7	Is there a history of seasonal shrink/swell subsidence in the local area, and/or evidence of such effects at the site?	NO	No evidence of seasonal shrink/ swell subsidence was noted to the buildings surrounding the site.
8	Is the site within 100m of a watercourse?	NO	The nearest surface water feature appears to be the River Thames, approximately 1.0km to the west of the site.
9	Is the site within an area of previously worked ground?	NO	
10	Is the site within an aquifer? If so will the proposed basement extend beneath the water table such that dewatering may be required during the construction?	NO	
11	Is the site within 5m of a highway or pedestrian right of way?	YES	Lower Mortlake Road and the adjoining footpath is immediately to the front (south) of the site. An existing front garden (proposed to become a light well) provides a buffer between the basement living space and public highway.
13	Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	YES	It has not been confirmed whether the adjacent terraced housing. In the event that the adjacent structures to nos. 47/49 do not have subterranean structures (as we suspect they do not) then the proposed basement will likely be founded at a depth lower than the existing foundations of the neighbouring buildings.
14	Is the site over (or within exclusion zone of) any tunnels e.g. railway lines?	NO	

SCREENING CHECKLIST: SURFACE FLOW AND FLOODING IMPACT IDENTIFICATION			
CONSIDERATION		RESPONSE	JUSTIFICATION
1	As part of the proposed site drainage, will surface water flows (eg volume of rainfall and peak run-off) be materially changed from the existing route?	YES	No survey of any existing drain runs have been completed to date, however as we are incorporating lightwells to the majority of the frontage it is expected that some reconfiguration of the existing drainage runs will be required. The public sewer running adjacent to no.51 Lower Mortlake Road will be maintained, and serve nos.49 & 49A. Nos 47 and the proposed 47A will likely require new connections, and we will take the opportunity to separate the foul and surface/storm water flows to the separate sewers in the highway. We will also take the opportunity to incorporate SUDS into the scheme to reduce the peak storm water run off rate.
2	Will the proposed basement development result in a change in the proportion of hard surfaced/paved external areas?	NO	The proposed basement is entirely within the footprint of the existing building, existing building garden area and adjacent vacant lot - with all of these areas currently comprising areas of existing hard paving.
3	Will the proposed basement result in changes to the profile of the inflows (instantaneous and long term) of the surface water being received by adjacent properties or downstream watercourses?	NO	See above
4	Will the proposed basement development result in changes to the quality of of surface water being received by adjacent properties or downstream watercourses?	NO	No changes are being proposed to any areas of soft or hard landscape

3.2. STAGE 2: SCOPING

The screening assessment identifies the following matters, which are required to be studied and justified or discussed further.

- Unconfirmed water table level but expected to be beneath proposed basement founding level.
- The foundations to the proposed basement are likely to be deeper than the neighbouring foundations.
- The sequence and characteristics of the soil underlying the specific Site have not been confirmed in-situ.
- Recent site usage indicates there is a risk of soil contamination which will be determined following a soil investigation.
- The Site and proposed works occur within 5m of the public highway or pedestrian right of way.
- A Ground Movement Assessment (GMA) may be required to assess the potential damage to neighbouring buildings.

These aspects are considered further in Stage 4 (see Section 5) and elaborated upon in Section 6 (detailed design considerations).

4. STAGE 3: SITE INVESTIGATION

4.1. WATER TABLE / AQUIFER

Prior to detailed design, a deep trial pit should be completed adjacent to the proposed works to confirm whether the water table is within the depth of our proposed excavation, and if so to trial dewatering methods and ensure the solution is viable and workable. A suitable location for this deep trial pit may be in the location of the proposed external front light well, to allow the profile and bearing depth of the existing foundations (and thus how we will interact with them) to be confirmed.

4.2. SOIL UNDERLYING THE SITE

An on-site investigation should be completed before detailed design commences, which should confirm the Site specific strata / soil build up, as well as the presence of any water (water table or perched water), hyrdo-geological flows, etc. The findings of the desktop investigations indicate we are likely to be excavating near the top of the Clay strata, so perched water may be present. The investigation should also include a basic suite of contamination testing, as the history of the Site suggests a small risk that contamination may be present. These investigations should allow a suitable and robust scheme to be developed without negatively impacting on the local environment. If ground water is encountered it may be prudent to install a standpipe and monitor levels over a period.

4.3. DEPTH OF OUR FOUNDATIONS AND THOSE OF THE NEIGHBOURING BUILDING

Prior to detailed design, trial pitting should be completed around the Site and up against neighbouring structures to confirm the profile and bearing depth of the existing foundations where this is possible. It is important that the depth of the foundations to adjacent properties is determined as it is almost certain that the new basement proposal will undermine these. As such the basement construction methodology will ensure that the structural integrity of all neighbouring property footings will be maintained, and details will be developed to ensure this.

4.4. GROUND MOVEMENT ASSESSMENT (GMA)

Once more is known about the ground conditions and neighbouring foundations a ground movement assessment will likely be opted for to help confirm the predicted movements of the neighbouring structures and highway are within agreed limits. The construction methodology will take these limits into account, along with possible actions should a trigger level be reached.

5. STAGE 4: IMPACT ASSESSMENT

5.1. SECONDARY AQUIFER & SUBTERRANEAN GROUNDWATER FLOW IMPACT

The desktop study together with knowledge of nearby investigations has indicated that groundwater levels may be between 5.0 and 6.0m below existing ground level. Whilst this suggests we should be able to construct the basement above the water table, this should be confirmed with on-site site investigations. There is a small risk of contamination in the soils on the Site due to the historic land use.

We are expecting to almost entirely be excavating within the Kempton Park gravel Formation, and due to the expectation of it being above the water table is not considered that the introduction of the proposed lower ground floor on this Site should have a negative impact on any groundwater flows.

5.2. PUBLIC HIGHWAY BOUNDARY PROXIMITY IMPACT

The implications of this matter are related to the design and construction of suitable retaining structures. This is therefore discussed and addressed in section 6, which details the considerations of how the structures will be built against the existing boundaries, and section 7, which addresses the works sequence.

5.3. GROUND MOVEMENT ANALYSIS

The proposed excavation of the basement will remove a depth of some 3.0m of soil.

A Ground Movement Analysis may be conducted as part of the next phase, in line with CIRIA C580 to determine the movement response of the subsoils as a result of the proposed excavations. The methodology will help ensure a damage category of 2 or less on the Burland Scale, both in our property and the neighbouring property. In reality we would expect the scheme to result in a category of 1 or less.

Please refer to the appendices for the calculations, design output, construction sequence illustrations and structural drawings.

Constructure has direct experience of underpinning and and the creation of lower ground floors and basements, and do not expect significant movement (if any) to occur in the neighbouring properties.

5.4. STABILITY OF EXCAVATIONS

Excavations in made ground and granular soils are more likely to be unstable and so may require temporary support, although as excavations will exceed 1.2m this will be necessary anyway for safety compliance.

Trial pits and boreholes will be completed prior to the developed design, which will help identify the ground conditions.

6. DETAILED PROPOSALS AND DESIGN CONSIDERATIONS

6.1. SITE CONSTRAINTS & SEQUENCING

The section of site occupied by nos. 47 and 49 Lower Mortlake Road is relatively constrained, with side access to the east of no. 49 required to remain open to allow for continued access to the private property at no. 49A and as such not likely to be available for access. Alternatively, there is the option of providing alternative access to no. 49A through a designated safe path/route through the area currently referred to as the vacant plot. The vacant plot section of the property is relatively open and unobstructed, with easy access from the street and should allow adequate room for a site set up, welfare, deliveries, muck away, etc, as well as providing a protected route to no.49A if required. Access can revert back to the original once the work around the houses is complete, and before the excavation of the vacant plot commences.

The basement is considered in two sections; with a section to be built under the new development, and a section under the existing buildings of nos. 47 and 49 Mortlake Road. The excavation of the basement section beneath the existing building is currently assumed to be completed by a combination of contiguous piling and underpinning the load bearing walls over the proposed basement footprint, using reinforced concrete underpins which will also serve to act as the primary retaining structure. An underpin-style sequenced approach to constructing the full perimeter basement wall will be adopted. A ground floor structure can then be reinstated. For the section of basement beneath the existing vacant plot, it is expected that contiguous piling and underpin bays will be used to stabilise the ground and provide support to the adjacent structures whilst the soil is removed and permanent RC retaining walls are constructed.

The protection of the neighbouring properties and boundary structures has been carefully considered, such to ensure that during the works, the boundary and neighbouring structures are protected from ground movement. The techniques proposed therefore are designed to conform with this.

6.2. BASEMENT SLAB

Depending on how close to the clay strata we get it is proposed to create a combined ground bearing and suspended reinforced concrete slab and provide a heave zone in the centre of the slab. This would be achieved by installing a ClayBoard void-former in the central area, which would be designed to degrade after concrete curing, such to create a sub-floor void. Edge thickenings will be present around the perimeter.

6.3. HEAVE PROTECTION

The nature of the sandy/gravel Kempton Park Formation is such that heave under the shallow excavation may not be of significance, however has been allowed for at this stage, in case we are close to the clay strata and ground recovery comes in to play. The formation of a suspended slab with nominal sub-floor void is considered to be ample precaution against minor effects of changes in ground loading condition.

6.4. WATER PRESSURE AND CONTROL

The desktop study has indicated that groundwater levels may be between 5.0m and 6.0m below existing ground level, and therefore it is unlikely that our proposed excavation will be within the water table. This should be confirmed at the earliest convenience and an appropriate construction methodology agreed. A degree of dewatering may be required, however as we will be excavating close to the clay strata and as such perched water may be encountered. This dewatering is not expected to pose a problem for the construction or surrounding buildings/highway.

For the permanent design we have assumed a high ground water level to account for a general rise in water table level or a "burst water main" scenario. This has been accounted for for the hydrostatic pressure on the lower ground floor slab, and also in terms of buoyancy.

6.5. HIGHWAYS

The front of the property is adjacent to a public highway which is also a part of the TFL roads network. A publicly accessible alleyway is to the immediate western edge of the Site.

As our excavation depth is circa 3m, the Highway surcharge (typically based on the Highways Agency Design Manual for Roads and Bridges Volume 1, Section 3, Part 14, with values of HB loading of 12.0kN/m2 or HA loading of 10.0kN/m2 being considered) has been considered on our retaining walls along this edge that frame the front light well. A calculation for this wall is appended to this report.

6.6. PARTY WALLS

The proposed development will fall within the scope of the Party Wall Act 1996 due to excavating near land belonging to another demise. We are planning to excavate within 3m of a neighbouring building, and likely within 6m of an existing building where that work would cut a line drawn at 45 degrees from the bottom of the neighbours foundation.

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 matter under the Act and provision of the Party Wall Awards will protect the interests of all owners.

The scheme for this Site will be developed so as not to preclude or inhibit similar, or indeed any, works on the adjoining properties in the street. The Surveyors will verify this as part of the process under the Act.

6.7. DESIGN CODES

The following design codes will be followed during the detailed design stage:

The Building Regulations 2010 - Approved Document A

- BS 648 - Weights of building materials

- BS 5950:1 - Structural use of steelwork in building
- BS 5268 - Structural use of timber
- BS 5628-1:2005 - Code of practise for the use of masonry
- BS 6399:1 - Loadings for buildings (Dead and imposed loads)
- BS 6399:2 - Loadings for buildings (Wind loads)
- BS 8000:Section 2.2:1990 - Workmanship on building sites
- BS 8002 - Earth retaining structures
- BS 8004 - Foundations
- BS 8102 - Protection of structures against water from the ground
- BS 8110:1 - Structural use of Concrete

7. CONSTRUCTION METHODOLOGY

7.1. SEQUENCE OF WORKS

The outline construction sequence and temporary works assumed in the design and described in this report will be superseded by the Contractor's construction proposals. The Contractor will be required to provide full proposals, method statements and calculations to the engineer prior to the commencement of any works on site and these will be considered in conjunction with the permanent structures and verified as suitable before the works are implemented.

The appointed contractor will be required to provide a detailed works sequence with their tender submission. An outline sequence of the substructures works is likely to be as follows:

STAGE 1 :

- Welfare temporarily set up in existing houses for piling phase
- Site set up, secured and established
- Two-way access to properties along Blue Anchor Alley temporarily restricted to access off A307 (subject to agreement)
- Hoarding erected in positions to allow piling to take place (agreements required)
- Masonry wall demolished along Blue Anchor Alley and to front of existing houses
- Existing single storey building to north-west corner of site carefully demolished
- Contiguous piling installed as shown around the perimeter, plus 2-4 no. temporary internal piles as indicated

STAGE 2 :

- Once piling is complete, site welfare is established in existing external area
- Remove the ground floor structure from within the existing houses

- Existing houses underpinned along both side walls and central Party Wall, in recognised and approved underpinning sequence. Underpins to continue up to the level of the proposed GF slab, requiring the existing foundation to be removed in 1m bays during the underpinning process. This is to allow provision of a lateral head restraint to the top of the retaining wall/underpins, and also vertical support to the new GF slab

Note: underpins running adjacent to no.51 Lower Mortlake Road are to be reinforced, designed to resist the surcharge from no.51 foundations.

Note: underpins running adjacent to the external area are to be reinforced, designed to resist the surcharge from the construction requirements for the external area

STAGE 3 :

- Once the underpinning is complete, temporary steel beams are to be installed across the front and rear existing facades, and needling installed through to support the walls over

Note: It may be more viable (cost and safety) to demolish the rear outriggers and re-construct like-for-like after the completion of the new lower ground floor structure - subject to permission

STAGE 4 :

- Reduced level dig can now commence within the existing houses down to formation level, incorporating temporary propping as required. Muck-away can be transported either to the existing external space by the future no. 47A, or to the front of nos. 47/49; assumed to a roll-on-roll-off skip or suchlike
- It is assumed the contractor will continue the excavation into the proposed front and rear light wells/terraces

STAGE 5:

- Once reduced level dig is complete, install any below slab services, sumps, etc, blinding, any required heave mats, and then cast the lower ground floor RC slab, tying in with the perimeter underpinning
- Create the RC retaining/lining wall in front of the piles to the light wells/terraces

STAGE 6:

- Form the new RC ground floor slab within the existing houses
- Reinstate bases of existing masonry walls and dry pack to new GF RC slab, making good as required
- Remove the temporary steel needles and beams, and make good as required

STAGE 7:

- Relocate site welfare to the existing houses
- Underpin the side wall of no. 49A and the side wall of the building running along the northern boundary. Use reinforced underpins if permitted by Party Wall agreement
- Commence reduced level dig for the existing external area to create the new lower ground floor, installing temporary propping as required

- Excavation assumed to go from the rear of the site and work to the front to allow the front of the site to be used for roll-on-roll-off skip for as long as possible
- Temporary piles installed to assist with excavation below existing houses can be removed

STAGE 8:

- Once reduced level dig is complete, install any below slab services, sumps, etc, blinding, any required heave mats, and then cast the lower ground floor RC slab, tying in with the perimeter underpinning/piling (including the proposed sunken terrace areas)
- Create the RC retaining/lining wall in front of the piles where required
- Form the new vertical shell & core of the the proposed apartments up to ground level, and then form the new RC ground floor slab
- Once the ground floor slab is cast and cured, the groundworks should be stable and any final temporary propping removed

7.2. TEMPORARY WORKS

Temporary works design and coordination is to be carried out by a suitably qualified and experienced specialist and full design details (drawings and calculations) will be submitted to the 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 the existing structure, excavations and adjacent structures at all times.

7.3. MOVEMENT CONTROL

The techniques proposed are proven to produce minimal or negligible movement effects to the existing superstructure walls and to the structure of neighbouring properties, and the deflection of the retaining walls can be practically limited so as to avoid disturbance to the retained ground.

It has been demonstrated that the excavations made and the works being conducted using normal techniques it is practical to achieve a level of 1 [very slight damage] on the Burland Scale, such to limit any damage to ‘slight’.

A heave response, due to the relatively minor overburden relief, is not considered to represent a practical risk. Heave protection will still be considered to further mitigate any residual risk however.

7.4. MONITORING OF ADJACENT STRUCTURES

Whilst no movement is anticipated to the neighbouring buildings, to ensure that the integrity of these structures is safeguarded it is proposed to use a system of movement monitoring. The Contractor shall appoint a specialist survey company to establish monitoring positions (targets) to key elements of the neighbouring buildings as deemed required.

The external facades will be monitored at these positions and the targets shall be firmly attached to allow 3D location measurement for the duration of the work, to a continuous and uninterrupted accuracy of +/- 1mm. Suitable remote reference bases unaffected by the works will be adopted.

Two series of baseline readings shall be taken before the work begins then readings shall be taken shortly after the start of excavation then at weekly intervals during the basement construction until the RC shell is complete and propped after which point the frequency will be reduced to then a final reading 6 months after completion.

All measurements will be plotted graphically, clearly indicating any movements over time. Results shall be submitted and circulated to all relevant parties including the appointed Party Wall Surveyors within 24 hours of being measured.

Trigger levels are to be as set out below. In the event of a ‘red’ value being reached the Contractor must immediately stop, make safe the works, notify the Party Wall Surveyors and only recommence when agreed by the appointed Surveyors.

Trigger Levels for movement:

Lateral or vertical movement of facades:

Amber +/- 4mm	All parties notified
Red +/- 8mm	Work stopped and reviewed

7.5. NOISE, DUST AND VIBRATION

All demolition and construction works will be carried out by a competent and qualified contractor, who will be required to accord with the Considerate Constructors Scheme, and take all necessary measures to minimise the short term disturbances in terms of noise, vibration and dust which might impact on the local environment and the neighbouring residents and businesses.

The following measures and actions will be implemented:

Noise – Neighbours will be notified in advance of noisy activity, in particular where these are on or near boundary structures. Where there is particular sensitivity, activity will be restricted to 09:00-17:00 Monday to Friday.

In all cases where possible, electrically operation tools will be used in preference to engine driven machinery.

The use of site radios will be considered carefully in terms of their locations and volume levels, and if any neighbour complaints are received, a firm prohibition of their use will be enforced.

Vibration – While the use or percussive, powered machinery upon hard construction materials in many situations will likely give rise to inevitable vibration, wherever possible and in accordance with CCS Code, unnecessary vibration will be avoided and mitigated. This will take the form of the careful planning and consideration of the hardness of the material being demolished, and the works planned and notified accordingly, and where considered particularly unavoidable, the 09:00-17:00 working hours principle be observed.

Dust – Most of the works will be internal and so can be relatively easily isolated from becoming airborne and dispersing to neighbours and the local environment. External activity shall be contained as best as possible using suitable hoardings and sheeting.

Materials stored externally would be covered or contained to avoid wind and weather disturbance to granular and particulate materials. Structural concrete will be typically mixed off-site and delivered, but where small quantities or mortar are to be site mixed, this can be done in an enclosed area to limit cement dust from becoming airborne.

Deliveries of materials shall be covered where potential for dust is prevalent. Waste skips and excavated soils are to be covered whenever practicable.

For activities that generate dust, surface wetting-down, and water misting will be used to suppress dusting. Rotary cutters will use water as a dust suppressant.

Housekeeping – Shared driveways, external pavements on the Site and in front of, will be regular swept, and should vehicles or windows become soiled, the contractor shall arrange cleaning as the neighbour so desires.

8. SUMMARY

During construction, lateral and vertical stability of the existing structure and adjoining structures subject to the party wall act as detailed above will be maintained by a combination of contiguous piling and underpinning of the required existing load bearing walls, such that no significant adverse movement is expected. The construction sequence used, including limiting excavations to 1m bays, and incorporation of suitable temporary propping should also serve to maintain stability to the soil and foundations of nos 47 & 49, the adjoining structures, highways and the immediately surrounding area.

Environmental impacts have been assessed, and the response to geotechnical and hydrological aspects have been considered. The proposals are deemed to not have any adverse impact in this respect.

Once complete, the new structure will provide a robust and secure support for both new and existing structures without detriment to the overall stability of the building, adjoining properties or Highway.

APPENDICES.

APPENDIX A: PROPOSED DRAWINGS

Proposed Architectural Drawings

APPENDIX B: POSSIBLE CONSTRUCTION SEQUENCE

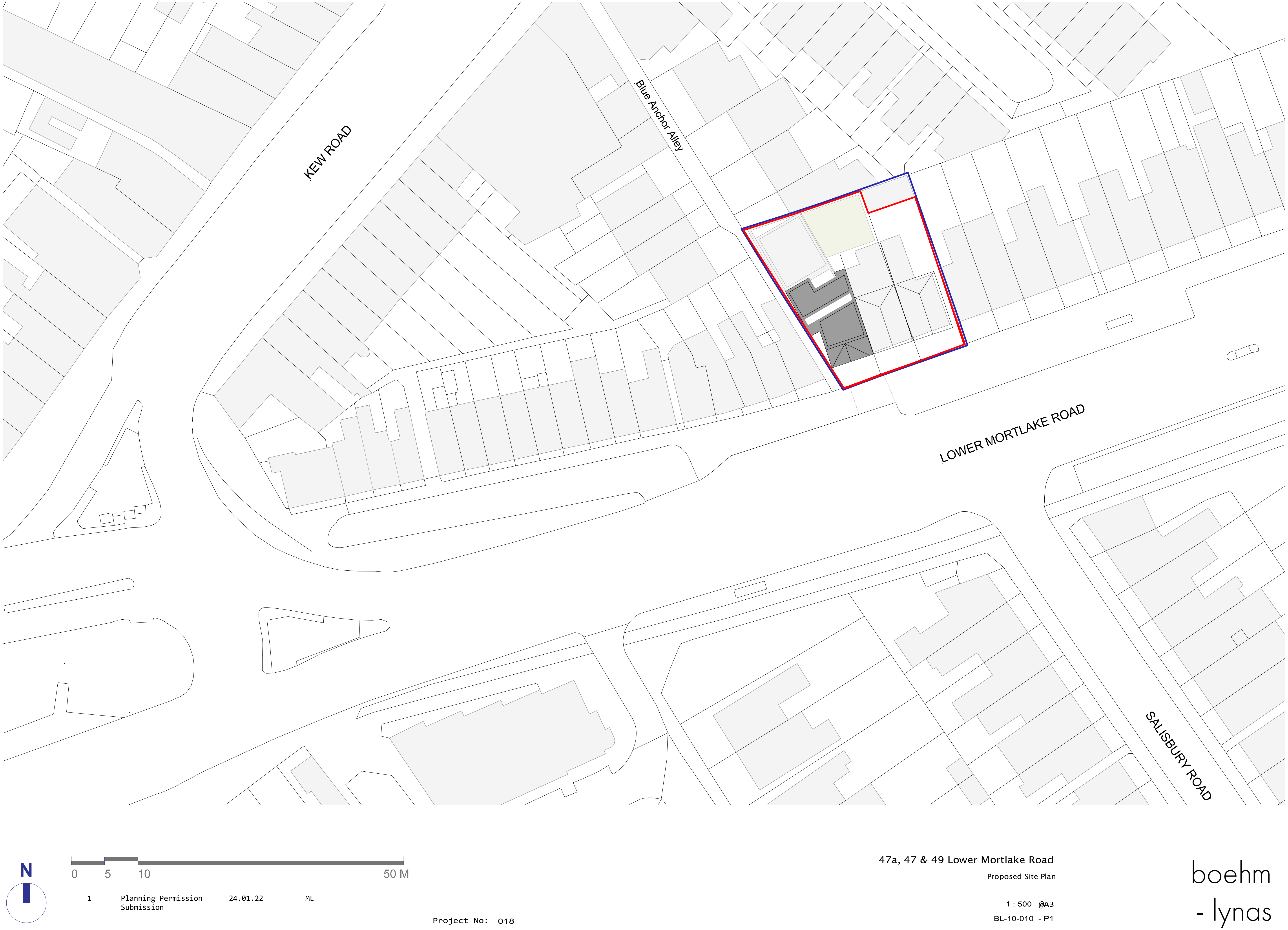
2218_SK-01: Possible Construction Sequence

APPENDIX D: STRUCTURAL CALCULATIONS

Typical Retaining Wall

Buoyancy Check

APPENDIX A: PROPOSED DRAWINGS



1	Planning Permission Submission	24.01.22	ML

Project No: 018
Last Issued: 24.01.22

47a, 47 & 49 Lower Mortlake Road
Proposed Site Plan
1 : 500 @A3
BL-10-010 - P1
Original drawing is A3. Do not scale from this drawing.

boehm
- lynas

0 1 5 10 M

N

P	Description	Date	By
1	Planning Permission Submission	24.01.22	ML

Drawn: ML
Project No: 018
24.01.22

47a, 47 & 49 Lower Mortlake Road
Ground Floor Plan

1 : 100 @A3
BL-15-100 - P1
Original drawing is A2. Do not scale from this drawing.

boehm - lynas

0 1 5 10 M

P 1	Planning Permission Submission	24.01.22	ML

Drawn: ML

Project No: 018

24.01.22

47a, 47 & 49 Lower Mortlake Road

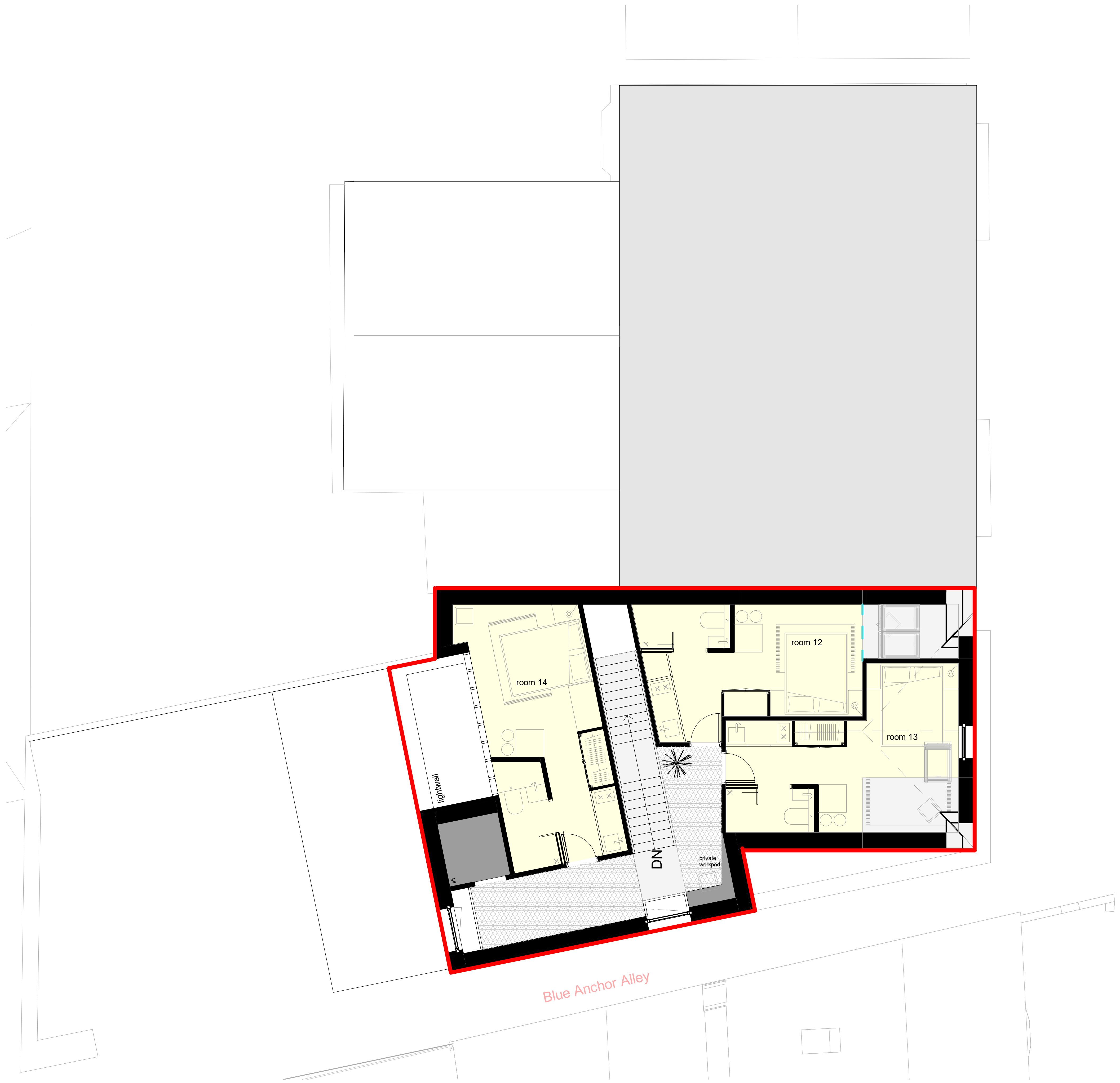
First Floor Plan

1 : 100 @A3

BL-15-101 - P1

Original drawing is A2. Do not scale from this drawing.

boehm - lynas



0 1 5 10 M

P	1	Planning Permission Submission	24.01.22	ML

Drawn: ML
Project No: 018
24.01.22

47a, 47 & 49 Lower Mortlake Road
Second Floor Plan

1 : 100 @A3
BL-15-102 - P1
Original drawing is A2. Do not scale from this drawing.

boehm
- lynas

0 1 5 10 M

N

P 1 Planning Permission Submission 24.01.22 ML

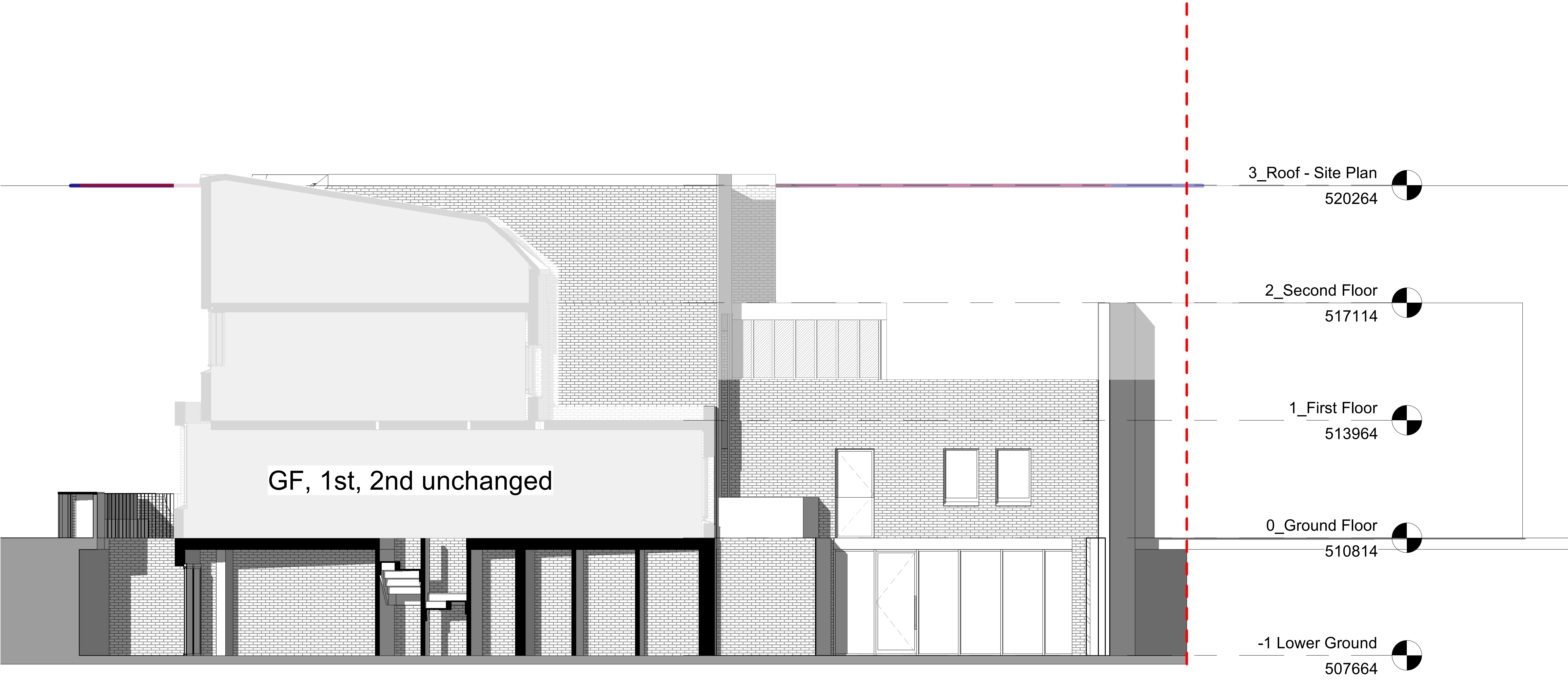
Drawn: ML
Project No: 018
24.01.22

47a, 47 & 49 Lower Mortlake Road

Roof Plan

1 : 100 @A3
BL-15-103 - P1
Original drawing is A2. Do not scale from this drawing.

boehm
- lynas



East Elevation

1 : 100

0 1 5 10 M

1	Planning Permission Submission	24.01.22	ML

Project No: 018

Last Issued: 24.01.22

47a, 47 & 49 Lower Mortlake Road

East Elevation

1 : 100 @A3

BL-15-300 - P1

Original drawing is A3. Do not scale from this drawing.

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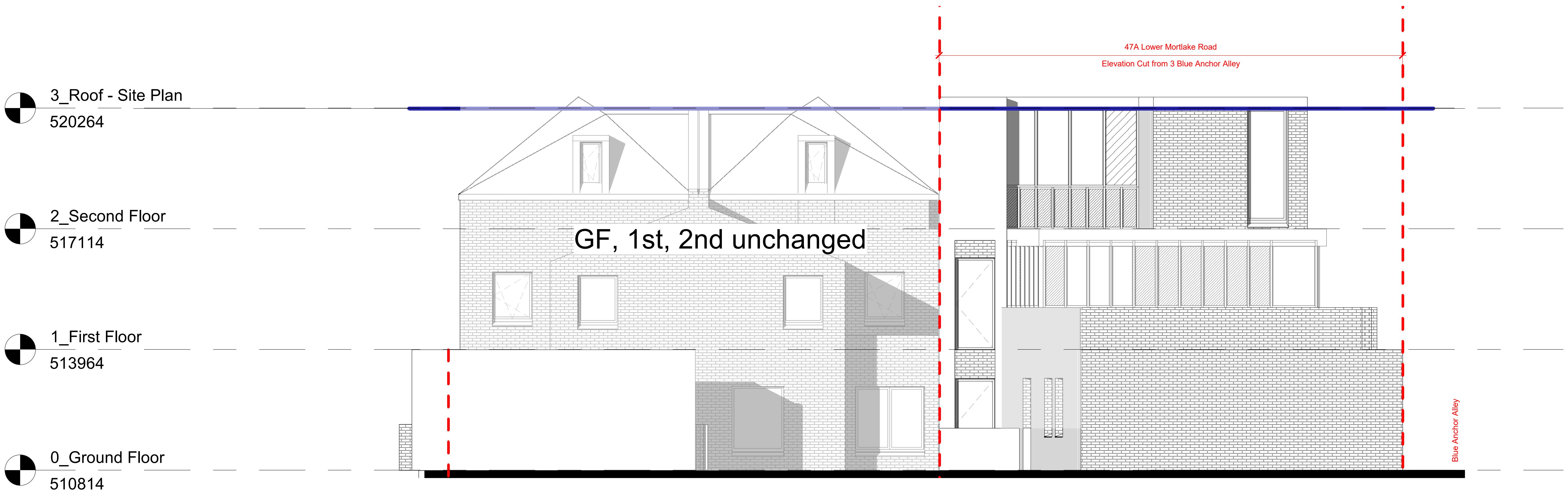
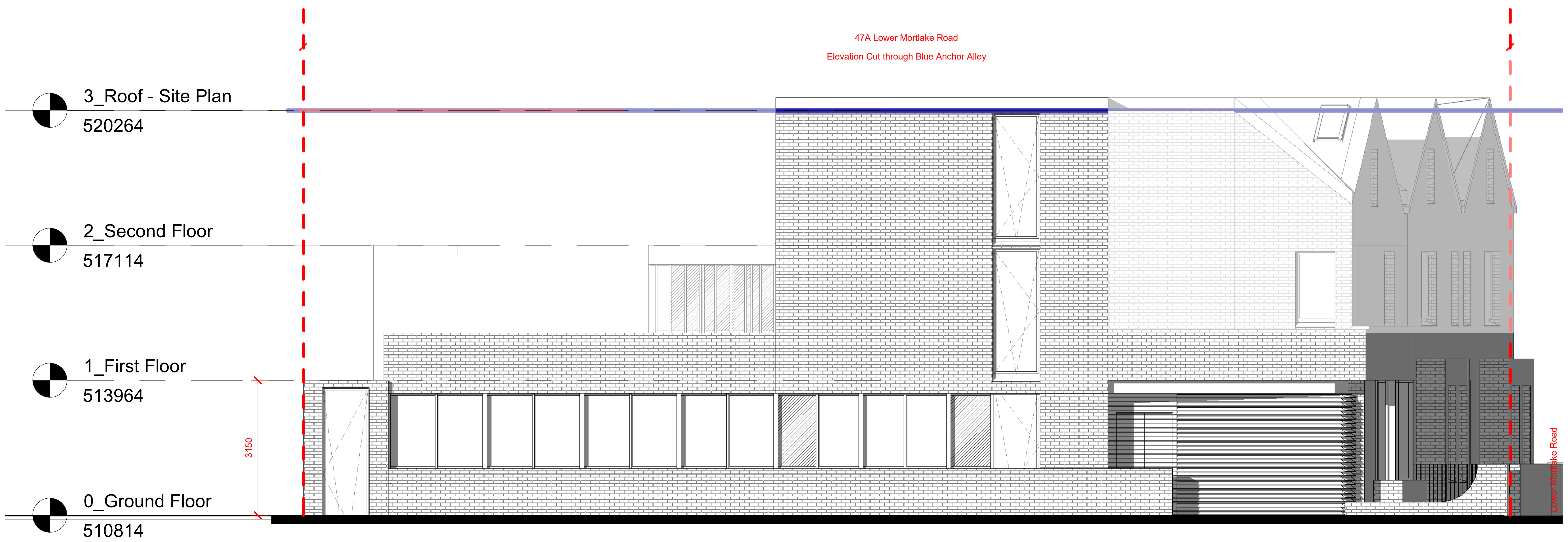


North Elevation

1 : 100



West Elevation

1 : 100

0 1 5 10 M

P 1 Planning Permission Submission 24.01.22 ML

Drawn: ML
Project No: 018
24.01.22

47a, 47 & 49 Lower Mortlake Road

North and West Elevations

1 : 100 @A3
BL-15-301 - P1
Original drawing is A2. Do not scale from this drawing.

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1	Planning Permission Submission	24.01.22	ML

Project No: 018

Last Issued: 24.01.22

47a, 47 & 49 Lower Mortlake Road

Lower Mortlake Elevation

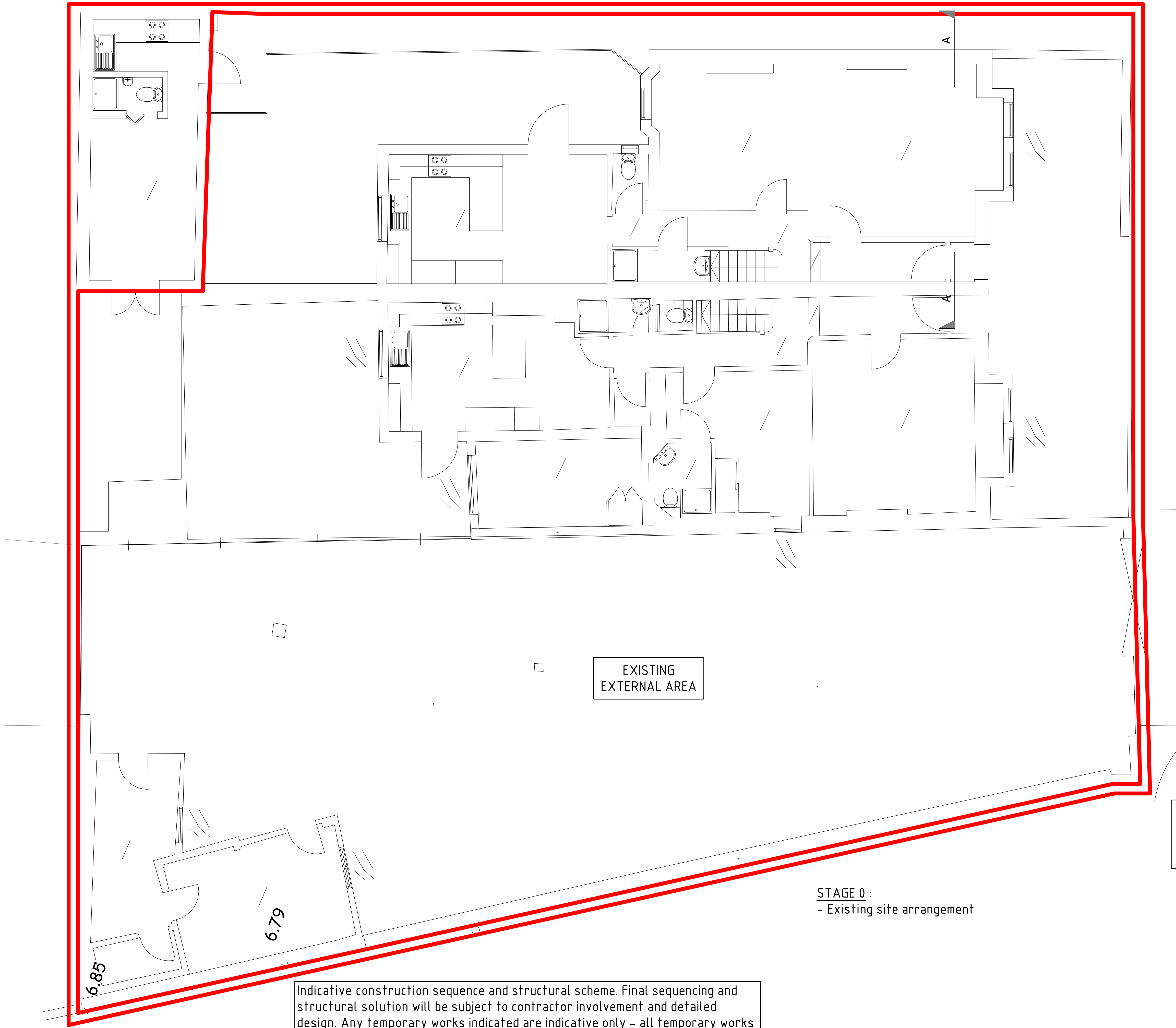
1 : 100 @A3

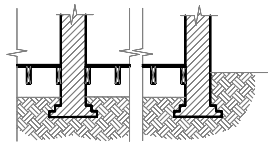
BL-15-303 - P1

Original drawing is A3. Do not scale from this drawing.

boehm - lynas

APPENDIX B: POSSIBLE CONSTRUCTION SEQUENCE





Assumed existing foundations

SECTION A-A

Pedestrian access down Blue Anchor Alley restricted during works (access to properties via A307 end)

STAGE 0 :
- Existing site arrangement

Indicative construction sequence and structural scheme. Final sequencing and structural solution will be subject to contractor involvement and detailed design. Any temporary works indicated are indicative only - all temporary works will be designed by the appointed contractors temporary works engineer

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.

PRELIMINARY ISSUE

Rev	Date	Drawn	Eng	Amendment
P1	26.01.22	PRH	PRH	Preliminary Issue

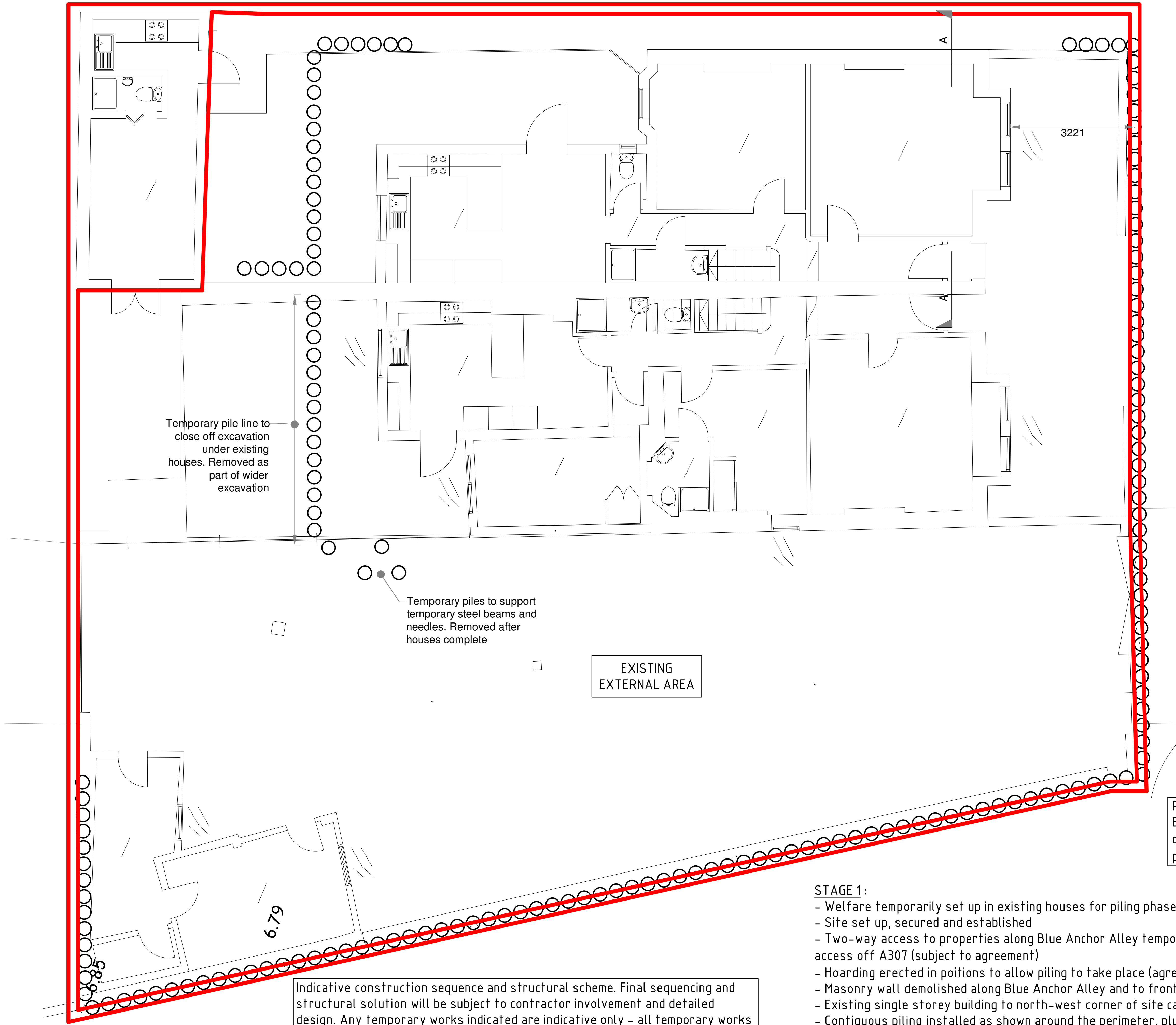
Project
47,47A,49 LOWER MORTLAKE RD

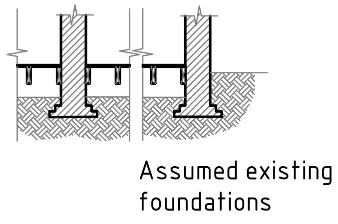
INDICATIVE CONSTRUCTION SEQUENCE
- SHEET 1

Drawing No. 2218 /SK-01	Rev P1
Scale @ A1 1:100	Scale @ A3 1:200
Drawn PRH	Engineer PRH

Structural Designers

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





SECTION A-A

STAGE 1:

- Welfare temporarily set up in existing houses for piling phase
- Site set up, secured and established
- Two-way access to properties along Blue Anchor Alley temporarily restricted to access off A307 (subject to agreement)
- Hoarding erected in poitions to allow piling to take place (agreements required)
- Masonry wall demolished along Blue Anchor Alley and to front of existing houses
- Existing single storey building to north-west corner of site carefully demolished
- Contiguous piling installed as shown around the perimeter, plus 2-4no. temporary internal piles as indicated

Indicative construction sequence and structural scheme. Final sequencing and structural solution will be subject to contractor involvement and detailed design. Any temporary works indicated are indicative only - all temporary works will be designed by the appointed contractors temporary works engineer

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Legend:

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

PRELIMINARY ISSUE

Rev	Date	Drawn	Eng	Amendment
P1	26.01.22	PRH	PRH	Preliminary Issue

Project

47,47A,49 LOWER MORTLAKE RD

INDICATIVE CONSTRUCTION SEQUENCE
- SHEET 2

Drawing No. 2218 /SK-01	Rev P1
Scale @ A1 1:100	Scale @ A3 1:200
Drawn PRH	Engineer PRH

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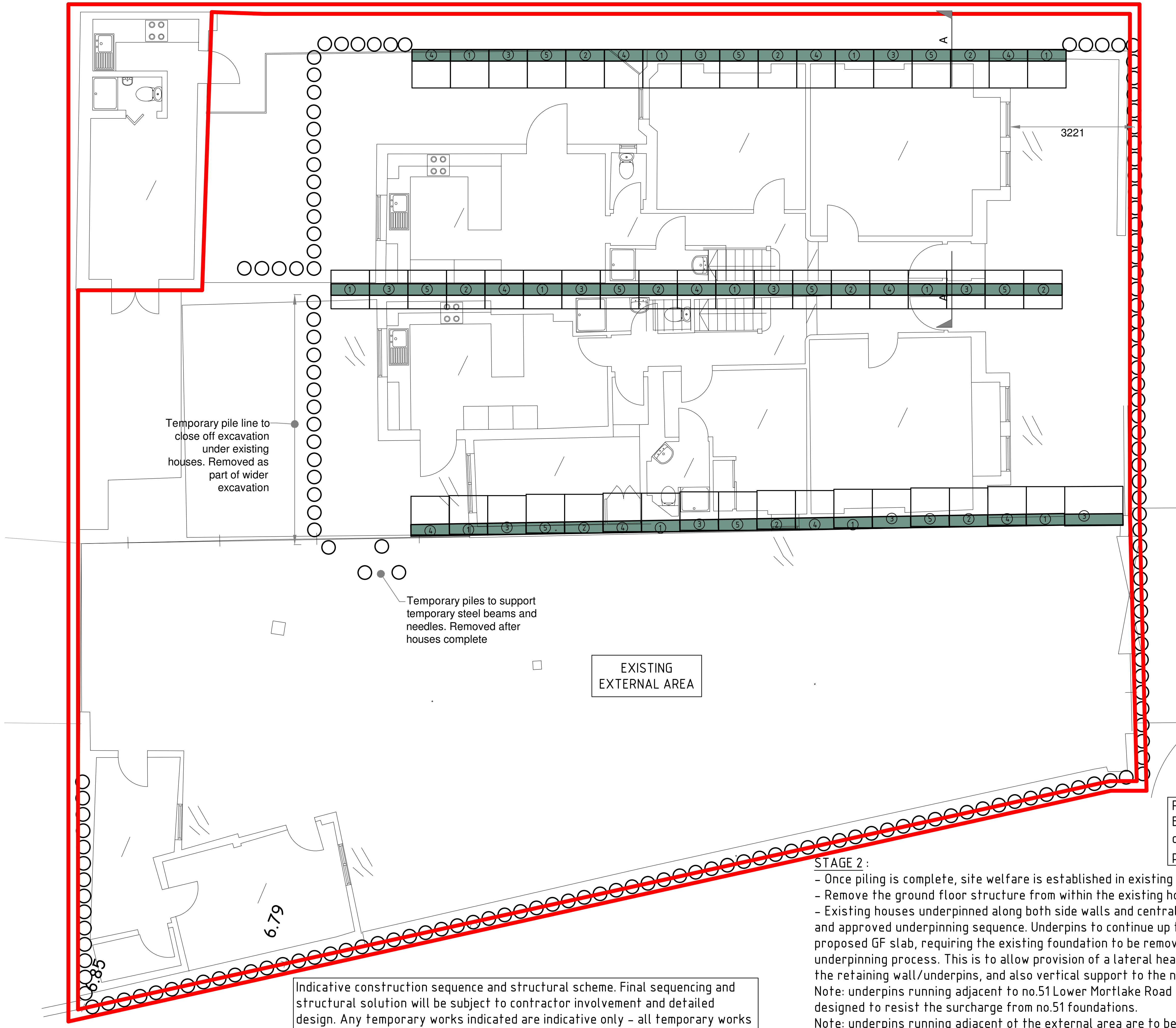

Pedestrian access down Blue Anchor Alley restricted during works (access to properties via A307 end)

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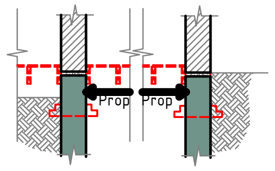
STAGE 2 :

- Once piling is complete, site welfare is established in existing external area
- Remove the ground floor structure from within the existing houses
- Existing houses underpinned along both side walls and central Party Wall, in recognised and approved underpinning sequence. Underpins to continue up to the level of the proposed GF slab, requiring the existing foundation to be removed in 1m bays during the underpinning process. This is to allow provision of a lateral head restraint to the top of the retaining wall/underpins, and also vertical support to the new GF slab

Note: underpins running adjacent to no.51 Lower Mortlake Road are to be reinforced, designed to resist the surcharge from no.51 foundations.

Note: underpins running adjacent ot the external area are to be reinforced, designed to resist the surcharge from the construction requirements for the external area



SECTION A-A

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47,47A,49 LOWER MORTLAKE RD

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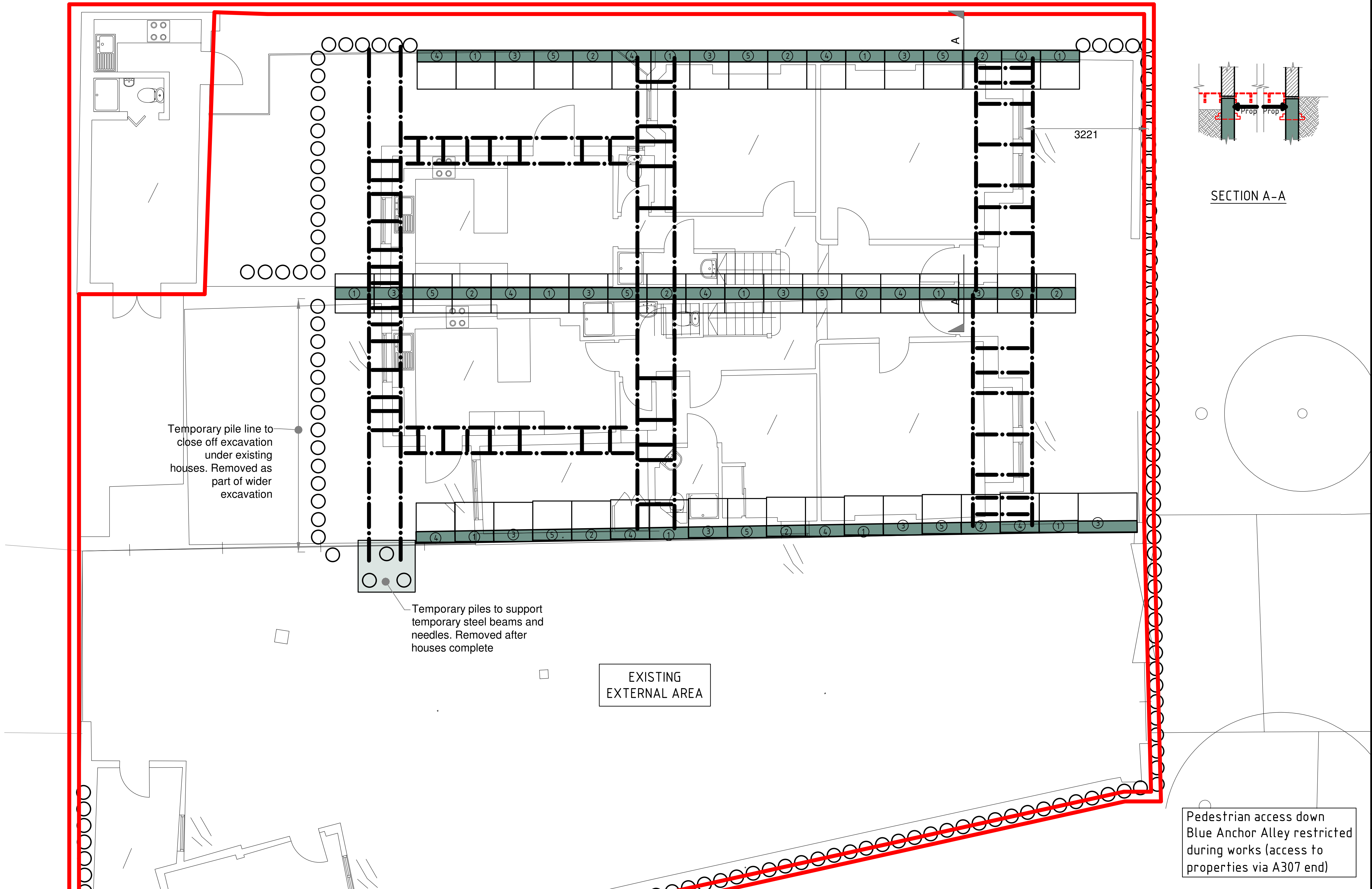

STAGE 3 :
- Once the underpinning is complete, temporary steel beams are to be installed across the front and rear existing facades, and needling installed through to support the walls over
Note: It may be more viable (cost and safety) to demolish the rear outriggers and re-construct like-for-like after the completion of the new lower ground floor structure - subject to permission

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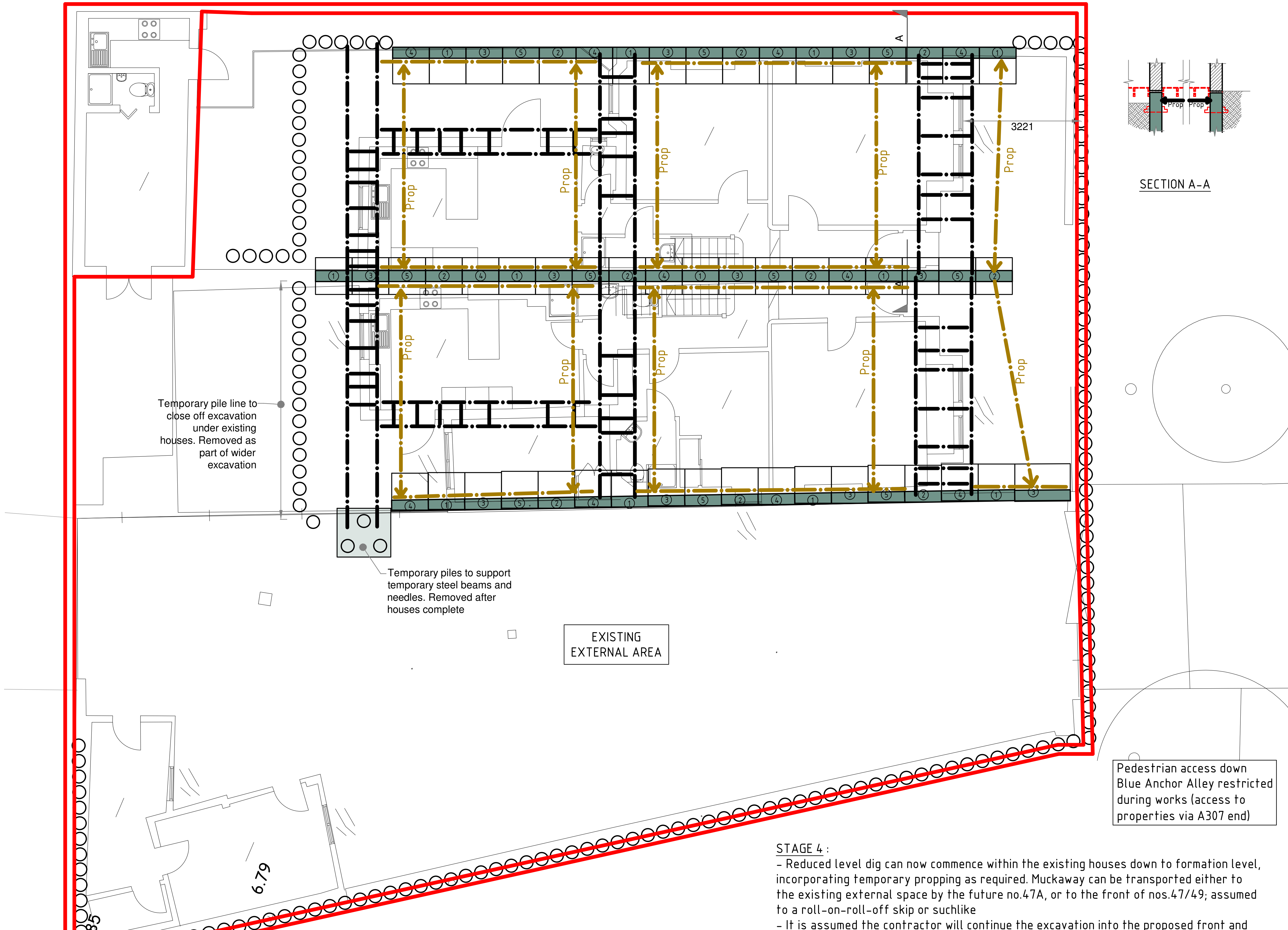

STAGE 4 :
- Reduced level dig can now commence within the existing houses down to formation level, incorporating temporary propping as required. Muckaway can be transported either to the existing external space by the future no.47A, or to the front of nos.47/49; assumed to a roll-on-roll-off skip or suchlike
- It is assumed the contractor will continue the excavation into the proposed front and rear lightwells/terraces

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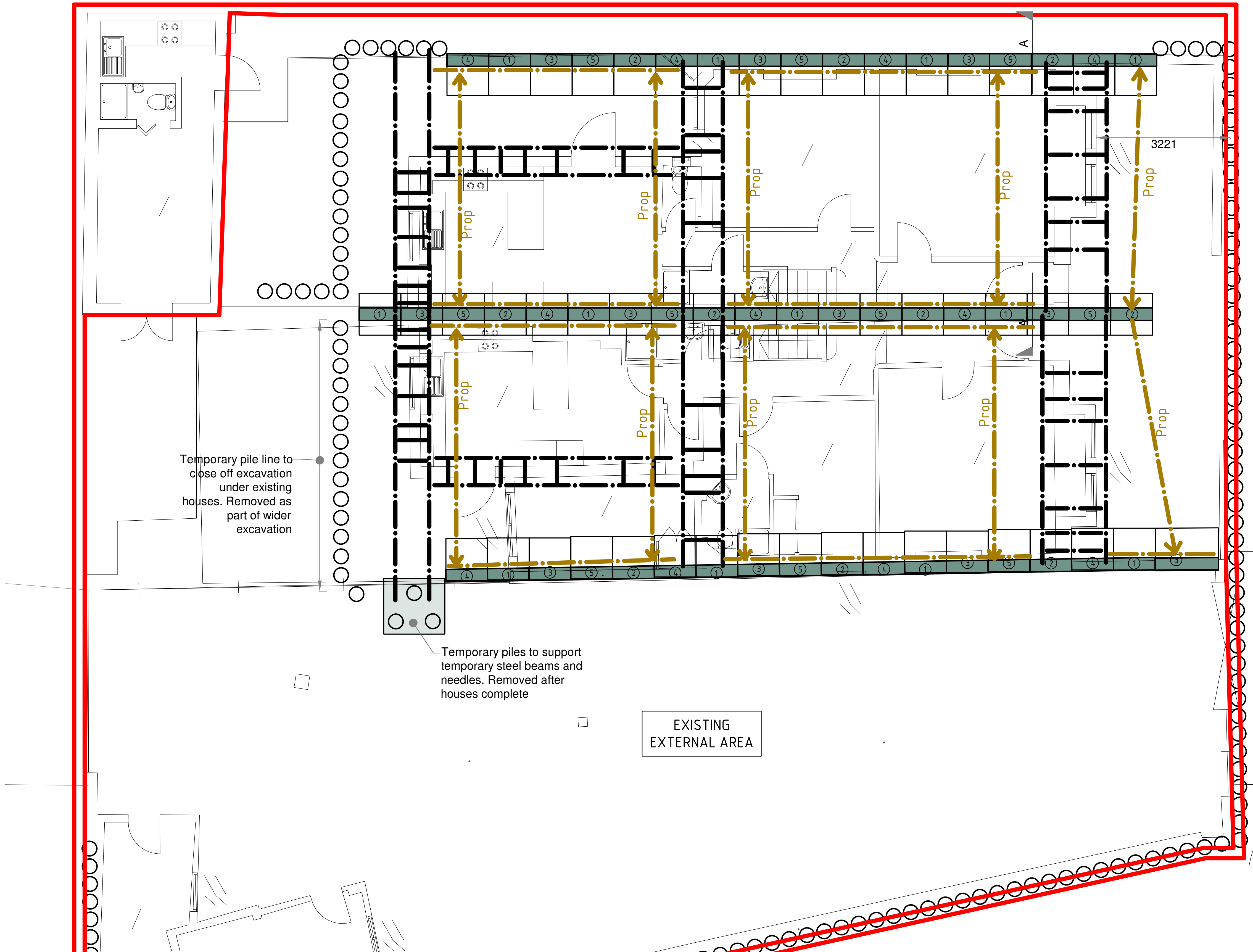

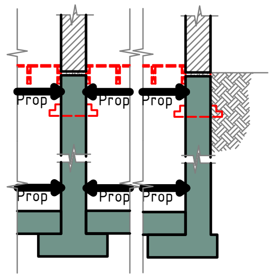

SECTION A-A

STAGE 5:
- Once reduced level dig is complete, install and below slab services, sumps, etc, blinding, any required heave mats, and then cast the lower ground floor RC slab, tying in with the perimeter underpinning
- Create the RC retaining/lining wall in front of the piles to the lightwells/terraces

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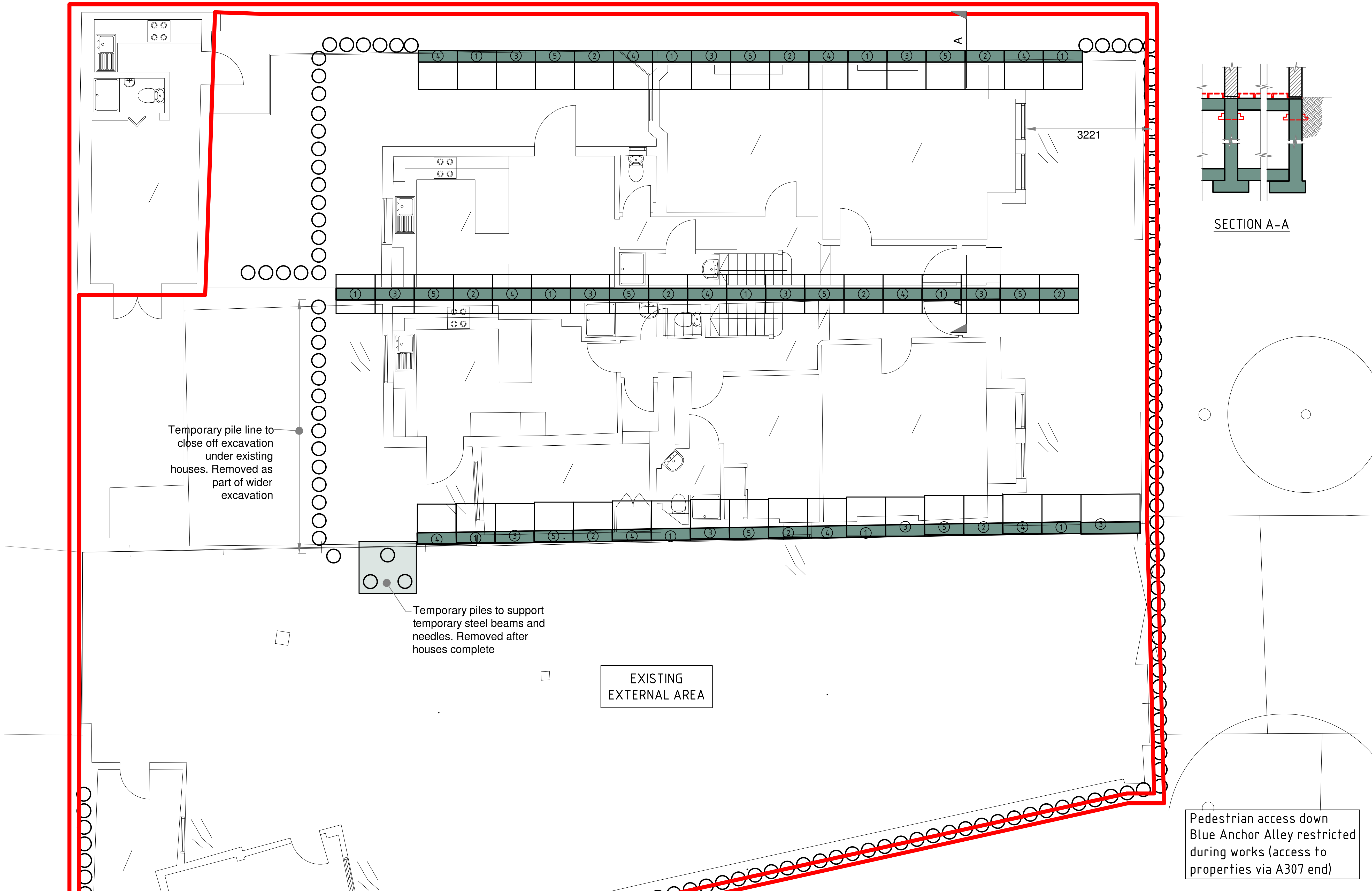

SECTION A-A

STAGE 6:
- Form the new RC ground floor slab within the existing houses
- Reinstate bases of existing masonry walls and drypack to new GF RC slab, making good as required
- Remove the temporary steel needles and beams, and make good as required

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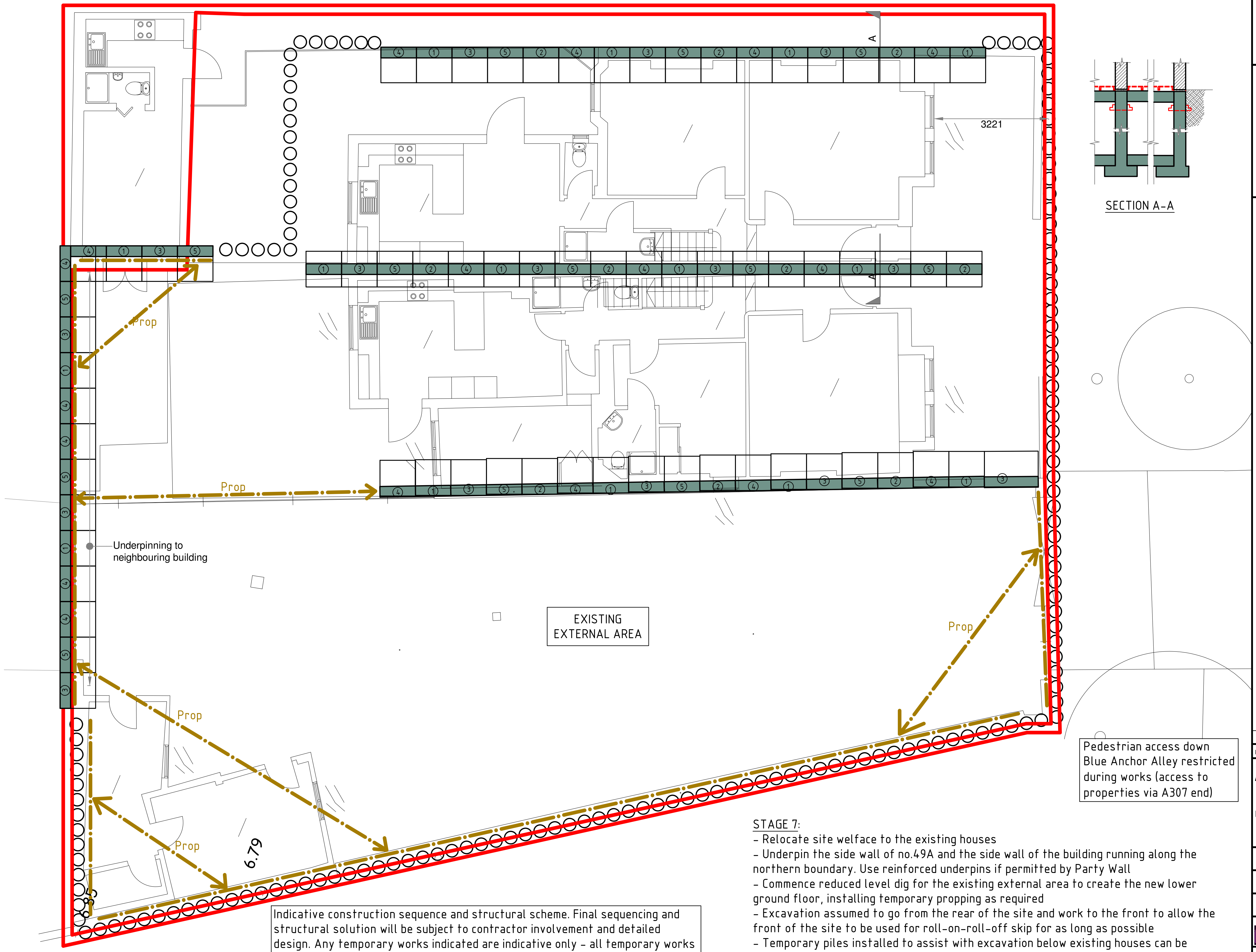

SECTION A-A

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STAGE 7:
- Relocate site welfare to the existing houses
- Underpin the side wall of no.49A and the side wall of the building running along the northern boundary. Use reinforced underpins if permitted by Party Wall
- Commence reduced level dig for the existing external area to create the new lower ground floor, installing temporary propping as required
- Excavation assumed to go from the rear of the site and work to the front to allow the front of the site to be used for roll-on-roll-off skip for as long as possible
- Temporary piles installed to assist with excavation below existing houses can be removed

Pedestrian access down Blue Anchor Alley restricted during works (access to properties via A307 end)

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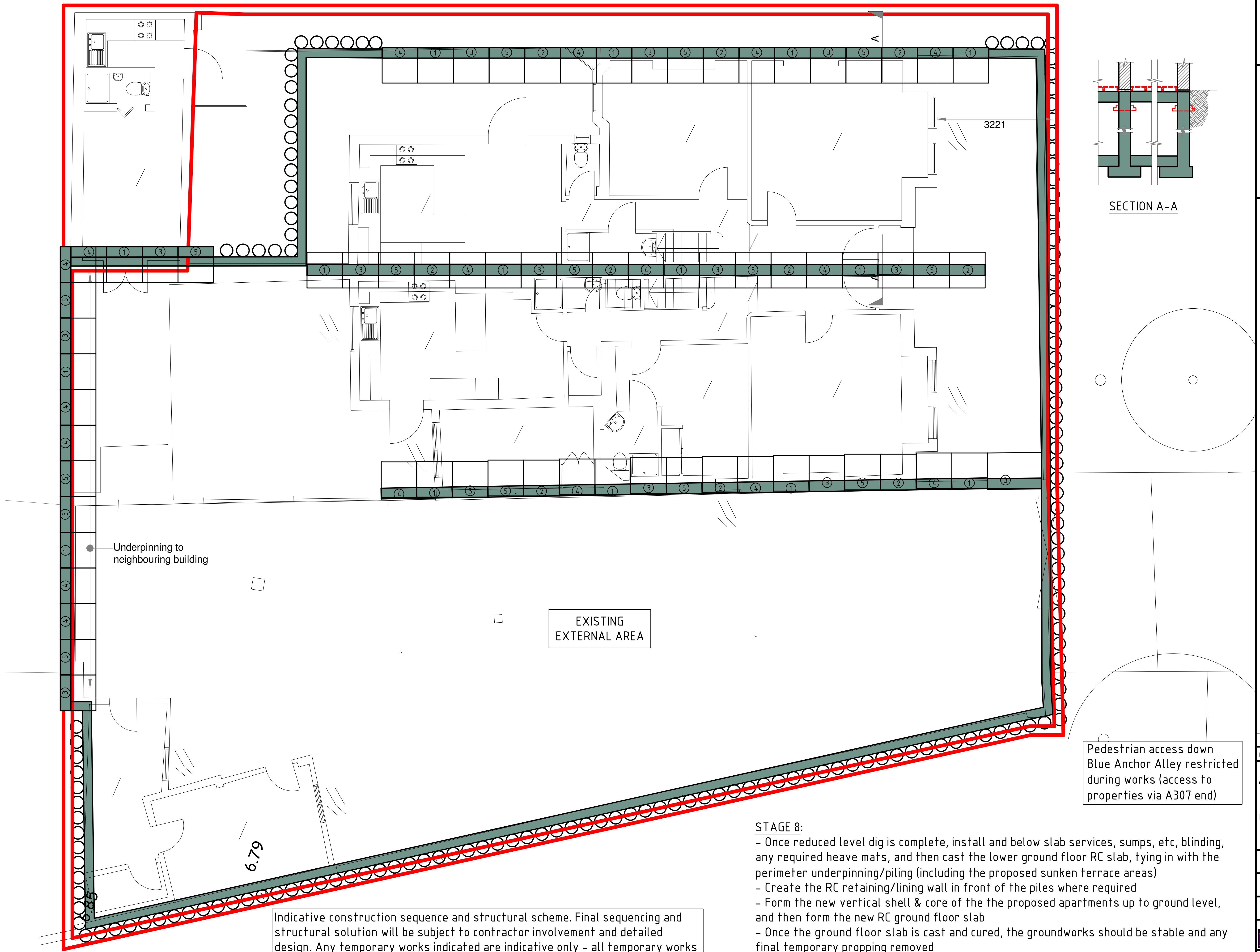

SECTION A-A

Pedestrian access down Blue Anchor Alley restricted during works (access to properties via A307 end)

STAGE 8:

- Once reduced level dig is complete, install and below slab services, sumps, etc, blinding, any required heave mats, and then cast the lower ground floor RC slab, tying in with the perimeter underpinning/piling (including the proposed sunken terrace areas)
- Create the RC retaining/lining wall in front of the piles where required
- Form the new vertical shell & core of the the proposed apartments up to ground level, and then form the new RC ground floor slab
- Once the ground floor slab is cast and cured, the groundworks should be stable and any final temporary propping removed

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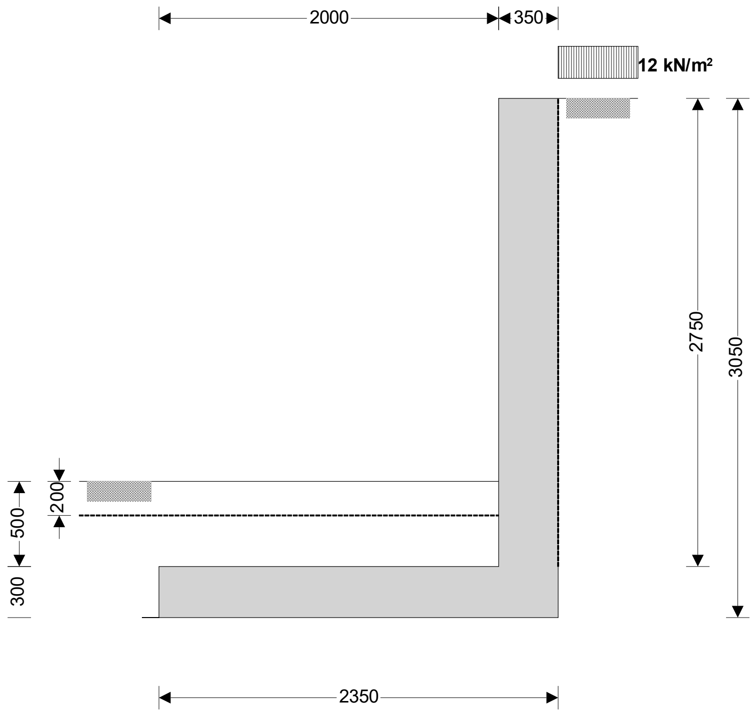
APPENDIX C: CALCULATIONS

Tekla Tedds Constructure Ltd Unit D, 15 Bell Yard Mews London SE1 3TY	Project 47a Lower Mortlake Road				Job no. 2018	
	Calcs for Retaining Wall to Front Light Well				Start page no./Revision 1	
	Calcs by GW	Calcs date 26/01/2022	Checked by PH	Checked date 26/01/2022	Approved by PH	Approved date 26/01/2022

RETAINING WALL ANALYSIS (BS 8002:1994)

TEDDS calculation version 1.2.01.06



Wall details

Retaining wall type	**Unpropped cantilever**
Height of retaining wall stem	h_{stem} = **2750** mm
Thickness of wall stem	t_{wall} = **350** mm
Length of toe	l_{toe} = **2000** mm
Length of heel	l_{heel} = **0** mm
Overall length of base	$l_{base} = l_{toe} + l_{heel} + t_{wall}$ = **2350** mm
Thickness of base	t_{base} = **300** mm
Depth of downstand	d_{ds} = **0** mm
Position of downstand	l_{ds} = **-100** mm
Thickness of downstand	t_{ds} = **300** mm
Height of retaining wall	$h_{wall} = h_{stem} + t_{base} + d_{ds}$ = **3050** mm
Depth of cover in front of wall	d_{cover} = **500** mm
Depth of unplanned excavation	d_{exc} = **200** mm
Height of ground water behind wall	h_{water} = **0** mm
Height of saturated fill above base	$h_{sat} = \max(h_{water} - t_{base} - d_{ds}, 0 \text{ mm})$ = **0** mm
Density of wall construction	γ_{wall} = **23.6** kN/m^3
Density of base construction	γ_{base} = **23.6** kN/m^3
Angle of rear face of wall	α = **90.0** deg
Angle of soil surface behind wall	β = **0.0** deg
Effective height at virtual back of wall	$h_{eff} = h_{wall} + l_{heel} \times \tan(\beta)$ = **3050** mm

Retained material details

Mobilisation factor	M = **1.5**
Moist density of retained material	γ_m = **18.0** kN/m^3

Saturated density of retained material γ_s = **21.0** kN/m³

Design shear strength ϕ' = **24.2** deg

Angle of wall friction δ = **0.0** deg

Base material details

Moist density γ_{mb} = **18.0** kN/m³

Design shear strength ϕ'_b = **24.2** deg

Design base friction δ_b = **18.6** deg

Allowable bearing pressure $P_{bearing}$ = **100** kN/m²

Using Coulomb theory

Active pressure coefficient for retained material

$$K_a = \sin(\alpha + \phi')^2 / (\sin(\alpha)^2 \times \sin(\alpha - \delta) \times [1 + \sqrt{(\sin(\phi' + \delta) \times \sin(\phi' - \beta) / (\sin(\alpha - \delta) \times \sin(\alpha + \beta)))}]^2) = \mathbf{0.419}$$

Passive pressure coefficient for base material

$$K_p = \sin(90 - \phi'_b)^2 / (\sin(90 - \delta_b) \times [1 - \sqrt{(\sin(\phi'_b + \delta_b) \times \sin(\phi'_b) / (\sin(90 + \delta_b)))}]^2) = \mathbf{4.187}$$

At-rest pressure

At-rest pressure for retained material $K_0 = 1 – \sin(\phi') =$ **0.590**

Loading details

Surcharge load on plan Surcharge = **12.0** kN/m²

Applied vertical dead load on wall W_{dead} = **0.0** kN/m

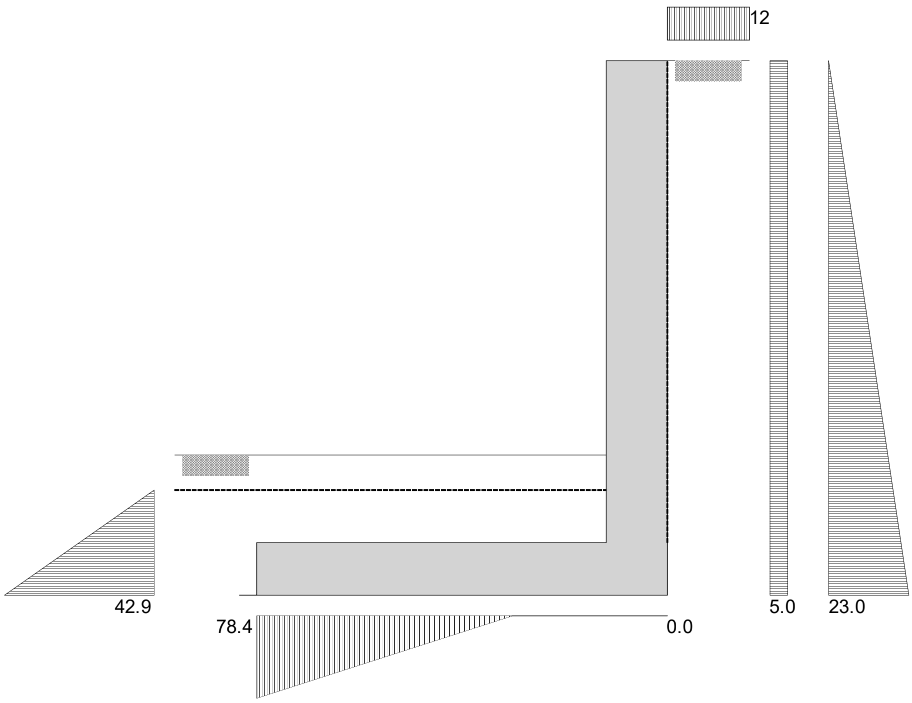
Applied vertical live load on wall W_{live} = **0.0** kN/m

Position of applied vertical load on wall l_{load} = **0** mm

Applied horizontal dead load on wall F_{dead} = **0.0** kN/m

Applied horizontal live load on wall F_{live} = **0.0** kN/m

Height of applied horizontal load on wall h_{load} = **0** mm



Loads shown in kN/m, pressures shown in kN/m²

Vertical forces on wall

Wall stem $w_{wall} = h_{stem} \times t_{wall} \times \gamma_{wall}$ = **22.7** kN/m

Wall base $w_{base} = l_{base} \times t_{base} \times \gamma_{base}$ = **16.6** kN/m

Soil in front of wall $w_p = l_{toe} \times d_{cover} \times \gamma_{mb}$ = **18** kN/m

Total vertical load $W_{total} = w_{wall} + w_{base} + w_p$ = **57.4** kN/m

Horizontal forces on wall

Surcharge $F_{sur} = K_a \times Surcharge \times h_{eff}$ = **15.3** kN/m

Moist backfill above water table $F_{m\_a} = 0.5 \times K_a \times \gamma_m \times (h_{eff} - h_{water})^2$ = **35** kN/m

Total horizontal load $F_{total} = F_{sur} + F_{m\_a}$ = **50.4** kN/m

Calculate stability against sliding

Passive resistance of soil in front of wall $F_p = 0.5 \times K_p \times \cos(\delta_b) \times (d_{cover} + t_{base} + d_{ds} - d_{exc})^2 \times \gamma_{mb}$ = **12.9** kN/m

Resistance to sliding $F_{res} = F_p + (W_{total} - w_p) \times \tan(\delta_b)$ = **26.1** kN/m

FAIL - Sliding force is greater than resisting force

Overturning moments

Surcharge $M_{sur} = F_{sur} \times (h_{eff} - 2 \times d_{ds}) / 2$ = **23.4** kNm/m

Moist backfill above water table $M_{m\_a} = F_{m\_a} \times (h_{eff} + 2 \times h_{water} - 3 \times d_{ds}) / 3$ = **35.6** kNm/m

Total overturning moment $M_{ot} = M_{sur} + M_{m\_a}$ = **59** kNm/m

Restoring moments

Wall stem $M_{wall} = w_{wall} \times (l_{toe} + t_{wall} / 2)$ = **49.4** kNm/m

Wall base $M_{base} = w_{base} \times l_{base} / 2$ = **19.5** kNm/m

Total restoring moment $M_{rest} = M_{wall} + M_{base}$ = **69** kNm/m

Check stability against overturning

Total overturning moment M_{ot} = **59.0** kNm/m

Total restoring moment M_{rest} = **69.0** kNm/m

PASS - Restoring moment is greater than overturning moment

Check bearing pressure

Soil in front of wall $M_{p\_r} = w_p \times l_{toe} / 2$ = **18** kNm/m

Total moment for bearing $M_{total} = M_{rest} - M_{ot} + M_{p\_r}$ = **28** kNm/m

Total vertical reaction $R = W_{total}$ = **57.4** kN/m

Distance to reaction $x_{bar} = M_{total} / R$ = **488** mm

Eccentricity of reaction $e = abs((l_{base} / 2) - x_{bar})$ = **687** mm

Reaction acts outside middle third of base

Bearing pressure at toe $p_{toe} = R / (1.5 \times x_{bar})$ = **78.4** kN/m^2

Bearing pressure at heel p_{heel} = 0 kN/m^2 = **0** kN/m^2

PASS - Maximum bearing pressure is less than allowable bearing pressure

RETAINING WALL DESIGN (BS 8002:1994)

TEDDS calculation version 1.2.01.06

Ultimate limit state load factors

Dead load factor γ_{f_d} = **1.4**

Live load factor γ_{f_l} = **1.6**

Earth and water pressure factor γ_{f_e} = **1.4**

Factored vertical forces on wall

Wall stem $w_{wall\_f} = \gamma_{f\_d} \times h_{stem} \times t_{wall} \times \gamma_{wall}$ = **31.8** kN/m

Wall base $w_{base\_f} = \gamma_{f\_d} \times l_{base} \times t_{base} \times \gamma_{base}$ = **23.3** kN/m

Soil in front of wall $w_{p\_f} = \gamma_{f\_d} \times l_{toe} \times d_{cover} \times \gamma_{mb}$ = **25.2** kN/m

Total vertical load $W_{total\_f} = w_{wall\_f} + w_{base\_f} + w_{p\_f}$ = **80.3** kN/m

Factored horizontal at-rest forces on wall

Surcharge $F_{sur\_f} = \gamma_{f\_l} \times K_0 \times Surcharge \times h_{eff}$ = **34.6** kN/m

Moist backfill above water table $F_{m\_a\_f} = \gamma_{f\_e} \times 0.5 \times K_0 \times \gamma_m \times (h_{eff} - h_{water})^2$ = **69.2** kN/m

Total horizontal load $F_{total\_f} = F_{sur\_f} + F_{m\_a\_f}$ = **103.7** kN/m

Passive resistance of soil in front of wall $F_{p\_f} = \gamma_{f\_e} \times 0.5 \times K_p \times \cos(\delta_b) \times (d_{cover} + t_{base} + d_{ds} - d_{exc})^2 \times \gamma_{mb}$ = **18** kN/m

Factored overturning moments

Surcharge $M_{sur\_f} = F_{sur\_f} \times (h_{eff} - 2 \times d_{ds}) / 2$ = **52.7** kNm/m

Moist backfill above water table $M_{m\_a\_f} = F_{m\_a\_f} \times (h_{eff} + 2 \times h_{water} - 3 \times d_{ds}) / 3$ = **70.3** kNm/m

Total overturning moment $M_{ot\_f} = M_{sur\_f} + M_{m\_a\_f}$ = **123** kNm/m

Restoring moments

Wall stem $M_{wall\_f} = w_{wall\_f} \times (l_{toe} + t_{wall} / 2)$ = **69.2** kNm/m

Wall base $M_{base\_f} = w_{base\_f} \times l_{base} / 2$ = **27.4** kNm/m

Soil in front of wall $M_{p\_r\_f} = w_{p\_f} \times l_{toe} / 2$ = **25.2** kNm/m

Total restoring moment $M_{rest\_f} = M_{wall\_f} + M_{base\_f} + M_{p\_r\_f}$ = **121.7** kNm/m

Factored bearing pressure

Total moment for bearing $M_{total\_f} = M_{rest\_f} - M_{ot\_f}$ = **-1.3** kNm/m

Total vertical reaction $R_f = W_{total\_f}$ = **80.3** kN/m

Distance to reaction $x_{bar\_f} = M_{total\_f} / R_f$ = **-16** mm

Eccentricity of reaction $e_f = abs((l_{base} / 2) - x_{bar\_f})$ = **1191** mm

WARNING - Beyond scope of calculation

Bearing pressure at toe $p_{toe\_f} = R_f / (1.5 \times x_{bar\_f})$ = **-3368.2** kN/m^2

Bearing pressure at heel p_{heel_f} = 0 kN/m^2 = **0** kN/m^2

Rate of change of base reaction rate = $p_{toe\_f} / (3 \times x_{bar\_f})$ = **70644.92** kN/m^2/m

Bearing pressure at stem / toe $p_{stem\_toe\_f} = \max(p_{toe\_f} - (rate \times l_{toe}), 0 \text{ kN/m}^2)$ = **0** kN/m^2

Bearing pressure at mid stem $p_{stem\_mid\_f} = \max(p_{toe\_f} - (rate \times (l_{toe} + t_{wall} / 2)), 0 \text{ kN/m}^2)$ = **0** kN/m^2

Bearing pressure at stem / heel $p_{stem\_heel\_f} = \max(p_{toe\_f} - (rate \times (l_{toe} + t_{wall})), 0 \text{ kN/m}^2)$ = **0** kN/m^2

Design of reinforced concrete retaining wall toe (BS 8002:1994)

Material properties

Characteristic strength of concrete f_{cu} = **40** N/mm^2

Characteristic strength of reinforcement f_y = **500** N/mm^2

Base details

Minimum area of reinforcement k = **0.13** %

Cover to reinforcement in toe — c_{toe} = **50** mm

Calculate shear for toe design

Shear from weight of base — $V_{toe\_wt\_base} = \gamma_{f\_d} \times \gamma_{base} \times l_{toe} \times t_{base}$ = **19.8** kN/m

Shear from weight of soil — $V_{toe\_wt\_soil} = w_{p\_f} - (\gamma_{f\_d} \times \gamma_m \times l_{toe} \times d_{exc})$ = **15.1** kN/m

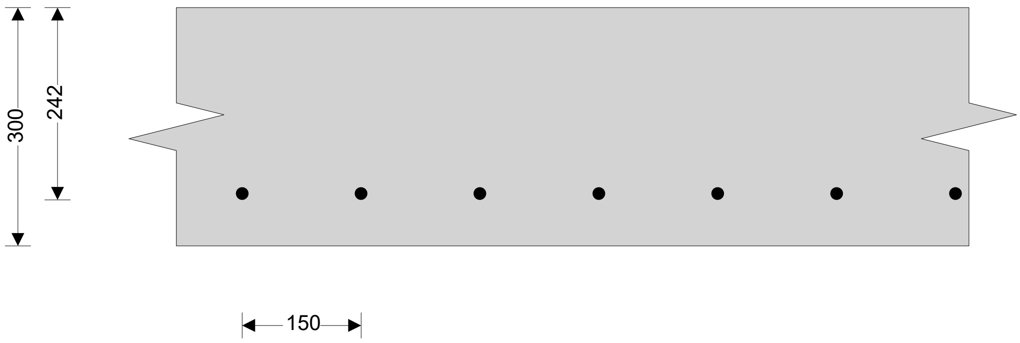
Total shear for toe design — $V_{toe} = V_{toe\_wt\_base} - V_{toe\_wt\_soil}$ = **4.7** kN/m

Calculate moment for toe design

Moment from weight of base — $M_{toe\_wt\_base} = (\gamma_{f\_d} \times \gamma_{base} \times t_{base} \times (l_{toe} + t_{wall} / 2)^2 / 2)$ = **23.4** kNm/m

Moment from weight of soil — $M_{toe\_wt\_soil} = (w_{p\_f} - (\gamma_{f\_d} \times \gamma_m \times l_{toe} \times d_{exc})) \times (l_{toe} + t_{wall}) / 2$ = **17.8** kNm/m

Total moment for toe design — $M_{toe} = M_{toe\_wt\_base} - M_{toe\_wt\_soil}$ = **5.7** kNm/m



Check toe in bending

Width of toe — b = **1000** mm/m

Depth of reinforcement — $d_{toe} = t_{base} - c_{toe} - (\phi_{toe} / 2)$ = **242.0** mm

Constant — $K_{toe} = M_{toe} / (b \times d_{toe}^2 \times f_{cu})$ = **0.002**

Compression reinforcement is not required

Lever arm — $z_{toe} = \min(0.5 + \sqrt{(0.25 - (\min(K_{toe}, 0.225) / 0.9))}, 0.95) \times d_{toe}$

z_{toe} = **230** mm

Area of tension reinforcement required — $A_{s\_toe\_des} = M_{toe} / (0.87 \times f_y \times z_{toe})$ = **57** mm²/m

Minimum area of tension reinforcement — $A_{s\_toe\_min} = k \times b \times t_{base}$ = **390** mm²/m

Area of tension reinforcement required — $A_{s\_toe\_req} = \mathrm{Max}(A_{s\_toe\_des}, A_{s\_toe\_min})$ = **390** mm²/m

Reinforcement provided — **16 mm dia.bars @ 150 mm centres**

Area of reinforcement provided — $A_{s\_toe\_prov}$ = **1340** mm²/m

PASS - Reinforcement provided at the retaining wall toe is adequate

Check shear resistance at toe

Design shear stress — $v_{toe} = V_{toe} / (b \times d_{toe})$ = **0.019** N/mm²

Allowable shear stress — $v_{adm} = \min(0.8 \times \sqrt{(f_{cu} / 1 \text{ N/mm}^2)}, 5) \times 1 \text{ N/mm}^2$ = **5.000** N/mm²

PASS - Design shear stress is less than maximum shear stress

From BS8110:Part 1:1997 – Table 3.8

Design concrete shear stress — v_{c_toe} = **0.688** N/mm²

$v_{toe} < v_{c\_toe}$ - No shear reinforcement required

Design of reinforced concrete retaining wall stem (BS 8002:1994)

Material properties

Characteristic strength of concrete — f_{cu} = **40** N/mm²

Characteristic strength of reinforcement — f_y = **500** N/mm²

Wall details

Minimum area of reinforcement — k = **0.13** %

Cover to reinforcement in stem c_{stem} = **50** mm

Cover to reinforcement in wall c_{wall} = **50** mm

Factored horizontal at-rest forces on stem

Surcharge $F_{s\_sur\_f} = \gamma_{f\_l} \times K_0 \times \text{Surcharge} \times (h_{eff} - t_{base} - d_{ds})$ = **31.2** kN/m

Moist backfill above water table $F_{s\_m\_a\_f} = 0.5 \times \gamma_{f\_e} \times K_0 \times \gamma_m \times (h_{eff} - t_{base} - d_{ds} - h_{sat})^2$ = **56.2** kN/m

Calculate shear for stem design

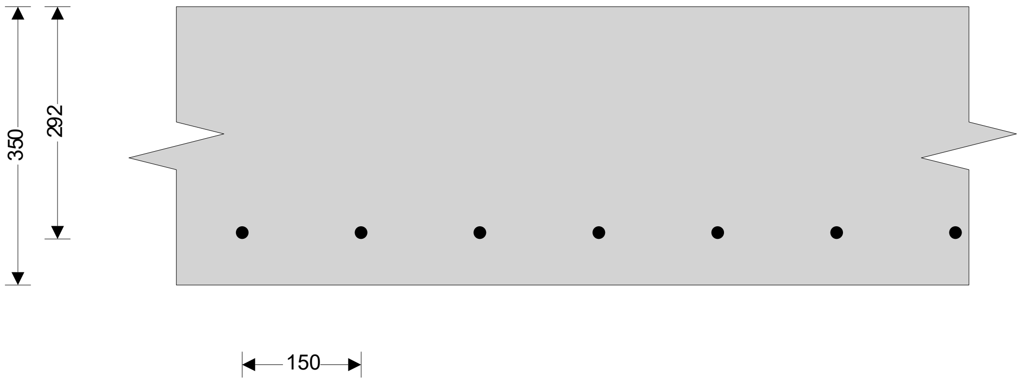
Shear at base of stem $V_{stem} = F_{s\_sur\_f} + F_{s\_m\_a\_f}$ = **87.4** kN/m

Calculate moment for stem design

Surcharge $M_{s\_sur} = F_{s\_sur\_f} \times (h_{stem} + t_{base}) / 2$ = **47.5** kNm/m

Moist backfill above water table $M_{s\_m\_a} = F_{s\_m\_a\_f} \times (2 \times h_{sat} + h_{eff} - d_{ds} + t_{base} / 2) / 3$ = **60** kNm/m

Total moment for stem design $M_{stem} = M_{s\_sur} + M_{s\_m\_a}$ = **107.5** kNm/m



Check wall stem in bending

Width of wall stem b = **1000** mm/m

Depth of reinforcement $d_{stem} = t_{wall} - c_{stem} - (\phi_{stem} / 2)$ = **292.0** mm

Constant $K_{stem} = M_{stem} / (b \times d_{stem}^2 \times f_{cu})$ = **0.032**

Compression reinforcement is not required

Lever arm $z_{stem} = \min(0.5 + \sqrt{(0.25 - (\min(K_{stem}, 0.225) / 0.9))},0.95) \times d_{stem}$

z_{stem} = **277** mm

Area of tension reinforcement required $A_{s\_stem\_des} = M_{stem} / (0.87 \times f_y \times z_{stem})$ = **891** mm²/m

Minimum area of tension reinforcement $A_{s\_stem\_min} = k \times b \times t_{wall}$ = **455** mm²/m

Area of tension reinforcement required $A_{s\_stem\_req} = \text{Max}(A_{s\_stem\_des}, A_{s\_stem\_min})$ = **891** mm²/m

Reinforcement provided **16 mm dia.bars @ 150 mm centres**

Area of reinforcement provided $A_{s\_stem\_prov}$ = **1340** mm²/m

PASS - Reinforcement provided at the retaining wall stem is adequate

Check shear resistance at wall stem

Design shear stress $v_{stem} = V_{stem} / (b \times d_{stem})$ = **0.299** N/mm²

Allowable shear stress $v_{adm} = \min(0.8 \times \sqrt{(f_{cu} / 1 \text{ N/mm}^2)}, 5) \times 1 \text{ N/mm}^2$ = **5.000** N/mm²

PASS - Design shear stress is less than maximum shear stress

From BS8110:Part 1:1997 – Table 3.8

Design concrete shear stress v_{c_stem} = **0.617** N/mm²

$v_{stem} < v_{c\_stem}$ - No shear reinforcement required

Check retaining wall deflection

Basic span/effective depth ratio ratio_{bas} = **7**

Design service stress $f_s = 2 \times f_y \times A_{s\_stem\_req} / (3 \times A_{s\_stem\_prov})$ = **221.5** N/mm²

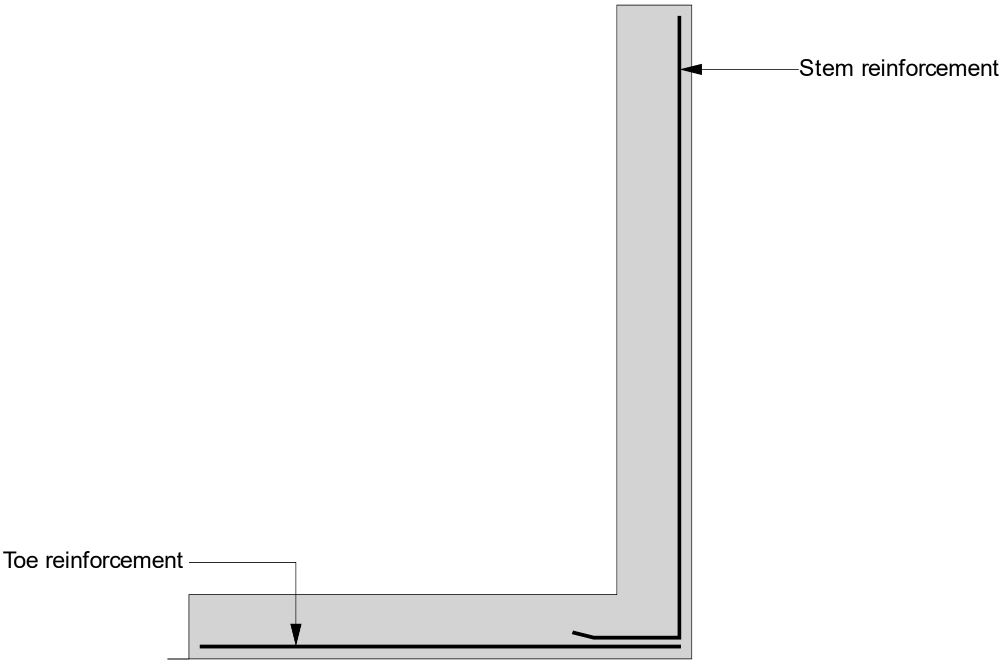
Modification factor $factor_{tens} = \min(0.55 + (477\ N/mm^2 - f_s)/(120 \times (0.9\ N/mm^2 + (M_{stem}/(b \times d_{stem}^2)))),2) =$ **1.54**

Maximum span/effective depth ratio $ratio_{max} = ratio_{bas} \times factor_{tens} =$ **10.75**

Actual span/effective depth ratio $ratio_{act} = h_{stem} / d_{stem} =$ **9.42**

PASS - Span to depth ratio is acceptable

Indicative retaining wall reinforcement diagram



Toe bars - 16 mm dia.@ 150 mm centres - (1340 mm^2/m)
Stem bars - 16 mm dia.@ 150 mm centres - (1340 mm^2/m)

Project No. 2218	Sheet	Revision	Project 47-49 LOWER MORTLAKE RD
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BUOYANCY CHECK

AREA OF BASEMENT ≃ 550 m^2 (TO OUTSIDE FACE OF RETAINING WALL)

- DEPTH OF BASEMENT ≃ 3M (TO U/S OF GROUND FLOOR SLAB)
- DEPTH INTO 'WORST CASE' WATER TABLE = 2M (1M BELOW GL)

∴ TOTAL VOLUME OF WATER DISPLACED = 1100 m^2

∴ TOTAL HYDROSTATIC UPLIFT FORCE = 11,000 KN (SLS)

APPROX VOLUME OF CONCRETE IN THE BASEMENT :

- WALLS = 21 + 27 + 19 + 28 + 19 + 18 + 6 = 138 M

  STEM = 2.2 M × 0.225 M × 138 M = 68.3 m^3 = 1639 KN

  BASE = 1.25 × 0.25 × 55 M = 17.2 m^3 = 413 KN

- WEIGHT OF BRICKWORK WALLS OVER :
  - BUILDING HEIGHT (NO 47-49) = 7.0 M

    NO 47-49 = 7.0 M × 0.225 M × 60 M × 0.7 (FOR VOIDS)

    × 22 KN/m^3 = 1455 KN

  - BUILDING HEIGHT (NEW DEVELOPMENT)

    3 STOREY = 10 M × 3.6 KN/m^2 × 25 M = 900 KN

    SINGLE STOREY = 4.0 M × 3.6 KN/m^2 × 15 M = 216 KN

  - WEIGHT OF GROUND FLOOR SLAB

    450 m^2 × 0.2 M × 24 KN/m^3 = 2160 KN

  - WEIGHT OF BASEMENT SLAB

    550 M × 0.35 M × 24 KN/m^2 = 4620 KN

Project No. 2218	Sheet	Revision	
Date JAN 21	Engineer GW	Checked	Project 47-49 LOWER MORTLAKE RD

- WEIGHT OF SUPERSTRUCTURE FLOORS (ASSUME TIMBER)

= 400 m^2 (APPROX) × 1.15 kN/m^2 × 2 FLOORS

= 920 kN

- WEIGHT OF PERIMETER BLOCKWORK IN BASEMENT

= 100 m^2 × 2.7m × 0.1m × 18 kN/m^3 = 486 kN

- WEIGHT OF STRUCTURE ROOF (ASSUME TIMBER)

= 200 m^2 × 1.3 kN/m^2 = 260 kN (FLAT ROOF)

= 160 m^2 × 1.35 kN/m^2 = 220 kN (TILED)

- WEIGHT OF BASEMENT SCREED

= 550 × 0.07 × 23 kN/m^3 = 885 kN

TOTAL DEAD LOAD APPLIED AROUND BASEMENT = 14174 kN

14,174 kN > 11,000 kN OK (FOS = 1.3)