KEY GS

Geological & Geotechnical Consultants

# 22 Holmes Road, London NW5 3AB

# Basement Impact Assessment (Land Stability)

# (April 2019)

**Prepared for Stantec UK Ltd**

Geological & Geotechnical Consultants

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**Stantec UK Ltd**

**22 Holmes Road, London NW5 3AB**

**Basement Impact Assessment (Land Stability)**

**(April 2019)**

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Key GeoSolutions;

| | |
|---|---|
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Norton Mayfield;

| | |
|---|---|
| 1617-NMA-XX-00-DR-A-20101 | Ground Floor Option 2 |
| 1617-NMA-XX-01-DR-A-20101 | First Floor Option 2 |
| 1617-NMA-XX-B1-DR-A-20101 | Basement Option 2 |
| 1617-NMA-XX-R1-DR-A-20101 | Roof Plan Option 2 |
| 1617-NMA-XX-ZZ-DR-A-20301 | Section AA |
| 1617-NMA-XX-ZZ-DR-A-20302 | Section BB |
| 1617-NMA-XX-ZZ-DR-A-20303 | Section CC |
| 1617-NMA-00-ZZ-DR-A-00303 | Sections DD & EE |

## 1.0 INTRODUCTION

Key GeoSolutions Ltd (KGS) have been commissioned by Stantec Limited to undertake a land stability assessment in relation to a proposed basement development at 22 Holmes Road, NW5 3AB.

### 1.1 Proposed Development

The property is described in the Camden Local List (2015) as 'semi-detached mid-19th century villa, semi basement plus two storeys, set behind front garden.

The proposed development will comprise:

- The demolition of the existing lean-to store room at the side of the house and former studio building, closing off of the existing house at the off-shot;
- Erection of a two-bed, three storey house, in-filling the gap between the existing house and the neighbouring office building, fronting onto Holmes Road;
- Erection of two connected two-bed houses over three storeys within a courtyard arrangement at the rear of the site.

### 1.2 Scope of Work

The purpose of this assessment is to consider if the proposed basements can be constructed without having a detrimental impact on the surroundings with respect to land stability and in particular whether the development will affect the stability of neighbouring properties.

### 1.3 Qualifications

This assessment has been undertaken by Brian Duthie and Howard Clarke. Brian holds a BEng in Engineering Geology and Geotechnics, is a chartered geologist, Fellow of the Geological Society and UK Registered Ground Engineering Adviser with 30 years' experience in geotechnical engineering. Howard holds a BEng in Civil Engineering, is a chartered engineer and Member of the Institution of Civil Engineers and Member of the Institute of Structural Engineers with 13 years' experience in civil engineering. Both assessors satisfy the qualification requirements given in the Camden Planning Guidance 4.

### 1.4 Limitations

The conclusions and recommendations made in this report are limited to those that can be made

on the basis of the research carried out. The results of the research should be viewed in the context of the work that has been carried out and no liability can be accepted for matters outside the stated scope of the research. The assessment does not constitute a detailed structural design for the basement structure, as would be required to allow construction to take place.

This report has been prepared for the information, benefit and use of Stantec UK Ltd only and any liability of Key GeoSolutions Ltd to any third party, whether in contract or in tort, is specifically excluded. Any third party finding themselves in possession of this report may not rely upon it without first obtaining the written authority of Key GeoSolutions Ltd.

## 2.0 SITE DESCRIPTION

The site, 22 Holmes Road in the London Borough of Camden, post code NW5 3AB and National Grid Reference 528865mE, 185057mN. The site is approximately rectangular in plan and covers an area of 290m², being approximately 9.5m by 30.6m with the long axis running front to back at approximately south south-west to north north-east.

The general topography of the area slopes gently down from Hampstead Heath to the north-east, the overall topographical gradient in the area is approximately 1 vertical in 10 horizontal (c. 5.7°) from north-east to south-west. The approximate location of the site is shown on Figure 1 below.

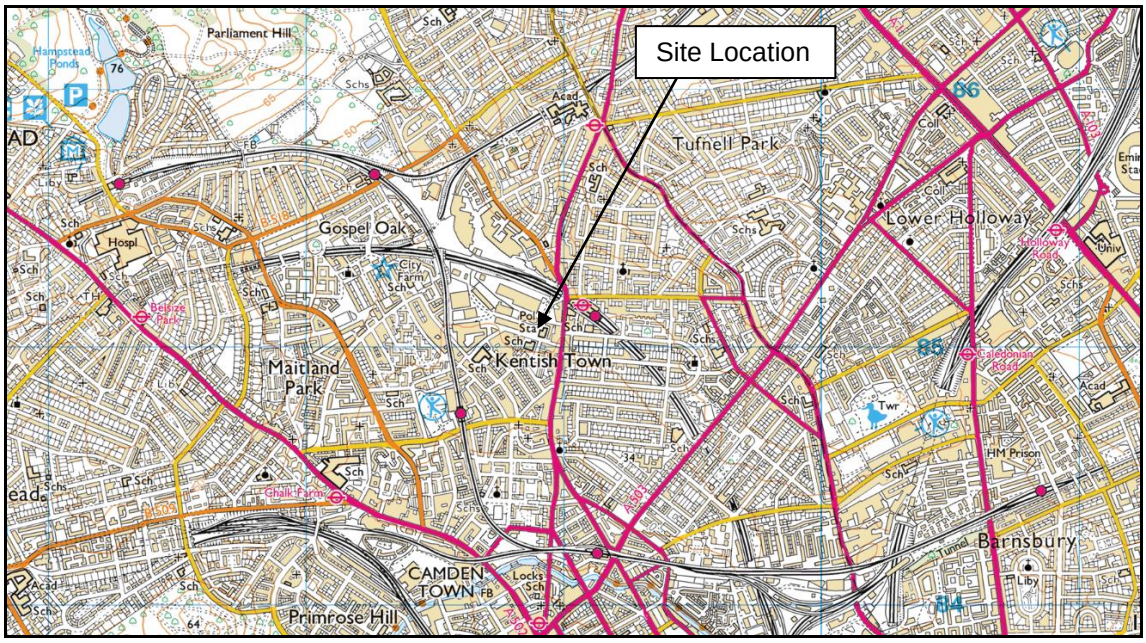


Figure 1 – Approximate Site Location

## 3.0 PROJECT SCREENING AND SCOPING

Following the guidance given in the London Borough of Camden document CPG4 'Basements and lightwells' (2013) it is required to identify the potential impacts of the proposed scheme. The flowchart entitled 'Slope stability screening flowchart' in Figure 2 of CPG4 assists with understanding the potential impacts that a basement may have.

| **SLOPE STABILITY** (Slope stability screening flowchart (Figure 2, CPG4 (Camden Council, 2013)) | | | |
|---|---|---|---|
| **Impact question** | **Answer** | **Justification** | **Reference** |
| 1) Does the existing site include slopes, natural or manmade, greater than 7°? | **No** | Figure 10 Camden Topographic Map<br>Figure 16 Slope Angle Map<br>From a walkover of the site and surrounding areas topography is essentially flat. | Ove Arup, 2010<br>Ordnance Survey Mapping. |
| 2) Will the proposed re-profiling or landscaping at site change slopes at the property boundary to more than 7°? | **No** | No re-profilling of the site is proposed | Drawings of proposed development |
| 3) Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°? | **No** | | |
| 4) Is the site within a wider hillside setting in which the general slope is greater than 7°? | **No** | Figure 10 Camden Topographic Map | Ove Arup, 2010 |
| 5) Is the London Clay the shallowest strata at the site? | **Yes** | Figure 5 South Camden Geological Map | Ove Arup, 2010,<br>BGS Geoindex, site investigation |
| 6) Will any trees be felled as part of the proposed development and / or any works proposed within any tree protection zones where trees are to be retained? | **No** | | Drawings of proposed development |
| 7) Is there any history of seasonal shrink-swell subsidence in the local area, and / or evidence of such effects at the site? | **No** | None reported by home-owner and on inspection no evidence in property or immediate neighbours of subsidence. Proposed foundation depths will be beyond depth of influence of vegetation. | |

| | | | |
|---|---|---|---|
| 8) Is the site within 100m of a watercourse or potential spring line? | **No** | The route of a tributary of the River Fleet is shown approximately 120m to the east of the site, Figure 2, Camden 1:10,560 Geological Map (1920) and Figure 11 Watercourses. | Ove Arup, 2010 |
| 9) Is the site within an area of previously worked ground? | **No** | An area of worked ground is shown approximately 150m to the west north-west of the site, Figure 4 North Camden Geological Map. The boreholes drilled at the site found only shallow made ground, less than 1.0m deep. | Ove Arup, 2010<br>Site Investigation |
| 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 construction? | **No** | No groundwater was encountered in the boreholes during the site investigation. Subsequent monitoring of the piezometers has found a rising water level in borehole WS02. Given the very slow rate of water rise it is likely that this represents a seepage from a very thin silt bed in the London Clay. | Ove Arup, 2010 |
| 11) Is the site within 50m of Hampstead Heath ponds? | **No** | The ponds are approximately 1.5km to the north-west. | Ove Arup, 2010<br>OS Mapping |
| 12) Is the site within 5m of a highway or pedestrian right of way? | **Yes** | The proposed basements in the two properties to the rear will be within 5m of Regis Road. | OS Mapping and Google Maps<br>Drawings of proposed development |
| 13) Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties? | **Yes** | Basements to two properties adjacent to north-west boundary will be significantly deeper than the foundations of the adjacent property. A trial pit was excavated to expose the foundations of the adjacent property. | OS Mapping and Google Maps<br>Site investigation |
| 14) Is the site over (or within the exclusion zone of) any tunnels e.g. railway lines? | **No** | Figure 18 Transport Infrastructure | Ove Arup, 2010 |

## 4.0 GROUND CONDITIONS

### 4.1 Soil Conditions

The site is covered by British Geological Survey 1:50,000 Geological Sheet No. 256 (North London), which indicates the site to be underlain by deposits of the London Clay Formation of Eocene age, no superficial deposits are shown to overlie the London Clay.

An intrusive site investigation was undertaken at the site on 28th February 2019, report reference 19-088-R-001, a copy of which is included as Appendix 1. The site investigation comprised three windowless sampling boreholes and a hand dug trial pit. All encountered made ground, with the depth varying from 0.5 to 0.9m, consisting of predominantly sand, overlying London Clay. Boreholes WS02 and WS03 were taken to a depth of 5.45m into the London Clay.

Trial TP01 was excavated in order to determine the depth of the foundation of the party wall with 24 Holmes Road. The top of the foundation was encountered at 0.5m depth and the underside of the foundation was at 0.9m.

### 4.2 Groundwater Conditions

No groundwater was encountered by the boreholes or trial pit. Standpipes were installed in each of the three boreholes, WS01 and WS03 were installed at shallow depths in order to monitor any perched water on the surface of the London Clay and in WS02 to the full depth of the borehole.

Monitoring of the standpipes has been undertaken on three occasions, 21/03/19, 02/04/19 and 17/04/19. WS01 has been dry on all occasions. WS03 had water at 0.87 and 0.88m depth below ground on the first two visits and was dry on the third visit, suggesting some surface water percolation through the made ground. WS02 has shown a rise in water level on each monitoring occasion, when the rise is plotted against time there appears to be a linear relationship. This suggests that the rise is due to a seepage from a thin low permeability silt / sand parting. For further assessment of groundwater conditions refer to Stantec Ltd report reference 67109 R1 D1, 22 Holmes Road NW5 3AB - Basement Impact Assessment: - Surface Water and Groundwater.

## 5.0 LAND STABILITY ASSESSMENT

Where the screening checklist has returned a 'yes' response to any question that matter is carried forward to the scoping stage. The scoping produces a statement which defines the matters of concern identified in the screening stage.

### 5.1 Proposed Development

The proposed development is shown on the Norton Mayfield Architects drawings, which are included at the rear of this report;

- 1617-NMA-XX-00-DR-A-20101 Ground Floor Option 2
- 1617-NMA-XX-01-DR-A-20101 First Floor Option 2
- 1617-NMA-XX-B1-DR-A-20101 Basement Option 2
- 1617-NMA-XX-R1-DR-A-20101 Roof Plan Option 2
- 1617-NMA-XX-ZZ-DR-A-20301 Section AA
- 1617-NMA-XX-ZZ-DR-A-20302 Section BB
- 1617-NMA-XX-ZZ-DR-A-20303 Section CC
- 1617-NMA-00-ZZ-DR-A-00303 Sections DD & EE

The proposed basements are within 5m of the public highway and will significantly increase the differential depth of foundations relative to neighbouring properties. The basements on the western side of the site will be of the order of 2.1m deeper than the underside of the foundations of the party wall between 22 and 24 Holmes Road. The floor of the existing basement / lower ground floor is approximately 1.0m below ground level. It is proposed that the floor of the new basements will be 3.0m below ground level.

KGS drawing number 19-088-D-001 has been produced to illustrate the relationship between the foundations of the neighbouring properties / structures and the proposed basement construction.

### 5.2 Movement Assessment

No detailed structural design has been produced for the proposed development to date, however a structural assessment has been undertaken by Osborne Edwards Ltd (report reference 19088/JO, July 2019). The report reviews the feasibility of the basement construction and proposes a construction methodology. The report concludes that through careful planning and execution of the construction work and employing a sufficiently stiff bracing system during formation of the basement a means of forming the basement without risk of significant lateral movements is both possible and practical.

The construction methodology to form the basement is a combination of contiguous bored pile

walls and underpinning of sections of the existing foundations. The relationship of the pile walls and underpinning to the existing structures is shown on KGS drawing number 19-088-D-001, the existing is shown in orange on the cross-sections and the proposed is shown in green. The depth of the existing foundation under the wall of No. 24-26 is taken from the trial pit excavated adjacent to the wall. Based upon the existing and proposed levels of the floors it is likely that the foundations to this wall will not need to be underpinned, however if they do the depth of the underpins will be small.

It is assumed that a suitably experienced specialist basement contractor will be appointed for the basement works, this contractor will be responsible for the design and implementation of the temporary works necessary to build the basement.

Ground movements resulting from underpinning are not well documented and there is no specific method for assessing their magnitude. When underpinning is carried out in a well-controlled manner, movements are typically small. The ground conditions at the site are London Clay from surface, within which underpinning operations can normally be undertaken with relatively little disturbance. It is proposed that the formation of the basement wall adjacent to the existing property will be made in a sequential underpinning pattern with underpins being no wider than 1.2m. The sequence of the underpinning will be in the 1, 4, 2, 5, 3 sequence and such that any given underpin will be completed, dry packed and a minimum period of 48 hours lapsed before an adjacent excavation commenced to form another underpin.

Assessment of the ground movements resulting from the pile installation and the excavation to form the basement has been undertaken with reference to CIRIA C760 Guidance on embedded retaining wall design (2017). To provide some basis for estimating likely movements and damage resulting from excavating the basement in front of the underpinning and in the absence of underpinning specific guidance, the underpinned sections have been treated as piles.

For the bored pile walls the embedded length of the piles will be wholly in stiff London Clay, hence it is possible from C760 to estimate the horizontal and vertical movements that could be expected as a result of the pile installation and the excavation of the basements. It is assumed that a high stiffness support system will be applied to the underpins and the contiguous bored pile wall. The calculations for movement a presented in Appendix 2.

From C760 Figure 6.15 it can be seen that at a distance of four times the depth of the excavation from behind the wall the expected movement will be negligible, for the excavation depth of 3.5m this would be a distance of 14m. The key structures / infrastructure that would be impacted within this zone of influence are listed in Table 1 overleaf, along with a summary of the total predicted levels of movement due to the basement construction.

The movements given by C760 are for excavations with long straight walls, corners tend to limit movements, such that horizontal deflections towards an excavation in the vicinity of a corner to the excavation are typically reduced to about half that predicted. Hence, given the limited dimensions of the proposed excavations and likely effect the corners will have, the predicted movements given in Table 1 are likely to be conservative. In particular, the movements likely to be experienced in the footpath and highway at Regis Road and Holmes Road will be small.

Table 1 – Predicted movements due to pile installation and basement excavation

| Structure / Infrastructure | Distance from excavation (m) | Predicted Horizontal Movement (mm) | Predicted Vertical Movement (mm) |
|---|---|---|---|
| Existing wall of No. 22 | 0 | 9.25 | 5.40 |
| Party wall with No. 24 | 0 | 9.25 | 5.40 |
| Rear garden wall to No. 22 | 2.6 | 7.55 | 6.30 |
| Garden wall with No. 20 | 0 | 9.25 | 5.40 |
| Regis Road Footpath | 3.0 | 6.45 | 6.00 |
| Regis Road Highway | 4.6 | 5.70 | 5.45 |
| Holmes Road Footpath | 5.6 | 4.80 | 4.75 |
| Holmes Road Highway | 7.2 | 3.95 | 3.55 |

No. 24-26 Holmes Road is immediately adjacent to the proposed basements and hence will likely be impacted the most. No 24-26 is approximately 12m wide, the calculations presented in Appendix 2 calculate the deflection ratio and horizontal strain for the building, these are then used to determine the damage category in accordance with C760 Figure 6.27 and Box 6.3. It is estimated that the damage likely to 24-26 Holmes Road will be in Damage Category 1.

The garden party walls, which are free standing structures and are free to move laterally with the ground, should be relatively unaffected by the movements.

Whilst a rising water level has been encountered in WS02 and the water level in the most recent monitoring visit was at around the depth of the proposed basement excavation it is considered unlikely that significant volumes of water will be encountered within the excavation, rather localised seepages from silt / sand partings, which should be dealt with as they are encountered.

The work should be carried out in accordance with the Party Wall etc. Act 1996 and a pre-condition survey of the adjacent properties will be required.

### 5.3 Monitoring

It will be necessary to monitor the impact of the works on the adjoining properties and the public highway to ensure that movements are not excessive. The monitoring should comprise the following;

- Visual inspection of the party wall and any pre-existing cracking
- Attachment of tell tales to accurately record movement of any pre-existing cracks
- Installation of levelling targets to monitor settlement of the party walls and the public highway, to be monitored by standard optical equipment.

The levelling targets on the party walls should be no greater than 2m apart and located as close to the top of the existing foundations as possible. The maximum allowable movement should be no more than 3mm between adjacent levelling targets.

The limits on maximum movement and proposed actions are given in the table below;

| Movement | Category | Action |
|---|---|---|
| 0 - 5 mm | Green | No action required |
| 5 – 10 mm | Amber | Crack monitoring:<br>Carry out local structural review;<br>Preparation for the implementation of remedial measures should be required |
| >10 mm | Red | Crack monitoring:<br>Implement structural support as required;<br>Cease works with exception of necessary works for the safety and stability of the structure and personnel;<br>Review monitoring data and implement revised method of works |

Monitoring should be undertaken at weekly intervals during excavation works and if no significant movement is identified monitoring can be reduced to fortnightly.

### 5.4 Damage Category

If it is assumed that a suitable structural design, including temporary works, is produced and a suitably experienced contractor is appointed, then past experience of basement construction in London has shown that ground movements caused by the proposed construction techniques to this depth in London Clay can be limited to an acceptable level. In the worst-case, which is deemed to be the impact to No. 24-26 Holmes Road, it would be expected that possible damage to this property would fall into Category 1 (very slight).

## 6.0 CONCLUSIONS

An assessment has been made of the potential impacts of the proposed basement construction at 22 Holmes Road with respect to slope stability and ground movement. This assessment does not constitute a detailed structural design for the basement.

Given that the natural topography of the area is essentially flat it is considered that the proposed basement will not have an impact on the overall slope stability within the area.

With regard to impact on the adjacent properties and the public highway it is considered that the expected movement will not be excessive. It is concluded that the risk of any damage to adjacent properties will fall into Category 1 of the Damage Categories after Burland 1995, with the degree of severity being very slight, which in relation to damage to the buildings would equate to fine cracks which are easily treated in normal decoration.

Hence, it is concluded, based upon the information currently available, that the proposed basements could be constructed employing appropriate construction methods without significant impact on either the slope stability within the area or on the adjacent properties or infrastructure.

## 7.0 REFERENCES

7.1 22 Holmes Road NW5 3AB, Report on the Ground Investigation, Key GeoSolutions Ltd report reference 19-088-R-001, March 2019.

7.2 Norton Mayfield Architects drawings;

- 1617-NMA-XX-00-DR-A-20101 Ground Floor Option 2
- 1617-NMA-XX-01-DR-A-20101 First Floor Option 2
- 1617-NMA-XX-B1-DR-A-20101 Basement Option 2
- 1617-NMA-XX-R1-DR-A-20101 Roof Plan Option 2
- 1617-NMA-XX-ZZ-DR-A-20301 Section AA
- 1617-NMA-XX-ZZ-DR-A-20302 Section BB
- 1617-NMA-XX-ZZ-DR-A-20303 Section CC

7.3 22 Holmes Road NW5 3AB - Basement Impact Assessment - Surface Water and Groundwater, Stantec Ltd report reference 67109 R1 D1, April 2019.

7.4 CIRIA C760 Guidance on embedded retaining wall design, 2017

7.5 Assessment of risk of damage to buildings due to tunnelling and excavation, Burland J B, 1995

7.6 Ground movements resulting from urban tunnelling: predictions and effects, Rankin W J, 1988

# APPENDICES

# APPENDIX 1
# GROUND INVESTIGATION REPORT

KEY GS

Geological & Geotechnical Consultants

# 22 Holmes Road NW5 3AB

# Report on Ground Investigation (March 2019)

**Prepared for Stantec UK Limited**

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Job Number: 19-088

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# Stantec UK Limited

## 22 Holmes Road NW5 3AB

## Report on Ground Investigation (March 2019)

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Figure 1 Site Location Plan

Figure 2 Borehole Location Plan


**Appendices**


Appendix 1 Borehole Logs

Appendix 2 Laboratory Testing Results

## 1.0 INTRODUCTION

Key GeoSolutions Ltd (KGS) have been commissioned by Stantec UK Limited (Stantec) to undertake a ground investigation at 22 Holmes Road in order to ascertain the ground conditions for the assessment of a proposed extension.

The property is described in the Camden Local List (2015) as 'semi-detached mid-19th century villa, semi basement plus two storeys, set behind front garden.

The proposed development will comprise:

- The demolition of the existing lean-to store room at the side of the house and former studio building, closing off of the existing house at the off-shot;
- Erection of a two-bed, three storey house, in-filling the gap between the existing house and the neighbouring office building, fronting onto Holmes Road;
- Erection of two connected two-bed houses over three storeys within a courtyard arrangement at the rear of the site.

The comments given in this report and any opinions expressed are based on the ground conditions encountered during the site work, the results of tests made in the field and on information made available by Stantec. There may be, however, conditions pertaining to the site which have not been disclosed by the investigation and which therefore could not be taken into account in this report. In particular old foundations or underground services may be present that could affect the proposed development. The term 'topsoil' is used in this report to describe the surface, usually organic, layer including turf and shallow soils, weathered material with roots etc. and should not be taken to imply agricultural soil suitable for sale.

# 2.0 SITE OVERVIEW

## 2.1 Site Location

The site, which may be located by approximate National Grid Reference 528865mE, 185057mN, is situated on the north side of Holmes Road, near the centre of Kentish Town, in the Borough of Camden, London (Figure 1).

## 2.2 Geology of the Site

The site is covered by BGS 1: 50,000 Geological Sheet No. 256 (North London). This indicates the site to be underlain by deposits of the London Clay Formation of Eocene age, no superficial deposits are shown to overlie the London Clay.

## 3.0 GROUND INVESTIGATION

Three boreholes (WS01, WS02 and WS03) were sunk at the front, rear and eastern side of the property in order to investigate the ground conditions in accordance with the guidelines laid down in BS EN 1997-2:2007. A hand dug trial pit (TP01) was excavated along the eastern boundary of the site in order to expose the existing foundations of the adjacent building.

The boreholes were sunk using a windowless sampling rig, the approximate locations of the boreholes are shown on Figure 1. The depths of the boreholes and trial pits and descriptions of the soils encountered are given in the records in Appendix 1.

Disturbed samples and SPT's (Standard Penetration Tests) were taken at the depths shown on the borehole records. The results of the SPT's are provided on the window sample logs within Appendix 1. Physical and chemical testing was carried out on four representative samples of the ground encountered; the results are given in Appendix 2.

On completion of each borehole a standpipe was installed; the standpipes in boreholes at the front and rear of the building were installed within the made ground, and the standpipe in the borehole at the side of the house was installed within the London Clay to a depth of approximately 5.00mbgl. Details of the installations are given on the borehole records.

The site work was carried out on the 28th February 2019 and generally in accordance with the guidelines laid down in BS EN 1997-2:2007.

## 4.0 GROUND CONDITIONS

The following strata were encountered during the investigation:-

- Made Ground
- Sandy gravelly Clays (re-worked London Clay)
- Clays (London Clay Formation)

All boreholes were terminated in the London Clay Formation.

- WS01 was terminated at a depth of 1.00m bgl. Groundwater was not encountered.
- WS02 was terminated at a depth of 5.45m bgl. Groundwater was not encountered.
- WS03 was terminated at a depth of 5.45m bgl. Groundwater was not encountered.

The trial pit uncovered bricks down to a concrete foundation at 0.50m bgl, the concrete foundation continued down to natural ground at 0.90m bgl, and was seen to be founded on the London Clay.

- TP01 was terminated at a depth of 1.00m bgl. Groundwater was not encountered.

A summary of the geotechnical testing is given in the table below;

| | Range (number of results) | | | | |
|---|---|---|---|---|---|
| Strata | Moisture Content % | Plasticity Index | SPT N Value | Undrained Triaxial kN/m² | Notes |
| London Clay | 32-33 (5) | 44-49 (3) | 7-20 (10) | 53-85 (3) | |

## 5.0 PRELIMINARY GEOTECHNICAL ASSESSMENT

Shallow spread foundations should be taken down to a minimum firm CLAY, foundations should be designed with an allowable bearing pressure of 100 kN/m². Given the high potential for volume change foundations should be designed in accordance with the NHBC Standards.

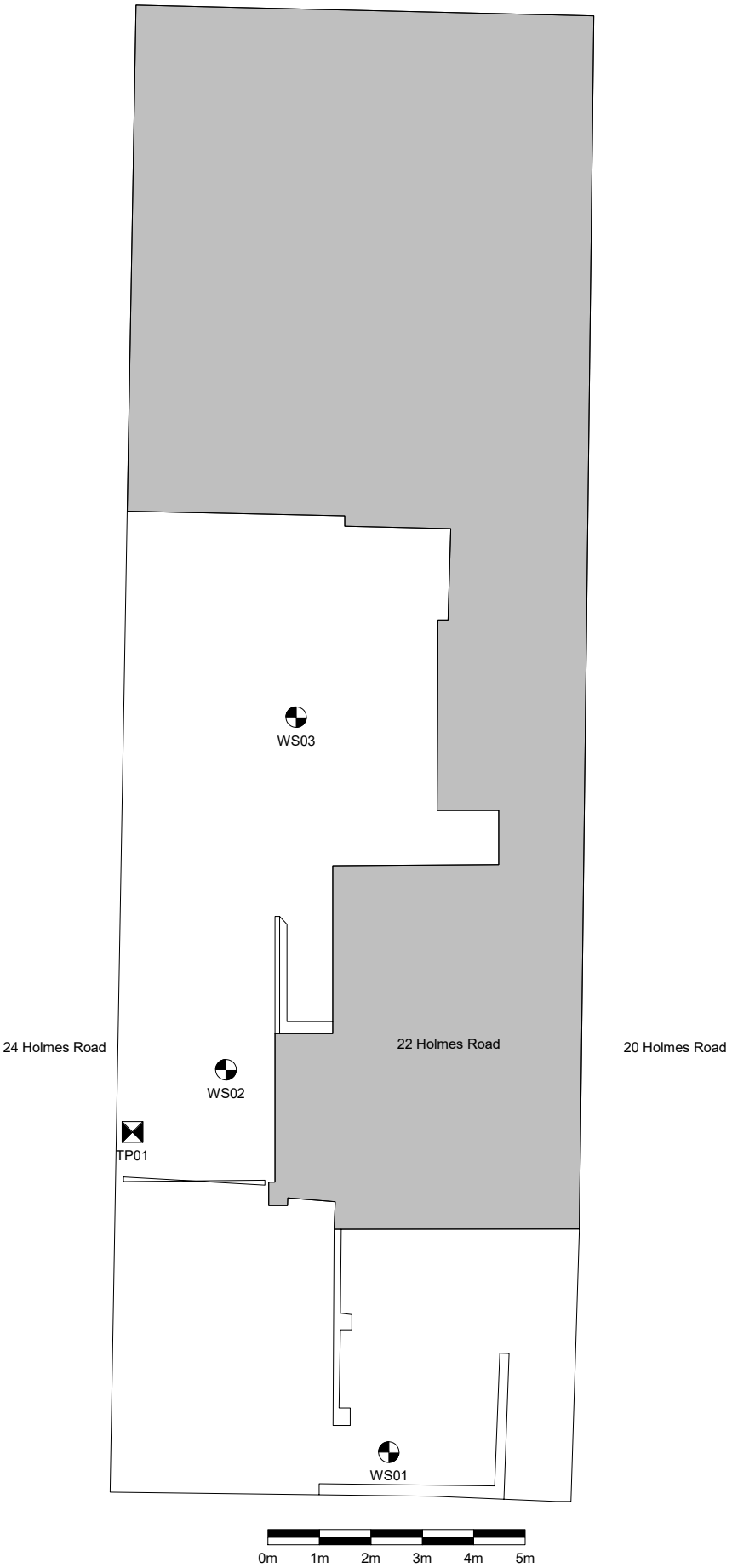
The following parameters are suggested for retaining wall design purposes;

| Strata | Bulk Unit Weight (kN/m³) | Effective Cohesion (kN/m²) | Effective Friction Angle (Degrees) |
|---|---|---|---|
| London Clay | 20 | 0 | 20 |

Given the high plasticity of the clay floor slabs should be of suspended construction.

The chemical testing indicates Design Sulphate Class of DS1 and AC-1, in accordance with BRE SD1 (BRE, 2005).

# FIGURES




| Rev. | Revision Detail | Drawn | Date |
|---|---|---|---|
| 01 | First Issue | WR | 20/03/18 |

CLIENT:

STANTEC UK

PROJECT:

22 HOLMES ROAD

TITLE:

SITE INVESTIGATION
LOCATION PLAN



Key GeoSolutions Ltd
Nova House
Audley Avenue
Newport
Shropshire TF10 7DW
Tel: 01952 822960
E-mail: info@keygs.com
Web: www.keygs.com

| Drawn: | Checked: | Date: |
|---|---|---|
| WR | BD | Feb '19 |
| Scale: | Original Sheet Size: | Status: |
| NTS | A4 | DRAFT |

Drawing No.: **FIGURE 1**

Revision: **01**

# APPENDICES

# APPENDIX 1

## BOREHOLE LOGS

Key GeoSolutions Ltd
info@keygs.com
Telephone: 01952 822960
Fax: 01952 822961

# WELL NUMBER WS01



**CLIENT** Stantec **PROJECT NAME** 22 Holmes Road

**PROJECT NUMBER** 19-088 **PROJECT LOCATION** London

**DATE STARTED** 28/2/19 **COMPLETED** 28/2/19 **CO-ORDINATES** mE, mN

**DRILLING CONTRACTOR** Dynamic Sampling UK **GROUND ELEVATION** **HOLE SIZE** 200

**DRILLING METHOD** Hand Dug Trial Pit **LOGGED BY** Will Roberts **CHECKED BY** BD

| DEPTH (m) | SAMPLE TYPE NUMBER | GRAPHIC LOG | MATERIAL DESCRIPTION & REMARKS | WELL DIAGRAM |
|---|---|---|---|---|
| | | | 0.15 Grass onto MADE GROUND consisting dark grey slightly silty gravelly SAND including brick fragments ash clinker and stones | |
| | | | MADE GROUND consisting brown very silty gravelly SAND with roots and stones including rare to occasional brick fragments and clinker | |
| | | | 0.50 Firm mottled orange brown CLAY with roots and occasional gravel of stones and flint | |
| | | | 0.80 Stiff brown CLAY | |
| 1 | | | 1.00 | |

Bottom of borehole at 1.00 metres.

**NOTES** Groundwater not encountered.

**SAMPLE TYPE KEY** U = Undisturbed D = Disturbed B = Bulk J = Jar VA = Shear Vane SPT = Standard Penetration Test

Key GeoSolutions Ltd
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Telephone: 01952 822960
Fax: 01952 822961

# WELL NUMBER WS02



**CLIENT** Stantec **PROJECT NAME** 22 Holmes Road

**PROJECT NUMBER** 19-088 **PROJECT LOCATION** London

**DATE STARTED** 28/2/19 **COMPLETED** 28/2/19 **CO-ORDINATES** mE, mN

**DRILLING CONTRACTOR** Dynamic Sampling UK **GROUND ELEVATION** **HOLE SIZE** 110

**DRILLING METHOD** Windowless Sampler **LOGGED BY** Will Roberts **CHECKED BY** BD

| DEPTH (m) | SAMPLE TYPE NUMBER | BLOW COUNTS (SPT N VALUE) | TESTS | GRAPHIC LOG | MATERIAL DESCRIPTION & REMARKS | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| | | | | | 0.10 CONCRETE | |
| | | | | | MADE GROUND consisting light grey to grey very gravelly SAND. Gravel is fine to coarse angular to sub-angular brick and concrete | |
| | | | | | 0.40m; becoming dark grey slightly silty with coal fragments and ash | |
| | | | | | 0.70 0.60m; becoming very clayey | |
| | | | | | 0.80 MADE GROUND consisting soft brown occasionally sandy CLAY with occasional fine to coarse angular to sub-rounded brick stones and ash | |
| 1 | SPT | 2-1-2-2 (7) | | | Soft to firm brown CLAY | |
| 2 | B | () | Cu = 53 kPa | | | |
| | SPT | 2-3-3-3 (11) | | | 2.50m; becoming stiff | |
| 3 | B | () | | | | |
| | SPT | 4-4-4-5 (17) | Cu = 61 kPa | | | |
| 4 | SPT | 4-4-4-4 (16) | | | | |
| 5 | SPT | 5-5-5-5 (20) | | | 5.45 | |

Bottom of borehole at 5.45 metres.

**NOTES** Groundwater not encountered.

**SAMPLE TYPE KEY** U = Undisturbed D = Disturbed B = Bulk J = Jar VA = Shear Vane SPT = Standard Penetration Test

Key GeoSolutions Ltd
info@keygs.com
Telephone: 01952 822960
Fax: 01952 822961

# WELL NUMBER WS03



**CLIENT** Stantec **PROJECT NAME** 22 Holmes Road

**PROJECT NUMBER** 19-088 **PROJECT LOCATION** London

**DATE STARTED** 28/2/19 **COMPLETED** 28/2/19 **CO-ORDINATES** mE, mN

**DRILLING CONTRACTOR** Dynamic Sampling UK **GROUND ELEVATION** **HOLE SIZE** 110

**DRILLING METHOD** Windowless Sampler **LOGGED BY** Will Roberts **CHECKED BY** BD

| DEPTH (m) | SAMPLE TYPE NUMBER | BLOW COUNTS (SPT N VALUE) | TESTS | GRAPHIC LOG | MATERIAL DESCRIPTION & REMARKS | WELL DIAGRAM |
|---|---|---|---|---|---|---|
| | | | | | 0.10 CONCRETE | |
| | | | | | MADE GROUND consisting dark grey silty gravelly to very gravelly SAND with occasionaly ash. Gravel is fine to coarse angular to sub-angular including brick concrete glass coal and stones | |
| | | | | | 0.80 | |
| 1 | | | | | 0.90 MADE GROUND consisting soft brown gravelly slightly sandy CLAY. Gravel is fine to medium occasionally coarse sub-angular to rounded brick flint and stones | |
| | SPT | 2-4-4-6 (16) | | | Firm orange brown slightly sandy to sandy gravelly CLAY. Gravel is fine to coarse angular to sub-rounded stones and flint | |
| | | | | | 1.2m; becoming very gravelly | |
| 2 | | | | | 2.00 | |
| | B SPT | () 2-3-3-4 (12) | | | Stiff brown CLAY | |
| | | | | | 2.5m; with blue grey sub-vertical intersecting planar features | |
| 3 | | | | | | |
| | B SPT | () 2-3-3-3 (11) | Cu = 85 kPa | | | |
| 4 | | | | | | |
| | SPT | 4-4-4-5 (17) | | | | |
| 5 | | | | | | |
| | SPT | 5-5-5-5 (20) | | | 5.45 | |

Bottom of borehole at 5.45 metres.

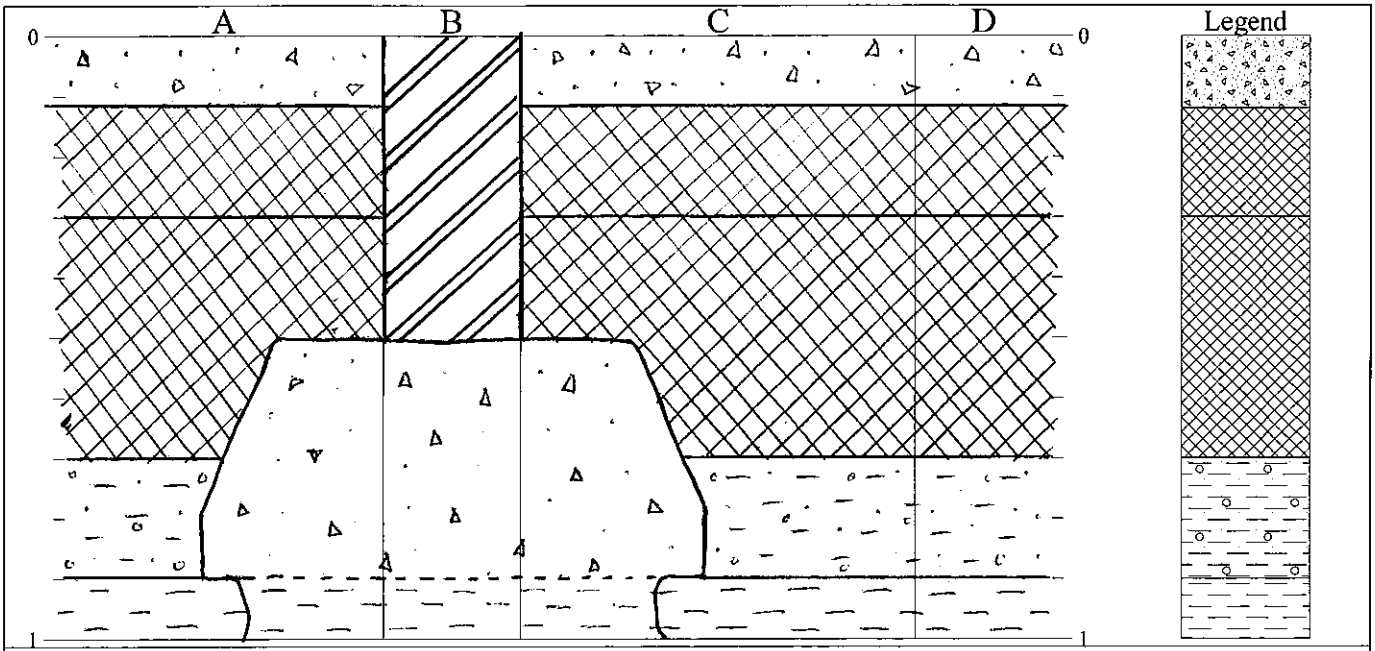
**NOTES** Groundwater not encountered.

**SAMPLE TYPE KEY** U = Undisturbed D = Disturbed B = Bulk J = Jar VA = Shear Vane SPT = Standard Penetration Test

KEY | GS
Key GeoSolutions Ltd
info@keygs.com
Telephone: 01952 822960
Fax: 01952 822961

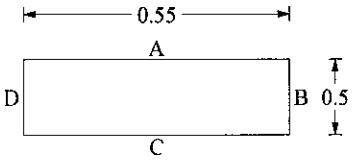
# TRIAL PIT LOG

| Project | | | | TRIAL PIT No |
|---|---|---|---|---|
| London - 22 Holmes Road | | | | TP01 |
| Job No: 19-088 | Date: 28-02-19 28-02-19 | Ground Level (m): | Co-Ordinates (m): | |
| Contractor: Dynamic Sampling UK | | | | Sheet: 1 of 1 |




| STRATA | | | SAMPLES & TESTS | | |
|---|---|---|---|---|---|
| Depth | No | DESCRIPTION | Depth | No | Remarks/Tests |
| 0.00-0.12 | | CONCRETE | | | |
| 0.12-0.30 | | MADE GROUND consisting brick fragments and gravel in a dark grey sandy slightly silty ash matrix | | | |
| 0.30-0.70 | | MADE GROUND consisting soft grey brown occasionally sandy slightly gravelly CLAY with occasional ash. Gravel is fine to coarse angular to sub-rounded brick stones coal<br><br>0.50 FOUNDATION: Base of bricks onto concrete. | | | |
| 0.70-0.90 | | Soft mottled orange brown CLAY with rare to occasional gravel and sand. Gravel is fine to medium stones and brick | | | |
| 0.90-1.00 | | Firm mottled orange brown CLAY<br>0.90 FOUNDATION: Base of concrete onto natural ground. | | | |

Shoring/Support:
Stability:





GENERAL REMARKS

| All dimensions in metres Scale 1:12.5 | Client: Stantec | Method/ Plant Used: | Logged By: WR |
|---|---|---|---|

# APPENDIX 2

## LABORATORY TESTING RESULTS

8180

GROUND ENGINEERING LIMITED

Newark Road Peterborough

t: 01733 566566

e: admin@groundengineering.co.uk

# TEST CERTIFICATE

## Determination of Liquid & Plastic Limits

Tested in accordance with BS 1377-2:1990: Clause 4.4 & 5: One Point Method

| | | | |
|---|---|---|---|
| Client: | Key GeoSolutions Ltd | Certificate Number: | PL6616-1/1/704 |
| Client Address: | Nova House<br>Audley Ave<br>Newport<br>Shropshire TF10 7DW | Client Reference: | L9632 |
| | | Job Number: | PL6616-1 |
| | | Date Sampled: | Unknown |
| Contact: | Will Roberts | Date Received: | 06.03.2019 |
| | | Date Tested: | 12.03.2019 |
| Site Name: | 22 Holmes Road | Certificate of Sampling: | N/A |
| Site Address: | | Sampling Certificate No.: | N/A |
| | | Sampled By: | Client |

**Test Results:**

**Laboratory Reference:** PL6616-1/1

**Sample Reference:** Not Given

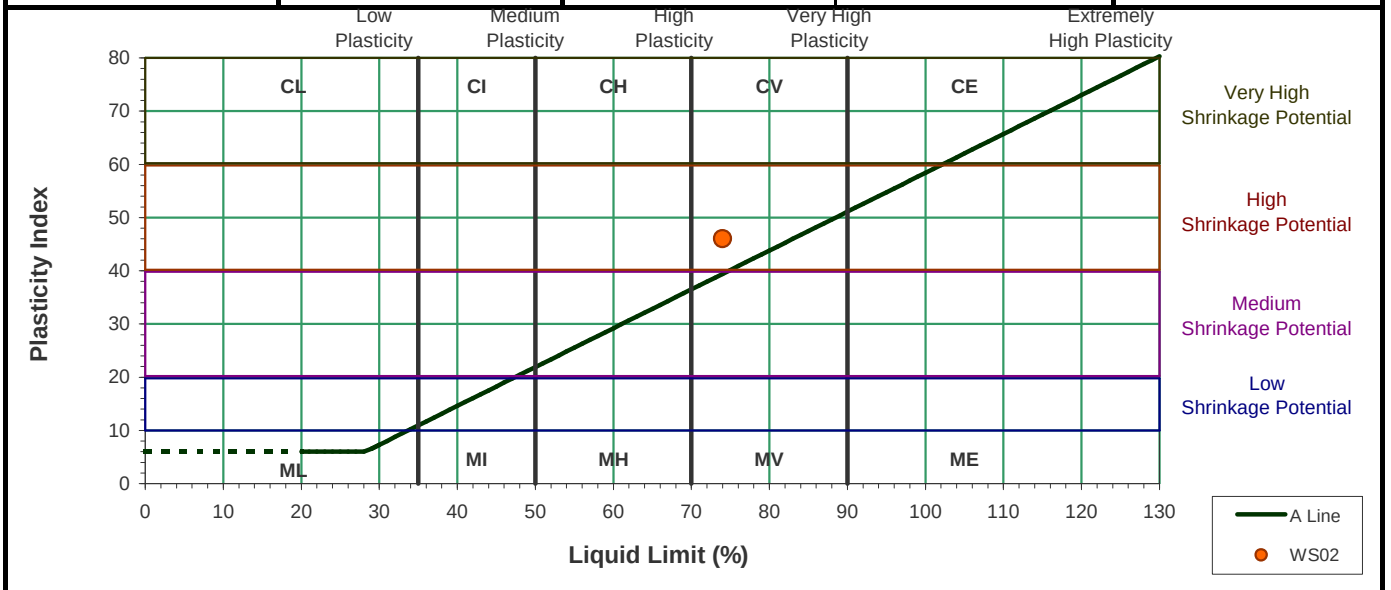
**Sample Description:** Firm brown orange-brown grey slightly silty CLAY.

**Location:** WS02 **Depth Top:** 1.80m

**Sample Preparation:** As Received **Depth Base:** 2.00m

Estimated % Passing 425µm BS Test Sieve

| Moisture Content (%) | Liquid Limit [%] | Plastic Limit [%] | Plasticity Index | % Passing 425µm BS Test Sieve |
|---|---|---|---|---|
| 32 | 74 | 28 | 46 | 100 |




Comments:

Approved Signatory: M. Hartnup - Laboratory Manager Signed:

**for and on behalf of Ground Engineering Ltd**

Date Reported: 20.03.2019 Page 1 of 1

Form Number: GELab/C/704 Version 44

8180

GROUND ENGINEERING LIMITED

Newark Road Peterborough

t: 01733 566566

e: admin@groundengineering.co.uk

# TEST CERTIFICATE

## Determination of Liquid & Plastic Limits

Tested in accordance with BS 1377-2:1990: Clause 4.4 & 5: One Point Method

| | | | |
|---|---|---|---|
| Client: | Key GeoSolutions Ltd | Certificate Number: | PL6616-1/2/704 |
| Client Address: | Nova House<br>Audley Ave<br>Newport<br>Shropshire TF10 7DW | Client Reference: | L9632 |
| | | Job Number: | PL6616-1 |
| | | Date Sampled: | Unknown |
| Contact: | Will Roberts | Date Received: | 06.03.2019 |
| | | Date Tested: | 12.03.2019 |
| Site Name: | 22 Holmes Road | Certificate of Sampling: | N/A |
| Site Address: | | Sampling Certificate No.: | N/A |
| | | Sampled By: | Client |

**Test Results:**

**Laboratory Reference:** PL6616-1/2

**Sample Reference:** Not Given

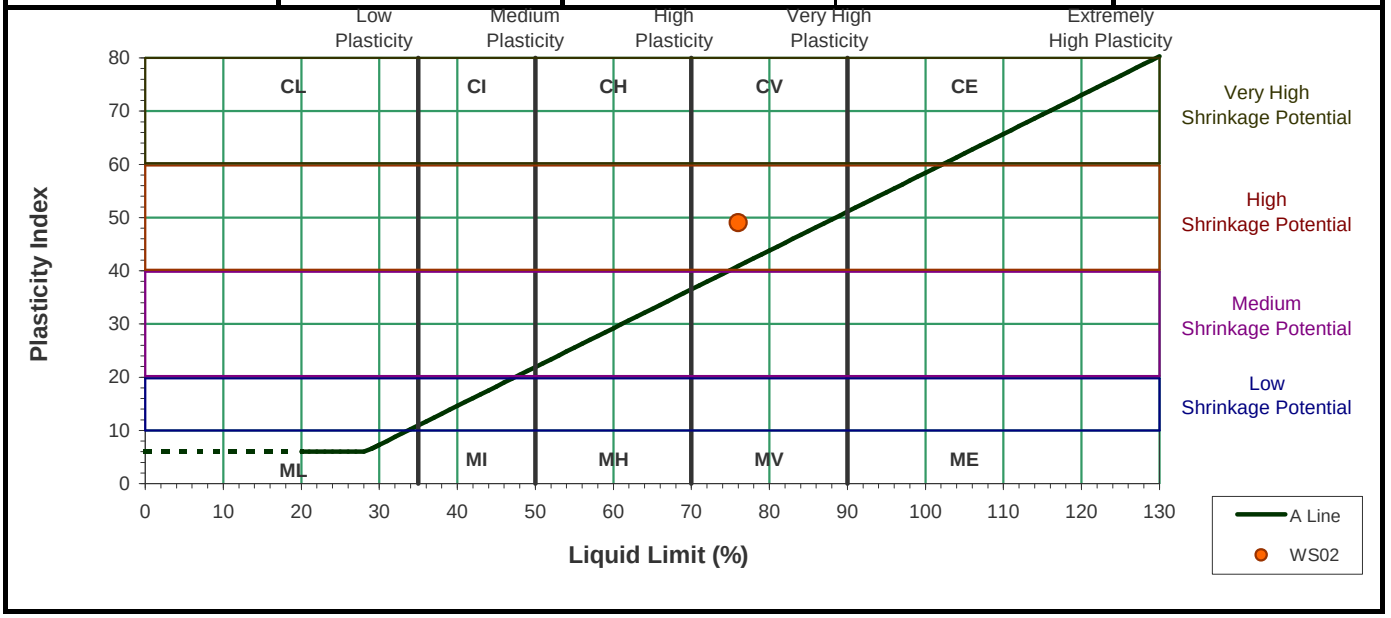
**Sample Description:** Firm brown orange-brown grey slightly silty CLAY with rare fine calcareous concretions.

**Location:** WS02 **Depth Top:** 2.80m

**Sample Preparation:** As Received **Depth Base:** 3.00m

Estimated % Passing 425µm BS Test Sieve

| Moisture Content (%) | Liquid Limit [%] | Plastic Limit [%] | Plasticity Index | % Passing 425µm BS Test Sieve |
|---|---|---|---|---|
| 33 | 76 | 27 | 49 | 100 |




Comments:

Approved Signatory: M. Hartnup - Laboratory Manager Signed:

**for and on behalf of Ground Engineering Ltd**

Date Reported: 20.03.2019 Page 1 of 1

Form Number: GELab/C/704 Version 44

8180

GROUND ENGINEERING LIMITED

Newark Road Peterborough

t: 01733 566566

e: admin@groundengineering.co.uk

# TEST CERTIFICATE

## Determination of Liquid & Plastic Limits

Tested in accordance with BS 1377-2:1990: Clause 4.4 & 5: One Point Method

| | | | |
|---|---|---|---|
| Client: | Key GeoSolutions Ltd | Certificate Number: | PL6616-1/3/704 |
| Client Address: | Nova House<br>Audley Ave<br>Newport<br>Shropshire TF10 7DW | Client Reference: | L9632 |
| | | Job Number: | PL6616-1 |
| | | Date Sampled: | Unknown |
| Contact: | Will Roberts | Date Received: | 06.03.2019 |
| | | Date Tested: | 11.03.2019 |
| Site Name: | 22 Holmes Road | Certificate of Sampling: | N/A |
| Site Address: | | Sampling Certificate No.: | N/A |
| | | Sampled By: | Client |

**Test Results:**

**Laboratory Reference:** PL6616-1/3

**Sample Reference:** Not Given

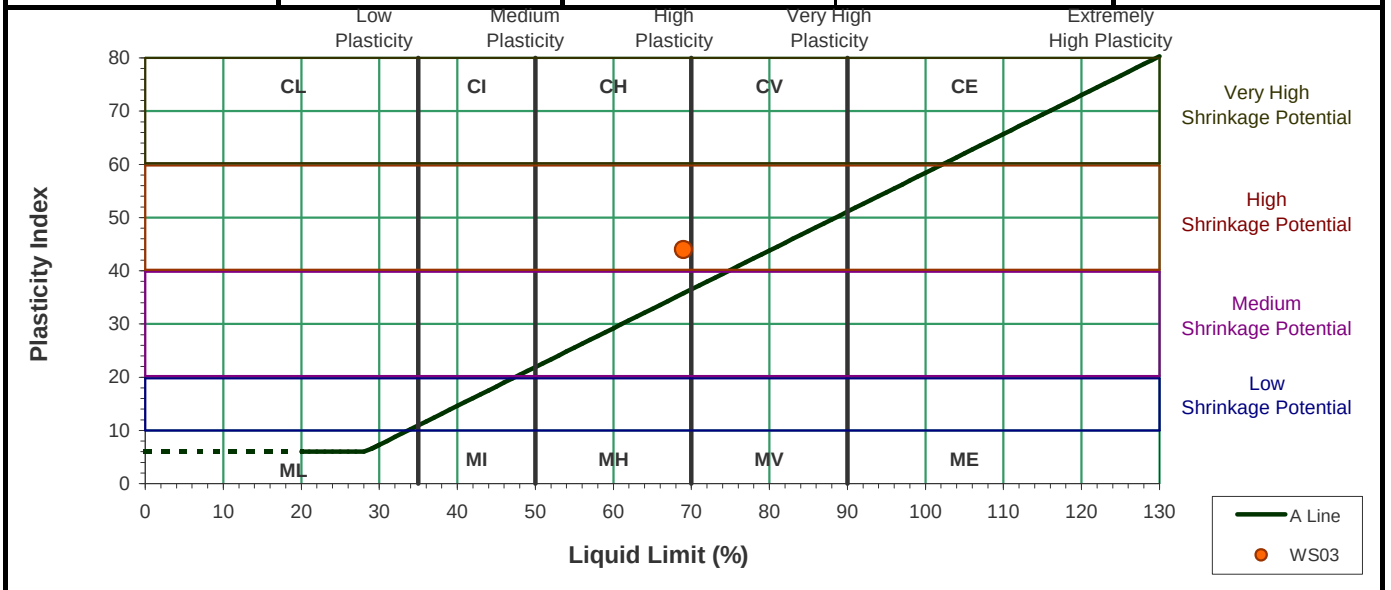
**Sample Description:** Firm brown grey slightly silty slightly gravelly CLAY. Gravel consists of fine to medium angular to rounded calcareous concretions and flint.

**Location:** WS03 **Depth Top:** 2.00m

**Sample Preparation:** As Received **Depth Base:** 2.25m

Estimated % Passing 425µm BS Test Sieve

| Moisture Content (%) | Liquid Limit [%] | Plastic Limit [%] | Plasticity Index | % Passing 425µm BS Test Sieve |
|---|---|---|---|---|
| N/A | 69 | 25 | 44 | 92 |




Comments: Gravel particles removed by hand

Approved Signatory: M. Hartnup - Laboratory Manager Signed:

**for and on behalf of Ground Engineering Ltd**

Date Reported: 20.03.2019 Page 1 of 1

Form Number: GELab/C/704 Version 44

8180

GROUND ENGINEERING LIMITED

Newark Road Peterborough
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e: admin@groundengineering.co.uk

# TEST CERTIFICATE

## Determination of Undrained Shear Strength in Triaxial Compression

(Single Stage Test - BS 1377 : Part 7 : Clause 8)

| | | | |
|---|---|---|---|
| Client: | Key GeoSolutions Ltd | Certificate Number: | PL6616-1-1 / 714-1 |
| Client Address: | Nova House<br>Audley Avenue, Enterprise Park<br>Newport, Shropshire | Client Reference Number: | **L9632** |
| | | Date Sampled: | 28.02.2019 |
| | | Date Received: | 01.03.2019 |
| Postcode: | TF10 7DW | Date Tested: | 11.03.2019 |
| Contact: | Will Roberts | Sampling Certificate No.: | N/A |
| Site Name: | 22 Holmes Road | Certificate of Sampling: | N/A |
| Site Address: | Not Given | Sampled By: | Client |

**Test Results:**

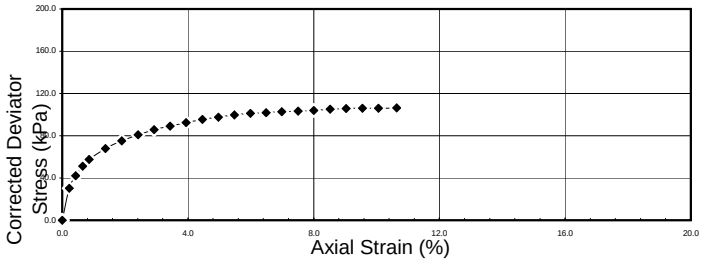
| | | | |
|---|---|---|---|
| Lab Reference | PL6616-1-1 | Sample Ref: | **Not Given** |
| Location: | **WS02** | Depth ( m ): | **1.80 to 2.00** |
| Sample Description: | Firm brown orange-brown grey slightly silty CLAY. | | |

Variations from Standard: None
Laboratory Temperature ($^{o}$C): 22.0

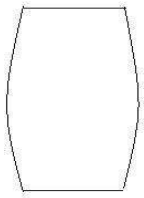
**Specimen Details**

| | | | |
|---|---|---|---|
| Initial Height ( mm ): | 135.0 | Latex Membrane Thickness ( mm ): | 0.40 |
| Initial Diameter ( mm ): | 85.0 | Applied Rate of Strain (%/min): | 2.00 |
| Depth within Sample ( m ): | 1.80 to 1.95 | Initial Bulk Density ( Mg/m$^3$ ): | **1.94** |
| Orientation within Sample: | Vertical | Initial Moisture Content ( % ): | **32** |
| Method of Preparation : | Undisturbed (BS 1377:1990:Pt 1:8) | Initial Dry Density ( Mg/m$^3$ ): | **1.48** |

**Deviator Stress against Axial Strain**




**Failure Sketch**



| | | |
|---|---|---|
| Cell Pressure | **50** | kPa |
| Membrane Correction | 1.2 | kPa |
| Corrected Maximum Deviator Stress | 106 | kPa |
| Strain | 11 | % |
| Undrained Shear Strength | **53** | kPa |
| Mode of Failure | | Plastic |

Approved Signatory: [x ] M.Hartnup - Laboratory Manager
[ ] L.Petch - Team Leader

Signed:

**for and on behalf of Ground Engineering Ltd**

Date Reported: 20/03/2019





**Form Number: GELab/C/714-1 Issue 1**

Registered in England and Wales
Reg Number 6929574
Reg Office: Ground Engineering Ltd
Newark Rd
Peterborough PE1 5UA

8180

GROUND ENGINEERING LIMITED

Newark Road Peterborough
t: 01733 566566
e: admin@groundengineering.co.uk

# TEST CERTIFICATE

## Determination of Undrained Shear Strength in Triaxial Compression

(Single Stage Test - BS 1377 : Part 7 : Clause 8)

| | | | |
|---|---|---|---|
| Client: | Key GeoSolutions Ltd | Certificate Number: | PL6616-1-2 / 714-1 |
| Client | Nova House | Client Reference Number: | **L9632** |
| Address: | Audley Avenue, Enterprise Park | Date Sampled: | 28.02.2019 |
| | Newport, Shropshire | Date Received: | 01.03.2019 |
| Postcode: | TF10 7DW | Date Tested: | 11.03.2019 |
| Contact: | Will Roberts | Sampling Certificate No.: | N/A |
| Site Name: | 22 Holmes Road | Certificate of Sampling: | N/A |
| Site Address: | Not Given | Sampled By: | Client |

**Test Results:**

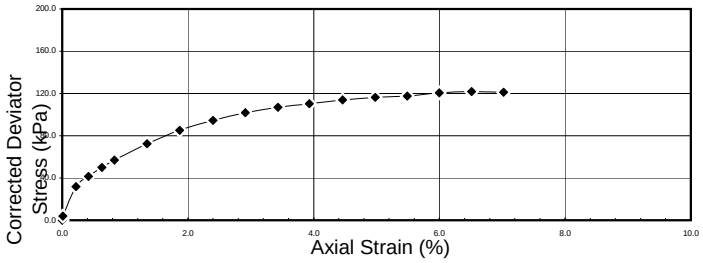
| | | | |
|---|---|---|---|
| Lab Reference | PL6616-1-2 | Sample Ref: | **Not Given** |
| Location: | **WS02** | Depth ( m ): | **2.80 to 3.00** |
| Sample Description: | Firm brown orange-brown grey slightly silty CLAY with rare fine calcareous concretions. | | |

Variations from Standard: None
Laboratory Temperature ($^{o}$C): 22.0

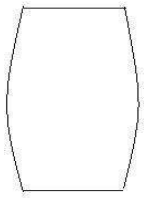
**Specimen Details**

| | | | |
|---|---|---|---|
| Initial Height ( mm ): | 157.0 | Latex Membrane Thickness ( mm ): | 0.40 |
| Initial Diameter ( mm ): | 83.0 | Applied Rate of Strain (%/min): | 2.00 |
| Depth within Sample ( m ): | 2.80 to 2.95 | Initial Bulk Density ( Mg/m$^3$ ): | **1.86** |
| Orientation within Sample: | Vertical | Initial Moisture Content ( % ): | **33** |
| Method of Preparation : | Undisturbed (BS 1377:1990:Pt 1:8) | Initial Dry Density ( Mg/m$^3$ ): | **1.40** |

**Deviator Stress against Axial Strain**




**Failure Sketch**



| | | |
|---|---|---|
| Cell Pressure | **50** | kPa |
| Membrane Correction | 0.8 | kPa |
| Corrected Maximum Deviator Stress | 122 | kPa |
| Strain | 6.5 | % |
| Undrained Shear Strength | **61** | kPa |
| Mode of Failure | | Plastic |

Approved Signatory: [x ] M.Hartnup - Laboratory Manager
[ ] L.Petch - Team Leader

Signed:

**for and on behalf of Ground Engineering Ltd**

Date Reported: 20/03/2019





**Form Number: GELab/C/714-1 Issue 1**

Registered in England and Wales
Reg Number 6929574
Reg Office: Ground Engineering Ltd
Newark Rd
Peterborough PE1 5UA

8180

GROUND ENGINEERING LIMITED

Newark Road Peterborough
t: 01733 566566
e: admin@groundengineering.co.uk

# TEST CERTIFICATE

## Determination of Undrained Shear Strength in Triaxial Compression

(Single Stage Test - BS 1377 : Part 7 : Clause 8)

| | | | |
|---|---|---|---|
| Client: | Key GeoSolutions Ltd | Certificate Number: | PL6616-1-4 / 714-1 |
| Client | Nova House | Client Reference Number: | **L9632** |
| Address: | Audley Avenue, Enterprise Park | Date Sampled: | 28.02.2019 |
| | Newport, Shropshire | Date Received: | 01.03.2019 |
| Postcode: | TF10 7DW | Date Tested: | 11.03.2019 |
| Contact: | Will Roberts | Sampling Certificate No.: | N/A |
| Site Name: | 22 Holmes Road | Certificate of Sampling: | N/A |
| Site Address: | Not Given | Sampled By: | Client |

**Test Results:**

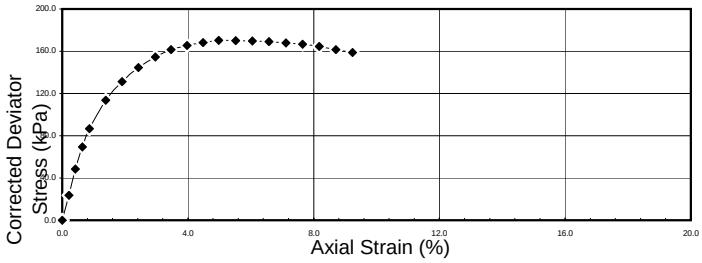
| | | | |
|---|---|---|---|
| Lab Reference | PL6616-1-4 | Sample Ref: | **Not Given** |
| Location: | **WS03** | Depth ( m ): | **3.00 to 3.30** |
| Sample Description: | Stiff brown CLAY. | | |

Variations from Standard: None
Laboratory Temperature ($^{o}$C): 22.0

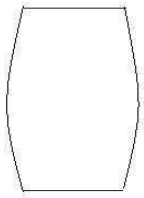
**Specimen Details**

| | | | |
|---|---|---|---|
| Initial Height ( mm ): | 129.0 | Latex Membrane Thickness ( mm ): | 0.40 |
| Initial Diameter ( mm ): | 74.0 | Applied Rate of Strain (%/min): | 2.00 |
| Depth within Sample ( m ): | 3.00 to 3.15 | Initial Bulk Density ( Mg/m$^3$ ): | **1.81** |
| Orientation within Sample: | Vertical | Initial Moisture Content ( % ): | **32** |
| Method of Preparation : | Undisturbed (BS 1377:1990:Pt 1:8) | Initial Dry Density ( Mg/m$^3$ ): | **1.37** |

**Deviator Stress against Axial Strain**




**Failure Sketch**



| | | |
|---|---|---|
| Cell Pressure | **50** | kPa |
| Membrane Correction | 0.7 | kPa |
| Corrected Maximum Deviator Stress | 170 | kPa |
| Strain | 5.0 | % |
| Undrained Shear Strength | **85** | kPa |
| Mode of Failure | | Plastic |

**Comments: Poor sample - broken**

Approved Signatory: [x ] M.Hartnup - Laboratory Manager
[ ] L.Petch - Team Leader

Signed:

**for and on behalf of Ground Engineering Ltd**

Date Reported: 20/03/2019





**Form Number: GELab/C/714-1 Issue 1**

Registered in England and Wales
Reg Number 6929574
Reg Office: Ground Engineering Ltd
Newark Rd
Peterborough PE1 5UA

# APPENDIX 2
# GROUND MOVEMENT CALCULATIONS

| CLIENT: | PROJECT | KEY GS |
|---|---|---|
| J. LEES | 22 HOLMES ROAD | |

## GMA

### Installation

For retained height c. 3.5m assume pile depth c. 10m.

From Fig. 6.8 p160 C760;

| Dist. Wall from | Horiz mvt./ wall depth (%) | Movement (mm) | Vertical Mvt./ wall depth (%) | Mvt. (mm) |
|---|---|---|---|---|
| 0 | 0.040 | 4.0 | 0.040 | 4.0 |
| 2.6 | 0.030 | 3.0 | 0.035 | 3.5 |
| 3.0 | 0.026 | 2.6 | 0.032 | 3.2 |
| 4.6 | 0.022 | 2.2 | 0.030 | 3.0 |
| 5.6 | 0.020 | 2.6 | 0.030 | 3.0 |
| 7.2 | 0.015 | 1.5 | 0.025 | 2.5 |
| 11.0 | 0.010 | 1.0 | 0.018 | 1.8 |

### Excavation

Excavation depth c. 3.5m from Fig 6.15, p168, C760; assuming high stiffness installation;

| Dist. from Wall | Horiz mvt/ Excavtn depth (%) | Mvt. (mm) | Vertical mvt/ Excavtn depth (%) | Mvt. (mm) |
|---|---|---|---|---|
| 0 | 0.15 | 5.25 | 0.04 | 1.40 |
| 2.6 | 0.13 | 4.55 | 0.08 | 2.80 |
| 3.0 | 0.11 | 3.85 | 0.08 | 2.80 |
| 4.6 | 0.10 | 3.50 | 0.07 | 2.45 |
| 5.6 | 0.08 | 2.80 | 0.05 | 1.75 |
| 7.2 | 0.07 | 2.45 | 0.03 | 1.05 |
| 11.0 | 0.04 | 1.40 | 0.02 | 0.70 |

### Total Movement

| Structure/Infrastructure | Horiz. | Vertical |
|---|---|---|
| Wall of No. 22 | 9.25 | 5.40 |
| Party wall of No. 24 | 9.25 | 5.40 |
| Rear garden wall | 7.85 | 6.30 |
| Wall with No. 20 | 9.25 | 5.40 |
| Rees's Road | 5.70 | 5.45 |
| Holmes Road | 3.95 | 3.55 |

| PROJECT REF. | DATE | BY | CHECKED | PAGE |
|---|---|---|---|---|
| 19-088 | 06/2/20 | RD | JH | 1 of 2 |

| CLIENT: | PROJECT | KEY GS |
|---|---|---|
| J. LEEB | 22 HOLMES ROAD | |

Following methodology in Box 6.3 CIRIA C760 p. 181

$$L/H = \frac{12}{8} = 1.5$$

limiting values for Cat. 1 from Table 6.4 are 0.05 to 0.075%.

From Fig 6.27c & $L/H = 1.5$

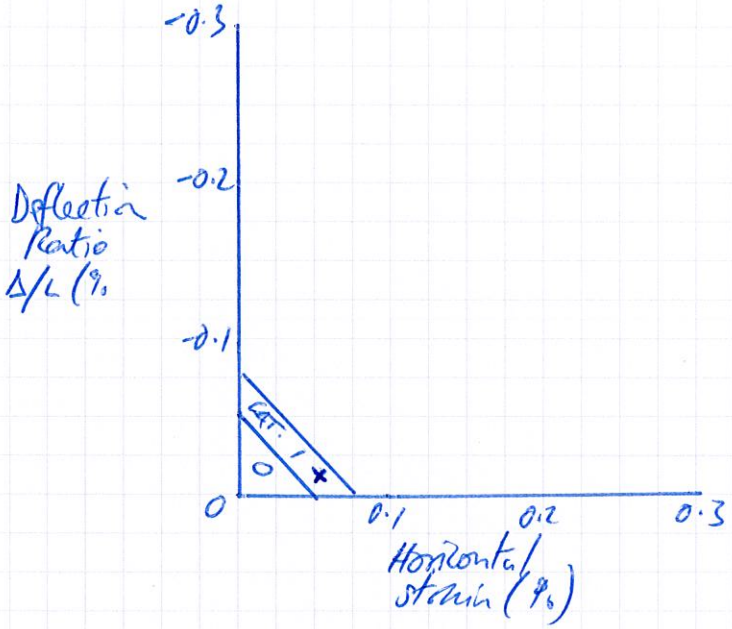



Fig. 6.27c

From movement assessment

$$\Delta/L = \frac{1.6}{12000} = 0.013\%$$

$$\varepsilon_h = \frac{9.25 - 2.4}{12000} = 0.057\%$$

} Plot on Fig 6.27c

Hence predicted Damage Category = Category 1.

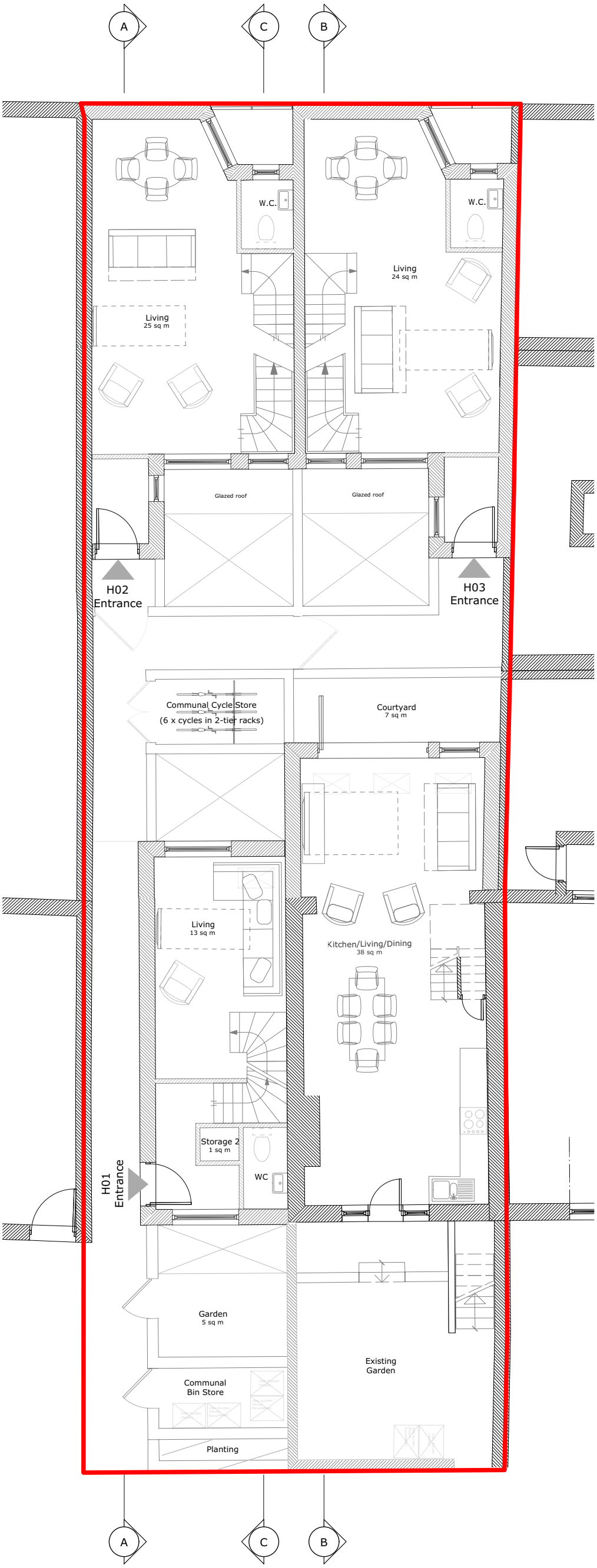
| PROJECT REF. | DATE | BY | CHECKED | PAGE |
|---|---|---|---|---|
| 19-088 | 06/2/20 | TSD | TD | 2 of 2 |

# DRAWINGS

KEY:

Existing Walls

Proposed Walls




| Unit | GIA [m2] | GIA [ft2] | Type |
|---|---|---|---|
| H01 | 79 | 850 | 2b3p |
| H02 | 89 | 958 | 2b4p |
| H03 | 87 | 936 | 2b4p |
| | | | |
| | **255** | **2744** | |
| | | | |

P6 21/11/17 Updates for pre-app resubmission

revisions:

All dimensions and areas are approximate and are to be verified on site. Do not scale.

Purpose of issue:

For Pre-Application Advice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www.nortonmayfield.co.uk


Client:

Judith Leeb

Project Title:

**22 Holmes Road, London NW5 3AB**

Drawing No:

1617-NMA-XX-00-DR-A-20101

Drawing title:

Ground Floor

Option 2

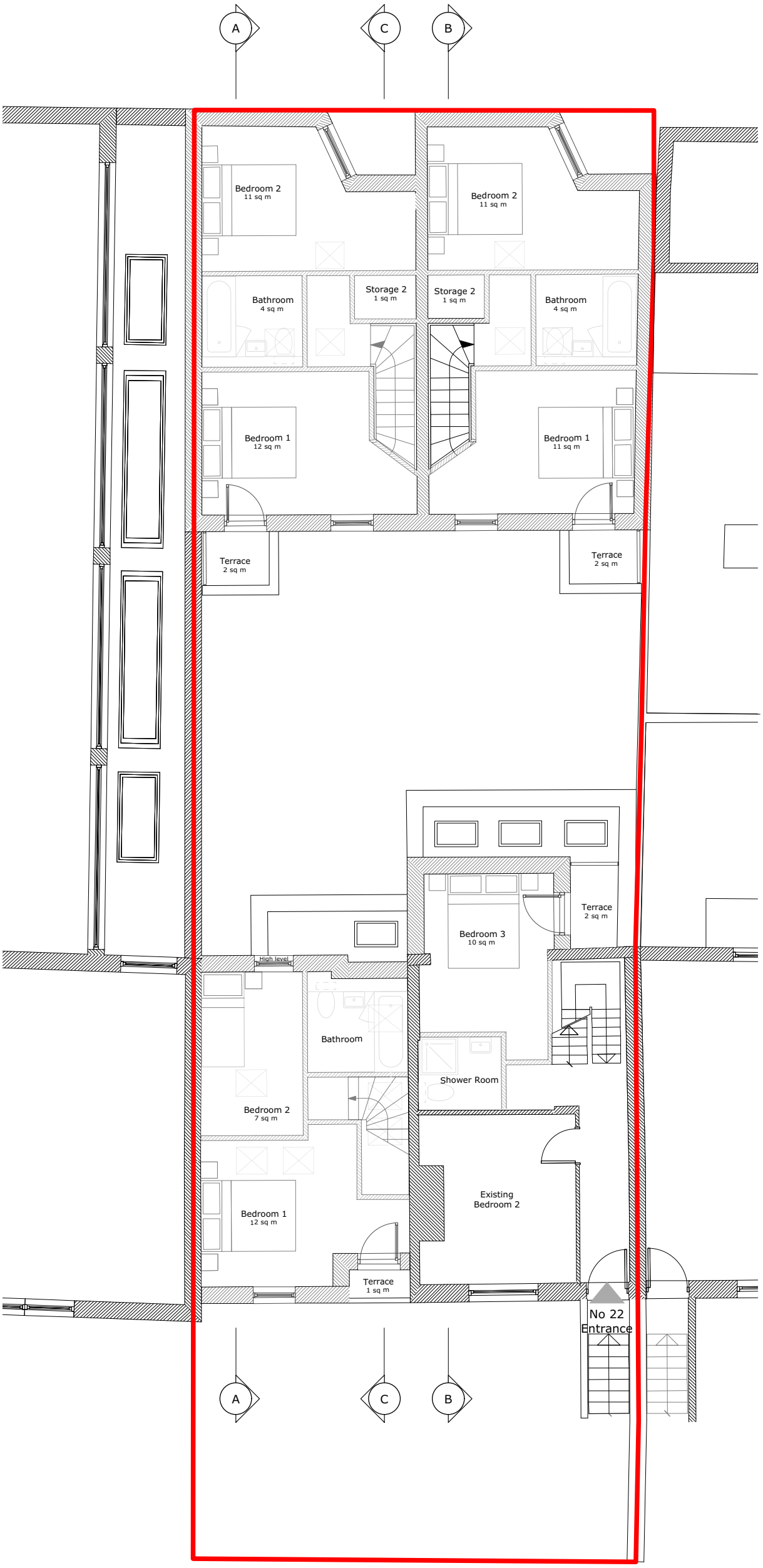
| Project No: | Status: | Rev: | Scale: |
|---|---|---|---|
| 1617 | S2 | P6 | 1:50@A1<br>1:100@A3 |

1617-NMA-XX-ZZ-M2-A-20100.vwx

KEY:

Existing Walls

Proposed Walls




P6 21/11/17 Updates for pre-app resubmission

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Project Title:

**22 Holmes Road, London NW5 3AB**

Drawing No:

1617-NMA-XX-01-DR-A-20101

Drawing title:

First Floor

Option 2

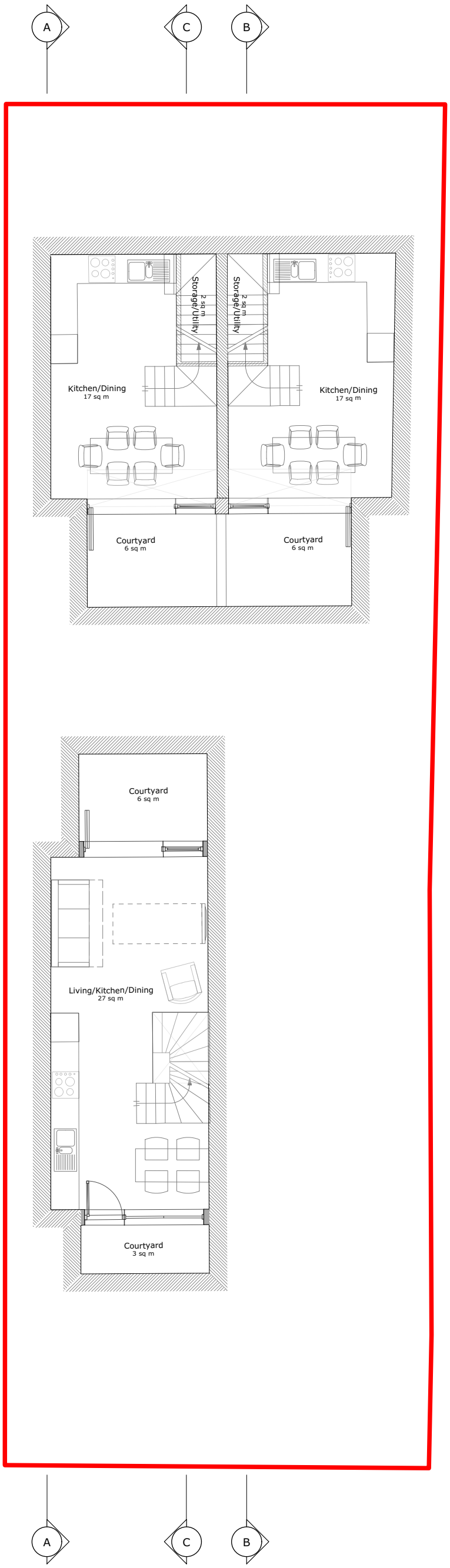
| Project No: | Status: | Rev: | Scale: |
|---|---|---|---|
| 1617 | S2 | P6 | 1:50@A1 1:100@A3 |

1617-NMA-XX-ZZ-M2-A-20100.vwx

KEY:

Existing Walls

Proposed Walls




P6 21/11/17 Updates for pre-app resubmission

revisions:



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Project Title:

**22 Holmes Road, London NW5 3AB**

Drawing No:

1617-NMA-XX-B1-DR-A-20101

Drawing title:

Basement

Option 2

| Project No: | Status: | Rev: | Scale: |
|---|---|---|---|
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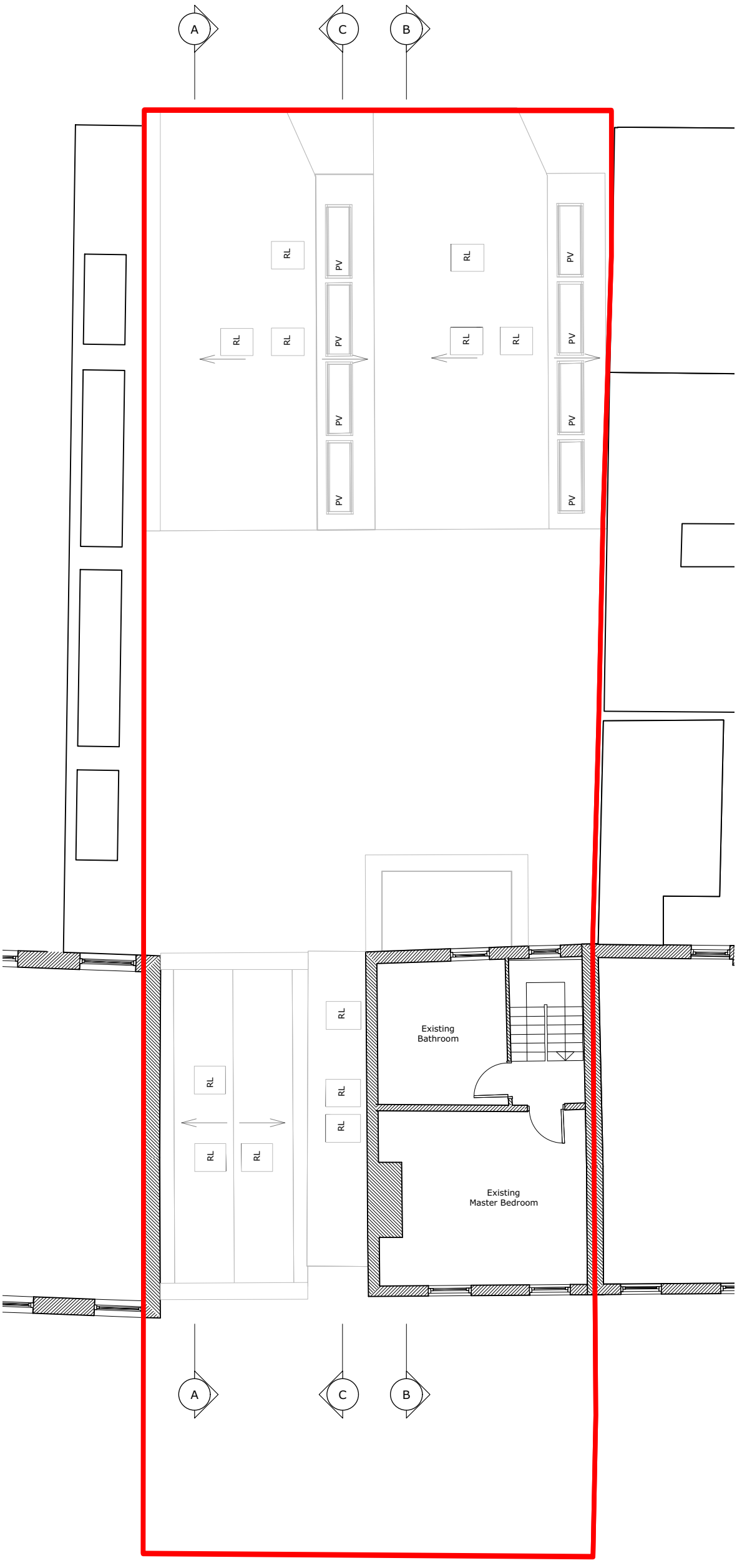
1617-NMA-XX-ZZ-M2-A-20100.vwx

KEY:

Existing Walls

Proposed Walls




P4 21/11/17 Updates for pre-app resubmission

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Client:

Judith Leeb

Project Title:

**22 Holmes Road, London NW5 3AB**

Drawing No:

1617-NMA-XX-R1-DR-A-20101

Drawing title:

Roof Plan

Option 2

| Project No: | Status: | Rev: | Scale: |
|---|---|---|---|
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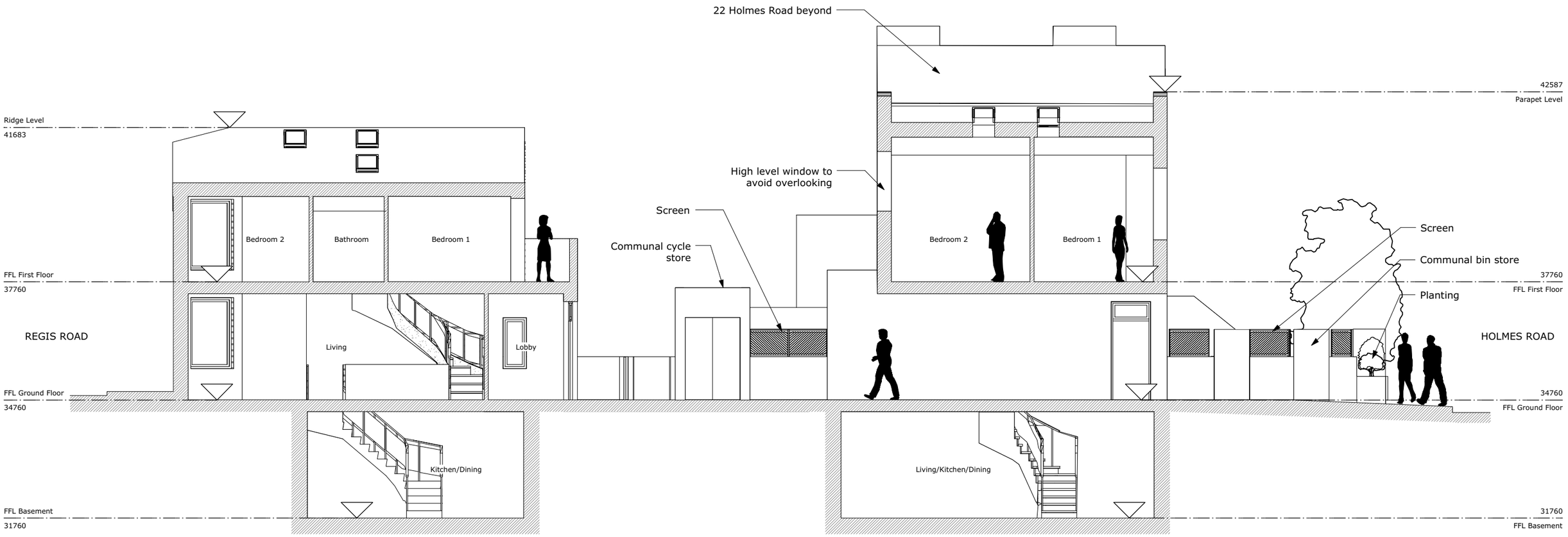
1617-NMA-XX-ZZ-M2-A-20100.vwx




P3 21/11/17 Updates for pre-app resubmission

revisions:



Purpose of issue:

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Client:

Judith Leeb

Project Title:

**22 Holmes Road, London NW5 3AB**

Drawing No:

1617-NMA-XX-ZZ-DR-A-20301

Drawing title:

Section AA

| Project No: | Status: | Rev: | Scale: |
|---|---|---|---|
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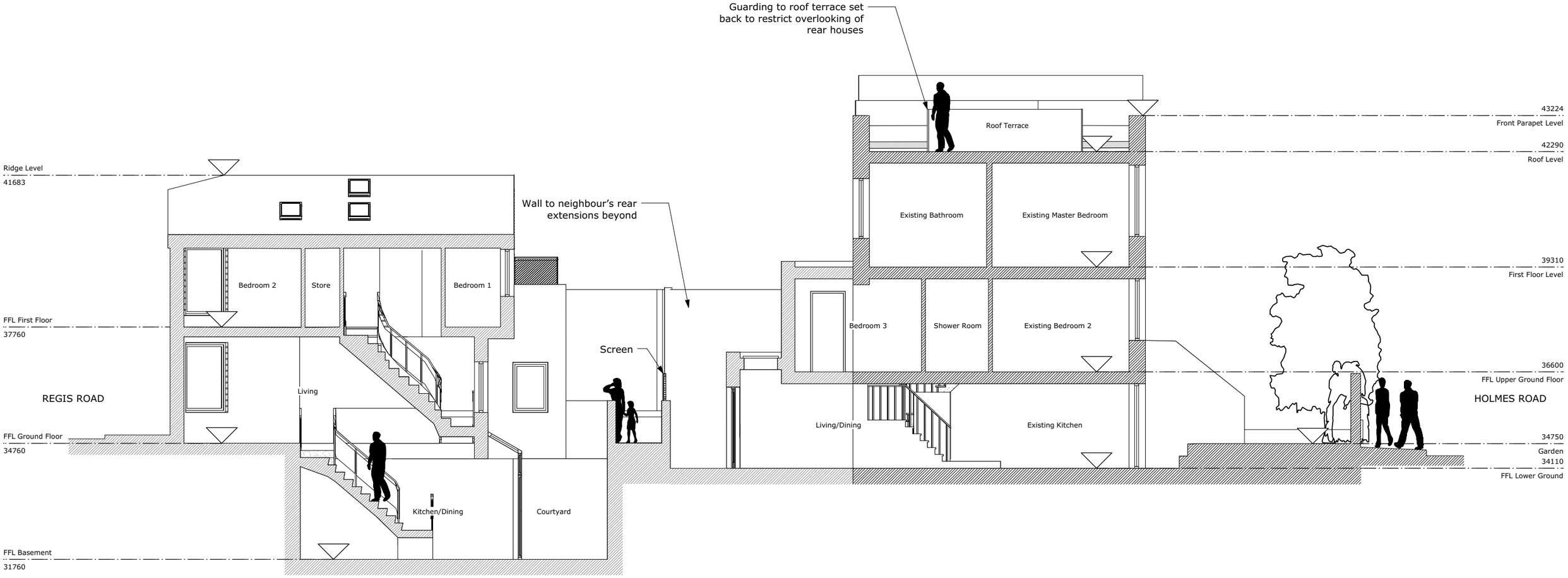


KEY:

Existing Walls

Proposed Walls

P3 21/11/17 Updates for pre-app resubmission

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Purpose of issue:

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Project Title:

**22 Holmes Road, London NW5 3AB**

Drawing No:

1617-NMA-XX-ZZ-DR-A-20302

Drawing title:

Section BB

Option 2

| Project No: | Status: | Rev: | Scale: |
|---|---|---|---|
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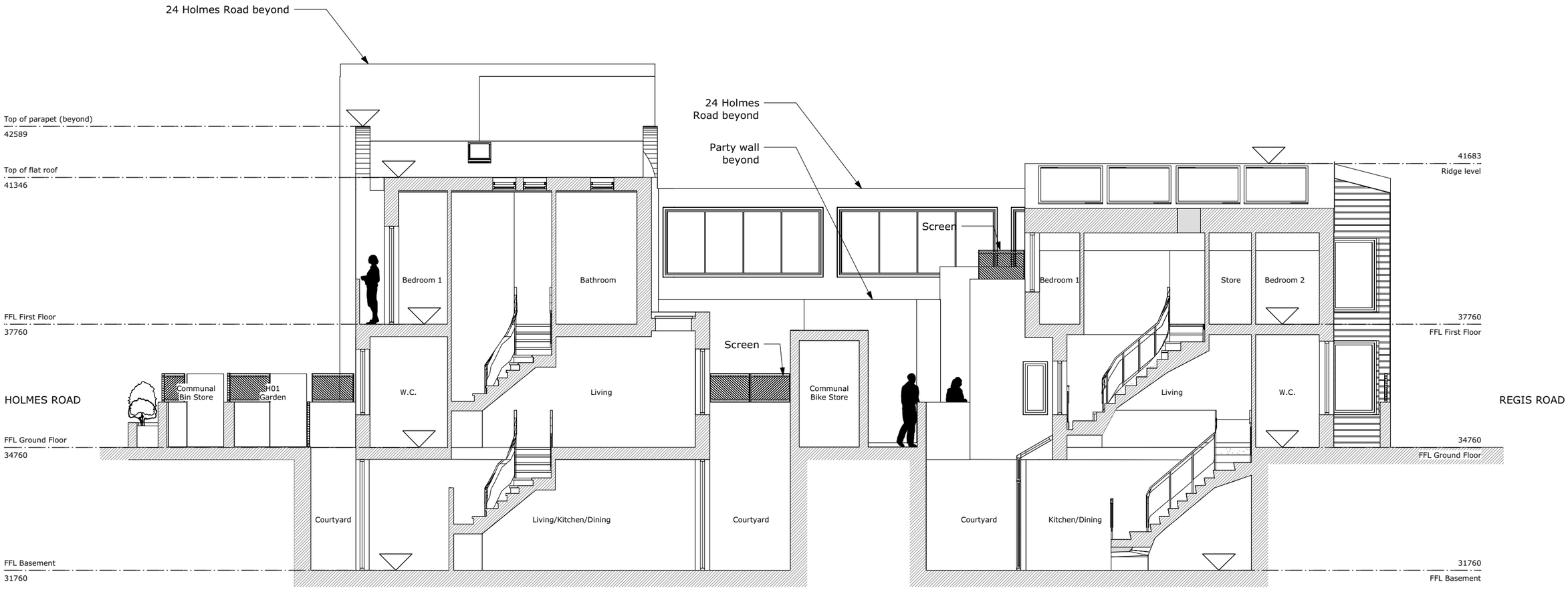


P3 21/11/17 Updates for pre-app resubmission

revisions:



Purpose of issue:

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**22 Holmes Road, London NW5 3AB**

Drawing No:

1617-NMA-XX-ZZ-DR-A-20303

Drawing title:

Section CC

Option 2

| Project No: | Status: | Rev: | Scale: |
|---|---|---|---|
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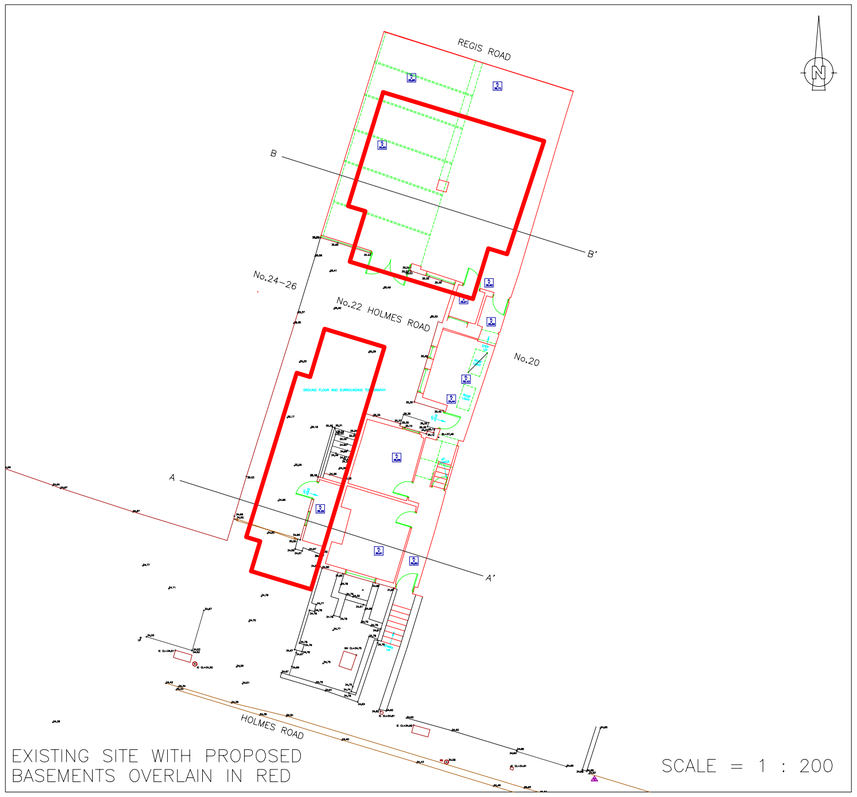
NOTES

EXISTING STRUCTURAL ELEMENTS

PROPOSED BASEMENT




EXISTING SITE WITH PROPOSED BASEMENTS OVERLAIN IN RED

SCALE = 1 : 200

| | | | |
|---|---|---|---|
| 01 | First Issue | WR | 01/01/19 |
| Rev. | Revision Detail | Drawn | Date |



CLIENT:

STANTEC UK

PROJECT:

22 HOLMES ROAD

TITLE:

CROSS SECTIONS THROUGH PROPOSED BASEMENT

| Drawn: | Checked: | Date: |
|---|---|---|
| WR | BD | Feb '20 |
| Scale: | Original Sheet Size: | Status: |
| As Shown | A2 | DRAFT |

Drawing No. 19–088–D–001 Revision: 01

KEY GS
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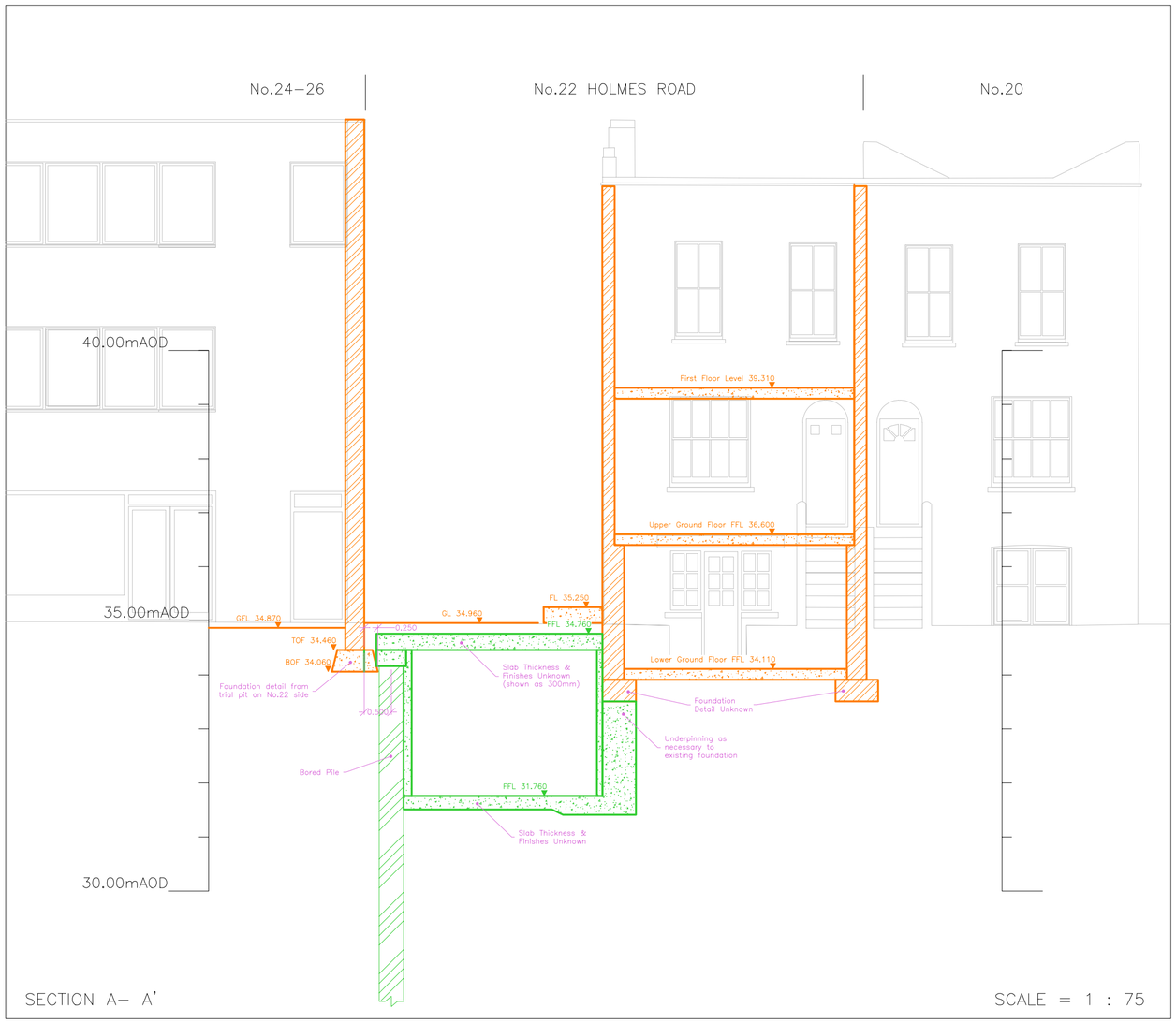


SECTION A– A'

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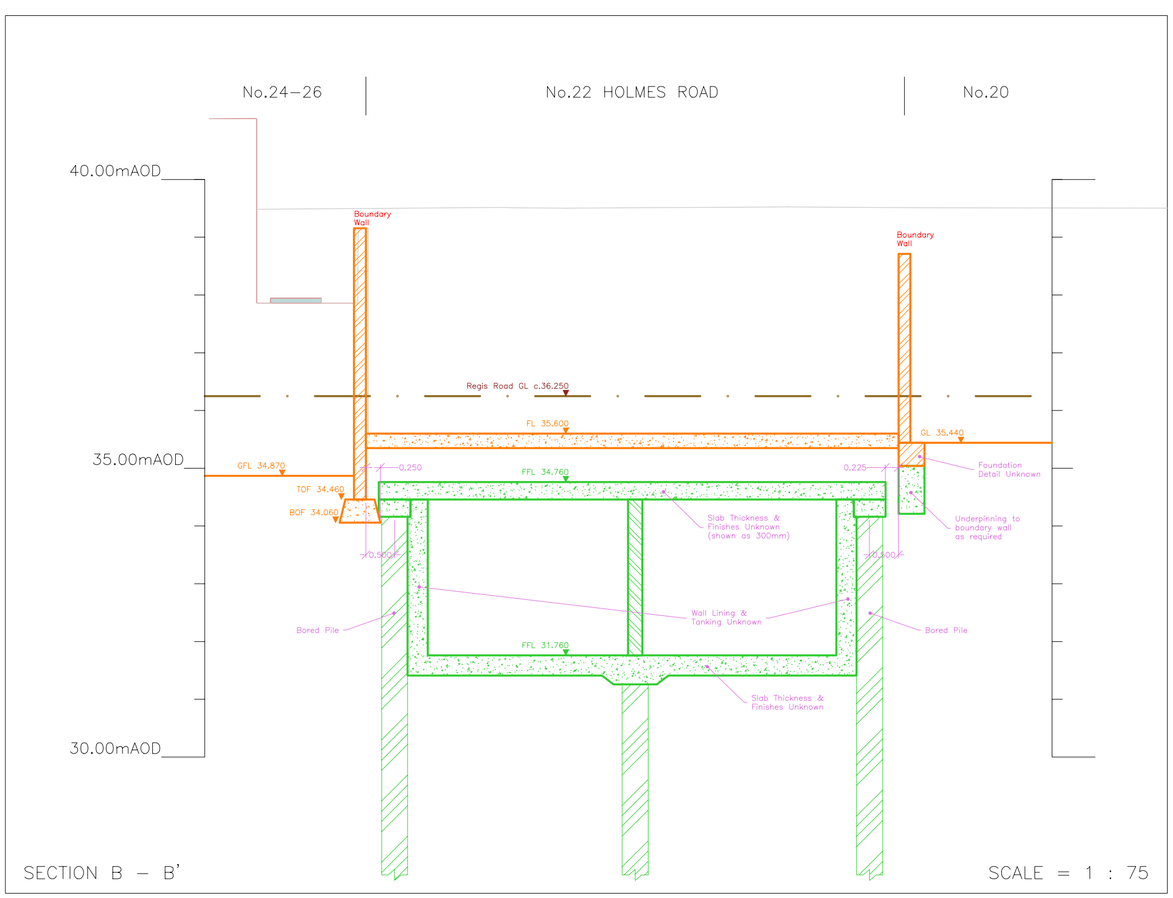


SECTION B – B'

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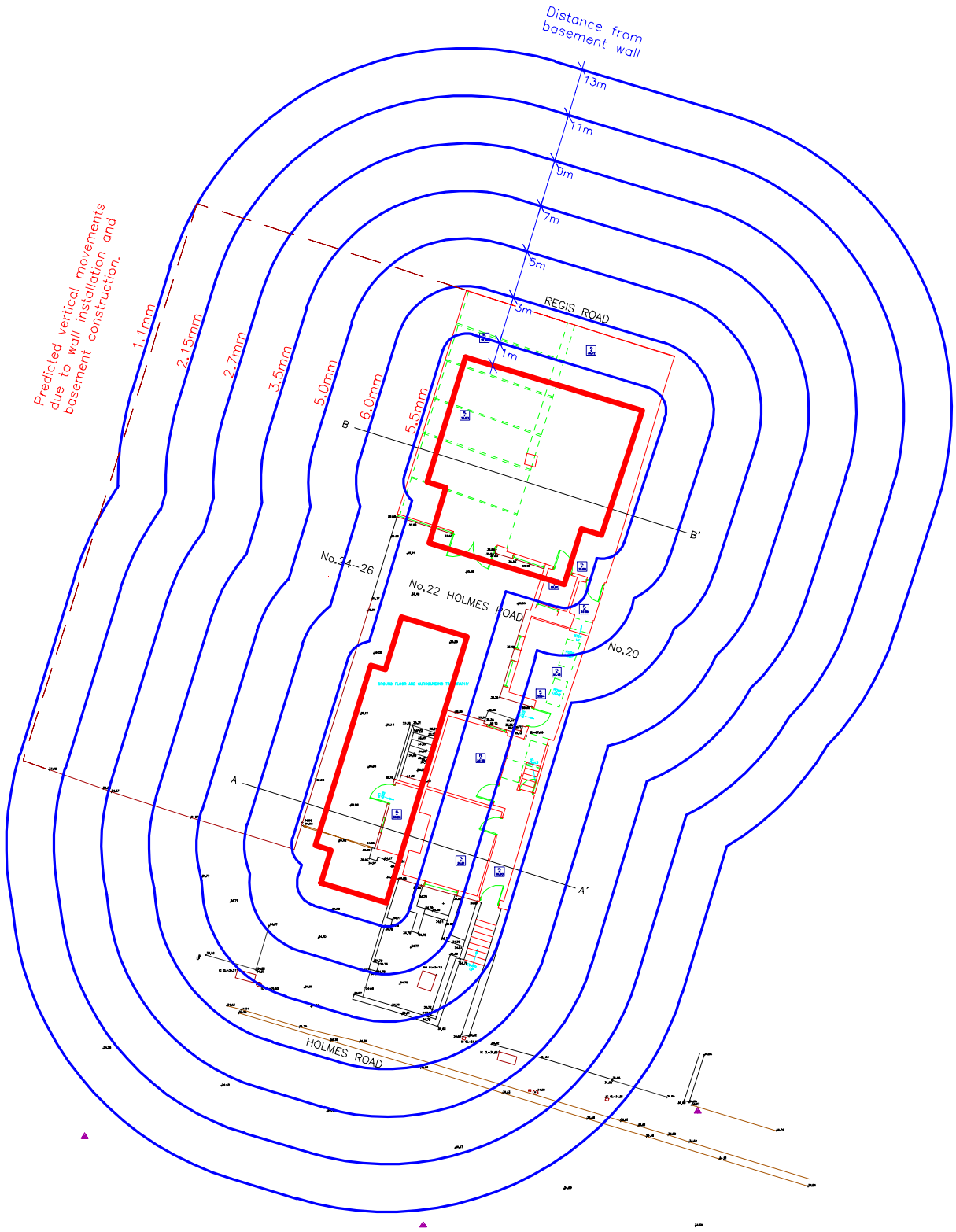


| Rev. | Revision Detail | Drawn | Date |
|---|---|---|---|
| 02 | Revised surround detail. | WR | 16/03/20 |
| 01 | First Issue | WR | 06/03/20 |

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PROJECT:

22 HOLMES ROAD

TITLE:

CONTOUR PLOT OF VERTICAL MOVEMENTS

| Drawn: | Checked: | Date: |
|---|---|---|
| WR | BD | Mar '20 |
| Scale: 1:250 | Original Sheet Size: A4 | Status: DRAFT |
| Drawing No. 19-088-D-002 | | Revision: 02 |