1387 - Minerva House, Hatton Gardens EC1N 8BR | Stage 2

HEYNE TILLETT STEEL

Contents

Appendices

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Approved by: Tom Steel

HEYNE TILLETT STEEL

1 Introduction

This report has been prepared by Heyne Tillett Steel (HTS) to accompany the planning application for the proposed works to Minerva House, 26-27 Hatton Garden. The proposed development is located in the London Borough of Camden and comprises the additional of a single storey upward extension to the rear of the property, infilling of lightwells and the opening up of the internal space by replacing load-bearing partitions with steel framing. The extent of the existing basement is not proposed to change.

1.1 Available information

The report and assessment is based on the following available information:

- A visual survey of the existing building with limited opening up work to the upper stories
- Opening up works and trial pits completed within the rear of the property at basement and ground floor levels
- Trentside Geotechnical Testing Site Investigation Engineer and Factual Reports dated 1st February 2016
- British Geological Survey borehole record drawings for surrounding sites
- Historical Maps for the site
- Savills Building Surveyor's Report dated December 2014
- Ben Adams Architectural Planning Drawings dated March 2016
- Sumo Survey Services measured survey information
- Thames Water Asset searches

Site location

2 Existing Site Conditions

2.1 Existing Site

The existing site is located on Hatton Garden, close to the junction with Greville Street, with a narrow annex at the rear of the main building that fronts onto Greville Street. The site is approximately 200m east of Farringdon Station.

Historically the site is understood to have been used by the Royal Orthopaedic Hospital until 1907 when the hospital building was demolished and the current building was constructed. The building is thought to have been designed for the jewellery industry, with showrooms on the lower floors and workshops above. Bomb maps indicate that the site escaped damage during World War 2.

Bomb map indicating no damage to site during WWII

2.2 Neighbouring properties

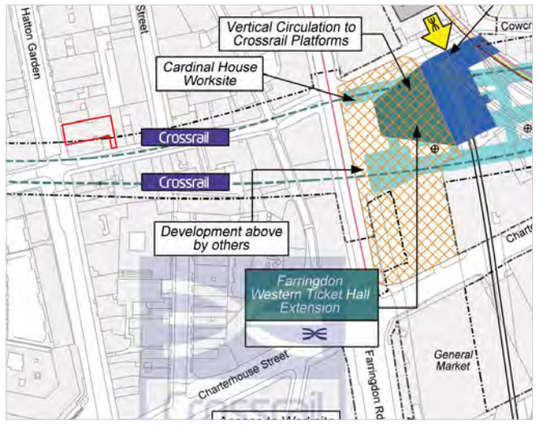
The building is constructed such that it wraps around No. 25 Hatton Garden and No. 36 Greville Street to the south. It would appear that the existing building abuts up to the neighbouring buildings, with the boundary wall likely to be classified as a party wall. Similarly to the north the building abuts up to 28 Hatton Garden and to 25 Greville Street to the east. Where additional load is taken on the party walls or excavation/underpinning is required close to the walls then Party Wall awards may need to be served on the neighbouring freeholder/ leaseholders.

2.3 Existing Ground Conditions

Ground investigation works have been undertaken to identify the profile of the existing footings and to confirm the make-up of the underlying ground. A number of trial pits have been completed that confirm the building is supported on pad and strip footings that bear onto the ground below. A borehole has also been completed to a depth of 10m below basement level.

The borehole indicates that ground conditions below the basement slab comprise around 1.4m depth of made ground, over a sandy gravel layer extending to 2.7m depth and a clay strata below this. The ground information appears to be consistent with the BGS records for surrounding sites. Testing of the ground indicates a bearing capacity in excess of 400kPa within the gravel strata and 240kPa within the clay layer.

Groundwater was encountered within the borehole at the bottom of the gravel layer at 2.7m depth below the existing basement level but it is likely that this was perched groundwater on the top of the clay strata. No groundwater was encountered in any of the trial pits, with the groundwater table expected to be in the clay layer.



Plan showing proximity to Crossrail

2.4 Crossrail

Crossrail tunnels run close to the site under Greville Street and part of the building sits above an area that is of interest to Crossrail. Crossrail have been contacted as part of the pre planning work and have outlined the parts of the scheme that they would need to consider the following:

- A development scope, with finalised arrangement drawings when available including programme of works
- A Load take down (Category I checked) of existing and proposed loads and demonstrating these comply with CRL guidance. Based on a small change and increment, it is not expected that this would cause significant ground movement, which might otherwise require assessment.
- Details of any proposed ground investigation and of any below ground works
- Contractors method statements demonstrating that excessive vibration during demolition, has been considered and mitigated

It is likely that Crossrail will have been carrying out monitoring of the building or surrounding areas during tunnelling works and will have an interest in the project going forward.

Thames Water Asset Plan

2.5 Existing Drainage

The Thames Water Asset search indicates that large combined sewers run under both Greville Street and Hatton Garden, both of which are 1295x762 in size. There are limited sewer manholes close to the site but the nearest manhole suggests the sewer invert level is around 5m below street level and it is expected that the drainage from site enters the sewer directly under gravity. A CCTV survey of the drainage will be completed at the next stage of the project.

The Thames Water Asset search also indicates that a Storm Relief sewer for the river Fleet runs under Hatton Garden. The location of this sewer is considered to be sufficiently far away from the site so as not to be affected by the proposed works.

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3 Existing Building

3.1 Existing Superstructure

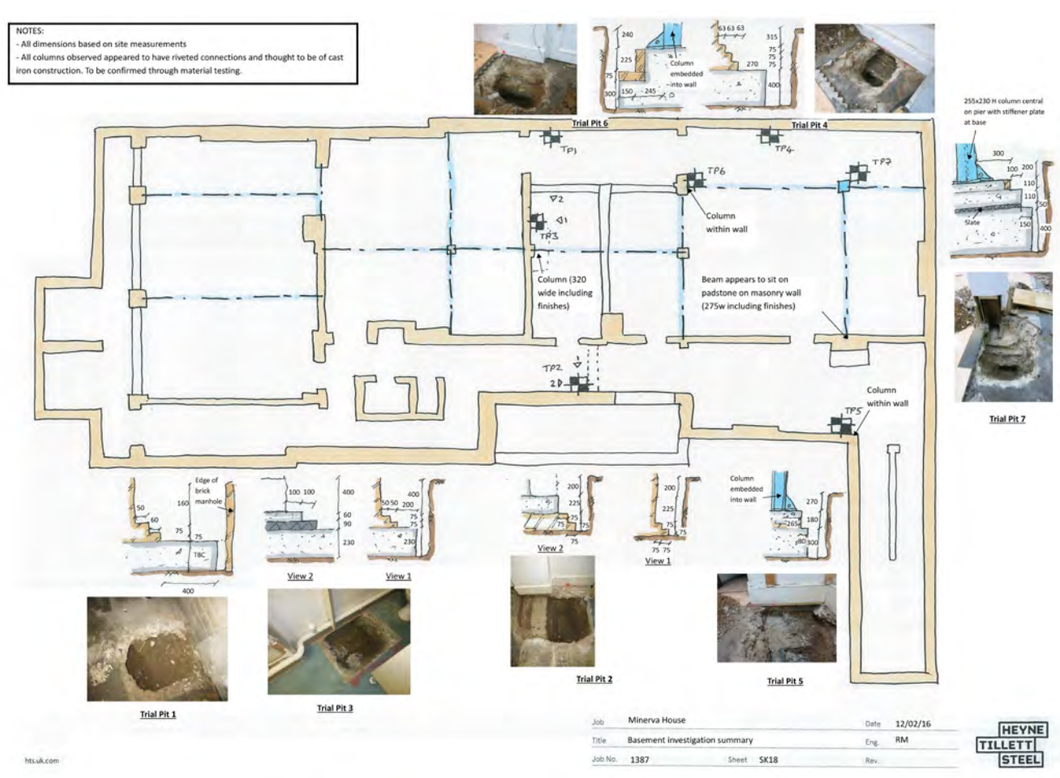
The existing building dates from around 1908 and comprises of 6 storeys fronting Hatton Garden and 4 storeys behind, over a basement. The floor structure generally appears to be of solid concrete construction, most likely formed from filler joists with concrete infill. At the lower levels the floors are supported on what appears to be an early steel frame, with the detailing suggesting that cast iron columns and wrought iron beams could have been utilised in some locations. A number of the steels appear to be concrete or masonry encased. Some chimney breasts that run up the building are also transferred on a grillage of steels at first floor level.

External walls are of solid masonry construction, with glazed bricks or stonework visible externally. The front façade and areas around the lightwells at ground floor level appear to have columns embedded within the façade but investigations have not concluded if these are located in all external walls on the floors above. There is no obvious cracking to the facades, which could have resulted from corrosion of the concealed steel frame.

The building is understood to have been a bespoke design for the jewellery industry, with showrooms at ground floor level and office/workshop space above. The expected live loading from the building would be in line with proposed future use.

Detailing of the columns and beams at ground floor level appears to be consistent with early steel frames and cast iron column construction during the early 20th Century. In order to carry out a more thorough assessment of the load bearing capacity of the beams and columns, it is recommended that testing be completed to confirm the material properties of these.

Column head detail at first floor



Basement investigation summary

3.2 Existing Foundations

A number of trial pits were completed in the basement and the results are summarised in the appendices. The pits indicated pads and strip footings below columns/ walls and suggested that footings were generally founded at around 0.6-1.0m below ground onto gravelly material.

Calculations have been completed to assess the load on the existing building, based on a solid concrete floor thickness of 200mm, which would need to be confirmed. The two columns that have been assessed both have a bearing stress under the footing of around 380kPa, which is high and close to the 400kPa capacity indicated for the gravels.

Around the perimeter, where the lightwells are located, the vertical loading on the foundations is lower, with bearing stresses under the footings around 100kPa and foundation widths are likely sized to suit the loading from the basement retaining wall construction.

At the front of the building are 6 No. pavement vaults formed from arched brickwork extend under the pavement and part of the Hatton Garden road. The condition of these has not been verified on site and these are expected to fall outside the scope of any proposed works.

Existing pad footings under columns

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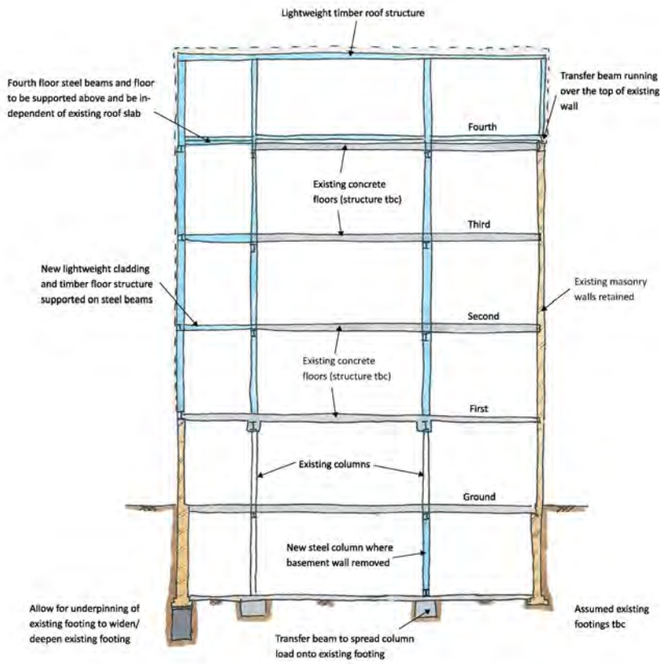
4 Proposed Works



Proposed superstructure alteration section

4.1 Proposed Superstructure

The proposed superstructure works involve the infilling of a number of lightwells, the opening up of the existing space internally by the removal of a number of walls/ chimneys and a single storey upward extension at fourth floor level over part of the building.

4.1.1 Infilling lightwells

The existing building is set out such that the building mass decreases above first floor level in order to accommodate a number of lightwells. It is proposed that three of the existing lightwells will be infilled with new floor structure up to the new roof level at 5th floor level, with the external wall line pushed out closer to the boundary. In order to form these the existing external walls adjacent to the lightwell will be demolished and new steel framing introduced to support the edge of the floor slabs and a new lightweight floor structure. A lightweight cladding system such as rendered panels, glazed curtain walling, brick slip system or metal cladding is proposed to form the new external wall line, with cross bracing to provide stability.

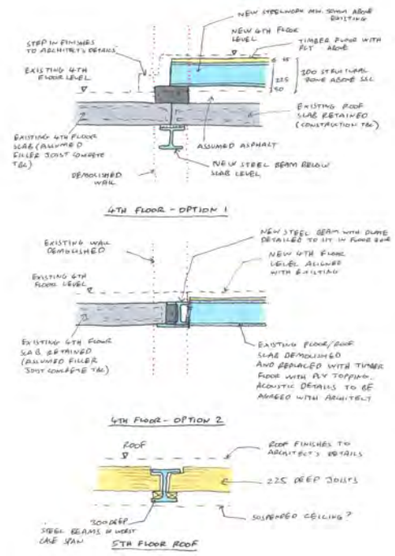
New steel columns will be set out so that the line through

Existing Lightwells to be removed

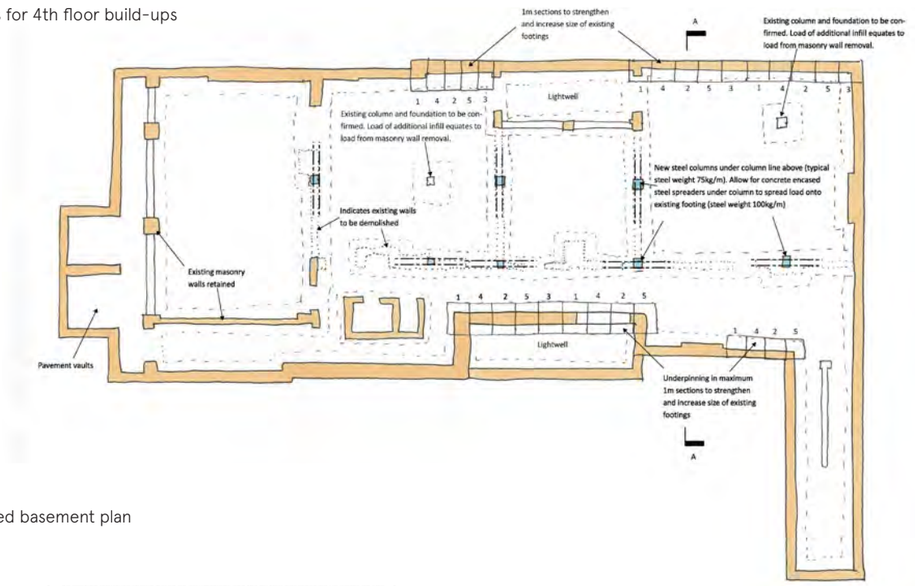
with column lines at basement/ground floor levels. The weight of the new floor structure approximately equates to the load from the removal of the external wall. Additional load will be transferred onto the perimeter walls of the lightwells at ground/basement levels, which will be spread evenly along the wall using spreader beams.

4.1.2 Internal wall/chimney removal

A number of internal chimney breasts and load bearing masonry walls are to be removed as part of the proposed scheme. The existing floor structure is to remain and it is proposed that the floors will be supported off of a number of steel beams that sit below the floor on existing wall lines. New steel columns will be installed, which will punch through the existing floor slabs and will line through with the columns of the transfer structure at ground floor. The interface between existing walls, chimneys and the floor structure will be explored in more detail during the next stage of the project, in order to confirm the support details. Temporary propping will be required before these walls are removed, to ensure the building is fully supported throughout the works.



Options for 4th floor build-ups



Proposed basement plan

4.1.3 Single storey upward extension

The upward extension would be formed in lightweight construction, utilising a steel frame that lines though with columns under. Existing chimney stacks at fourth floor roof level will be demolished. Options have been considered for the removal or retention of the existing roof structure, depending if the new floor structure is to step or not. Both options would utilise a new independent steel deck and timber floor formed above this level, on a fully tied steel frame. The steel frame will be connected to the new steel columns as part of the internal wall/chimney removal and will sit directly onto masonry walls around the perimeter, with suitable tying to meet disproportionate collapse requirements.

The roof structure will be timber joists between steel beams and the cladding will comprise glazing and lightweight cladding systems. Cross bracing will be incorporated into the roof structure in order to provide an independent stability system.

As there is an existing transfer structure at first floor level, with a number of beams and columns that are thought to be cast or wrought iron, it is not desired to increase the overall load below first floor level. It is therefore proposed to offset the weight of the upward extension against the removal of the chimney breasts and internal masonry walls. An initial assessment of the loadings suggests that this should be achievable, however it is subject to more detailed investigation works to confirm wall thicknesses, floor build ups and locations of beams. Loading on the building can be reduced further by the removal of the existing fourth floor roof structure, which is not currently being considered.

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4.2 Proposed Substructure

The existing substructure comprises of pads and strip footings that bear onto the ground. For the internal columns and pads, the loading it is not anticipated that the loading will increase for the new scheme and additional strengthening works are not required.

Around the perimeter, walls that sit under the infilled lightwells will see an increase in loading approximately double the existing vertical load. Most of these walls also act as retaining structures and the foundations appear to have been designed to accommodate both vertical and lateral loading. To accommodate the increase in load it is proposed to install underpinning to the footings to increase the width of these. This has implications on party walls to the neighbouring properties and so alternative proposals will be investigated during the next design stage.

4.3 Stability

The existing stair cores and lift shaft structure is to be retained as part of the scheme. The core contributes towards the stability of the existing building, along with the existing perimeter masonry walls and diaphragm action of the floor structure.

Where external masonry walls are being removed and new structure is created around the lightwells, zones of cross bracing have been shown on the external wall line in order to provide stability. These will sit on and be distributed into the lower masonry perimeter walls.
The proposed upward extension will have an independent bracing system comprising cross braced bays, which will transfer forces into the surrounding walls.

4.4 Disproportionate Collapse

The existing building is 4 storeys over a basement at the rear and 6 storeys over a basement at the front and would be categorised as class 2b under disproportionate collapse requirements. This would require both horizontal and vertical tying in accordance part A of the building regulations. The existing building is framed out in some locations, which will provide some horizontal and vertical tying but as parts appear to be supported on masonry it will not currently adhere to a class 2B structure. The removal of masonry walls and the additional of internal columns will improve the existing building for disproportionate collapse, as the connections can be designed for the required tie forces.

It is proposed for the upward extension to be formed as an independent steel frame that sits and is fixed to the structure below. The connection of the box will be designed with tying forces such that the frame would remain intact if a masonry wall or column below were removed and adheres to the recommendations outlined in guidance publication from the Institution of Structural Engineers, `practical guide to structural robustness and disproportionate collapse in buildings'.

4.5 Below Ground Drainage

It is proposed to reuse the existing drainage on site where possible. A CCTV survey has not been completed to date and will be carried out during the next stage of the project. The existing drainage will then be assessed for suitability of reuse, with upgrades to the existing drainage network as required by the new scheme.

Existing beam and column junction

5 Construction Considerations

5.1 Temporary works considerations

Temporary works will be required as part of the scheme, which would be designed by the contractor's temporary works engineer. It is currently thought that the following items of temporary works will be required:

- Support to the existing floor slabs where the existing supporting masonry walls are to be removed.
- Temporary restraint to wall returns where external walls are removed to form lightwell infills.

5.2 Health and Safety considerations

Elements of the work which will need to be considered carefully to ensure the risks to the general public are controlled include:

- Working at height – fall protection etc.
- Deliveries and lifting of materials on a public highway

An assessment of the construction risks associated with the structural works has been made and possible methods of mitigation considered. This is shown in the Designers Risk Assessment to be found in the appendices.

6 Design Risks

There are a number of design risks that will be mitigated during the next stages of design development. These include:

- Requirements for Crossrail are yet to be confirmed and could include monitoring and condition surveys of the tunnels if there is an increase in loading on the building
- Scaffold will be required in order to construct the new lightwell infills, which may require access to the neighbouring land
- Underpinning to the boundary walls where lightwell infills are located will likely require Party Wall Awards to be served on the neighbouring properties, the process for which can take time to complete
- The existing structure has not been exposed in all locations, with current floor build-ups and exact positions of columns still to be confirmed.
- Perimeter columns in external masonry walls have not been exposed on site. Although there is no evidence of cracking within the external masonry or stonework, it would need to be confirmed if these exist and are not suffering from corrosion.
- The thickness of existing internal masonry walls and chimneys is still to be confirmed on site in order to carry out a full load assessment of the existing building

7 Recommendations for further work

As part of the next stage of the project, it is recommended that further investigation work is completed once greater access is available to tenanted areas further up the building. These include:

- Drill holes through the upper floor slabs and roof slab to confirm the thickness of the existing floor structure
- Investigations within walls to the upper stories in locations where columns are positioned on the floors below, to confirm if these continue up the building
- Investigations at the end of beam lines within the upper stories, to confirm if these bear onto masonry or columns embedded within walls
- Material testing to the beams/columns that have been exposed at ground floor level, to confirm if these are steel or cast iron/wrought iron and the strength of these
- A CCTV survey of the existing drainage on the site

View of existing vault structure

Appendix A

Outline Specifications

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A.1 General:

A.1.1

The following design elements should be in accordance with the architects details:

- Water and damp proofing
- Setting-out
- Fire protection
- Floor separation and acoustic isolation
- External works
- Landscaping
- Finishes
- Internal partitions

A.2 Concrete:

A.2.1 The concrete grades to be used are as follows:

- Blinding, Gen1
- Mass concrete to underpinning, Gen3
- Insitu RC concrete slabs, underpinning and walls, RC40

A.2.2 All formed surfaces to be Type A (basic) finish in accordance with BS-8110. Tops of ground beams and floor slabs to be uniformly leveled and tamped to type 1u finish, subject to agreement with raised flooring manufacturer.

A.2.3. Pudlo Waterproof concrete may be used for the retaining walls and basement slab.

A.3 Steelwork:

A.3.1 All steelwork to be grade S275 to BS EN 10025 and in accordance with BS-5950 UNO.

A.3.2 All connections to have minimum 2no. M16 bolts, with minimum 6mm leg length continuous fillet welds, unless specifically noted.

A.3.3 All steelwork to be blast cleaned to SA2.5. Internal steelwork painted with 75 µm of zinc phosphate primer, 75 µm sealant. External steelwork to be galvanised to 140µm.

A.4 Timber:

A.4.1. All timber members are to be grade C16 to BS 5268 unless noted otherwise. Timber to be pressure impregnated with preservative and cut ends brush treated

A.4.2. Lateral restraint straps for floors are to be minimum 900 long 30 x 5 galvanized MS straps at 1200crs with 150 bobend.

A.5 Temporary Works: The contractor is responsible for the design, installation and maintenance of all necessary temporary works to ensure the strength and stability of the building throughout the construction process

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Appendix B

Design Parameters

B.1 Codes of Practice:

B.1.1 Eurocodes:

Loading	BS EN 1990 NA (Basis of Structural Design) BS EN 1991-1-1 NA (Dead & Imposed Loads) BS EN 1991-1-4 NA (Wind Actions)
Concrete	BS EN 1992-1-1 BS EN 1992-1-1 NA
Piles	BS EN 1997-1 (Geotechnical Design BS EN 1997-1 NA

B.1.2 Building Regulations 2000:

Approved Document A – Structure (2004 edition)
Approved Document H – Drainage & Waste Disposal (2002 edition)

B.1.3 Temporary Works

Demolition Works to be carried out in line with ICE Demolition Protocol 2008.

Façade retention works should be designed in accordance with the recommendations set out in CIRIA guide C579 (2003 `Retention of Masonry Facades).

The deflection of the retained façade should be limited to Span/750 under full loading.

B.2 Design Loadings:

B.2.1 Imposed Loadings (new build areas): kN/m^2

a.	Am k k cpag_j	2. .
b.	Roof, no access / including snow	0.75

B2.3 Deflection:

Imposed load deflections will be limited to:

Concrete:
Internal floors - Span / 250
Edge support masonry - Span / 360

B.2.4 Wind Loading to BS EN 1991-1-4 NA

Appendix C

Existing Plans and Investigations

External courtyard. Access available through left side door only. Trial pit to avoid manhole.

Basement retaining wall foundations tbc after vacant possession of unit

TP1

TP4

Trial pit could be located on either side of wall

Column or pier in wall to line through with position of ground floor column

TP6

TP7

TP3

Indicates position of likely beams at ground floor over

1

Wall supporting ground floor column and floor

TP8

1

BH1

Walls supporting ground floor structure

Encased column

Masonry pier or column lining through with position of ground floor column

TP2

Red indicates key trial pits

Wall supporting ground and first floor

Lightwell

TP5

Basement concrete ground bearing slab and masonry retaining walls tbc in trial pits

Existing pavement vault structures

TP	Break out basement slab locally and excavate 600x600 pit to reveal footing to wall and to confirm ground conditions. Reinstate soil, slab and make good following engineer's inspection.
BH	Borehole using a low headroom rig to 10m depth to confirm the ground conditions and bearing capacity of soil
1	Locally remove boxing out and encasement to one corner of column to confirm the size and form of column.

Job	Minerva House	Date	07/08/15
Title	Existing Basement Plan showing Investigations	Eng.	RM
Job No.	1387 Sheet SK08	Rev.	A

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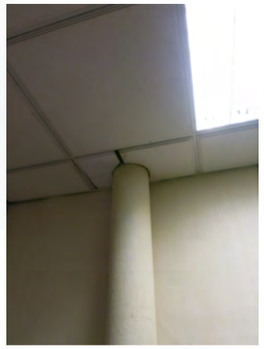
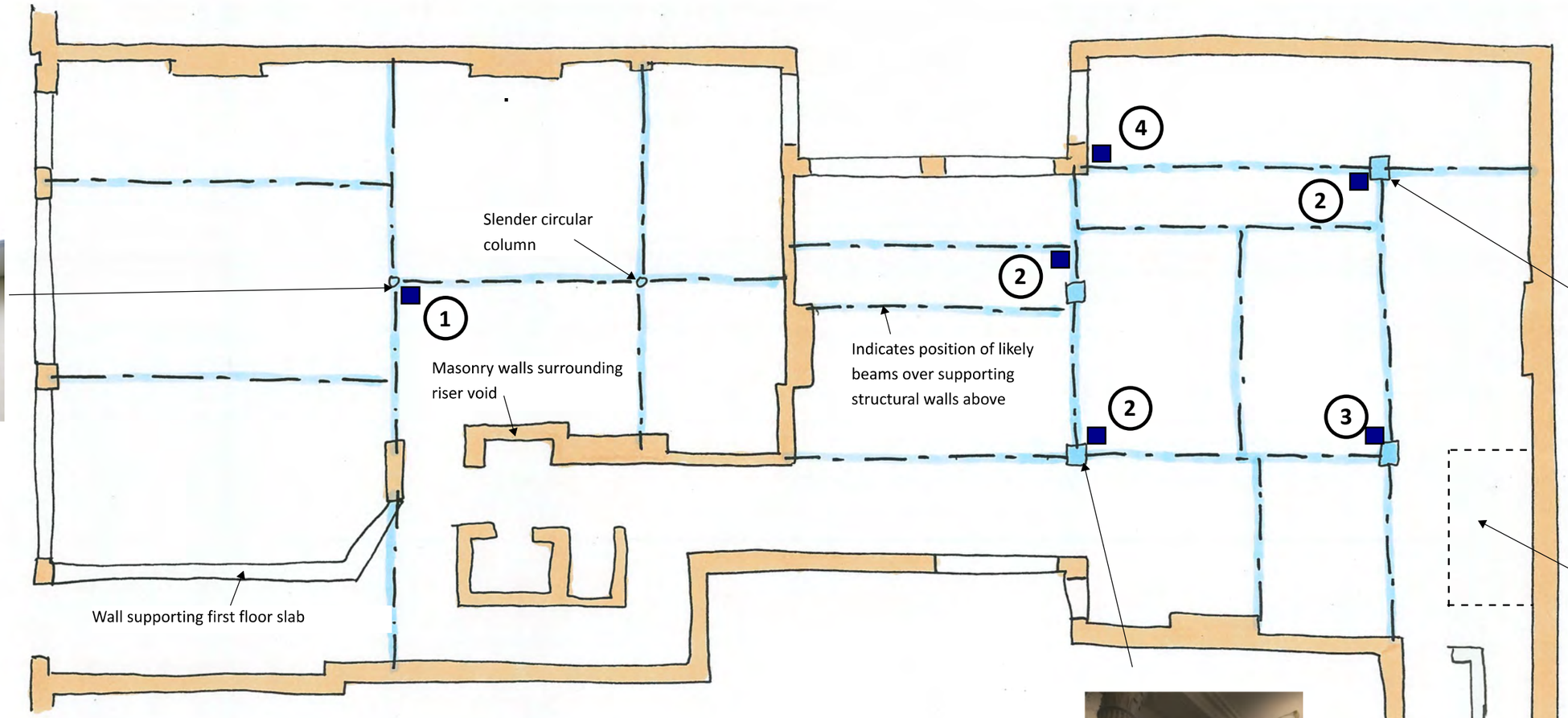
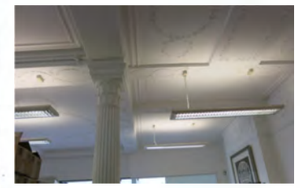
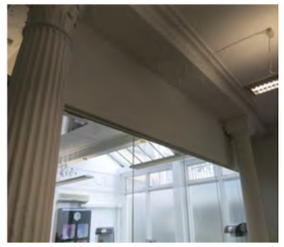


Slender circular column







Architecturally encased column and beam. Tbc if investigations can locally remove cornice detail.

1	Remove ceiling tiles locally around column head to confirm downstands, original ceilings and if top of column is visible
2	Break out finishes to ceiling/downstand to expose beam, to confirm size and floor structure over. Reinstate any concrete surround to beams.
3	Break out finishes to column to confirm if steel column and to allow profile and size to be measured. Reinstate any concrete surround.
4	Locally remove ceiling finishes at high level interface of downstand beam/wall to confirm pier size and bearing

Job	Minerva House		Date 07/08/15
Title	Existing Ground floor showing investigations		Eng. RM
Job No.	1387	Sheet SK09	Rev.

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Downstand under suspected load bearing wall over

Slender circular column

Indicates position of likely beams over supporting floor above

1

1

2

1	Remove ceiling tiles locally to confirm downstands, original ceilings etc. Reinstate after engineer's inspection..
2	Break out finishes to ceiling/downstand to expose beam, to confirm size and floor structure over. Reinstate any concrete surround to beams.

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Job	Minerva House	Date	07/08/15
Title	Existing First Floor Plan showing investigations	Eng.	RM
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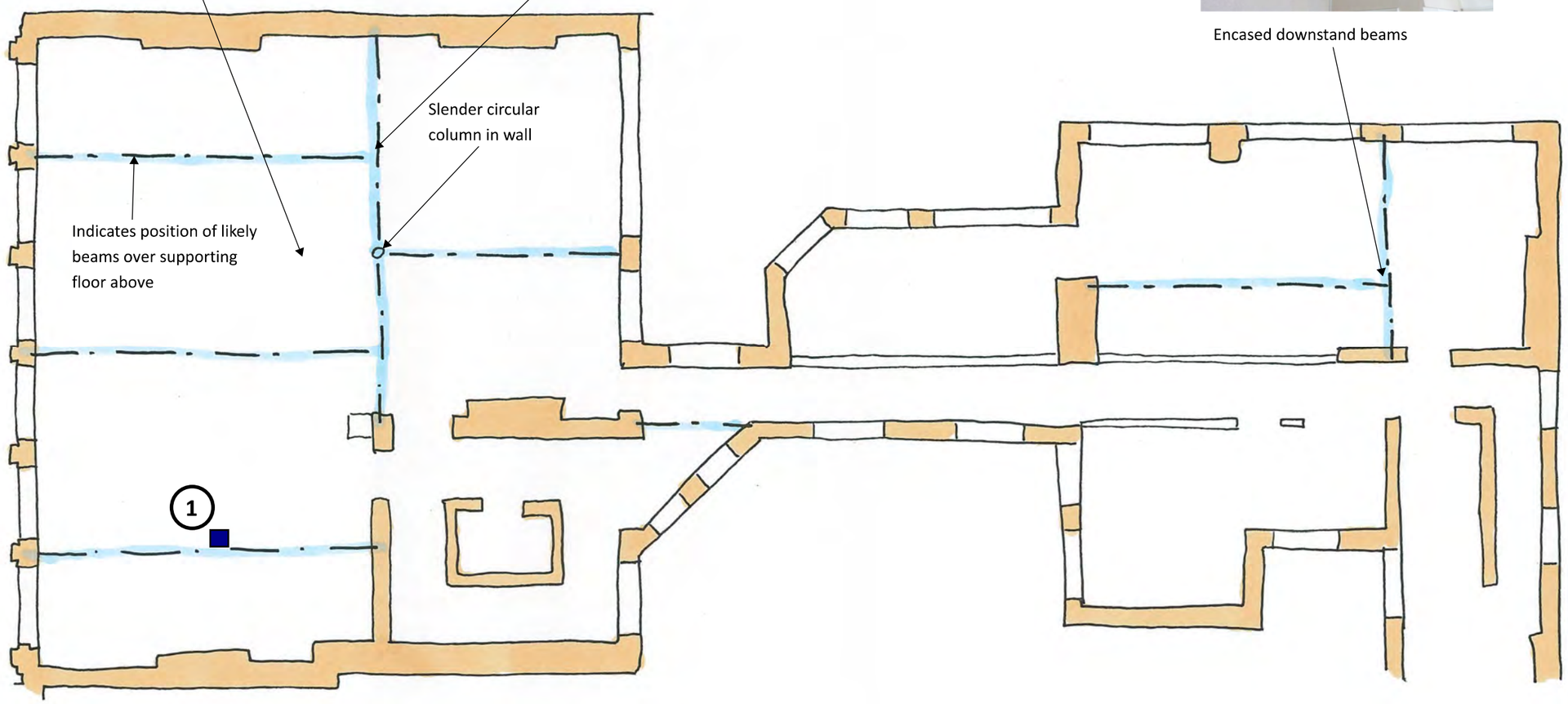
Ceiling tiles with tops of partitions left in place

Original ceiling and downstand visible

Encased downstand beams



1	Remove ceiling tiles locally to confirm downstands, original ceilings etc. Reinstate after engineer's inspection..

Job	Minerva House	Date	07/08/15
Title	Existing Second floor Plan showing investigations	Eng.	RM
Job No.	1387 Sheet SK11	Rev.	

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