188 Goldhurst Terrace

London NW6 3HN

Construction Method Statement

For

Mrs. Elsa Benchimol

Val Pseneac BSc MSc CEng MIStructE
DVP Sructures Ltd

Contents

Appendices

1.0 INTRODUCTION

1.1. This report has been prepared by DVP Structures in conjunction with Milvum Engineering Services to summarise the structural and geotechnical aspects relating to the proposed basement redevelopment works at 188 Goldhurst Terrace, London NW6 3HN (hereafter referred to as the site); and to provide an overview of the new basement construction methodology and sequence.

1.2. The report should be read in conjunction with the main Basement Impact Assessment (BIA) prepared by Milvum.

1.3. It is noted that this is document is only intended to be used for planning purposes. It should not be used for costing, procurement or construction purposes.

2.0 EXISTING BUILDING DESCRIPTION

2.1. The existing property is a 3-storey mid-terrace bound by Goldhurst Terrace to the south and neighbouring gardens and properties to the north, south and west.

2.2. The property shares party walls with 190 to the west and 186 to the east.

2.3. It is understood that the 190 has undergone redevelopment works which included the addition of a full basement level. Structural engineering drawings relating to 190 indicate full reinforced concrete (RC) underpinning to the Party Wall shared with the site.

2.4. Survey drawings relating to no. 186 indicate the presence of a partial basement area approximately 2.3m in depth. The reduced basement area is located at a distance of circa 4.8m from the Party Wall with the site.

2.5. The property was likely constructed in 1850-1900s using traditional materials and techniques employed at the time. The external walls are of load-bearing solid masonry of thicknesses varying from 215mm to 330mm.

2.6. The ground floor is assumed to comprise suspended timber construction. However, areas comprising ground bearing concrete slabs may be present.

2.7. The upper floors construction comprises suspended timber joists with boarding on top. The mansard roof is anticipated to comprise timber construction, possibly supported by internal walls or steel beams.

2.8. The existing foundations likely comprise corbelled bases on concrete strip footings founded at approximately 1.0m bgl, based on trial pit data relating to 190 and 192.

2.9. A partial cellar of reduced depth and footprint is likely present towards the front of the building, based on existing information on neighbouring properties of similar construction.

2.10. A site specific ground investigation has not been undertaken. However, based on information available from previous site investigation works at 192 and 190 Goldhurst Terrace it is anticipated that the ground conditions comprises made ground to approximately 1.0m bgl, head deposits to 3.0m bgl and London Clay.

2.11. Reference should be made to Sections 6.0 and 7.0 of the main body of the BIA report for detailed ground conditions information; and Appendix 3 for drawings relating to the neighbouring properties.

3.0 PROPOSED WORKS

3.1. The redevelopment basement works include the construction of a single storey basement covering the existing house footprint and extending to the rear.

3.2. A lightwell is proposed to be incorporated at the front of the property (Refer to the architect's drawings; and Appendix 1 for structural drawings).

3.1. The basement is proposed to be accessed via a set of internal stairs, in line with the existing steps arrangement.

3.2. The level (SSL) of the new basement slab is proposed to be c. 3.0m below the existing ground floor level, whilst the basement formation level is anticipated to be no deeper than 3.5m bgl.

3.3. The basement walls are to be generally formed using reinforced concrete (RC) underpinning constructed in a non-consecutive sequence (i.e. traditional "hit and miss" sequence). The RC underpin is to project above the existing wall footing with a 200mm thick RC stem to facilitate the connection with the new RC slab at ground floor.

3.4. A 200mm RC liner wall is proposed to be constructed along the Party Wall with 190, considering that it was underpinned as part of the basement construction within the neighbouring property.

3.5. The RC underpin stem walls will be designed to resist the lateral forces arising from surcharge loadings, hydrostatic pressure and soil pressure; as well as the gravitational loads acting above ground floor.

3.6. The basement slab is intended to be designed as suspended between the underpin base toes and pad foundations that will support internal columns. Heave protection is to be incorporated underneath the slab.

3.7. The existing assumed timber floor at ground level is to be replaced with a new RC slab cast on profiled metal decking. The ground floor slab will be 1—way spanning between a grillage of steel beams running orthogonal to the Party Walls.

3.8. The lateral movement due to excavation and basement underpinning works, will be minimised by adopting high stiffness temporary propping (refer to Appendix 1 for the proposed construction sequence) in the temporary condition.

3.9. Two levels of temporary propping (steel props and waling beams) are proposed to be installed during construction within the main basement footprint. Considering the presence of the existing basement at 190, it is recommended that out-of-balance lateral forces due to earth pressure on no. 186 are transferred via diagonal props. In the permanent condition, all walls are to be propped by the basement and ground floor concrete slabs.

3.10. Temporary works will be required to support the existing internal load-bearing walls during basement construction. One approach could be to support the internal walls via "needles" propped by temporary steel beams running the full width of the basement supported by new RC walls (refer to drawings for indicative proposals).

3.11. A Ground Movement Assessment (GMA - see Section 9.0 of the BIA Report) has been undertaken to estimate likely movements during basement construction. The results indicate that horizontal and vertical movements in the region of 5-10mm are anticipated during construction. Assuming high levels of workmanship and suitable construction sequence, damage to neighbouring properties is likely to correspond to Category 1 (Very Slight) on the Burland Scale.

3.12. A movement monitoring regime will be implemented in order to monitor displacement during construction and limit any neighbouring building damage to Category 1 on the Burland Scale.

3.13. Reference should be made to CMS Appendix 1 for drawings outlining the indicative basement layout and sequence of underpinning; and basement construction sequence. CMS Appendix 2 includes diagrammatic construction sequence of a typical RC underpin.

4.0 DESIGN CONSIDERATIONS

4.1. This chapter outlines the loading requirements which will need to be accounted for as part of the structural design of the basement.

4.2. The design and relevant loadings are generally established in line with the relevant Eurocode design standard, including:

- BS EN 1990 Basis of Design
- BS EN 1991 Actions on Structures
- BS EN 1992 Design of Concrete Structures
- BS EN 1993 Design of Steel Structures
- BS EN 1997 Geotechnical Design

4.3. The RC walls and basement/ground floor slabs will have to be designed giving consideration to the following forces (variable and permanent actions):

- Soil Pressure
- Surcharge loadings, including a proportion of loads transferred by the neighbouring building foundations
- Hydrostatic Pressure
- Heave Forces
- Dead, superimposed and imposed loads on ground and basement slabs

4.4. The basement slab will require design verification taking into account likely heave and hydrostatic pressures. Approximate calculations have been undertaken to determine likely forces acting on the basement slab.

4.5. For the purposes of RC basement wall and slab design, an equivalent hydrostatic pressure of c. 22kN/m2 will be assumed. This corresponds to an equivalent hydrostatic head of 2.2m, conservatively taken any ground water levels at 1.0m bgl.

4.6. Assuming that heave protection measures are implemented, the pressure on the basement slab may be expressed as an equation whereby:

Load case (LC) 1: Slab pressure = hydrostatic pressure = 22kN/m2

LC 2: Slab pressure = "fail load" of the heave material (c. 13kN/m2)

4.7. The pressure dissipation due to the slab deflection is a function of stiffness, with more flexible slabs allowing for more pressure dissipation compared to stiffer slabs. It is worth noting that in the case of slabs on clay soils, a relatively small slab displacement can dissipate a large proportion of any hydrostratic pressure building-up underneath the slab.

4.8. The excavation of the basement could potentially result in a total maximum overburden pressure relief of c. 47.5kPa (c. 2.5m of soil @ 19kN/m3) within the existing lower ground floor footprint.

4.9. The approximate theoretical heave pressure can be estimated by applying the effective stress method, giving the following:

$$\sigma' = 19kN/m3*2.5m - 2.5m*10kN/m^3 = 22.5kN/m2$$

4.10. However, given that the crushing of the heave protection material will dissipate the heave stress only hydrostatic pressure should be considered in the long term.

4.11. Assuming a 300mm thick basement slab, the net upward pressure (unfactored) the slab will need to be designed for is as follows (self-weight of slab plus limited finishes accounted for)

LC 1: Slab pressure (hydro, unfactored) = 22kPa-0.3m*25kN/m3-1.5kPa=13.2kPa

LC 2: Slab pressure (heave) = 13kPa-0.3m*25kN/m3-1.5kPa=4.2kPa

4.12. Considering the small span of the basement slab, it can be reinforced such that it has sufficient capacity to resist the bending and shearing forces induced by the pressures indicated above.

4.13. To minimise long-term vertical displacements, the ground bearing stresses will be limited to 100kPa, which is to be confirmed by the geotechnical assessment report.

4.14. For the calculation of the lateral soil pressure acting on the earth side of the retaining wall, active pressure coefficients are appropriate.

4.15. With reference to potential surcharge loadings, a minimum value of 5kPa of surface pressure acting on the external ground is to be used for retaining wall verification.

4.16. Where there are existing shallow foundations within the proximity of the proposed basement walls (e.g. front lightwell; rear basement area adjacent to the single storey extension at no. 186) relevant surcharge loadings should be calculated and applied as part of the wall design.

4.17. Where the basement walls are unpropped at the topped, these will be generally designed to span horizontally between the stiff returns (i.e. front lightwell and rear basement wall along the proposed walk-on glass).

5.0 WATER-RESISTING PROTECTION

5.1. The proposed basement is intended to offer habitable space for the building occupants. Therefore, this will likely require two forms of protection against water ingress in accordance with BS 8102: 2022 Protection of Below Ground Structures Against Water Ingress.

5.2. It is assumed that a dry environment with no leakage permitted (Tightness Class 3 in accordance with BS EN 1992-3) will be required for the project; and suitable waterproofing measures will need to be employed to achieve high levels of protection.

5.3. Three methods of protection against water ingress are typically considered for basement design (see Table 1 below and Figs. 1 to 3):

Table 1: Basement Waterproofing – Methods of Protection as per BS 8102

Type	Method of Protection	Operation
A	Barrier	A membrane is used to keep water physically outside the usable space
B	Structurally Integral	The basement walls and slabs are designed to specific crack width and/or special additives are used to obtain waterproof concrete
C	Drained Cavity	An inner cavity membrane lines the basement wall and slab; any water penetrating the wall and slab is directed behind the cavity membrane into a drainage channel and a sump chamber where water is removed by a pump.

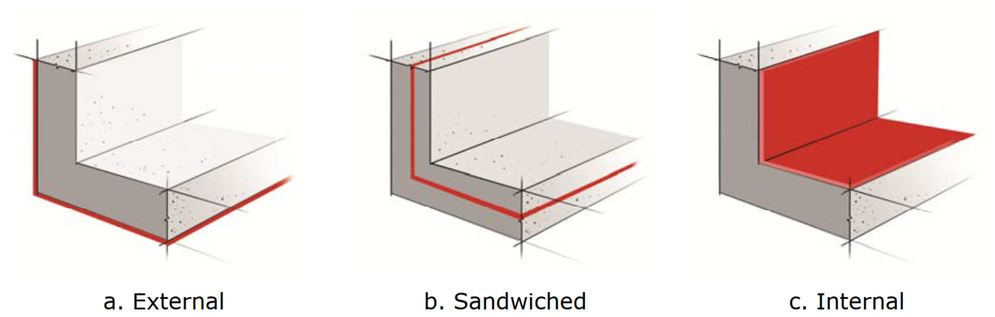


Fig. 1 – Barrier Protection Waterproofing Options

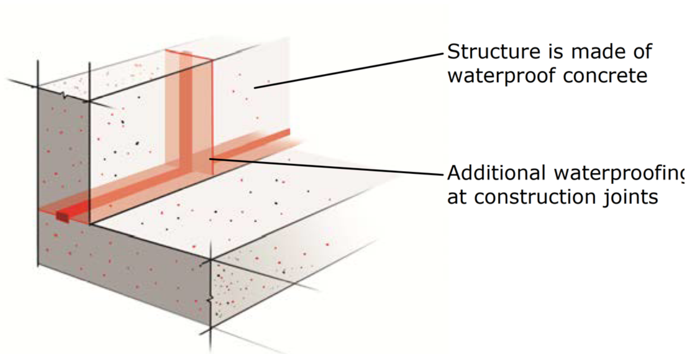


Fig. 2 – Structurally Integral Waterproofing

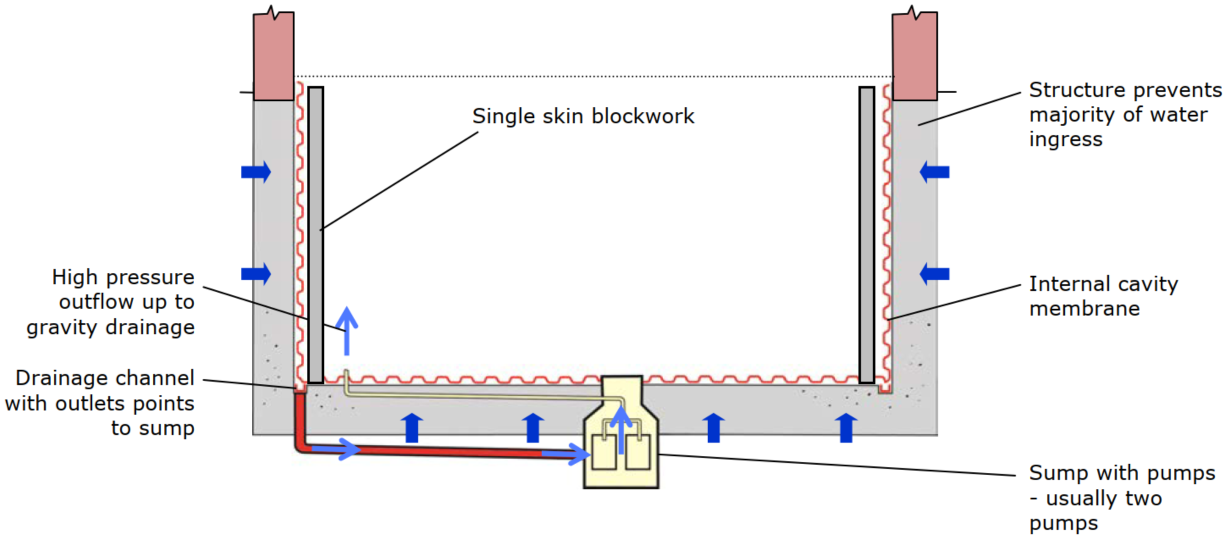


Fig. 3 – Drained Cavity

5.4. Types A and B measures are often combined to achieve high levels of waterproofing resistance; Type C is also common with habitable basements.

5.5. At this stage, it is assumed that a combination of structurally integral protection (RC wall/slab designed to 0.2-0.3mm crack width and adoption of water resistant concrete) and drained cavity system will be implemented for this basement; thus achieving two levels of protection.

5.6. The final waterproofing strategy should be decided collectively by the design team, client and a specialist waterproofing contractor.

6.0 MOVEMENT MONITORING AND CONTROL

6.1. A competent contractor experienced with this type of works will be appointed to undertake the works. Early input from the contractor will be required in order to establish the optimal sequence of construction and co-ordination of temporary works.

6.2. Stiff temporary propping will be employed during the construction of the basement. The propping system is anticipated to comprise a waling beam (steel UB or UC sections) running horizontally along the basement walls. Props, consisting of proprietary sections or UC/UB steel elements, are to be installed such that these run the full width of the basement or diagonally; and act in compression to resist the horizontal actions on the wall.

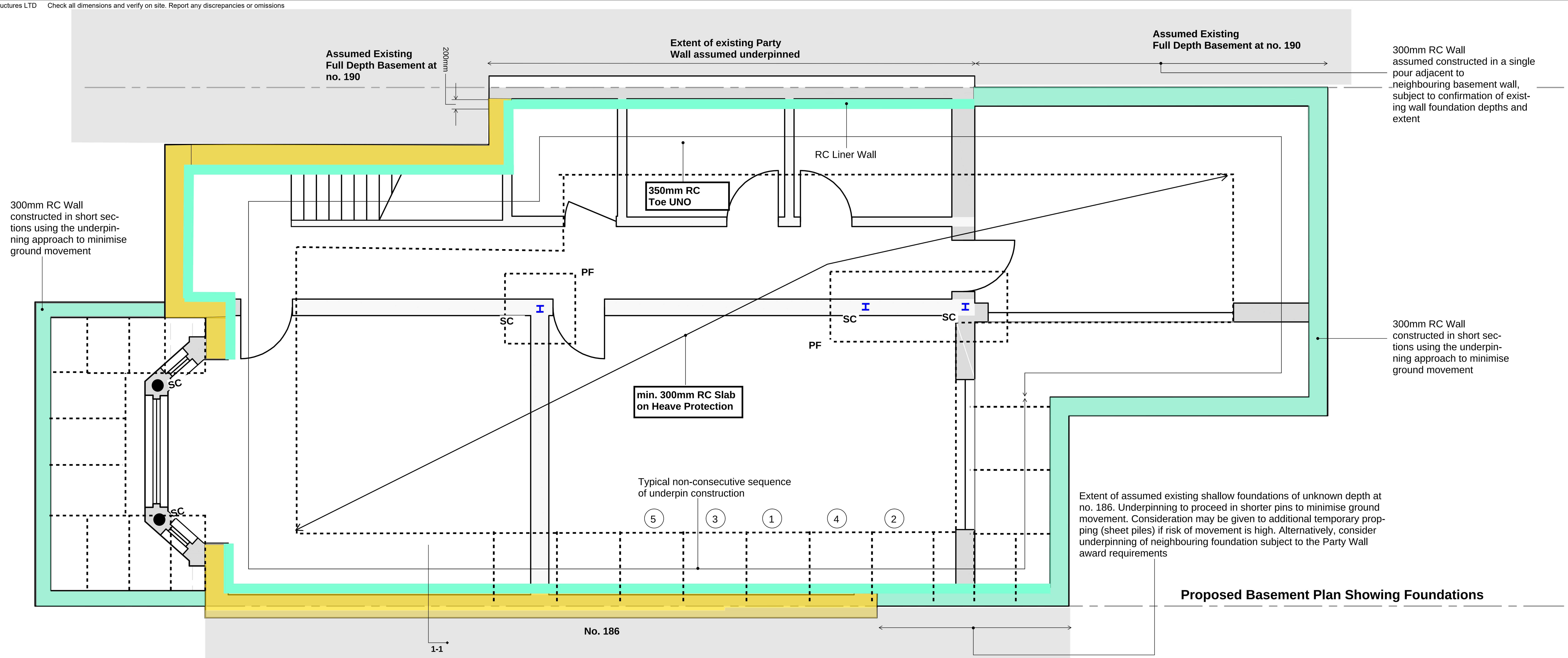
6.3. A movement monitoring regime with a traffic light system ("green" – no action; "amber" – increase frequency of readings and notify relevant parties; and "red" – implement agreed measures and/or stop work) will be employed during construction. The aim of the monitoring will be to establish the amount of vertical and horizontal structural movement such that any structural damage recorded can be no worse than Category 1 on the Burland Scale.

6.4. Movement trigger levels are to be agreed with the Party Wall Surveyors and implemented accordingly.

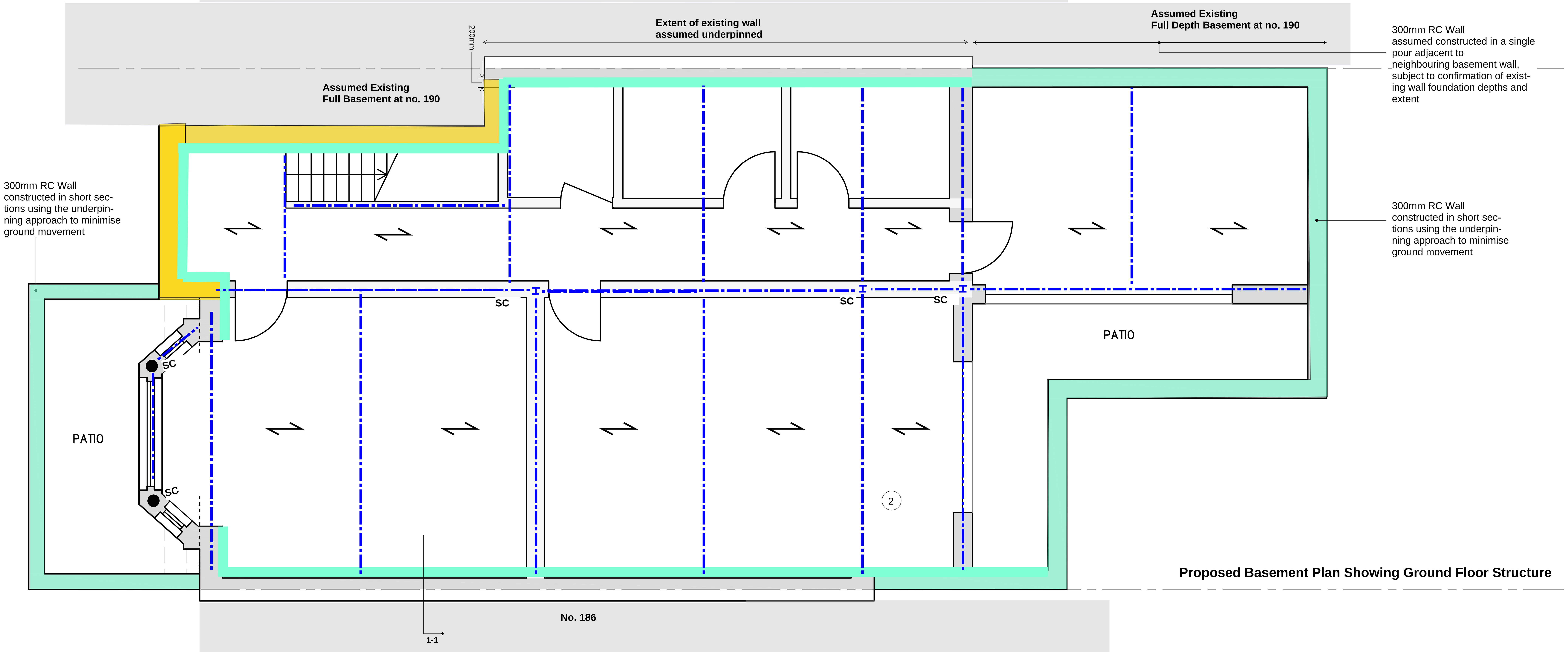
6.5. Assuming high standards of workmanship, close co-ordination between the temporary and permanent works engineer and the correct implementation of movement monitoring, minimal ground and structural movement is anticipated during construction.

Appendix 1:

Preliminary Structural Drawings



Proposed Basement Plan Showing Foundations



Proposed Basement Plan Showing Ground Floor Structure

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ONLY STATUS C DRAWINGS TO BE USED FOR CONSTRUCTION.

Key
Existing Structure
Structure to be demolished
Steelwork
Reinforced Concrete Wall
RC Concrete Underpinning of existing wall
New min. 150mm composite slab of normal weight concrete on Comflor60 steel profiled decking or equivalent; reinforced with mesh in the top face

PF RC Pad Foundation
SC Steel Column
SB Steel Beam

NOTE:
Refer to Architect's details for finished floor levels, build up and setting out

NOTE:
All basement reinforced concrete element (slab and wall) to comprise water-resisting admixtures (Caltite or equivalent). Refer to waterproofing specialist's information for further details. Where new R.C. construction is not adopted, allow for the existing masonry basement walls to be waterproofed using two methods of protection (i.e. internal barrier and drained cavity system)

Revision	Date	Description	Issuer
P1	25.10.24		

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Client	Mrs. Elsa Benchimol
Project	188 Goldhurst Terrace London NW6 3HN
Title	Proposed Basement Plans

Drawn by	Checked by	Scale	Sheet Size
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Proj. No.	Doc. Type	Drg. No.	Rev
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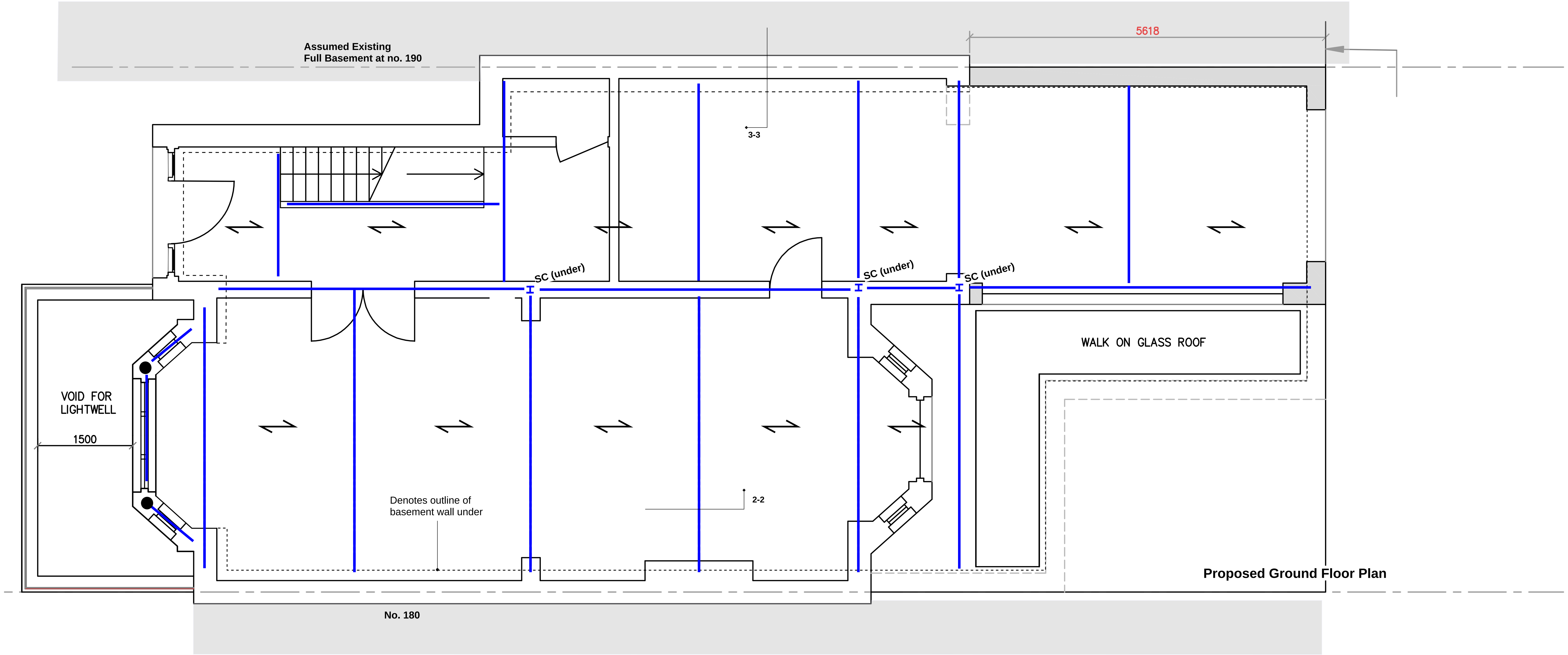
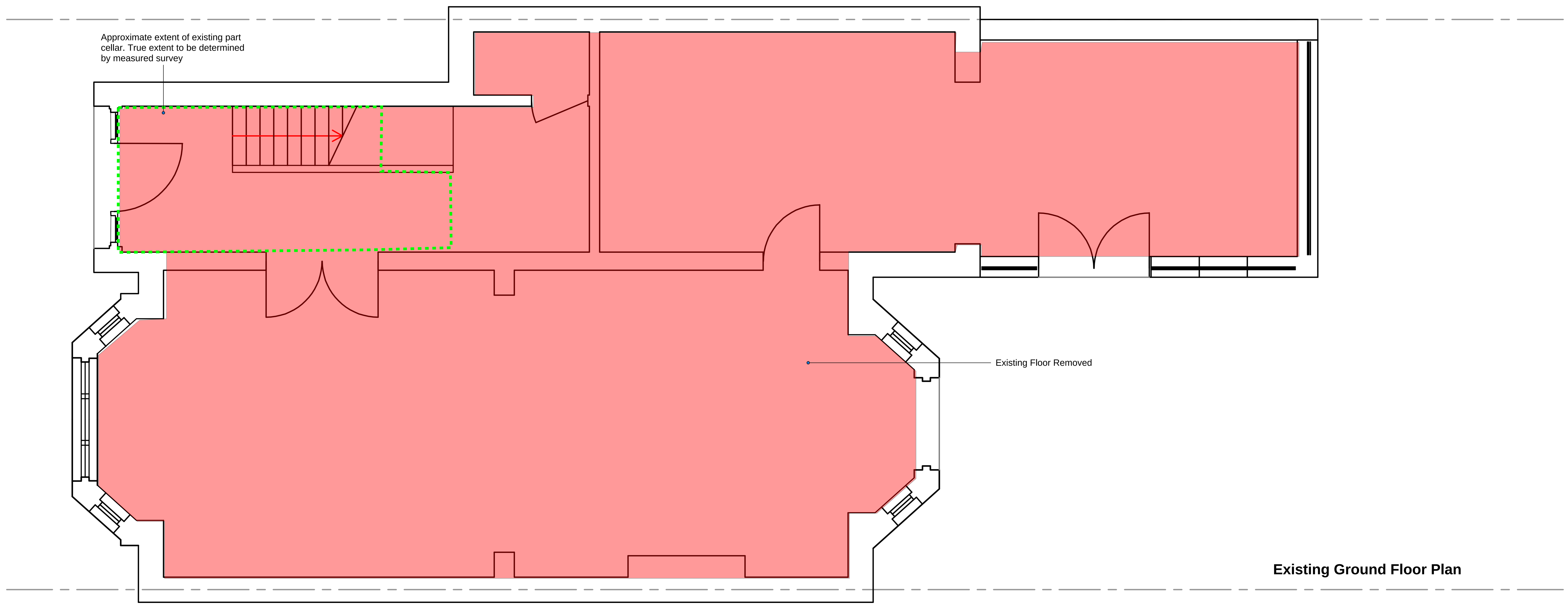


Proposed Ground Floor Plan



Existing Ground Floor Plan

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Key	
(grey fill)	Existing Structure
(red cross-hatch)	Structure to be demolished
(blue dash-dot line)	Steelwork
(green fill)	Reinforced Concrete Wall
(yellow fill)	RC Concrete Underpinning of existing wall
(span arrow)	New min. 150mm composite slab of normal weight concrete on Comflor60 steel profiled decking or equivalent; reinforced with mesh in the top face

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Proj. No.	**Doc. Type**	**Drg. No.**	**Rev**
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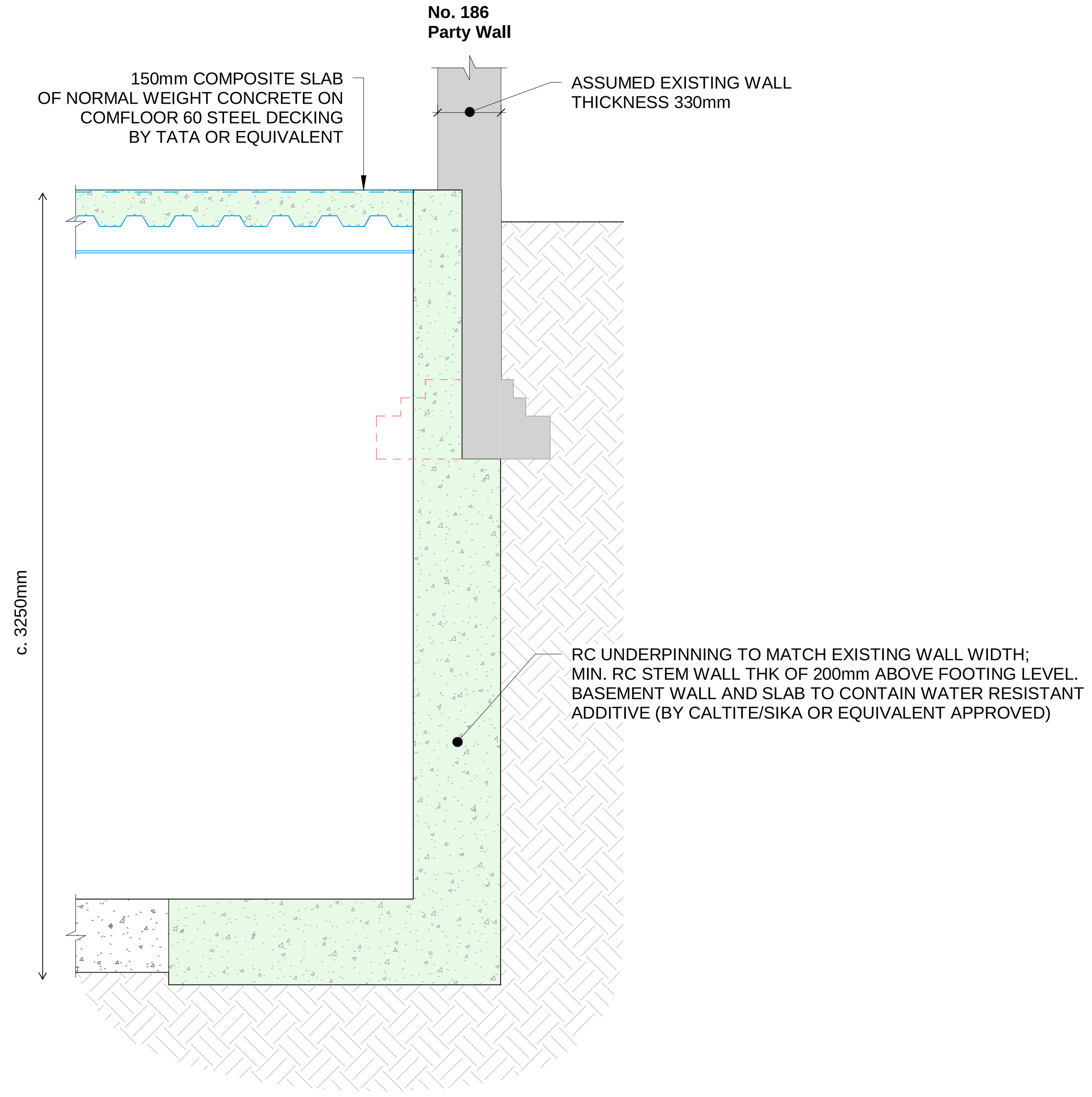

① **Section 1**
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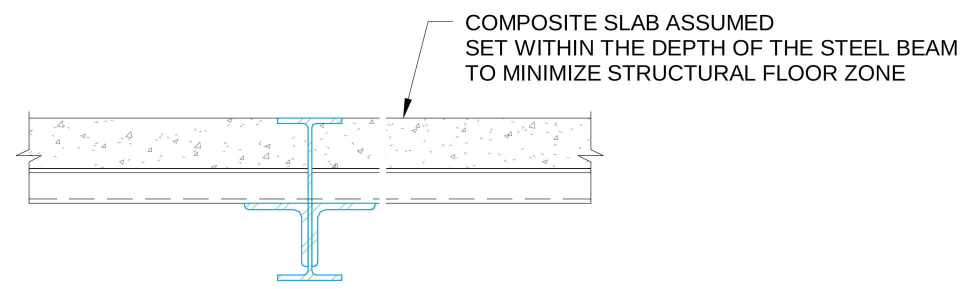
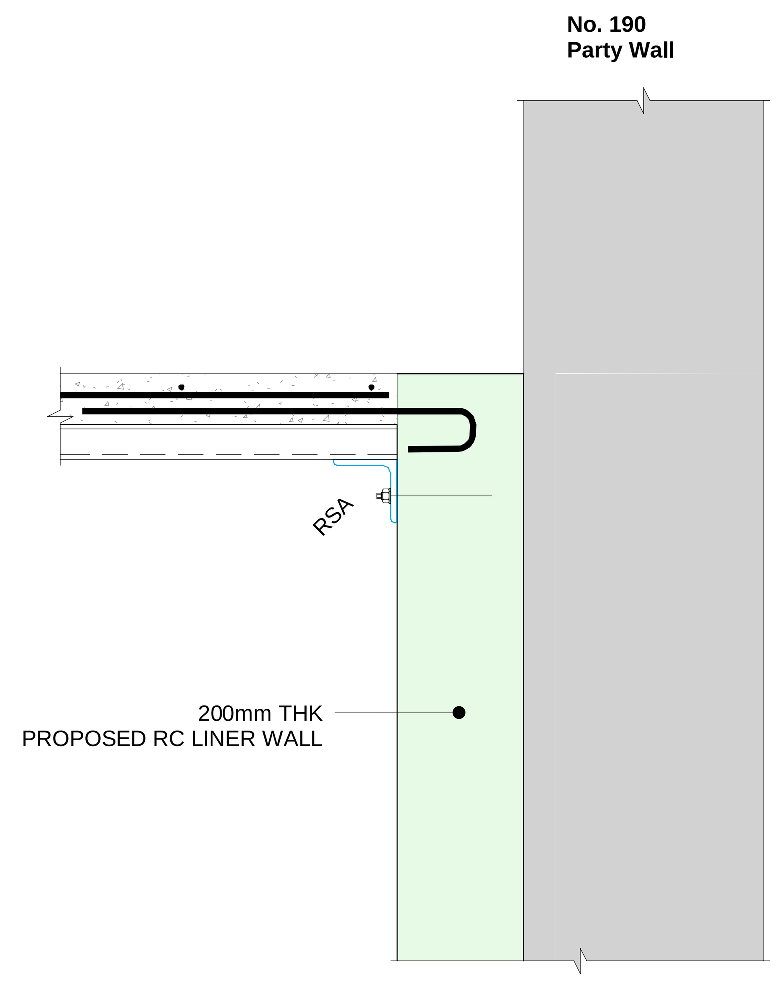


Typical Section Through Steel Beam
1 : 10

② **Section 2**
1 : 10



③ **Section 3**
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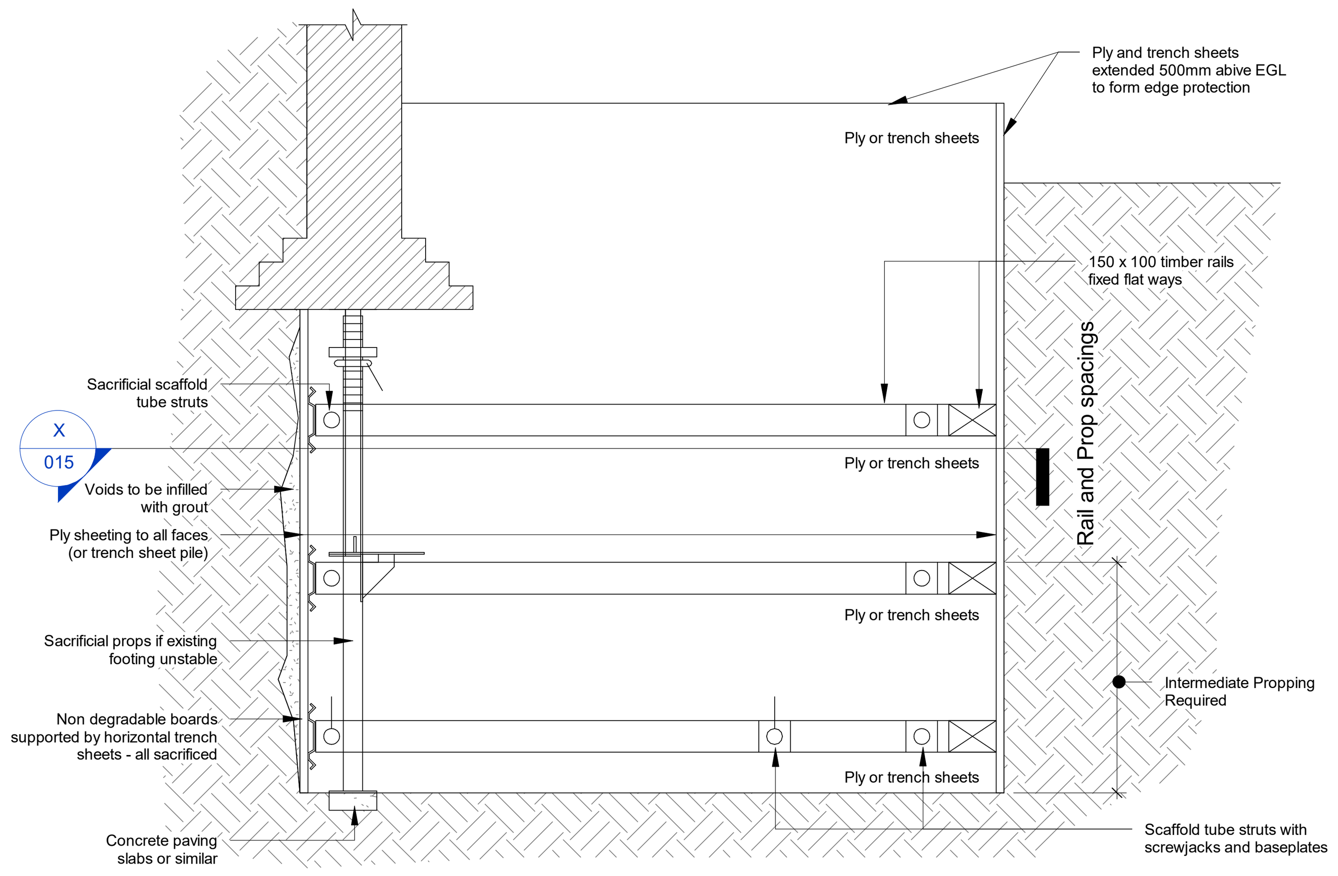
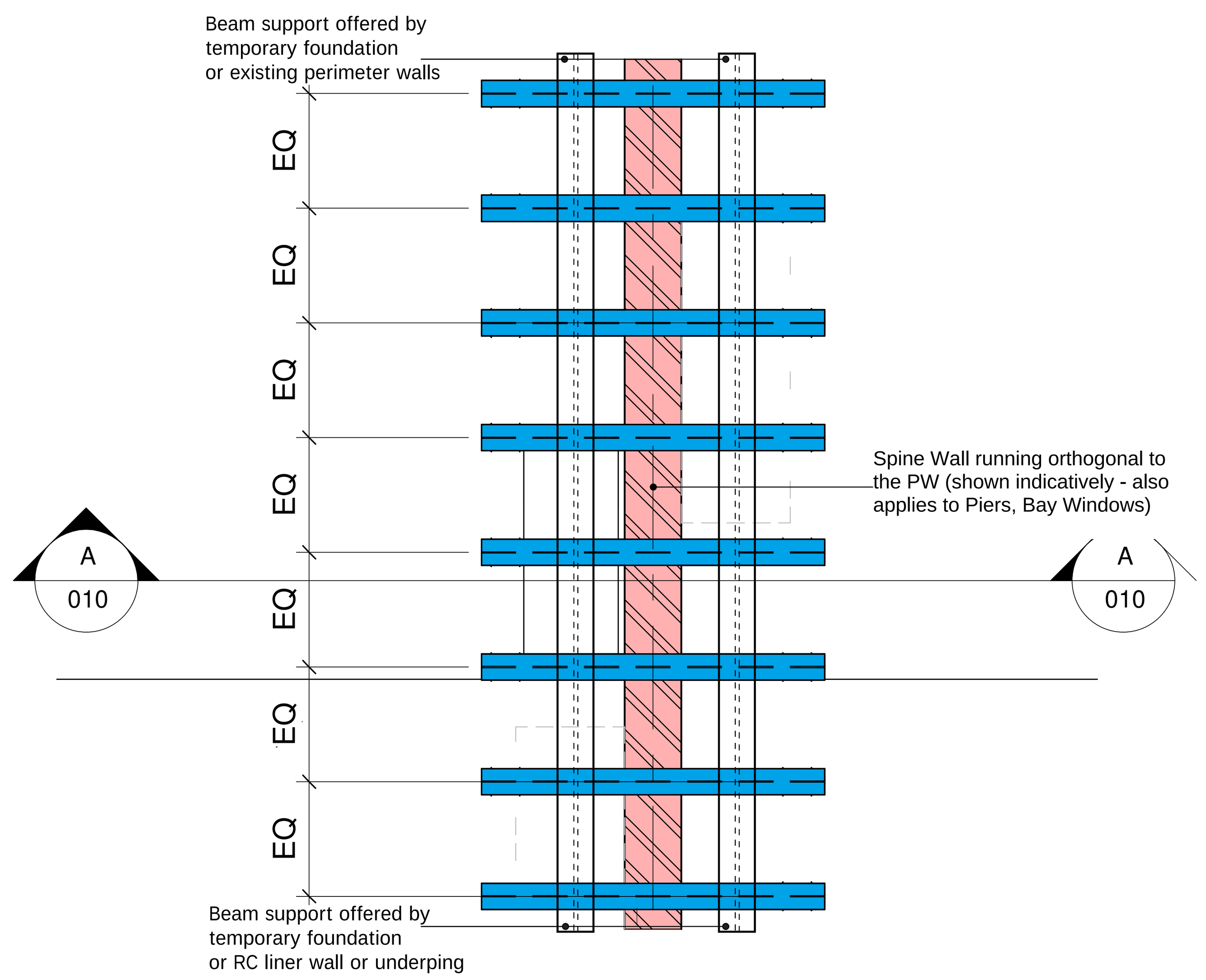
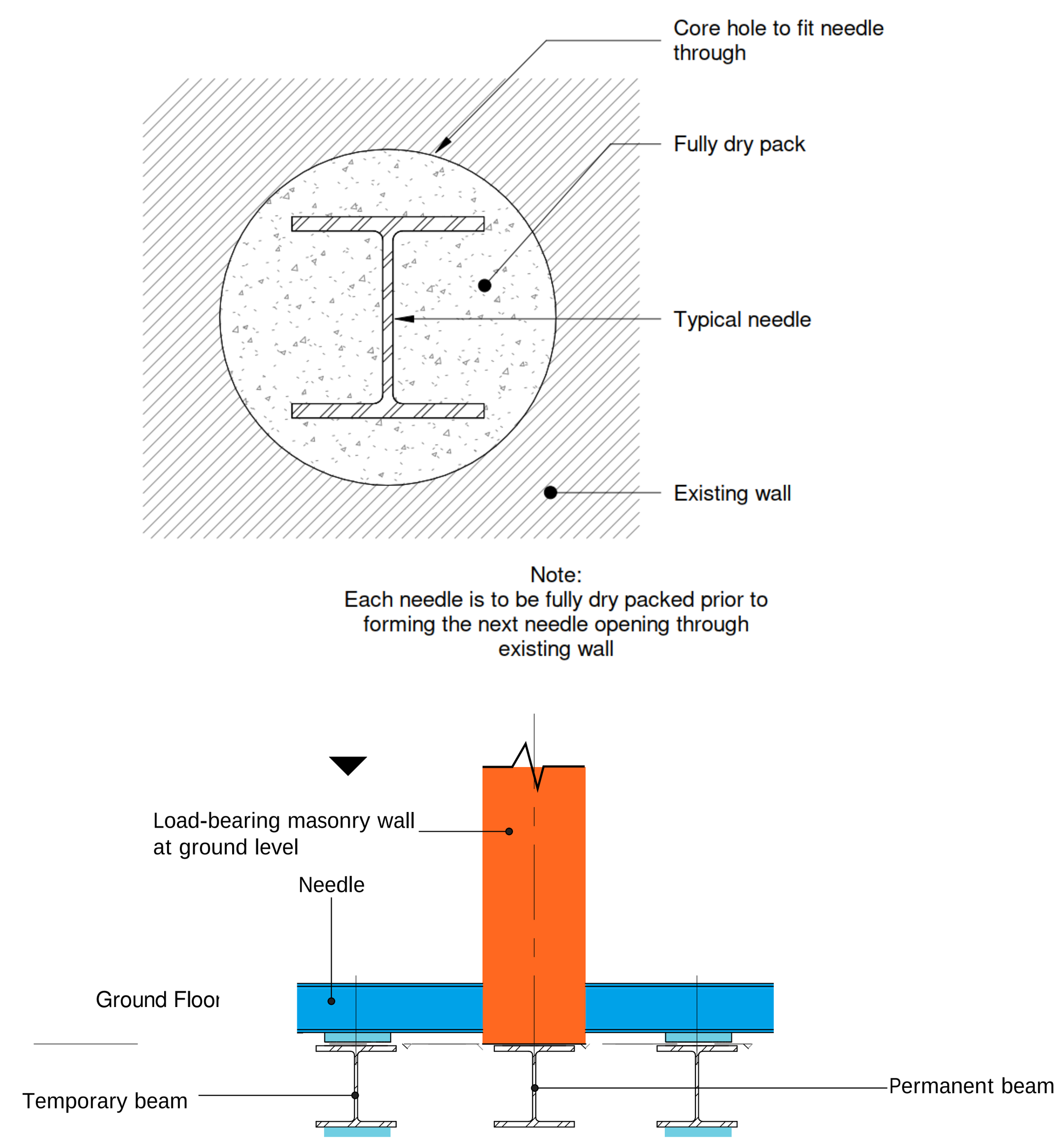


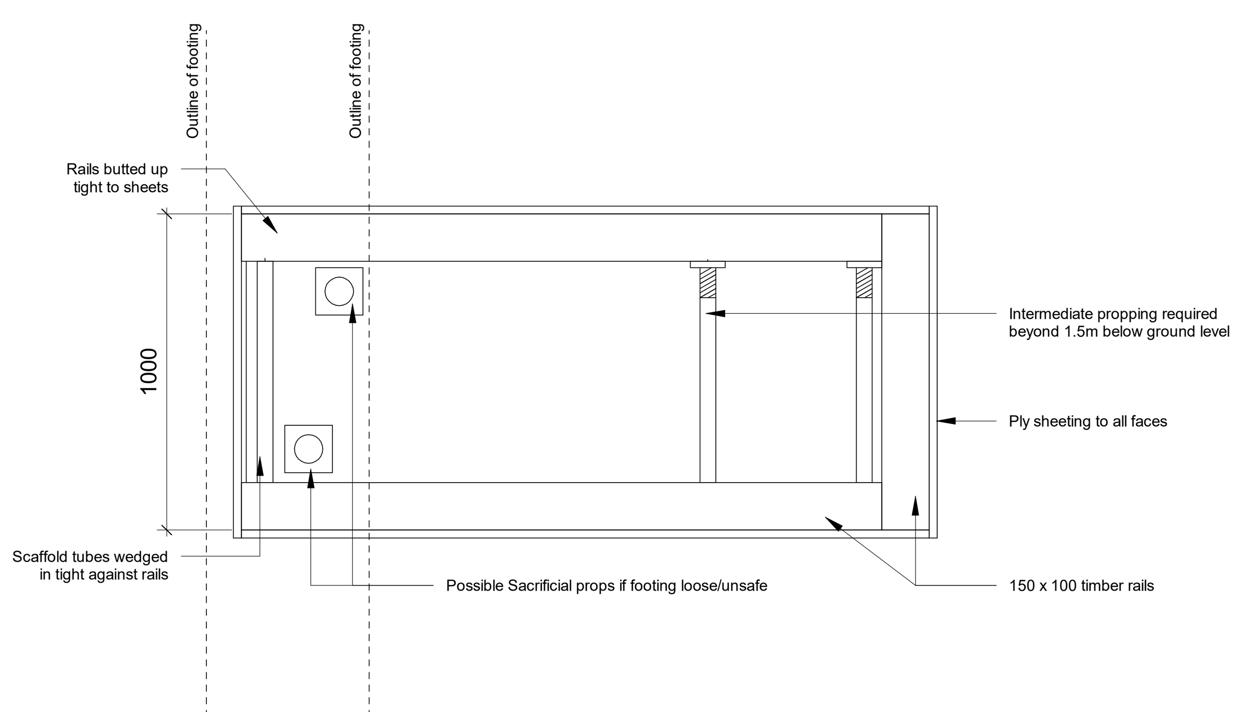
Indicative underpinning temporary works for existing walls
1 : 20



Temporary Works - Plan View



Section A-A



Section X
1 : 20

Note: Indicative temporary works that allow the installation of steel beams to the underside of existing internal loadbearing walls at ground level

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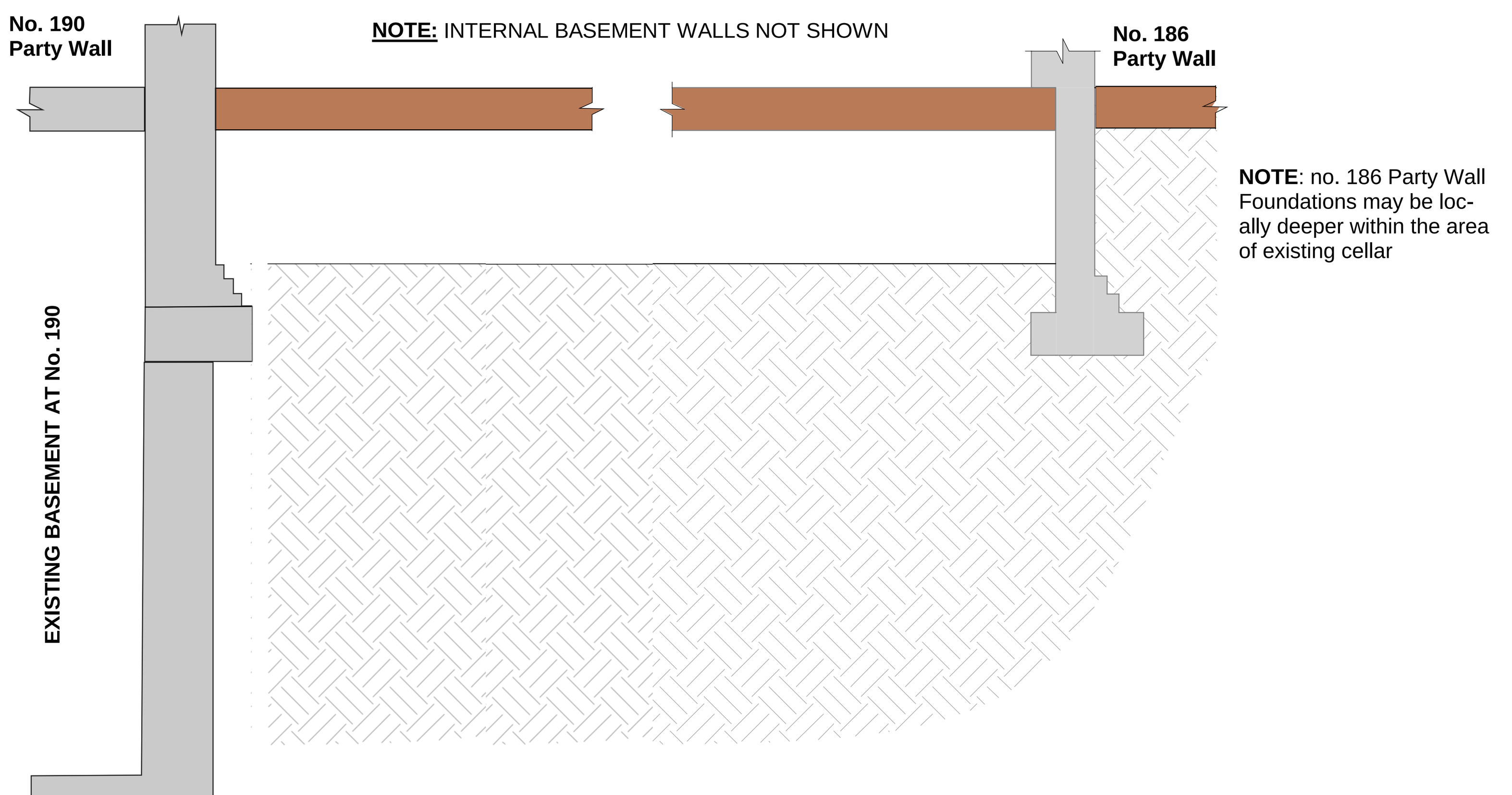
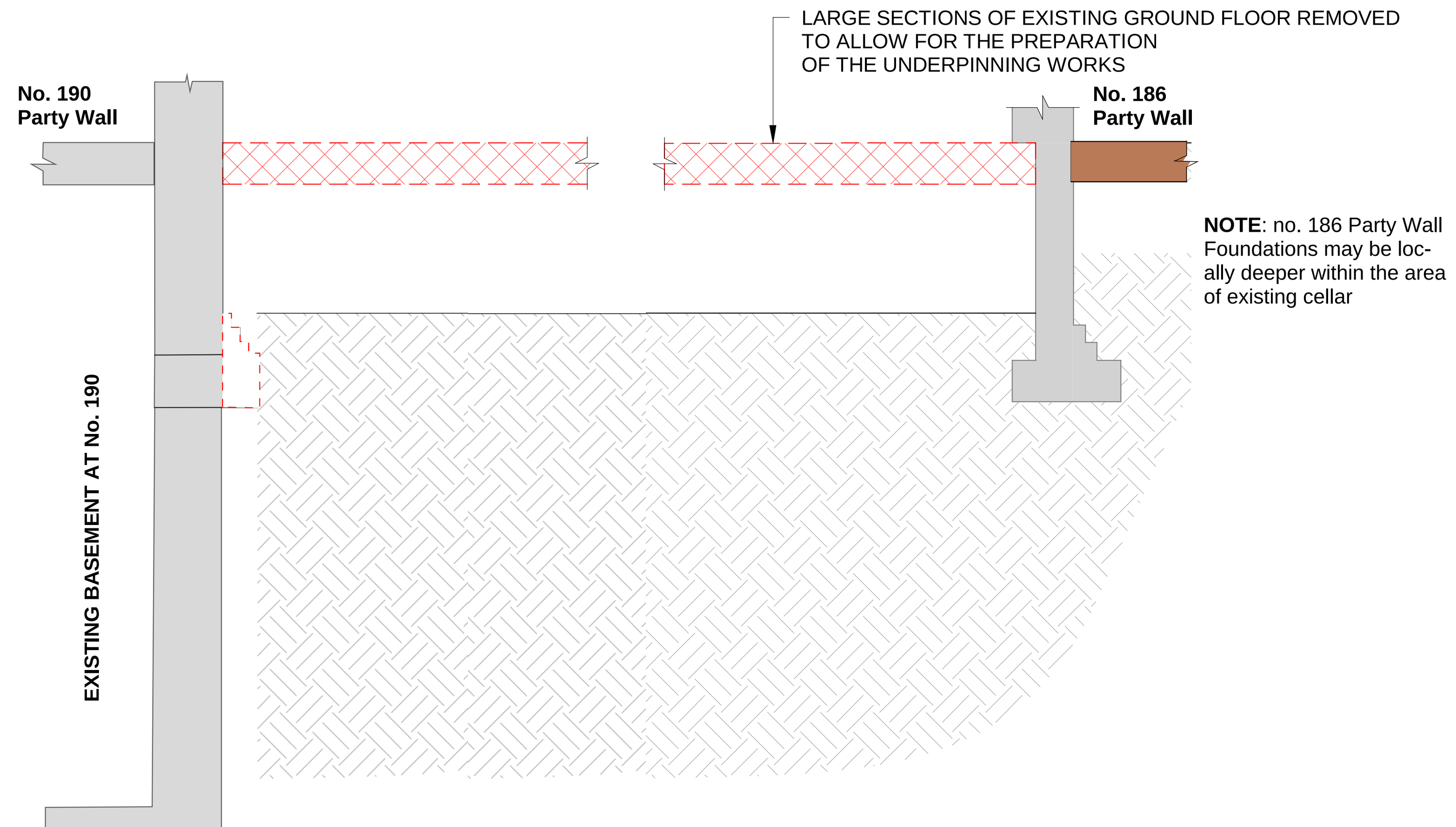
24122	D	003	P1



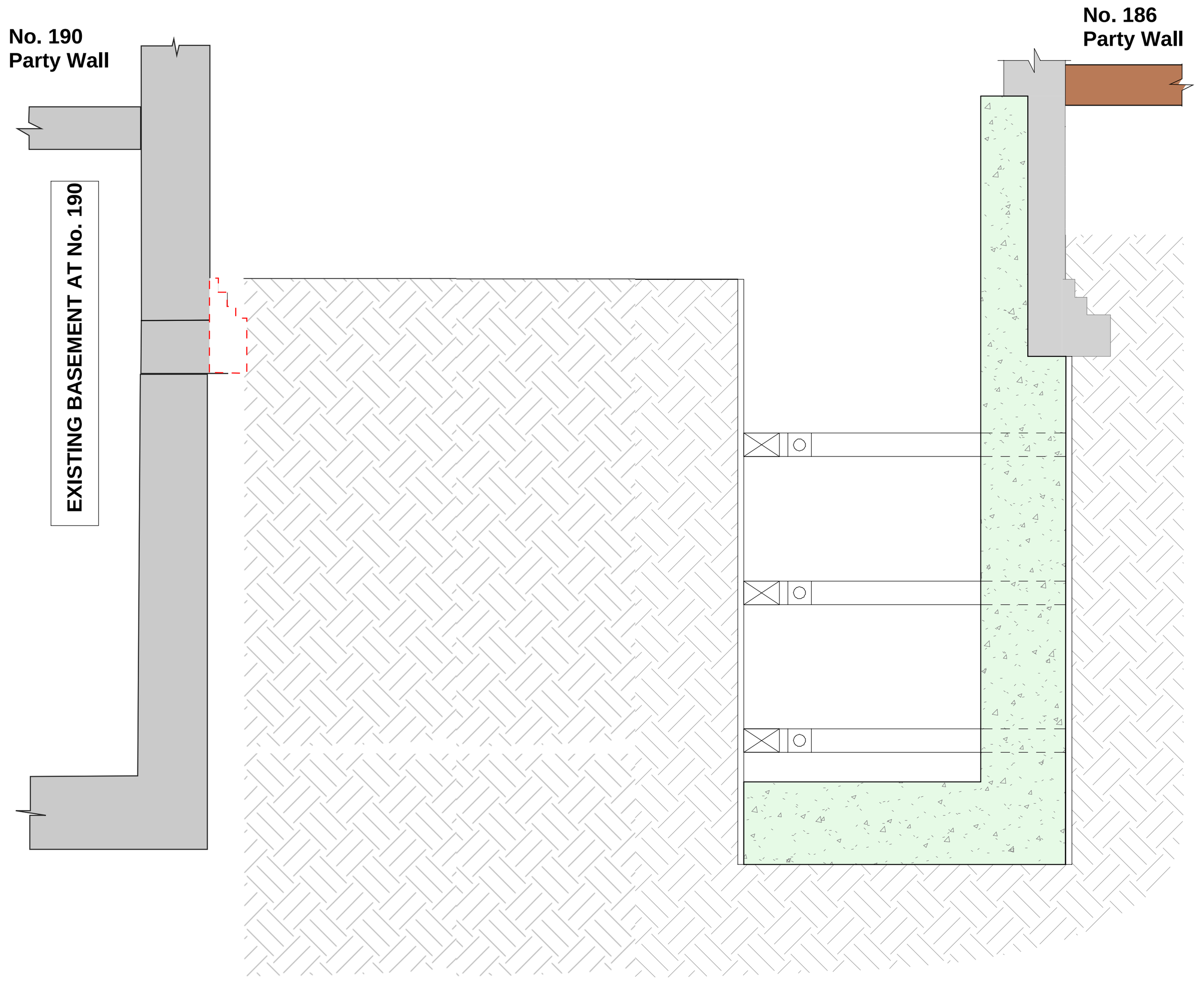
STAGE 0 - Part Basement

- Existing Construction



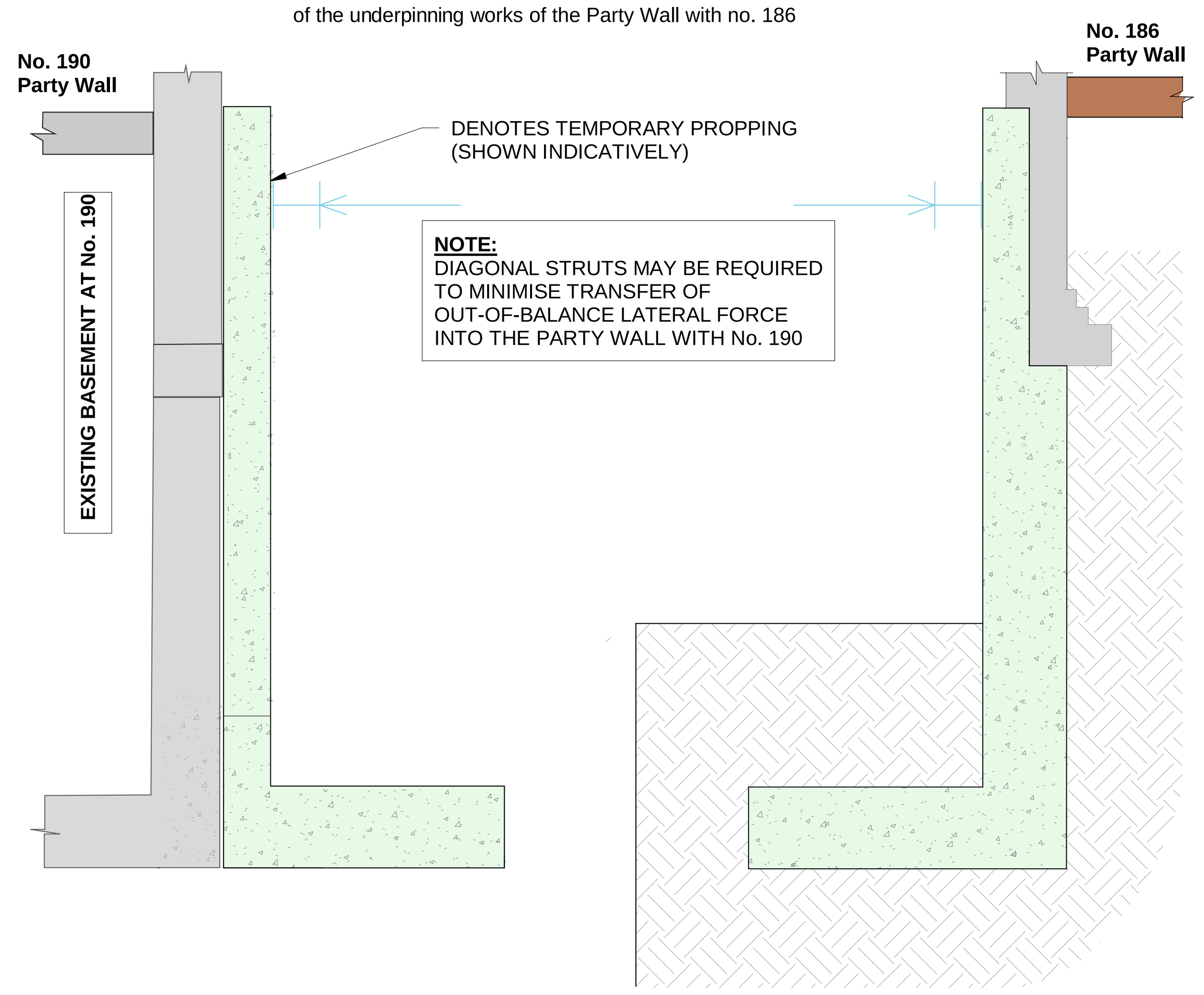
STAGE 1 - Part Basement

- Remove sections of the ground floor timber to allow for the preparation of the underpinning works of the Party Wall with no. 186



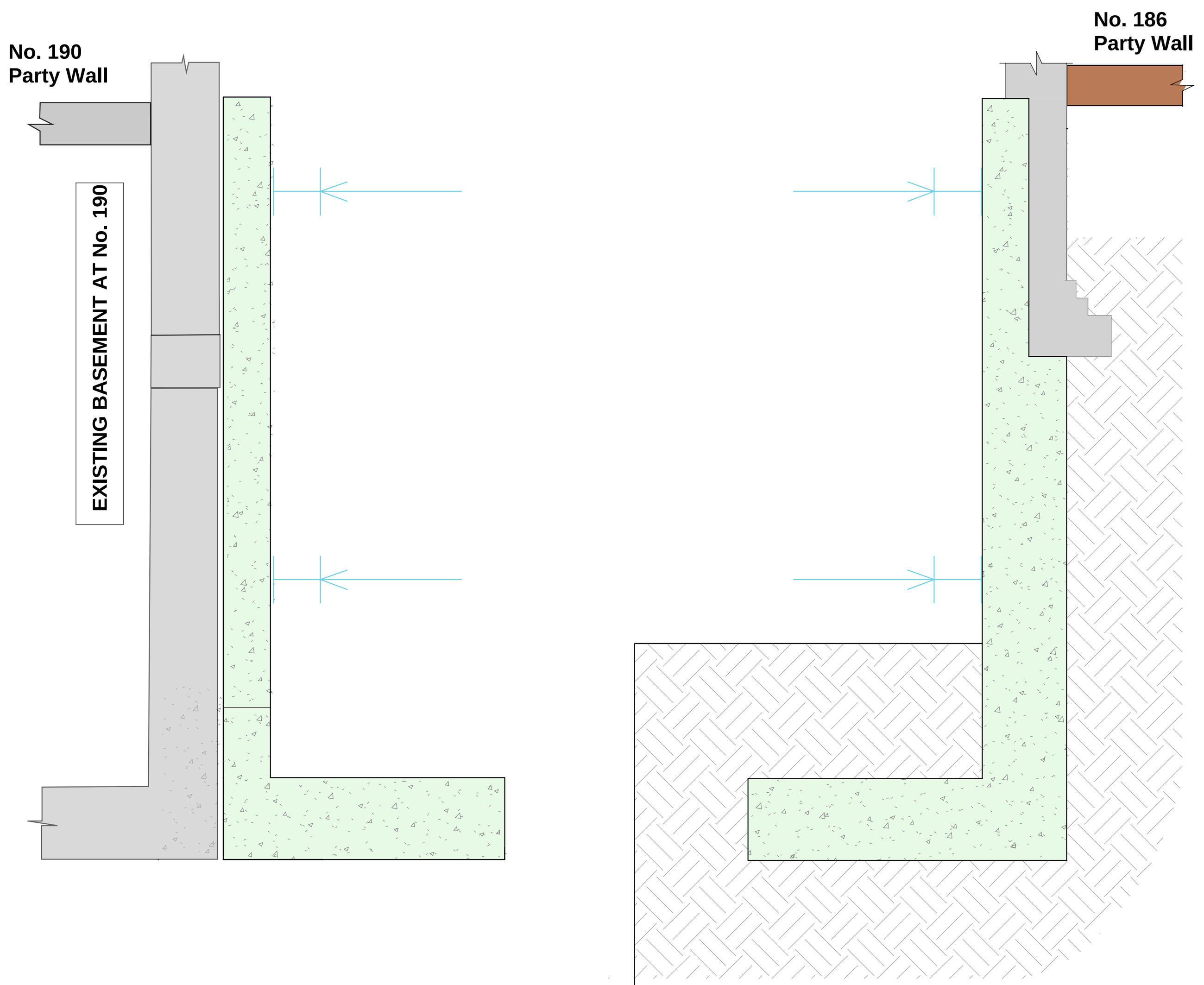
STAGE 2

- Excavate for underpin
- Install temporary excavation propping
- Construct R.C. toe with projecting rebars installed to achieve lapping with the slab and neighbouring toes; and mass concrete underpin
- Construct R.C. stem wall and dry pack
- Back-fill excavation
- The above steps are to be repeated for each underpin



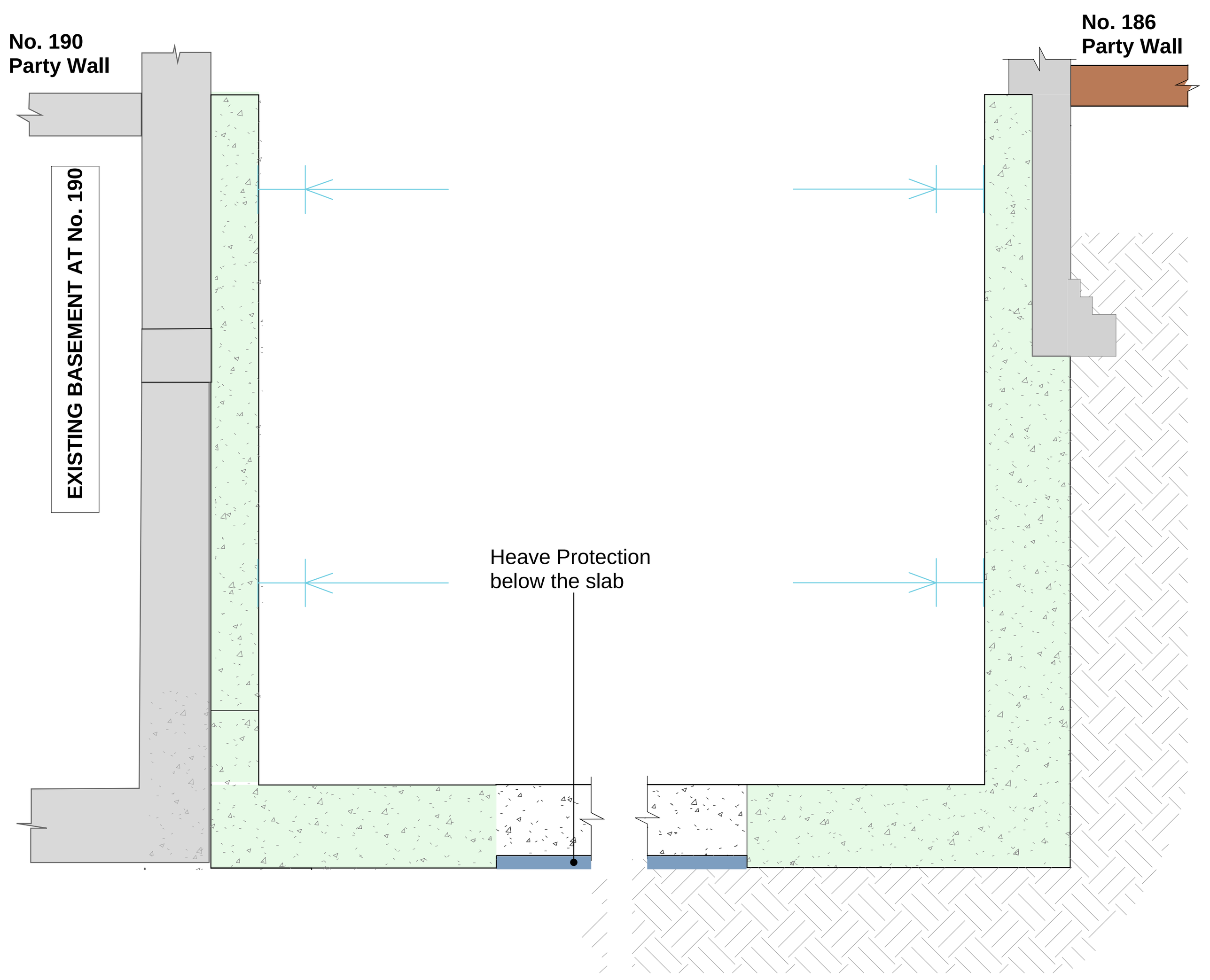
STAGE 3

- Complete underpinning works
- Construct the RC liner wall in large sections along the Party Wall with no. 190
- Reduce formation levels slightly to allow for the installation of the upper level of temporary propping, which will likely comprise walers and struts



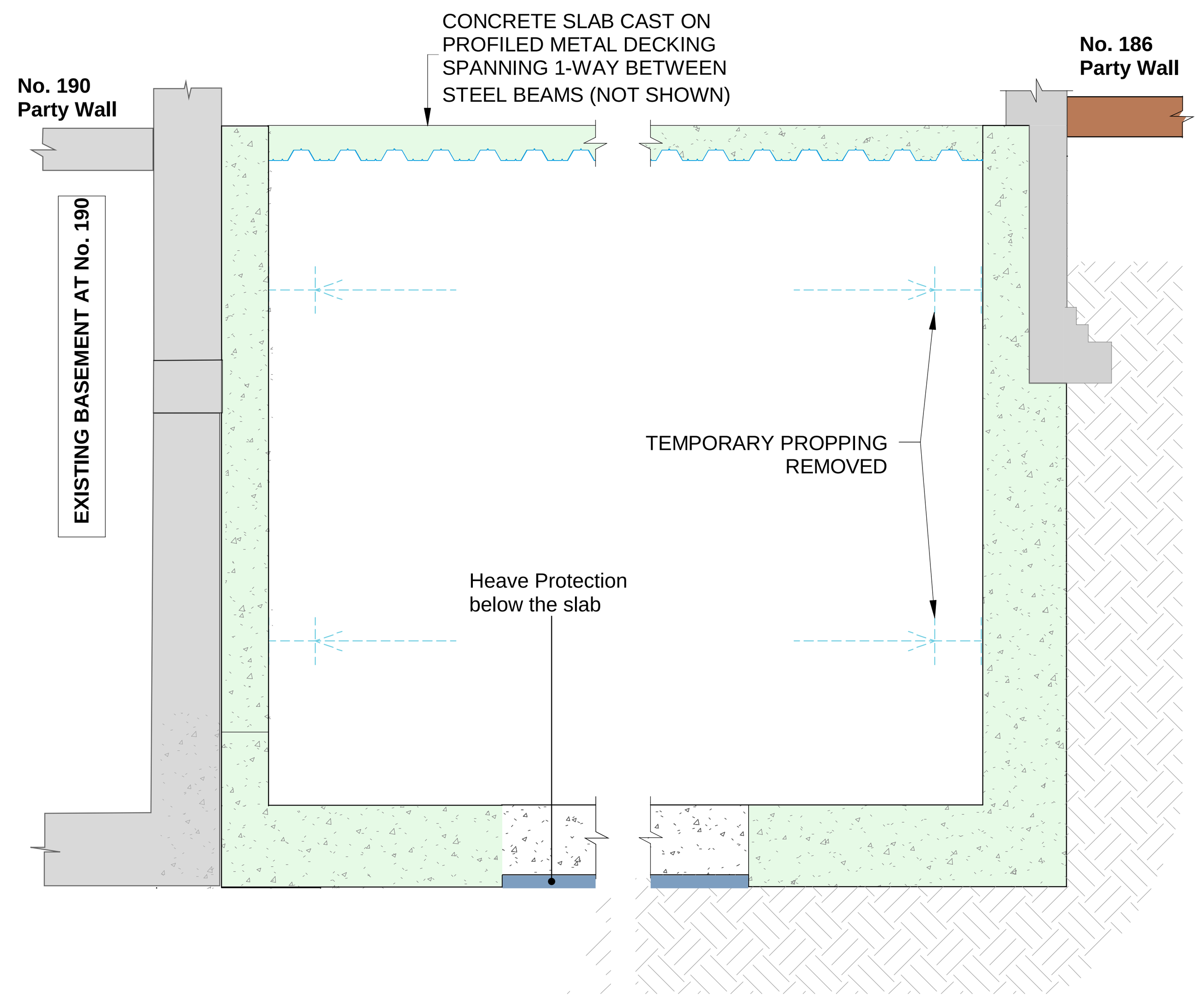
STAGE 4

- Reduce formation levels further, following the installation of upper level of temporary propping
- Install second level of temporary propping



STAGE 5

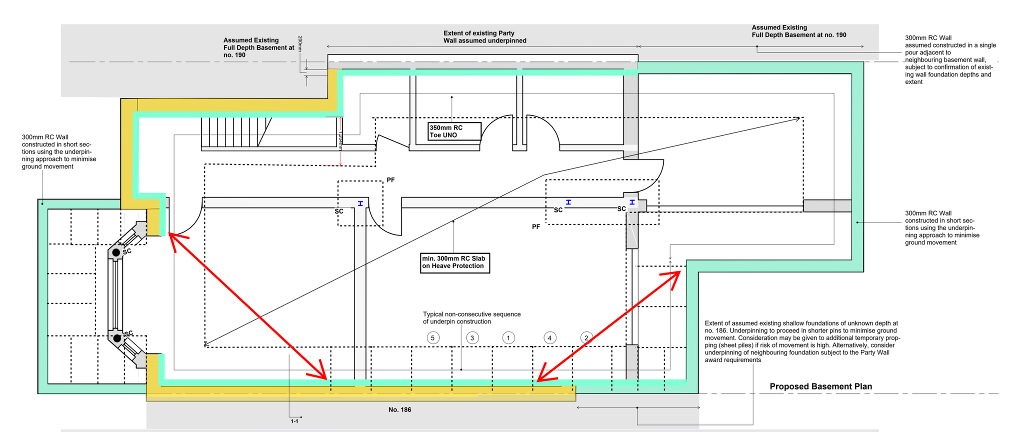
- Once the temporary propping has been installed, proceed with partial excavation of the basement.
NOTE: Full basement excavation is also possible, providing the internal load-bearing walls are temporarily supported.
- Lay the reinforcement and construct the RC basement slab.



STAGE 6

- Once the R.C. basement slab has been constructed, remove the low level temporary propping.
- Erect steel columns and ground floor steelwork.
- Cast the ground floor slab and remove the upper level propping.
- Basement construction complete.

NOTE:
DIAGONAL STRUTS MAY BE REQUIRED TO MINIMISE TRANSFER OF OUT-OF-BALANCE LATERAL FORCE INTO THE PARTY WALL WITH No. 190 (STRUTS SHOWN INDICATIVELY BELOW)



Indicative Basement Key Plan

1 : 100

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4. ALL WORK IS TO BE DONE IN ACCORDANCE WITH THE RELEVANT SPECIFICATIONS ISSUED BY DVP STRUCTURES, BRITISH STANDARD CODES OF PRACTICE, STATUTORY REQUIREMENTS AND THE CONTRACT DOCUMENTS.
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C : CONSTRUCTION - FULLY DEVELOPED DRAWINGS ISSUED UNDER INSTRUCTION FOR CONSTRUCTION

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Revision	Date	Description	Issuer
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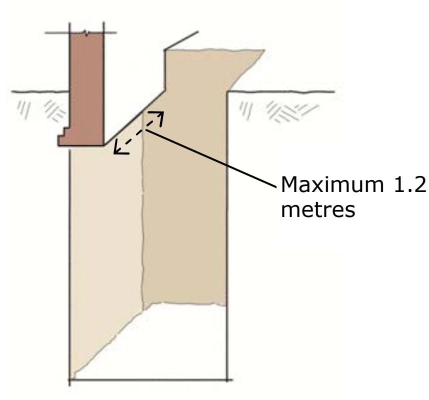
Client	Mrs. Elsa Benchimol
Project	188 Goldhurst Terrace London NW6 3HN
Title	Indicative Basement Construction Sequence

Drawn by	Checked by	Scale	Sheet Size
MA	VP	As indicated	A1

Proj. No.	Doc. Type	Drg. No.	Rev
24122	D	004	P1

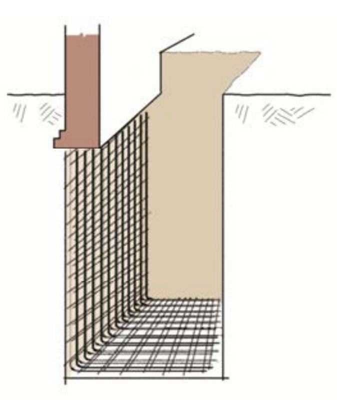
Appendix 2:

Diagram of a typical RC Underpin Construction



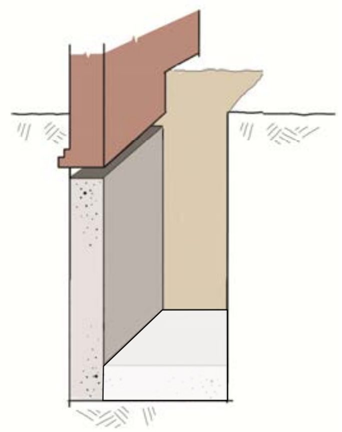
1. Excavation must be fully supported by props and shoring.
2. Edge protection to prevent falls into the excavation must be installed.
3. A temporary vertical prop or support may be placed under the wall to keep any loose bricks or masonry in place.
4. The main load from the existing wall will span onto the wall and foundations on either side of the excavation.

Stage 1. Excavation



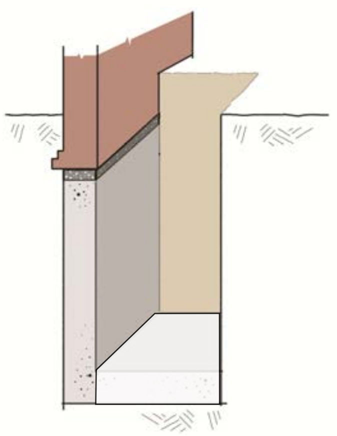
1. Reinforcement is fixed into position.
2. Reinforcement details are given in the engineering design. It is critical that the reinforcement is installed as detailed in the design
3. The design will usually require a shear connection between adjacent underpins. This is generally achieved using dowel bars between adjacent pins or by building sheer keys in the concrete underpin walls.

Stage 2. Reinforcement



1. Concrete is placed in the toe first.
2. Once the toe is sufficiently cured the concrete wall is poured.
3. Shuttering, usually timber, is used to hold the concrete for the wall in place while it is placed.
4. Gap of approximately 75mm left between the top of the concrete and the underside of the existing foundation.

Stage 3. Concrete placement



1. After a minimum of 24 hours dry-pack is rammed into the 75mm void that has been left above the new underpin.
2. Dry-pack is a mix of sharp sand and cement. It is easy to handle and has a low shrink volume, minimising settlement of the wall onto the new underpin foundation.
3. The completed underpin must be supported horizontally either by horizontal propping or by backfilling the excavation until the ground slab and possibly other permanent works are constructed.

Stage 4. Dry packing

Typical underpin construction sequence