Quadrant Harmon Consulting Ltd
Consulting Civil & Structural Engineers

BASEMENT IMPACT ASSESSMENT

GEO-TECHNICAL AND STRUCTURAL ENGINEERING

For

FORMATION OF NEW BASEMENT

1 Wadham Gardens

London

NW3 3DN

Prepared for

Amek Property Investments LLP

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SOH/1550/23 October 2015 Rev 2-15 June 2018

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EXECUTIVE SUMMARY

This report and supporting documentation demonstrates that the proposal to construct a basement below the existing house can be executed safely, using conventional construction techniques.

The basement is to be constructed using underpinning techniques and top down method of construction. This method uses temporary piles to support the new ground floor slab and the basement is then excavated below this using temporary propping to restrain the underpinning until the permanent works are completed. This method is shown diagrammatically on drawing 1550/01.

The following report and supporting documentation meets the requirements of The London Borough of Camden Planning Guidance Basements and Light Wells CPG4:-

1 Detailed desk top study provided with submission

2 Site investigation carried out and water levels recorded.

3 Details of the Adjoining buildings do not shown signs of historic or ongoing movement

4 The details of the structure and foundations have been determined.

5 There will be no impact on water flows or cumulative effects.

6 The surface water drainage system will be re-used along with the connection to the mains sewer.

7 There is no risk of flooding on the site and there is no increase in surface water run-off.

8 The sequences of construction are shown on the structural engineering documents and drawings submitted with the application.

9 There is a very minimal risk of damage being caused to adjoining buildings this is because of the depth of excavation and proximity of the adjoining buildings.

The predicted damage is Category 0 Negligible BRE Digest 251 Assessment of Damage in Low Rise Buildings. This is the lowest category possible to quote but it is not envisaged that any damage to buildings will be caused by the formation of the basement during and post construction.

1.0 Introduction

1.1 This report has been prepared to support the Planning Application which is to be submitted by Hub Architects on behalf of Amek Property Investment LLP. The report should be read in conjunction with the submitted architects planning drawings, structural scheme drawings, the Site Investigation Report and Site Search Report. (Geo-Environmental Report GE10977).

The purpose of this report is to outline the anticipated method of construction and anticipated sequence for the formation of the new basement and to demonstrate the works can be carried out safely and without causing damage to the t adjacent building, roads and footpath.

Summarised below are the findings of report GE10977 a more detailed description of the proposals are contained within the following Sections 2.0 to 9.0.

1.2 Basement Impact Assessment Screening.

These are set out in report GE10977 and are summarised below:-

1 Subterranean (Groundwater) Screening Assessment

The above assessment did not identify any potential issues with regard to groundwater flows.

2 Stability Screening Assessment.

The above assessment identified three items which needed to be assessed:

Q5 The London Clay Formation is the shallowest stratum at the site.
Q12 The site is within five metres of the highway and pavement.
Q13 The proposed basement foundations will be deeper than the neighbouring properties foundations.

3 Surface Flow and Flooding Screening Assessment

The above assessment did not identify any potential issues with regard to surface flow and flooding.

1.3 Basement Impact Assessment Scoping.

These are set out in report GE10977 and the impacts are summarised below:-

Q5 The London Clay Formation is prone to seasonal shrinkage and swelling.
Q12 The site is within five metres of Wadham Gardens
Q13 Excavation for the basements may result in structural damage to neighbouring properties if there is sufficient differential depth between adjacent foundations.

The above impacts were assessed by carrying out the following:

1.4 Site Investigation Strategy

These are set out in report GE10977 and the impacts are summarised below:-

Environmental Areas of Concern: Investigated using window sampling, testing and analysis.

Geotechnical Areas of Concern:

Shrinkable Soils: Window sample boreholes located across the site coupled with regular sampling and laboratory analysis. Positions WS1 to WS4

Existing Foundations: Hand excavated trial pits located adjacent to the building to reveal and plot the existing foundations. Positions TP1 to TP4.

Groundwater: Standpipes installed to record water levels. Positions WS2 and WS4

1.5 Impact Assessment and Review (Outline)

These are set out in report GE10977 and the impacts are summarised below:-

Foundations will be underpinning to the existing walls to a depth of 3.5 to 4.0 bgl and the allowable ground pressure is assessed at 160kN/sq,m. For the raft an allowable bearing pressure of 40 kN/sq.m in order to limit differential settlement.

Excavations within the made ground will remain stable in the short term but will require temporary supports in the long term. Conditions encountered in Trial Pit 2 indicates a leak from a sewage pipe that means the ground is saturated and will require temporary support.

Basement Construction will not encounter the water table however perched water tables may be encountered and some limited pumping may be required.

The basement will have negligible effect on the existing groundwater regime in respect of the wider environment.

The basement is to be fully tanked and designed to resist hydrostatic pressures as required by the relevant standard.

Basement Retaining Walls are to be designed using the parameters provided and in this respect the underpinning is to be reinforced and designed as a retaining wall monolithic with the basement raft slab.

Sub Surface Concrete is to be designed in accordance with BRE Special Digest 1 for sulphates to DS-2 classification AC-1s.

Vertical Movements Due to Excavations (Short Term)

The short term analysis estimates a maximum of 9mm heave at the centre of the excavation. Predicted heave movements beneath the party walls range between 1mm and 3mm.

It is noted that it is unlikely that these levels of movements would be realised occur due the restraining effect of the underpinning etc.

Vertical Movements Due to Excavations (Long Term)

The long term analysis indicates 12mm heave at the centre of the excavation and 5mm on the party wall.

Again it is noted that it is unlikely that these theoretical values would be attained.

Movements due to pile installation, underpin construction and basement excavation.

Horizontal movements were assessed to be of the order of 6mm and 12mm and that the settlement would be countered by the heave and these are not considered significant.

Building Damage Assessment

The damage assessed from the analyses was Category 0 i.e. negligible. It is anticipated that the cross propping would be introduced early in the works to provide a very stiff support system to the walls and underpinning would be carried out to avoid instability of excavations and keep ground loss to a minimum

Monitoring

The adjoining building and existing building will be monitored using the Red, Green and Amber system as set out on 1550/GN02.

2.0 Technical Description

2.1 The proposed basement will be designed and detailed in accordance with the Building Regulations and relevant British Standard or Eurocode as applicable.

2.3 The building is mainly a traditionally constructed two storey house, using loadbearing walls which support suspended timber floors and the pitched roof. Subsequent alterations have created rooms in the loft space and the building has a newer single storey side extension

Existing foundations are corbelled out brickwork for the original building and concrete strip foundations for the newer extensions.

It is proposed to demolish the newest extensions along the north elevation and construct a basement over the area and a single storey above on a lesser scale than the existing footprint. The basement will be formed after demolition by constructing pins to a sequence shown on the drawings.

2.2 The proposed basement will be formed by underpinning the entire perimeter walls with reinforced concrete underpinning which will act to transfer the main loads to the lower level and also to retain the adjacent ground. The base of the underpinning will be monolithic with the basement slab and in the permanent situation will be propped by the new reinforced concrete ground floor slab.

Internal walls will be supported from the suspended ground floor slab with loads transferred to columns basement to ground floor.

2.3 It is proposed that the works are executed using the top down method and the proposed sequences for works are shown on drawings 1550/GN02 and 1550/GN03.

2.4 In order to minimise inward deflections during excavations, the sequences referred to above and shown on the drawings require temporary propping and this will be achieved by the new ground floor slab propping the top of the retaining wall. Temporary propping will also be required to prevent sliding at basement level. This will be removed on completion of the basement slab.

This propping system will be provided with a monitoring system.

2.5 During construction and for six months following completion of the basement the adjoining buildings and the existing building will be monitored for movement. The proposed monitoring regime is outlined on drawing 1550/GN02.

2.6 Once the basement and ground floor are completed the proposed structural alterations for the superstructure will be completed.

3.0 Ground Conditions

3.1 A desk top study and site investigation has been carried out by Geo Environmental referenced in the introduction and is to be read with this documents and to form part of the application.

3.2 The Geological Survey Sheet for the area, Sheet No 256 (North London) identifies that the naturally occurring sub-soil is London Clay. This is confirmed by the window sampling carried out on site which shows varying depths of made ground and weathered London Clay becoming un-weathered with depth.

3.3 No water was encountered at the level of the basement although there was some ingress from a perched water table at a higher level. The perched water table is localised and to enable construction some minor pumping may be required. Standpipes are installed in order to monitor this until construction commences on site.

The basement walls however will be designed for a head of water.

3.4 The findings of the contamination testing show that there was elevated levels of lead and this forms a risk to construction workers who will need to wear suitable protection. For end users in soft landscaping areas it is recommended that 600 of the surface soils are removed and 150mm of stone fill and 450mm of top soil are imported. This is not required in hard landscaped areas.

4.0 Existing Foundations

4.1 The existing foundations generally comprise corbelled brick/concrete strip footings at depths varying from 1000 to 1600 below external ground.

5.0 Design

5.1 The new basement will transfer the loads from the building to the London Clay and retain the soils and adjacent buildings and walls. Formation level is approx. 3.5 metres below ground level.

5.2 Due the depth of the basement release of the overburden pressure and resulting heave is not considered to be significant however the basement slab will be designed for heave pressure.

5.3 The allowable bearing pressure at basement level for the underpinning is 160 kN/sq.m and the allowable bearing pressures for the raft will be 40 kN/sq.m.

5.4 The methodology and sequencing of the basement will be carried out to minimise inward horizontal deflections and hence minimise the risk of settlement at ground level.

6.0 Design of Temporary Piles

6.1 In order to support the internal walls temporarily plunge piles will be installed. The plunge piles in the final condition will be cut to basement level and used to reduce heave.

6.2 For the final design the amount of settlement of the piles will be determined and if necessary hydraulic jacks will be used to ensure controlled transfer of loads from the building over to the supports.

7.0 Influence of Settlement on Adjacent Properties.

7.1 The influence of settlement on the adjoining building is not considered to be significant is assessed at Category 0 i.e. negligible. Also as noted above any settlements of ground to due inward defection of the retaining walls will be minimised by the stiffness of the designed sub-structure and method of construction proposed.

8.0 Construction Method.

8.1 The construction methods to be employed are conventional however prior to construction the Main Contractor will be requested to provide method statements and final construction sequences for review. The anticipated sequences envisaged are provided on the drawings.

9.0 Hydrology

9.1 The site lies approximately mid-way between two tributaries of The Tyburn (Ref Lost Rivers of London) which are now culverted. The site is not overlain with Terrace Gravels and the boreholes encountered no inflows of water which demonstrates that there are no streams running through the site.

9.2 The site is not within an area designated by the Environment Agency to be subject to flooding and there is no history of flooding also there are no aquifers in close proximity to the site.

9.3 The new basement does not impinge on the water table and thus flows through and around they site will not be affected. Also it should be noted that the building that area is not overdeveloped and given the density of buildings, the new basement under the property and if constructed under all the adjoining properties could not form a significant barrier to water flows.

9.4 The existing storm water drains and the connection to the main sewer are to be retained and because of the nature of the development there will be no increased flow to the main sewers.

Prepared By

Stuart Harmon B.Eng(Dist), C.Eng, M.I.Struct.E.

For and on behalf of Quadrant Harmon Consulting Ltd
13 June 2015

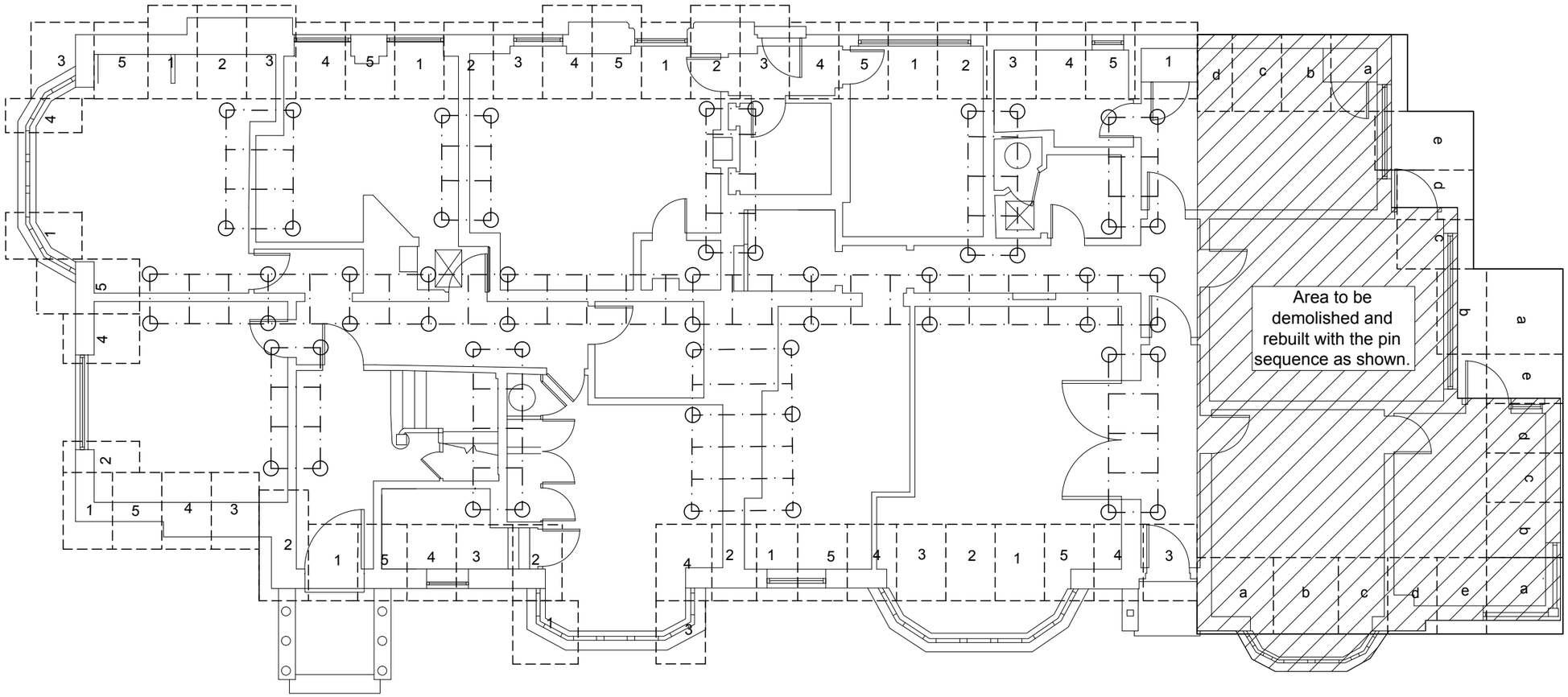
Notes

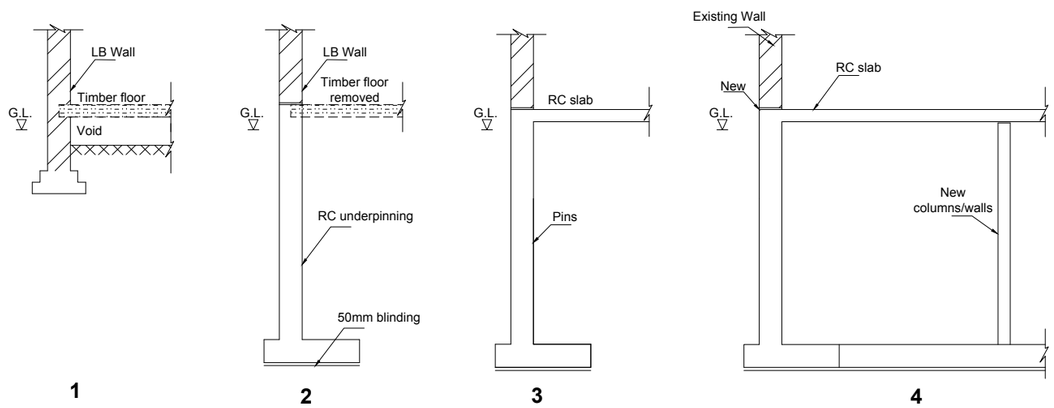
1. This drawing is to be read in conjunction with all relevant Architects and Engineer's drawings and specifications.

2. All workmanship and materials are to comply with Specification, Building Regulations, relevant British Standard and manufacturers recommendations.

3. All dimensions are in mm unless noted. This drawing is not to be scaled.
For General Notes Refer to drawing 1550-GN01 to GN03

Note: All underpins are reinforced concrete connected by bent out bars.





1 2 3 4

Schematic sequence of works
Scale 1:100

0 1 2 3 4 5

REV	DATE	DESCRIPTION	BY	CHKD
		FOR_PLANNING		
2	28/10/15	For planning	CM	SOH
1	23/10/15	For planning	CM	SOH

DATE OCTOBER_2015 PRODUCED BY CM
SCALE A1_1:50 A3_1:100 CHECKED SOH
CAD REF APPROVED

ORIGINAL DRAWING SIZE A3

CLIENT
MARCUS_COOPER_GROUP

PROJECT
1_WADHAM_GARDENS

TITLE
UNDERPINNING TEMPORARY_WORKS &_SEQUENCE

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JOB No.	DRAWING No.	REV.
1550	01	2

Notes

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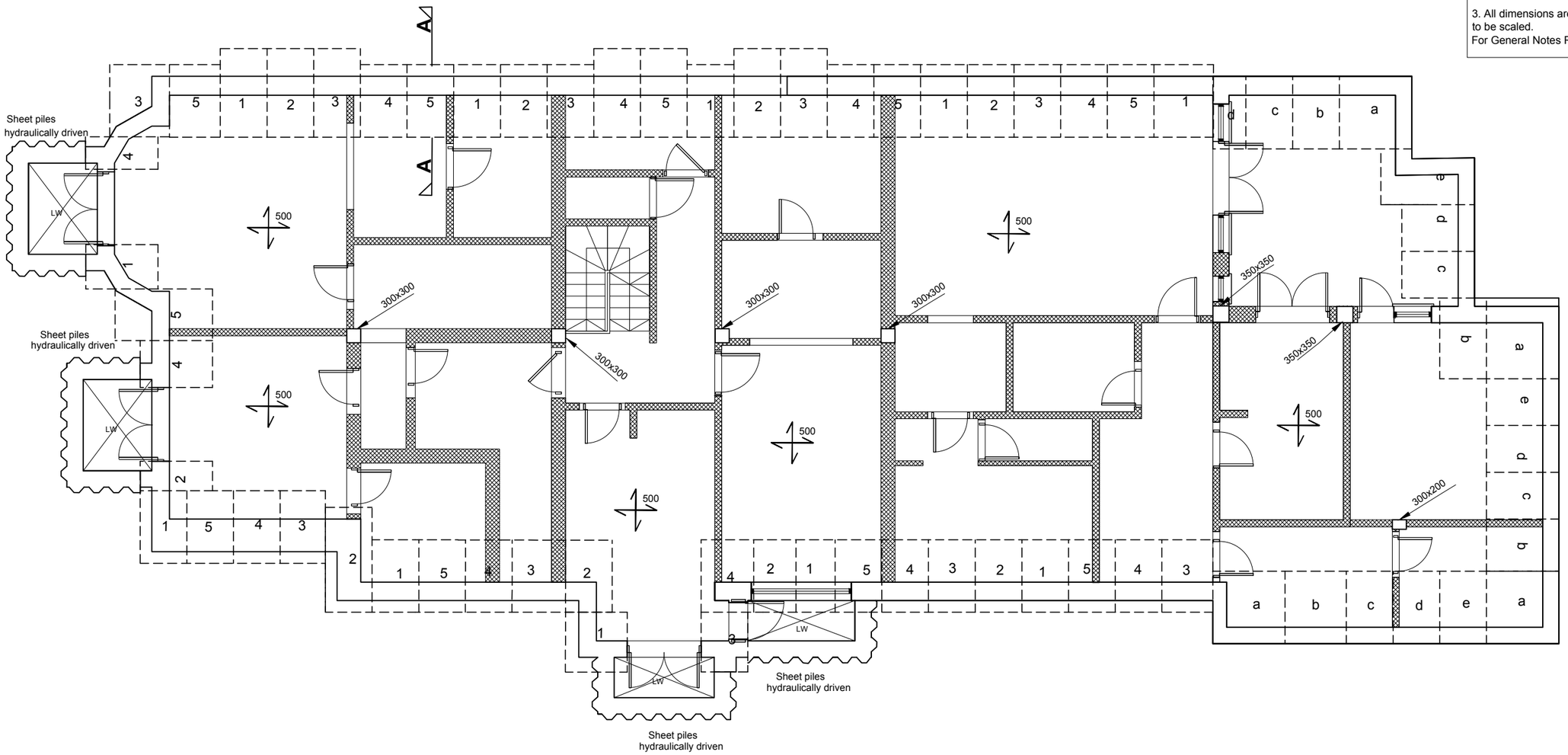
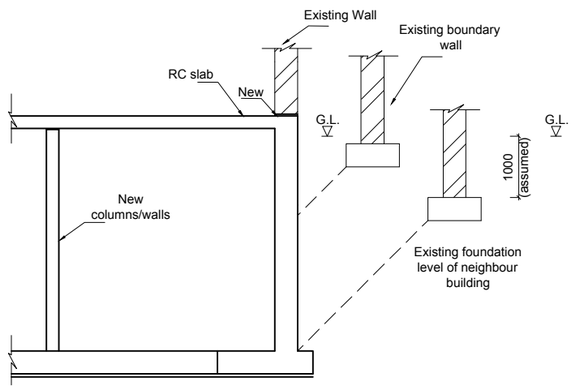
For General Notes Refer to drawing 1550-GN01 to GN03



Plan
(Scale 1: 100)



Section A-A

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CLIENT
AMEK_PROPERTY_INVESTMENT_LLP

PROJECT
1_WADHAM_GARDENS
LONDON_NW3_3DN

TITLE
UNDERGROUND_FLOOR

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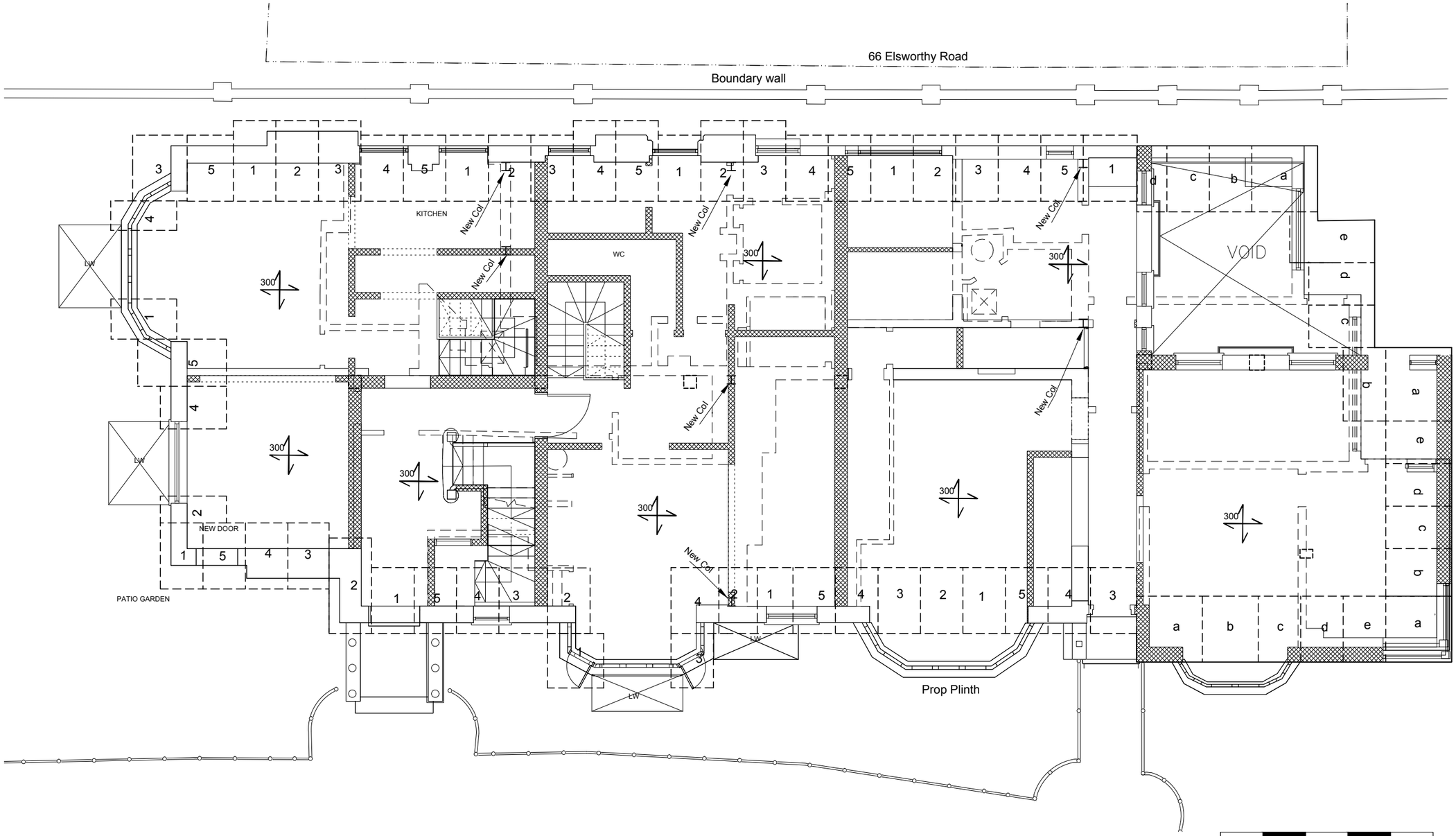
JOB No.	DRAWING No.	REV.
1550	**02**	**2**



Plan
(Scale 1: 100)

0 1 2 3 4 5

Notes

1. This drawing is to be read in conjunction with all relevant Architects and Engineer's drawings and specifications.

2. All workmanship and materials are to comply with Specification, Building Regulations, relevant British Standard and manufacturers recommendations.

3. All dimensions are in mm unless noted. This drawing is not to be scaled.
For General Notes Refer to drawing 1550-GN01 to GN03

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PROJECT
1_WADHAM_GARDENS
LONDON_NW3_3DN

TITLE
GROUND_FLOOR

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JOB No.	DRAWING No.	REV.
1550	**03**	**2**

1. The drawings are to be read in conjunction with relevant Architects and Engineer's drawings and specification.

2. All workmanship and materials are to comply with Specification, Building Regulations, relavent British Standard and manufacturers recommendations.

3. All dimensions are in mm unless noted. This drawings is not to be scaled.

4. All dimensions and setting out are to be checked on site and discrepancies reported to the Contract Administrator.

5. The structural information shown on this drawing is to be checked on site

6. Floors have been designed for the following characteristic super imposed loadings
Basement - Ground 1.5 kN/sq.m
Existing floor 1.5kN/sq.m
The Contractor is to ensure that floors are not overloaded during construction.

7. Foundations have been designed for an allowable ground bearing pressure of 190 kN/sq.m. If soft spots are encountered at formation level these are to be reported to the Structural Engineer. Soft spots at formation level are to be removed and backfilled with plain concrete.

8. All formation levels are to be inspected by the Building Control Inspector, allow for removal of last 150 of soil at the time of inspection. Provide the Structural Engineer with 24 hours notice when formations are ready for inspection.

9. Excavated material unsuitable for reuse as granular fill is to be removed from site to tip. Note Licensed Tip if site is contaminated.

10. Ensure that all excavations are kept free of standing water during construction.

11. Unless noted otherwise all foundations, poolside raft and walls, and ground floor slab to Caltite specifications.

Structural Concrete

12. Concrete Grades: -
Plain Concrete backfilling and blinding concrete Grade C25 min cement content 275kg/cu.m
Foundations and Substructure concrete Grade C40 min cement content 325kg/cu.m
Superstructure Concrete Grade C40 min cement content 325kg/cu.m

13.Blinding concrete to bases, slabs and ground beams to be a minimum of 75mm thick.

Structural Steelwork

14. All structural steelwork shall be Grade S355 unless otherwise noted.

15. Paint treatment to steelwork to be in accordance with the Specification.
Note: where steel beams are embedded in external walls provide additional two coats of Bitumastic paint.

16. For fire protection to steelwork refer to the architect's drawings.

17. Bolts for connection of structural steel members are to be zinc plated grade 8.8. Provide a minimum of four bolts at all steel to steel connections.

18. The Contractor shall design all connections to the ultimate loads and moments shown on the drawings

19. The Contractor shall submit fabrication drawings to the Engineer for approval at least 14 days before commencing fabrication of the steelwork.

20. Stairs by specialist to be designed for a super load of 1.5kN/m².

21. Stainless steel and mild steel to be isolated to prevent Bi-metallic action.

Structural Timber

22. Structural timber is to be Grade C24 U.N.O.

23. All timber to timber connections are to be fixed with a minimum of 2No 4x100 nails.

24. All nails, screws joist hangers and timber connectors, are to be galvanised

Holding down and restraint straps to be as manufactured by BAT Expamet

Masonry

25. For masonry details refer to Architects drawings

26. For positions of horizontal and vertical brick/block movement joints refer to Architects drawings.

Compression Joints : Provide 15 joints filled with compressible filler ( ) or equal approved

Joints are to be filled and sealed to Architect's details.

27. Cavity wall ties shall be stainless steel Ancon ref SD1 spaced at 450 centres vertically and 900 centre horizontally staggered.

28. Head restraints to non loadbearing walls shall be as manufactured by Ancon.

29. Stainless steel brick support angle system as manufactured by Ancon.

30. Blockwork to be
- Medium dense 7.3 N/mm2, mortar 1:1:6

Brickwork to be 20 N/sq.mm.

Underpinning

31 Before commencing underpinning carry out sufficient trial excavations to confirm the depths of the existing footings which are shown on the drawings.

32 Before commencing work prepare a method statement and submit Contractor Designed Temporary Works proposals for retaining the excavated faces and for the Underpinning.

33 Install as the excavation proceeds, where necessary, pre-cast poling boards to ensure no loss of ground.

34 Ensure faces of cast underpins are cleaned off and wetted prior to casting adjacent pin.

35 The inside face of pins are to be cast to ensure they are true to line and level and the face is suitable for the damp proof membrane and/or details specified by the architect.

REV	DATE	DESCRIPTION	BY	CHKD
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2	28/10/15	For planning	CM	SOH
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CLIENT
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PROJECT
1_WADHAM_GARDENS
LONDON_NW3_3DN

TITLE
GENERAL_NOTES

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JOB No.	DRAWING No.	REV.
1550	**GN01**	**2**

Construction Requirements and Anticipated Sequence
General

1 Prior to commencement, during demolition and construction the Contractor shall carry out as appropriate sufficient dimensional survey's and further investigations to enable the design of the temporary works and to validate the findings of the exposures carried out pre-contract.

In this respect allowance should be made for further trial pits and holes through boundary walls.

The Contractor may phase this work to suit the proposed construction programme with due allowance made to incorporate changes to the permanent works.

2 The Contractor shall prepare method statements and temporary works proposal in advance of commencing the various elements of the work and shall allow 14 days for consideration of the proposals by the Architect and Structural Engineer as appropriate. This is to include the design and details for the contiguous piling which are also to form part of the permanent works.

These method statements are as follows:-

1 Retention Existing Building

Temporary works proposals for the retention of the existing building. The temporary works are to provide lateral restraint to the retained walls and dead shoring to some walls.

The Temporary works are to be designed to enable piling and construction of the basement.

2 Demolition.

Provide proposals for demolition and retention of structures above ground. Including locations of any plunge piles or other systems to be adopted to enable construction of the basement.

3 Underpinning

Provide method statements and methods for keeping excavations free of water. Also provide temporary propping proposals.

4 Excavation

Provide method statements and propping proposals.

3 Anticipated sequences are provided below to demonstrate the complexity of the works.

The Contractor is responsible for determining his own proposed sequences and methodology for executing the works whether or not they are at variance with the anticipated sequence and shall submit proposals to the Architect and Structural Engineer for comment.

Items identified within the Anticipated Sequences may be carried out where and when appropriate concurrently to suit the Contractors proposed phasing and method of carrying out the works. The Anticipated sequences below are likely to overlap and the Contractor is to identify in the Sequence of construction.

4 Reference to Temporary Works shall mean Contractor Designed Temporary works.

5 Temporary works to retain the existing building are to be designed to enable the installation of piles

Anticipated Sequence
(to be read in conjunction with the drawings and specification items may run concurrently as appropriate

1 Carry out a survey of the existing building and set up survey stations to monitor the building and adjoining owners walls (Prior to excavation)

2 Carry out demolition of extensions shown on the Architect's drawing.

3 Remove the ground floor.

4 Underpin to sequence shown.

5 Install plunge piles.

6 Install temporary propping.

7 Make connection to plunge piles

8 Pin walls over to ground floor slab

9 Remove pins supporting walls over.

10 Install horizontal props to underpinning.

11 Complete excavation.

12 Construct basement slab and columns.

13 After concrete has attained 30 N/mm2 cube strength remove props and cut down plunge piles.

14 Complete construction.

Underpinning temporary propping

1. The Main Contractor is responsible for the concept and design of all temporary works in laterally restraining the underpinning. The design is to limit settlement of adjoining walls to 5mm
2. The arrangement temporary works must allow for the installation of the permanent works.
3. The Main Contractor shall conceive the temporary works to suit the construction methodology and sequence of works.
4. The temporary works design shall be submitted to the Party Wall Surveyors for their comments .
5. The requirements of the party wall award is that the temporary works supporting the underpinning shall be rigid with zero deflection of where propped.
6. Between props the max deflection is limited to 10mm.
7. The retaining wall is to be designed for the lateral pressures from soil and water plus the surcharge loads along the perimeter and surcharge from the adjoining buildings.

Monitoring Walls & Buildings

1. Surveying of Fixed Stations on Walls & Buildings shall be carried out as follows
   - ▲ **For the first 3 months.** Weekly
   - ▲ **Until the Ground slab is constructed.** Weekly
   - ▲ **Following 6 months.** Monthly
2. The Monitoring Survey Trigger Levels for Monitoring carried out against the adjoining properties shall form two Levels. Amber Level and Red Level.
3. AMBER LEVEL shall consist of the following trigger levels:
   - Limits on Total Lateral Movement of Monitoring Points +/- 5mm
   - Limits on Total Vertical Movement of Monitoring Points +/- 5mm

Should these limits be reached the SE, CA and party wall surveyors shall be informed. Works shall not halt upon these levels being reached as this is to highlight potential further movement.

4. RED LEVEL shall consist of the following Trigger levels:
   - Limits on Total Lateral Movement of Monitoring Points +/- 10mm
   - Limits on Total Vertical Movement of Monitoring Points +/- 10mm

Should these limits be exceed works will stop until remedial measures have been agreed between the SE, CA, Contractor and the adjoining Party Wall Surveyor.

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CLIENT
AMEK_PROPERTY_INVESTMENT_LLP

PROJECT
1_WADHAM_GARDENS
LONDON_NW3_3DN

TITLE
CONSTRUCTION_REQUIREMENTS_&
ANTICIPATED_SEQUENCE

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JOB No.	DRAWING No.	REV.
1550	**GN02**	**2**

Underpinning
Notes:

1 Concrete to be Grade C35 min cement content 325kg/cu.m.

2 Dry pack mortar 3:1 sand cement plus Conbex 100. Mix to have sufficient water to be mouldable by hand.

3 The underpinning at the base is to be the same width as the existing footings at base level. The inside face is to line through with the existing wall face above footing level. On completion of the underpinning trim away existing footings back to wall face.

4 Underpins are reinforced to short lengths and cast in. Bent bars are to be cast in for bending into the next pin.

5 Install as the excavation proceeds and as necessary pre-cast poling boards to ensure no loss of ground.

6 Ensure faces of cast underpins are cleaned off and wetted prior to casting adjacent pin.

7 It envisaged that the underpinning will be carried out in two stages, the first depth of underpinning will be cast to approximately half the total depth. This underpinning will subsequently be underpinned, offset lower pins by 300 to ensure staggered construction joints.

8 Before commencing underpinning carry out sufficient trial excavations to determine the depth of existing foundations.

9 Before commencing work prepare a method statement and submit Contractor Designed Temporary Works proposals for retaining the excavated faces and structures over.

10 The inside face of pins are to be cast to ensure they are true to line and level and the face is suitable for the damp proof membrane specified by the architect.

Sequence for Two Stage Dig Underpins:

(Pin Sequence similar except lettered)

Two stage underpinning will only be carried out when the depth exceeds 4 metres

Stage1

1 Excavate Pins 1 down to approx 2.0m below ground level and clean off underside of footing.

2 Cast Pins 1 to within 75mm of underside of brickwork over

3 After 3 day's dry pack ensuring the void is filled with mortar.

4 After 24 hours commence remaining Pins 2 repeating the above sequence before commencing remaining pins also to be sequenced as numbered.

5 Either before or as general excavation proceeds install Contractor Designed lateral supports.

Stage 2

1 Excavate for Pins 1 including foundation base (offset by 300) down to formation level and clean off underside of previously cast underpinning.

2 Cast Foundation base and Cast Pins 1 to within 75mm of underside of Pin over.

3 After 3 day's dry pack ensuring void is filled with mortar.

4 After 24 hours commence Pin 2 and remaining in their numbered sequence.

5 Either before or as general excavation proceeds install Contractor Designed lateral supports.

6 Trim off footing to inside face of wall, note this activity can be carried out following completion of Stage 1.

Note: Pins may be constructed in one stage if preferred.

		FOR_PLANNING		
2	28/10/15	For planning	CM	SOH
1	22/10/15	For planning	CM	SOH
REV	DATE	DESCRIPTION	BY	CHKD

DATE OCTOBER_2015 PRODUCED BY CM
SCALE A1_1:50 A3_1:100 CHECKED SOH
CAD REF APPROVED

ORIGINAL DRAWING SIZE A3

CLIENT
AMEK_PROPERTY_INVESTMENT_LLP

PROJECT
1_WADHAM_GARDENS
LONDON_NW3_3DN

TITLE
NOTES
PIN_&_UNDERPINNING_SEQUENCE

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JOB No.	DRAWING No.	REV.
1550	**GN03**	**2**