Structural Feasibility Report

Relating to: Removal of Column and Walls at
XXXX
XXXX
XXXX

Report date: XXXX

ALLCOTT COMMERCIAL

Project preface

Client(s) name:	XXXX
Client(s) address:	XXXX

Prepared at:	Allcott Associates LLP Unit 3, The Fosse Fosse Way Radford Semele Leamington Spa CV31 1XN
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Job reference:	XXXX

Reviewed by:	Timothy Allcott

View of Front Elevation

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1 Introduction

1.1 Instructions

In accordance with instructions received from XXXX we have carried out a Structural feasibility study for alterations at the property known as XXXX. The inspection was carried out on XXXX.

All comments are based on visual inspection only, together with a desk top review of existing design information provided by the client.

No drainage survey or investigation of the foundations was undertaken as part of our inspection.

1.2 Brief

Allcott Associates were instructed to undertake a structural feasibility review to consider removal of an existing column in the kitchen of the above property. Whilst on site, we were also asked to consider the implications of removal of a ground floor wall adjacent to the front door, together with the partial removal of two internal walls at first floor adjacent to the stair and landing.

It should be noted that if any of the structural works identified in this report are progressed, Building Control approval will be required. Detailed structural calculations will need to be prepared and submitted as part of the application, which are not part of the scope of this study. This feasibility report does not constitute a detailed design, therefore further work will be required to prepare calculations.

1.3 Site inspection

Where the terms “right hand” or “left hand” are used, they assume that the reader is facing the front of the property with the main access door situated within the front elevation.

The inspection carried out was visual in nature only and was limited to structural elements of the property only.

2 Description of the Existing Property

2.1 Basis of information

In addition to the visual inspection carried out on XXXX, the following information has been referred to in the preparation of the feasibility report:

- Architectural drawings by PPA Architecture for modifications undertaken in 2012 including:
    - PPA1207/101C - Ground Floor Plan
    - PPA1207/102C - Proposed First and Second Floor Plans
    - PPA1207/103C - Proposed Elevations
    - PPA1207/104B - Proposed Sections
    - PPA1207/105A - Proposed Plans – Mechanical/Electrical
- Structural sketches by Intrepid Consulting Engineers, dated October 2012 including:
    - SK-01 (rev. B) First and Second Floor Plans as Proposed
    - SK-02 (rev.C) Ground Floor Plan as Proposed – Showing Structure Over
    - SK-03 (rev. B) Foundation Plan as Proposed
    - SK04 to SK12 A4 Structural Details Sketches
- Estate Agent's floor plans from 2012 and 2020, taken from Rightmove

We cannot confirm whether the architectural drawing and structural information represents the as built details, therefore opening up will be required on site to confirm the existing construction if any of the proposed modifications are to be undertaken.

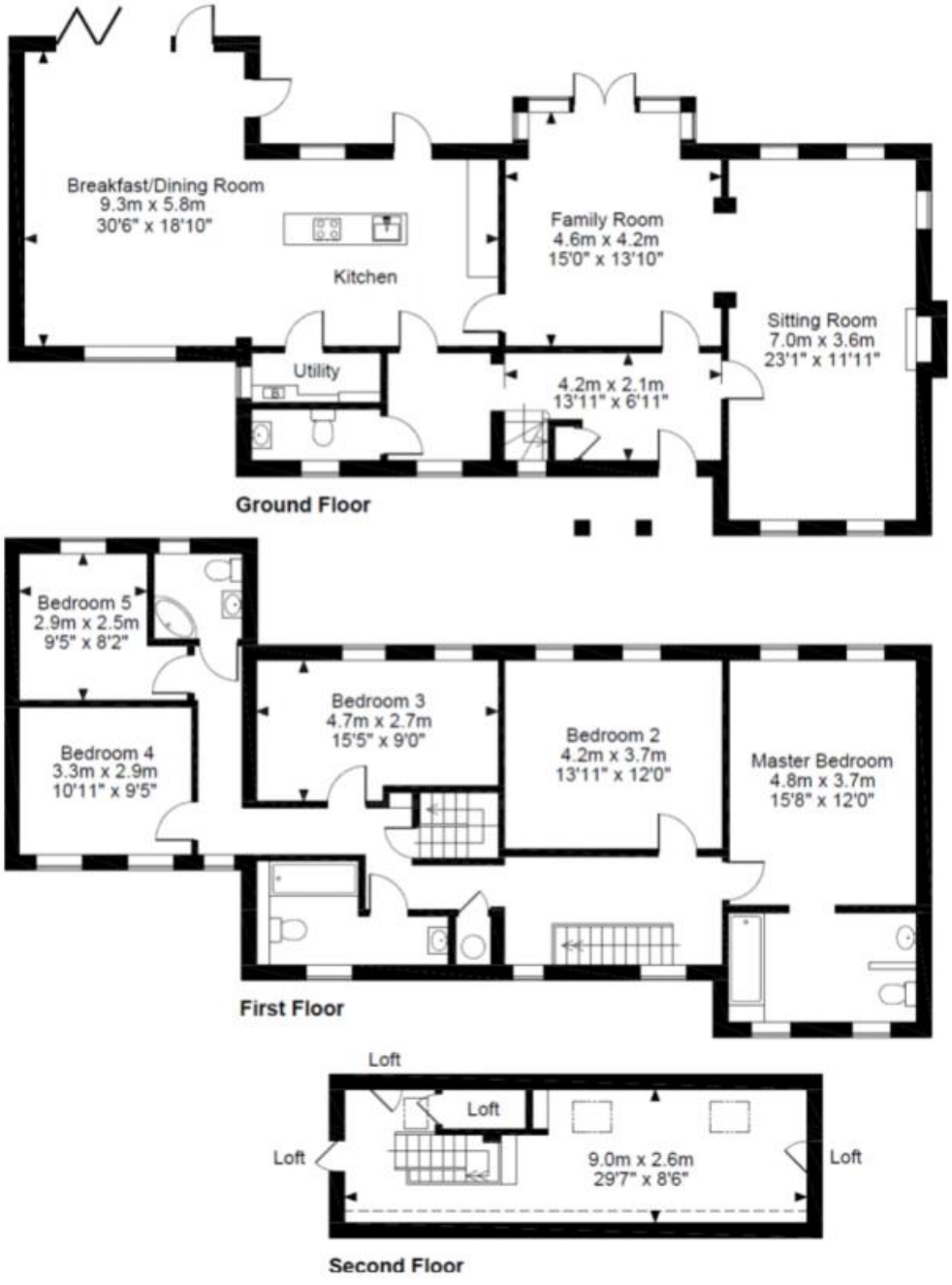
2.2 Property Prior to 2012 Works

XXXX is a large detached property of traditional construction. The original part of the property comprises solid brickwork external walls. Timber floor joists at first floor typically span from the front to the rear.

Prior to the extensive modifications and extension undertaken in 2012, the property comprised 236m^2 of accommodation over 3 floors, with a combined kitchen and breakfast dining room, family room and sitting room at ground floor. At first floor were 5 bedrooms,

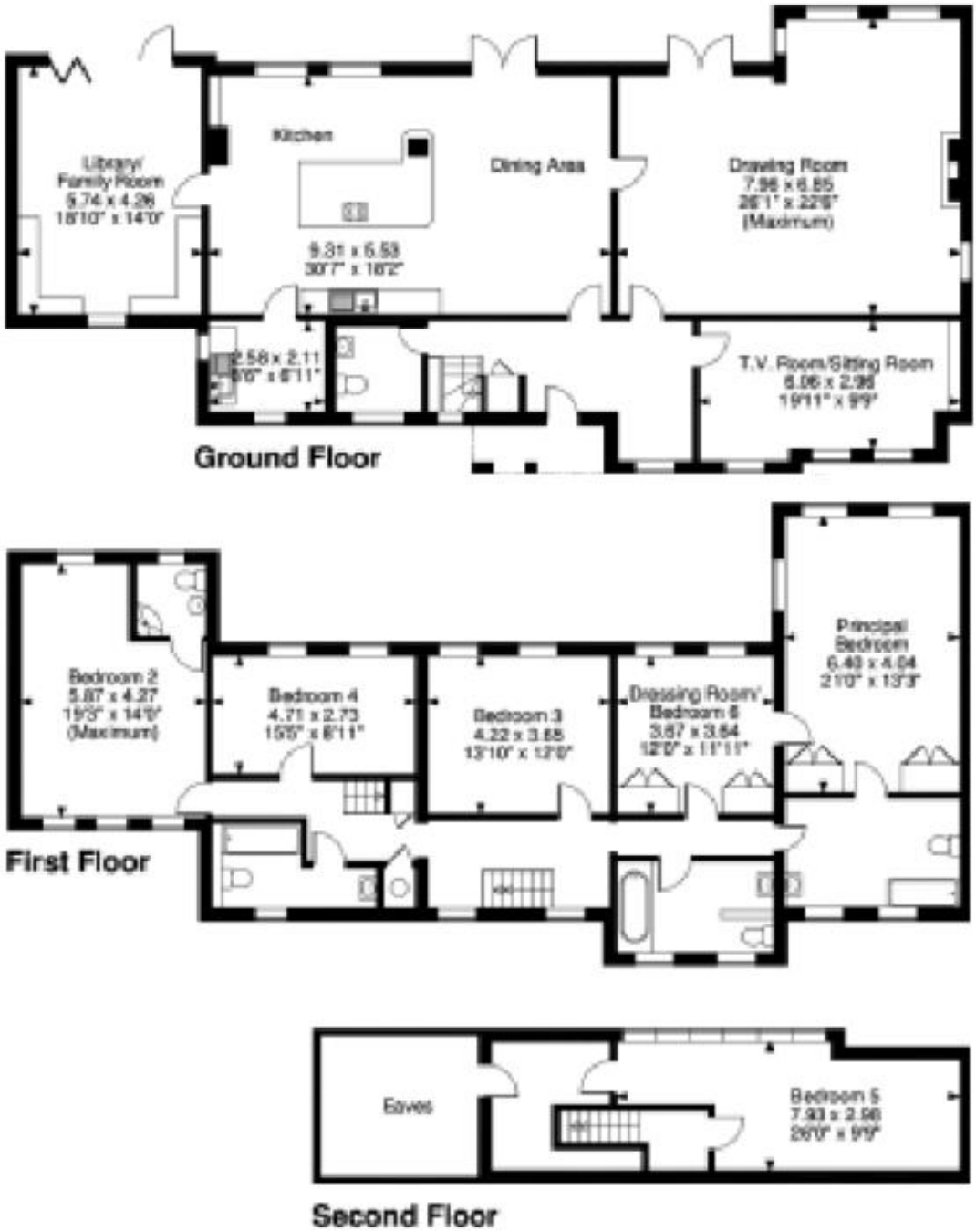
two with ensuite facilities, and a separate bathroom. To the second floor was a single loft room with limited headroom. Refer to the indicative plan layout below taken from Rightmove.

It appears that significant modifications and extension had previously been undertaken, including a two storey extension to the left hand side to create the breakfast / dining room and two bedrooms above, together with a partial loft conversion. These previous works included removal of part of the original left hand gable wall at ground floor level to create the open plan kitchen diner.



2.3 2012 Extension and Remodelling Works

Extensive modifications were undertaken in 2012, together with a two storey extension to the right hand side of the property – to create the current internal layout. The approximate floor area of the current layout is 348m^2, an increase of almost 50%. Refer to the indicative plan layout below taken from Rightmove.



At ground floor extensive changes were made to the internal walls, including infilling the previous opening between the kitchen and breakfast diner to create a library. The wall

between the kitchen and former family room was removed to create a 9m wide kitchen diner, the area of which was increased further by the addition of a single storey lean-to across the rear of the property. The sitting room was doubled in size by the addition of the right hand extension, which required the removal of the original right hand gable end wall at ground level. The extensions were noted to be of 300mm thick brick and block cavity wall construction founded on 600mm wide mass concrete strip footings. The ground floor of the extensions comprises suspended timber joists, which we assume was designed to match the existing ground floor construction.

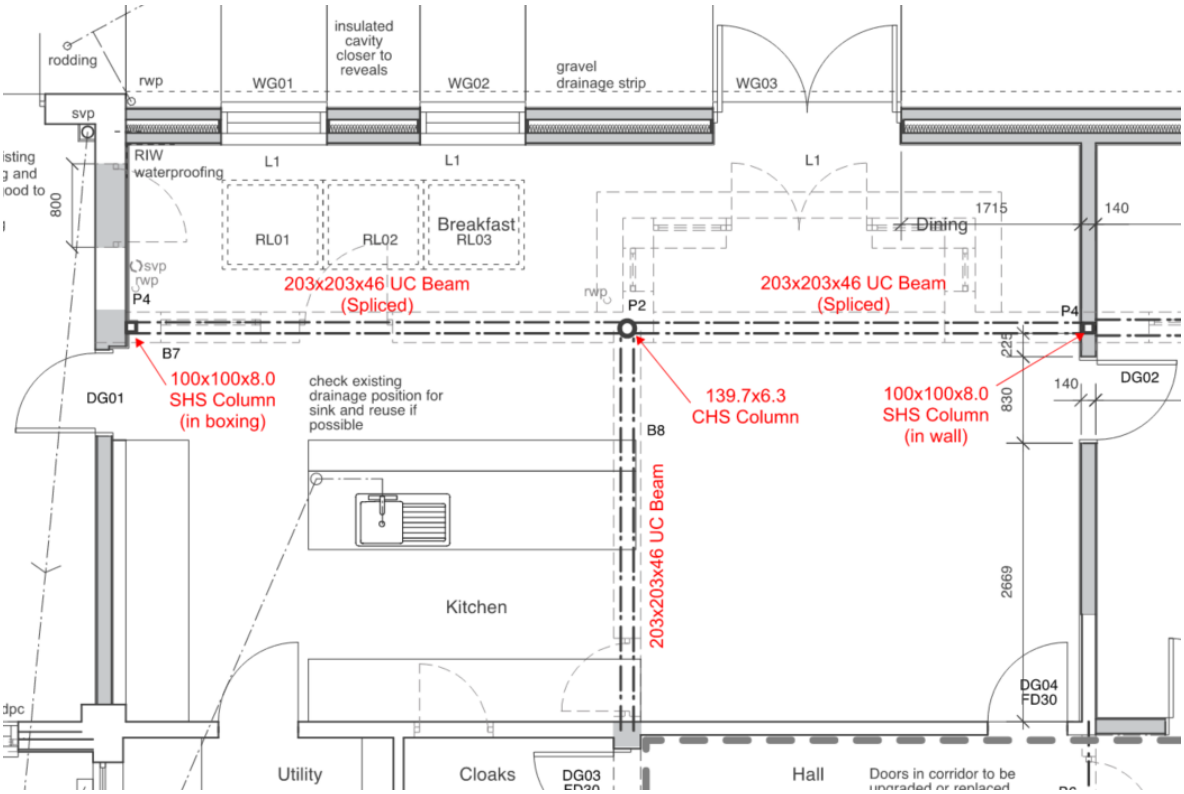
At first floor the remodelling was less extensive, predominantly involving the removal and construction of partition walls to increase the size of bedroom 2, and new localised door openings in the right hand gable wall to provide access to the master bedroom in the new extension.

At second floor level, the access stair was replaced, and a large dormer window was added to the rear elevation to make the space at this level more useable. The full extent of the works can be seen on the PPA Architecture drawings provided in Appendix A and the Structural Engineering Drawings in Appendix B.

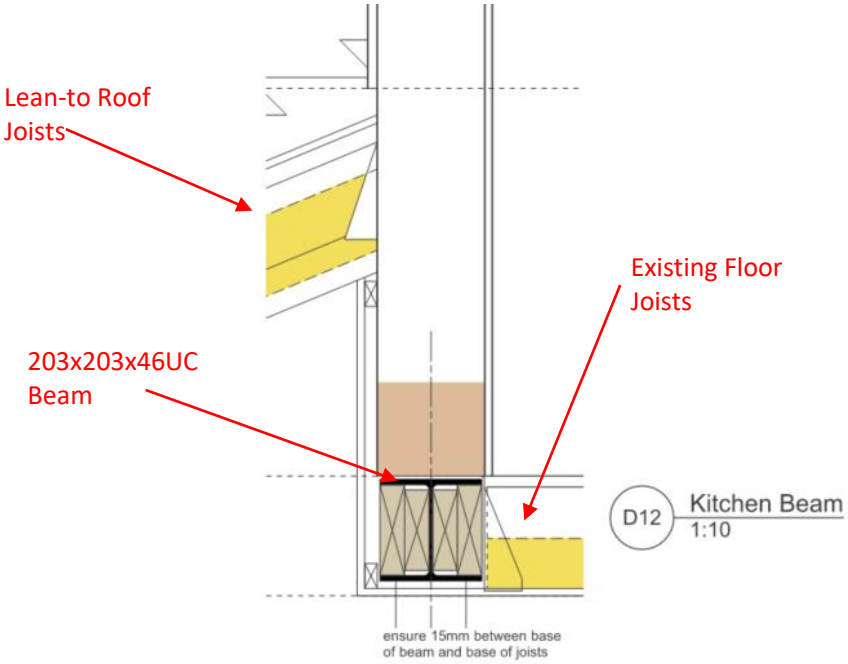
To achieve the modifications, a significant amount of steelwork was incorporated into the building - particularly between ground and first floor - to support the original rear and right hand elevations at first floor above areas of wall removal. A total of six steel columns and associated concrete pad foundations were constructed as part of the modifications.

Within the kitchen, a single column labelled P2 is located at the junction beneath the original rear elevation and the wall between the bedrooms above. This is a 139.7x6.3 CHS (circular hollow section) steel column, encased with a plasterboard boxing approximately 230mm x 230mm on plan. This can be seen in the following photograph.

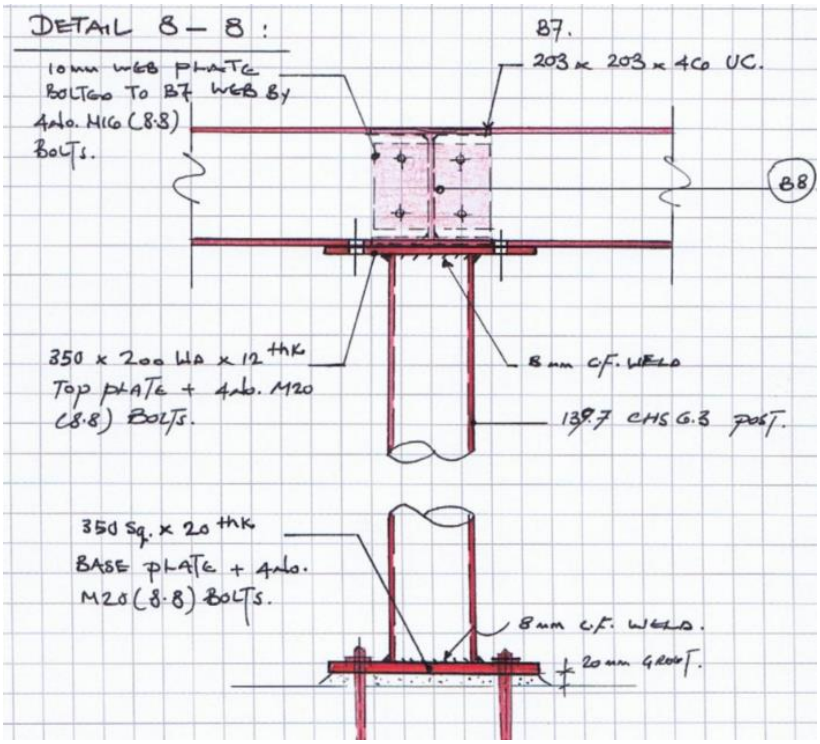
The column supports 203x203x46UC steel beams in two directions in the ceiling above. At either end of the kitchen, the steel beams are supported on 100x100x8 SHS (square hollow section) steel columns. These are indicated on the following extract of the kitchen plan. The structural drawings indicate that the 203x203x46UC beam running parallel to the rear elevation is continuous through into the living room, and that it was spliced into sections approximately 2-3m long to facilitate installation.



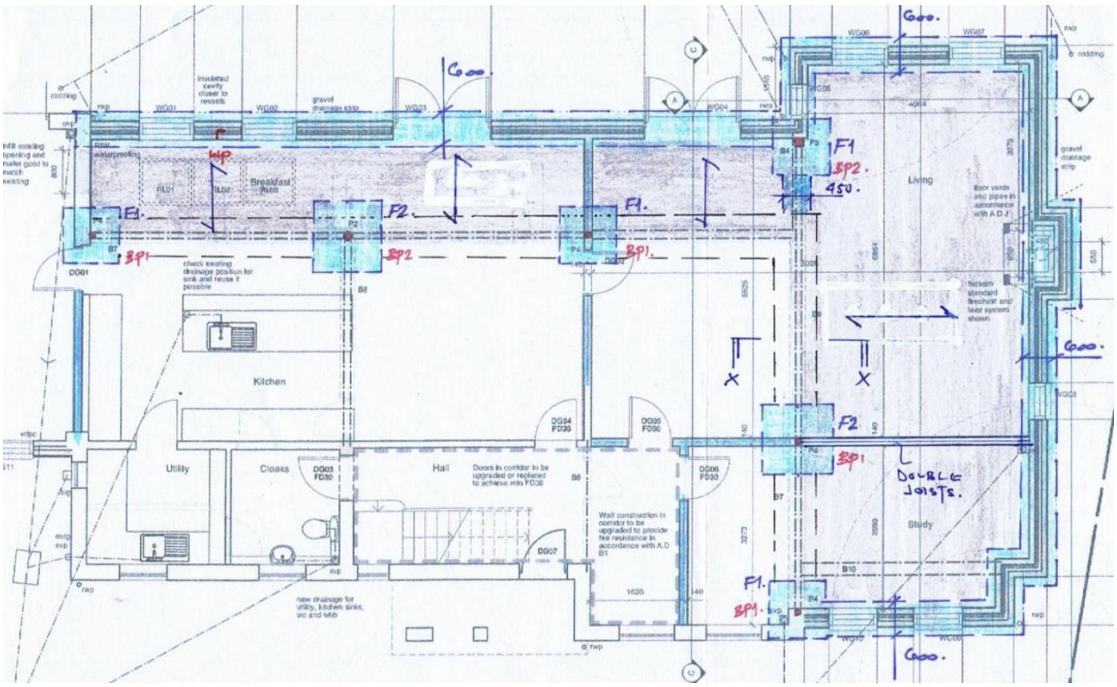
Detail D12 taken from the architectural drawings indicates that this 203x203x46UC beam is positoned within the depth of the existing floor joists, which have been modified to hang off the steel bean via joist hangers. Refer to detail D12 below.



Detail 8-8 from the structural engineer sketches confirms that this 203x203x46UC beam is continuous over the head of the CHS column and can be seen in the extract below.



The foundation drawing SK-03 indicates that the CHS column is founded on a 1250x1250 concrete pad footing (reference F2), which the SHS columns at either end of the kitchen are founded on 1000x1000 pad footings (reference F1), as can be see in th edrawing extract below.



The drawing notes that all foundations are to be cast in GEN3 concrete, therefore they are mass concrete (i.e. without steel reinforcement). The depth of the footings is not confirmed on the drawing, however based on the plan dimensions we would assume they are at least 500mm deep.

3 Proposed Modifications

3.1 Kitchen Column Removal

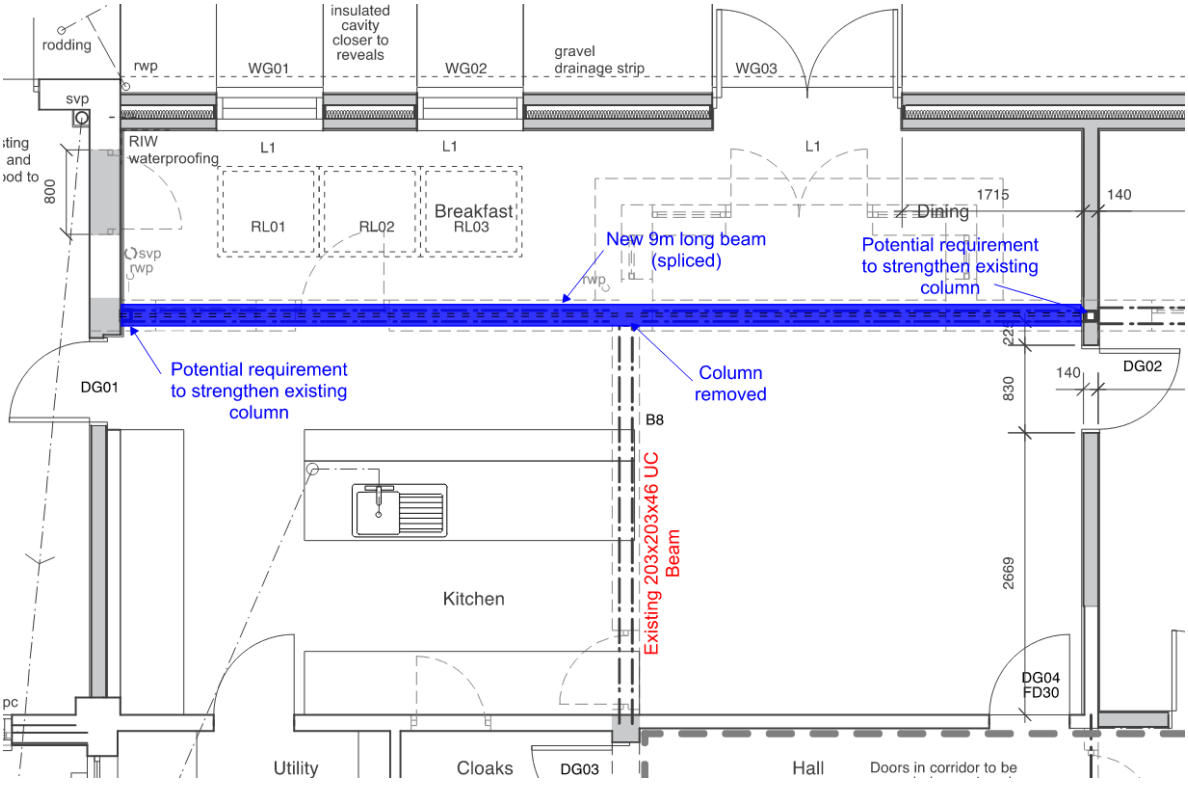
We have considered to options to enable the CHS column in the kitchen to be removed. In the case of Options 1 and 2, works to the foundations will be required and temporary works will be required to support the rear of the property whilst the new steelwork is being installed.

Option 1

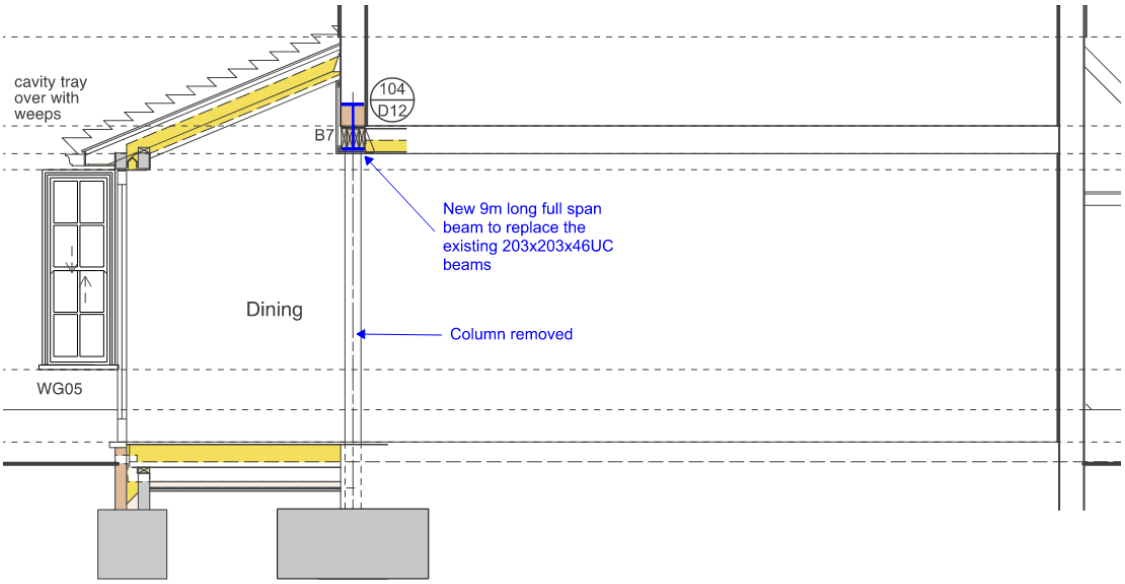
This option involves replacement of the existing 203x203x46UC beam parallel to the rear elevation with a deeper steel beam (or pair of beams) spanning the full approximately 9m width of the kitchen, as shown on the plan and section below.

Preliminary sizing suggests that this beam would need to be in the order 535mm deep and therefore should be able to fit in the existing bulkhead beneath the underside of the lean-to roof. The new beam would weigh approximately 750-800kg, therefore it would almost certainly need to be spliced into 3 sections to enable installation.

Option 1 Plan on Steelwork over Kitchen:



Option 1 Cross Section:



The existing 100x100x8 SHS columns at either end have sufficient capacity to support the new beam, however the foundations they sit on are likely to be insufficient, and therefore would need to be increased in size, either by underpinning, or by removal and replacement.

The advantage of this solution is that it does not result in any additional downstands to the kitchen ceiling, or additional columns and associated boxed out projections within the kitchen.

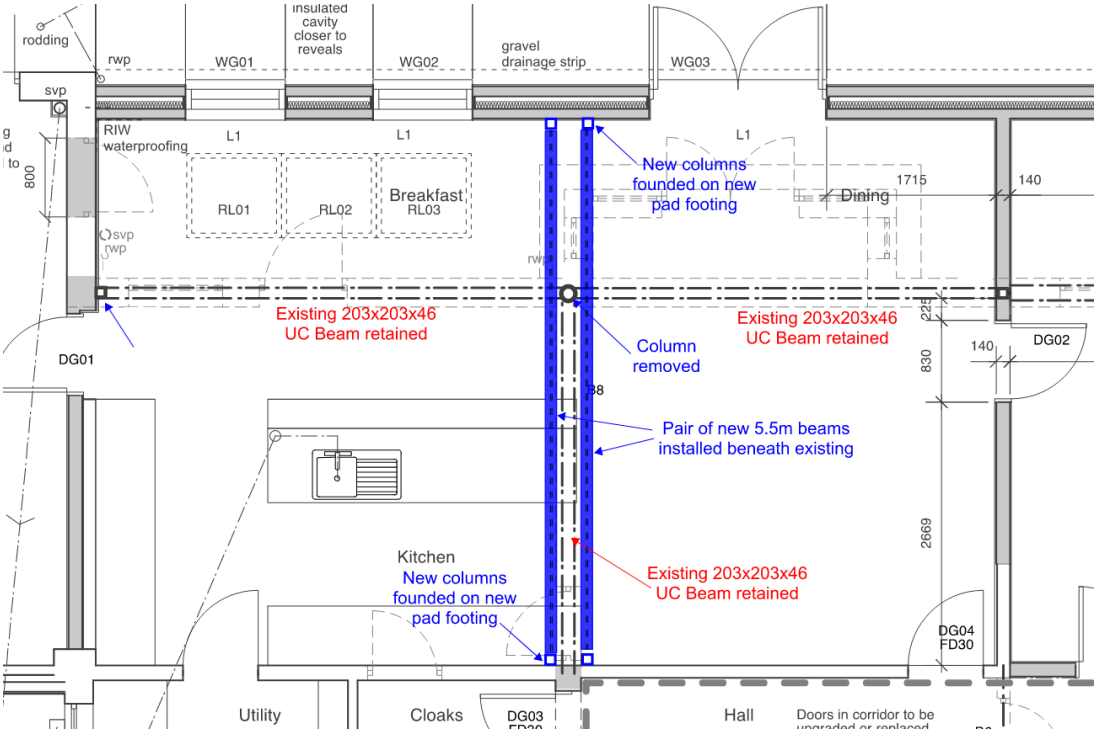
The disadvantage is that in order to install the new beam, the existing steel beam and column will need to be removed first. Therefore, significant temporary propping will be required to support the rear of the property during installation. In addition, the existing foundations will not be adequate to support the new beam, therefore the existing foundations labelled F1 will need to either be underpinned or broken out and replaced.

Option 2

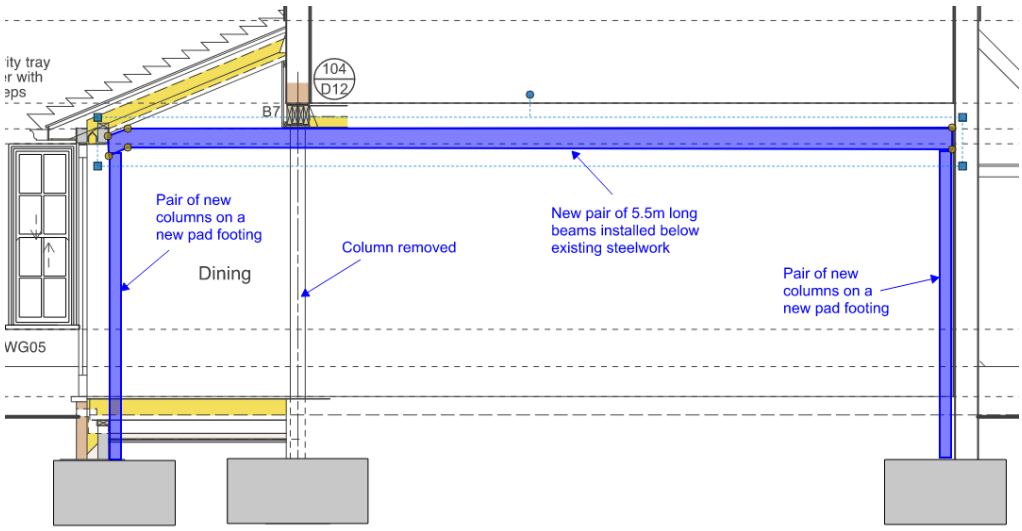
This option involves the installation of two new beams to the underside of the existing steelwork, running perpendicular to the rear elevation, as shown in the plan and cross sections below. The beams would be supported on a pair of columns at either side of the kitchen and indication on the plan and section.

Preliminary sizing suggests that each new beam would need to be a 203x203x52UC and would be installed either side of the existing column prior to removal. Allowing for deflection and plasterboard casing, this would result in a downstand to the ceiling approximately 250mm deep by 600mm wide. Each new beam would weigh approximately 300kg, therefore potentially they could be installed as a single section without splicing, subject to construction logistics.

Option 2 Plan on Steelwork over Kitchen:



Option 2 Cross Section:



The new columns would be similar to the existing 100x100 SHS columns, and would most likely result in a boxed out pier to the wall approximately 150mm deep. In each location, the floor would need to be lifted and new mass concrete foundations in the orider of 1.25x1.25m sqaure cast beneath the existing strip footings to the adjacent walls.

The advantage of this solution is that the new steelwork can be installed prior to removal of the existing column, therefore temporary propping works can be minimised. The new steel sections are also lighter than the single beam in Option 1, therefore they will be easier to install. In addition, the new foundations will be more straight forward to construct as they are not in the location of the existing pad footings.

The disadvantage of this option is that it will result in a new downstand to the ceiling of the kitchen (similar in appearance to that in the living room). There will also be new piers projecting from the front and rear walls of the kitchen at column locations, however the potential for the columns to be recessed into the walls could be explored.

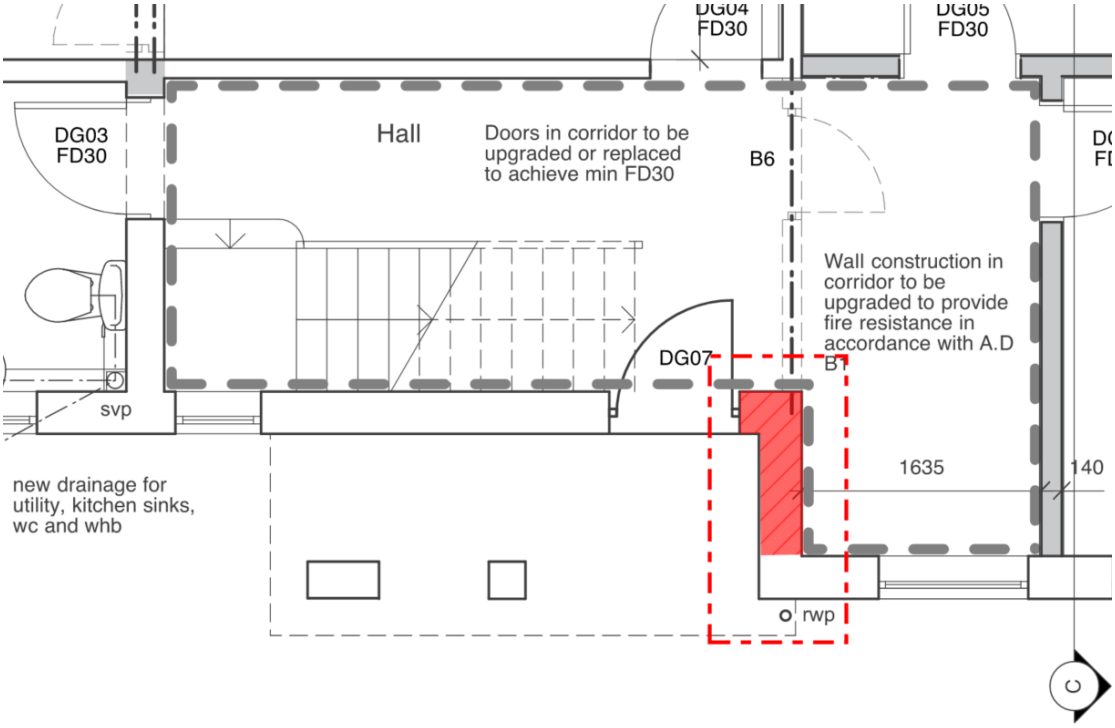
Option 3

Both Options 1 and 2 will have a significant cost associated with them; the work will be complicated to carry out on site. Option 3 would be to retain the CHS column, but to make it more visually appealing by removing the existing plasterboard boxing to expose the steel section itself.

The plasterboard casing currently provides fire protection to the column, therefore if it is exposed, it will need to be treated with an intumescent coating to achieve the same level of fire protection as the existing plasterboard.

3.2 Ground Floor Wall Removal

We understand that the client is considering building out beneath the existing porch canopy to the front door, and questioned whether it would be possible to remove the right hand side wall as shaded in red in the ground floor plan extract below.

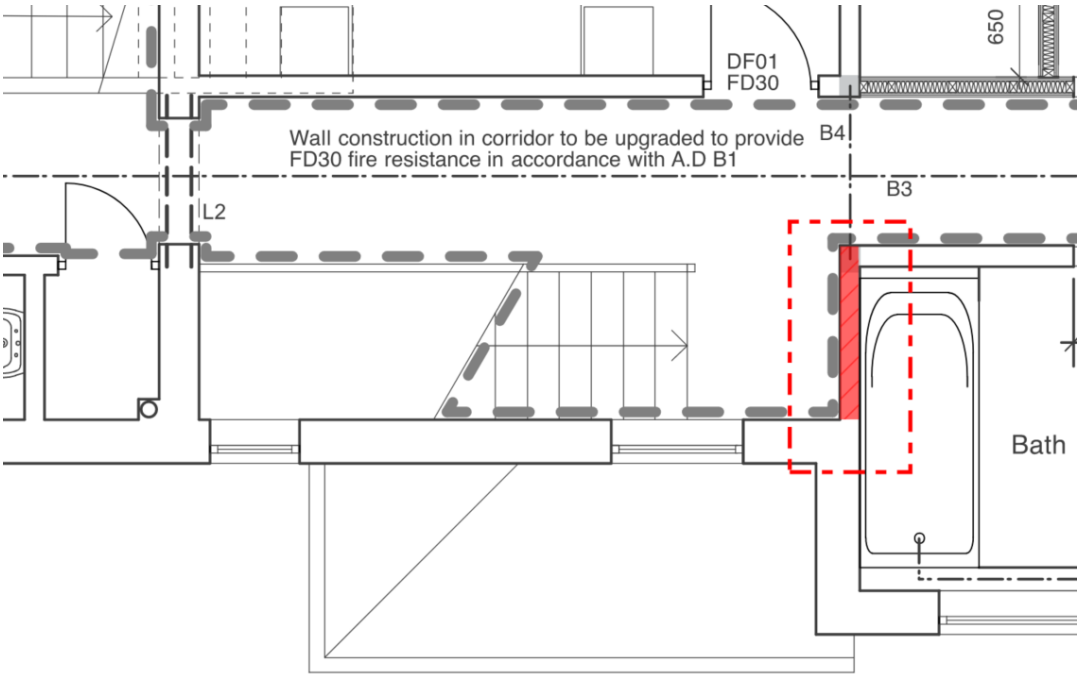


As can be seen from the plan, an internal wall on this line was removed during the 2012 works and replaced with a steel beam labelled B6 (152x89x16UB section) which bears on to the corner of this wall. The wall will also be providing lateral support to the front elevation.

Given these factors, and the extent of previous wall removal, we recommend that this section of wall is retained to maintain stability to the front elevation.

3.3 First Floor Wall Removal Adjacent to Bathroom

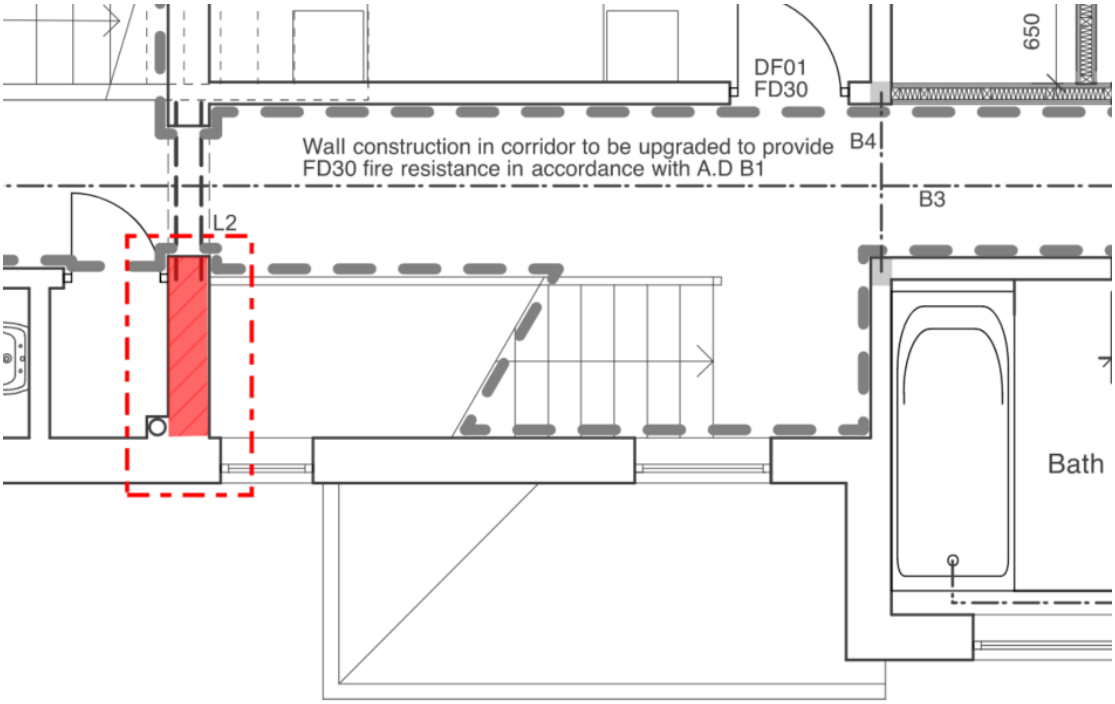
At first floor it was queried whether the wall between the landing and the bathroom could be removed, as shaded in red on the flooring plan extract and photograph. From out inspection on side, it appears that the wall is a combination of studwork and solid masonry. The structural drawings show that a steel beam labelled B4 (100x100x5.0 SHS) is supported on a 440x100x215 padstone to the right hand side of the existing opening. The beam will be supporting the floor to the loft conversion above.



It is feasible to remove this wall without impacting on the stability of the front elevation, as the external wall returns outwards at this location. A new steel beam would be required to be installed over to maintain support to the floor above. We anticipate that a 152x89x16UB similar to that in the same location at ground floor would be sufficient (subject to confirmation through detailed design).

3.4 First Floor Wall Removal Adjacent to Water Cylinder Cupboard

To the other side of the landing as first floor, it was also queried whether the wall between the landing and the water cylinder cupboard could be removed, as shaded in red on the flooring plan extract and photograph.



From our inspection on side, it appears that the wall is solid 225mm thick brickwork. The structural drawings show that a pair of precast concrete lintels labelled L2 (2no. 140mm deep by 100mm wide) are located above the arched opening.

Given the thickness of this wall, it will be providing lateral restraint to the front elevation, which is important as it is directly adjacent to the stair void, therefore the wall is not restrained by the floor in this location.

In light of this, it is possible to cut the wall back to increase the width of the opening, but we would advise against removing it completely. To maintain lateral restraint, in accordance with Building Regulations Approved Document A the minimum length of the wall providing lateral restraint should be at least 3 times the width of the external wall, or 675mm, which means that an internal projection of 450mm should be retained. A new pair of lintels or a shallow beam will need to be installed to maintain support to the floor above.

4 Summary and Next Steps

As described in Section 2, XXXX has previously undergone significant extension and alteration, most recently in 2012. This included the installation of steel beams and columns to support the rear and righthand elevations above the ground floor, to enable the floorplate to be opened up. New steel columns are founded on concrete pad footings.

Two options have been considered to enable removal of the existing 139.7x6.6 CHS column in the kitchen. In both case, new steel beams will need to be installed, and works will be required to either strength existing foundations or provide new foundations. Option 1 will result in the least visual impact, but will require significant temporary works to enable the installation. Option 2 will be easier to construct and will reduce the temporary works, but will result in a new downstand to the kitchen ceiling and potentially pier projections to the walls at new column locations.

As identified in Sections 3.2 to 3.4, we recommend that the external wall to the ground floor adjacent to the front door is not removed, as it is providing lateral restraint to the front elevation of the property. At the first floor landing, the wall to the bathroom can be removed with a new beam installed over. The wall to the water cylinder cupboard can be cut back to increase the opening, however again this will be contributing to the lateral stability of the front elevation. Therefore a minimum internal projection of 450mm should be retained in this location.

The options and details provided in this report all assume that the drawings of the previous works are an accurate representation of the as built arrangement. If any of the proposed options are progressed, we recommend that localised opening up is undertaken to confirm the existing construction details.

It should also be noted that all sizes of new steelwork should be considered to be indicative at this stage, and are subject to confirmation though detailed design.

If options 1 or 2 are progressed, we recommend that a brief ground investigation is carried out to confirm ground conditions and establish an allowable bearing capacity which will inform the foundation design.

5 Rights of Originator

Allcott Associates LLP will consider the re-issue of the report in its original form to a third party within 6 months of the original report date for an administrative fee (currently £50.00 excl VAT). Upon the lapse of a 6-month period the report can only be re-issued following a full re-inspection, which will attract a full inspection fee.

We reserve the right to refuse copies of the report to any third party (other than those named above). We also reserve the right to amend our opinions in the event of additional information being made available at some future date. The Contracts (Rights of Third Parties) Act 1999 shall not apply to this agreement.

END OF REPORT

James Bodicoat MEng, CEng, MICE, MIStructE
Associate Partner
For and on behalf of **Allcott Associates LLP**

6 Conditions

Structural Engineers Conditions

1.0 **Inspections**

A **Specific Structural Inspection** is restricted to visual observations of the matters, concerns, or problems stated in the report. The inspection will be undertaken externally and internally as necessary and you must provide us with access to all necessary parts including any basements and roof spaces if possible. We do not normally move heavy furniture, lift floor coverings or make exploratory holes during and inspection. If our Engineer considers that access to any area would be unsafe, or potentially unsafe, we will be unable to access such areas unless safety measures are arranged, this may incur an additional cost.

1.1 A **General Structural Inspection** of the structural load bearing elements does not include those aspects normally dealt within a Surveyors report, such as services, decorations, roof coverings and the like, the position of the property with respect to local amenities and the condition of the property with regards to dry rot, timber infestation, dampness, vermin and the like.

1.2 The structural load bearing elements normally comprise items such as the roof trusses, rafters, purlins, floor slabs, joists, beams, columns, external walls, internal walls which support other elements, foundations and the like. The inspection is limited to the main building and excludes any detached garages, outbuildings, walls, fences etc unless specifically included in the request. The report is a considered opinion of the structure at the time of the survey only.

1.3 Unless noted in the report we have not considered matters such as contaminated land, asbestos or other potentially hazardous materials, nor high alumina cement or other potentially deleterious materials.

1.4 Our report will include details of the inspection, being the condition of the property at the time of our inspection, our conclusions on the findings and our recommendations for any investigations, monitoring, repair or remedial works, or other action required.

1.5 A General Structural Inspection **is not** 'A Full Building Survey' in accordance with conditions of engagement of the Royal Institute of Chartered Surveyors (see note 1.2)

1.6 Our inspections will be carried out in a safe manner as advised by the HSE and no undue risks will be taken. Roof areas will have a head and shoulder inspection.

1.7 We do not check electrical installations or appliances as this has to be done by members of the IEE institute we will however advise if this is necessary.

1.8 We do not test gas installations or appliances as this has to be a Gas Safe registered gas engineer we will however advise if this is necessary.

1.9 We will advise if we note timber infestation however we will not check for timber infestation, as this has to be carried out by a member of the British Wood Preserving and Damp proofing association (BWPDA). Similarly with damp this also has to be checked and reported on by a member of (BWPDA).

1.10 No opening up of areas or lifting of carpets or moving of furniture is carried out.

1.11 Roof inspections will normally be head and shoulders inspections unless specifically having been requested for a roof survey, where we require the roof to be boarded or safe access arrangements made for the inspection. In any case old roofs will not be entered as potentially unsafe.

1.12 Where we arrange for other Contractors to carry out specialist reports we are not responsible for their content.

1.13 Where costs are quoted for remedial works these are budget costs and not fixed costs and may vary depending on a contractor's availability and location of works.

2.0 **Investigations**

2.1 Our services will be limited to an investigation of the problem(s) specified. Investigations means, and may include, archive research, interviewing persons or organisations, making exploratory holes or excavations, opening up or taking apart, taking samples, undertaking tests and any other activities necessary to determine the extent and cause of the problem.

2.2 Investigation work may cause damage – particularly to finishes and decorations. If you request us to carry out any investigation work this will indicate to us that you have all the necessary permissions from the owners and tenants of the property for us to carry out the work. Reinstatement will be included only if specifically agreed.

2.3 Our report will include details of the investigations, our conclusions on the findings and our recommendations for any monitoring, repair or remedial works, or other action required.

3.0 **Monitoring**

3.1 Our services will be limited to monitoring the problem areas specified and will involve measurements and visual observations at regular intervals for a predefined period.

3.2 Our report will include details of the monitoring, our conclusions on the results and our recommendations for further investigations, repair or remedial works, or other action required.

4.0 **Repair / Remedial Works – Design Stage**

4.1 Our services may include the detailing. Scheduling and specification of repairs and remedial works as agreed, the preparation of tender documents, obtaining of competitive tenders, reporting on the tenders and applying for Building Regulations and / or other necessary approvals. Building Regulations fess and the like will be extra.

5.0 **Repair / Remedial Works – Construction Stage**

5.1 Our service may include inspecting the contractor's work on an occasional site visit basis and administering the contract.

5.2 We normally undertake site inspections at weekly intervals although the frequency may vary according to the needs and the progress of the works.

5.3 We will issue instructions to the contractor and variations to the contract as necessary. Please note that you must not instruct the contractor yourself.

5.4 We will certify progress payments and upon satisfactory completion will certify the work and the final valuation. Completion certificates will only be issued when all our invoices are fully paid.

6.0 **Calculations**

6.1 Calculations will include for a site visit wherever possible although it is possible to work from your architectural drawings however the onus for dimensions will remain with person providing the plans. All steel beams are calculated on clear openings. Bearing length generally 150mm each side should be added to the length used.

6.2 According to your requirements, we will give structural advice on the feasibility of your proposals and will prepared structural calculations and sketch details for incorporation into your architectural drawing, for building regulations submission, and for your builders use and information.

6.3 Architectural, general arrangement or structural drawings are not normally prepared and will only be prepared if agreed in writing. Please be aware that architectural drawings are normally required for building alterations and extensions, in all but the simplest of cases.

7.0 **Miscellaneous Services**

7.1 The scope and any limitations to miscellaneous services will be agreed with you before commencing.

8.0 Limitations

8.1 This report is for the sole use of the person instructing the survey and cannot be passed to a third party without the consent of Allcott Associates LLP as the content will not be guaranteed to be correct as to when the report was transferred.

8.2 This survey is only valid for 6 months from the date of the survey as stated within the report

7 Appendix A – 2012 PPA Architecture Drawings

8 Appendix B – 2012 Structural Drawings

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Building Integrity.