The Old Dairy, WC1

Structural Engineering notes describing the proposed retention of the Northern Boundary Wall during both the Construction Works, and as part of the proposed development

Prepared for

WX Investments Ltd

January 2015

1492/11/TR 16 January 2015

The Old Dairy WC1

Structural Engineering notes describing the proposed retention of the Northern Boundary Wall during both the Construction Works, and as part of the proposed development

1.0 Introduction

We have been asked by WX Investments Ltd to prepare the following notes and drawings describing how the boundary wall to the North of the Old Dairy site is retained, both in the permanent case as part of the proposed redevelopment of the site, and in the temporary case during construction.

These notes are based on:

- Visits to the building
- Our desktop research of the site
- A site investigation carried out by Site Analytical in December 2014
- A topographical and plumbline survey by Aworth
- Our work on developing the structure scheme for the new development
- Our knowledge of buildings of this age and construction
- Our assumed sequence of construction for the whole development

These notes and drawings are to be submitted by the Architect S333 Architecture in response to condition number 9 in the planning consent previously obtained from the London Borough of Camden.

2.0 History and Geology

This is a brief summary of the development of the site based on historical maps for the area. A copy of the maps is included in Appendix A.

- 1740 Bloomsbury and St George's burial grounds have been laid out to the south of the site.

 The Foundling hospital is to the south of the burial grounds.
- 1815 Sidmouth Street to the north and Hunter Street to the west of the site are developed with terraced houses.
- 1862 The site is developed to produce a row of mews houses for houses on Regents Square. Wakefield Street and the surrounding area are largely developed.
- 1894 The burial ground has been converted into St George's Gardens.
- 1945 One of the mews houses on site is noted as having some light structural bomb damage. Many of the houses in the local area are shown to have significant structural damage.
- 1973 The mews houses have been demolished and replaced with the dairy building in its current form.

A site investigation, which included three 25m deep boreholes, has confirmed the following ground conditions beneath the site: approximately 1.5m of made ground, overlying 5m of brown, sandy, gravelly clay, overlying dark grey London clay. No groundwater was encountered in any of the boreholes during the works. Several trial pits were also excavated to a depth of up to 1.5m to expose the form and condition of the existing foundations to the north wall and elsewhere on the site, and to allow a more detailed investigation of the near-surface ground conditions. The results of the Site Investigation are summarised on drawing 1492/11/SK16 in Appendix B.

3.0 Form and Condition of Existing structure

Refer to drawings 1492/10/01-03 in Appendix B which illustrates our understanding of the existing structure to the Old Dairy buildings.

The summary shows the existing boundary wall to the north of the site to be a solid, 330mm thick brickwork wall. This wall supports the existing roof structure to the Old Dairy, which in turn provides horizontal restraint to the top of the wall. This wall is also restrained horizontally by the return garden walls to the terraced houses on Regent Sq, where they abut the boundary wall, as well as by some internal walls to a mezzanine structure within the Old Dairy. This is shown on drawing 1492/20/SK14 in Appendix C.

Trial pits have shown the north boundary wall to be founded on shallow mass concrete strip foundations bearing into the brown, sandy, gravelly clay. The vertical plumbline survey has shown that the north boundary wall is generally plumb.

4.0 Brief Description of the Proposed Scheme and Proposed Restraint to Boundary Wall

It is proposed to develop the site with a mixed use, office and residential development. This involves removing the existing building, with the exception of the north boundary wall and constructing a new 2 storey building with a basement.

The design of the proposed new structure has therefore been specifically developed to enable the north boundary wall to be kept in place during the proposed construction works and as an integral part of the proposed new development.

The following notes describe how we have assumed the whole scheme will be developed, and then in more detail how the north boundary wall is temporary supported at all stages during his phased construction including as part of the new buildings.

To allow a basement to be built close to the line of the north boundary wall, the wall it is to be underpinned. A reinforced concrete lining wall will be built in front of the concrete underpins, to span vertically between the new basement slab, and a reinforced concrete beam at ground floor level, which in turn will span between new party walls between each of the residential and office units. Above ground floor level, the existing boundary wall is to be strengthened by the addition of a new 225mm thick skin of reinforced brickwork, tied to the existing brickwork, so that it too can span between the party walls between the units. This is illustrated in the permanent case on drawing 1492/11/SK14 in Appendix C.

5.0 Sequence of Construction assumed in the design

5.1 **Overall Phasing**

Because of the long and relatively narrow shape of the site, and the limited access to the site from Wakefield Street, we have assumed that the works will be phased so that

access for construction, plant and materials can be maintained throughout the construction. Drawing 1492/11/SK15 shows how we have assumed the works are phased and how access and egress across the site is maintained at each stage of the works. This can be summarised as follows:

Phase I:

This involves providing site accommodation/storage on the southern west corner of the site and using the current access to enable the basements to the residential units to be built up to and including their ground floor slab so they are self-stable structures. Temporary propping to restrain the existing boundary wall is installed at the beginning of this phase, prior to the removal of the existing Old Dairy structure.

Phase II:

This maintains the existing site access but moves the site accommodation/site storage to be on top of the part-built residential units, allowing construction of the southern half of the office building up to and including the ground floor slab.

The ground floor slab beneath the new office accommodation/site storage will need to be temporarily propped off the basement as necessary.

Phase III:

Access to the site is switched over to be on top of the completed ground floor to phase II with appropriate temporary protection and propping as required.

The final part of the office development can now be built up to and including the ground floor slab, and the proposed link at basement level to phase II.

Phase IV:

Following completion of phase III the current access to the site can be reinstated over the basement link between the office buildings, with appropriate temporary protection and propping to this structure. This will also become the permanent access to the site.

The above ground construction can now proceed on all the residential and office buildings, probably working from the east to the west to help to reduce congestion on site.

The contractor may well be able to overlap the works described in these phases, such as by constructing the above ground structure to phase I whilst phase II and III are being constructed.

5.2 Restraint to North Boundary wall

Drawing 1492/11/SK14 illustrates in principle how restraint is currently provided to the boundary wall, how we have assumed it will be restrained during construction, and how it is proposed to be restrained in the permanent case as part of the proposed development. The Contractor will be required to monitor the wall for movement throughout the works, carrying out visual inspections daily, and recording the vertical and horizontal movement of fixed points on the wall on a weekly basis.

We will set trigger levels for the extent of movement anticipated as a result of the works, based on the sequence described below, which the movement monitoring work will be measured against.

5.3 Assumed sequence of construction affecting the North Boundary Wall

1492/11/SK01 to SK 13 in Appendix C shows the sequence of construction we have assumed in the design of the new structure for the north Boundary Wall based on the phasing outlined above.

This can be summarised as follows:

Phase 1

- a) Site set up and strip out all non-structural finishes from the building.
- b) First level of underpinning to boundary wall in the location of the proposed temporary restraint towers.
- c) Second level of underpinning to boundary wall and works to form the bases for the temporary restraint towers
- d) Erect temporary restraint towers, and install waling beams to hold boundary wall in place following demolitions of the existing structure and during the construction of the new buildings.
- e) Complete the remaining underpinning works to the boundary wall
- f) Install temporary pad footings and raking props to the Western end of the North Boundary wall
- g) The boundary wall is now held in place by the temporary restraint towers and raking props allowing the careful removal of the existing structure, including grubbing out the existing foundations and below ground drainage. Make good the existing retained North boundary wall immediately where built in structure is removed.
- h) Install sheet piling to the remaining perimeter of the new basement (south, east and west walls).
- Sequentially excavate and prop the excavation, starting at the eastern end of the site, working towards the West. Maintain props to the western end of the north wall.
- j) Construct the new basement slab and walls, removing the temporary props as the restraint they provide is replaced by the new basement slab.
- k) Construct the new ground floor slab and horizontal beam to the north wall, removing any final propping to the basement excavation and north wall once the slab has gained sufficient strength to provide restraint to the walls.

Phase 2

I) Once stage k) has been completed from phase 1, the works to construct the basement and ground floor structure to phase 2, to the South of the site can be carried out. This is to be carried out in a similar fashion to the basement in phase 1, and will not have any significant effect on the north boundary wall.

Phase 3

- a. Once the ground floor structures to Phase 1 and 2 have been completed, the temporary works to the phase 3 are of the site can be adjusted to allow the basement and ground floor slab in this area to be constructed.
- b. The first level of underpinning is to be carried out to the boundary wall to phase 3.
- c. The basement area is then mass excavated to above the base of the phase 1 pins, with temporary waling beams and props installed.

- d. The second level of underpinning, excavation and propping is then carried out.
- e. The new basement and ground floor structure is then constructed, similar to phase

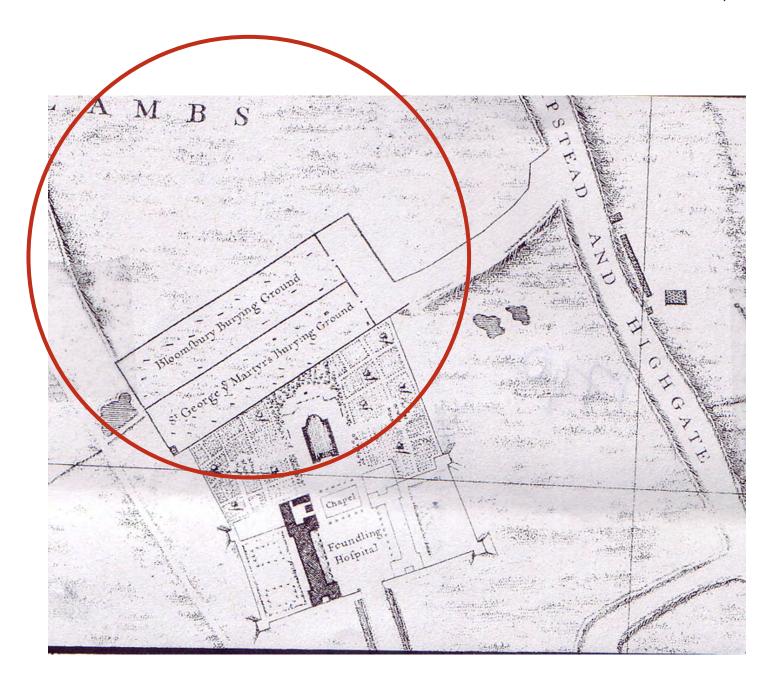
Phase 4

- f. Construct new above ground structure and complete works to thicken the existing boundary wall.
- g. The boundary wall is now held in place by and forms an integral part of the new building allowing the removal of the temporary waling beams and supporting towers, making good any pockets left in the boundary wall.

A monitoring regime will be put in place to monitor ground movements and adjacent buildings as a result of the works. The selected contractor will determine the sequence of construction to be used and this may impact on the detailed design, but it will be a contractual requirement that this meets or reduces the anticipated movement set by the trigger levels for the monitoring works, which will be based on the above sequence.

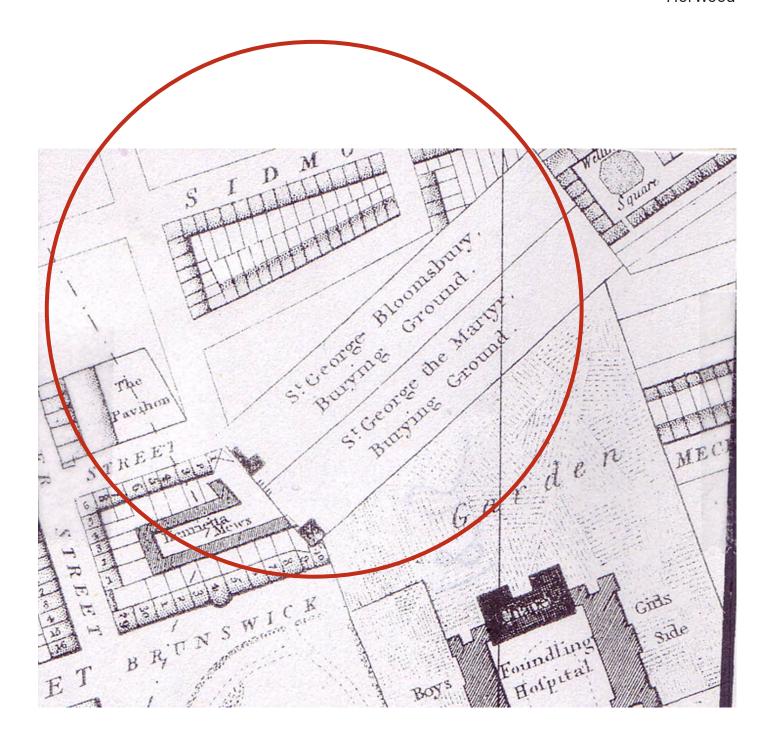
Appendix A Historical Maps

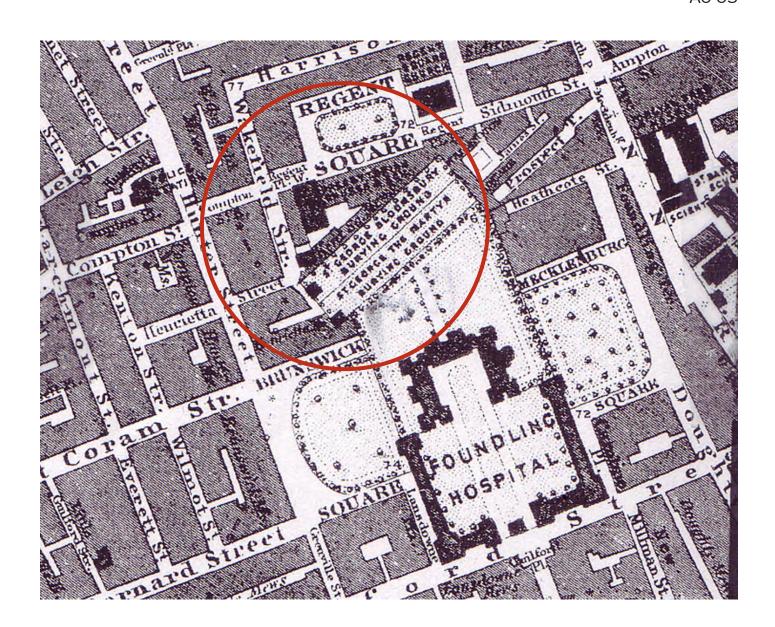
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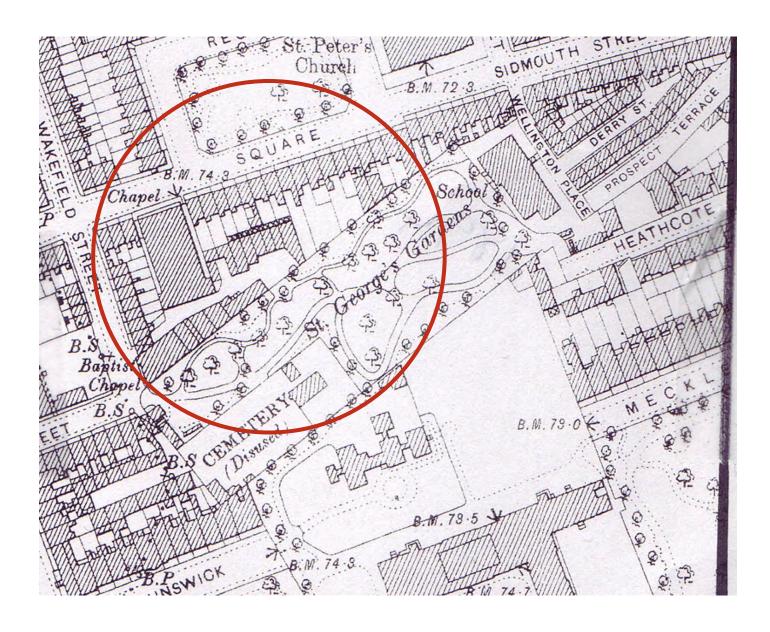
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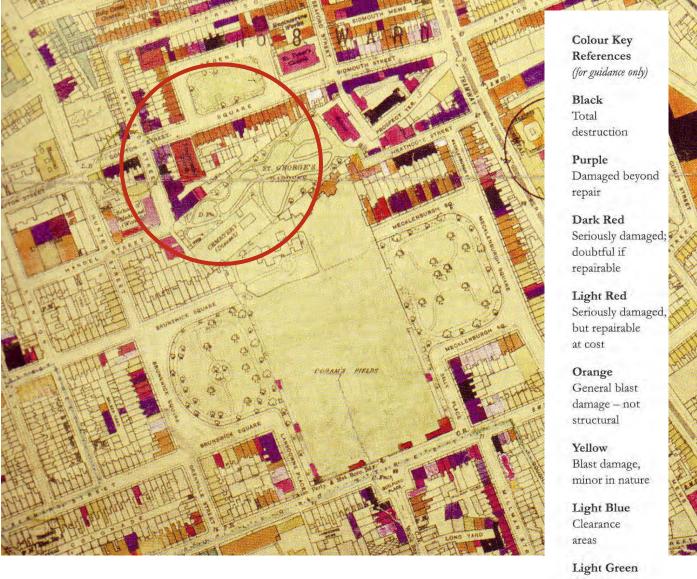




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LCC Bomb Damage Map



Light Green Clearance

areas



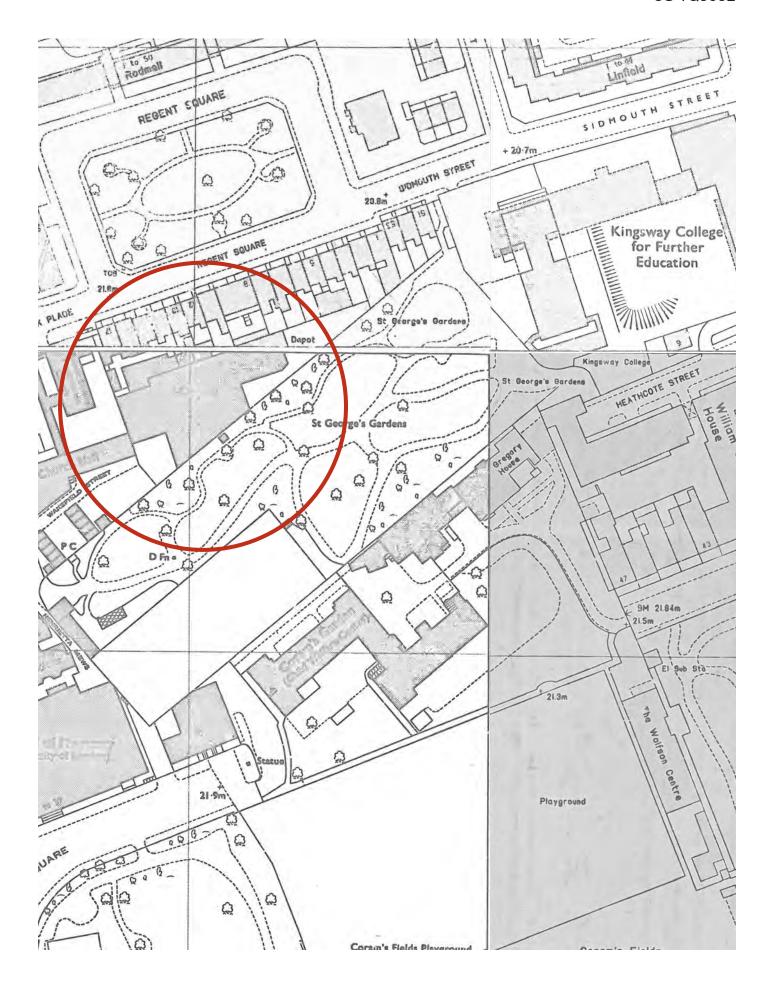
V1 flying bomb



V2 long range rocket

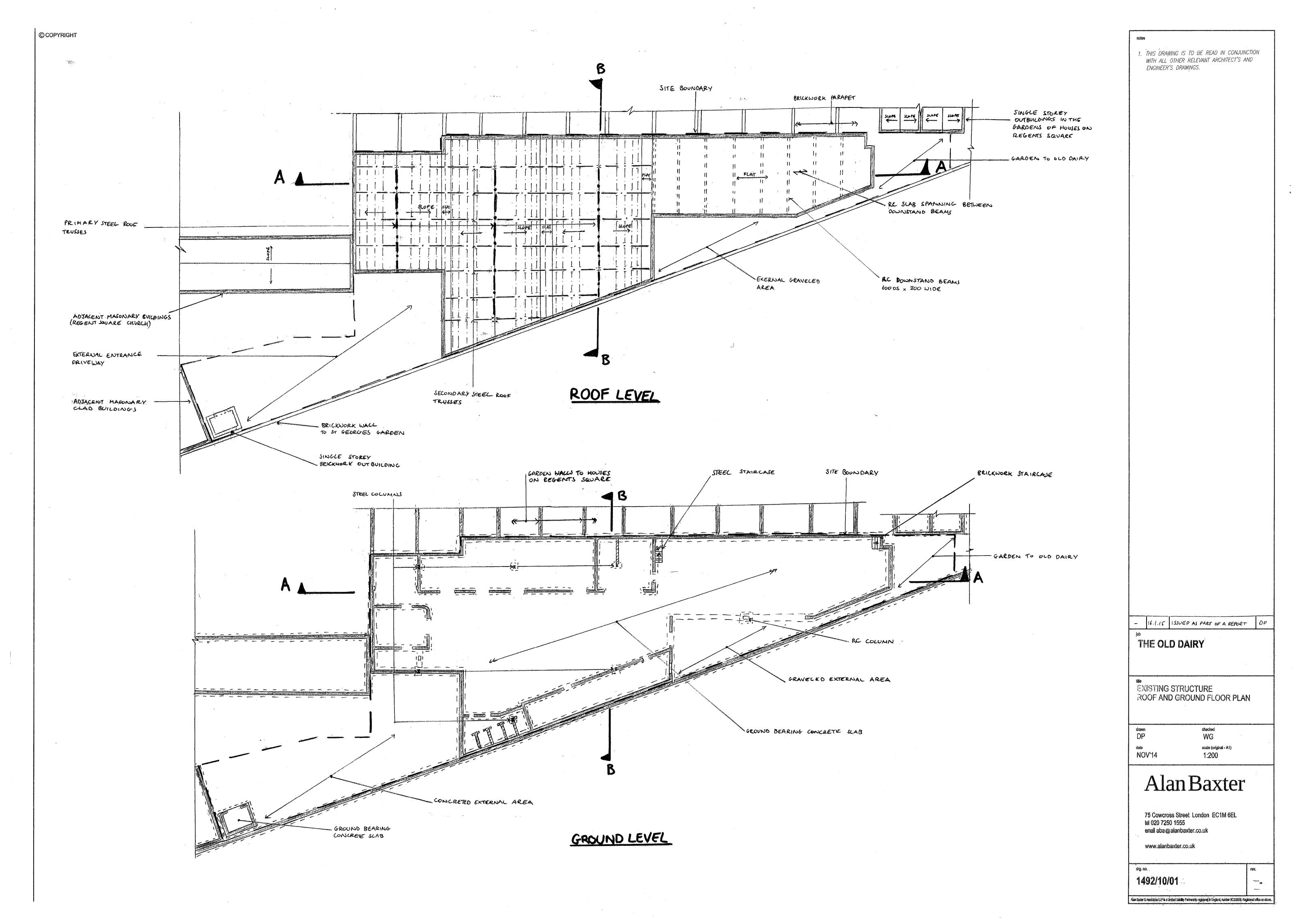
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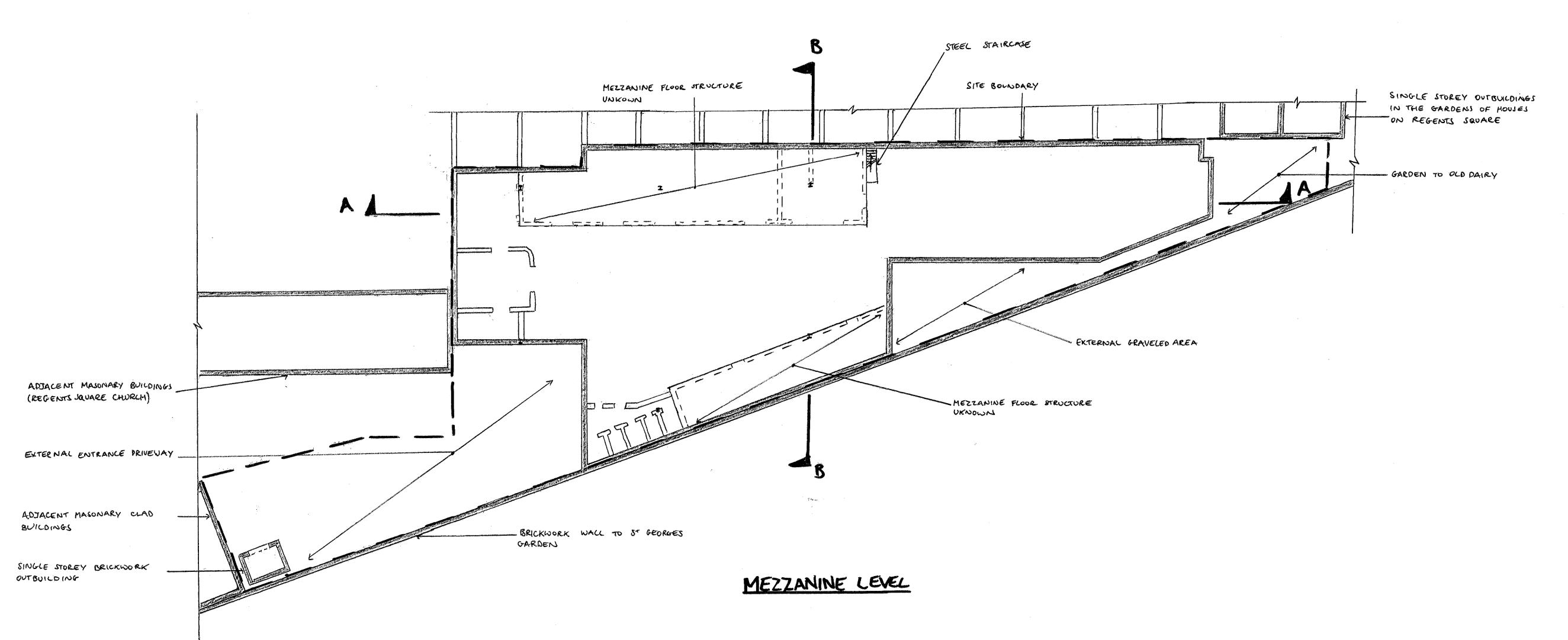
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Appendix B

Existing Structure Drawings





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WITH ALL OTHER RELEVANT ARCHITECT'S AND
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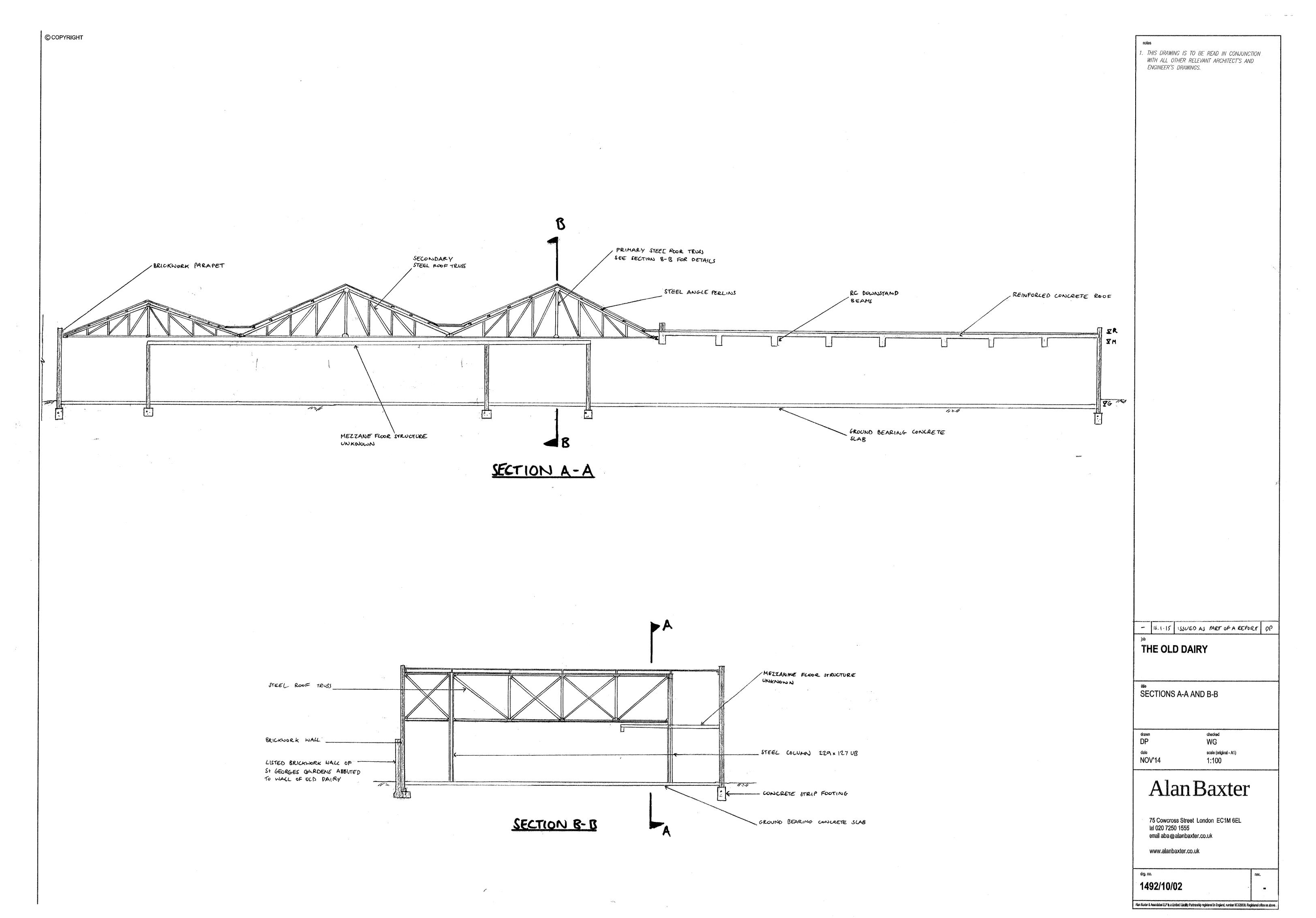
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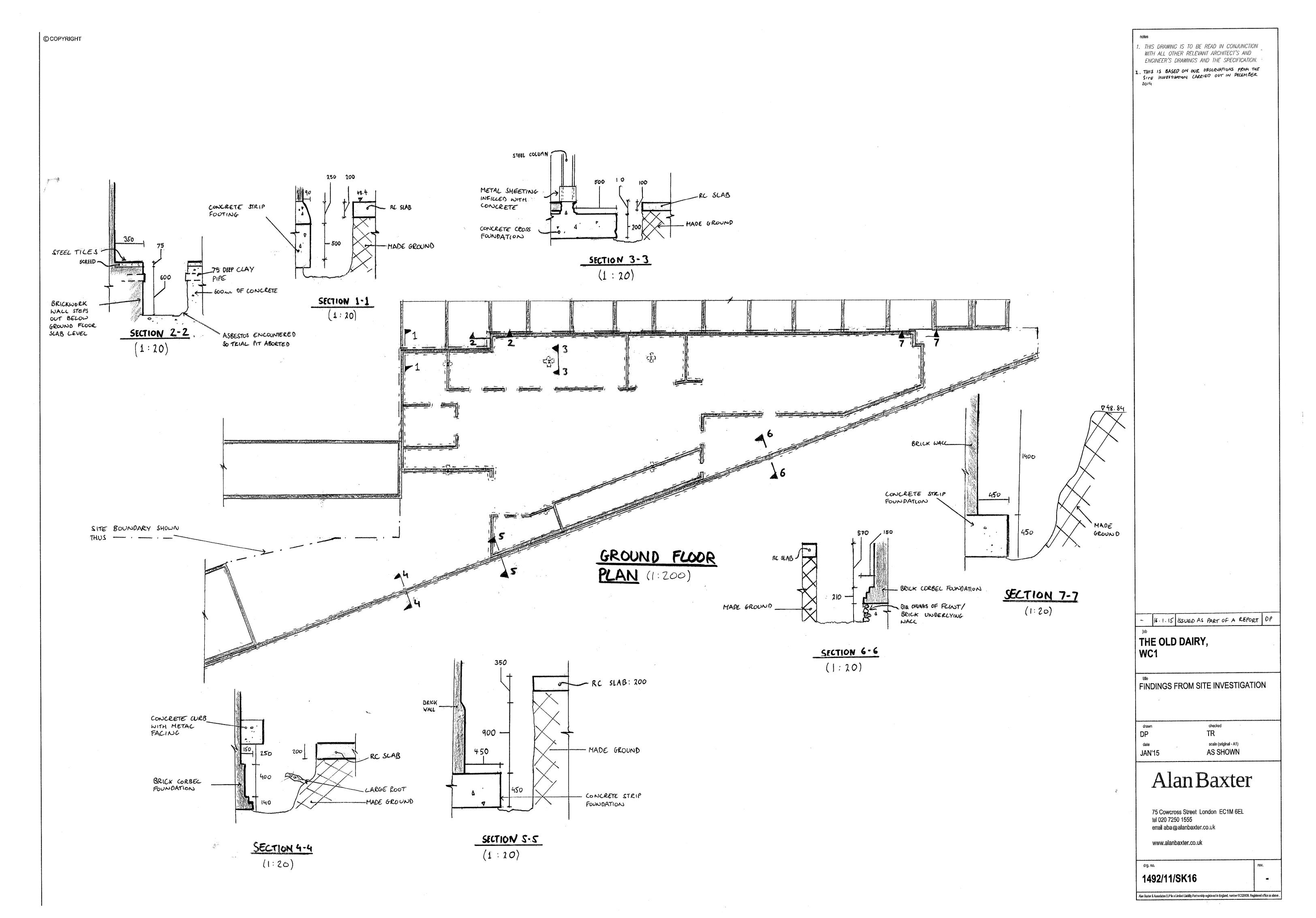
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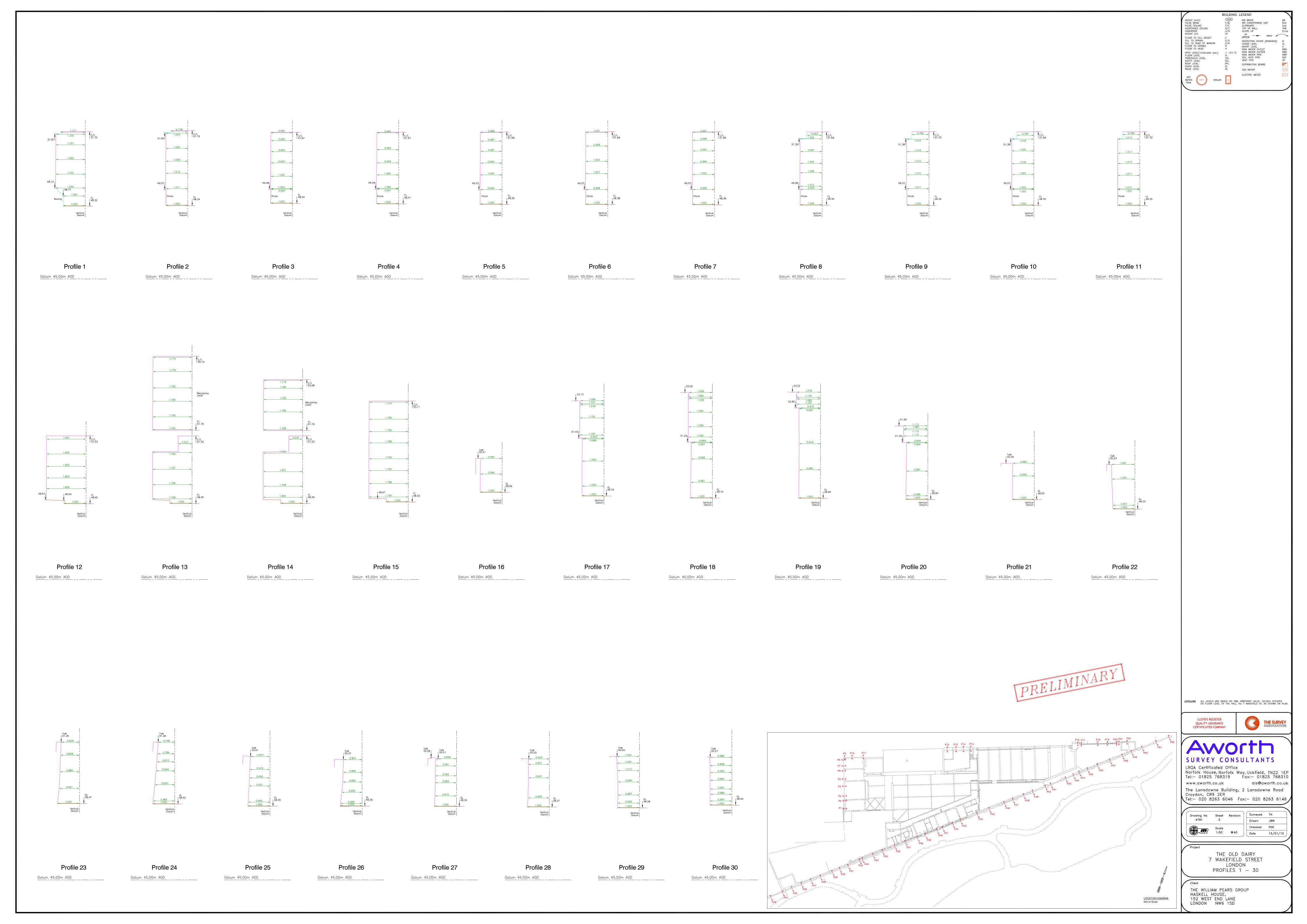
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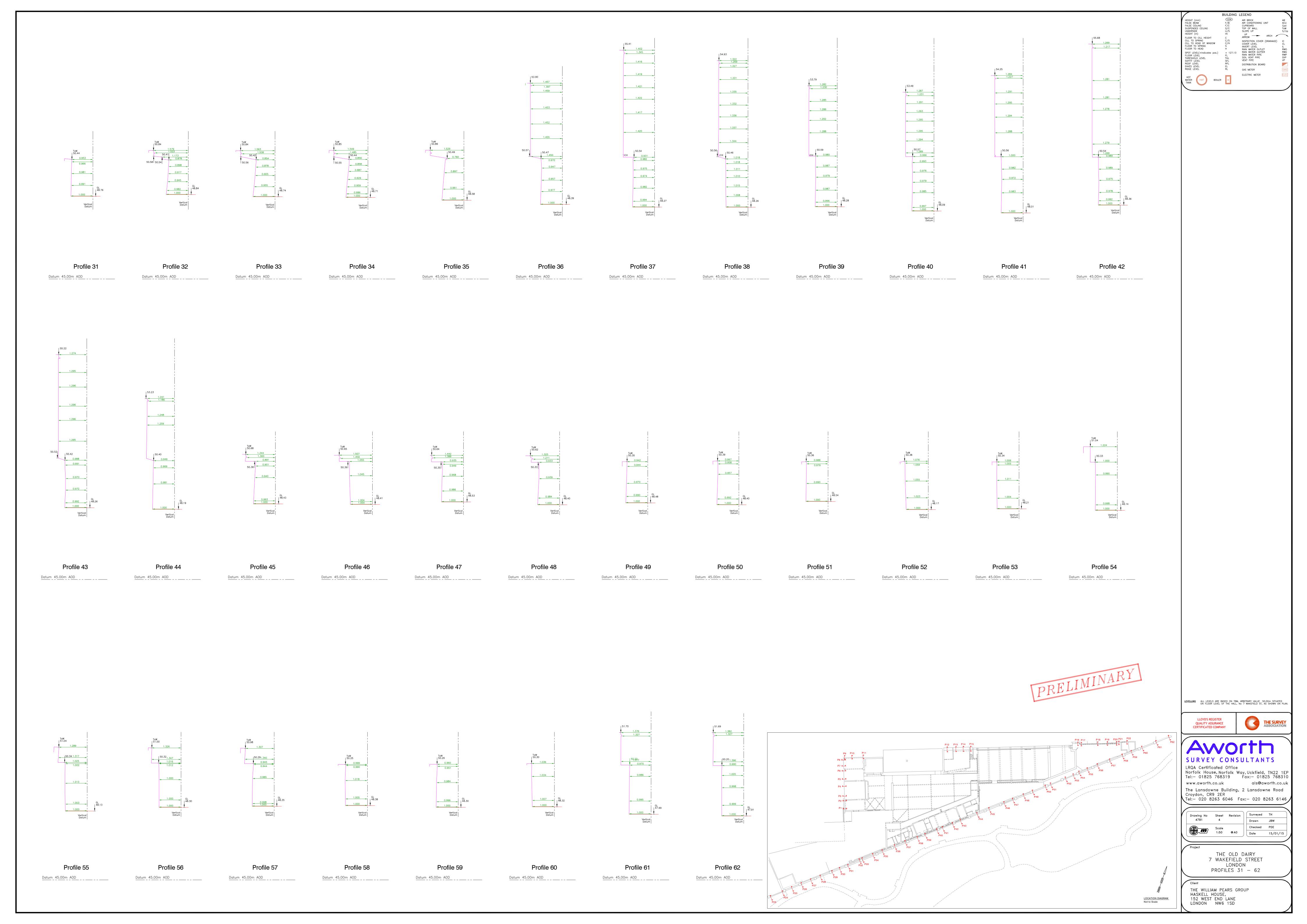
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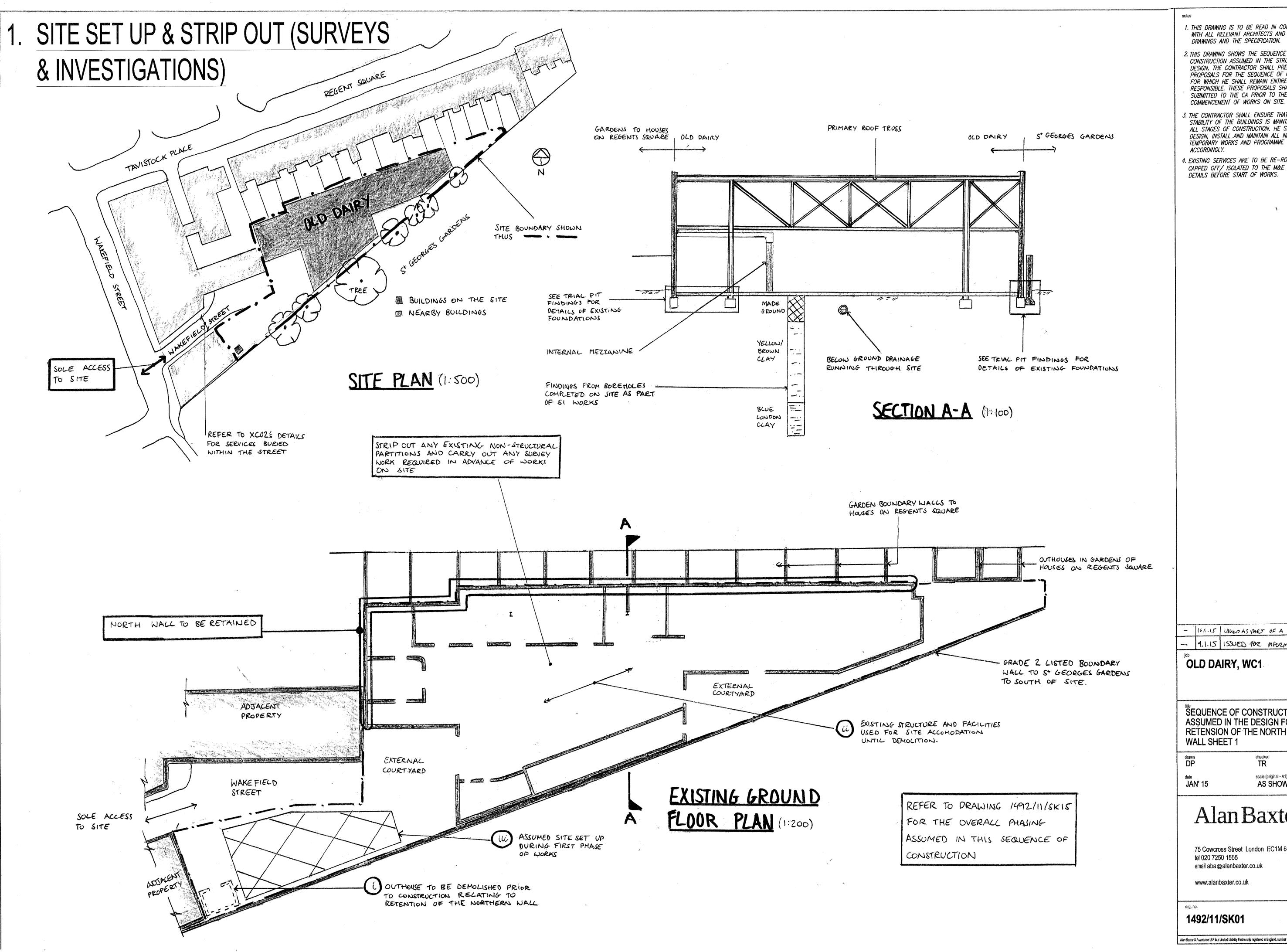






Appendix C

Phasing and Sequence of Construction Assumed in the Design



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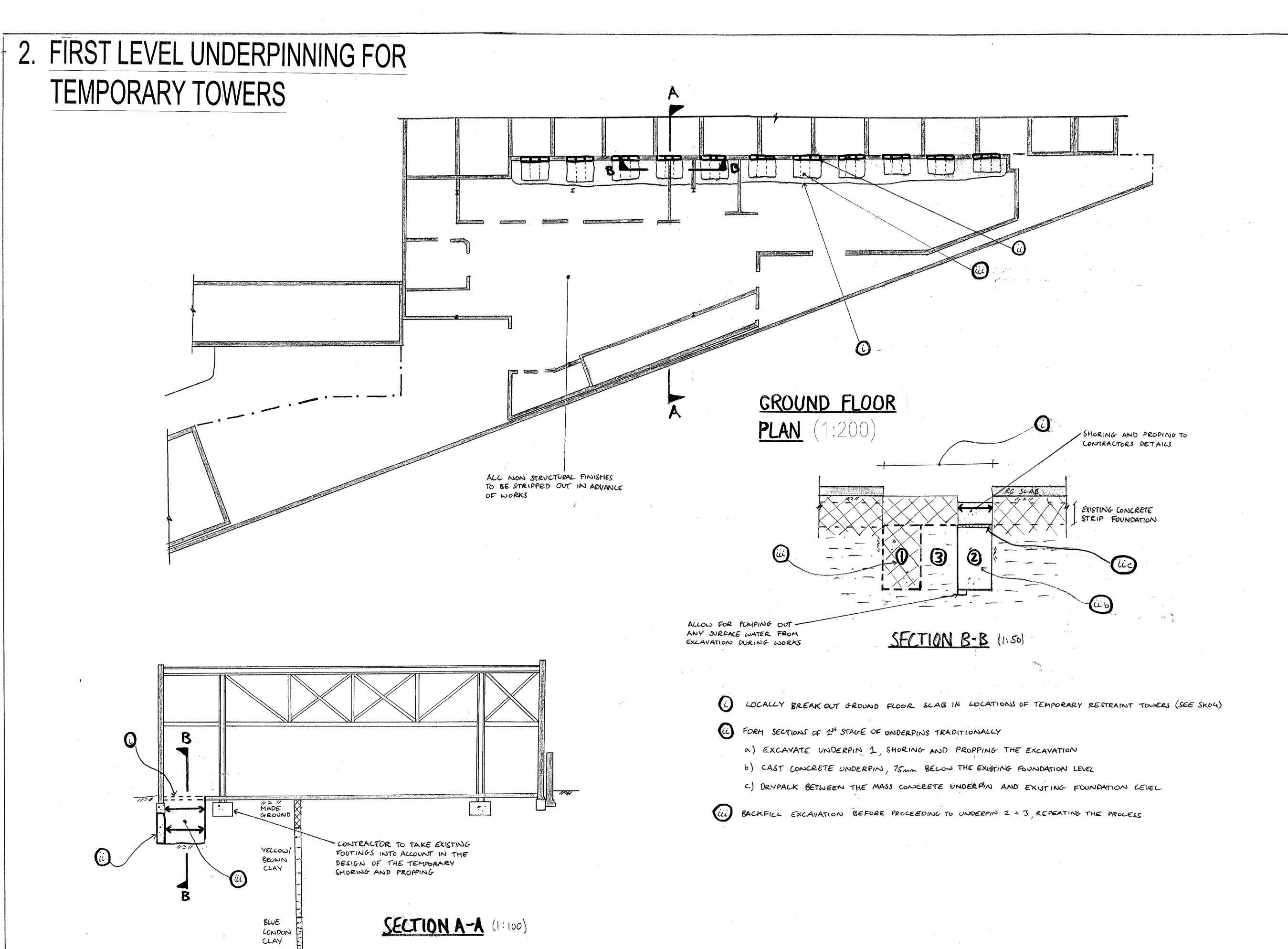
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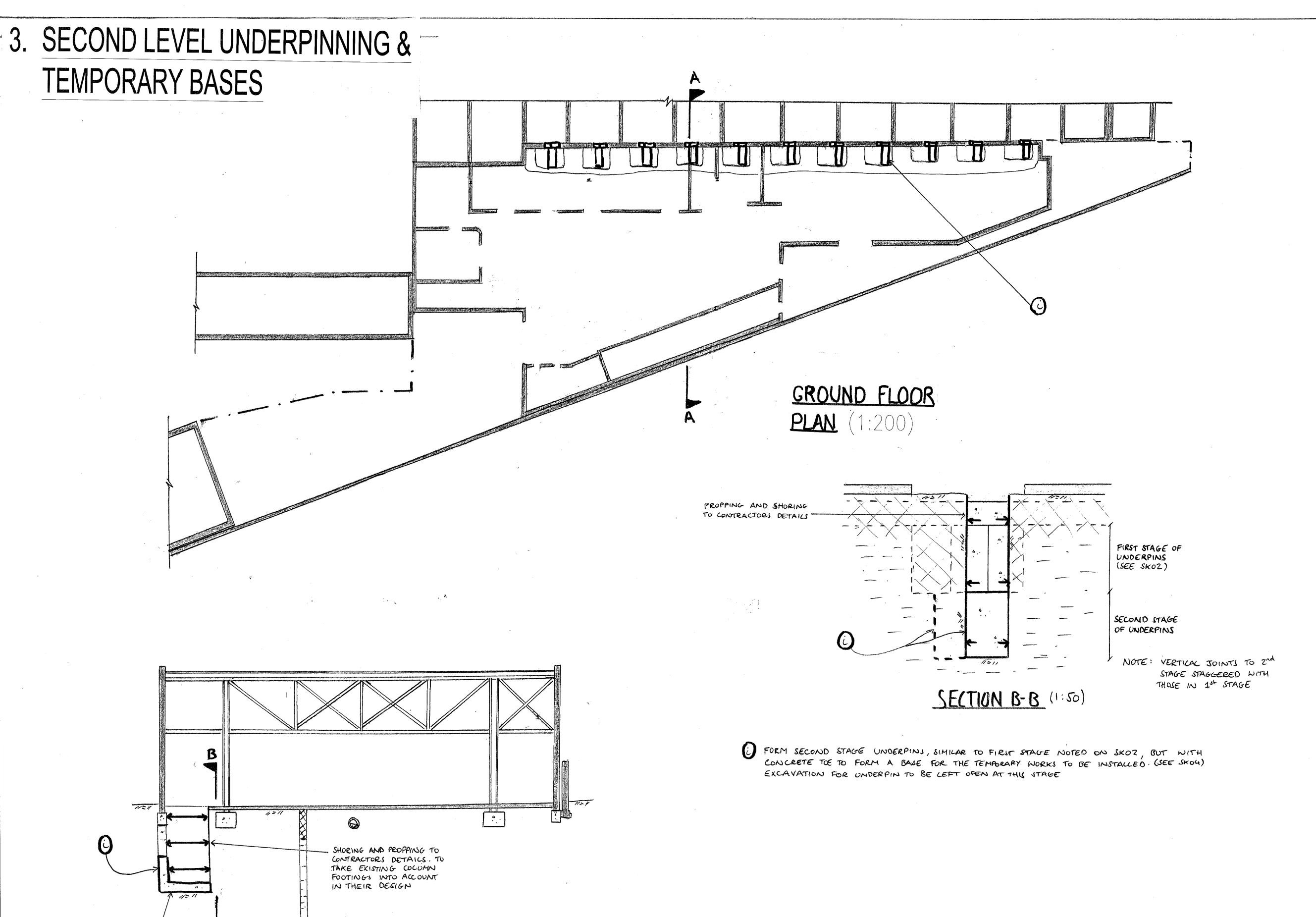
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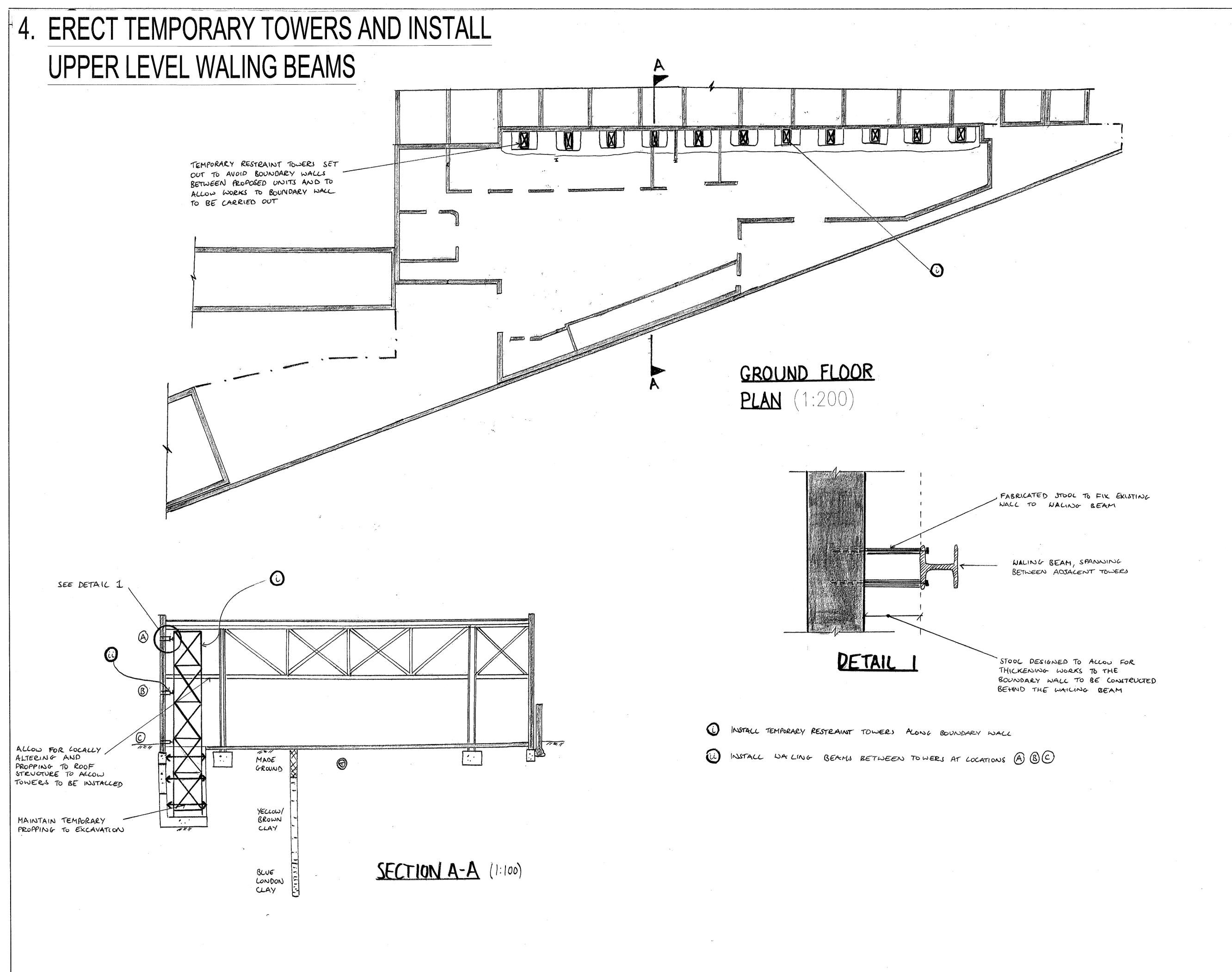
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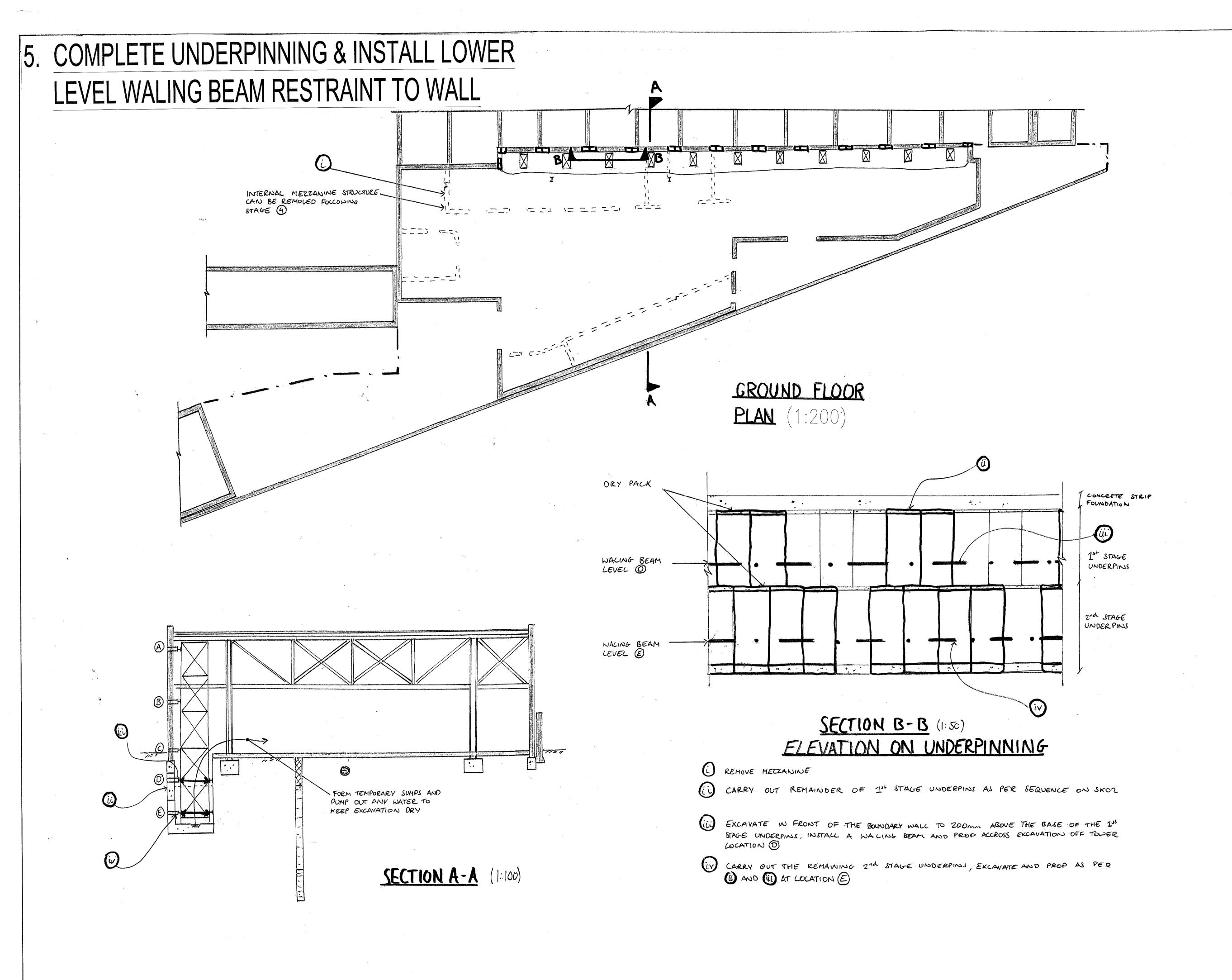
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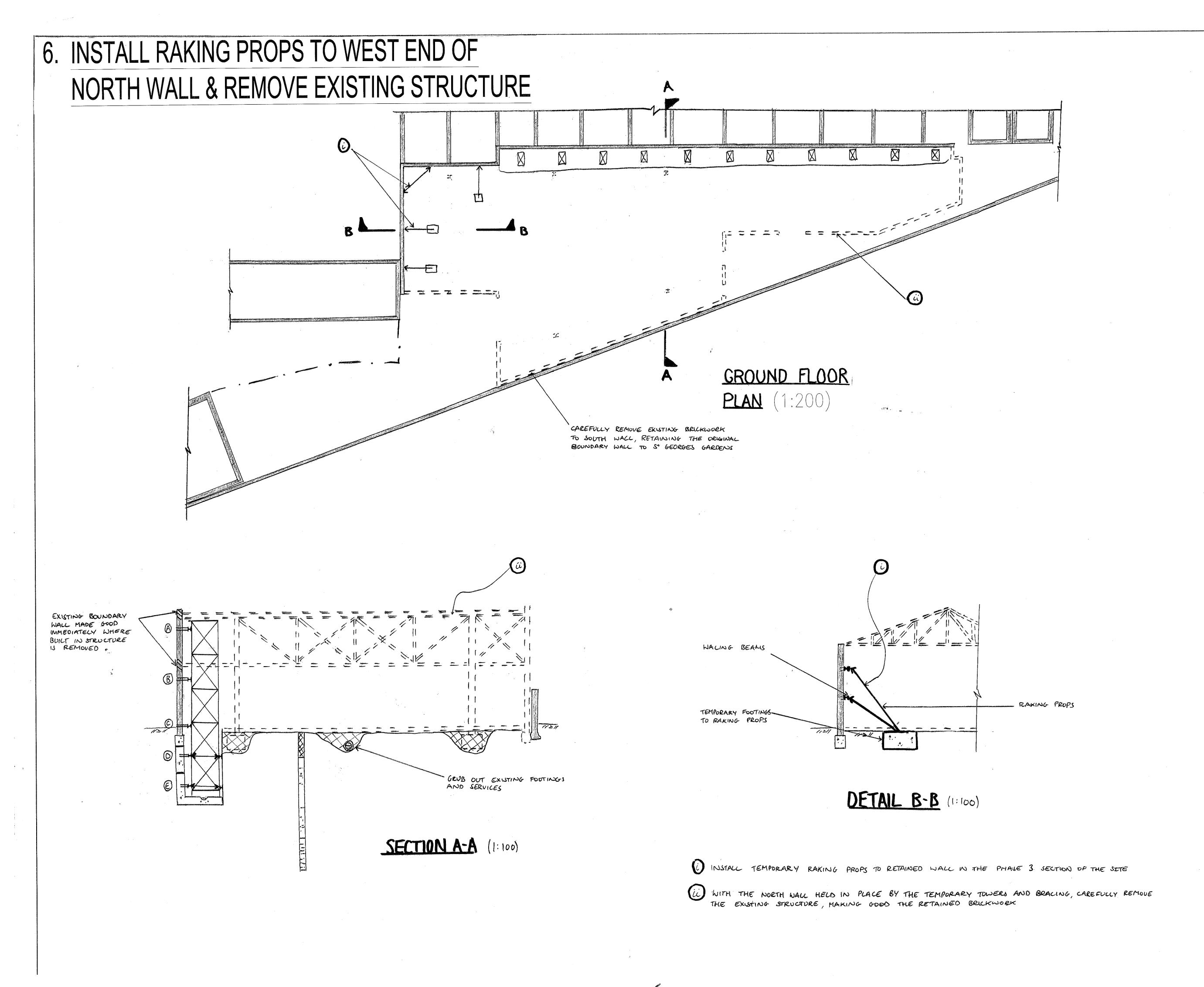
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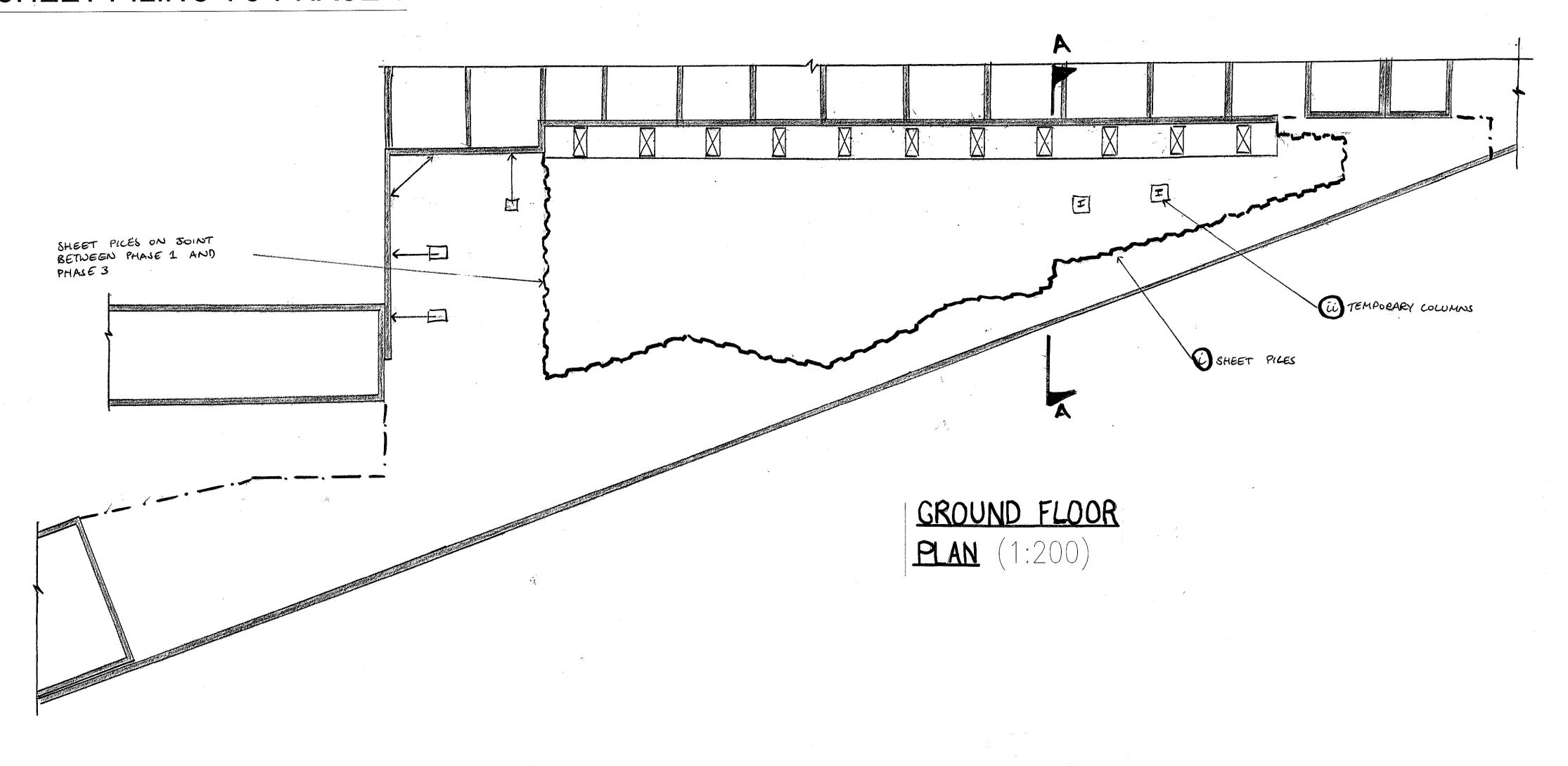
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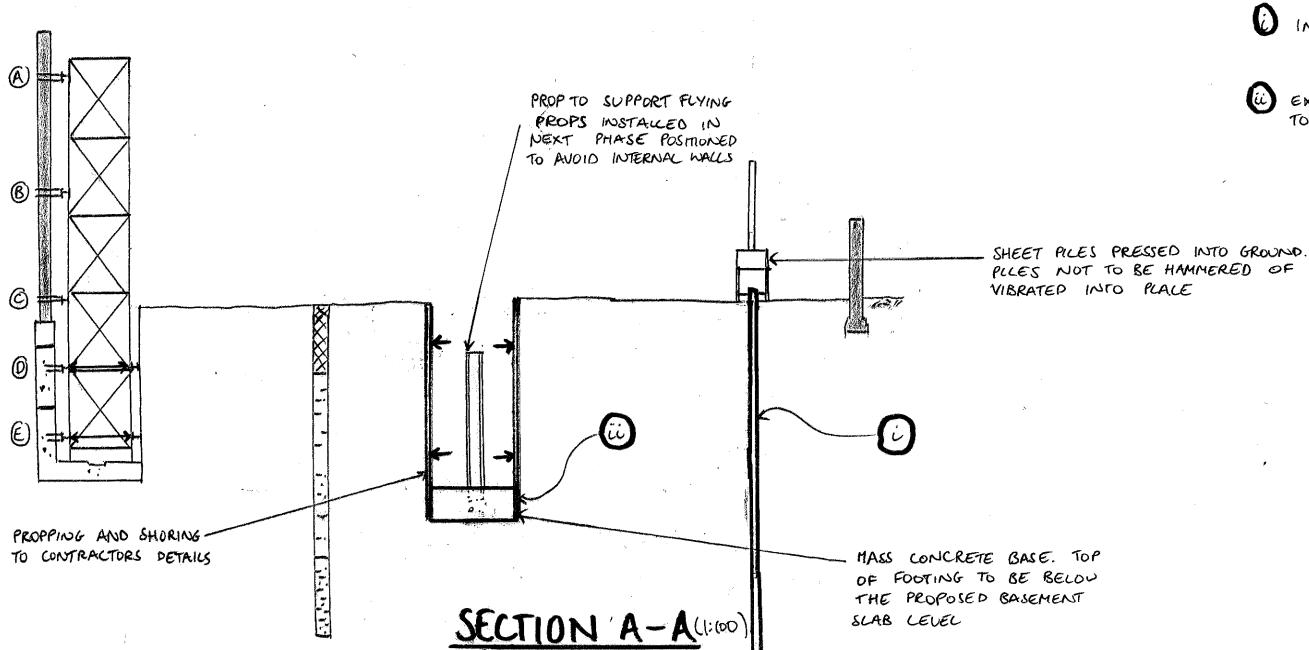
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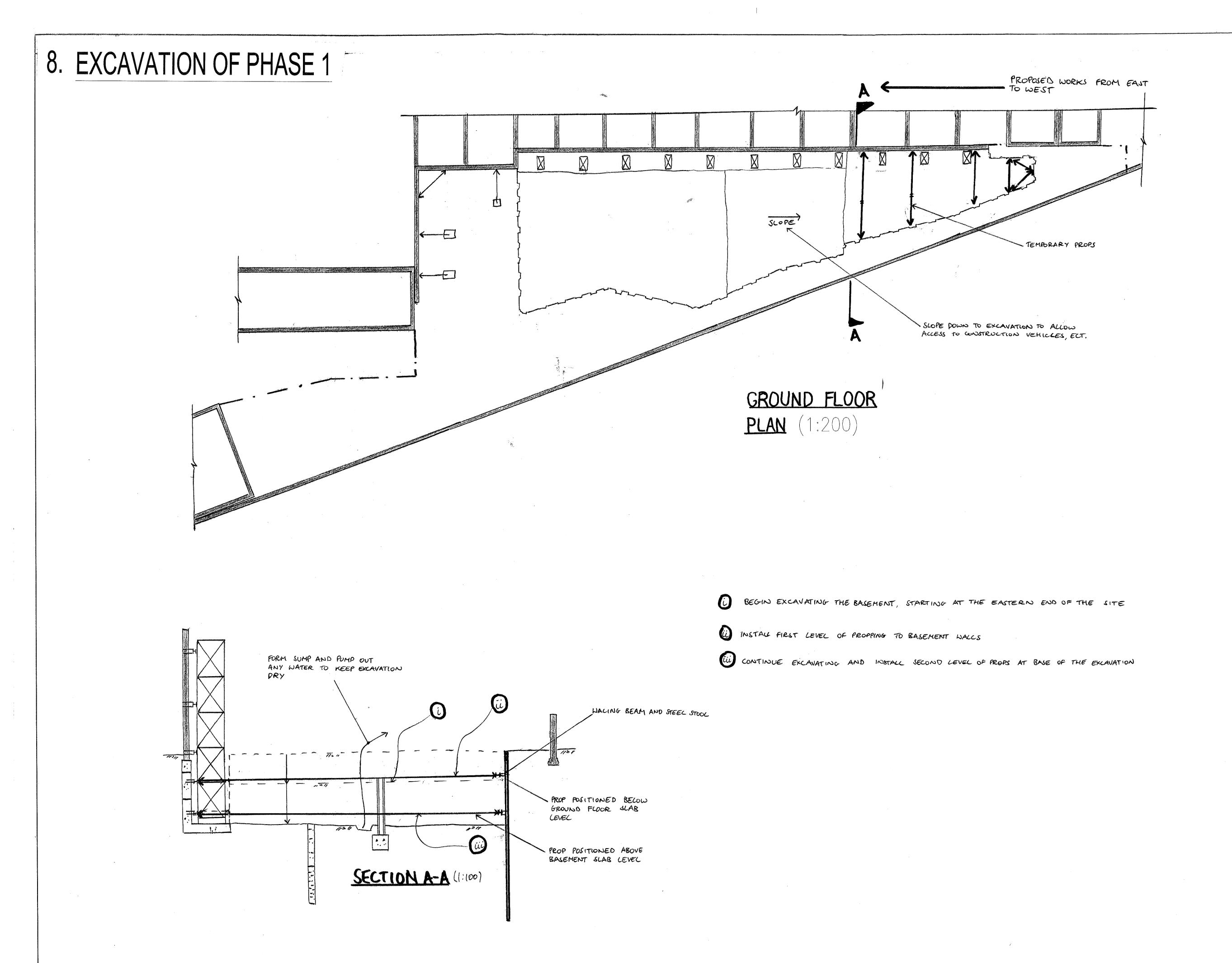
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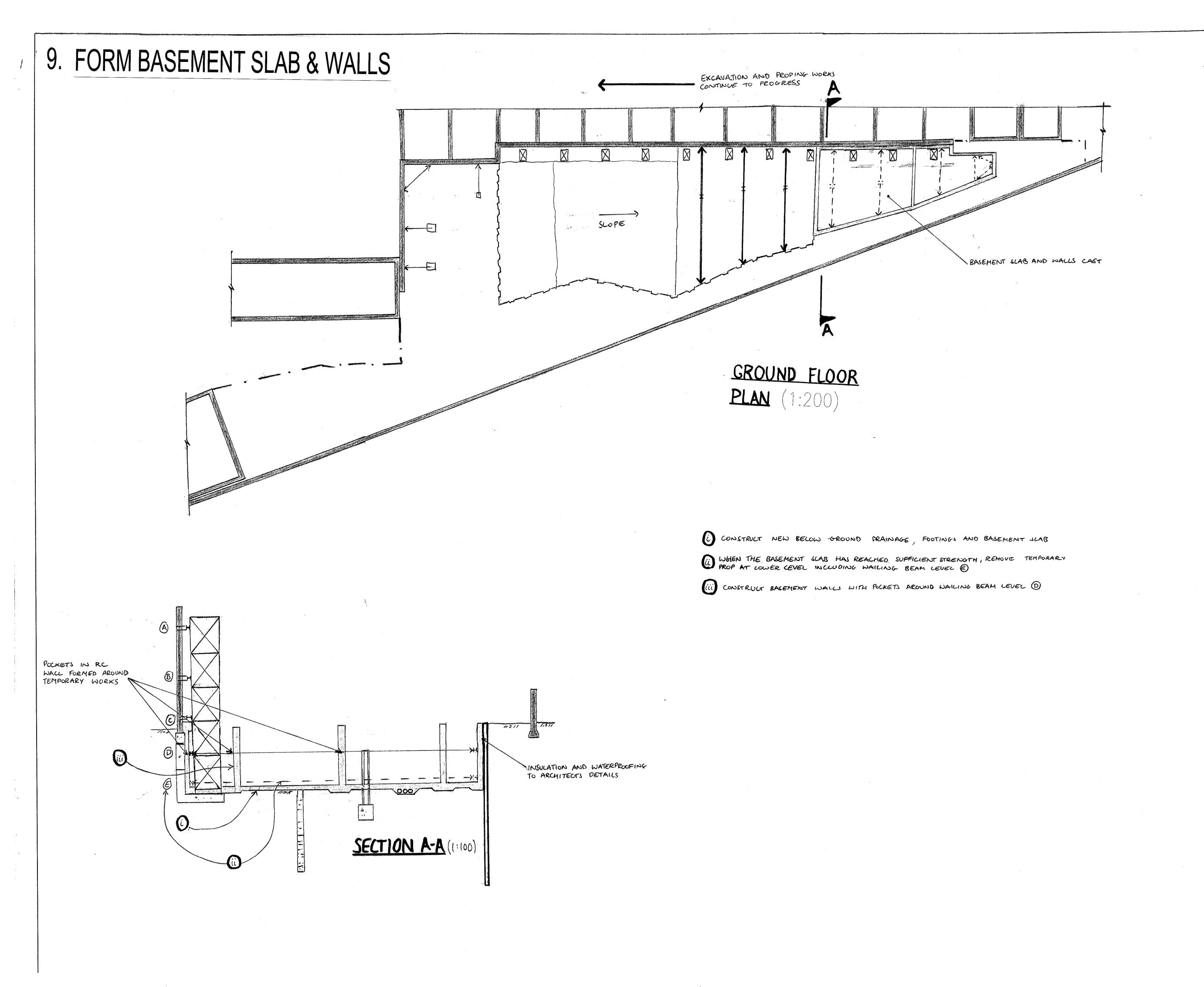
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DESIGN, INSTALL AND MAINTAIN ALL NECESSARY
TEMPORARY WORKS AND PROGRAMME THE WORKS ACCORDINGLY.

4. EXISTING SERVICES ARE TO BE RE-ROUTED OR CAPPED OFF/ ISOLATED TO THE M&E ENGINEERS DETAILS BEFORE START OF WORKS.

- 16.1.05 ISUED AS PART OF A REPORT OF

OLD DAIRY, WC1

SEQUENCE OF CONSTRUCTION ASSUMED IN THE DESIGN FOR THE RETENSION OF THE NORTH WALL SHEET 9

scale (original - A1)

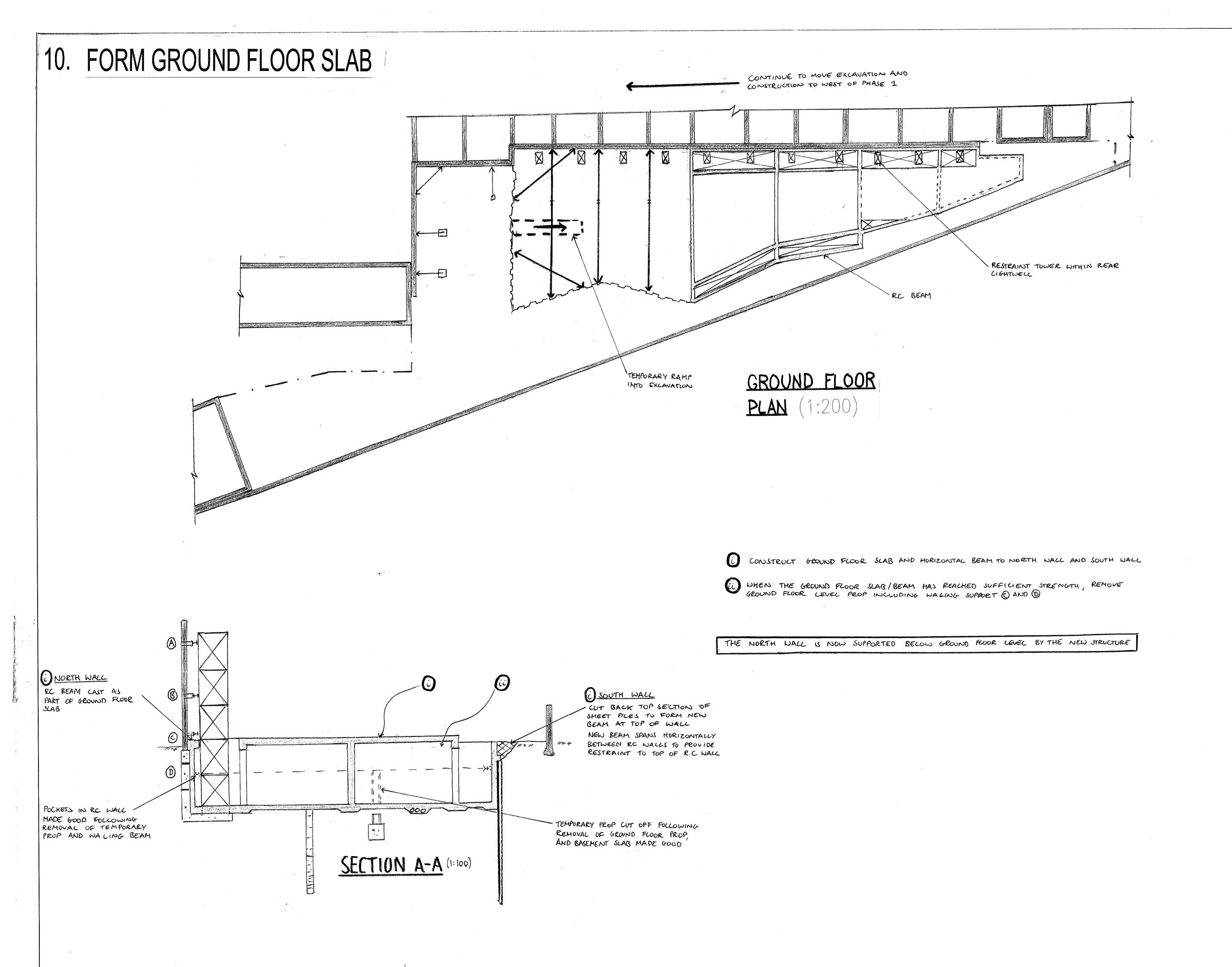
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1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND THE SPECIFICATION.

2. THIS DRAWING SHOWS THE SEQUENCE OF CONSTRUCTION ASSUMED IN THE STRUCTURAL DESIGN. THE CONTRACTOR SHALL PREPARE HIS OWN PROPOSALS FOR THE SEQUENCE OF CONSTRUCTION FOR WHICH HE SHALL REMAIN ENTIRELY RESPONSIBLE. THESE PROPOSALS SHALL BE SUBMITTED TO THE CA PRIOR TO THE COMMENCEMENT OF WORKS ON SITE.

3. THE CONTRACTOR SHALL ENSURE THAT THE STABILITY OF THE BUILDINGS IS MAINTAINED AT ALL STAGES OF CONSTRUCTION. HE SHALL DESIGN, INSTALL AND MAINTAIN ALL NECESSARY TEMPORARY WORKS AND PROGRAMME THE WORKS ACCORDINGLY.

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- 16.1.15 ISUED AS PART OF A REPORT

THE OLD DAIRY,

SEQUENCE OF CONSTRUCTION ASSUMED IN THE DESIGN FOR THE RETENTION OF THE NORTH WALL. SHEET 10

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Alan Baxter

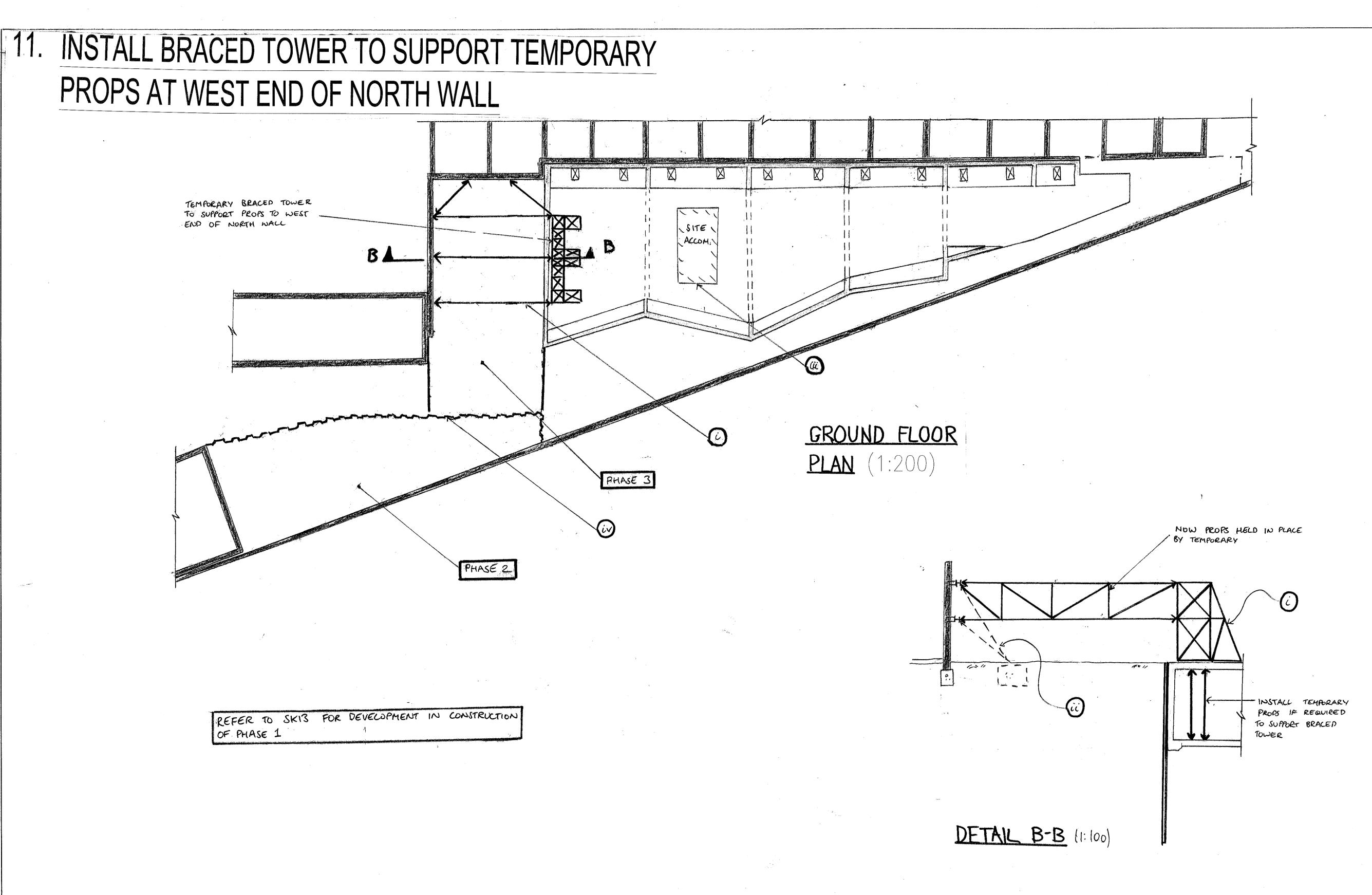
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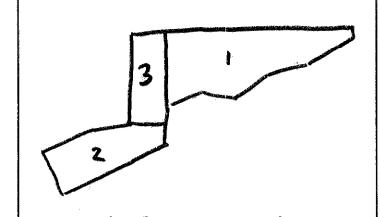
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- CONSTRUCT TEMPORARY BRACED TOWER AT WEST END OF PHASE 1, PROP BETWEEN NORTH WALL IN PHASE 3 AND TEMPORARY BRACED TOWER
- (1) REMOVE TEMPORARY RAKING PROPS AND FOOTINGS
- MOVE SITE ACCOMODATION ONTO GROUND FLOOR SLAB OF WEST END OF PHASE 1. INSTALL TEMPORARY PROPS TO SUPPORT GROUND FLOOR SLAB WHERE REQUIRED
- (V) SHEET PILE NORTH AND EAST OF BASEMENT IN PHASE 2 OF CONSTRUCTION

note

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PHASE KEY PLAN (NTS)

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OLD DAIRY, WC1

SEQUENCE OF CONSTRUCTION ASSUMED IN THE DESIGN FOR THE RETENSION OF THE NORTH WALL SHEET 11

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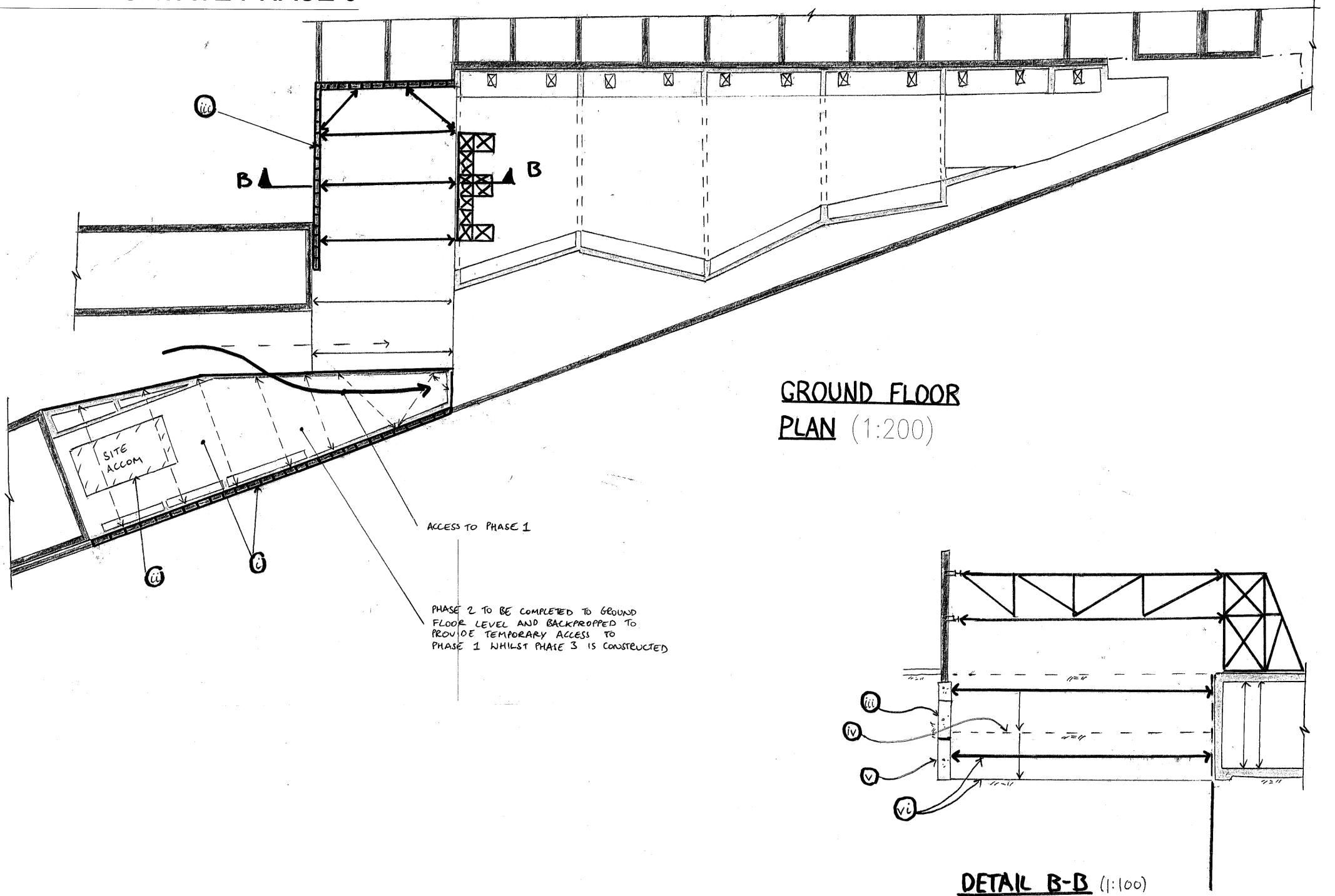
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12. CONSTRUCT PHASE 2 TO GROUND LEVEL & UNDERPIN AND EXCAVATE PHASE 3



- (EXCAVATE, UNDEPIN AND CONSTRUCT PHASE 2 TO GROUND FLOOR LEVEL, SIMILAR TO PHASE 1
- (i) MOVE SITE ACCOMODATION AND SITE ACCESS ONTO PHASE 2. TEMPORARY PROPPING GROUND FLOOR SLAB WHERE REQUIRED
- (iii) FORM 1st LEVEL UNDERPINS TO PHASE 3 TRADITIONALLY
- EXCAVATE + PROP TO ABOVE BASE OF 1st LEVEL OF PINS AND PROP
- FORM SECOND LEVEL OF UNDERPINS
- VI EXCAVATE AND PROP

n

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ÖLD DAIRY, WC1

SEQUENCE OF CONSTRUCTION ASSUMED IN THE DESIGN FOR THE RETENSION OF THE NORTH WALL SHEET 12

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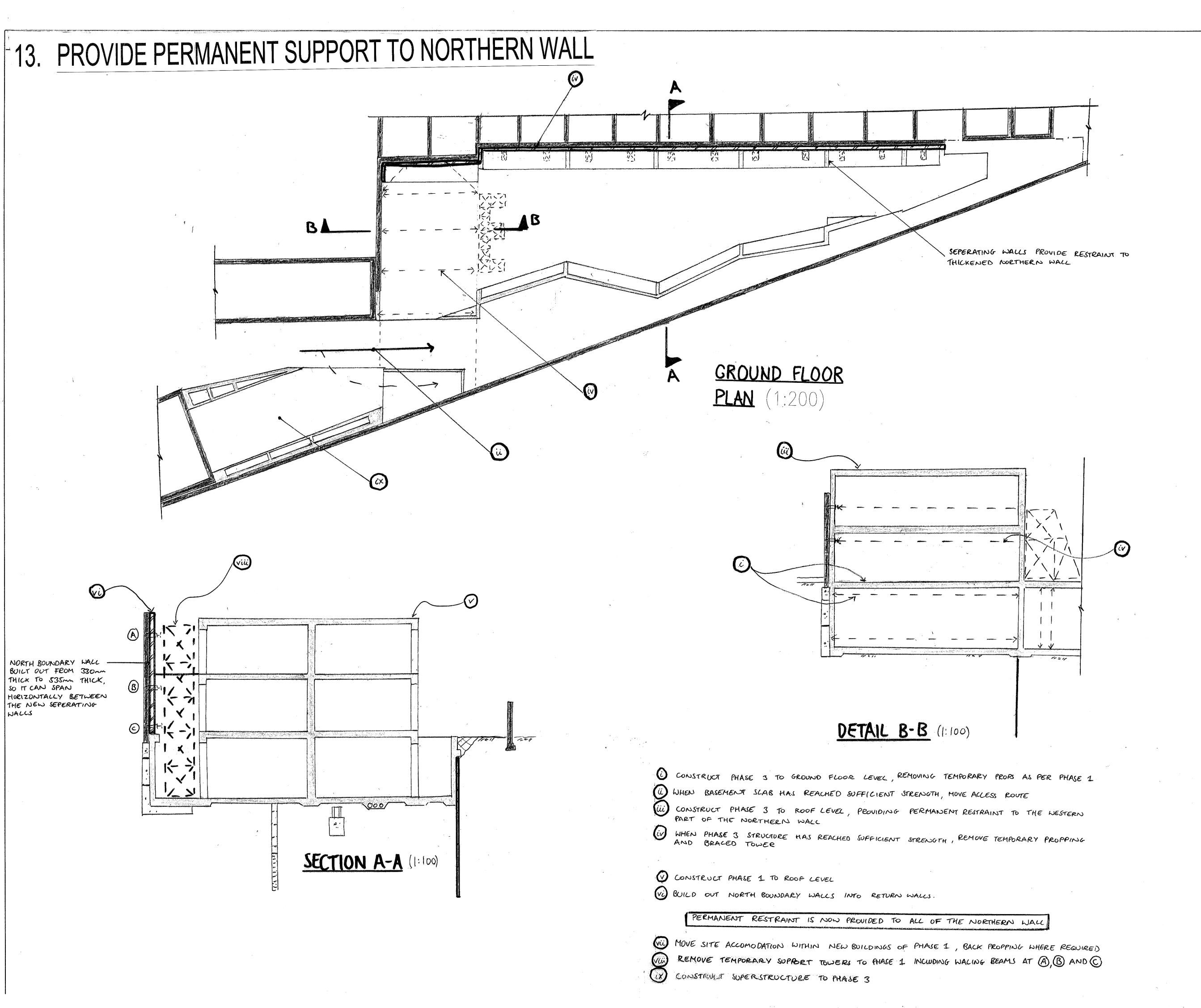
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THE OLD DAIRY, WC1

DESIGN DRAWING -OVERALL ASSUMED SEQUENCE OF CONSTRUCTION

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scale (original - A1) ≈ 1:500

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Prepared by Tom Roberts MIStructE MSc BSc

Reviewed by David Johncox MIStructE MICE BEng MConsE

Issued 16 January 2015

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