Job Number: 180618

CROFT STRUCTURAL ENGINEERS

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Basement Impact Assessment – Structural

Property Details
16 Frognal Gardens
London, NW3

Client Information
Holly Walk Developments
Alan Harari
20 Holly Walk
London
NW3 6RA

Structural Design Reviewed by	Above Ground Drainage Reviewed by
Chris Tomlin MEng CEng MIStructE	Phil Henry BEng MEng MICE

Hydrogeology Report	Land Stability Report
(Separate Report) Mr. Francis Williams	(Separate Report) Mr. Francis Williams

Revision	Date	Comment
-	03/10/18	First Issue
-	08/10/18	Minor alterations

LABC Regional winner 2013 awards · constructionline · TRADA · ice Institution of Civil Engineers · The Institution of Structural Engineers

Contents

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Executive (non-technical) Summary

	The London Borough of Camden requires a Basement Impact Assessment (BIA) to be prepared for developments that include basements and lightwells. This document forms the main part of the BIA and gives details on the impact of surface water flow. The scheme design for the proposed subterranean structure is also included. This document should be used in conjunction with the Land Stability and the Groundwater BIA (GWPR2777/GIR/September 2018). These are separate reports and are referred to, where relevant, within this document. This BIA follows the requirements contained within Camden Council's planning guidance CGP4 – Basements and Lightwells (2015). In summary, the council will only allow basement construction to proceed if it does not: • cause harm to the built or natural environment and local amenity • result in flooding • lead to ground instability. In order to comply with the above clauses, a BIA must undertake five stages detailed in CPG 4. This report has been produced in line with Camden planning guidance and associated supporting documents such as CPG1, DP23, DP26, DP25 and DP27. Technical information from 'Camden geological, hydrogeological and hydrological study - Guidance for subterranean development', Issue 01, November 2010 (GSD, hereafter) was also used and is referred to in this assessment.
Existing Site	The site is located in north-west London area of Hampstead in the Borough of Camden. The site is of a rectangular shape on a light slope of Holly Walk and currently occupied by two blocks of garages. The full area of site is tarmac paved.
Proposed Development	The proposed development involves the demolition of the garages and construction of three storey high residential property in its place. The property compromises of the partial basement extending about 2.6m below the ground level at the deepest part, ground and first floors.

	Figure 1: Aerial view with approx. site area indicated
Stage 1 – Screening	Refer to Ground and Water BIA report reference GWPR2777/GIR/September 2018.
Stage 2 – Scoping	Refer to Ground and Water BIA report reference GWPR2777/GIR/September 2018.
Stage 3 – Site Investigation and Study	Refer to Ground and Water BIA report reference GWPR2777/GIR/September 2018.
Stage 4 – Impact Assessment	Refer to Ground and Water BIA report reference GWPR2777/GIR/September 2018.

1. Site Investigation and Desk Study

This section identifies the relevant features of the site and its immediate surroundings, providing further scoping where required.

Desk Study and Walkover Survey

Site & Existing Property

The site is located in north-west London area of Hampstead in the Borough of Camden. The site is of a rectangular shape on a light slope of Holly Walk and currently occupied by two blocks of garages.

Hardstanding

The full area of site is tarmac paved.

Figure 2: Holly walk site view

Trees and Vegetation

Shrubs, but no trees on the site. Some trees on at the adjacent properties although the proposed works are outside of the tree protection areas.

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Proposed Development

The proposed development involves the demolition of the garages and construction of three storey high residential property in its place. The property compromises of the partial basement extending about 2.6m below the ground level at the deepest part, ground and first floors.

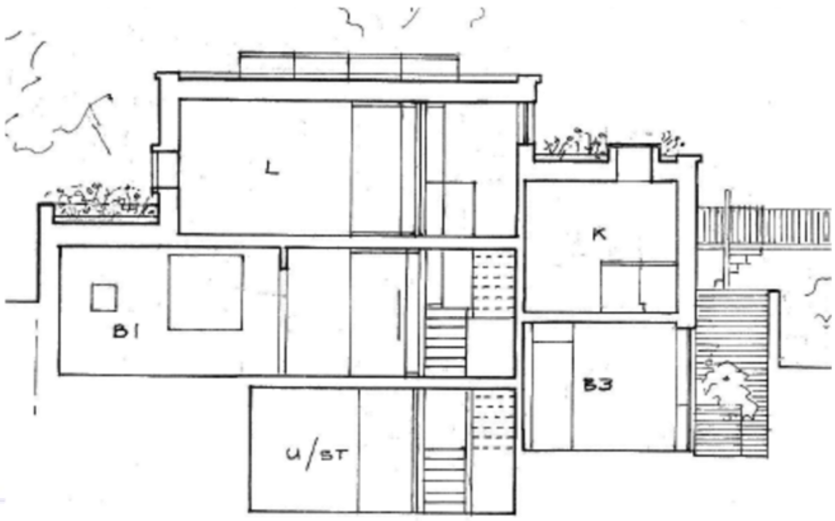


Figure 3: Section through the proposed property

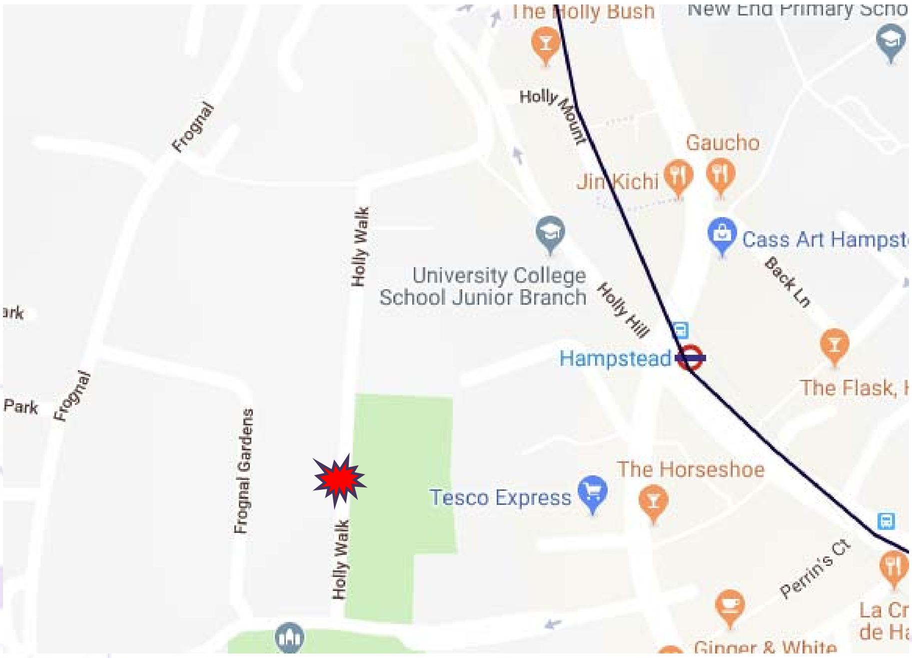
The outline construction sequence is appended to this report.

Listed Buildings and Conservation Areas

Data from Historic England shows that there are no listed buildings close by. The are listed tombs on the opposite site of the Holly Walk street although these are too far to be affected by the proposed works.

Figure 4: Extract showing listed buildings

The site is not in a conservation area.

<table>
<tr><td>Geology</td><td>Refer to the Ground Investigation report and the Hydrogeological and Land Stability assessment.</td></tr>
<tr><td>Highways & public footpaths</td><td>The site is within 5m of the public highway.</td></tr>
<tr><td>London Underground and Network Rail</td><td>

The site is more than 150m away from the nearest The London Underground Northern Line and the nearest National Rail Line is more than 300m away. These are unlikely to be affected by the new basement.</td></tr>
<tr><td>Proximity of Trees</td><td>There are trees close by, in the neighbouring land. These do not have tree preservation orders. The closest tree is more than 4m away from the outline of the proposed basement.</td></tr>
<tr><td></td><td><h2>Monitoring, Reporting and Investigation</h2>
The ground investigation report, which has data from initial site investigations and data from subsequent monitoring, is available as a separate report.</td></tr>
</table>

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Drainage Assessment

Hard standing	The hardstanding area will not change as the site currently is fully covered in tarmac.
SUDS Assessment	From review of the existing and proposed hardstanding the increase will be? 0% Percentage Increase < 5% — No SUDS to be incorporated into scheme Percentage Increase Between 5% to 10% — Where basements below a garden are present, then a soil band of a minimum of 1m should be provided.

Percentage Increase < 5%	No SUDS to be incorporated into scheme
Percentage Increase Between 5% to 10%	

Ground Movement Assessment & Predicted Damage Category

The design and construction methodology aims to limit damage to the existing building on the site, and to the neighbouring buildings, to Category 2 or lower as set out in Table 2.5 of CIRIA report C580. For this development, suitable temporary propping during the construction phase will limit the amount of movement due to the basement works. This is described in the Basement Method Statement (appended).

The ground movement assessment is contained within Ground and Water BIA report reference GWPR2777/GIR/September 2018.

Mitigation Measures Ground Movement

A method statement, appended, has been formulated with Croft's experience of over 500 basements completed without error. As mentioned previously, the procedures described in this statement will mitigate the impacts that the construction of the basement will have on nearby properties.

The works must be carried out in accordance with the Party Wall Act and condition surveys will be necessary at the beginning and the end of the works. The Party Wall Approval procedure will reinforce the use of the proposed method statement and, if necessary, require it to be developed in more detail with more stringent requirements than those required at planning stage.

It is not expected that any cracking will occur in nearby structures during the works. However, Croft's experience advises that there is a risk of movement to the neighbouring property.

To reduce the risk to the development:

- Employ a reputable firm that has extensive knowledge of basement works.
- Employ suitably qualified consultants Croft Structural Engineers has completed over 500 basements in the last five years.
- Provide method statements for the contractors to follow
- Investigate the ground this has now been done.
- Record and monitor the properties close by. This is completed by a condition survey under the Party Wall Act, before and after the works are completed. Refer to the end of the appended Basement Construction Method Statement.

With the measures listed above, the maximum level of cracking anticipated is 'Hairline' cracking. This can be repaired with normal decorative works. Under the Party Wall Act, minor damage, although unwanted, can be tolerated it is permitted to occur to a neighbouring property as long as repairs are suitability undertaken to rectify this. To mitigate this risk, the Party Wall Act is to be followed and a Party Wall Surveyor will be appointed.

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Monitoring of Structures

In order to safeguard the existing structures during underpinning and new basement construction, movement monitoring is to be undertaken.

Risk Assessment

Monitoring Level proposed	Type of Works.
Monitoring 4 Visual inspection and production of condition survey by Party Wall Surveyors at the beginning of the works and also at the end of the works. Visual inspection of existing party wall during the works. Inspection of the footing to ensure that the footings are stable and adequate. Vertical monitoring movement by standard optical equipment Lateral movement between walls by laser measurements	New basements greater than 2.5m and shallower than 4m deep in gravels Basements up to 4.5m deep in clays Underpinning works to grade I listed building

Before the works begin, a detailed monitoring report is required to confirm the implementation of the monitoring. The items that this should cover are:

- Risk Assessment to determine level of monitoring
- Scope of Works
- Applicable standards
- Specification for Instrumentation
- Monitoring of Existing cracks
- Monitoring of movement
- Reporting
- Trigger Levels using a RED / AMBER / GREEN System

Recommend levels are shown within the proposed monitoring statement.

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Basement Design & Construction Impacts and Initial Design Considerations

Foundation type	Reinforced concrete cantilevered retaining walls will form the new foundation of the property. The design of the retaining walls was calculated using software by TEDDS. The software is specifically designed for retaining walls and ensures that the construction is kept to a limit to prevent damage to the adjacent property. The overall stability of the walls is designed using K_a & K_p values, while the design of the wall structure uses K_0 values. This approach minimises the level of movement from the concrete affecting the adjacent properties. The design also considers floatation as a risk. The design has accounted for the weight of the building and the uplift forces from the water. The weight of the building is greater than the uplift, resulting in a stable structure.
Intended use of structure and user requirements	Family/domestic use
Loading Requirements (EC1-1)	<table><tr><th></th><th>UDL kN/m²</th><th>Concentrated Load kN</th></tr><tr><td>**Domestic Single Dwellings**</td><td>1.5</td><td>2.0</td></tr></table>
Part A3 Progressive collapse	Number of Storeys 3 **Is the Building Multi Occupancy?** No <table><tr><th></th><th></th></tr><tr><td>Class 1</td><td>Single occupancy houses not exceeding 4 storeys</td></tr></table>
Exposure and wind loading conditions	Basic wind speed V_b = 21 m/s to EC1-2 Topography not considered significant.
Stability Design	The cantilevered walls are suitable for carrying the lateral loading applied from above.
Lateral Actions	Below ground level, the reinforced concrete retaining walls are designed to carry the lateral loading applied from above. The lateral earth pressure exerts a horizontal force on the retaining walls. The

	retaining walls will be checked for resistance to the overturning force this produces. Lateral forces will be applied from: • Soil loads • Hydrostatic pressures • Surcharge loading from behind the wall These produce retaining wall thrust. This will be restrained by the opposing retaining wall.
Retained soil Parameters	Design overall stability to K_a & K_p values. Lateral movement necessary to achieve K_a mobilisation is height/500 (from Tomlinson). This is tighter than the deflection limits of the concrete wall.
Water Table	**Has a soil investigation been carried out?** Yes Design temporary condition for water table level, If deeper than basement ignore. Design permanent condition for water table level: If deeper than existing, design reinforcement for water table at full basement depth to allow for local failure of water mains, drainage and storm water. Global uplift forces can be ignored when the water table is lower than the basement. BS8102 only indicates guidance.

Additional loading requirements	**Surcharge Loading** The following will be applied as surcharge loads to the front/ front lightwell retaining walls: • $10kN/m^2$ if within 45° of road • $5kN/m^2$ if within 45° of Pavement • Garden Surcharge $2.5kN/m^2$ + 1 m of soil (if present above basement ceiling) $20kN/m^2$ • Surcharge for adjacent property $1.5kN/m^2$ + $4kN/m^2$ for concrete ground bearing slab Highways loading: The basement is within 5m of the pavement but not within 5m of the public highway. Adjacent Properties: All adjacent property footings within 45° to have additional geotechnical engineers input. A line at 45º from the base of the neighbours' wall footing would be intersected by the basement retaining wall. This should be accounted for in the design.
Mitigation Measures - Internal Flooding	To mitigate the risks associated with flooding, Croft would recommend the following mitigation measures: • To reduce the likelihood of flooding into the lightwells, these should be designed (at detailed design stage) with upstands above ground level. • A pumping mechanism will be installed for the proposed basement. There is a likelihood that this may fail and allow excess water to accumulate. If this were to occur, the build-up of water would be gradual and noticeable before it becomes a significant life-threatening hazard. • The pumping system should be a dual mechanism to maintain operation in the event of a failure. This should include a battery backup and a suitable alarm system for warning purposes. • To reduce the impact of surface water flooding, sustainable drainage systems such as on site attenuation (if practicable) should be considered at detailed design stage. • Route all electrical wiring at high level
Mitigation Measures - Drainage and	The design of drainage and damp-proofing is not within the scope of this assessment and would not normally be expected to be part of the structural engineer's remit at detailed design stage.

Damp-proofing	A common and anticipated detailed design stage approach is to use internal membranes (Delta or similar). These will be integral to the waterproofing of the basement. Any water from this will enter a drainage channel below the slab. This will be pumped and discharged into the exiting sewer system. It is recommended that a waterproofing specialist is employed to ensure all the water proofing requirements are met. The waterproofing specialist must name their structural waterproofer. The structural waterproofer must inspect the structural details and confirm that he is happy with the robustness. Due to the segmental construction nature of the basement, it is not possible to water proof the joints. All waterproofing must be made by the waterproofing specialist. He should review the structural engineer's design stage details and advise if water bars and stops are necessary. The waterproofing designer must not assume that the structure is watertight. To help reduce water flow through the joints in the segmental pins, the following measures should be applied: • All faces should be cleaned of all debris and detritus • Faces between pins should be needle hammered to improve key for bonding • All pipe work and other penetrations should have puddle flanges or hydrophilic strips
Mitigation Measures - Localised Dewatering	Monitor water levels 1 month prior to starting on site and throughout the construction process. Localised dewatering to pins may be necessary.

Temporary Works	Walls are designed to be temporarily stable. Temporary propping details will be required for the ground and this must be provided by the contractor. Their details should be forwarded to the design stage engineer. Particular attention should be paid to point loads from above. To demonstrate the feasibility of the works, a proposed basement construction method statement is appended. 1. Demolish existing structure 2. Excavate to formation level and prop as required (propping at base and head is recommended) 3. Construct basement and install drainage 4. Construct above ground structure Prior to construction, temporary propping details will be required. This must be provided by the contractor. Their details should be forwarded to the structural engineer at detailed design stage.

Noise and Nuisance Control	The contractor is to follow the good working practices and guidance laid down in the 'Considerate Constructors Scheme'. The hours of working will be limited to those allowed; 8am to 5pm Monday to Friday and Saturday Morning 8am to 1pm. None of the practices cause undue noise that one would typically expect from a construction site (a conveyor belt typically runs at around 70dB). The site will be hoarded with 8' site hoarding to prevent access. The hours of working will further be defined within the Party Wall Act. The site is to be hoarded to minimise the level of direct noise from the site. Working in the basement generally requires hand tools to be used. The level of noise generally will be no greater than that of digging of soil. The noise is reduced and muffled by the works being undertaken underground. The level of noise from basement construction works is lower than typical ground level construction due to this.
CTMP	The council may require a Construction Traffic Management Plan (CTMP) to be produced. This is outside the brief of the Basement Impact Assessment and is not covered within Croft's brief.

Appendix A: Structural Calculations

CPG4 section 5 highlights that other permits and requirements will be necessary after planning. Item 5.1 highlights that Building Regulations will be required. As part of the building control pack full calculations must be undertaken and provided at detailed design stage once planning permission is granted. The calculations must be completed to a recognised Standard (BS or Euro Codes). The calculations must take into account the findings of this report and the recommendations of the auditors.

The design must resist:

- Vertical loads from the proposed works and adjacent properties
- Lateral loads from wind, soil water and adjacent properties
- Loadings in the temporary condition
- All other applied loads on the building
- Uplift forces from hydrostatic effects and soil heave

The final proposed scheme must:

- Provide stability in the temporary condition to all forces
- Provide stability to all forces in the permanent condition

As part of the planning Croft structural engineers has considered some of the pertinent parts of the basement structure to ensure that it can be constructed. The following calculations are not a full set of calculations for the final design which must be provided for building regulations. The structural calculations we consider pertinent and included in this appendix for this development are:

1. Front basement foundation & retaining wall with highways loading as necessary

2. Party Wall foundation and retaining wall

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Project:	Holly Walk		Section	Sheet
Date	Oct-18	Rev	Date	Description
By	pr			
Checked				
Job No	180618	Status		Rev

Ref

Slab Uplift

Wall DL	35	kN/m			Wall DL	35	kN/m	
w =	0.3	m						
		soil depth above=	0	m				
		Span=	4.7	m				
							Water =	2 m
			H =	2	m			
		Slab Thickness =	0.225					
Heel=	0	Slab =	5.1					
		Toe =	0.3	m				
		Toewidth=	1.5	m		soil unit weight=	18	kN/m^3

Uplift Calc

Total Dead Load =	Slab=	28.6875	kN/m					
	Toe and heel =	27	kN/m					
	Wall =	30						
	Soil=(	0	+	0	) x 2 +	0 =	0	4
	Total Dead load =	155.688	kN/m					
Total Uplift Force=		106	kN/m	f.o.s.=	1.47	No Global Uplift		

Slab Uplift

Slab =	5.625	kN/m	Uplift =	20	
Service Moment =	-39.693	kNm/m			
Factored Design moment=	-46.769	kNm/m			
Factored Design shear =	-39.803	kN/m			

Global Heave

Weight of building =	155.688	kN/m			
Weight of soil removed =	190.8				
% change	18%		place	18%	of Slab area as heave protection
width of heave protection =	0.97535	m	place	0.98	m of Slab area as heave protection

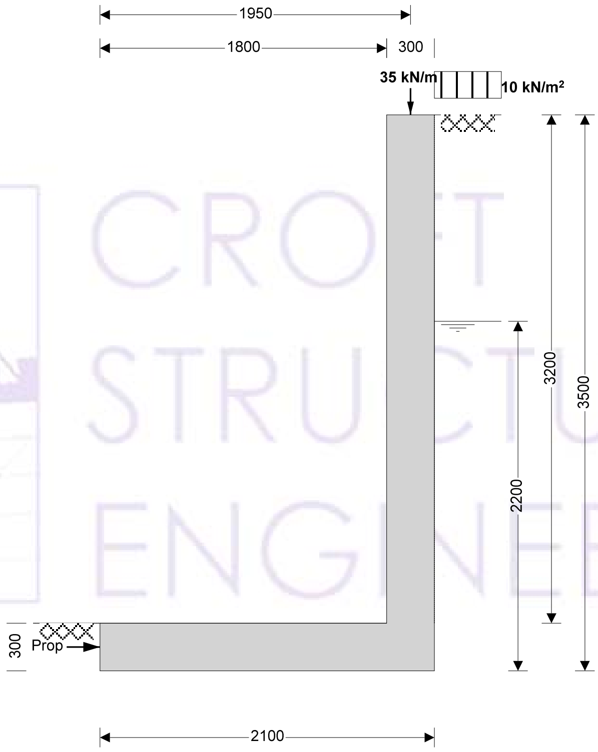
TYPICAL RC RETAINING WALL DESIGN

Loading

Cavity Wall	DLcavity = 3.98kN/m² × 5.5m = **21.890**kN/m
Floor DL (lower & first floor)	DLfloor = 2 × 0.7kN/m² × 4.1m / 2 = **2.870**kN/m
Roof DL	DLroof = 1.1kN/m² × 4.1m / 2 = **2.255**kN/m
Total Dead Load	DL = DLcavity + DLfloor + DLroof = **27.015**kN/m
Floor LL (lower & first floor)	LLfloor = 2 × 1.5kN/m² × 4.1m / 2 = **6.150**kN/m
Roof LL	LLroof = 0.75kN/m² × 4.1m / 2 = **1.537**kN/m
Total Live Load	LL = LLfloor + LLroof = **7.687**kN/m

RETAINING WALL ANALYSIS (BS 8002:1994)

TEDDS calculation version 1.2.01.06



Wall details

Retaining wall type	**Cantilever**		
Height of wall stem	h_{stem} = **3200** mm	Wall stem thickness	t_{wall} = **300** mm
Length of toe	l_{toe} = **1800** mm	Length of heel	l_{heel} = **0** mm
Overall length of base	l_{base} = **2100** mm	Base thickness	t_{base} = **300** mm
Height of retaining wall	h_{wall} = **3500** mm		
Depth of downstand	d_{ds} = **0** mm	Thickness of downstand	t_{ds} = **300** mm
Position of downstand	l_{ds} = **1400** mm		
Depth of cover in front of wall		d_{cover} = **0** mm	Unplanned
excavation depth	d_{exc} = **0** mm		

Height of ground water h_{water} = **2200** mm Density of water γ_{water} = 9.81 kN/m³

Density of wall construction γ_{wall} = **23.6** kN/m³ Density of base construction γ_{base} = **23.6** kN/m³

Angle of soil surface β = **0.0** deg Effective height at back of wall h_{eff} = **3500** mm

Mobilisation factor M = **1.5**

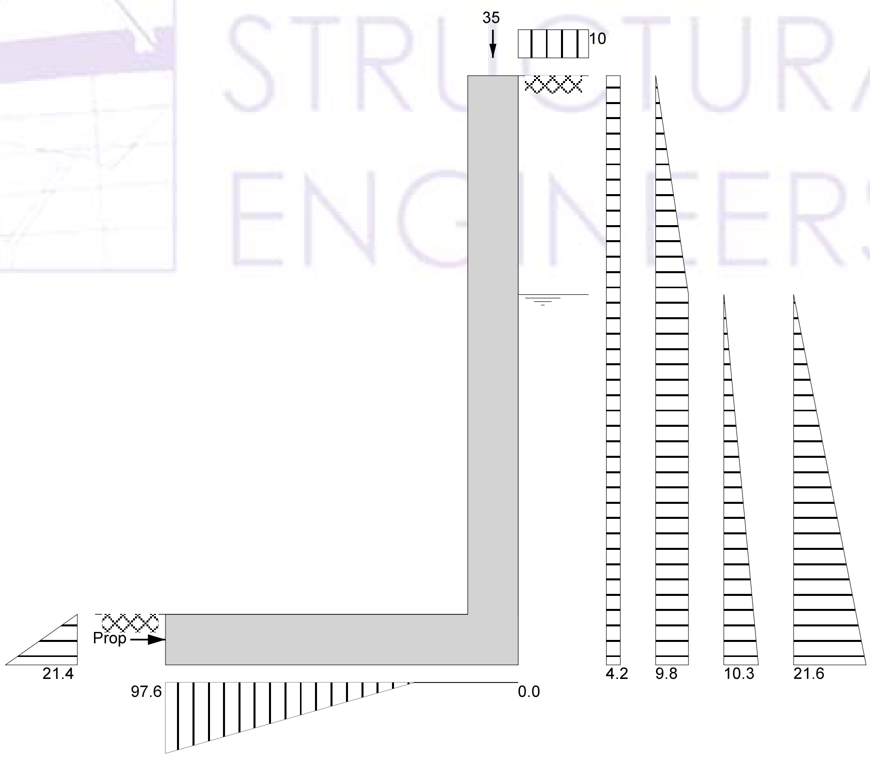
Moist density	γ_m = **18.0** kN/m³	Saturated density	γ_s = **21.0** kN/m³
Design shear strength	ϕ' = **24.2** deg	Angle of wall friction	δ = **0.0** deg
Design shear strength	ϕ'_b = **24.2** deg	Design base friction	δ_b = **18.6** deg
Moist density	γ_{mb} = **18.0** kN/m³	Allowable bearing	$P_{bearing}$ = **100** kN/m²

Using Coulomb theory

Active pressure	K_a =**0.419**	Passive pressure	K_p = **4.187**
At-rest pressure	K_0 = **0.590**		

Loading details

Surcharge load	Surcharge = **10.0** kN/m²		
Vertical dead load	W_{dead} = **27.0** kN/m	Vertical live load	W_{live} = **7.7** kN/m
Horizontal dead load	F_{dead} = **0.0** kN/m	Horizontal live load	F_{live} = **0.0** kN/m
Position of vertical load	l_{load} = **1950** mm	Height of horizontal load	h_{load} = **0** mm



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

Calculate propping force

Propping force F_{prop} = **52.7** kN/m

Check bearing pressure

Total vertical reaction R = **72.2** kN/m — Distance to reaction x_{bar} = **493** mm

Eccentricity of reaction e = **557** mm

Reaction acts outside middle third of base

Bearing pressure at toe p_{toe} = **97.6** kN/m² — Bearing pressure at heel p_{heel} = **0.0** kN/m²

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 pressure factor γ_{f_e} = **1.4**

Calculate propping force

Propping force F_{prop} = **52.7** kN/m

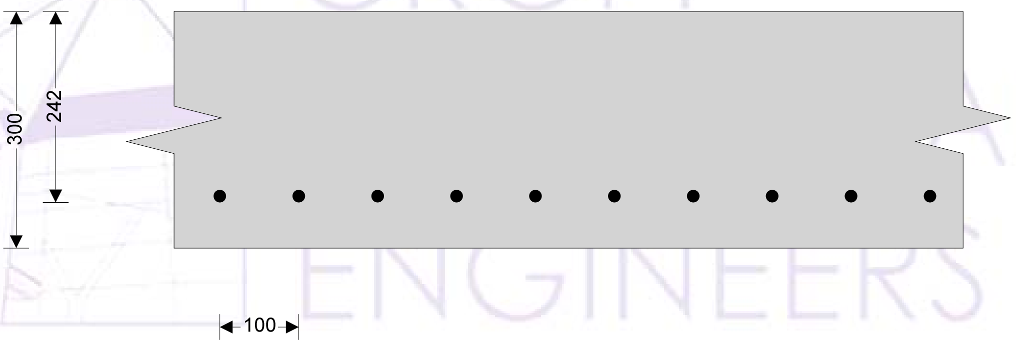
Design of reinforced concrete retaining wall toe (BS 8002:1994)

Material properties

Strength of concrete f_{cu} = **40** N/mm² — Strength of reinforcement f_y = **500** N/mm²

Base details

Minimum reinforcement k = **0.13** % — Cover in toe c_{toe} = **50** mm



Design of retaining wall toe

Shear at heel V_{toe} = **84.8** kN/m — Moment at heel M_{toe} = **178.4** kNm/m

Compression reinforcement is not required

Check toe in bending

Reinforcement provided **16 mm dia.bars @ 100 mm centres**

Area required $A_{s\_toe\_req}$ = **1868.7** mm²/m — Area provided $A_{s\_toe\_prov}$ = **2011** mm²/m

PASS - Reinforcement provided at the retaining wall toe is adequate

Check shear resistance at toe

Design shear stress v_{toe} = **0.350** N/mm² — Allowable shear stress v_{adm} = **5.000** N/mm²

PASS - Design shear stress is less than maximum shear stress

Concrete shear stress v_{c_toe} = **0.788** N/mm²

v_{toe} < v_{c_toe} - No shear reinforcement required

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

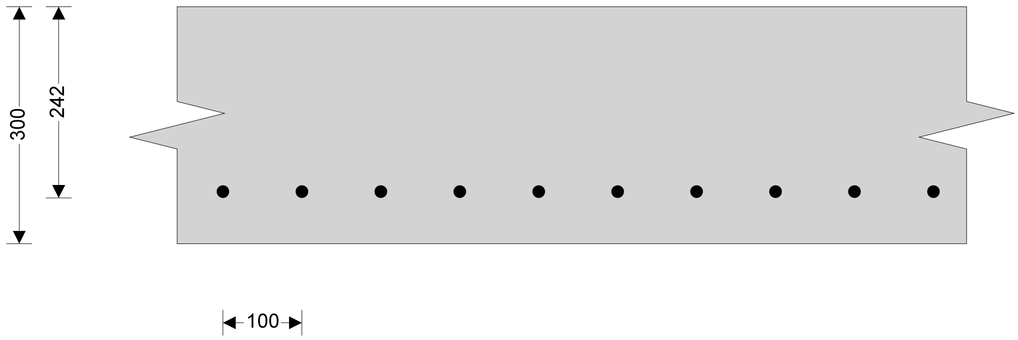
Material properties

Strength of concrete f_{cu} = **40** N/mm² Strength of reinforcement f_y = **500** N/mm²

Wall details

Minimum reinforcement k = **0.13** %

Cover in stem c_{stem} = **50** mm Cover in wall c_{wall} = **30** mm



Design of retaining wall stem

Shear at base of stem V_{stem} = **12.1** kN/m Moment at base of stem M_{stem} = **145.2** kNm/m

Compression reinforcement is not required

Check wall stem in bending

Reinforcement provided **16 mm dia.bars @ 100 mm centres**

Area required $A_{s\_stem\_req}$ = **1490.6** mm²/m Area provided $A_{s\_stem\_prov}$ = **2011** mm²/m

PASS - Reinforcement provided at the retaining wall stem is adequate

Check shear resistance at wall stem

Design shear stress v_{stem} = **0.050** N/mm² Allowable shear stress v_{adm} = **5.000** N/mm²

PASS - Design shear stress is less than maximum shear stress

Concrete shear stress v_{c_stem} = **0.788** N/mm²

v_{stem} < v_{c_stem} - No shear reinforcement required

Appendix B: Construction Programme

<u>The Contractor is responsible for the final construction programme</u>

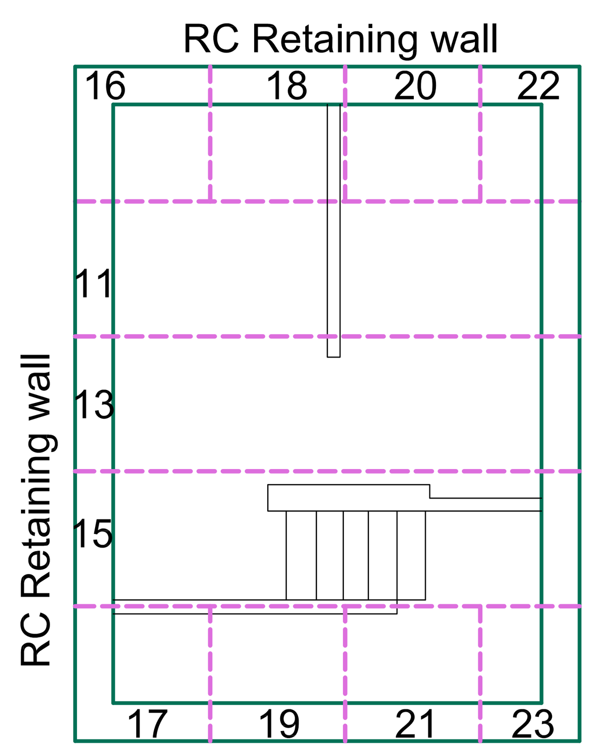
Outline construction Program

(For planning purposes only)

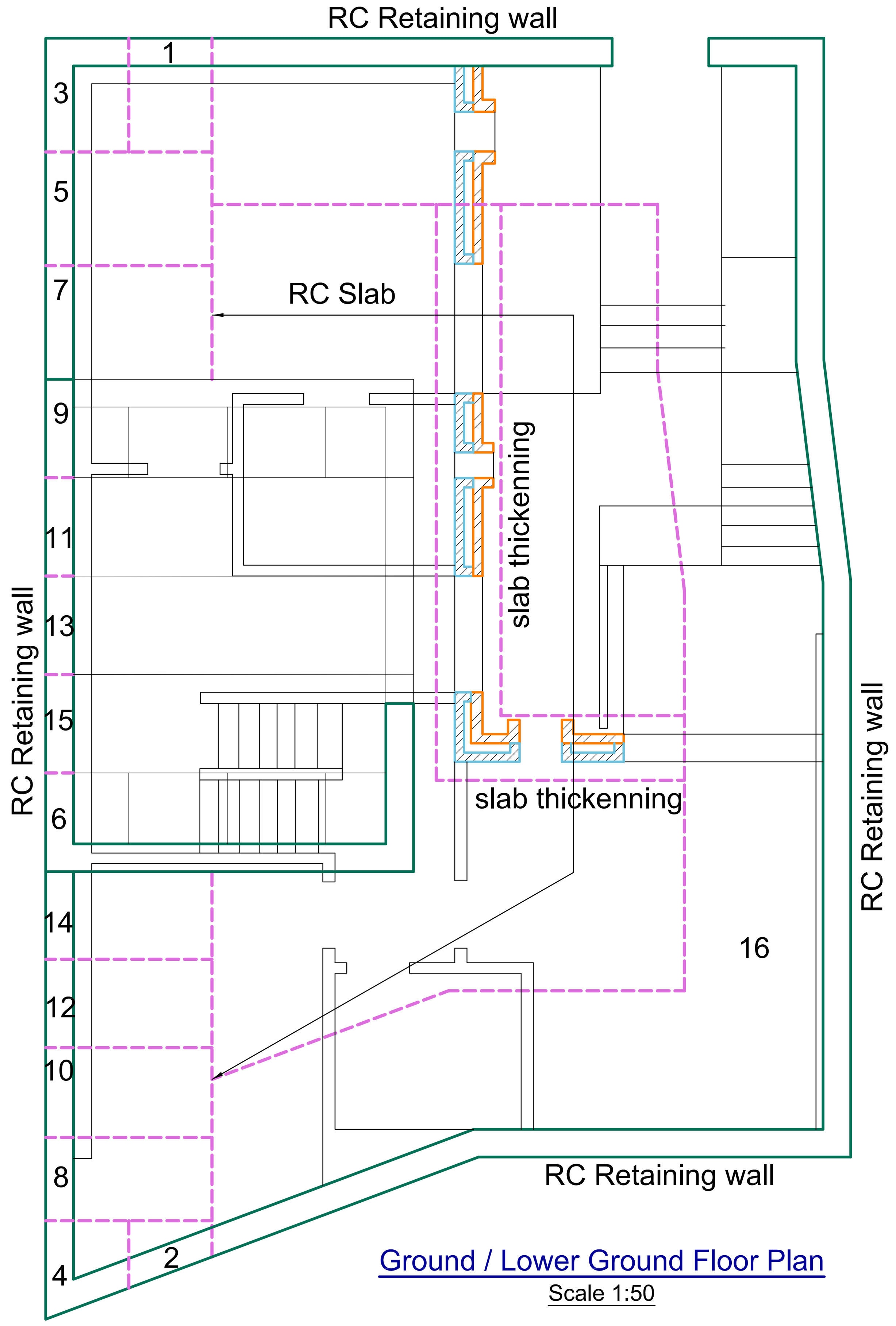
	Months															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Planning approval																
Derailed Design																
Tender																
Party Walls																
Monitoring of Adjacent structures																
Enabling works																
Basement Construction																
Superstructure construction																

Appendix C: Structural Drawings

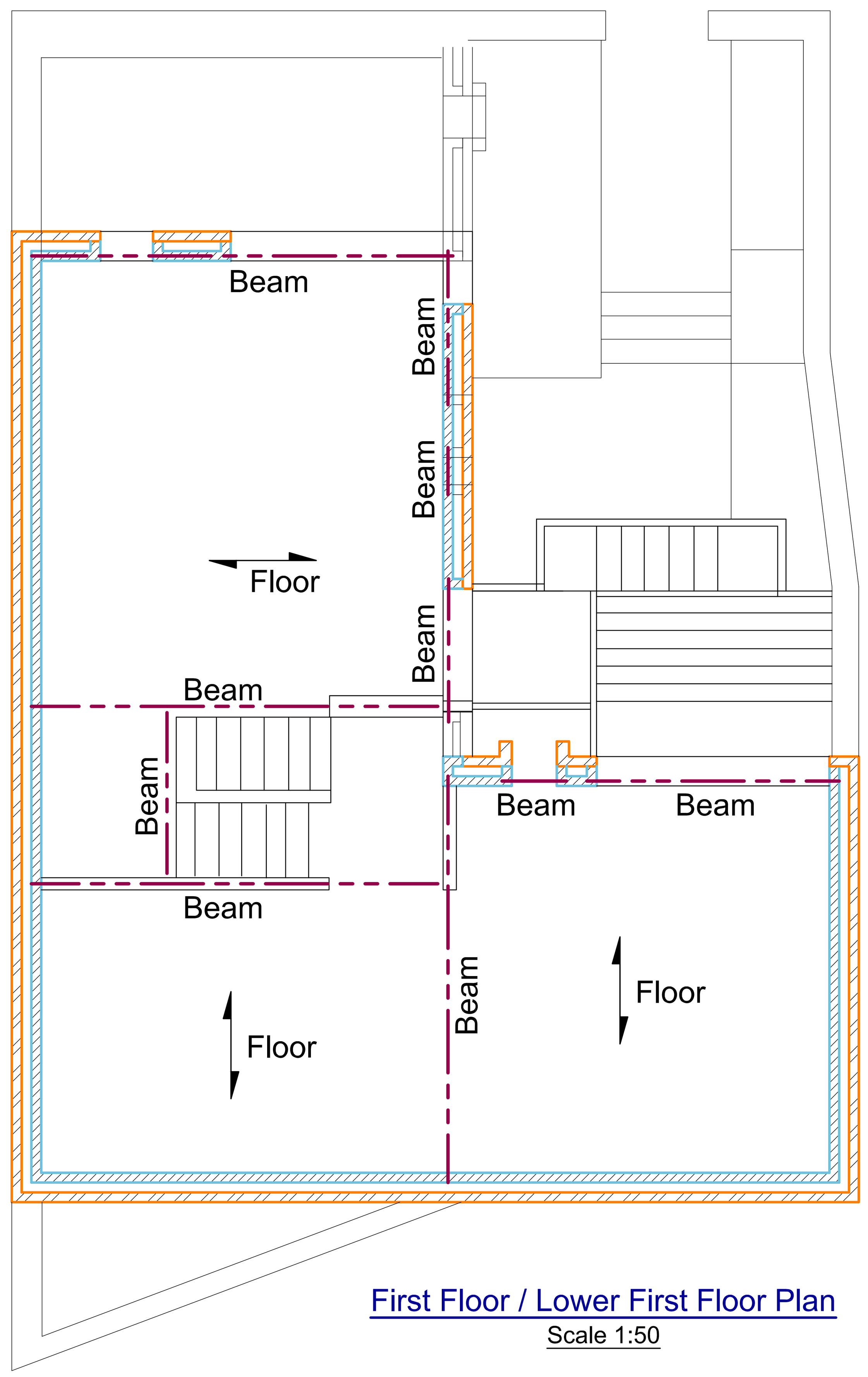
1:50 Basement Plan on A3 Showing Neighbouring basements if present
1:50 Ground Floor plan on A3 Showing Neighbouring property
1:50 Section on A3 Including section through Neighbouring Footings



Basement Plan
Scale 1:50



Ground / Lower Ground Floor Plan
Scale 1:50



First Floor / Lower First Floor Plan
Scale 1:50

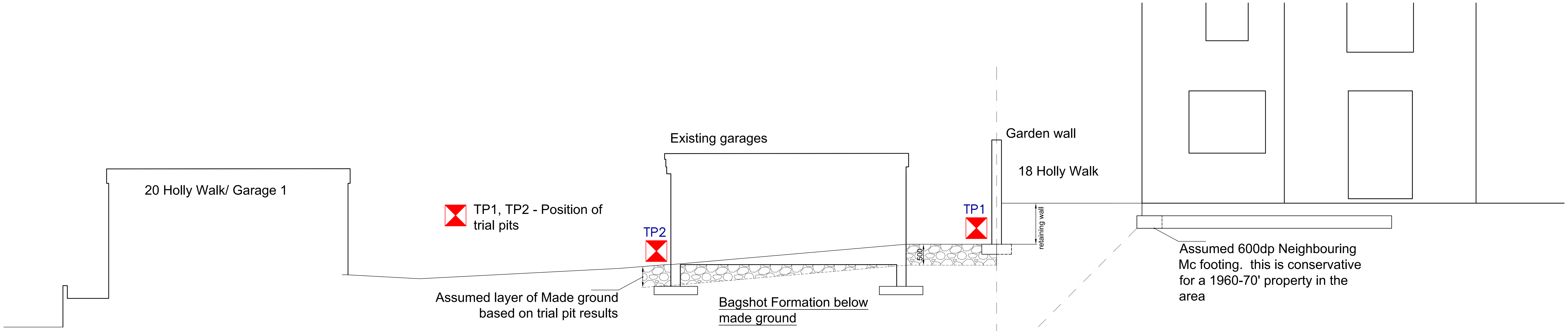
Issued for Planning

Rev	Date	Amendments
1	08/10/2018	Basement plan added
-	03/10/2018	First issue for comment

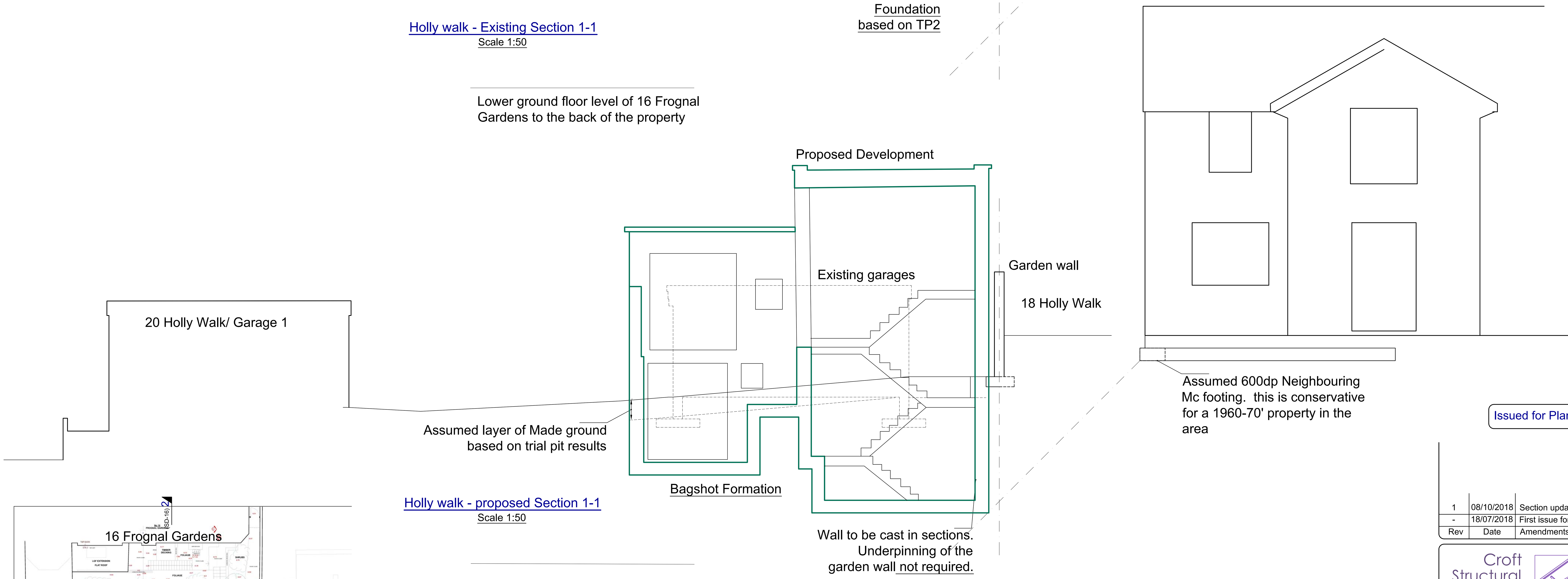
Croft Structural Engineers
Clockshop Mews, r/o 60 Saxon Rd, London, SE25 5EH. 020 8684 4744 www.croftse.co.uk

Client: Mr. Alan Harari
Project: Holly Walk
Title : Structural Plans

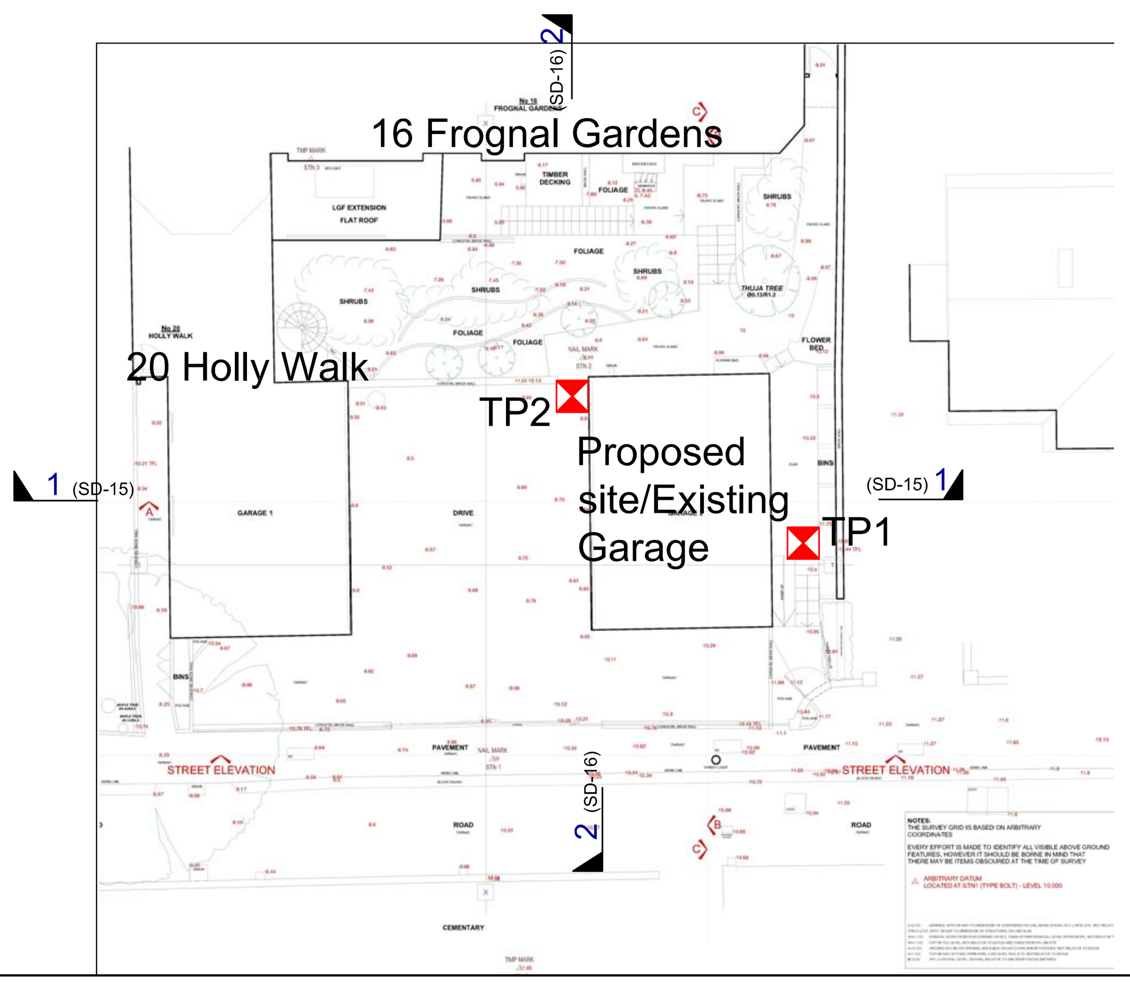
Job Number	Drawn / Chk'd	Scale
180618	pr / CT	as shown
Dwg Number	**Rev**	**Date**
SL-10	1	October '18



Holly walk - Existing Section 1-1
Scale 1:50



Holly walk - proposed Section 1-1
Scale 1:50



Issued for Planning

Rev	Date	Amendments
1	08/10/2018	Section updated
-	18/07/2018	First issue for comment

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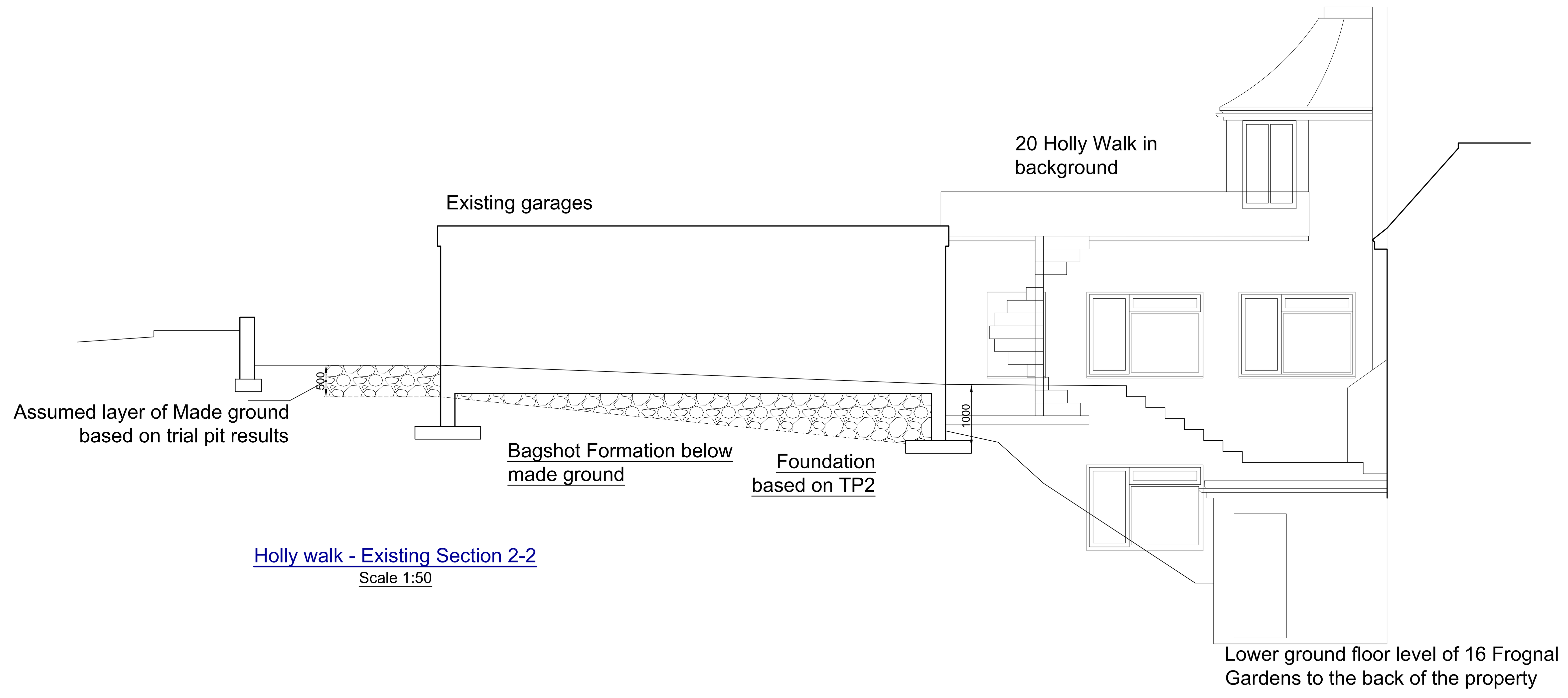
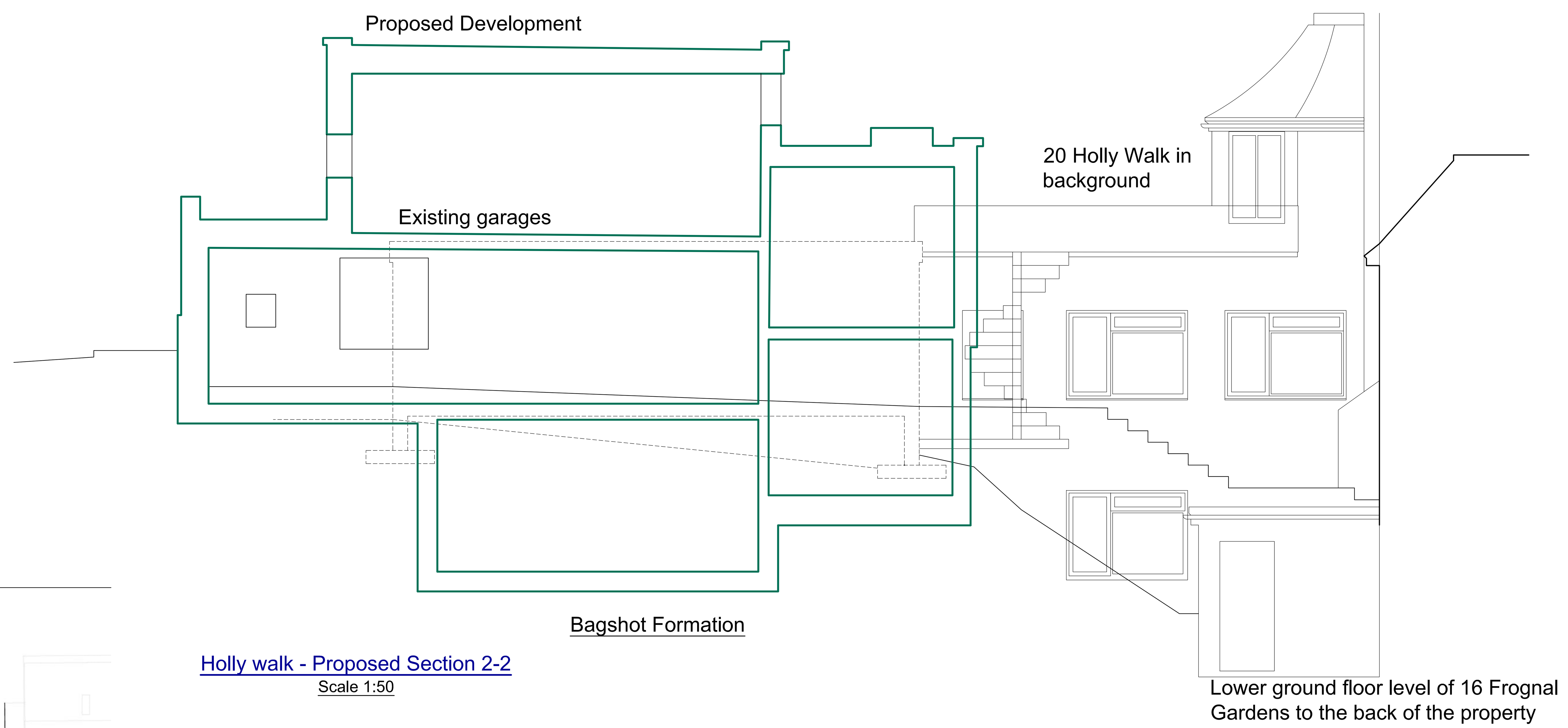
Project: Holly Walk
Title : Existing and Proposed section 1-1

Job Number	Drawn	Scale
180618	pr	as shown
	Chk'd CT	
Dwg Number	Rev	Date
SD-15	-	October '18



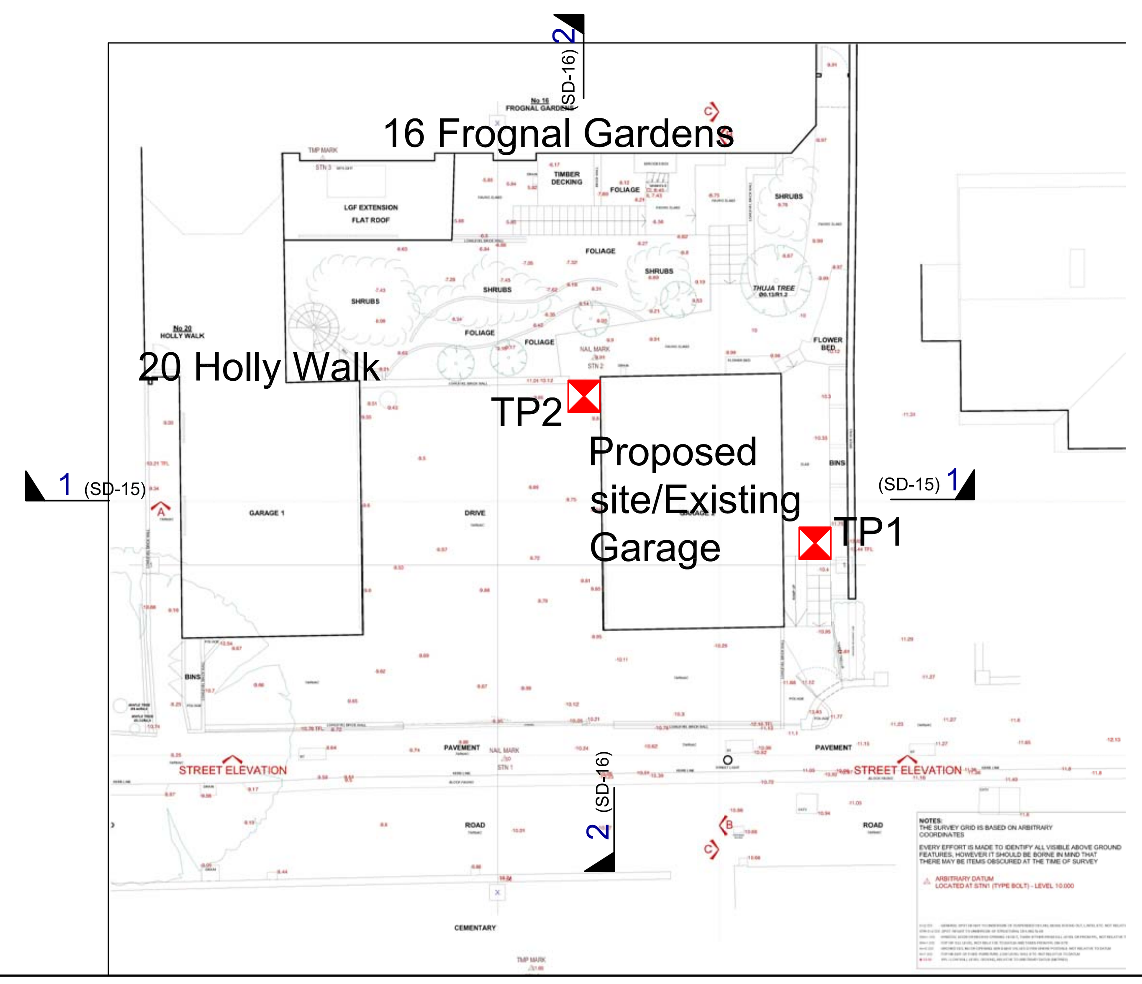
Holly walk - Existing Section 2-2

Scale 1:50



Holly walk - Proposed Section 2-2

Scale 1:50



Issued for Planning

Rev	Date	Amendments
1	08/10/2018	Section updated
-	18/07/2018	First issue for comment

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Job Number	Drawn	Scale
180618	pr	as shown
	Chk'd CT	
Dwg Number	Rev	Date
SD-15	1	October '18