Project No. 2124	Revision [P4]: September 2022

5 The Grove, Highgate

Structural Method Statement (SMS)

constructure

Structural Designers

Constructure Ltd
Unit 18, New Concordia Wharf
Mill Street, London SE1 2BB

constructure.co.uk
office@constructure.co.uk
020 7403 7989

QUALITY MANAGEMENT

PROJECT NO.	2124		
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DOCUMENT TITLE	Structural Report for Planning (SMS) - Condition 5		
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PREPARED BY	Tom Goodall BEng	**TITLE**	Engineer
CHECKED BY	Dave Oberoi-Morris BEng	**TITLE**	Director
AUTHORISED BY	Adam Harrison MEng CEng FICE	**TITLE**	Director

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Rev.	Date	Issue Purpose	Prepared	Checked	Authorised
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P3	11.04.22	For Planning	DOM	TG	AH
P4	14.09.22	For Planning	DOM	TG	AH

REVISION NOTES:

P4: Drawings updated to reflect consented plans, text updated accordingly

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1. INTRODUCTION

Constructure Ltd were appointed in March 2021 for structural advice on the proposed refurbishment works to No. 5, The Grove, Highgate. This report has been produced to satisfy Condition 5 of the listed building consent planning application (ref: 2021/2717/L). It details the outline approach that will be taken to safeguard the integrity of the building and adjacent structures.

Prior to works commencing on site, all internal structure will be exposed to confirm the condition and nature of the existing building. This assists to reliably inform the structural design and construction sequence. Initial non-intrusive investigations appear to show the building in a good and sound condition, with no signs of structural distress or disrepair, and as such in its current condition and form is fully suitable for refurbishment.

2. THE SITE

2.1. BRIEF DESCRIPTION OF SITE

The site is located in Highgate, with Hampstead Heath lying to the west/southwest. The property is accessed directly off The Grove with a gravel parking area to the front. To the southeast is Highgate Cemetery, and at the rear to the west are the expansive grounds of Witanhurst Mansion and ancillary buildings. To the northeast there is an underground service reservoir between The Grove and Highgate West Hill. To the rear of the building is a large ‘L’ shaped garden split in to two main areas. The upper terrace garden is approximately 15m x 30m and is separated from the lower garden (approximately 30m x 40m) with a high masonry retaining wall.

2.2. THE EXISTING BUILDING

The property is a grade II listed building, constructed initially in 1688 and then rebuilt in 1933 by notable architect C. H. James. It has been reported that the property underwent a full refurbishment in the 1980’s and then again in the early 2000’s.

The structure consists of 3 storeys above ground and a lower ground floor level that opens onto the garden. The building is of traditional construction with external/internal masonry walls and timber floors. Non load bearing partitions are formed from timber studwork. The roof is formed from a hollow clay pot slab, a technique commonly found around the 1930’s when the building was rebuilt. There are two outcropping gable roof sections tiled in clay.

Minor structural alterations are to be carried out as part of the refurbishment works (detailed in section 3.0). All intended retained elements are considered adoptable with only light repair expected in the event of the exposure of hidden defects.

3. STRUCTURAL METHOD STATEMENT

3.1. DESCRIPTION OF THE PROPOSED WORKS

The proposed refurbishment generally comprises minor structural alterations throughout the building. A brief description has been provided for each element of the works. The proposed construction method is provided with the knowledge of a detailed method statement from a Temporary Works Engineer prior to works commencing. All detailed proposals provided at a later stage will be reviewed by Constructure, as the Permanent Works Structural Engineer.

3.1.1. OVERVIEW

Generally, the historic fabric is to be retained as part of the refurbishment with the main works to be carried out internally. The principle structural alterations include the following; new openings in internal load bearing walls, removal of non-original chimney, removal of existing staircase and replacement with new and amendments to facilitate a large new sash window.

3.1.2. EXTERNAL WALLS / PARTY WALLS

The external and party walls are constructed from solid masonry.

Minor alterations are proposed to the existing openings within the external walls. The south elevation wall adjacent to the staircase will require new lintels (Catnic or similar). While the landings of the stair are to be removed, these are not currently providing restraint to this wall due to the span of the joists and lack of restraint straps or ties, and the short span between buttressing adjacent walls means there will be no negative effects arising from the reconfiguration of the staircase and the reinstatement of the enlarged window.

3.1.3. INTERNAL WALLS

The main structural works that are to be carried out internally are to the walls along gridlines 4 & C (refer to Appendix A for drawings). New steelwork is to be installed to replace existing load bearing masonry, re-supporting the existing structure above while maintaining stability. During the works, the floors will be temporarily propped with suitably braced scaffold/acrow props. The adjacent existing walls will need to be propped laterally. Once the temporary structure is in place, needle beams can be carefully installed at high level ensuring the existing structure is fully supported on to the temporary frame. At this stage, the existing masonry can be carefully dismantled to allow the new steelwork to be installed. Once the new permanent structure is fully fixed in place, and preloaded where necessary to avoid cracking, the temporary structure can be removed.

New steelwork to support these works sit within the depth of the existing floors and is similar to other steel interventions within the building that were carried out during the 1980s and 2000s works. New lintels in concrete are to match those already installed within the house, some original and others from more recent refurbishment works.

3.1.4. FLOORS

Generally, the existing floor joists are to be retained at each level

Where new steel beams are introduced, existing joists will need to be trimmed as necessary and re-supported on the new steelwork with proprietary metal joist hangers.

3.1.5. ROOF

The existing roof is to be retained. Where the non-original chimney is to be removed, the void is to be infilled with new steel and timbers and the roof finished to match existing.

The flat roof is formed from a hollow clay pot slab. Where new rooflights are to be formed, new steel beams are to be introduced to trim the openings. Due to the span of the slab at this level no temporary propping is required to form the roof lights, the opening will be carefully diamond cut and locally broken out, taking care to reduce vibration as far as possible so as to maintain the integrity of the remaining slab.

3.1.6. STAIRS

The existing staircase is positioned centrally in the building with solid masonry walls on each side. The wall on the south side is external with alterations to be made to the existing windows. The existing arrangement allows the staircase to be carefully dismantled without extensive temporary works, though a crash deck is to be installed to prevent falling debris posing a safety risk. The sequence of works described below will need to be carefully followed without deviation. Ultimately, the procedure for removing the existing staircase and installing the new one is straightforward with minimal implications on the existing fabric. All other permanent structural works are to be in place prior to starting the staircase installation.

1. Ensure that all other new permanent structural elements are in place prior to works commencing on the main staircase. New permanent structural steelwork will be providing restraint to the cross walls around the stair core with the timber floors (acting as a diaphragm) also restraining the walls at each level

2. Temporary scaffold is to be installed on the south facade to assist the modifications to the new large window opening. This opening and scaffold will be used for stair components to enter the building

3. Carefully remove the existing stairs in a top down sequence, with the crash deck reduced in height as the work progresses

4. Install/construct the new stair (detail design by specialist) from ground floor up. Landing steelwork is to be installed first, supported on the masonry side walls, which will in turn support the new stair structure

5. Remove scaffold and any other temporary props that were installed to assist the stair installation

6. Make good any damage to brickwork etc. and install finishes to Architect’s detail

Removal of the stair will not impact the external wall in the permanent or temporary condition. The wall is restrained by the adjacent cross-walls. The existing half landings are not bearing in to this external wall nor are any restraint straps installed and therefore are not providing any additional restraint.

The new stair is to be framed in steelwork and supported off steel beams at each floor level and half landing. These new beams will span between the load bearing masonry either

side of the new staircase. The stair design will be as shown on sketches SK-200 And SK-201 in appendix A.

3.1.7. CHIMNEY

The non-original chimney is to be removed completely. This should be carried out carefully by dismantling the chimney stack at roof level first and then continuing the work down to lower ground level. Temporary propping will be provided as required to support floor plates or masonry while these works are carried out.

3.2. SEQUENCE OF WORKS

LTS, the appointed Main Contractor, will be required to review this report with their team to propose their sequence of working prior to work commencing on site. This will strictly follow the parameters set out in this report, will be reviewed by Constructure as the Project Structural Engineer for compliance, and shall be monitored throughout the duration of the works.

A number of the structural alterations can be carried out simultaneously and therefore a site specific construction sequence is to be determined by the appointed Contractor.

To ensure that building remains stable throughout the works, the existing staircase must not be replaced until all other major structural works are completed.

4. TEMPORARY WORKS

Temporary Works have been designed to facilitate these works. The appointed Contractor will still need to carry out their own temporary works design which will be submitted to the project structural engineer for comment and ensure that the proposals within this report are carefully followed.

The Contractor will be responsible for the design, erection and maintenance of all temporary works to ensure the stability of excavations and adjacent structures at all times.

5. SUMMARY

The building is in a good and sound condition, with no signs of structural distress or disrepair, and as such in its current condition and form is fully suitable for refurbishment. All intended retained elements are considered adoptable with only light repair expected in the event of the exposure of hidden defects. Should any part of the building be found to contain hidden defects these will be reviewed on site by the Structural Engineer who shall remain engaged throughout the project.

The proposal to replace the existing staircase will not have an impact on the existing structure and its stability and integrity.

Consideration has been given to the need to ensure the structural stability and integrity of the historic fabric. The sequences noted in section 3 of this report demonstrate that the proposed works can be undertaken satisfactorily without impairing the stability or integrity of the existing structure.

Once complete, the new permanent structure will provide a robust and secure support without detriment to the overall building stability.

APPENDICES.

APPENDIX A – PROPOSED STRUCTURAL PLANS

2124_1991_T7 - Lower Ground Floor

2124_1001_T5 - Upper Ground Floor

2124_1011_T4 - First Floor

2124_1021_T4 - Second Floor

2124_1031_T4 - Flat Roof Plan

2124_1032_T2 - Pitched Roof Plan

2124_2001_T4 - Section A-A

2124_2002_T4 - Section B-B

2124_2012_T4 - Details & Sections

2124-SK-200 - Stair details

2124-SK-201 - Landing & stair details

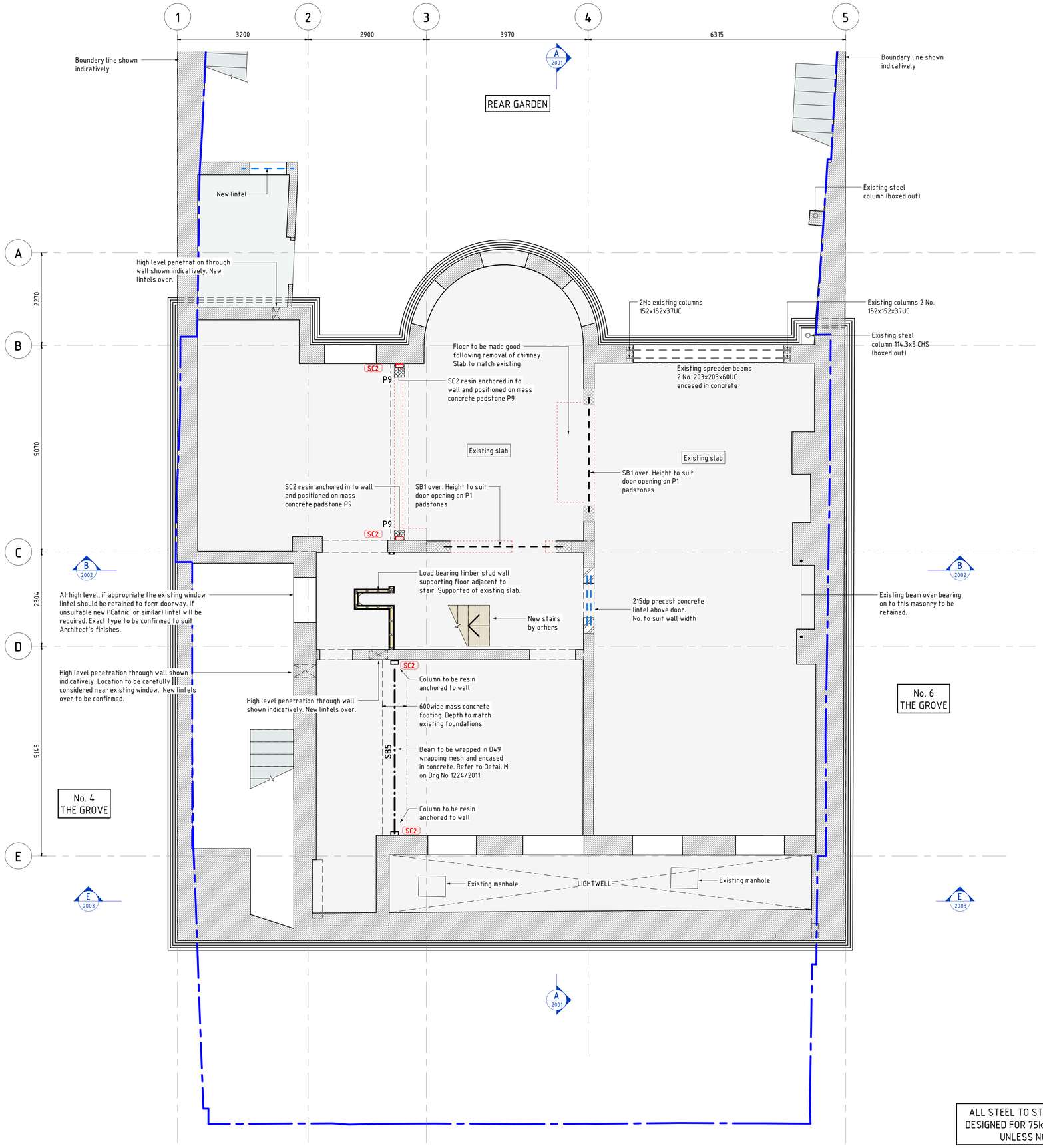
LOCATIONS OF HEAVY FINISHES (EG. MARBLE IN BATHROOMS) TO BE CONFIRMED. FLOOR TO BE STRENGTHENED LOCALLY

WHERE NEW TIMBER STUD PARTITIONS ARE TO BE SUPPORTED OFF EXISTING FLOOR JOISTS, EITHER DOUBLE UP JOISTS OR INSTALL TIMBER NOGGINS

FOR ALL EXISTING TIMBER FLOORS, 15thk WBP PLYWOOD IS TO BE GLUED AND SCREWED TO THE UNDERSIDE OF ALL JOISTS (SCREWS TO BE AT 150crs)

WHERE JOISTS ARE EXCESSIVELY NOTCHED REFER TO DETAIL S ON Drg No 2124/2012 FOR REMEDIAL REPAIR

ALL SERVICE PENETRATIONS THROUGH EXISTING MASONRY (200-800wide) TO BE FORMED WITH 100dp PRECAST LINTELS. NUMBER TO SUIT WIDTH OF WALL. HOLES LESS THAN 200WIDE ARE TO BE CORED. REFER TO DRAWINGS BY OTHERS FOR DETAILS. WHERE HOLES ARE CLOSE TO DOOR OPENINGS AND LINTELS FURTHER COORDINATION REQUIRED



ALL STEEL TO STEEL CONNECTIONS TO BE DESIGNED FOR 75kN (ULS) VERTICAL SHEAR UNLESS NOTED OTHERWISE

Notes :

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- Mass concrete.
- Blockwork.
- Brickwork.
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- Moment frame connection.
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- DJ – Double-up joists.
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STEELWORK COLUMNS

SC1	UC203x203x46
SC2	RHS200x100x10

STEELWORK BEAMS

SB1	UC203x203x46
SB2	UC152x152x37
SB3	UB203x102x23
SB5	UC254x254x73
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FLOOR LEGEND

Ex.	Denotes existing floor joist span (all tbc. following full strip out).
Ex.Roof	Pitched roof assumed to be formed from timber with hollow clay pot floor forming 2nd floor ceiling.
T1	200 x 50 C24 timber joists @ 400 c/c. with 25mm ply glued & screwed over.

Status

TENDER ISSUE

Rev	Date	Drawn	Eng	Amendment
T7	14.09.22	JFJ	TG	Issued for Tender
T6	26.04.22	JFJ	TG	Issued for Tender
T5	11.04.22	JFJ	TG	Issued for Tender
T4	22.02.22	JFJ	TG	Issued for Tender
T3	16.12.21	JFJ	TG	Issued for Tender
T2	06.12.21	JFJ	TG	Issued for Tender
I2	11.11.21	ET	TG	Issued for Information
T1	14.07.21	ET	TG	Issued for Tender
I1	27.05.21	ET	TG	Issued for Information

Project

THE GROVE, HIGHGATE

LOWER GROUND FLOOR PLAN

Drawing No.	2124 / 1991	Rev	T7
Scale @ A1	1:50	Scale @ A3	1:100
Drawn	ET	Engineer	TG

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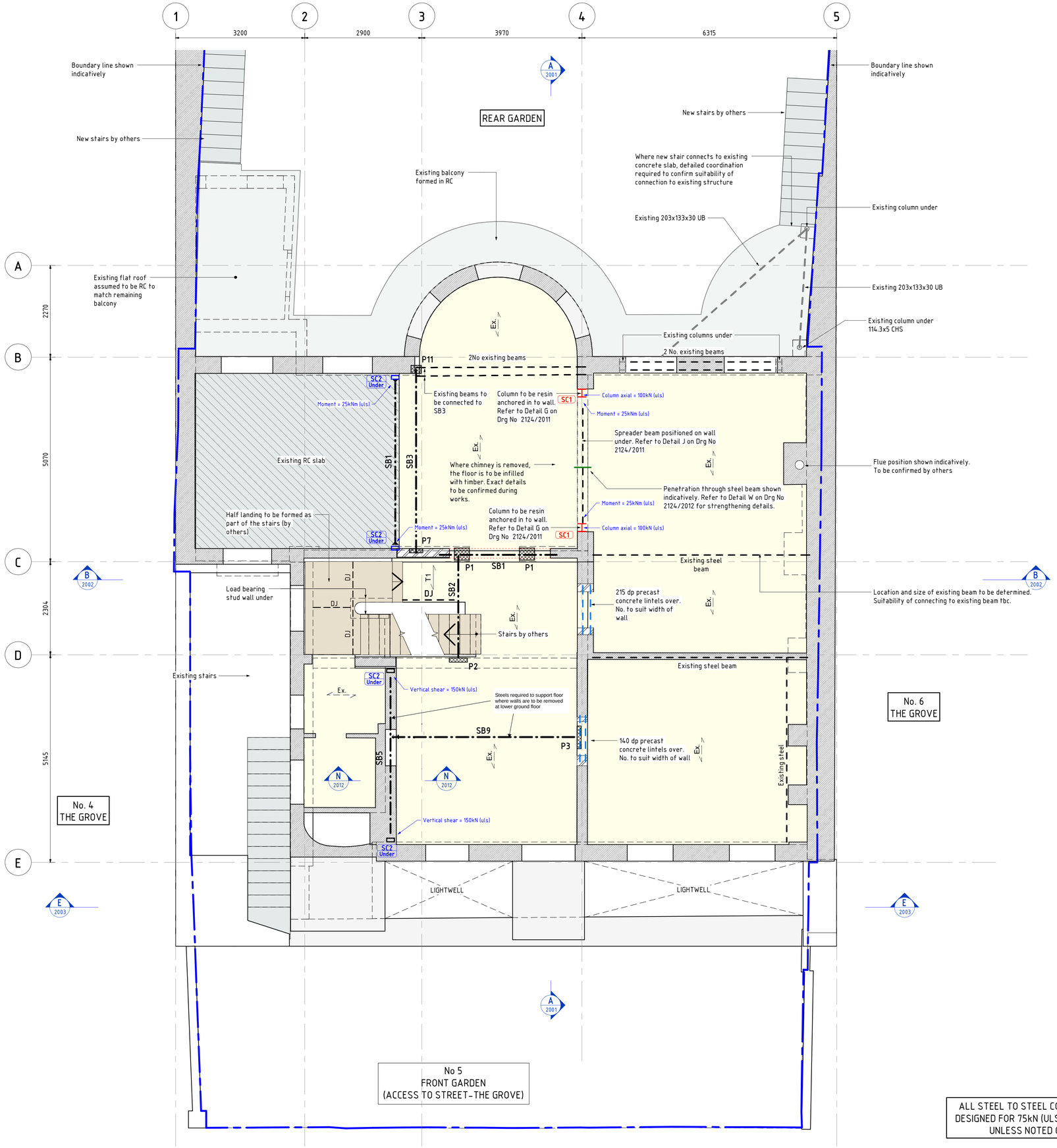

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Project

THE GROVE, HIGHGATE

UPPER GROUND FLOOR PLAN

Drawing No.	2124 / 1001	Rev	T5
Scale @ A1	1:50	Scale @ A3	1:100
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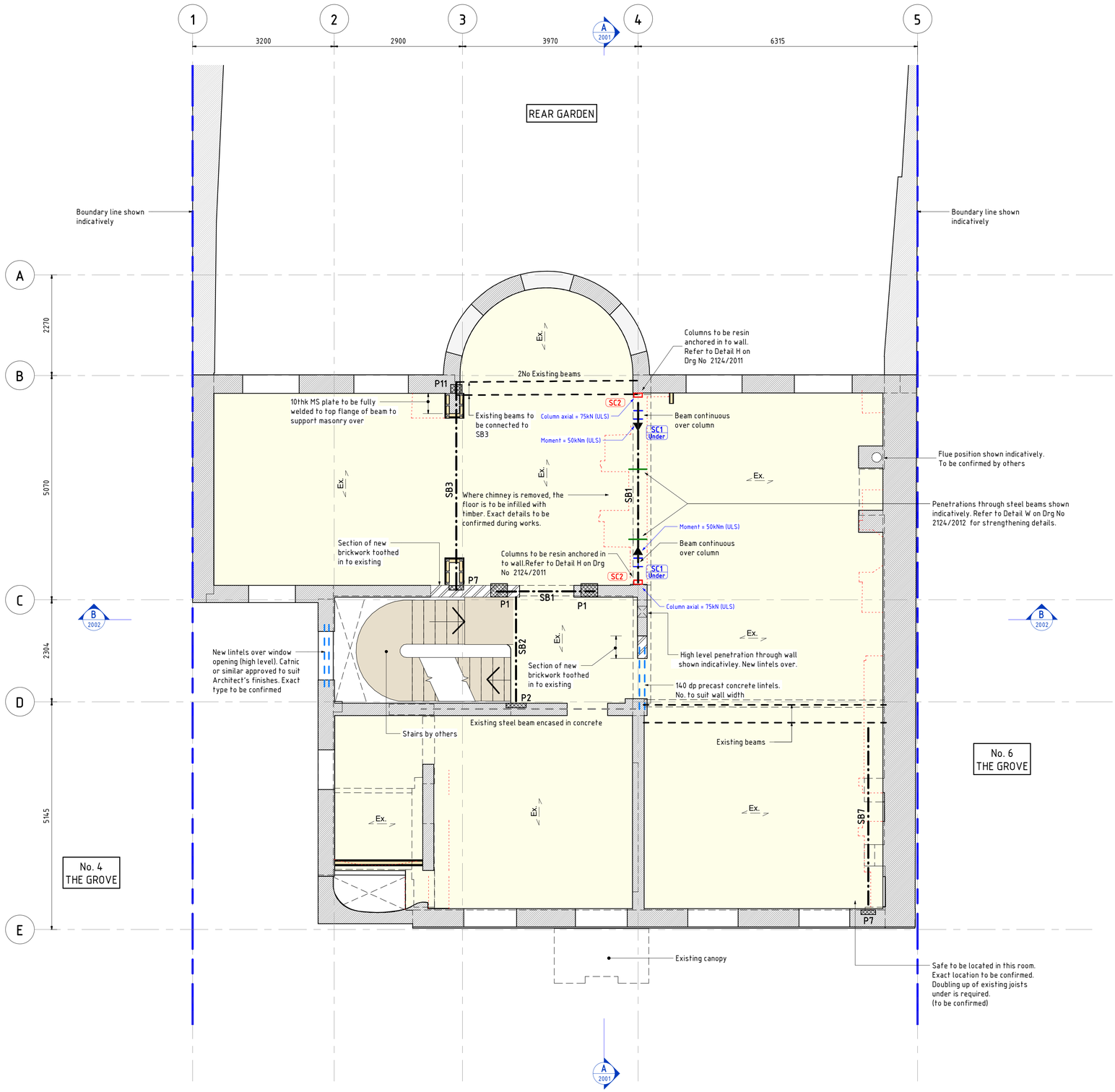

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Project: THE GROVE, HIGHGATE

FIRST FLOOR PLAN

Drawing No.	2124 / 1011	Rev	T4
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Drawn	ET	Engineer	TG

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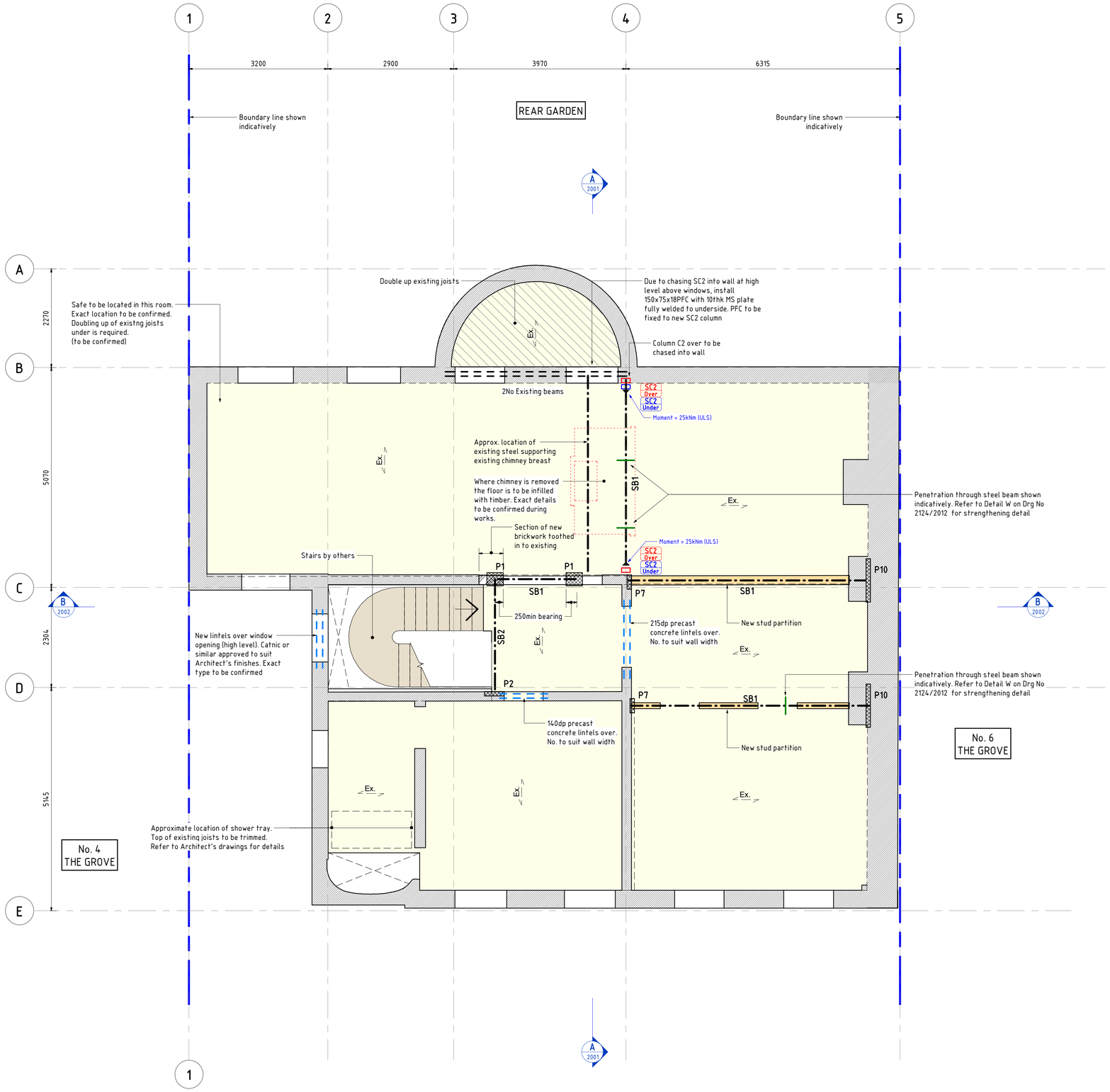

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T3	22.02.22	JFJ	TG	Issued for Tender
T2	06.12.21	JFJ	TG	Issued for Tender
I2	11.11.21	ET	TG	Issued for Information
T1	14.07.21	ET	TG	Issued for Tender
I1	27.05.21	ET	TG	Issued for Information

Project: THE GROVE, HIGHGATE

SECOND FLOOR PLAN

Drawing No.	2124 / 1021	Rev	T4
Scale @ A1	1:50	Scale @ A3	1:100
Drawn	ET	Engineer	TG

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office@constructure.co.uk
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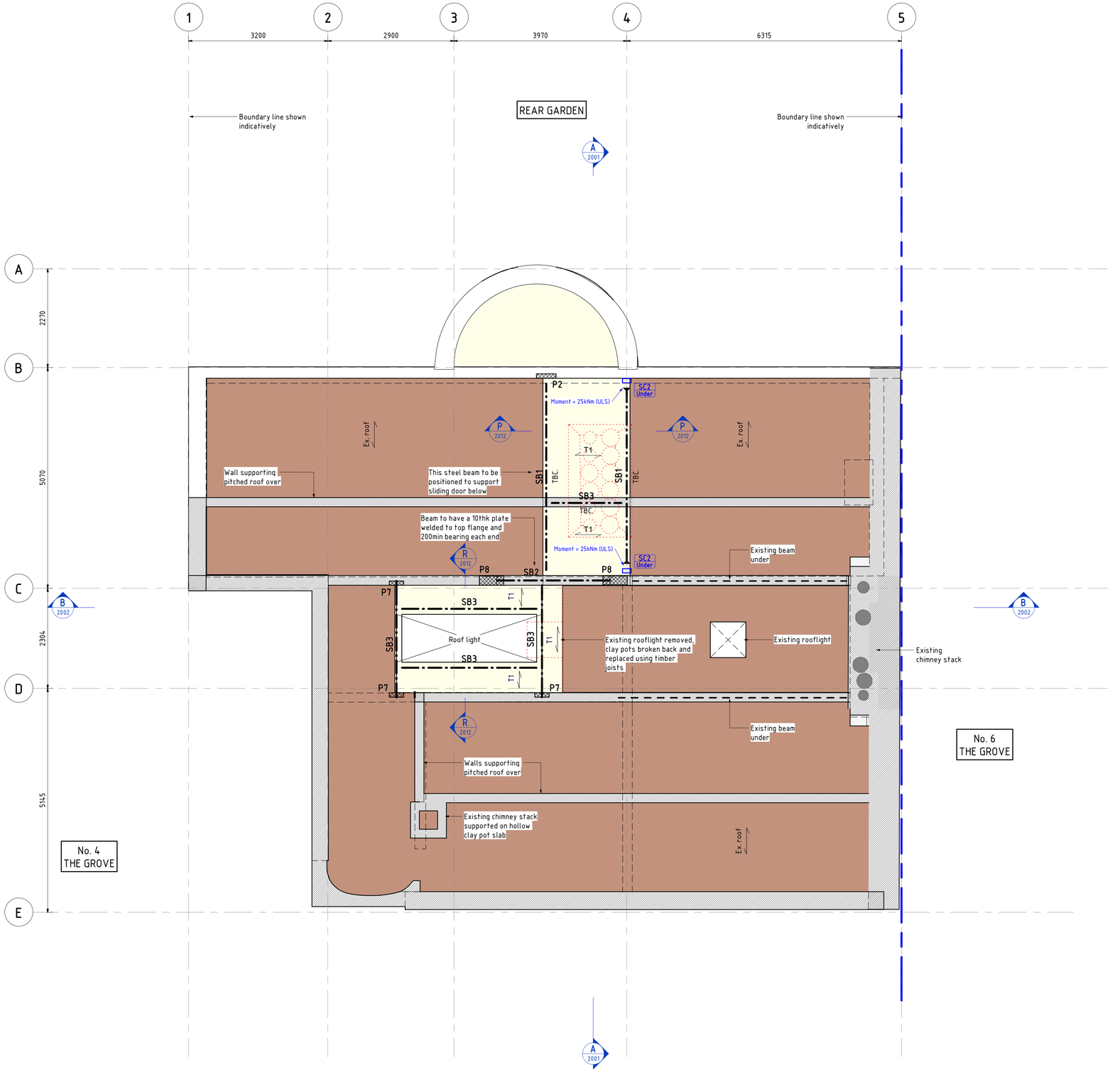
LOCATIONS OF HEAVY FINISHES (EG. MARBLE IN BATHROOMS) TO BE CONFIRMED. FLOOR TO BE STRENGTHENED LOCALLY

WHERE NEW TIMBER STUD PARTITIONS ARE TO BE SUPPORTED OFF EXISTING FLOOR JOISTS, EITHER DOUBLE UP JOISTS OR INSTALL TIMBER NOGGINS

FOR ALL EXISTING TIMBER FLOORS, 15thk WBP PLYWOOD IS TO BE GLUED AND SCREWED THE UNDERSIDE OF ALL JOISTS (SCREWS TO BE AT 150crs)

WHERE JOISTS ARE EXCESSIVELY NOTCHED REFER TO DETAIL S ON Drg No 2124/2012 FOR REMEDIAL REPAIR

ALL SERVICE PENETRATIONS THROUGH EXISTING MASONRY (200-800wide) TO BE FORMED WITH 100dp PRECAST LINTELS. NUMBER TO SUIT WIDTH OF WALL. HOLES LESS THAN 200WIDE ARE TO BE CORED. REFER TO DRAWINGS BY OTHERS FOR DETAILS. WHERE HOLES ARE CLOSE TO DOOR OPENINGS AND LINTELS FURTHER COORDINATION REQUIRED



FOR SMALL PENETRATIONS LESS THAN 125mm THROUGH THE HOLLOW CLAY POT SLAB REFER TO DRAWINGS BY OTHERS. ALL PENETRATIONS ARE TO AVOID RIB BEAMS AND POSITIONED AWAY FROM EXITING HOLES. CARE IS TO BE TAKEN TO ENSURE THAT THE INTEGRITY OF THE SLAB IS NOT COMPROMISED

ALL STEEL TO STEEL CONNECTIONS TO BE DESIGNED FOR 75kN (ULS) VERTICAL SHEAR UNLESS NOTED OTHERWISE

Notes :

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Legend :

- Existing structure.
- Structure under.
- Reinforced concrete section.
- Reinforced concrete surface.
- Mass concrete.
- Blockwork.
- Brickwork.
- Timber stud wall.
- Moment frame connection.
- Denotes crank in beam.
- DJ – Double-up joists.
- Demolition lines.
- Hollow clay pot slab.

STEELWORK COLUMNS

SC1	UC203x203x46
SC2	RHS200x100x10

STEELWORK BEAMS

SB1	UC203x203x46
SB2	UC152x152x37
SB3	UB203x102x23
SB5	UC254x254x73
SB6	UC203x203x60
SB7	UB203x133x30

PADSTONE SCHEDULE

P1	300 lg, 150 dp. (width to suit wall) MC padstone.
P2	450 lg, 100 wd, 225 dp MC padstone.
P3	560 lg, 100 wd, 300 dp MC padstone.
P7	330 lg, 100 wd, 225 dp MC padstone.
P8	560 lg, 350 dp, width to match wall. MC padstone.
P9	250 lg, 330 wd, 225 dp MC padstone.
P10	1000 lg, 100 wd, 500 dp MC padstone.
P11	250 lg, 200 wd. 225 dp MC padstone.

FLOOR LEGEND

Ex.	Denotes existing floor joist span (all tbc. following full strip out).
Ex.Roof	Pitched roof assumed to be formed from timber with hollow clay pot floor forming 2nd floor ceiling.
T1	200 x 50 C24 timber joists @ 400 c/c. with 25mm ply glued & screwed over.

Status

TENDER ISSUE

Rev	Date	Drawn	Eng	Amendment
T4	14.09.22	ET	TG	Issued for Tender
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T2	06.12.21	ET	TG	Issued for Tender
I2	11.11.21	ET	TG	Issued for Information
T1	14.07.21	ET	TG	Issued for Tender
I1	27.05.21	ET	TG	Issued for Information

Project

THE GROVE, HIGHGATE

FLAT ROOF PLAN

Drawing No.	2124 / 1031	Rev	T4
Scale @ A1	1:50	Scale @ A3	1:100
Drawn	ET	Engineer	TG

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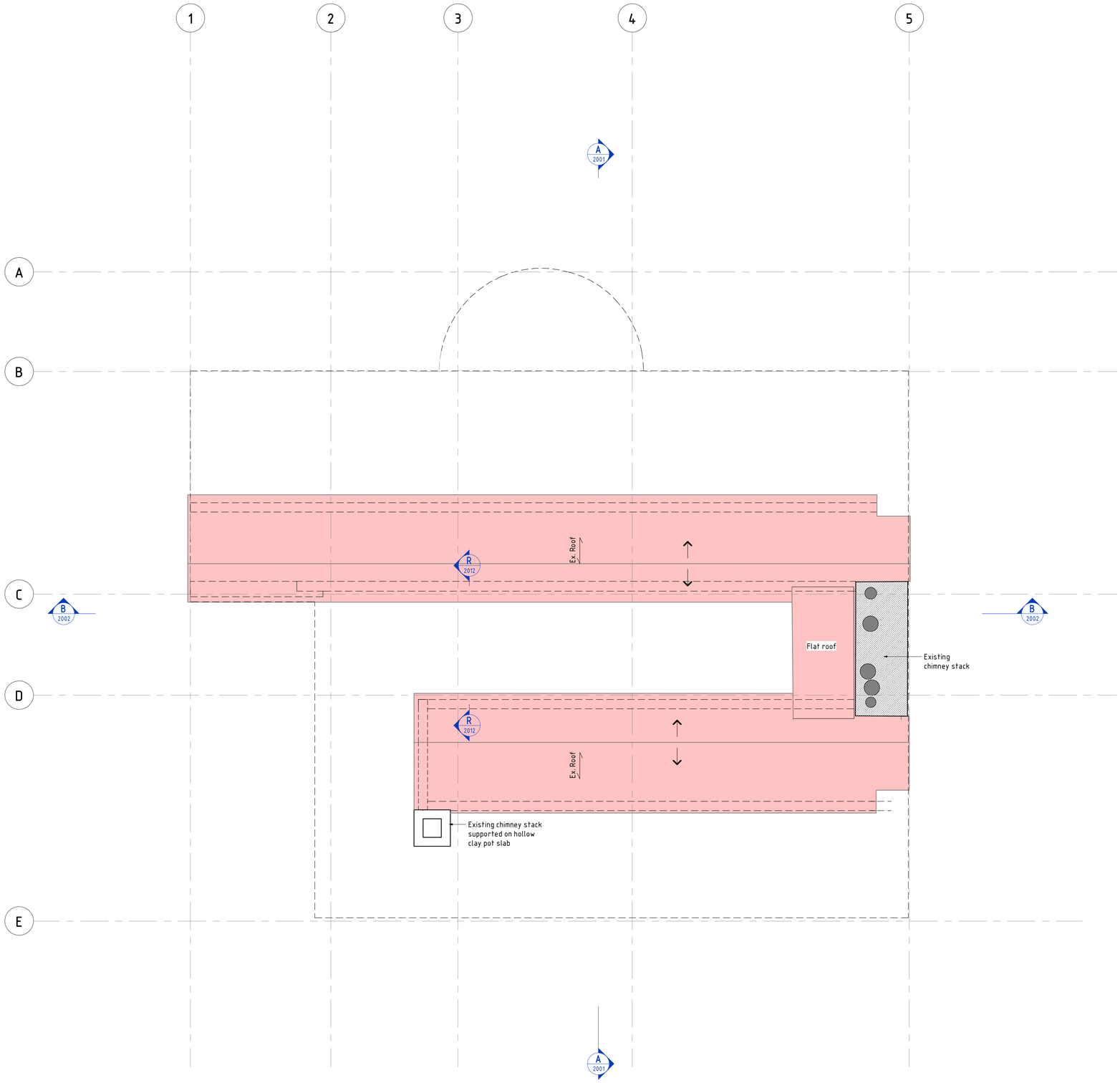

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Legend :

- Existing structure.
- Structure under.
- Reinforced concrete section.
- Reinforced concrete surface.
- Mass concrete.
- Blockwork.
- Brickwork.

EXISTING PITCHED ROOF TO REMAIN AS EXISTING

Status: TENDER ISSUE

Rev	Date	Drawn	Eng	Amendment
T2	14.09.22	JFJ	TG	Issued for Tender
T1	06.12.21	JFJ	TG	Issued for Tender

Project
THE GROVE, HIGHGATE

PITCHED ROOF PLAN

Drawing No.	2124 / 1032	Rev	T2
Scale @ A1	1:50	Scale @ A3	1:100
Drawn	ET	Engineer	TG

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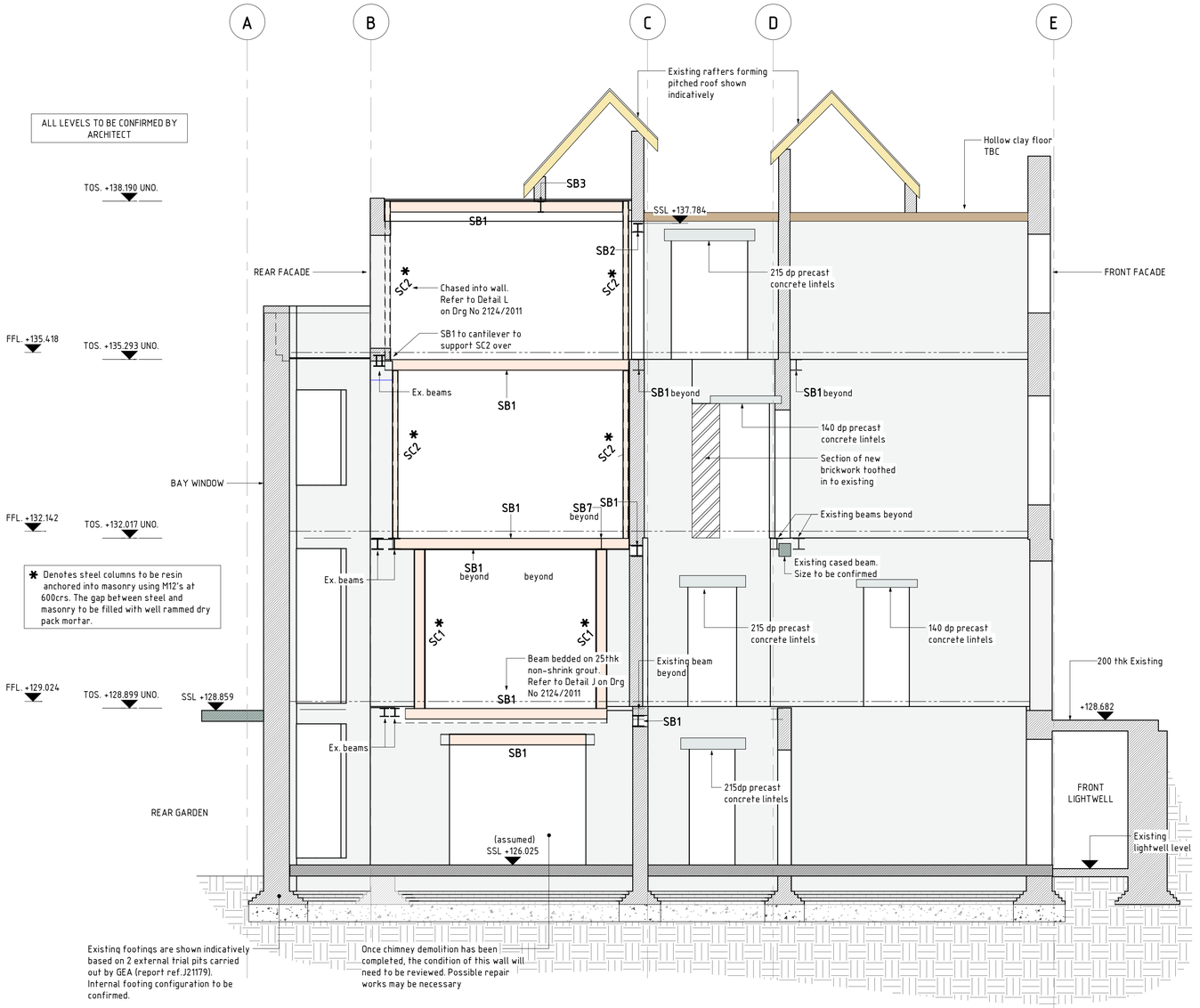

✱ Denotes steel columns to be resin anchored into masonry using M12's at 600crs. The gap between steel and masonry to be filled with well rammed dry pack mortar.

SECTION A-A

SCALE 1 : 50

PADSTONE SCHEDULE	
P1	300 lg, 150 dp. (width to suit wall) MC padstone.
P2	450 lg, 100 wd, 225 dp MC padstone.
P3	560 lg, 100 wd, 300 dp MC padstone.
P7	330 lg, 100 wd, 225 dp MC padstone.
P8	560 lg, 350 dp, width to match wall. MC padstone.
P9	250 lg, 330 wd, 225 dp MC padstone.
P10	1000 lg, 100 wd, 500 dp MC padstone.
P11	250 lg, 200 wd. 225 dp MC padstone

STEELWORK COLUMNS	
SC1	UC203x203x46
SC2	RHS200x100x10

STEELWORK BEAMS	
SB1	UC203x203x46
SB2	UC152x152x37
SB3	UB203x102x23
SB5	UC254x254x73
SB6	UC203x203x60
SB7	UB203x133x30

Notes :

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Legend :

- Existing structure.
- Structure under.
- Reinforced concrete section.
- Reinforced concrete surface.
- Mass concrete.
- Blockwork.
- Brickwork.
- Timber stud wall.
- Moment frame connection.
- Denotes crank in beam.
- DJ – Double-up joists.
- Demolition lines.

Status: TENDER ISSUE

Rev	Date	Drawn	Eng	Amendment
T4	14.09.22	ET	TG	Issued for Tender
T3	22.02.22	ET	TG	Issued for Tender
T2	06.12.21	ET	TG	Issued for Tender
I1	11.11.21	ET	TG	Issued for Information
T1	08.09.21	ET	TG	Issued for Tender

Project: THE GROVE, HIGHGATE

CROSS SECTIONS
SHEET 1

Drawing No.	2124 / 2001	Rev	T4
Scale @ A1	1:50	Scale @ A3	1:100
Drawn	ET	Engineer	TG

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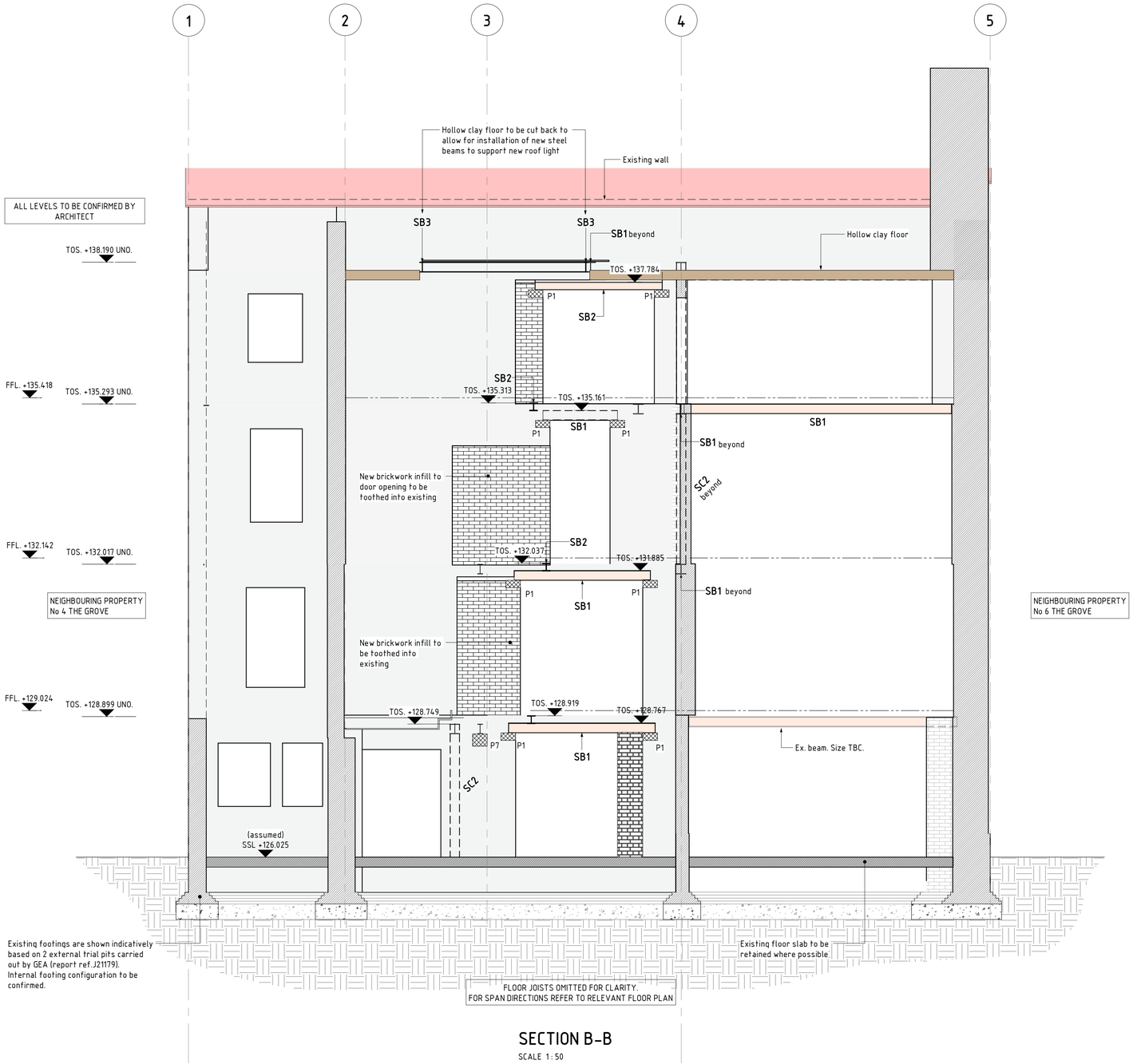

SECTION B-B

SCALE 1:50

PADSTONE SCHEDULE	
P1	300 lg, 150 dp. (width to suit wall) MC padstone.
P2	450 lg, 100 wd, 225 dp MC padstone.
P3	560 lg, 100 wd, 300 dp MC padstone.
P7	330 lg, 100 wd, 225 dp MC padstone.
P8	560 lg, 350 dp, width to match wall. MC padstone.
P9	250 lg, 330 wd, 225 dp MC padstone.
P10	1000 lg, 100 wd, 500 dp MC padstone.
P11	250 lg, 200 wd. 225 dp MC padstone

STEELWORK COLUMNS	
SC1	UC203x203x46
SC2	RHS200x100x10

STEELWORK BEAMS	
SB1	UC203x203x46
SB2	UC152x152x37
SB3	UB203x102x23
SB5	UC254x254x73
SB6	UC203x203x60
SB7	UB203x133x30

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Legend :

- Existing structure.
- Structure under.
- Reinforced concrete section.
- Reinforced concrete surface.
- Mass concrete.
- Blockwork.
- Brickwork.
- Timber stud wall.
- Moment frame connection.
- Denotes crank in beam.
- DJ – Double-up joists.
- Demolition lines.

Status: TENDER ISSUE

Rev	Date	Drawn	Eng	Amendment
T4	14.09.22	ET	TG	Issued for Tender
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I1	11.11.21	ET	TG	Issued for Information
T1	08.09.21	ET	TG	Issued for Tender

Project: THE GROVE, HIGHGATE

CROSS SECTIONS
SHEET 2

Drawing No.	2124 / 2002	Rev	T4
Scale @ A1	1:50	Scale @ A3	1:100
Drawn	ET	Engineer	TG

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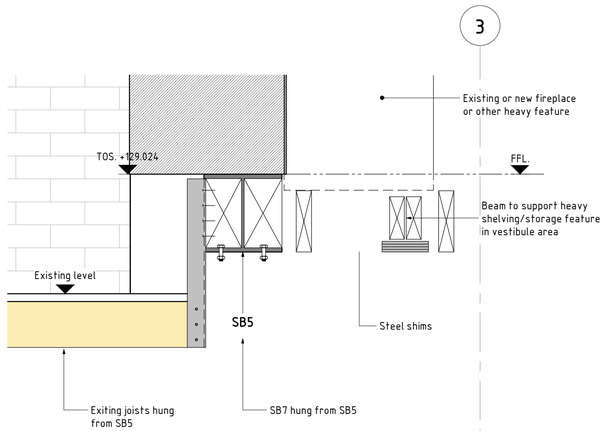
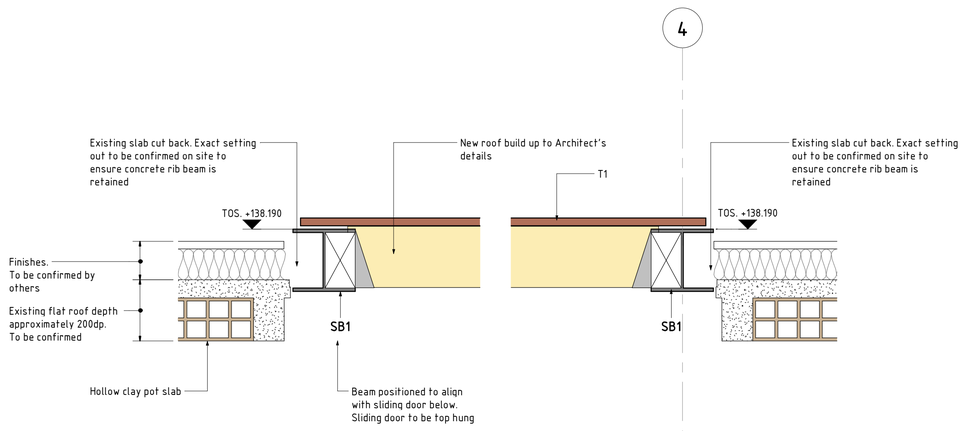


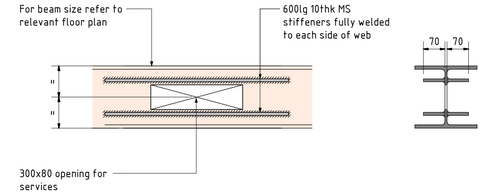
SECTION N-N

SCALE 1 : 10



SECTION P-P

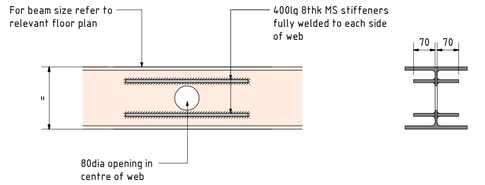
SCALE 1 : 10



DETAIL W-W

shown thus on plan

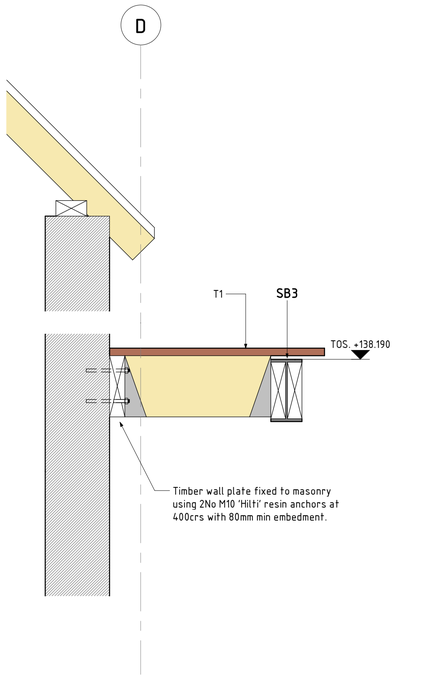
SCALE 1 : 10

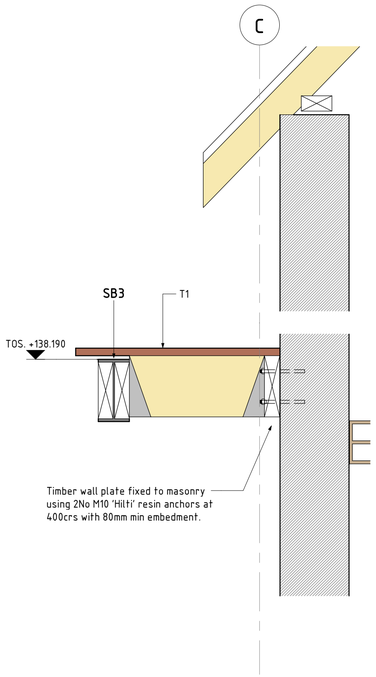


DETAIL X-X

shown thus on plan

SCALE 1 : 10





SECTION R-R

SCALE 1 : 10

PADSTONE SCHEDULE	
P1	300 lg, 150 dp. (width to suit wall) MC padstone.
P2	450 lg, 100 wd, 225 dp MC padstone.
P3	560 lg, 100 wd, 300 dp MC padstone.
P7	330 lg, 100 wd, 225 dp MC padstone.
P8	560 lg, 350 dp, width to match wall. MC padstone.
P9	250 lg, 330 wd, 225 dp MC padstone.
P10	1000 lg, 100 wd, 500 dp MC padstone.
P11	250 lg, 200 wd. 225 dp MC padstone

STEELWORK COLUMNS	
SC1	UC203x203x46
SC2	RHS200x100x10

STEELWORK BEAMS	
SB1	UC203x203x46
SB2	UC152x152x37
SB3	UB203x102x23
SB5	UC254x254x73
SB6	UC203x203x60
SB7	UB203x133x30

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Legend :

- Existing structure.
- Structure under.
- Reinforced concrete section.
- Reinforced concrete surface.
- Mass concrete.
- Blockwork.
- Brickwork.

Status: TENDER ISSUE

Rev	Date	Drawn	Eng	Amendment
T4	14.09.22	JFJ	TG	Issued for Tender
T3	11.04.21	JFJ	TG	Issued for Tender
T2	22.02.22	JFJ	TG	Issued for Tender
T1	06.12.21	ET	TG	Issued for Tender

Project: THE GROVE, HIGHGATE

DETAILS AND SECTIONS
SHEET 2

Drawing No.	2124 / 2012	Rev	T4
Scale @ A1	1:50	Scale @ A3	1:100
Drawn	ET	Engineer	TG

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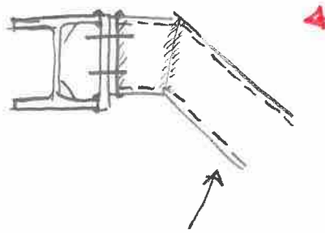

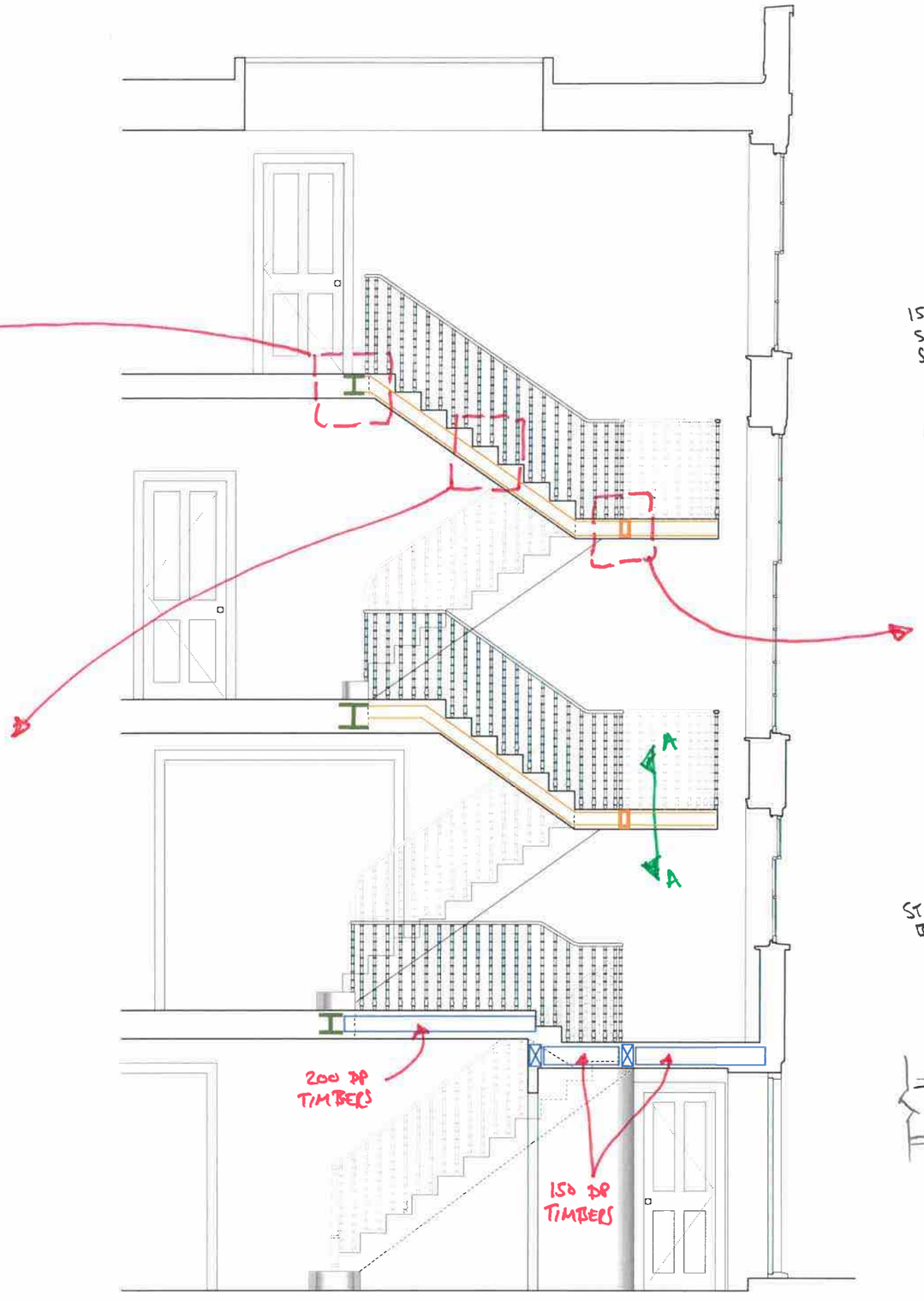

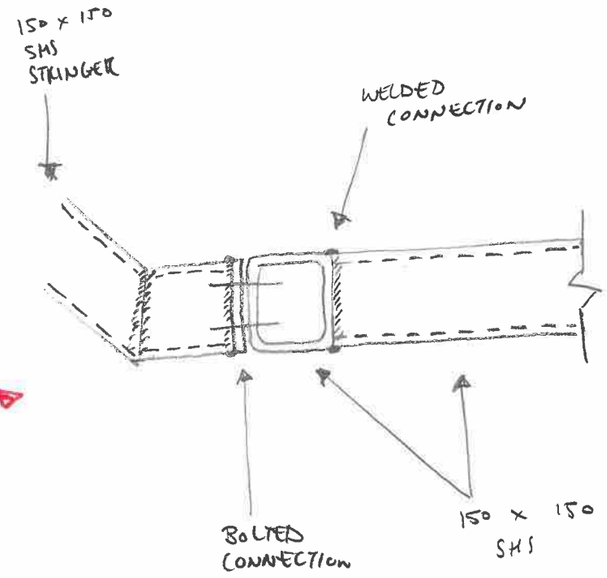

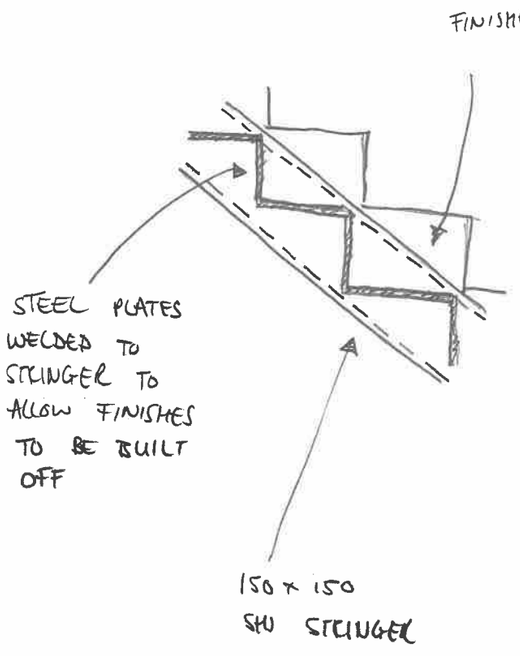

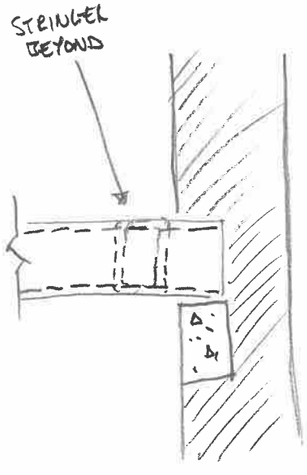

A-A

BEAM BEARING IN TO WALL

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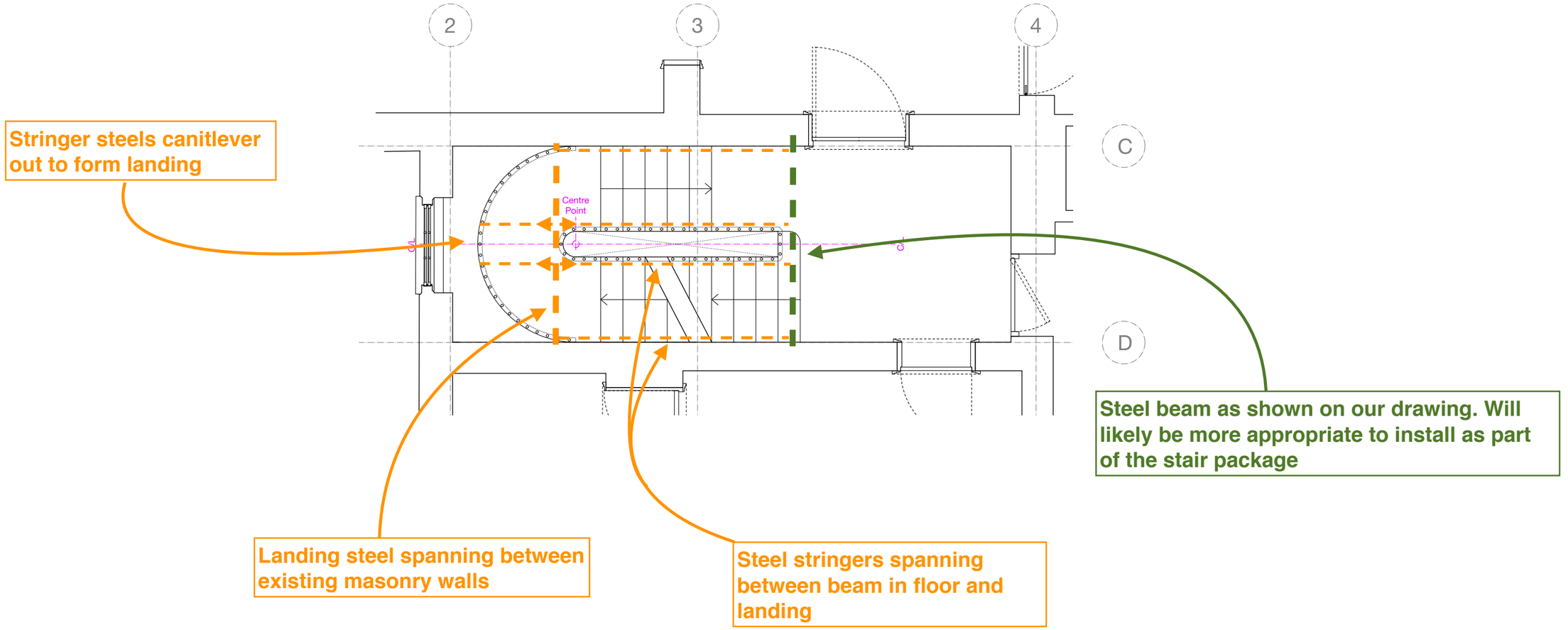
Project 5 The Grove		
Project No. 2124	Sheet SK-200	Rev.
Date 08.04.22	Eng. DOM	Chk.



TYPICAL NEW STAIR & LANDING STRUCTURE

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Project 5 The Grove		
Project No. 2124	Sheet SK-201	Rev.
Date 08.04.22	Eng. DOM	Chk.