Project No. 2124	Revision [P1]: September 2021

The Grove, Highgate

Structural Engineering Report for Planning (SMS)

constructure

Structural Designers

Constructure Ltd
15 Bell Yard Mews
London SE1 3TY

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

QUALITY MANAGEMENT

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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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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 and describes the scope and nature of the structural works. 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 is to 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 have been carried out and 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.

This report provides our opinion on the viability of the proposed structural alterations.

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 soffit appears to be 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 ALTERATIONS

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 indicative with detailed method statements to be carried out by the Contractor's Temporary Works Engineer prior to works commencing. All proposals 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, floor strengthening to allow for heavy finishes, removal of non-original chimney, removal of existing staircase and replacement with new.

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).

Where new steel beams bear in to the Party Walls, local mass concrete padstones are to be carefully cut into the existing brickwork. The Party Wall Surveyor will prepare and serve necessary notices under the provisions of the Act and agree Party Wall Awards.

3.1.3. INTERNAL WALLS

The main structural works that are to be carried out internally are to the walls along gridlines 3 & C (refer to Appendix A for drawings). The 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 need to be temporarily propped with suitably braced scaffold/acrow props (design by others). 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.

3.1.4. FLOORS

Generally, the existing floor joists are to be retained at each level. Where timbers are in poor condition (eg. timber rot or excessively notched) they are to be replaced with new to the structural engineers details. This will be confirmed upon completion of the full strip out.

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.

In a number of locations throughout the building heavy floor finishes are proposed. Floor strengthening will be required locally - typically doubling up existing joists and introducing a plywood skin.

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 timbers and the roof finished to match existing.

Further investigations are required to confirm that 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.

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 minor alterations to be made to the existing windows. The existing arrangement allows the staircase to be carefully dismantled without extensive temporary works. The sequence of works will need to be carefully considered as part of the Contractor's design and in accordance with their Temporary Works Engineer's details. All other permanent structural works should be in place prior to starting the staircase installation. The below sequence is indicative and provides a general outline to the stages of work.

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

3. Carefully remove the existing stairs in a top down sequence

4. Install/construct the new stair (detail design by specialist) from ground floor up. A detailed method statement will be produced by the Contractor for review by Constructure, as the Permanent Works Engineer, once the detailed design of the stair has been completed

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

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.

3.2. SEQUENCE OF WORKS

A detailed construction method statement is to be carried out by the Contractor prior to works commencing, which shall be reviewed by Constructure as the Project Structural Engineer. A number of the structural alterations outlined above 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 should not be replaced until all other major structural works are completed.

4. PARTY WALL MATTERS

The proposed development falls within the scope of the Party Wall Act 1996. Procedures under the Act will be dealt with in full by the Employer's Party Wall Surveyor. The Party Wall Surveyor will prepare and serve necessary notices under the provisions of the Act and agree Party Wall Awards in the event of disputes. The Contractor will be required to provide the Party Wall Surveyor with appropriate drawings, Method Statements and other relevant information covering the works that are notifiable under the Act. The resolution of matters under the Act and provision of the Party Wall Awards will protect the interests of all owners.

5. TEMPORARY WORKS

Temporary works design and coordination must be carried out by a suitably qualified and experienced specialist and full design details, including drawings and calculations, must be submitted to the structural engineer for comment. This specialist will be appointed by the Contractor who 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.

6. SUMMARY

The building appears to be 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.

The proposal to replace the existing staircase will not have a significant impact on the existing structure.

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_T1 - Lower Ground Floor

2124_1001_T1 - Upper Ground Floor

2124_1011_T1 - First Floor

2124_1021_T1 - Second Floor

2124_1031_T1 - Roof Plan

2124_2001_T1 - Section A-A

2124_2002_T2 - Section B-B

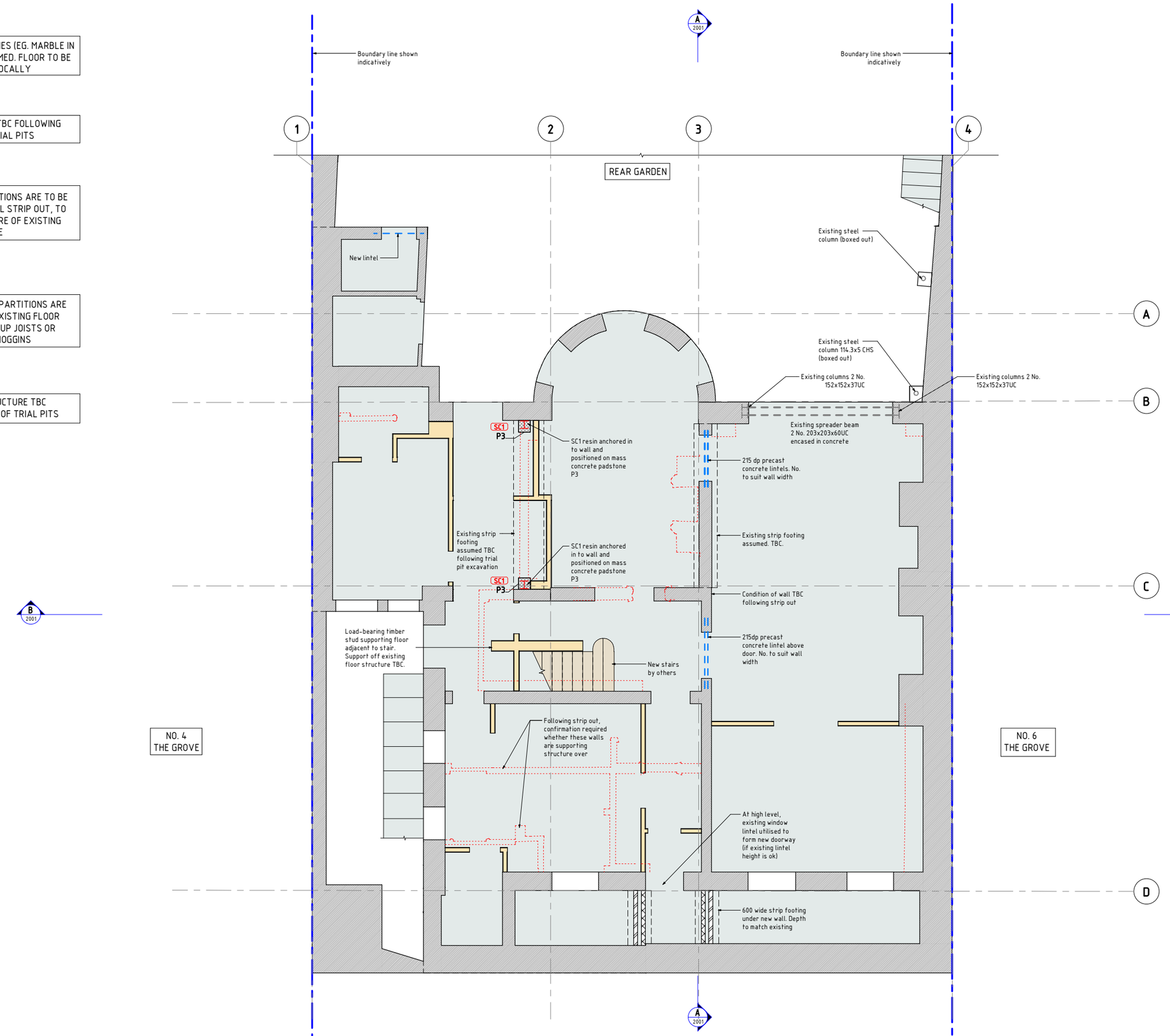
LOCATIONS OF HEAVY FINISHES (EG. MARBLE IN BATHROOMS) TO BE CONFIRMED. FLOOR TO BE STRENGTHENED LOCALLY

EXISTING FOUNDATIONS TBC FOLLOWING COMPLETION OF TRIAL PITS

ALL STRUCTURAL ALTERATIONS ARE TO BE REVIEWED FOLLOWING FULL STRIP OUT, TO CONFIRM DETAILS/ NATURE OF EXISTING STRUCTURE

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

EXISTING FLOOR STRUCTURE TBC FOLLOWING COMPLETION OF TRIAL PITS



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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.

STEELWORK BEAMS

SB1	UC203x203x46
SB2	UC152x152x37
SB3	UB203x102x23
SB4	PFC150x75x18

STEELWORK COLUMNS

SC1	UC203x203x46
SC2	RHS200x100x10

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.

PADSTONE SCHEDULE

P1	300 lg, 200 wd, 150 dp MC padstone.
P2	450 lg, 100 wd, 225 dp MC padstone.
P3	330 lg, 300 wd, 300 dp MC padstone.

Status: TENDER ISSUE

Rev	Date	Drawn	Eng	Amendment
T1	14.07.21	ET	TG	Issued for Tender
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Project
THE GROVE, HIGHGATE

LOWER GROUND FLOOR PLAN

Drawing No.	2124 / 1991	Rev	T1
Scale @ A1	1:50	Scale @ A3	1:100
Drawn	ET	Engineer	TG

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

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

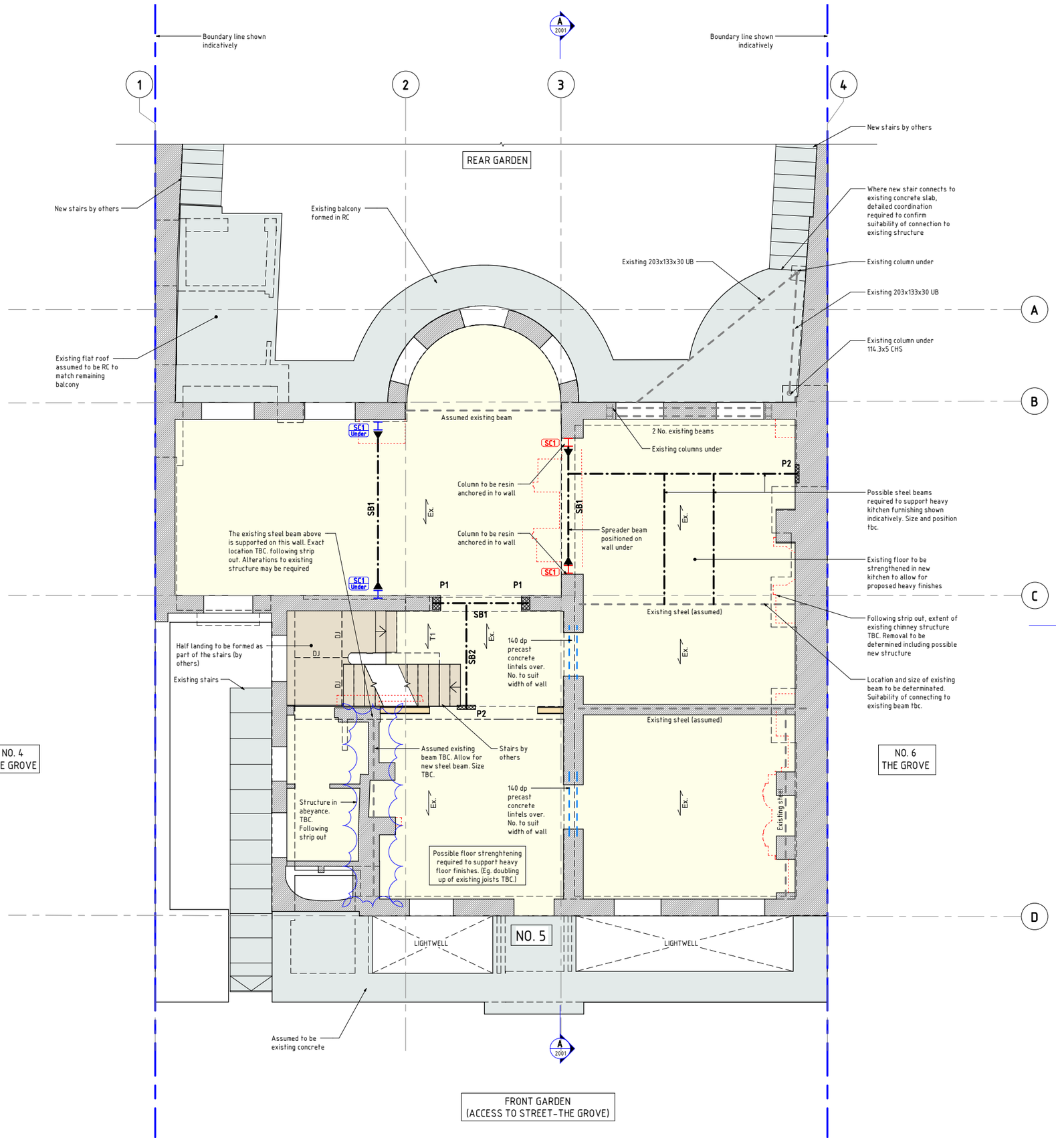
EXISTING FOUNDATIONS TBC FOLLOWING COMPLETION OF TRIAL PITS

ALL STRUCTURAL ALTERATIONS ARE TO BE REVIEWED FOLLOWING FULL STRIP OUT, TO CONFIRM DETAILS/ NATURE OF EXISTING STRUCTURE

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

EXISTING FLOOR STRUCTURE TBC FOLLOWING COMPLETION OF TRIAL PITS

ALL EXISTING JOIST DIRECTIONS ARE ASSUMED BASED ON LIMITED OPENING UP WORKS. TBC FOLLOWING STRIP OUT



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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.

STEELWORK BEAMS

SB1	UC203x203x46
SB2	UC152x152x37
SB3	UB203x102x23
SB4	PFC150x75x18

STEELWORK COLUMNS

SC1	UC203x203x46
SC2	RHS200x100x10

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.

PADSTONE SCHEDULE

P1	300 lg, 200 wd, 150 dp MC padstone.
P2	450 lg, 100 wd, 225 dp MC padstone.
P3	330 lg, 300 wd, 300 dp MC padstone.

Status: TENDER ISSUE

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Project: THE GROVE, HIGHGATE

UPPER GROUND FLOOR PLAN

Drawing No.	2124 / 1001	Rev	T1
Scale @ A1	1:50	Scale @ A3	1:100
Drawn	ET	Engineer	TG

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office@constructure.co.uk
020 7403 7989

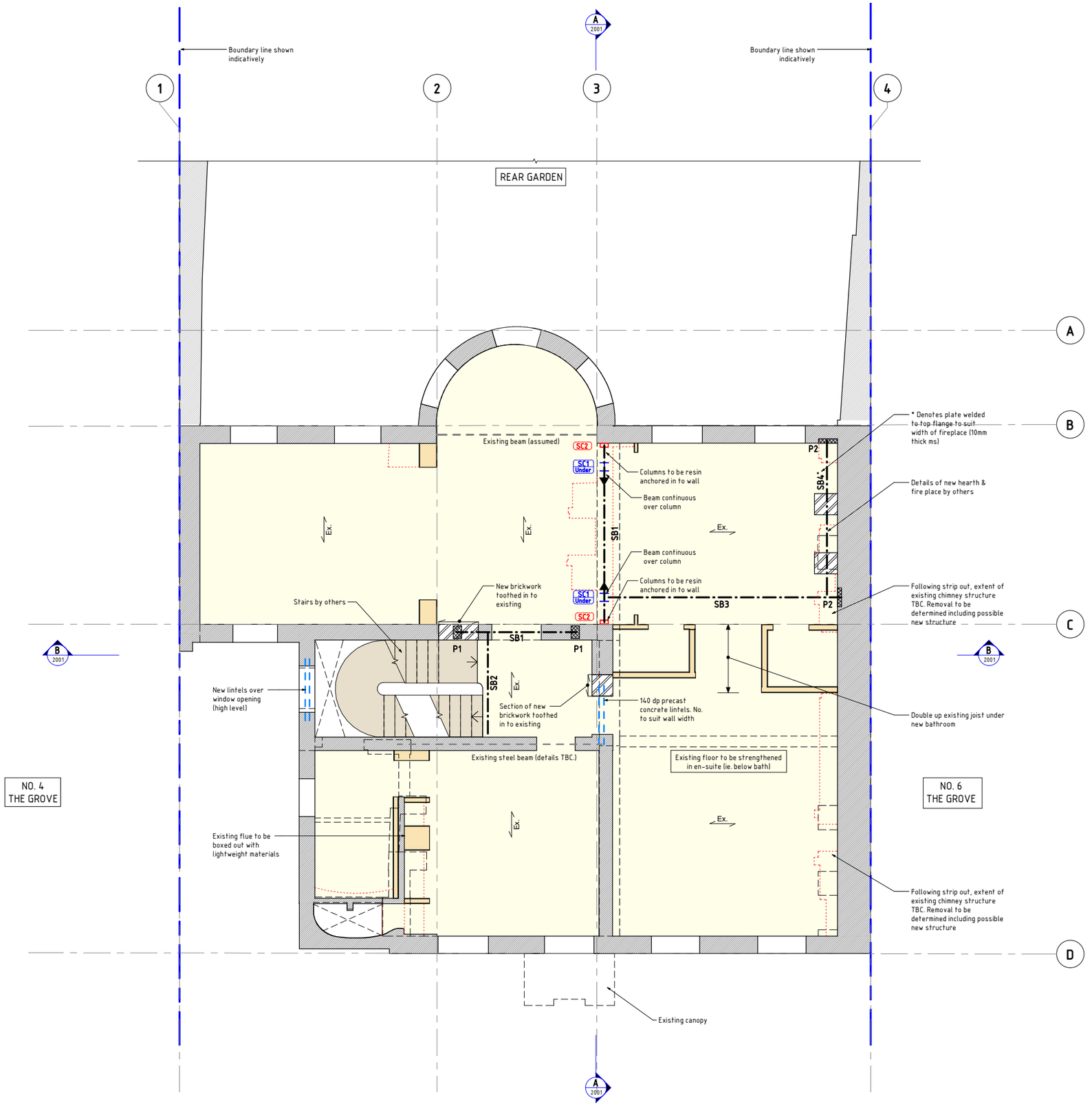
LOCATIONS OF HEAVY FINISHES (EG. MARBLE IN BATHROOMS) TO BE CONFIRMED. FLOOR TO BE STRENGTHENED LOCALLY

EXISTING FOUNDATIONS TBC FOLLOWING COMPLETION OF TRIAL PITS

ALL STRUCTURAL ALTERATIONS ARE TO BE REVIEWED FOLLOWING FULL STRIP OUT, TO CONFIRM DETAILS/ NATURE OF EXISTING STRUCTURE

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

ALL EXISTING JOIST DIRECTIONS ARE ASSUMED BASED ON LIMITED OPENING UP WORKS. TBC FOLLOWING STRIP OUT



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Legend :

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

STEELWORK BEAMS

SB1	UC203x203x46
SB2	UC152x152x37
SB3	UB203x102x23
SB4	PFC150x75x18

STEELWORK COLUMNS

SC1	UC203x203x46
SC2	RHS200x100x10

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.

PADSTONE SCHEDULE

P1	300 lg, 200 wd, 150 dp MC padstone.
P2	450 lg, 100 wd, 225 dp MC padstone.
P3	330 lg, 300 wd, 300 dp MC padstone.

Status: TENDER ISSUE

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Project
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FIRST FLOOR PLAN

Drawing No.	2124 / 1011	Rev	T1
Scale @ A1	1:50	Scale @ A3	1:100
Drawn	ET	Engineer	TG

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office@constructure.co.uk
020 7403 7989

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EXISTING FOUNDATIONS TBC FOLLOWING COMPLETION OF TRIAL PITS

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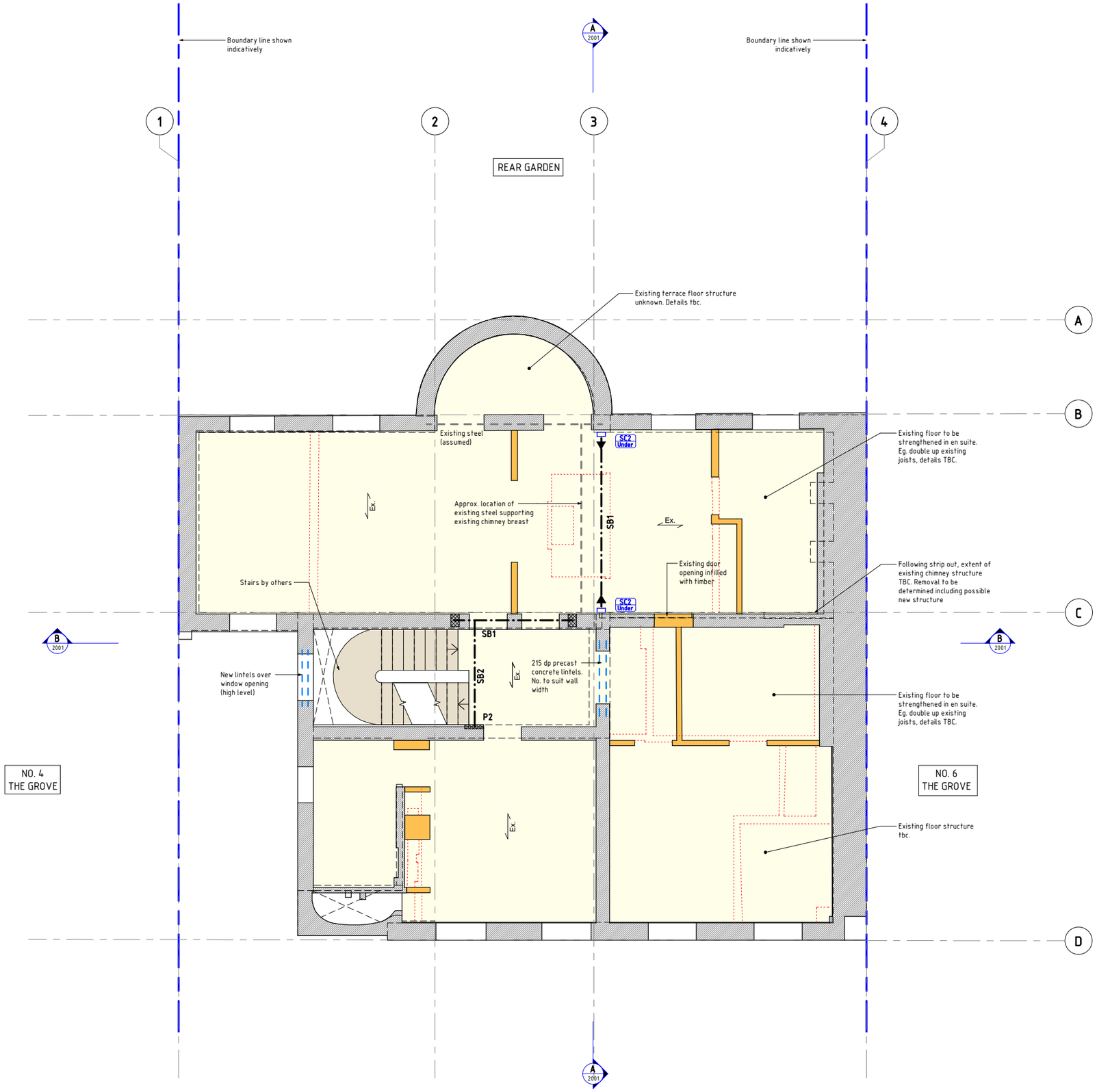
WHERE NEW TIMBER STUD PARTITIONS ARE TO BE SUPPORTED OFF EXISTING FLOOR JOISTS, EITHER DOUBLE UP JOISTS OR INSTALL TIMBER NOGGINS

ALL EXISTING JOIST DIRECTIONS ARE ASSUMED BASED ON LIMITED OPENING UP WORKS. TBC FOLLOWING STRIP OUT



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Legend :

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- Structure under.
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- Mass concrete.
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- DJ – Double-up joists.
- Demolition lines.

STEELWORK BEAMS

SB1	UC203x203x46
SB2	UC152x152x37
SB3	UB203x102x23
SB4	PFC150x75x18

STEELWORK COLUMNS

SC1	UC203x203x46
SC2	RHS200x100x10

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.

PADSTONE SCHEDULE

P1	300 lg, 200 wd, 150 dp MC padstone.
P2	450 lg, 100 wd, 225 dp MC padstone.
P3	330 lg, 300 wd, 300 dp MC padstone.

Status: TENDER ISSUE

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Project: THE GROVE, HIGHGATE

SECOND FLOOR PLAN

Drawing No.	2124 / 1021	Rev	T1
Scale @ A1	1:50	Scale @ A3	1:100
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EXISTING FOUNDATIONS TBC FOLLOWING COMPLETION OF TRIAL PITS

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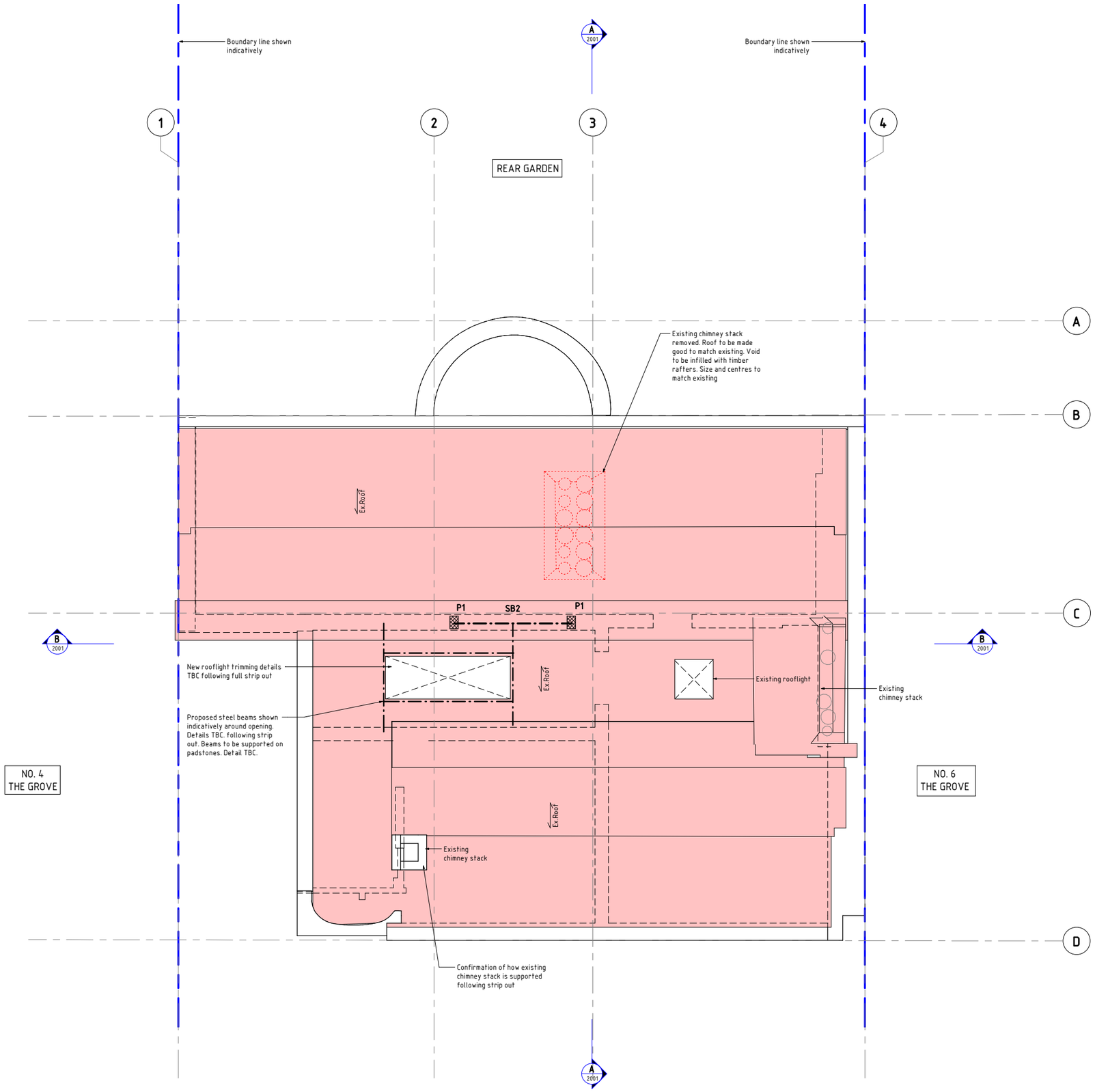
WHERE NEW TIMBER STUD PARTITIONS ARE TO BE SUPPORTED OFF EXISTING FLOOR JOISTS, EITHER DOUBLE UP JOISTS OR INSTALL TIMBER NOGGINS

EXISTING ROOF SPAN DIRECTION ASSUMED



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Legend :

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- DJ - Double-up joists.
- Demolition lines.

STEELWORK BEAMS

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SB2	UC152x152x37
SB3	UB203x102x23
SB4	PFC150x75x18

STEELWORK COLUMNS

SC1	UC203x203x46
SC2	RHS200x100x10

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.

PADSTONE SCHEDULE

P1	300 lg, 200 wd, 150 dp MC padstone.
P2	450 lg, 100 wd, 225 dp MC padstone.
P3	330 lg, 300 wd, 300 dp MC padstone.

Status: TENDER ISSUE

Rev	Date	Drawn	Eng	Amendment
T1	14.07.21	ET	TG	Issued for Tender
I1	27.05.21	ET	TG	Issued for Information

Project: THE GROVE, HIGHGATE

ROOF PLAN

Drawing No.	2124 / 1031	Rev	T1
Scale @ A1	1:50	Scale @ A3	1:100
Drawn	ET	Engineer	TG

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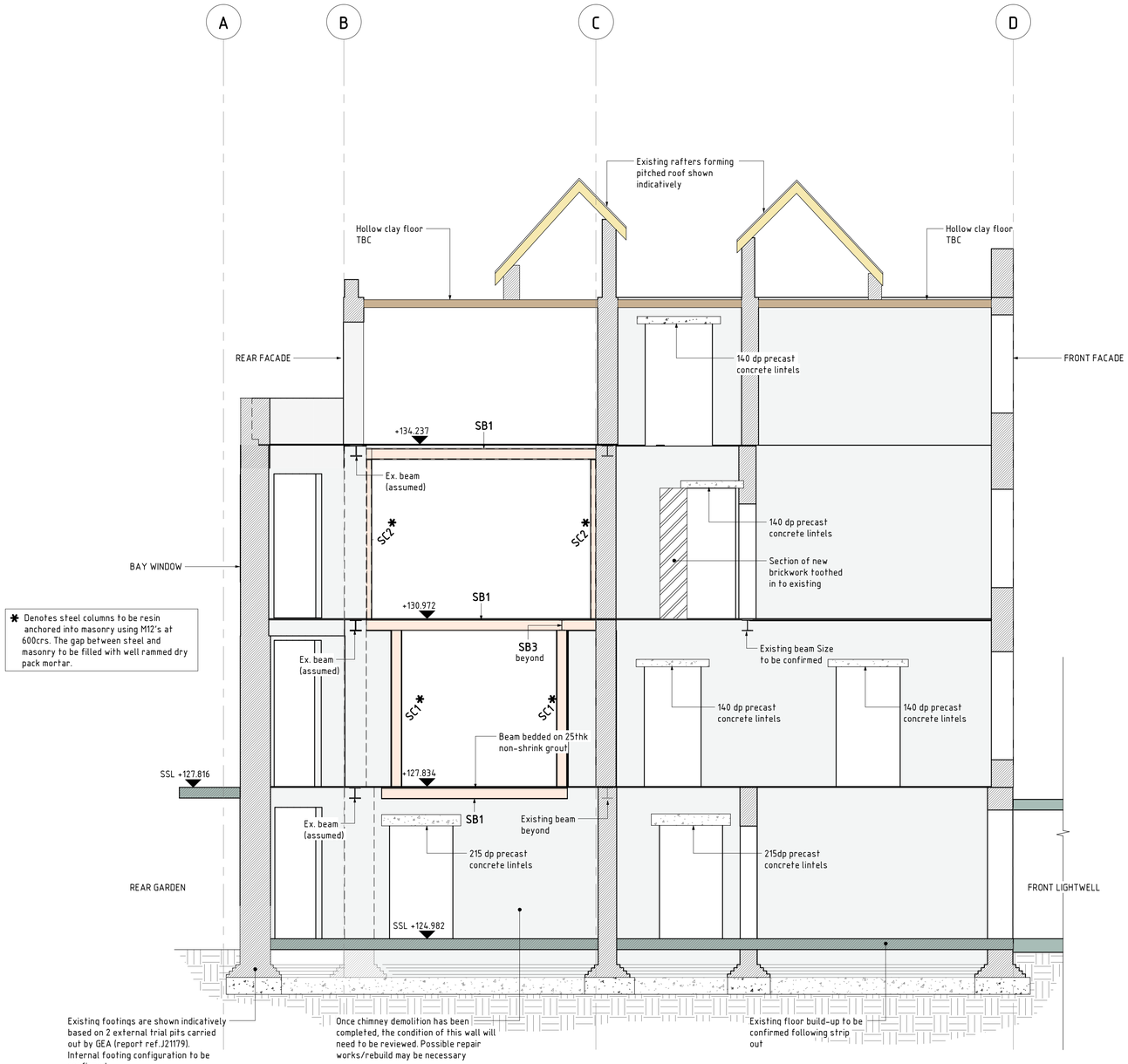

✱ Denotes steel columns to be resin anchored into masonry using M12's at 600crs. The gap between steel and masonry to be filled with well rammed dry pack mortar.

FLOOR JOISTS OMITTED FOR CLARITY.
FOR SPAN DIRECTIONS REFER TO RELEVANT FLOOR PLAN

SECTION A-A

SCALE 1 : 50

Notes :

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Legend :

- Existing structure.
- Structure under.
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- Mass concrete.
- Blockwork.
- Brickwork.
- Timber stud wall.
- Moment frame connection.
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- DJ – Double-up joists.
- Demolition lines.

STEELWORK BEAMS	
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SB2	UC152x152x37
SB3	UB203x102x23
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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.

PADSTONE SCHEDULE	
P1	300 lg, 150 dp. (width to suit wall) MC padstone.
P2	450 lg, 100 wd, 225 dp MC padstone.
P3	330 lg, 300 wd, 300 dp MC padstone.

Status: TENDER ISSUE

Rev	Date	Drawn	Eng	Amendment
T1	08.09.21	ET	TG	Issued for Tender

Project
THE GROVE, HIGHGATE

CROSS SECTIONS
SHEET 1

Drawing No.	2124 / 2001	Rev	T1
Scale @ A1	1:50	Scale @ A3	1:100
Drawn	ET	Engineer	TG

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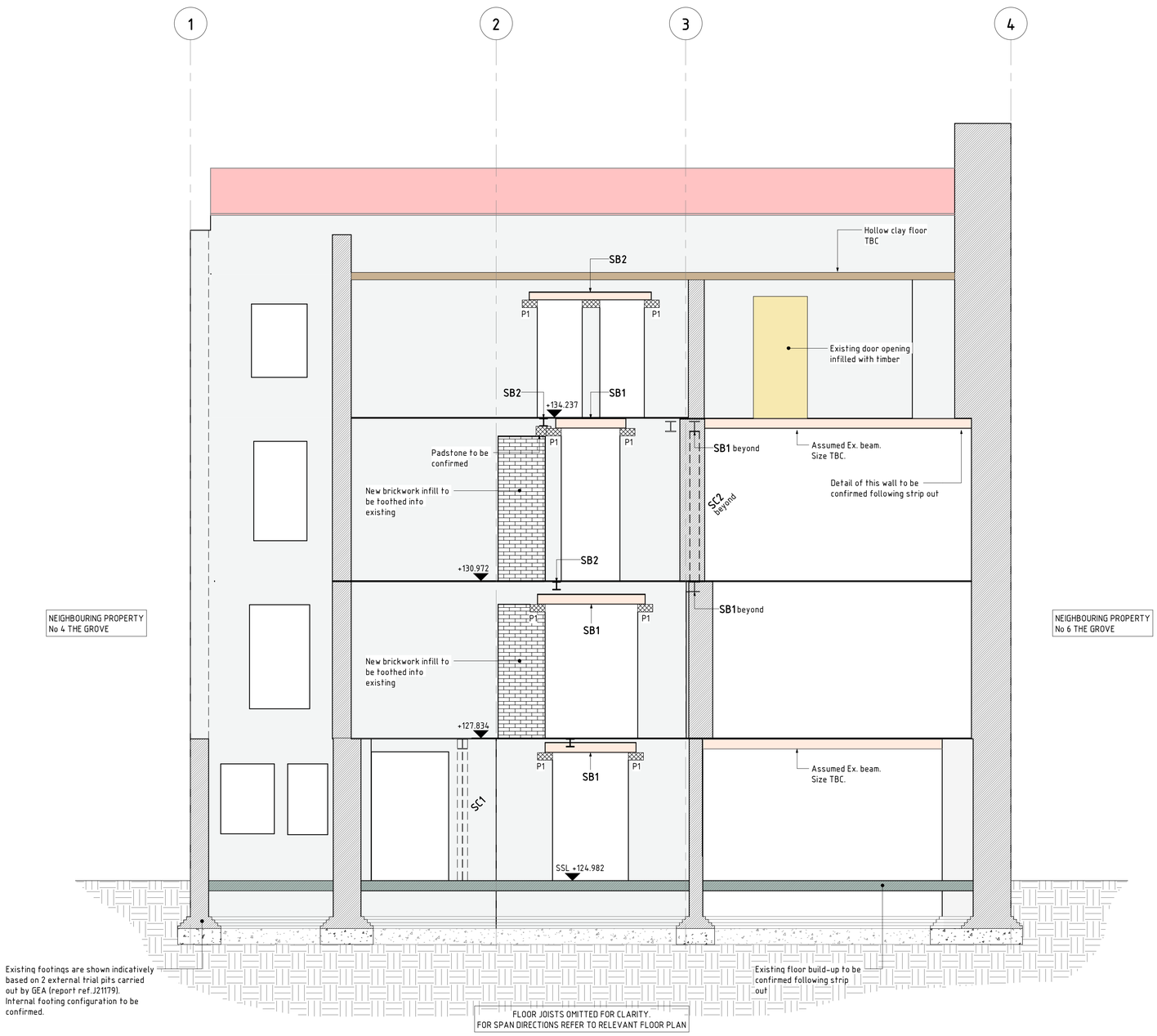
Structural Designers
constructure.co.uk
office@constructure.co.uk
020 7403 7989



SECTION B-B

SCALE 1 : 50

Notes :

1. This drawing is to be read in conjunction with all relevant Architect's, Engineer's and Specialist's drawings and specifications.
2. This drawing is the copyright of Constructure Ltd and is not to be used or reproduced without permission.
3. Do not scale from this drawing in either paper or digital form. Use written dimensions only. To check drawing has been printed to the intended scale the width of the column should be 100mm wide @ A1 or 50mm wide @ A3.

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.

STEELWORK BEAMS	
SB1	UC203x203x46
SB2	UC152x152x37
SB3	UB203x102x23
SB4	PFC150x75x18

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.

PADSTONE SCHEDULE	
P1	300 lg, 150 dp. (width to suit wall) MC padstone.
P2	450 lg, 100 wd, 225 dp MC padstone.
P3	330 lg, 300 wd, 300 dp MC padstone.

Status: TENDER ISSUE

Rev	Date	Drawn	Eng	Amendment
T1	08.09.21	ET	TG	Issued for Tender

Project
THE GROVE, HIGHGATE

CROSS SECTIONS
SHEET 2

Drawing No.	2124 / 2002	Rev	T1
Scale @ A1	1:50	Scale @ A3	1:100
Drawn	ET	Engineer	TG

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