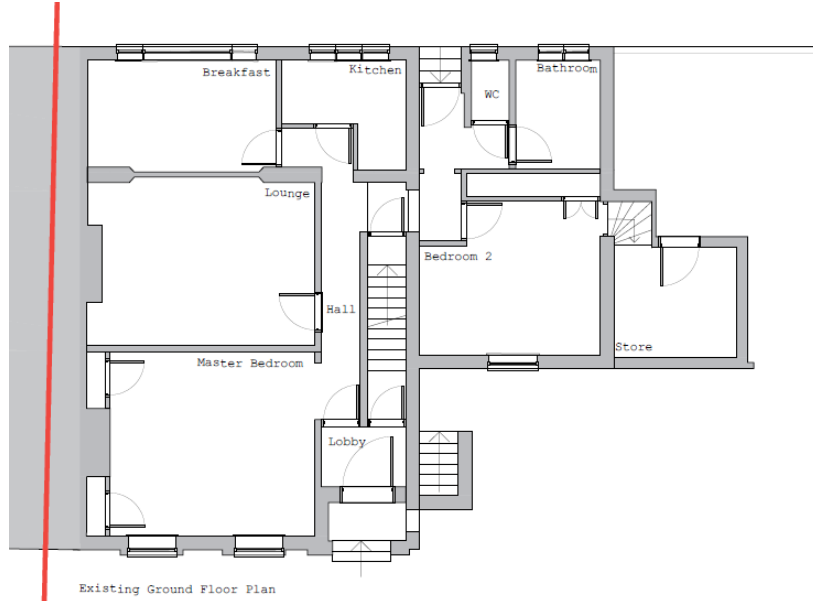


Figure 6.
Existing ground-floor
plan – extracted from
Colony Architects
drawing 03-00.

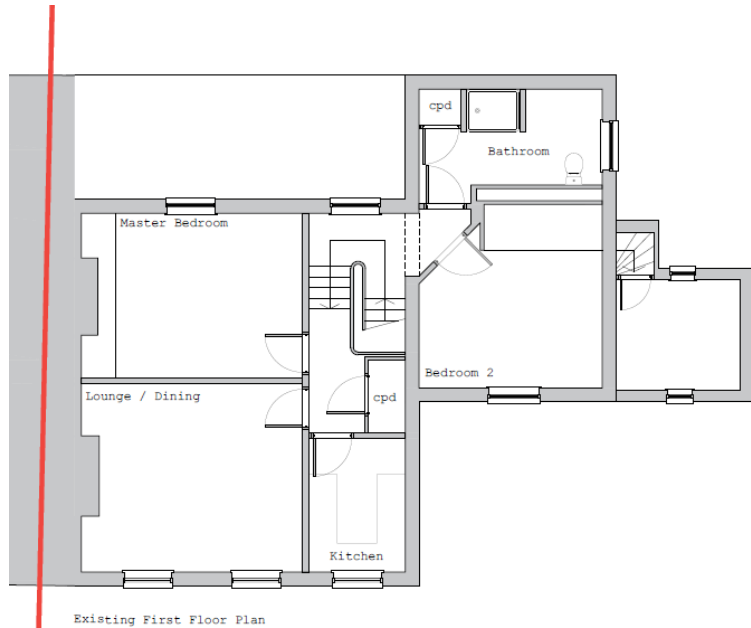


Figure 7.
Existing first-floor
plan – extracted from
Colony Architects
drawing 03-01.

3. Structural Assessment

3.1 Introduction

The feasibility report is based on a visual inspection of the property, the architectural drawings provided, and our experience.

The external elevations were inspected from ground level. Access was gained to the majority of the rooms inside the property, except Bedroom 2 in the first-floor flat and the space over the storeroom.

No detailed tests/analyses were performed on the construction materials used, or to test the load-bearing characteristics of the underlying subsoil. Structural elements that were covered, unexposed or inaccessible could not be inspected, and due to time and access restrictions, not all structural elements could be inspected. Once all structural elements are exposed/made accessible, further work may be required.

Digital photographs were taken to record areas of interest and are included in the report for reference.

- Traditional buildings and their materials were built to be 'breathable' – allowing moisture to penetrate the fabric and then evaporate when the conditions were appropriate. The application of non-porous, cement-rich mortars, renders, and paints to historically 'breathable' surfaces can cause moisture to become trapped, which in turn can cause decay to the underlying material. This decay is not always evident until the mortar/render/paint has been removed.

Please note: any references to the "left" and "right" are taken when facing the elevation/structural element being described.

3.2 Proposed Structural Alterations

3.2.1. Basement

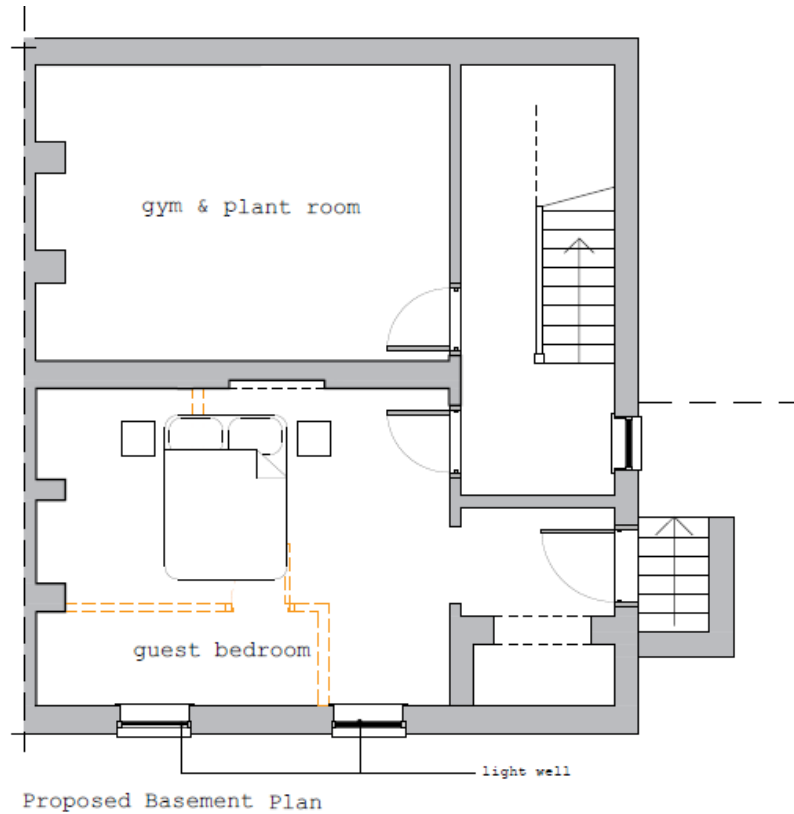


Figure 8. Proposed basement plan – extracted from Colony Architects drawing 03-11.

- i. The architectural drawings for the basement indicate that the proposed alterations comprise the removal of internal partitions from within the front room, and the insertion of two lightwells in the front wall (Fig. 8).
- ii. From the inspection, the partitions are clearly not historic. The east/west partition is of stud construction, while the partition towards the front elevation is of blockwork construction.
- iii. The ground floor construction comprises timber joists that span north-south, with internal support provided by two downstand timber beams that span east-south. Both beams are supported by the north/south blockwork partition (Fig. 9).



Figure 9. Partial view of the partitions within the basement, with the two downstand beams running left-to-right.

The beams are circa 185mm deep x 100mm wide and span c. 3.9m. During the inspection, it was not possible to confirm whether the joists are notched over the beam or not, i.e., the beams are deeper than the 185mm measured beneath the ceiling.

Based on an initial assessment for a 185mm deep x 100mm wide timber beam spanning c 3.9m, with assumed properties equivalent to a C24 grade, the beams would fail when assessed against modern codes of practice for bending stress and deflection, without the internal support. While we recognise that modern codes of practice should not be applied unthinkingly, in the context of building conservation, we would recommend that localised opening-up works be undertaken to confirm the exact size of the beam as part of the next phase of the project, and a provisional sum is allowed to strengthen the beams.

- iv. The formation of the two lightwells does not raise any significant structural concerns at present. However, the architectural drawings currently lack detail regarding their size and position. From a structural perspective, new lintels will be required over the openings, and new retaining structures will need to be added externally to form the well(s). At this stage, we would allow to use reinforced hollow blocks with a lightly reinforced concrete slab at its base. However, clarification should be sought with the arboricultural consultant, SJ Stephens Associates, as to

whether this, or any other construction, is feasible, considering the lightwells will lie within a Ground Protection Area.



Figure 10. Current view beneath the ground-floor windows, where the lightwells will be located.

- v. Although not shown on the architectural drawings, we understand from on-site discussions with Mr Akbar, and also referenced in the Pre-application Heritage Statement, prepared by Archway Heritage, dated November 2024, that the proposals may also include the lowering of the basement floor. We would recommend that intrusive investigations be undertaken to confirm the depth and nature of the existing footings as part of the next phase, as it may be necessary to underpin the existing footings to accommodate the revised floor level and build-up. This should be investigated and finalised before the application is submitted.
- vi. If the floor is level is not lowered, it may be necessary to thermally upgrade the current floor. This should be confirmed by the architects before the submission of the listed building consent application.
- vii. While outside of our brief, a localised bulge was observed in the brickwork beneath the boiler condensate pump at the base of the front wall in the north-west corner. There is also evidence of extensive root penetration and moisture ingress in this location (Fig. 11). We would recommend that this be investigated and a provisional sum set aside for remedial works as part of the project.



Figure 11.
View of the localised
bulge, root penetration
and moisture ingress in
the north-west corner.

- viii. Although not shown on the architectural drawings, it is assumed that some form of waterproofing system, such as a cavity drain membrane, will be required as part of the works. We would recommend that Colony Architects Ltd investigate and specify the appropriate system before submitting the listed building consent application, as additional structural works may be required to facilitate the installation.
- ix. On a similar matter, it appears that the drain at the base of the external staircase is blocked. We would recommend that this is cleaned and surveyed to ensure it is fit-for-purpose as part of the project.

3.2.2. Ground floor

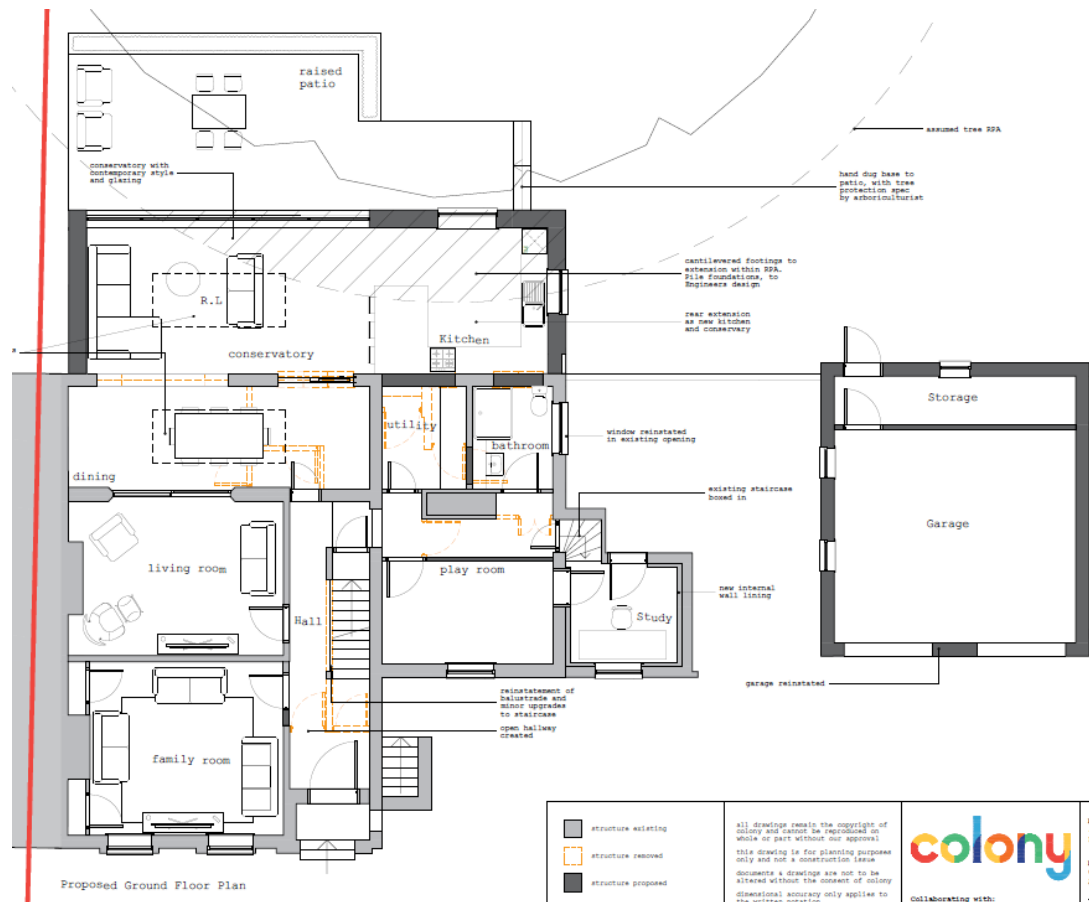


Figure 12. Proposed ground-floor plan – extracted from Colony Architects drawing 03-10.

i. The architectural drawings for the ground floor (Fig. 12) indicate that the proposed alterations include:

- a new rear extension,
- the removal of the masonry wall that separates the principal staircase from the hall on the ground floor,
- the removal of non-load-bearing walls from the proposed dining room,
- the lowering of the existing openings on the rear wall of the existing rear extension,
- the removal of non-load-bearing walls from the proposed utility room,
- the infilling of existing windows and door openings in the proposed utility room and bathroom,
- the reinstatement of the window on the south wall of the proposed bathroom,
- the creation of an opening between the proposed bathroom and corridor,

- the installation of a new partition to subdivide the existing bedroom into a playroom, with a separate corridor to the proposed bathroom,
 - the creation of a new opening between the proposed playroom and study,
 - the insertion of a new rooflight in the existing flat roof, and the
 - the creation of a new window in the east wall of the proposed study.
- ii. As the new rear extension lies within the No-Dig Construction zone, we would recommend that the new foundations for the extension be piled, either incorporating an integrated reinforced concrete ground-floor slab or utilising a reinforced concrete ground-beam arrangement with a separate or an integrated floor structure. This will require a suitable geotechnical investigation to be carried out (by others) to advise on the appropriate pile design/parameters.

To minimise the risk of differential movement between structural elements founded on different substrates/foundations, we would recommend that additional internal support be introduced within the new extension to carry the new first-floor wall, rather than relying on the existing wall for support.

While not a structural issue in itself, the construction of the new extension is likely to fall within the scope of the 1996 Party Wall Act. As a result, we would recommend that advice be sought from a competent Party Wall Surveyor at an early stage.

- iii. The removal of the wall that separates the principal staircase from the hall on the ground floor does not warrant immediate structural concern (Fig. 13). While the wall is not considered to be original, it may be providing support to the existing staircase and the first-floor landing. Should the wall be removed, a provisional sum should be allowed to either reinstate the staircase and landing or to undertake remedial works to the existing structures.



Figure 13.
View of the wall that
separates the principal
staircase from the
ground-floor hall (from
the half-landing).

- iv. Although not entirely clear at this stage, it appears that the insertion of the window in the study may clash with the historic first-floor joists and lathe-and-plaster ceiling (Fig. 14). We would recommend that, as part of the next phase, the architects develop their drawings to include existing and proposed sections to clarify these relationships.



Figure 14.
View of the historic lathe-
and-plaster ceiling in the
store.

- v. As previously noted, the store has a brick paver floor, which is likely to be historic. To enable the conversion of this space to habitable usage, it is assumed that the floor will require upgrading, including the introduction of additional insulation. This should be developed by the architects before the submission of the listed building consent application.
- vi. On a similar basis, we would recommend that the floor and ceiling levels in the proposed study and playroom be confirmed before the submission of the listed building consent application.
- vii. Although it does not warrant immediate structural concern, we would allow to strengthen the brickwork over the existing opening in the proposed ground-floor bathroom (Fig. 15) using stainless steel, threaded bars and resin grout, such as Helifix Helibars and Helibond grout, should the opening be reinstated.

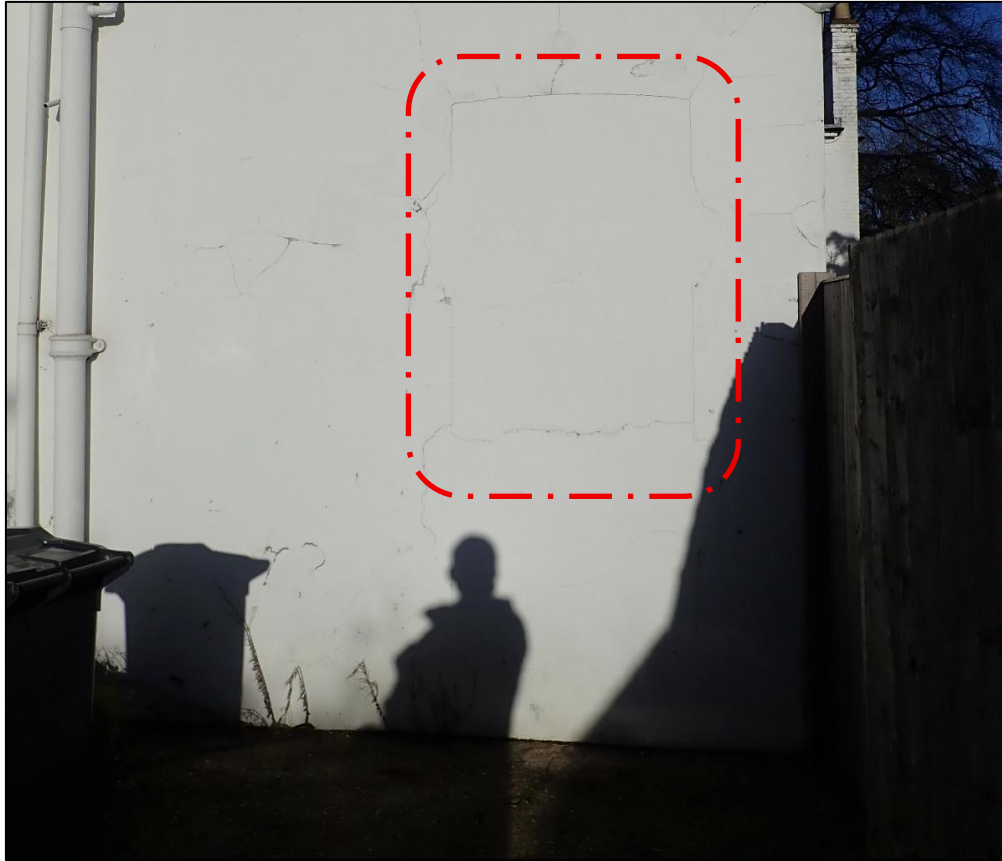


Figure 15. Outline of the infilled opening on the side/south elevation.

- viii. The proposed widening of the opening in the existing rear extension does not present any immediate structural concerns; however, a new intel will be required to support the altered span. As previously noted, the rear wall appears to have been rebuilt at some point, with exposed blockwork observed on the inner face in the existing kitchen (Fig. 17). The current window openings also have square heads rather than the shallow brick arches, which No. 39 has on its rear extension, indicating that the wall has been taken down and rebuilt (Fig. 16).



Figure 16. View of the rear elevation of the existing single-storey, rear extension, with No. 39 on the right-hand side.



Figure 17. View of the exposed blockwork in the existing kitchen.

- ix. The removal of non-load-bearing partitions and walls or the creation of new openings in existing load-bearing walls does not raise structural concerns. The creation of new openings in existing load-bearing walls will naturally require new lintels to be introduced.
- x. The insertion of a new rooflight within the existing flat roof does not raise any significant concerns. Structural alterations will be required, but these will be designed and detailed as part of the design package.

3.2.3. First Floor

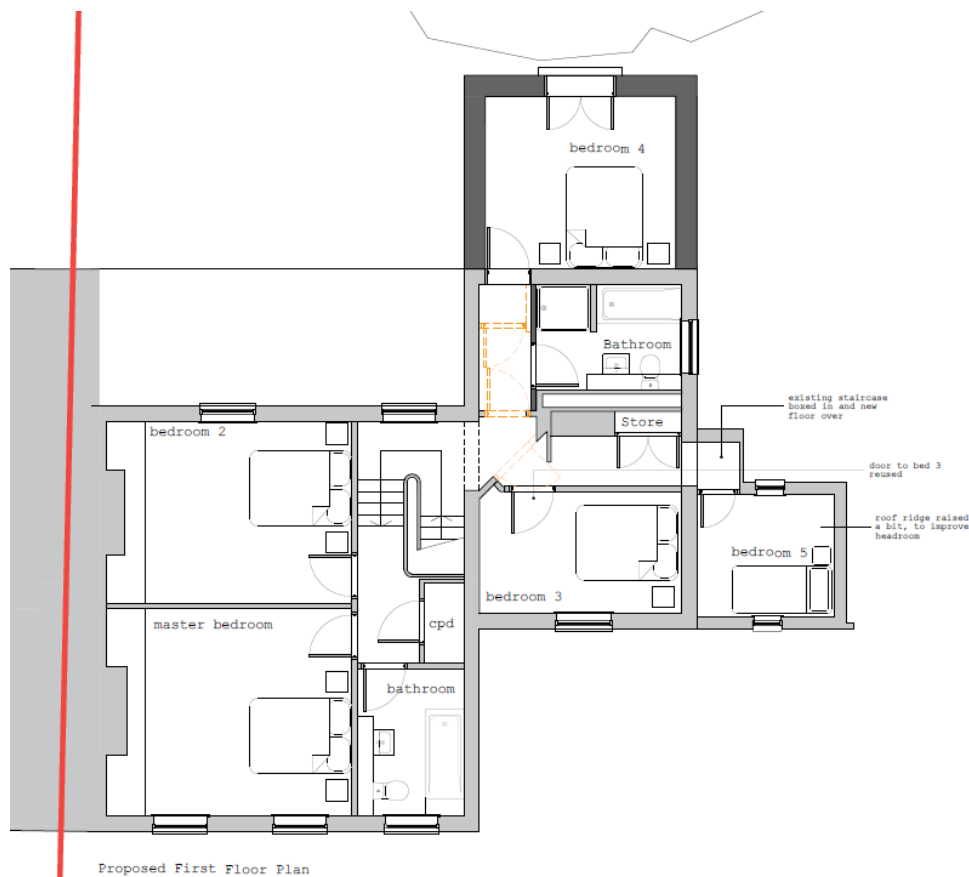


Figure 18. Proposed first-floor plan – extracted from Colony Architects drawing 03-10.

- i. The architectural drawings for the first floor (Fig. 18) indicate that the proposed alterations include:
 - The addition of a 4th bedroom to the east of the existing bathroom,
 - The introduction of new stud partitions and the removal of existing stud partitions,
 - The raising of the ridge over the proposed bedroom 5, and
 - The formation of a new opening in the existing rear wall to allow access to the new bedroom.

None of these raises structural concerns. The creation of new openings will naturally require new lintels to be introduced. We would recommend that the floor and ceiling levels in the proposed corridor and bedroom 5 be confirmed before the submission of the listed building consent application.

3.2.4. New Garage

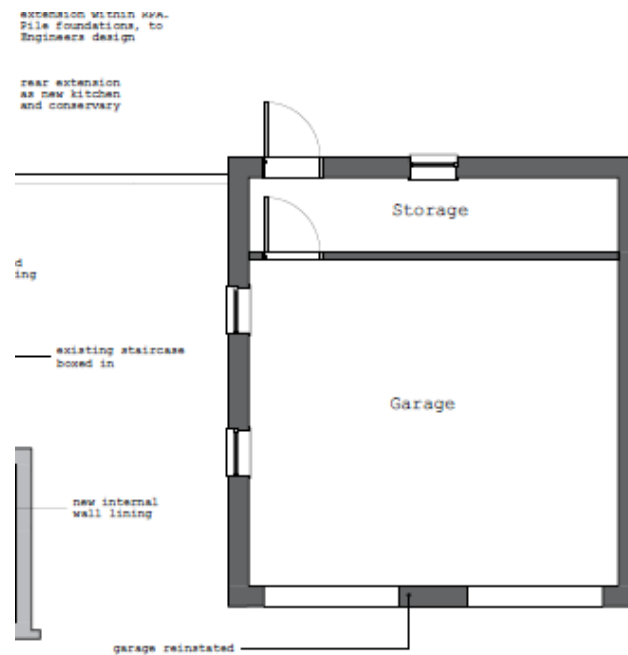


Figure 19. Proposed garage floor plan – extracted from Colony Architects drawing 03-10.

- i. The architectural proposals include a new garage adjacent to the southern boundary. The new garage will be single-storey with a duo-pitched roof. As the new garage lies within a No-Dig Construction zone, we would recommend utilising piled foundations with an integrated reinforced concrete ground-floor slab to support the superstructure, as recommended by SJ Stephens Associates. This will require a suitable geotechnical investigation to be carried out (by others) to advise on the appropriate pile design/parameters.
- ii. Although it is not a structural issue, per se, we would recommend that the widths of the openings be confirmed before the listed building consent application is submitted, as they appear to be relatively narrow, in our opinion.
- iii. While it is not a structural issue per se, the construction of the new garage is likely to fall under the 1996 Party Wall Act. As a result, we would recommend that advice be sought from a competent Party Wall Surveyor at an early stage.

4. Conclusion

Based on the architectural drawings provided and the inspection undertaken, none of the proposals warrants immediate structural concern. However, we would recommend that the architectural drawings are developed further before the submission of the listed building application, as further structural considerations may emerge through the design process.

We would recommend that the structural works be designed in accordance with all current British Standard Codes of Practice, including but not limited to:

- Design Loading BS6399
- Foundations BS8804
- Structural Concrete BS8110
- Structural Timber BS5268
- Structural Masonry BS5628 and CP111, and
- The Guide to the Conservation of Historic Buildings BS7913 and, in particular, clause 5.2 – Application of standards and codes of practice

Old buildings that have stood the test of time require judgment to be exercised when decisions are being made about their conservation. This judgement should be based on an understanding of principles informed by experience and knowledge, including that of relevant legislation. British Standards and other specifications and codes of practice should not be applied unthinkingly, in the context of building conservation. While the application of particular specifications, structural design codes and calculations can be appropriate in many circumstances, there can be other circumstances where it will be necessary to follow professional experience and judgement, on the basis of what has been proved to work.

Where timber elements are found to be defective, we would propose where they can be repaired, they are repaired using conventional carpentry techniques and steel plates (where they allow more of the historic timber to be retained than would otherwise be possible); where they cannot be repaired, we would propose new structural elements are introduced alongside them, and the existing (historic) elements are left in situ where possible.

We would like to highlight the fact that historic buildings need to 'breathe' in order to function and are also more flexible when compared to modern buildings constructed out of modern materials. Consequently, any new materials used should be appropriate for use in buildings of this age and nature.

We would also recommend that contact is made with the Conservation Officer so that he/she is made aware of the situation, as any repairs/extensive opening-up works will probably require a separate listed building consent application to be made.

Should you have any questions, please don't hesitate to contact us.

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