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SPT & Cohesion / Depth Graph

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Groundwater Monitoring Records & Rising Head Tests

Site	31 Willoughby Road, London, NW3 1RT
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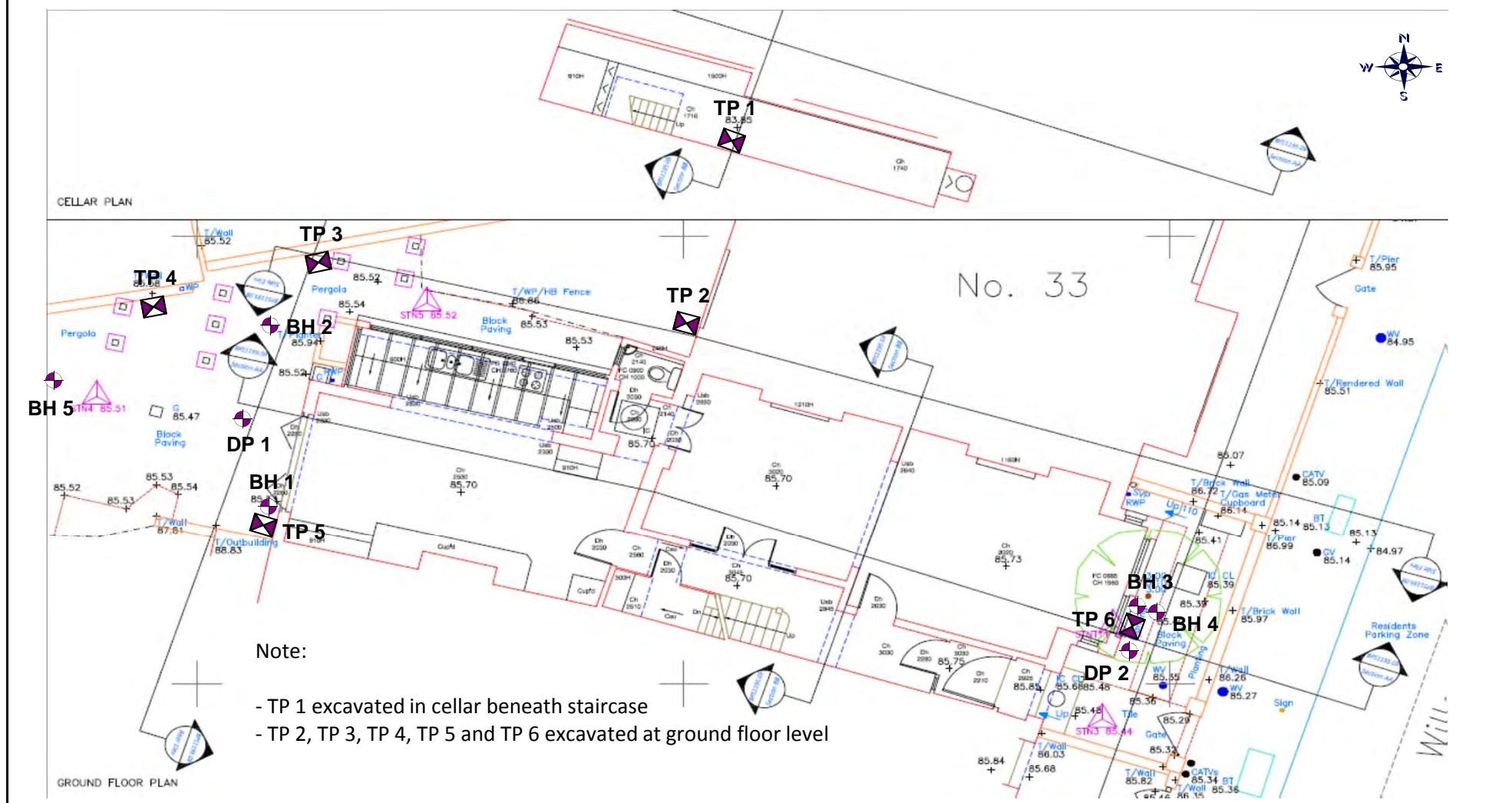
Client Manuela Eleuteri





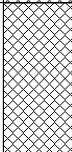

Engineer Richard Tant Associates

Job Number	J15315
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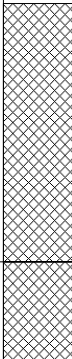
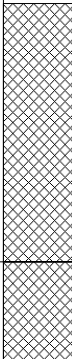
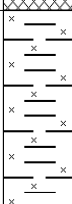

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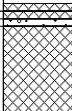
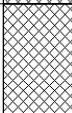
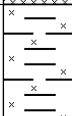



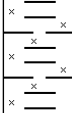
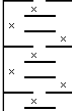

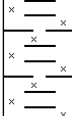
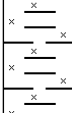
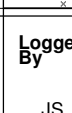

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<div><div>GEA</div><div>Geotechnical & Environmental Associates</div></div>				Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site 31 Willoughby Road, London, NW3 1RT		Number BH1		
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD) 85.55		Client Manuela Eleuteri		Job Number J15315		
		Location		Dates 13/01/2016		Engineer Richard Tant Associates		Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water	
				85.45 85.40 85.25	0.10 (0.15) 0.30	Brick Paving Made Ground (yellowish brown sand with gravel) Concrete		  		
					(1.10)	Made Ground (brown to dark brown silty sandy clay with gravel and occasional brick fragments)				
1.20	D1			84.15	1.40	Made Ground (pale greenish grey and orange-brown slightly sandy silty clay with occasional gravel, carbonaceous material and brick fragments)				
1.50	D2				(0.70)					
1.90	D3			83.45	2.10	Made Ground (orange-brown slightly sandy silty clay with gravel; dark grey between 2.7-2.8m)				
2.25	D4				(1.00)					
2.75	D5		Slow Inflow(1) at 3.00m, not sealed.	82.45	3.10	Firm becoming stiff brown becoming brownish grey silty CLAY				
3.50	D6				(0.90)					
				81.55	4.00	Terminated at 4.00m				
Remarks Groundwater monitoring standpipe installed to 3.1m Borehole completed from base of Trial Pit No 5								Scale (approx)	Logged By	
								1:50	JS	
								Figure No. J15315.BH1		

<div><div>GEA</div><div>Geotechnical & Environmental Associates</div></div>				Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site 31 Willoughby Road, London, NW3 1RT		Number BH2							
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD) 85.50		Client Manuela Eleuteri		Job Number J15315							
		Location		Dates 13/01/2016		Engineer Richard Tant Associates		Sheet 1/1							
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water						
0.50	D1		Slow Inflow(1) at 3.00m, not sealed.	85.40	0.10	Brick Paving									
				85.35	0.15										
				85.30	0.20										
1.50	D2						(3.00)		Made Ground (yellowish brown sand with gravel)						
											Concrete				
		Made Ground (brown, orange-brown and greenish grey silty sandy clay with gravel, rootlets and brick fragments)													
2.50	D3														
										3.35	D4				
		4.50	D5												

<div><div>GEA</div><div>Geotechnical & Environmental Associates</div></div>				Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site 31 Willoughby Road, London, NW3 1RT		Number BH3	
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD) 85.40		Client Manuela Eleuteri		Job Number J15315	
		Location		Dates 13/01/2016		Engineer Richard Tant Associates		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
2.00	D1			83.70	(1.70)	Made Ground (brown to dark brown sandy silty clay with gravel, ash, charcoal, rootlets and brick fragments)			
					1.70 (0.70)	Made Ground (orange-brown & grey mottled slightly silty clay with rare brick fragments)			
3.00	D2			83.00	2.40 (1.35)	Firm greenish grey and orange-brown slightly silty CLAY with carbonaceous material and gravel			
4.00-4.50	D3			81.65	3.75 (0.75)	Firm becoming stiff pale orange-brown becoming brownish grey slightly silty CLAY			
					4.50	Terminated at 4.50m			
<div>Remarks Taken from base of TP6 Groundwater not encountered Groundwater monitoring standpipe installed at 3.0m</div>							Scale (approx) 1:50	Logged By JS	
							Figure No. J15315.BH3		

<div><div>GEA</div><div>Geotechnical & Environmental Associates</div></div>				Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site 31 Willoughby Road, London, NW3 1RT		Number BH4	
Excavation Method Opendrive lined percussive sampler		Dimensions 110mm to 1.00m		Ground Level (mOD) 85.40		Client Manuela Eleuteri		Job Number J15315	
		Location		Dates 20/01/2016		Engineer Richard Tant Associates		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
1.00-1.45	SPT N=7		1,2/2,1,2,2	85.35 85.28	(0.05)	Paving Stone			
					0.05	Made Ground (orange-brown sand)			
					0.10	Concrete			
					(1.55)	Made Ground (brown to orange brown mottled grey sandy silty clay with gravel, brick fragments, charcoal, ash and roots)			
2.00-2.45	SPT N=6		0,0/1,2,1,2	83.70	1.70	Made Ground (grey and orange-brown mottled slightly silty clay with rare brick fragments and rootlets)			
					(0.80)				
3.00-3.45	SPT N=7 D1		0,0/1,2,2,2 Slow Inflow(1) at 3.30m, not sealed.	82.90	2.50	Firm pale orange-brown and greenish grey silty CLAY with occasional gravel and carbonaceous material; dark grey carbonaceous layers at 2.8 m to 3.0 m and 3.3 m to 3.4 m)		V1	
					(1.00)				
4.00-4.45	SPT N=7 D2		2,1/2,1,2,2	81.90 81.70	3.50 (0.20)	Firm pale orange-brown mottled grey slightly silty CLAY			
					3.70	Firm becoming stiff pale orange-brown becoming brownish grey slightly silty CLAY with rare selenite crystals and occasional partings of silt and sand			
4.50	D3				(1.30)				
5.00-5.45	SPT N=10		2,1/2,2,3,3	80.40	5.00	Stiff dark brownish grey slightly silty CLAY with occasional partings of silt and sand; claystone encountered at 6.5 m to 6.7 m			
5.50	D4								
6.00-6.45	SPT N=14		2,2/2,2,3,7						
6.50	D5								
7.00-7.45	SPT N=13		2,3/2,3,4,4						
7.50	D6				(5.00)				
8.00-8.45	SPT N=13		2,2/3,3,3,4						
8.50	D7								
9.00-9.45	SPT N=13		2,3/3,3,4,3						
9.50	D8								
10.00-10.45	SPT N=11		2,2/1,3,3,4	75.40	10.00				
Remarks Groundwater monitoring standpipe installed at 5.0m. SPT N results potentially impacted by proximity to BH3 and the potential effects of water softening in the base of the borehole, such that the results are not considered to represent the true in-situ strength. The assessment of the strength for the natural soils is therefore based on a combination of the test results together with the field observations, which indicated a firm becoming stiff consistency, and not just the SPT 'N' results alone.							Scale (approx)	Logged By	
							1:50	JS	
							Figure No. J15315.BH4		

<div><div>GEA</div><div>Geotechnical & Environmental Associates</div></div>				Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site 31 Willoughby Road, London, NW3 1RT		Number BH5	
Excavation Method Opendrive percussive lined sampler		Dimensions 110mm to 1.00m		Ground Level (mOD) 85.50		Client Manuela Eleuteri		Job Number J15315	
		Location		Dates 11/07/2017		Engineer Richard Tant Associates		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
1.00-1.45	SPT(C) N=9	DRY	0,1/2,2,2,3	85.40	0.10	Brick Paving			
				85.35	0.15	Made Ground (yellowish brown sand)			
				85.30	0.20	Concrete			
2.00-2.45	SPT(C) N=8	DRY	1,1/2,2,2,2	83.30	(2.00)	Made Ground (brown silty slightly sandy clay with occasional gravel, ash and small brick fragments)			
					2.20	Made Ground (brown silty clay with rare brick fragments)			
					(0.75)				
3.00-3.45	SPT(C) N=8	DRY	0,0/0,3,2,3	82.55	2.95	Made Ground (greenish brown silty clay with very rare brick fragments)			
				82.10	(0.45)	Firm becoming stiff brownish grey silty CLAY with relic root traces			
					3.40				
4.00-4.45	SPT N=12	DRY	2,2/3,3,3,3		(2.05)				
5.00-5.45	SPT N=16	DRY	2,2/3,4,5,4	80.05	5.45	Complete at 5.45m			
Remarks Groundwater not encountered during drilling and borehole remained dry throughout an observation period of approximatley 4 hours.								Scale (approx) 1:50	Logged By MP
								Figure No. j15315.BH5	

<div>GEA</div> <div>Geotechnical & Environmental Associates</div>		Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site 31 Willoughby Road, London, NW3 1RT		Probe Number DP1									
Method DPSH		Cone Dimensions	Ground Level (mOD) 85.50		Client Manuela Eleuteri		Job Number J15315								
		Location	Dates 11/07/2017		Engineer Richard Tant Associates		Sheet 1/1								
Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)	Blows for Depth Increment										
					0	1	2	3	4	5	6	7	8	9	10
0.10-0.20	1		85.50	0.00											
0.20-0.30	1														
0.30-0.40	0														
0.40-0.50	0														
0.50-0.60	1		85.00	0.50											
0.60-0.70	0														
0.70-0.80	0														
0.80-0.90	2														
0.90-1.00	3														
1.00-1.10	1		84.50	1.00											
1.10-1.20	1														
1.20-1.30	1														
1.30-1.40	0														
1.40-1.50	1														
1.50-1.60	0		84.00	1.50											
1.60-1.70	1														
1.70-1.80	0														
1.80-1.90	0														
1.90-2.00	1														
2.00-2.10	0		83.50	2.00											
2.10-2.20	0														
2.20-2.30	1														
2.30-2.40	0														
2.40-2.50	0														
2.50-2.60	1		83.00	2.50											
2.60-2.70	0														
2.70-2.80	1														
2.80-2.90	1														
2.90-3.00	0														
3.00-3.10	2		82.50	3.00											
3.10-3.20	1														
3.20-3.30	2														
3.30-3.40	1														
3.40-3.50	2		82.00	3.50											
3.50-3.60	2														
3.60-3.70	2														
3.70-3.80	2														
3.80-3.90	3														
3.90-4.00	3														
4.00-4.10	4		81.50	4.00											
4.10-4.20	3														
4.20-4.30	4														
4.30-4.40	4														
4.40-4.50	3		81.00	4.50											
4.50-4.60	3														
4.60-4.70	4														
4.70-4.80	3														
4.80-4.90	4														
4.90-5.00	4		80.50	5.00											
5.00-5.10	5														
5.10-5.20	6														
5.20-5.30	6														
5.30-5.40	6														
5.40-5.50	5		80.00	5.50											
5.50-5.60	5														
5.60-5.70	6														
5.70-5.80	5														
5.80-5.90	7														
5.90-6.00	7		79.50	6.00											
			79.00	6.50											
			78.50	7.00											
			78.00	7.50											
			77.50	8.00											
Remarks Groundwater not encountered Classification after Huntley (1990): Very Soft = <1; Soft = 1 to 2; Firm: 3 to 4; Stiff = 5 to 8; Very stiff = > 8													Scale (approx)	Logged By	
													1:40	MJD	
													Figure No.		
J15315.DP1															

<div>GEA</div> <div>Geotechnical & Environmental Associates</div>		Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site 31 Willoughby Road, London, NW3 1RT		Probe Number DP2									
Method Super Heavy Dynamic Probe (DPSH)		Cone Dimensions	Ground Level (mOD) 85.40	Client Manuela Eleuteri		Job Number J15315									
		Location	Dates 11/07/2017	Engineer Richard Tant Associates		Sheet 1/1									
Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)	Blows for Depth Increment										
					0	1	2	3	4	5	6	7	8	9	10
0.00-0.10	2		85.40	0.00	<div></div>										
0.10-0.20	3														
0.20-0.30	2														
0.30-0.40	1														
0.40-0.50	1														
0.50-0.60	1														
0.60-0.70	2														
0.70-0.80	1														
0.80-0.90	1														
0.90-1.00	1														
1.00-1.10	1														
1.10-1.20	1														
1.20-1.30	2														
1.30-1.40	1														
1.40-1.50	0														
1.50-1.60	0														
1.60-1.70	1														
1.70-1.80	0														
1.80-1.90	0														
1.90-2.00	1														
2.00-2.10	0														
2.10-2.20	0														
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5.40-5.50	7														
5.50-5.60	7														
5.60-5.70	7														
5.70-5.80	7														
5.80-5.90	7														
5.90-6.00	7														
												</			

Excavation Method
Manual

Dimensions
250 x 420 x 500

Ground Level (mOD)
83.85

Client
Manuela Eleuteri

Job Number
J15315

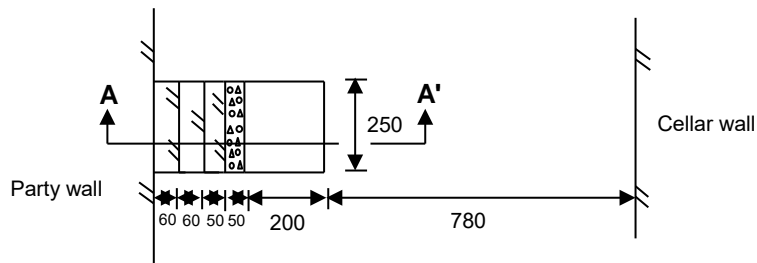
Location
Ground Level

Dates
12/01/16 to 13/01/16

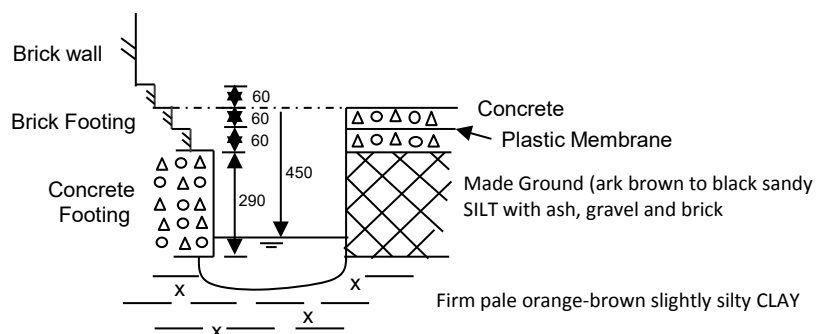
Engineer
Richard Tant Associates

Sheet
1/1

PLAN



SECTION A - A'



Remarks:

All dimensions in millimetres

Trial pit sides remained stable during excavation

Groundwater encountered at a depth of 0.45 m

Scale:

1:20

Logged by:

JS

PLAN

Diagram showing the plan view of the building foundation. The building is labeled "No. 31 (3 storeys)" and "No. 33 (3 storeys)". The foundation is labeled "Kitchen (1 storey)" and "WC (1 storey)". The plan shows the layout of the foundation, including the location of the kitchen and WC, and the dimensions of the foundation (60, 60, 200). A north arrow is present in the top right corner.

SECTION A - A'

Diagram showing the cross-section A-A' of the foundation. The section shows the foundation wall and the surrounding soil. The foundation wall is labeled "Brick wall" and "Concrete Footing". The soil is labeled "Made Ground (reddish brown clayey silty sand with gravel and brick fragments)" and "Made Ground (dark greyish brown slightly silty, sandy CLAY with gravel, concrete blocks and whole brick)". The dimensions of the foundation and the soil are given in millimeters (mm).

Dimensions (mm):

- Foundation wall: 60, 60, 200
- Foundation footing: 60, 60, 200
- Soil layers: 40, 40, 100, 620, 70, 70, 70, 440, 150

Labels:

- Brick wall
- Concrete Footing
- Paving slabs
- Concrete
- Made Ground (reddish brown clayey silty sand with gravel and brick fragments)
- Made Ground (dark greyish brown slightly silty, sandy CLAY with gravel, concrete blocks and whole brick)
- Made Ground (pale yellowish, orange to greenish brown very sandy CLAY)

JS



Geotechnical &
Environmental
Associates

Widbury Barns
Widbury Hill
Ware
Herts SG12 7QE

Site

31 Willoughby Road, London, NW3 1RT

**Trial Pit
Number**

2

Excavation Method

Manual

Dimensions

350 x 380 x 1600

Ground Level (mOD)

85.50

Client

Manuela Eleuteri

Job

Number

J15315

Location

Ground Level

Dates

12/01/16 to 13/01/16

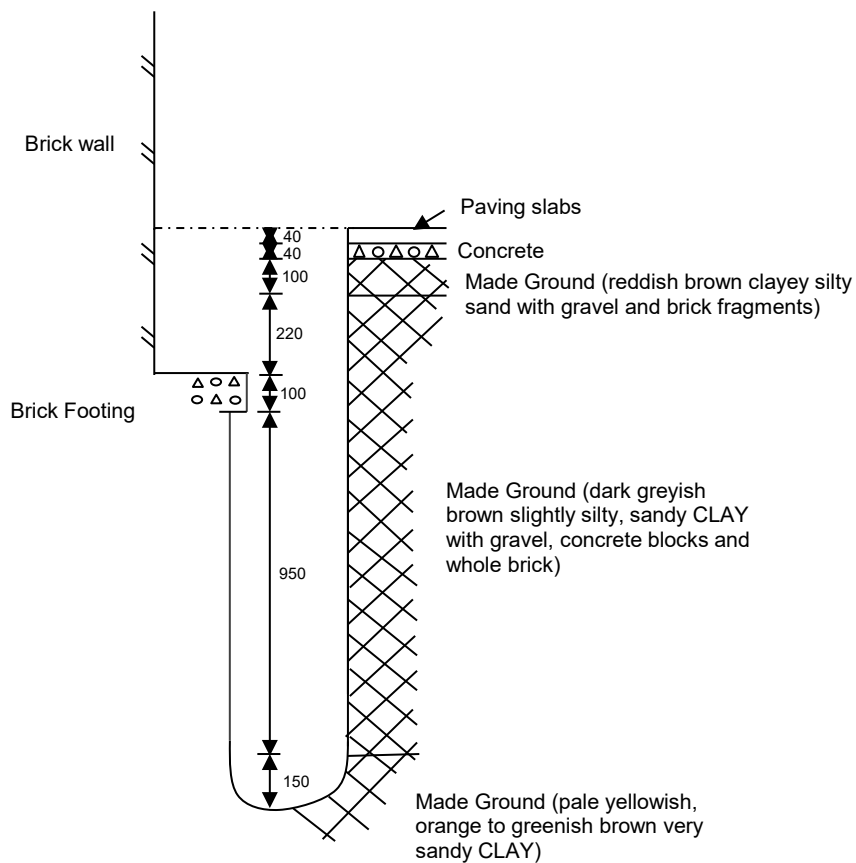
Engineer

Richard Tant Associates

Sheet

2/2

SECTION B - B'



Remarks:

All dimensions in millimetres

Trial pit sides remained stable during excavation

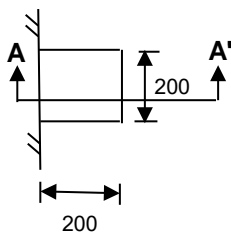
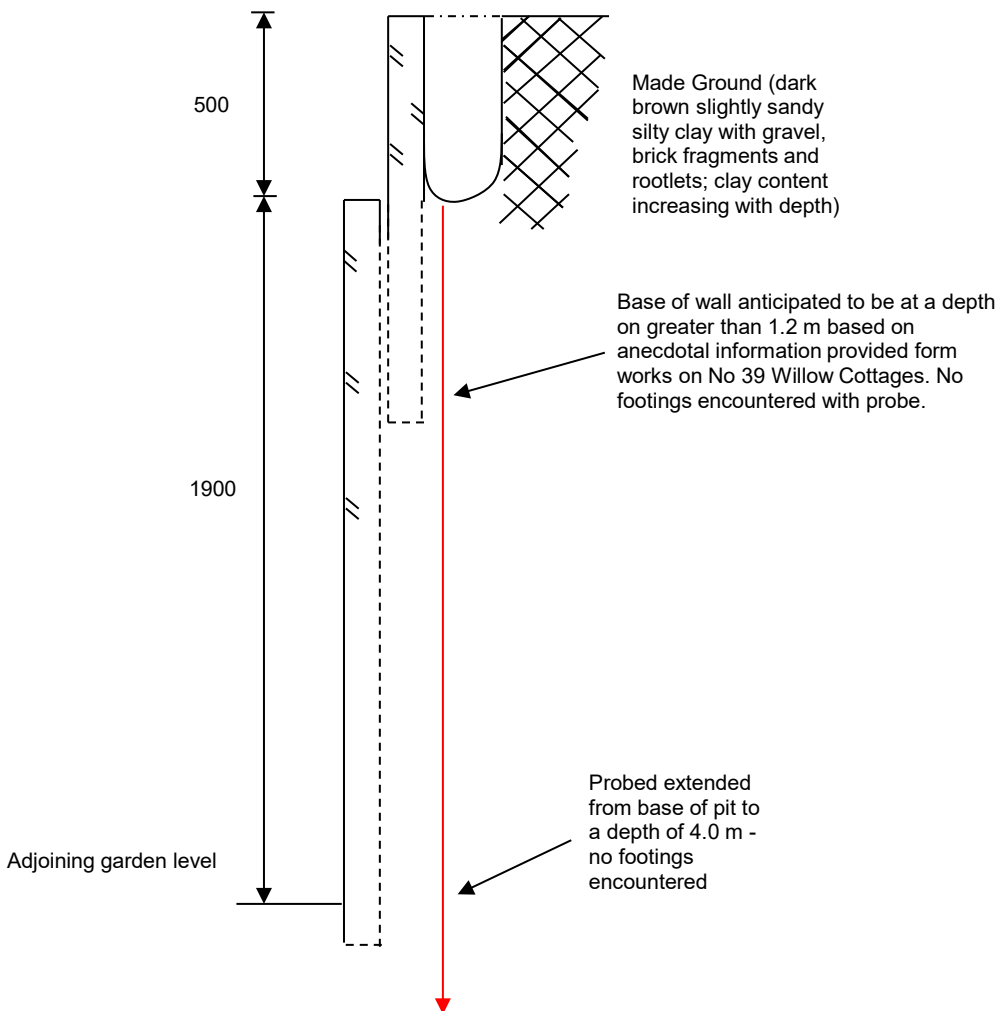
Groundwater not encountered

Scale:

1:20

Logged by:

JS

GEA Geotechnical & Environmental Associates		Widbury Barns Widbury Hill Ware Herts SG12 7QE	Site 31 Willoughby Road, London, NW3 1RT	Trial Pit Number 3
Excavation Method Manual	Dimensions 200 x 200 x 500	Ground Level (mOD) 85.50	Client Manuela Eleuteri	Job Number J15315
	Location Ground Level	Dates 12/01/16 to 13/01/16	Engineer Richard Tant Associates	Sheet 1/1
<div style="text-align: center;"> <p>PLAN</p>  </div> <div style="text-align: center;"> <p>SECTION A - A'</p>  <p>Made Ground (dark brown slightly sandy silty clay with gravel, brick fragments and rootlets; clay content increasing with depth)</p> <p>Base of wall anticipated to be at a depth on greater than 1.2 m based on anecdotal information provided from works on No 39 Willow Cottages. No footings encountered with probe.</p> <p>Probed extended from base of pit to a depth of 4.0 m - no footings encountered</p> <p>Adjoining garden level</p> </div>				
Remarks: All dimensions in millimetres Trial pit sides remained stable during excavation Groundwater not encountered				Scale: 1:20
				Logged by: JS

Excavation Method
Manual

Dimensions
200 x 250 x 600

Ground Level (mOD)
85.50

Client
Manuela Eleuteri

Job Number
J15315

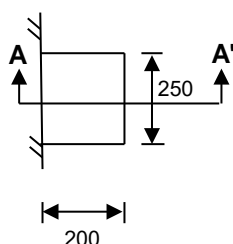
Location
Ground Level

Dates
12/01/16 to 13/01/16

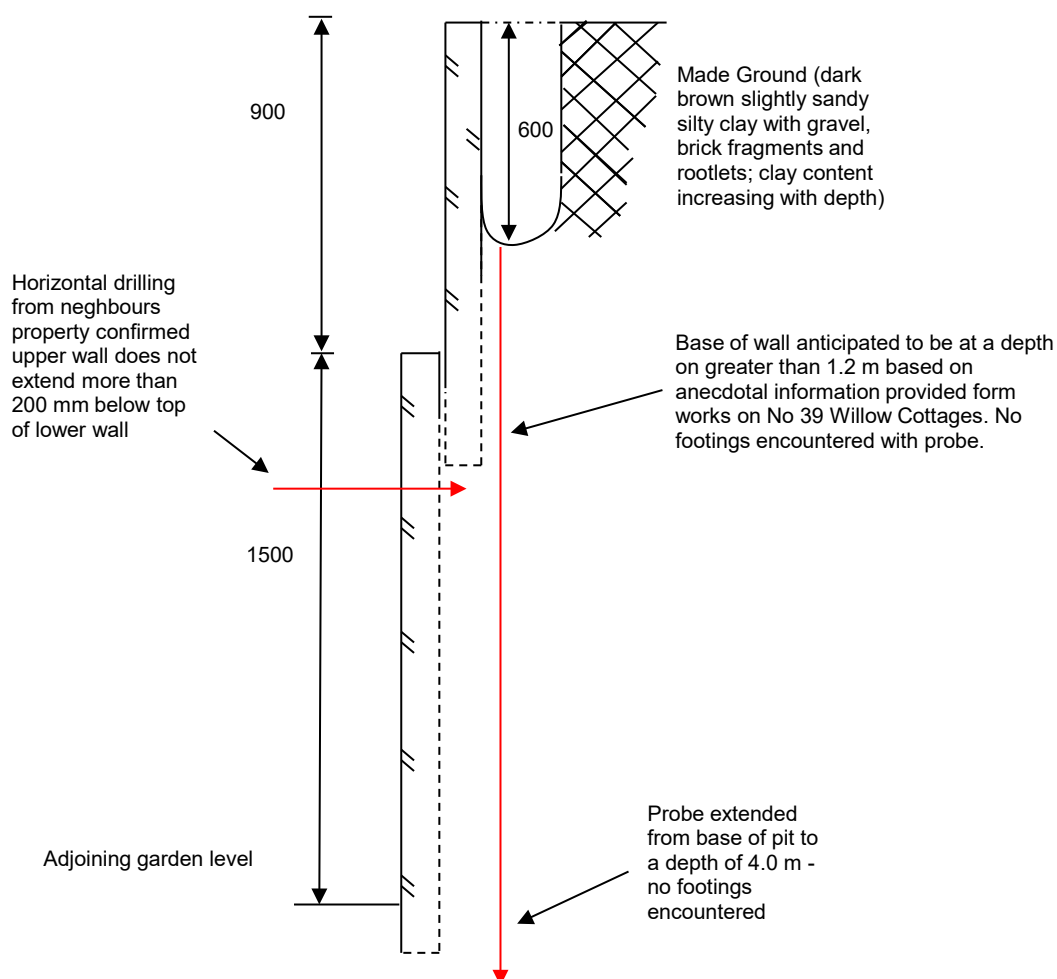
Engineer
Richard Tant Associates

Sheet
1/1

PLAN



SECTION A - A'



Remarks:

All dimensions in millimetres

Trial pit sides remained stable during excavation

Groundwater not encountered

Scale:

1:20

Logged by:

JS

Excavation Method
Manual

Dimensions
700 x 900 x 1200

Ground Level (mOD)
85.50

Client
Manuela Eleuteri

Job Number
J15315

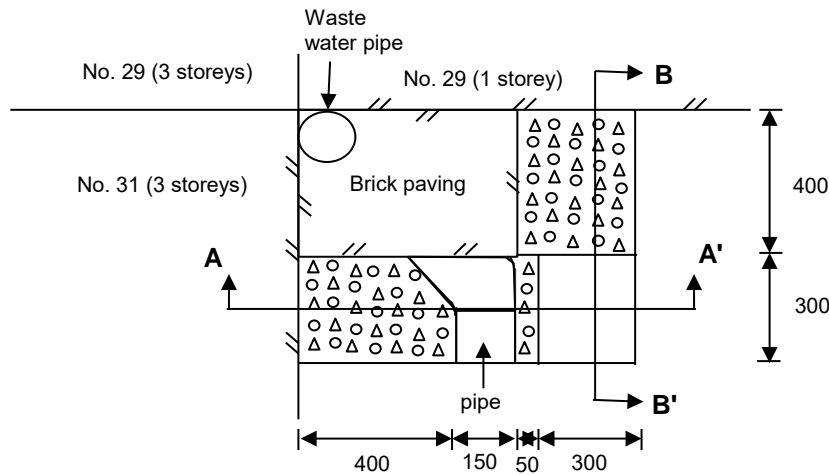
Location
Ground Level

Dates
12/01/16 to 13/01/16

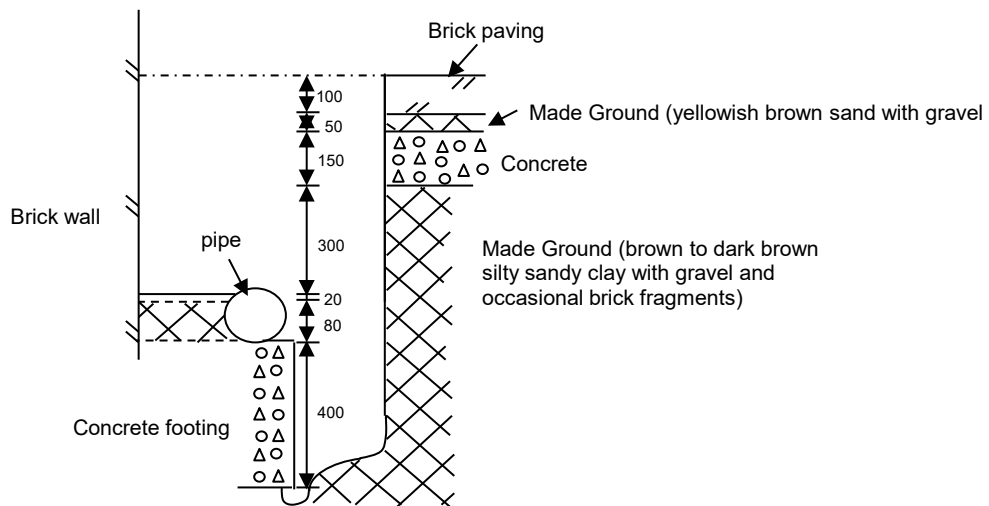
Engineer
Richard Tant Associates

Sheet
1/2

PLAN



SECTION A - A'



Remarks:

All dimensions in millimetres

Trial pit sides remained stable during excavation

Groundwater not encountered

Scale:

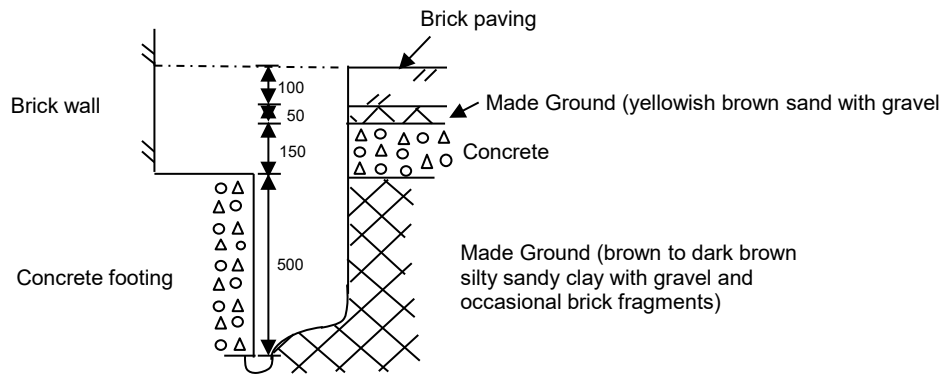
1:20

Logged by:

JS

Excavation Method Manual	Dimensions 700 x 900 x 1200	Ground Level (mOD) 85.50	Client Manuela Eleuteri	Job Number J15315
	Location Ground Level	Dates 12/01/16 to 13/01/16	Engineer Richard Tant Associates	Sheet 2/2

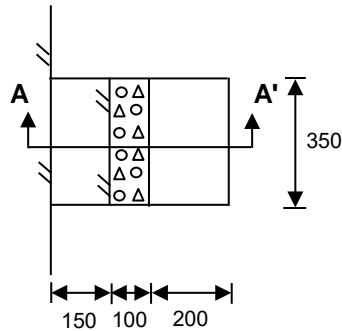
SECTION B - B'



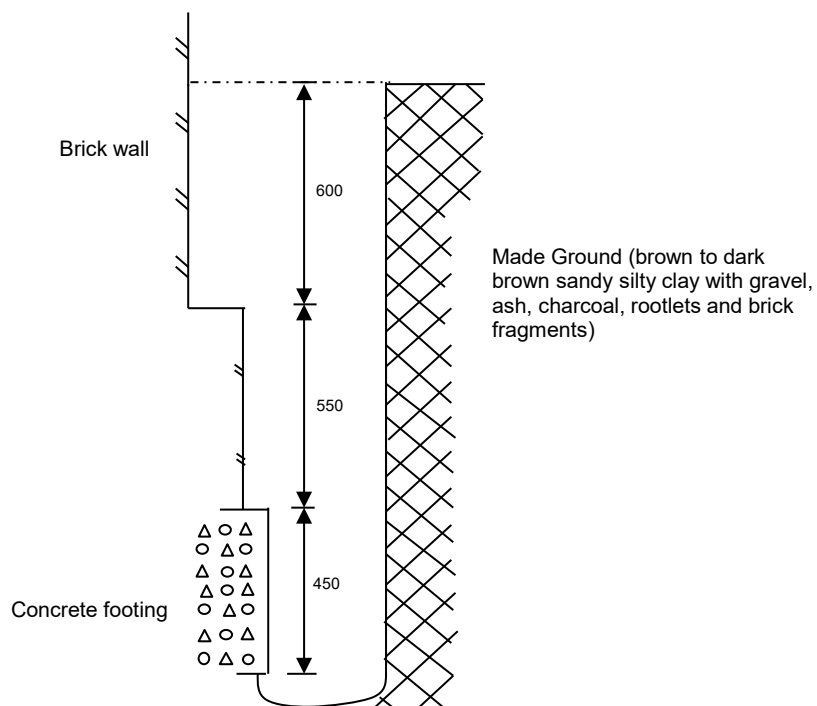
Remarks: All dimensions in millimetres Trial pit sides remained stable during excavation Groundwater not encountered	Scale: 1:20
	Logged by: JS

Excavation Method Manual	Dimensions 350 x 450 x 1800	Ground Level (mOD) 85.40	Client Manuela Eleuteri	Job Number J15315
	Location Ground Level	Dates 12/01/16 to 13/01/16	Engineer Richard Tant Associates	Sheet 1/1

PLAN



SECTION A - A'



Remarks: All dimensions in millimetres Trial pit sides remained stable during excavation Groundwater not encountered	Scale: 1:20
	Logged by: JS

Site 31 Willoughby Road, London, NW3 1RT

Client Manuela Eleuteri

Engineer Richard Tant Associates

Job Number
J15315

Sheet
1 / 1



View of TP1 - looking southeast



View into TP1 - looking southeast

Site 31 Willoughby Road, London, NW3 1RT

Client Manuela Eleuteri

Engineer Richard Tant Associates

Job Number
J15315

Sheet
1 / 1



View of TP2 - looking southeast



View into TP2 - looking southeast

Site 31 Willoughby Road, London, NW3 1RT

Client Manuela Eleuteri

Engineer Richard Tant Associates

Job Number
J15315

Sheet
1 / 1



View of TP3 - looking northeast



View into TP3 - looking north

Site 31 Willoughby Road, London, NW3 1RT

Client Manuela Eleuteri

Engineer Richard Tant Associates

Job Number
J15315

Sheet
1 / 1



View of TP4 - looking northwest



Plan view of TP4 - looking northwest

Site 31 Willoughby Road, London, NW3 1RT

Client Manuela Eleuteri

Engineer Richard Tant Associates

Job Number
J15315

Sheet
1 / 1



View of TP5 - looking southeast



View into TP5 - looking east

Site 31 Willoughby Road, London, NW3 1RT

Client Manuela Eleuteri

Engineer Richard Tant Associates

Job Number
J15315

Sheet
1 / 1



View of TP6 - looking northwest



View into TP6 - looking northeast



Job No.	Project Name	Programme	
20228	31 Willoughby Road	Samples received	21/01/2016
		Schedule received	21/01/2016
Project No.	Client	Project started	22/01/2016
J15315	GEA	Testing Started	02/02/2016

[illegible]

Test Methods: BS1377: Part 2: 1990:
Natural Moisture Content : clause 3.2
Atterberg Limits: clause 4.3 and 5.0

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU

Tel: 01923 711 288
Email: James@k4soils.com

**Checked and
Approved**

Initials J.P

Date: 03/02/2016



Loss On Ignition - Summary of Results

Job No.	Project Name	Programme	
20228	31 Willoughby Road	Samples received	21/01/2016
		Schedule received	21/01/2016
Project No.	Client	Project Started	22/01/2016
J15315	GEA	Testing Started	02/02/2016

[illegible]

Test Methods: BS1377: Part 3: 1990:
Mass Loss on Ignition : clause 4.0

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU
Tel: 01923 711 288
Email: James@k4soils.com

Checked and Approved

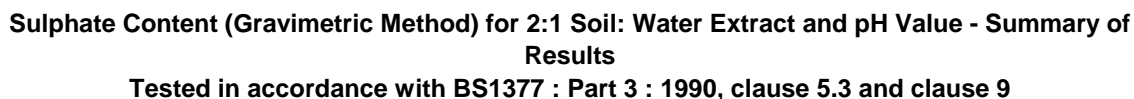
Initials J.P

Date: 03/02/2016

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5-R30 (Rev. 0)

[illegible]

Checked and Approved	
Initials	J.P
Date:	03/02/2016



Unit A2
Windmill Road
Ponswood Industrial Estate
St Leonards on Sea
East Sussex
TN38 9BY
Telephone: (01424) 718618
Facsimile: (01424) 729911
info@elab-uk.co.uk

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 16-05425

Issue: 1

Date of Issue: 29/01/2016

Contact: James Phaure

Customer Details: K4 Soils Laboratory Ltd
Unit 8
Watford
Hertfordshire WD18 9RU

Quotation No: Q15-00248

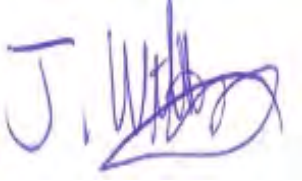
Order No: 20228

Customer Reference: J15315

Date Received: 27/01/2016

Date Approved: 29/01/2016

Details: 31 Willoughby Way

Approved by: 

John Wilson, Operations Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)



Sample Summary

Report No.: 16-05425

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
51816	BH4 D1 3.00	Not Provided	27/01/2016	Silty loam	a



2683

Results Summary

Report No.: 16-05425

ELAB Reference	51816
Customer Reference	D1
Sample ID	
Sample Type	SOIL
Sample Location	BH4
Sample Depth (m)	3.00
Sampling Date	

Determinand	Codes	Units	LOD	
Miscellaneous				
Soil Organic Matter	U	%	0.1	3.3



Method Summary

Report No.: 16-05425

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Soil organic matter	U	Air dried sample	29/01/2016	BS1377:P3	Titrimetry

Report Information

Report No.: 16-05425

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"

Soil sample results are expressed on an air dried basis

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

PCB congener results may include any coeluting PCBs

Uncertainty of measurement for the determinands tested are available upon request

Deviation Codes

-
- | | |
|---|--|
| a | No date of sampling supplied |
| b | No time of sampling supplied (Waters Only) |
| c | Sample not received in appropriate containers |
| d | Sample not received in cooled condition |
| e | The container has been incorrectly filled |
| f | Sample age exceeds stability time (sampling to receipt) |
| g | Sample age exceeds stability time (sampling to analysis) |

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month

All water samples will be retained for 7 days following the date of the test report

Charges may apply to extended sample storage



Geotechnical &
Environmental
Associates

Widbury Barn
Widbury Hill
Ware
Herts SG12 7QE

SPT / Depth & Level Graph

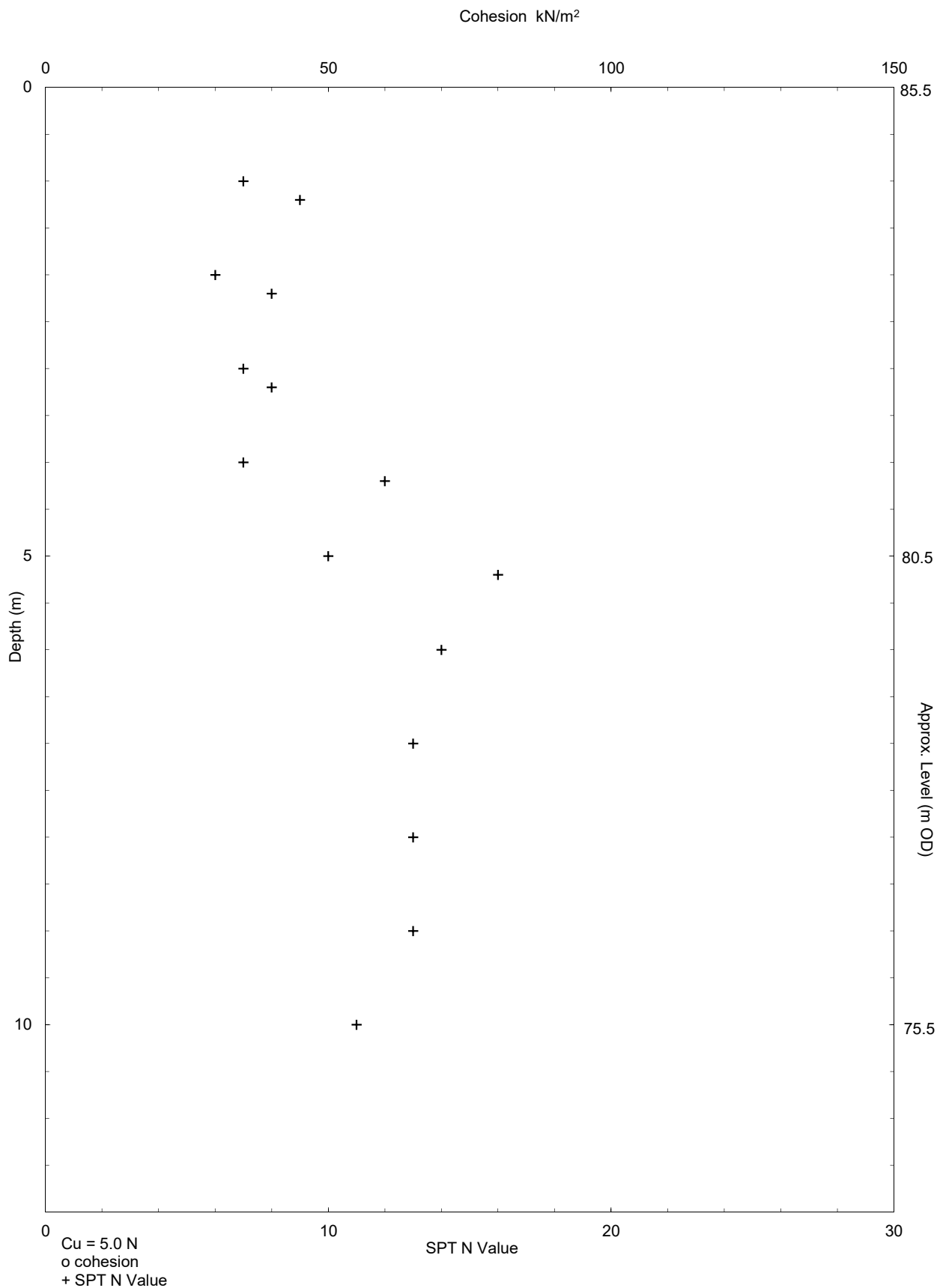
Site 31 Willoughby Road, London, NW3 1RT

Client Manuela Eleuteri

Engineer Richard Tant Associates

Job Number
J15315

Sheet
1 / 1



Results - Soil

Client: GEA	Chemtest Job No.:				16-00910	16-00910	16-00910	16-00910
Quotation No.:	Chemtest Sample ID.:				241134	241135	241136	241139
Order No.:	Client Sample Ref.:				BH1	BH2	TP1	TP6
	Client Sample ID.:				1	1	1	1
	Sample Type:				SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				2.25	0.50	0.40	0.50
	Bottom Depth (m):							1.00
	Date Sampled:				13-Jan-2016	13-Jan-2016	13-Jan-2016	13-Jan-2016
Determinand	Accred.	SOP	Units	LOD				
Moisture	N	2030	%	0.020	23	21	27	16
Stones	N	2030	%	0.020	< 0.020	< 0.020	< 0.020	< 0.020
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones, Brick
Soil Texture	N	2040		N/A	Clay	Clay	Clay	Clay
pH	M	2010		N/A	7.3	8.1	8.2	8.2
Sulphate (2:1 Water Soluble) as SO ₄	M	2120	g/l	0.010	0.058	< 0.010	0.16	0.011
Chloride (Extractable)	M	2220	g/l	0.010	0.023	< 0.010	0.019	< 0.010
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)	M	2325	mg/kg	0.50	2.1	1.6	6.8	1.9
Sulphate (Total)	M	2430	mg/kg	100	1300	850	3000	1100
Arsenic	M	2450	mg/kg	1.0	9.8	17	47	19
Cadmium	M	2450	mg/kg	0.10	0.10	< 0.10	< 0.10	< 0.10
Chromium	M	2450	mg/kg	1.0	39	40	52	34
Copper	M	2450	mg/kg	0.50	16	33	270	50
Mercury	M	2450	mg/kg	0.10	< 0.10	0.80	0.13	0.66
Nickel	M	2450	mg/kg	0.50	43	25	53	25
Lead	M	2450	mg/kg	0.50	37	330	670	350
Selenium	M	2450	mg/kg	0.20	0.28	< 0.20	< 0.20	< 0.20
Zinc	M	2450	mg/kg	0.50	58	81	180	120
Total Organic Carbon	M	2625	%	0.20	0.41	0.67	5.8	1.1
TPH >C5-C6	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C6-C7	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C7-C8	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C8-C10	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C10-C12	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C12-C16	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	4.7
TPH >C16-C21	N	2670	mg/kg	1.0	< 1.0	2.7	< 1.0	31
TPH >C21-C35	N	2670	mg/kg	1.0	< 1.0	5.3	< 1.0	38
Total TPH >C5-C35	N	2670	mg/kg	10	< 10	< 10	< 10	74
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	2.6
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.20
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	1.5
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	1.5
Phenanthrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	19
Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	2.2
Fluoranthene	M	2700	mg/kg	0.10	< 0.10	0.76	0.45	21
Pyrene	M	2700	mg/kg	0.10	< 0.10	0.71	0.47	19

Results - Soil

Client: GEA	Chemtest Job No.: 16-00910				16-00910	16-00910	16-00910	16-00910
Quotation No.:	Chemtest Sample ID.: 241134				241134	241135	241136	241139
Order No.:	Client Sample Ref.:				BH1	BH2	TP1	TP6
	Client Sample ID.:				1	1	1	1
	Sample Type:				SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				2.25	0.50	0.40	0.50
	Bottom Depth (m):							1.00
	Date Sampled:				13-Jan-2016	13-Jan-2016	13-Jan-2016	13-Jan-2016
Determinand	Accred.	SOP	Units	LOD				
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	9.3
Chrysene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	9.7
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	11
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	4.5
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	7.6
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	5.2
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	1.3
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	4.1
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	120
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30

Report Information

Key

- U UKAS accredited
- M MCERTS and UKAS accredited
- N Unaccredited
- S This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
- SN This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
- T This analysis has been subcontracted to an unaccredited laboratory
- I/S Insufficient Sample
- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at our Coventry laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container

Sample Retention and Disposal


All soil samples will be retained for a period of 60 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.co.uk

		Widbury Barn Widbury Hill Ware Herts SG12 7QE		Generic Risk-Based Soil Screening Values																																																																																																																																																																																																																						
Site31 Willoughby Road, London, NW3 1RT				Job Number J15315																																																																																																																																																																																																																						
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<table><tr><th>Contaminant</th><th>Screening Value mg/kg</th><th>Data Source</th></tr><tr><td colspan="3">Metals</td></tr><tr><td>Arsenic</td><td>37</td><td>C4SL</td></tr><tr><td>Cadmium</td><td>26</td><td>C4SL</td></tr><tr><td>Chromium (III)</td><td>3000</td><td>LQM/CIEH</td></tr><tr><td>Chromium (VI)</td><td>21</td><td>C4SL</td></tr><tr><td>Copper</td><td>2,330</td><td>LQM/CIEH</td></tr><tr><td>Lead</td><td>200</td><td>C4SL</td></tr><tr><td>Elemental Mercury</td><td>1</td><td>SGV</td></tr><tr><td>Inorganic Mercury</td><td>170</td><td>SGV</td></tr><tr><td>Nickel</td><td>97</td><td>LQM/CIEH</td></tr><tr><td>Selenium</td><td>350</td><td>SGV</td></tr><tr><td>Zinc</td><td>3,750</td><td>LQM/CIEH</td></tr><tr><td colspan="3">Hydrocarbons</td></tr><tr><td>Benzene</td><td>0.87</td><td>C4SL</td></tr><tr><td>Toluene</td><td>610</td><td>SGV</td></tr><tr><td>Ethyl Benzene</td><td>350</td><td>SGV</td></tr><tr><td>Xylene</td><td>230</td><td>SGV</td></tr><tr><td>Aliphatic C5-C6</td><td>110</td><td>LQM/CIEH</td></tr><tr><td>Aliphatic C6-C8</td><td>370</td><td>LQM/CIEH</td></tr><tr><td>Aliphatic C8-C10</td><td>110</td><td>LQM/CIEH</td></tr><tr><td>Aliphatic C10-C12</td><td>540</td><td>LQM/CIEH</td></tr><tr><td>Aliphatic C12-C16</td><td>3000</td><td>LQM/CIEH</td></tr><tr><td>Aliphatic C16-C35</td><td>76,000</td><td>LQM/CIEH</td></tr><tr><td>Aromatic C6-C7</td><td>See Benzene</td><td>LQM/CIEH</td></tr><tr><td>Aromatic C7-C8</td><td>See Toluene</td><td>LQM/CIEH</td></tr><tr><td>Aromatic C8-C10</td><td>151</td><td>LQM/CIEH</td></tr><tr><td>Aromatic C10-C12</td><td>346</td><td>LQM/CIEH</td></tr><tr><td>Aromatic C12-C16</td><td>593</td><td>LQM/CIEH</td></tr><tr><td>Aromatic C16-C21</td><td>770</td><td>LQM/CIEH</td></tr><tr><td>Aromatic C21-C35</td><td>1230</td><td>LQM/CIEH</td></tr><tr><td>PRO (C5 –C10)</td><td>1352</td><td>Calc</td></tr><tr><td>DRO (C12 –C28)</td><td>80,363</td><td>Calc</td></tr><tr><td>Lube Oil (C28 –C44)</td><td>77,230</td><td>Calc</td></tr><tr><td>TPH</td><td>1000</td><td>Trigger for speciated testing</td></tr></table>			Contaminant	Screening Value mg/kg	Data Source	Metals			Arsenic	37	C4SL	Cadmium	26	C4SL	Chromium (III)	3000	LQM/CIEH	Chromium (VI)	21	C4SL	Copper	2,330	LQM/CIEH	Lead	200	C4SL	Elemental Mercury	1	SGV	Inorganic Mercury	170	SGV	Nickel	97	LQM/CIEH	Selenium	350	SGV	Zinc	3,750	LQM/CIEH	Hydrocarbons			Benzene	0.87	C4SL	Toluene	610	SGV	Ethyl Benzene	350	SGV	Xylene	230	SGV	Aliphatic C5-C6	110	LQM/CIEH	Aliphatic C6-C8	370	LQM/CIEH	Aliphatic C8-C10	110	LQM/CIEH	Aliphatic C10-C12	540	LQM/CIEH	Aliphatic C12-C16	3000	LQM/CIEH	Aliphatic C16-C35	76,000	LQM/CIEH	Aromatic C6-C7	See Benzene	LQM/CIEH	Aromatic C7-C8	See Toluene	LQM/CIEH	Aromatic C8-C10	151	LQM/CIEH	Aromatic C10-C12	346	LQM/CIEH	Aromatic C12-C16	593	LQM/CIEH	Aromatic C16-C21	770	LQM/CIEH	Aromatic C21-C35	1230	LQM/CIEH	PRO (C5 –C10)	1352	Calc	DRO (C12 –C28)	80,363	Calc	Lube Oil (C28 –C44)	77,230	Calc	TPH	1000	Trigger for speciated testing	<table><tr><th>Contaminant</th><th>Screening Value mg/kg</th><th>Data Source</th></tr><tr><td colspan="3">Anions</td></tr><tr><td>Soluble Sulphate</td><td>500 mg/l</td><td>Structures</td></tr><tr><td>Sulphide</td><td>50</td><td>Structures</td></tr><tr><td>Chloride</td><td>400</td><td>Structures</td></tr><tr><td colspan="3">Others</td></tr><tr><td>Organic Carbon (%)</td><td>6</td><td>Methanogenic potential</td></tr><tr><td>Total Cyanide</td><td>140</td><td>WRAS</td></tr><tr><td>Total Mono Phenols</td><td>420</td><td>SGV</td></tr><tr><td colspan="3">PAH</td></tr><tr><td>Naphthalene</td><td>12.40</td><td>C4SL exp & LQM/CIEH</td></tr><tr><td>Acenaphthylene</td><td>850</td><td>LQM/CIEH</td></tr><tr><td>Acenaphthene</td><td>1,000</td><td>LQM/CIEH</td></tr><tr><td>Fluorene</td><td>780</td><td>LQM/CIEH</td></tr><tr><td>Phenanthrene</td><td>380</td><td>LQM/CIEH</td></tr><tr><td>Anthracene</td><td>9,200</td><td>LQM/CIEH</td></tr><tr><td>Fluoranthene</td><td>670</td><td>LQM/CIEH</td></tr><tr><td>Pyrene</td><td>1,600</td><td>LQM/CIEH</td></tr><tr><td>Benzo(a) Anthracene</td><td>8.7</td><td>C4SL exp & LQM/CIEH</td></tr><tr><td>Chrysene</td><td>14</td><td>C4SL exp & LQM/CIEH</td></tr><tr><td>Benzo(b) Fluoranthene</td><td>10.5</td><td>C4SL exp & LQM/CIEH</td></tr><tr><td>Benzo(k) Fluoranthene</td><td>15.0</td><td>C4SL exp & LQM/CIEH</td></tr><tr><td>Benzo(a) pyrene</td><td>5.00</td><td>C4SL</td></tr><tr><td>Indeno(1 2 3 cd) Pyrene</td><td>6.2</td><td>C4SL exp & LQM/CIEH</td></tr><tr><td>Dibenzo(a h) Anthracene</td><td>1.35</td><td>C4SL exp & LQM/CIEH</td></tr><tr><td>Benzo (g h i) Perylene</td><td>71</td><td>C4SL exp & LQM/CIEH</td></tr><tr><td>Screening value for PAH</td><td>71.4</td><td>B(a)P / 0.15</td></tr><tr><td colspan="3">Chlorinated Solvents</td></tr><tr><td>1,1,1 trichloroethane (TCA)</td><td>53.1</td><td>LQM/CIEH</td></tr><tr><td>tetrachloroethane (PCA)</td><td>2.4</td><td>LQM/CIEH</td></tr><tr><td>tetrachloroethene (PCE)</td><td>4.5</td><td>LQM/CIEH</td></tr><tr><td>trichloroethene (TCE)</td><td>0.598</td><td>LQM/CIEH</td></tr><tr><td>1,2-dichloroethane (DCA)</td><td>0.014</td><td>LQM/CIEH</td></tr><tr><td>vinyl chloride (Chloroethene)</td><td>0.00329</td><td>LQM/CIEH</td></tr><tr><td>tetrachloromethane (Carbon tetra</td><td>0.089</td><td>LQM/CIEH</td></tr><tr><td>trichloromethane (Chloroform)</td><td>3.86</td><td>LQM/CIEH</td></tr></table>			Contaminant	Screening Value mg/kg	Data Source	Anions			Soluble Sulphate	500 mg/l	Structures	Sulphide	50	Structures	Chloride	400	Structures	Others			Organic Carbon (%)	6	Methanogenic potential	Total Cyanide	140	WRAS	Total Mono Phenols	420	SGV	PAH			Naphthalene	12.40	C4SL exp & LQM/CIEH	Acenaphthylene	850	LQM/CIEH	Acenaphthene	1,000	LQM/CIEH	Fluorene	780	LQM/CIEH	Phenanthrene	380	LQM/CIEH	Anthracene	9,200	LQM/CIEH	Fluoranthene	670	LQM/CIEH	Pyrene	1,600	LQM/CIEH	Benzo(a) Anthracene	8.7	C4SL exp & LQM/CIEH	Chrysene	14	C4SL exp & LQM/CIEH	Benzo(b) Fluoranthene	10.5	C4SL exp & LQM/CIEH	Benzo(k) Fluoranthene	15.0	C4SL exp & LQM/CIEH	Benzo(a) pyrene	5.00	C4SL	Indeno(1 2 3 cd) Pyrene	6.2	C4SL exp & LQM/CIEH	Dibenzo(a h) Anthracene	1.35	C4SL exp & LQM/CIEH	Benzo (g h i) Perylene	71	C4SL exp & LQM/CIEH	Screening value for PAH	71.4	B(a)P / 0.15	Chlorinated Solvents			1,1,1 trichloroethane (TCA)	53.1	LQM/CIEH	tetrachloroethane (PCA)	2.4	LQM/CIEH	tetrachloroethene (PCE)	4.5	LQM/CIEH	trichloroethene (TCE)	0.598	LQM/CIEH	1,2-dichloroethane (DCA)	0.014	LQM/CIEH	vinyl chloride (Chloroethene)	0.00329	LQM/CIEH	tetrachloromethane (Carbon tetra	0.089	LQM/CIEH	trichloromethane 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Contaminant	Screening Value mg/kg	Data Source																																																																																																																																																																																																																								
Metals																																																																																																																																																																																																																										
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Chromium (III)	3000	LQM/CIEH																																																																																																																																																																																																																								
Chromium (VI)	21	C4SL																																																																																																																																																																																																																								
Copper	2,330	LQM/CIEH																																																																																																																																																																																																																								
Lead	200	C4SL																																																																																																																																																																																																																								
Elemental Mercury	1	SGV																																																																																																																																																																																																																								
Inorganic Mercury	170	SGV																																																																																																																																																																																																																								
Nickel	97	LQM/CIEH																																																																																																																																																																																																																								
Selenium	350	SGV																																																																																																																																																																																																																								
Zinc	3,750	LQM/CIEH																																																																																																																																																																																																																								
Hydrocarbons																																																																																																																																																																																																																										
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Concentrations measured below the above values may be considered to represent 'uncontaminated conditions' which pose 'LOW' risk to human health. Concentrations measured in excess of these values indicate a potential risk which require further, site specific risk assessment.																																																																																																																																																																																																																										
SGV - Soil Guideline Value, derived from the CLEA model and published by Environment Agency 2009																																																																																																																																																																																																																										
LQM/CIEH - Generic Assessment Criteria for Human Health Risk Assessment 2nd edition (2009)derived using CLEA 1.04 model 2009																																																																																																																																																																																																																										
C4SL - Defra Category 4 Screening value based on Low Level of Toxicological Risk																																																																																																																																																																																																																										
C4SL exp & LQM/CIEH calculated using C4SL revisions to exposure assessment but LQM/CIEH health criteria values																																																																																																																																																																																																																										
Calc - sum of nearest available carbon range specified including BTEX for PRO fraction																																																																																																																																																																																																																										
B(a)P / 0.15 - GEA experince indicates that Benzo(a) pyrene (one of the most common and most carcenogenic of the PAHs) rarely exceeds 15% of the total PAH concentration, hence this Total PAH threshold is regarded as being conservative																																																																																																																																																																																																																										

Site	31 Willoughby Road, London, NW3 1RT	Job Number J15315
Client	Manuela Eleuteri	Sheet 2 / 2
Engineer	Richard Tant Associates	

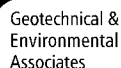
Proposed End Use **Residential with plant uptake**

The key generic assumptions for this end use are as follows;

- ☐ that groundwater will not be a critical risk receptor;
- ☐ that the critical receptor for human health will be a young female aged 0 to 6 years old;
- ☐ that the exposure duration will be six years;
- ☐ that the building type equates to a terraced house.
- ☐ that the critical exposure pathways will be direct soil and indoor dust ingestion, consumption of home grown produce, consumption of soil adhering to home grown produce, skin contact with soils and dust, and inhalation of dust and vapours

Where contaminant concentrations are measured at concentrations below the generic screening value it is considered that they pose an acceptable level of risk and thus further consideration of these contaminant concentrations is not required. However, where concentrations are measured in excess of the generic screening value there is considered to be a potential that they could pose an unacceptable risk and thus further action will be required which could include:

- ☐ additional testing to zone the extent of the contaminated material and thus reduce the uncertainty with regard to its potential risk;
- ☐ site specific risk assessment to refine the assessment criteria and allow an assessment to be made as to whether the concentration present would pose an unacceptable risk at this site; or
- ☐ soil remediation or risk management to mitigate the risk posed by the contaminant to a degree that it poses an acceptable risk.



Widbury Barn
Widbury Hill
Ware, Herts
SG12 7QE

Site

31 Willoughby Road, London, NW3 1RT

Borehole
Number

BH2

Installation Type
Standpipe

Dimensions

Internal Diameter of Tube [A] = 30 mm
Diameter of Filter Zone = 60 mm

Client	
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Manuela Eleuteri

**Job
Number**
J15315

Location

Ground Level (mOD)

85.50


Engineer

Richard Tant Associates

Sheet
1/1

 ∇_1

Remarks

 Geotechnical & Environmental Associates		Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site 31 Willoughby Road, London, NW3 1RT				Borehole Number BH3			
Installation Type Standpipe		Dimensions Internal Diameter of Tube [A] = 30 mm Diameter of Filter Zone = 60 mm				Client Manuela Eleuteri				Job Number J15315	
		Location		Ground Level (mOD) 85.40		Engineer Richard Tant Associates				Sheet 1/1	

Legend	Water	Instr (A)	Level (mOD)	Depth (m)	Description	Groundwater Strikes During Drilling										
						Date	Time	Depth Struck (m)	Casing Depth (m)	Inflow Rate	Readings				Depth Sealed (m)	
			84.40	1.00	Bentonite Seal							5 min	10 min	15 min	20 min	
						Groundwater Observations During Drilling										
						Date	Start of Shift				End of Shift					
							Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)	Time	Depth Hole (m)	Casing Depth (m)	Water Depth (m)	Water Level (mOD)
					Slotted Standpipe											
						Instrument Groundwater Observations										
						Inst. [A] Type : Slotted Standpipe										
						Date	Instrument [A]			Remarks						
							Time	Depth (m)	Level (mOD)							
			82.40	3.00		02/02/16		2.75	82.65							
					23/02/16		2.70	82.70								
					14/12/16		2.75	82.65								
					05/07/17		2.85	82.55								
					11/07/17		2.80	82.60								
			80.90	4.50	General Backfill											

Remarks

Site 31 Willoughby Road, London, NW3 1RT

Client Manuela Eleuteri

Engineer Richard Tant Associates

Job Number
J15315

Sheet
1/1

Date: 05 July 2017

Borehole No: 1

Test No: 1

Test Data

Before start of test:

Standpipe depth (m): 3.28

Screen depth (m): 1.00

Water level (m): 2.46

Time (mins)	Depth to Water (m)	Depth of Water (m)
0.0	3.12	0.16
1.0	3.12	0.16
3.0	3.12	0.16
5.0	3.11	0.17
10.0	3.11	0.17
15.0	3.11	0.17
20.0	3.11	0.17
30.0	3.11	0.17
45.0	3.11	0.17
60.0	3.10	0.18
90.0	3.10	0.18
120.0	3.10	0.18

Soakage Calculation

Borehole Diameter (m) 0.0600

Borehole Area (m) 0.0028

Borehole Perimeter (m) 0.188

From Plot: D1 (m) 3.12

D2 (m) 3.10

T1 (min) 0

T2 (min) 120

Soakage Volume (m³) 0.000

Soakage Area (m²) 0.43

Time (min) 120

Soakage rate (m/sec) 1.81554E-08

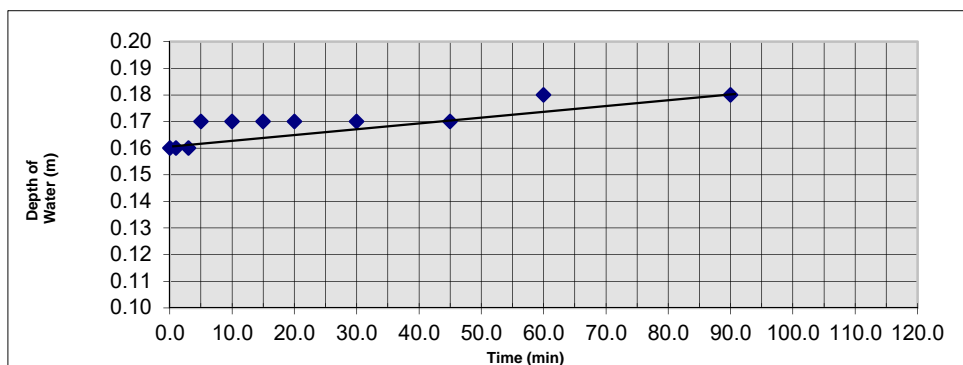
Soakage rate (m/day) 0.001568627

At end of test:

Standpipe depth (m): 3.28

Screen depth (m): 1.00

Water level (m): 3.10



Remarks: Bailing at this position to reduce the water level, had no measureable effect on the water level in the nearby standpipe within BH2

Site 31 Willoughby Road, London, NW3 1RT

Client Manuela Eleuteri

Engineer Richard Tant Associates

Job Number
J15315

Sheet
1/1

Date: 05 July 2017

Borehole No: 2

Test No: 1

Test Data

Before start of test:

Standpipe depth (m): 3.82

Screen depth (m): 1.00

Water level (m): 3.17

Time (mins)	Depth to Water (m)	Depth of Water (m)
0.0	3.48	0.34
1.0	3.47	0.35
3.0	3.46	0.36
5.0	3.43	0.39
10.0	3.40	0.42
15.0	3.38	0.44
20.0	3.35	0.47
30.0	3.32	0.50
45.0	3.29	0.53
60.0	3.26	0.56
90.0	3.23	0.59
120.0	3.21	0.61

Soakage Calculation

Borehole Diameter (m) 0.0600

Borehole Area (m) 0.0028

Borehole Perimeter (m) 0.188

From Plot: D1 (m) 3.32

D2 (m) 3.21

T1 (min) 30

T2 (min) 120

Soakage Volume (m³) 0.000

Soakage Area (m²) 0.53

Time (min) 90

Soakage rate (m/sec) 1.0778E-07

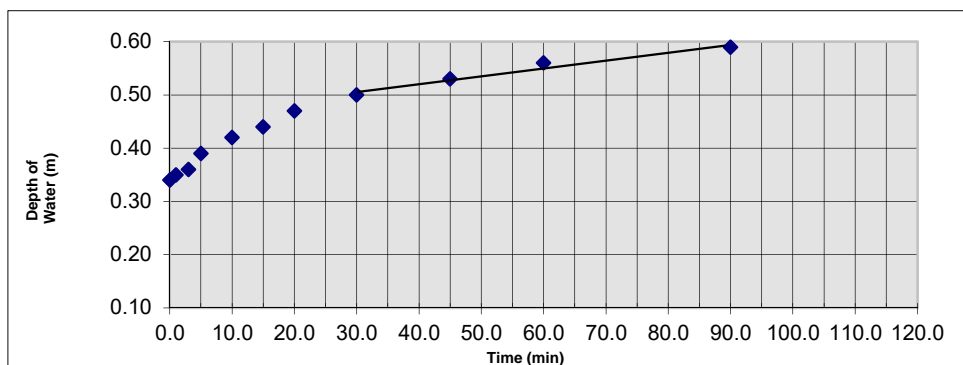
Soakage rate (m/day) 0.009312169

At end of test:

Standpipe depth (m): 3.82

Screen depth (m): 1.00

Water level (m): 3.21



Remarks: Bailing at this position to reduce the water level, had no measureable effect on the water level in the nearby standpipe within BH1

Site 31 Willoughby Road, London, NW3 1RT

Client Manuela Eleuteri

Engineer Richard Tant Associates

Job Number
J15315

Sheet
1/1

Date: 05 July 2017

Borehole No: 4

Test No: 1

Test Data

Before start of test:

Standpipe depth (m): 4.80

Screen depth (m): 1.00

Water level (m): 2.88

Time (mins)	Depth to Water (m)	Depth of Water (m)
0.0	4.80	0.00
1.0	4.80	0.00
3.0	4.79	0.01
5.0	4.79	0.01
10.0	4.77	0.03
15.0	4.76	0.04
20.0	4.75	0.05
30.0	4.73	0.07
45.0	4.71	0.09
60.0	4.68	0.12
90.0	4.64	0.16
120.0	4.62	0.18

Soakage Calculation

Borehole Diameter (m) 0.1000

Borehole Area (m) 0.0079

Borehole Perimeter (m) 0.314

From Plot: D1 (m) 4.77

D2 (m) 4.62

T1 (min) 10

T2 (min) 120

Soakage Volume (m³) 0.001

Soakage Area (m²) 1.20

Time (min) 110

Soakage rate (m/sec) 1.48544E-07

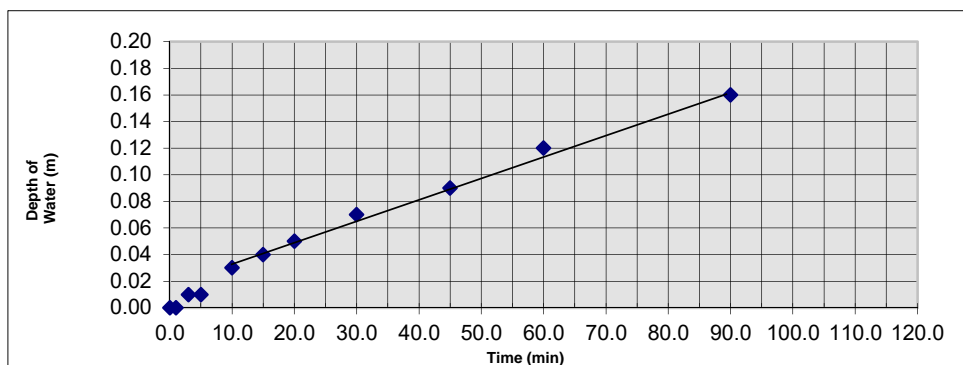
Soakage rate (m/day) 0.012834225

At end of test:

Standpipe depth (m): 4.80

Screen depth (m): 1.00

Water level (m): 4.62



Remarks: Monitoring of the adjacent standpipe within BH3 showed no change in the observed water level (2.85 m) during bailing out of BH4 and throughout the subsequent test.



**PROPOSED BASEMENT AT
31 WILLOUGHBY ROAD,
LONDON, NW3 1RT**

FLOOD RISK ASSESSMENT

JANUARY 2016

REF: 1542/RE/12-15/01 REVISION A

CONTRACT

Evans Rivers and Coastal Ltd has been commissioned by Geotechnical and Environmental Associates to carry out a Flood Risk Assessment for a proposed basement at number 31 Willoughby Road, London, NW3 1RT.

QUALITY ASSURANCE, ENVIRONMENT AND HEALTH AND SAFETY

Evans Rivers and Coastal Ltd operates a Quality Assurance, Environmental, and Health and Safety Policy.

This project comprises various stages including data collection; hydrological and hydrogeological assessments; surface water drainage designs; and reporting. Quality will be maintained throughout the project by producing specific methodologies for each work stage. Quality will also be maintained by initiating internal quality procedures including the validation of third party deliverables; creation of an audit trail to record any changes made; and document control using a database and correspondence log file system.

To adhere to the Environmental Policy, data will be obtained and issued in electronic format and alternatively by post. Paper use will also be minimised by communicating via email or telephone where possible. Documents and drawings will be transferred in electronic format where possible and all waste paper will be recycled. Meetings away from the office of Evans Rivers and Coastal Ltd will be minimised to prevent unnecessary travel, however for those meetings deemed essential, public transport will be used in preference to car journeys.

The project will follow the commitment and objectives outlined in the Health and Safety Policy operated by Evans Rivers and Coastal Ltd. All employees will be equipped with suitable personal protective equipment prior to any site visits and a risk assessment will be completed and checked before any site visit. Other factors which have been taken into consideration are the wider safety of the public whilst operating on site, and the importance of safety when working close to a water source and highway. Any designs resulting from this project and directly created by Evans Rivers and Coastal Ltd will also take into account safety measures within a "designers risk assessment".

Report carried out by:



.....
Rupert Evans, BSc (Hons), MSc, CEnv, C.WEM, MCIWEM, AIEMA

DISCLAIMER

This report has been written and produced for Geotechnical and Environmental Associates. No responsibility is accepted to other parties for all or any part of this report. Any other parties relying upon this report without the written authorisation of Evans Rivers and Coastal Ltd do so at their own risk.

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DRAWINGS	BPS1195.02 4186/SM01

1. INTRODUCTION

1.1 Project Scope

1.1.1 Evans Rivers and Coastal Ltd has been commissioned by Geotechnical and Environmental Associates to carry out a Flood Risk Assessment for a proposed basement at number 31 Willoughby Road, London, NW3 1RT.

1.1.2 Specifically, this assessment intends to:

- 1) Carry out an appraisal of flood risk from all sources such as fluvial/tidal, groundwater, surface water/sewers, artificial sources in accordance with NPPF and other documents such as the SFRA and SWMP;
- 2) Recommend mitigation measures where appropriate;
- 3) Report findings and recommendations.

1.1.3 This assessment is carried out in accordance with the requirements of the National Planning Policy Framework (NPPF) dated March 2012. Other documents which have been consulted include:

- DEFRA/EA document entitled *Framework and guidance for assessing and managing flood risk for new development Phase 2 (FD2320/TR2)*, 2005;
- DEFRA/Jacobs 2006. *Groundwater flooding records collation, monitoring and risk assessment (ref HA5)*.
- National Planning Practice Guidance – Flood Risk and Coastal Change.
- London Borough of Camden Preliminary Flood Risk Assessment (PFRA) Version 0.2 dated 2011.
- London Borough of Camden Strategic Flood Risk Assessment (SFRA) dated 2014.
- London Borough of Camden Surface Water Management Plan (SWMP) Version 1 dated 2011.
- London Borough of Camden flood risk management strategy (FRMS) dated 2013.
- London Borough of Camden, Camden geological, hydrogeological and hydrological study – Guidance for subterranean development dated 2010.
- London Borough of Camden, Camden Planning Guidance – Basements and Lightwells (CPG 4) dated July 2015.
- Woods-Ballard., et al. 2015. *The SUDS Manual, Report C753*. London: CIRIA.
- National SUDS Working Group. 2004. *Interim Code of Practice for Sustainable Drainage Systems*.

2. DATA COLLECTION

2.1 To assist with this report, the data collected included:

- 1:250,000 *Soil Map of South East England* (Sheet 6) published by Cranfield University and Soil Survey of England and Wales 1983.
- 1:625,000 *Hydrogeological Map of England and Wales*, published in 1977 by the Institute of Geological Sciences (now the British Geological Survey).
- Local borehole data extracted from the *BGS Online Geology Viewer*.
- *Summary of ground investigation preliminary findings* produced by Geotechnical and Environmental Associates in January 2016 (excerpts in Appendix A).
- Information and data from:
 - London Borough of Camden Preliminary Flood Risk Assessment (PFRA) Version 0.2 dated 2011.
 - London Borough of Camden Strategic Flood Risk Assessment (SFRA) dated 2014.
 - London Borough of Camden Surface Water Management Plan (SWMP) Version 1 dated 2011.
 - London Borough of Camden Flood Risk Management Strategy (FRMS) dated 2013.
 - London Borough of Camden, Camden geological, hydrogeological and hydrological study – Guidance for subterranean development dated 2010.

2.2 All third party data used in this study has been checked and verified prior to use in accordance with Evans Rivers and Coastal Ltd Quality Assurance procedures.

3. SITE CHARACTERISTICS

3.1 Existing Site Characteristics and Location

- 3.1.1 The site is located at number 31 Willoughby Road, London, NW3 1RT. The approximate Ordnance Survey (OS) grid reference for the site is 526727 185854 and the location of the site is shown on Figure 1.



Figure 1: Site location plan (Source: Ordnance Survey, 2015)

- 3.1.2 The site is located within a residential area and comprises a four-storey building which is accessed from Willoughby Road adjacent to the eastern frontage of the site. There are front and rear garden areas which are largely covered by block paving apart from a small area of the front garden which remains vegetated (i.e. bedding plants).
- 3.1.3 The topographical survey/existing layout can be seen on Drawing Number BPS1195.02 and shows that ground levels across the site do not vary significantly and that the dwelling is set approximately 300mm higher than existing ground levels.

3.2 Site Proposals

- 3.2.1 It is understood that the development will comprise the construction of a single level basement beneath the existing property, which will extend beneath part of rear garden and beyond the existing front footprint to create a lightwell space. The proposed basement is understood to extend to a depth of approximately 3m, such that formation level is expected to be within the London Clay.
- 3.2.2 It is understood that this Flood Risk Assessment needs to assess the flood risk to the basement level only. The site proposals can be seen on Drawing Number 4186/SM01.

4. SOURCES OF FLOODING

4.1 Fluvial/Tidal

- 4.1.1 The Environment Agency Flood Map shows that the site is located within the NPPF Flood Zone 1, 'Low Probability' which comprises land as having less than a 1 in 1000 year annual probability of fluvial or tidal flooding (i.e. an event more severe than the extreme 1 in 1000 year event). NPPF states that all uses of land, including basements, are appropriate in this zone.
- 4.1.2 The SFRA also states that there has been no historical flooding within the Borough from fluvial or tidal sources. Furthermore, the SWMP confirms that the Borough does not fall within the Environment Agency's flood zones and therefore is not at significant risk from fluvial or tidal flooding.
- 4.1.3 The SFRA and SWMP states that all main rivers historically located within the Borough are now culverted and incorporated into the sewer network. The SWMP discusses the River Fleet which is one of London's "lost rivers" and which historically originates from springs on Hampstead Heath and drains to the Thames through the Borough. The Fleet is entirely incorporated within the sewer network.
- 4.1.4 The SFRA continues to discuss the Borough's historic rivers and in addition to the Fleet, the Tyburn, Kilburn and Brent were also located in the area of Hampstead Heath. All of these "lost rivers" are also now incorporated into the local sewer system maintained by Thames Water. It is for these reasons that the Borough is located entirely within Flood Zone 1.

4.2 Critical Drainage Areas (CDA)

- 4.2.1 Despite the site being located within Flood Zone 1, it is understood from Figure 6/Rev 2 of the SFRA and Figure 3.1 of the SWMP, that the site is located within the Group3-010 Critical Drainage Area (CDA).
- 4.2.2 The SWMP defines the CDA as:

"A discrete geographic area (usually a hydrological catchment) where multiple and interlinked sources of flood risk (surface water, groundwater, sewer, main river and/or tidal) cause flooding in one or more Local Flood Risk Zones during severe weather thereby affecting people, property or local infrastructure."

4.3 Groundwater Flooding

- 4.3.1 In addition to the information provided in the SFRA and SWMP, in order to assess the potential for groundwater flooding, the Jacobs/DEFRA report entitled *Strategy for Flood and Coastal Erosion Risk Management: Groundwater Flooding Scoping Study*, published in May 2004, was consulted, together with the guidance offered within the document entitled *Groundwater flooding records collation, monitoring and risk assessment (ref HA5)*, commissioned by DEFRA and carried out by Jacobs in 2006.
- 4.3.2 The *Summary of ground investigation preliminary findings* produced by Geotechnical and Environmental Associates in January 2016, indicates that the soils beneath the site comprise Made Ground (sandy clay) overlying London Clay. Groundwater seepages were encountered during the investigation and within the London Clay at 3m bgl.

- 4.3.3 Paragraphs 2.10.4 and 2.10.6 of the SFRA states that the London Clay has a low permeability but is likely to permit moderate infiltration. Paragraph 6.4.8 of the SFRA suggests that there could be perched water within sand pockets of the London Clay.
- 4.3.4 Figure 4e/Rev 1 of the SFRA shows that the site has not been affected in the past from groundwater flooding incidents and that the site is not located within an area of increased susceptibility to elevated groundwater and is therefore expected to remain at depth. Figure 4a/Rev 1 of the SFRA also shows that the site is not located across an area with superficial (and more permeable) deposits beneath the surface.
- 4.3.5 The BGS Groundwater Susceptibility Map also indicates that there is “Limited Potential for Groundwater Flooding to Occur” at the site.
- 4.3.6 The results from the intrusive testing indicate that groundwater is likely to be encountered below the site to a depth of 3m and therefore equal to or higher than the proposed basement floor.
- 4.3.7 The potential for groundwater to rise significantly is low considering the low permeable soil types, however, it is recommended that the basement is designed to achieve a Grade 3 level of waterproofing protection as outlined in BS8102:2009. A new reinforced concrete lining wall and ground-bearing concrete slab could be constructed using water resistant concrete to form the primary barrier. An internal drained cavity system will act as a secondary barrier against water ingress.
- 4.3.8 The evidence suggests that it is unlikely that the water table has the potential to breach the ground surface and flow into the building and basement via the ground floor.
- 4.3.9 The groundwater flooding risk to the property and basement is considered to be overall low and the risk reduced further by the appropriate mitigation measures stated within this section.

4.4 Surface Water Flooding and Sewer Flooding

- 4.4.1 Surface water and sewer flooding across urban areas is often a result of high intensity storm events which exceed the capacity of the sewer thus causing it to surcharge and flood. Poorly maintained sewer networks and blockages can also exacerbate the potential for sewer flooding.

Surface Water Flooding

- 4.4.2 It has been established that the site lies within the Group3-010 Critical Drainage Area. The SFRA notes that the surface water mapping indicates that the surface water flood extent broadly follows the natural topography of the borough and man-made features such as roads and rail lines. During extreme modelling scenarios, the SFRA states that there is increased ponding in areas of properties. For example, the SWMP indicates that the modelling shows deep flooding at Gospel Park, affecting Oak Village, Lamble St, Grafton Road and Kiln Place, caused by railway embankments creating a “basin” into which surface water collects.
- 4.4.3 The SFRA discusses the two large surface water flooding events in the Borough, which occurred in 1975 and 2002 and caused widespread damage. It is understood that during these events the sewers reached maximum capacity, however, Figure 3ii/Rev 1 of the SFRA shows that the site and the adjacent highway of Willoughby Road were not affected during these events.

- 4.4.4 Figure 3ii/Rev 1 of the SFRA (Figure 2 below) also shows that the site and the adjacent highway of Willoughby Road are not at risk from surface water flooding during events up to and including the 1 in 1000 year event. In fact, the site is located across an area with a less than 1 in 1000 year return period of surface water flooding.
- 4.4.5 It is considered that the site is not at risk of surface water flooding as indicated by the maps.

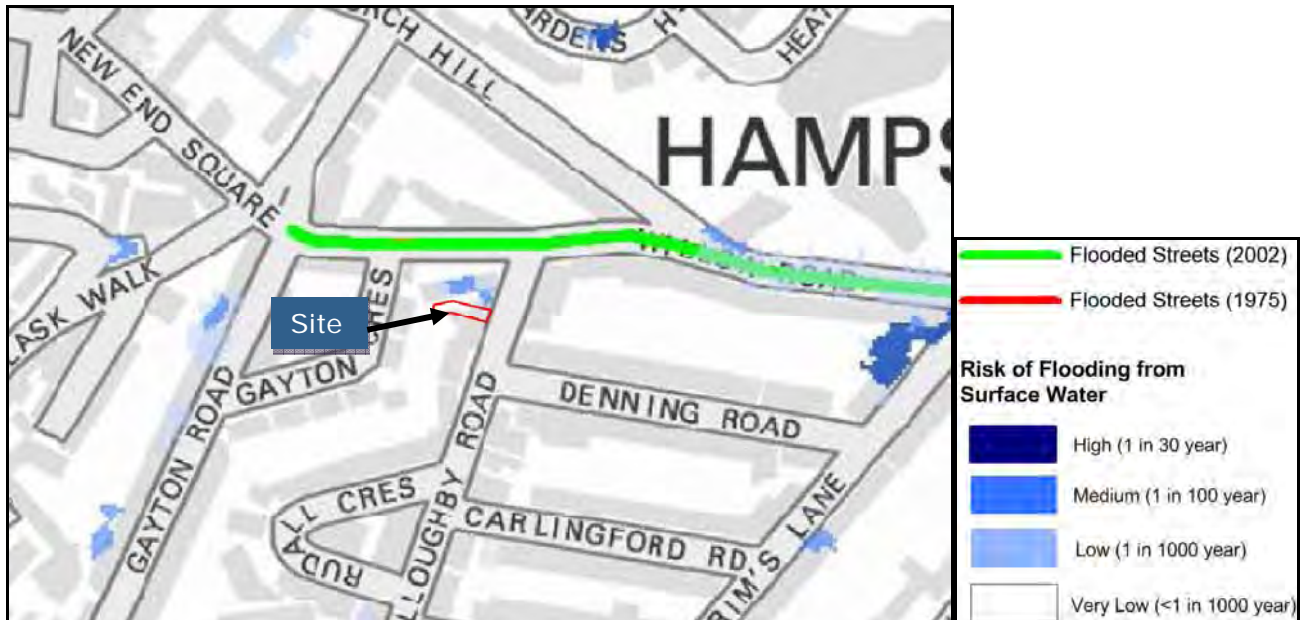


Figure 2: Location of site in relation to surface water flood extent (Source: taken from Figure 3ii/Rev 1 of the SFRA)

Sewer Flooding

- 4.4.6 The SFRA states that the majority of the Borough is served by a combined surface and foul water system which is designed to accommodate rainfall events of up to 1 in 30 years return period.
- 4.4.7 The combined sewer network outfalls into the River Thames during intense rainfall events when the sewer network reaches capacity. The evidence suggests that as the sewer capacity becomes exceeded this results in surcharging of the network prior to sufficient discharge into the Thames.
- 4.4.8 Figure 5a/Rev 1 of the SFRA indicates that the site is located across an area which has had 4 recorded internal sewer flooding incidents. Figure 5b/Rev 1 of the SFRA that the site is located across an area which has had 1 external sewer flooding incidents.
- 4.4.9 It is likely that foul water from the basement level will be drained to a submersible packaged pumping station and pumped to ground level where it will flow into the surrounding sewer system via gravity. It is understood that a non-return valve (e.g. <http://www.forgevalves.co.uk/>) will be installed so that the basement (and upper floors) will be protected further from sewer flooding.
- 4.4.10 This approach also complies with paragraph 5.11 of the Camden Planning Guidance CPG4 dated 2015. Therefore, if the sewer in the road becomes completely full during a heavy storm, foul water does not backflow into the property.

4.5 Reservoirs, Canals And Other Artificial Sources

- 4.5.1 The failure of man-made infrastructure such as flood defences and other structures can result in unexpected flooding. Flooding from artificial sources such as reservoirs, canals and lakes can also occur suddenly and without warning, leading to high depths and velocities of flood water which pose a safety risk to people and property.
- 4.5.2 The Environment Agency's "Risk of flooding from reservoirs" map suggests that the site is not at risk from reservoir flooding. This supported by the SFRA which also states that the risk of flooding from the Regent's Canal is low.

5. SURFACE WATER DRAINAGE

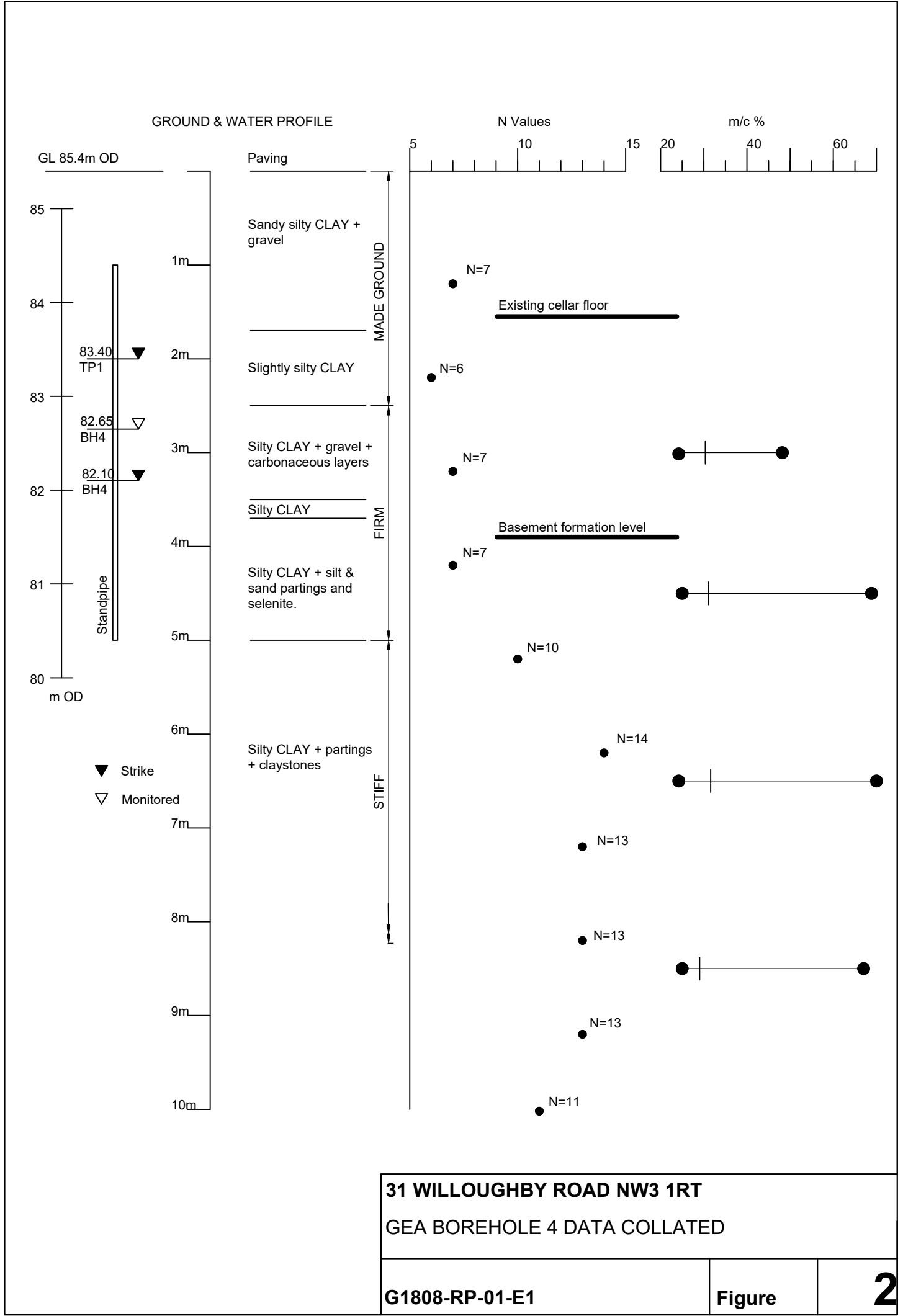
- 5.1 Policy 5.13 in Chapter 5 of the London Plan dated March 2015, requires sustainable drainage systems (SUDS) to be installed where appropriate and in line with the drainage hierarchy in order for runoff to be managed as close to its source as possible.
- 5.2 The London Plan states that SUDS should be utilised unless there are practical reasons for not doing so. The less permeable soils beneath the site are unlikely to possess sufficient infiltration capacity for the practical use of infiltration devices.
- 5.3 Despite a small increase in impermeable area at the front of the property as a result of the basement development, there is a lack of available space and little opportunity to reduce runoff rates from the site via attenuation or rainwater harvesting.
- 5.4 If an attenuation tank was included at the site, it would need to be located in the rear garden area and therefore it may be difficult to direct flows from this device through the house and into the sewer beneath Willoughby Road. It is likely that in this instance, surface water from the tank would be directed to the foul water pump at basement level in order to maintain a discharge into the sewer. There is uncertainty about the viability of this approach, especially when considering the positions of existing downpipes and the reliability of the pump to accommodate surface water flows as well as foul water flows.
- 5.5 Despite this, other SUDS measures should be considered such as rain gardens (i.e. vegetated depressions which hold back water) and pervious surfaces (i.e. possibly permeable paving which could temporarily retain surface water).

6. CONCLUSIONS

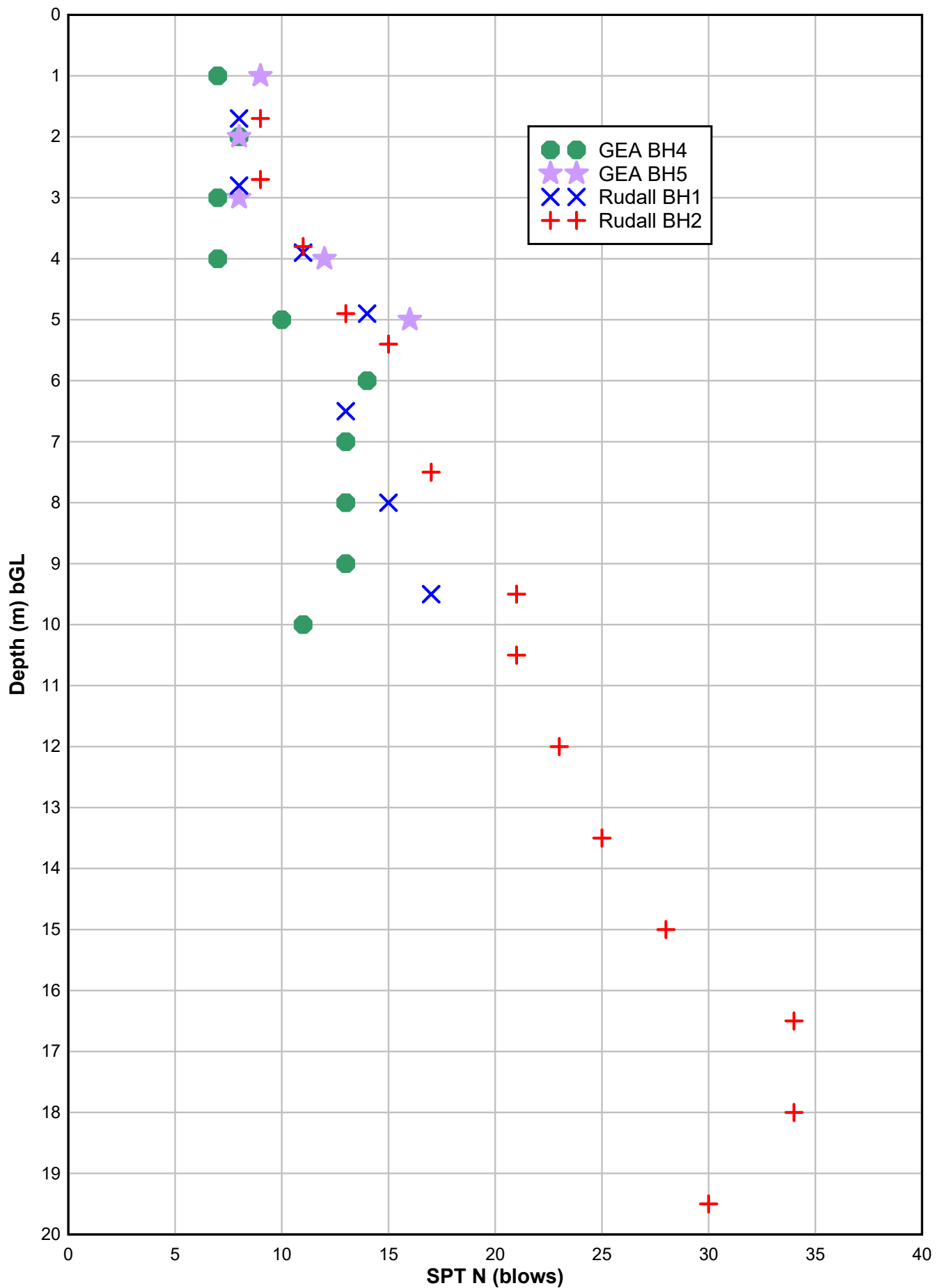
- A review of the relevant guidance documents and various types of data collected at the site has enabled a full assessment of the flood risks to be quantified.
- The site is located within the Flood Zone 1 therefore all uses of land are appropriate in this zone.
- This assessment has investigated the possibility of groundwater flooding and flooding from other sources at the site. It is considered that there will be low risk of groundwater flooding and surface water flooding across the site.
- There is a low to moderate risk of flooding from sewers, however, as a precaution; the risk from sewer flooding should be mitigated further by introducing a non-return valve to the pumped system.

7. BIBLIOGRAPHY

- i. Communities and Local Government 2012. *National Planning Policy Framework*.
- ii. DEFRA/EA 2005. *Framework and guidance for assessing and managing flood risk for new development, Phase 2, Flood and Coastal Defence R&D Programme, R&D Technical Report FD2320/TR2*. Water Research Council.
- iii. DEFRA/Jacobs 2004. *Strategy for Flood and Coastal Erosion Risk Management: Groundwater Flooding Scoping Study (LDS), Final Report, Volumes 1 and 2*.
- iv. Geological Society of London 2006. *Groundwater and Climate Change*. Geoscientist magazine, Volume 16, No 3.
- v. Institute of Geological Sciences 1977. *Hydrogeological Map of England and Wales*, 1:625,000. NERC.
- vi. London Borough of Camden Preliminary Flood Risk Assessment (PFRA) Version 0.2 dated 2011.
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- viii. London Borough of Camden 2013a. *CPG4 Basement and Lightwells*.
- ix. London Borough of Camden 2013b. *Flood risk management strategy*.
- x. London Borough of Camden 2011. *Surface Water Management Plan* Version 1.
- xi. London Borough of Camden 2010. *Camden geological, hydrogeological and hydrological study – Guidance for subterranean development*.
- xii. Water UK 2012. *Sewers for Adoption 7th Edition, A design and construction guide for developers*. Water Research Council.



G1808 31 WILLOUGHBY ROADNW3 1RT - Proposed Basement
SPT Profiles GEA BH4, BH5 & 37-39 Rudall Crescent BH1, BH2



Appendix C Contents

Eldreds 2018-2019 ground investigation – factual report

Figure 4 - Site plan

Borehole records

Laboratory test results

Figure 5 – Transducer arrangement

Figure 6 – Plot of particle size distribution test results

Figure 7 – Plot of Moisture content, plasticity and clay content profiles

Figure 8 – Plot of groundwater measurement August 2018 to March 2019

Figure 9 – Sketched long section

Figure 10 – Sketched cross section of front part of No.31

Figure 11 – Sketched cross section of rear part of No.31

Figure 12 – Plot of SPT and U100 blow count profiles

Figure 13 – Plot of SPTCu and Triaxial test undrained shear strength profiles



Project 31 WILLOUGHBY ROAD NW3 1RT - BASEMENT				BH1
Job No G1808	Date 13-08-18 14-08-18	Ground Level (m ODN) 85,50	Co-Ordinates (OSGB36) E 526.718,0 N 185.855,0	
Method Demountable cable percussion rig; borehole 200dia. to 5m, 150dia. 5m to EOB				Sheet 1 of 3

SAMPLES & TESTS			Water	EXCAVATION RECORD				
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	MATERIAL DESCRIPTION	
							Main Description	Strata Notes
0,50-0,95	B1			84,20		(1,30)	0,0- 0,2 Brick pavours on sharp sand 0,2- 0,3 Concrete 0,3- 0,5 Crushed brick 0,5- 1,3 Soft grey/green clay sand & brick; (cutting tool drove brick to 2m bGL) (MADE GROUND)	
1,00-1,95 1,00	B3 C	N7 1/2/1/2/2/2					1,30	
1,50-1,95 1,50	B4 C	N8 2/1/1/2/3/2				(2,20)	Soft low strength brown sandy and silty CLAY with rare rounded flint gravel and 5mm angular brick fragments (driven from above?) (MADE GROUND)	
2,00-2,45	U5	12 blows						
2,50 2,50 2,80	S6 SPT	N7 1/1/2/2/1/2						
3,00-3,45 3,00-3,45	U7 B8	16 blows NR						
3,50 3,50	S9 SPT	N10 1/2/2/2/3/3		82,00		3,50	Firm medium strength brown slightly sandy silty CLAY with rare m.f. rounded flint gravel. (HEAD)	
4,00-4,45	U10	25 blows		81,50			(0,50)	
4,50 4,50	S11 SPT	N15 1/2/3/3/4/5				(2,00)	Firm becoming stiff, medium strength brown fragmented and thinly laminated silty CLAY disturbed by freeze/thaw, possibly with zones of concentrated mobilization. Occasional fine roots. (LONDON CLAY - Disturbed)	
5,00-5,45	U12	30 blows						

Groundwater Observations During Drilling					Groundwater Strikes During Drilling							Chiselling		
Date &Time	Obs. (min)	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Date &Time	Obs. (min)	Strike Depth (m)	Casing Depth (m)	Inflow Rate	Rise to depth	Depth Sealed (m).	From (m).	To (m)	Time (hhmm)
13/08 00:00	Wet	2,80	2,00	2,80	13/08 00:00	30	2.8	2,00	Seep					
13/08 00:00	Dry	4,00	4,00											

All dimensions in metres Scale 1:34.375	Contractor P J Drilling Ltd	Plant Used Dando 100 modular rig.	Logged By Mdf/MLE
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Project 31 WILLOUGHBY ROAD NW3 1RT - BASEMENT				BH1
Job No G1808	Date 13-08-18 14-08-18	Ground Level (m ODN) 85,50	Co-Ordinates (OSGB36) E 526.718,0 N 185.855,0	
Method Demountable cable percussion rig; borehole 200dia. to 5m, 150dia. 5m to EOB				Sheet 2 of 3

SAMPLES & TESTS			Water	EXCAVATION RECORD				
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	MATERIAL DESCRIPTION	
							Main Description	Strata Notes
5,50 5,50	S13 SPT	N17 3/2/3/4/5/5						10mm thick bands of broken shells at circa 8.0m
				79,50		6,00		
6,00-6,45	U14	25 blows				Stiff medium to high strength grey slightly silty thinly laminated and very closely fissured (fissures are horizontal) CLAY; (LONDON CLAY)		
6,50 6,50	S15 SPT	N17 1/2/4/4/4/5						
7,00-7,45	U16	35 blows						
7,50 7,50	S17 SPT	N18 2/3/4/4/5/5						
8,00-8,45	U18	40 blows						
8,50 8,50	S19 SPT	N17 1/2/3/4/5/5						
9,00-9,45	U20	40 blows						
9,45 9,50 9,50	D21 S22 SPT	N21 2/3/4/4/5/8						
10,00-10,45	U23	40 blows						
10,45 10,50 10,50	D24 S25 SPT	N24 3/4/5/5/7/7						


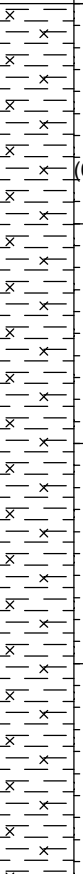
Groundwater Observations During Drilling					Groundwater Strikes During Drilling							Chiselling		
Date & Time	Obs. (min)	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Date & Time	Obs. (min)	Strike Depth (m)	Casing Depth (m)	Inflow Rate	Rise to depth	Depth Sealed (m)	From (m)	To (m)	Time (hhmm)
13/08 00:00	Dry	6,10	4,50											

All dimensions in metres Scale 1:34.375	Contractor P J Drilling Ltd	Plant Used Dando 100 modular rig.	Logged By Mdf/MLE
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CABLE PERCUSSION BOREHOLE RECORD

Project 31 WILLOUGHBY ROAD NW3 1RT - BASEMENT				BH1
Job No G1808	Date 13-08-18 14-08-18	Ground Level (m ODN) 85,50	Co-Ordinates (OSGB36) E 526.718,0 N 185.855,0	
Method Demountable cable percussion rig; borehole 200dia. to 5m, 150dia. 5m to EOB				Sheet 3 of 3







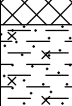
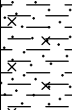
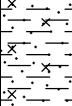
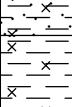
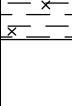
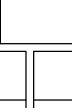
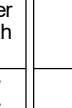



SAMPLES & TESTS			Water	EXCAVATION RECORD						
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	MATERIAL DESCRIPTION			
							Main Description	Strata Notes		
11,00-11,45	U26	45 blows					Stiff high strength grey silty thinly laminated and very to extremely closely fissured (fissures are horizontal to sub horizontal) CLAY. (LONDON CLAY) <i>(continued)</i>	Consistency is locally firm at circa 14.0m		
11,45-11,50	D27	N28 2/7/7/7/7/7				(6,50)				
11,50-11,50	S28									
11,50	SPT									
12,00-12,45	U29			45 blows						
12,45-12,50	D30			N29 3/6/7/7/7/8						
12,50-12,50	S31									
12,50	SPT									
13,00-13,45	U32	48 blows								
13,45-13,50	D33	N34 4/6/7/8/9/10								
13,50-13,50	S34									
13,50	SPT									
14,00-14,45	U35			48 blows						
14,45-14,55	D36			N35 7/7/8/8/9/10						
14,55-15,00	S37									
15,00-15,00	SPT									
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Groundwater Observations During Drilling					Groundwater Strikes During Drilling							Chiselling		
Date & Time	Obs. (min)	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Date & Time	Obs. (min)	Strike Depth (m)	Casing Depth (m)	Inflow Rate	Rise to depth	Depth Sealed (m).	From (m).	To (m)	Time (hhmm)
14/08 00:00	Wet	13,00	4,50	13,00	14/08 00:00	30	13	4,50	Seep					
14/08 00:00	Dry	15,00	4,50											

All dimensions in metres Scale 1:34.375	Contractor P J Drilling Ltd	Plant Used Dando 100 modular rig.	Logged By Mdf/MLE
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Project 31 WILLOUGHBY ROAD NW3 1RT - BASEMENT				BH2
Job No G1808	Date 15-08-18 15-08-18	Ground Level (m ODN) 85,50	Co-Ordinates (OSGB36) E 526.719,0 N 185.855,0	
Method Demountable cable percussion rig; borehole 200dia.				Sheet 1 of 1

SAMPLES & TESTS			Water	EXCAVATION RECORD				
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	MATERIAL DESCRIPTION	
							Main Description	Strata Notes
0,50-0,95	B1	NR			(0,50)	Brick pavours on sand to 0.15m on 100mm thick concrete on soft dark grey/brown clay with brick. (MADE GROUND)	15mm layer of organic material; possibly from stream bed. circa 2.5m	
1,00-1,45	B3	N4	85,00		0,50	Soft low strength dark grey/brown becoming brown mottled green silty sandy and slightly gravelly CLAY. Gravel is m.f rounded flint with rare crushed brick. Occasional fine roots. (MADE GROUND) .		
1,00	SPT	1/2/1/1/1/1						
1,50-1,95	U4	11 blows			(2,50)			
1,95	D5							
2,00	S6							
2,00-2,45	B7	N4						
2,00	SPT	2/1/1/1/1/1						
2,50-2,95	U8	11 blows						
2,95	D9		82,50		3,00			
3,00	S10					Soft medium strength brown silty, slightly sandy CLAY. Occasional fine roots. (HEAD)		
3,00-3,45	B11	N7						
3,00	SPT	1/1/1/2/2/2						
3,45	D12				(1,50)			
3,50-3,95	U11	15 blows						
3,95	D12							
4,00	S13	N12						
4,00	SPT	1/1/2/3/3/4						
4,50-4,95	U14		81,00		4,50	Firm medium strength thinly laminated brown silty CLAY. Occasional fine roots. (DISTURBED LONDON CLAY)		
					(0,50)			
4,95	D15		80,50		5,00			
						Borehole ends		

Groundwater Observations During Drilling					Groundwater Strikes During Drilling							Chiselling		
Date &Time	Obs. (min)	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Date &Time	Obs. (min)	Strike Depth (m)	Casing Depth (m)	Inflow Rate	Rise to depth	Depth Sealed (m).	From (m).	To (m)	Time (hhmm)
		1,35		Dry										
		3,00	2,00	Dry										
		3,50	3,00	Dry										
		5,00	3,00	Dry										

All dimensions in metres Scale 1:34.375	Contractor P J Drilling Ltd	Plant Used Dando 100 modular rig.	Logged By Mdf/MLE
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Descriptions of samples from 31 Willoughby Road recovered 13th to 15th August 2018 Logged by M.H. de Freitas

Bulk(B), SPT(S), Cutting shoe (CS) samples logged 13th-15th August

U(UUTxl) extruded & tested 15th November; logged 26th November 2018

Vocabulary of spacing:

Fissuring. Very close = 20 – 60mm. Extremely close = <20mm.

Thinly laminated = < 6mm

Loc'n	Depth	Type	Description	Geology
BH1	0.5	B		
	1.0-1.45	B		
	1.5-1.95	B		
	2.0-2.45	U	Soft brown clay @PL comprising angular fragments of clay mixed with ~ 0.5cm lenses silt which together exhibit a crude stratification, plus occasional 0.5cm angular fragment of red brick. Fine rootlets present. .	Made Ground
	2.5-2.95	S	Soft brown damp clay with possibly slightly silt/fine sand content with rounded flint fragment medium gravel size. @ PL or just wet of.	Made Ground
	3.0-3.45	B	Soft, brown, moist to almost wet clay matrix supporting isolated medium to fine (and suspect smaller) size angular fragments of brick and stone. Brown colouration in clay contains patches of different hues. Wet of PL	
	3.5-3.95	S	Firm brown damp mosaic of angular clasts ~ 7mm side length of London Clay some being litho-relics, with veins and blotches of blue. Rounded flints of medium and fine grained gravel size. @PL or just wet of	London Clay
	4.0-4.45	U	Soft to firm brown horizontally thinly laminated brown clay @ PL comprised of angular but rounded fragments of laminated clay up to 4cm across often with smooth surfaces, closely packed and mainly outlined by light brown 1mm rim of light brown clay; occasional 1mm rim of soft light blue clay. (Disturbed by freeze-thaw).	London Clay
	4.5-4.95	S	Stiff brown damp mosaic of angular lithorelics of thinly laminated London Clay ~ 7mm side length, bounded by veins of blue clay <1mm thick. @PL	London Clay

Descriptions of samples from 31 Willoughby Road recovered 13th to 15th August 2018 Logged by M.H. de Freitas

Bulk(B), SPT(S), Cutting shoe (CS) samples logged 13th-15th August

U(UUTxl) extruded & tested 15th November; logged 26th November 2018

Vocabulary of spacing:

Fissuring. Very close = 20 – 60mm. Extremely close = <20mm.

Thinly laminated = < 6mm

Loc'n	Depth	Type	Description	Geology
BH1	5.0-5.45	U	Firm grey very closely fissured clay going brown on the fissures. Fissures producing blocks 5cm -6cm across; clay in blocks @ PL. Between these blocks is soft grey clay on wet side of PL consisting of 1cm angular fragments forming a clay clast supported fabric in a soft clay matrix. Some of the boundaries between this soft clay and the blocks bounded by fissures are striated surfaces that are sub-horizontal and at 45°. Fine lace-like network of black fibrous rootlets on some planar surfaces. (Disturbed with what appear to be zones of concentrated mobilization; slope instability, valley bulge?).	London Clay
	5.5-5.95	S	Stiff brown damp mosaic of angular fragments larger than those above ~10mm+ very well thinly laminated; appears to be undisturbed. @PL.	London Clay
	6.0-6.45	U	Stiff horizontally very closely fissured grey thinly laminated clay that has a dry silty appearance, just turning brown on fissure surfaces; on dry side of PL. Horizontal fissures smooth, undulating and extremely closely spaced	London Clay
	6.5-6.95	S	Stiff grey damp very well & thinly laminated clay. @PL	London Clay
	7.0-7.45	U	Stiff grey thinly laminated clay that glistens suggesting a visible silt content. On dry side of PL. Horizontal smooth undulating fissures just discernible. Small gastropods occasionally present	London Clay
	7.5-7.95	S	Stiff grey damp very well & thinly laminated clay. @PL	London Clay
	8.0-8.45	U	Firm grey thinly laminated clay just wet of PL. Bands of broken shells 1cm thick at 40° subparallel to laminations. Weakly developed	London Clay

Descriptions of samples from 31 Willoughby Road recovered 13th to 15th August 2018 Logged by M.H. de Freitas

Bulk(B), SPT(S), Cutting shoe (CS) samples logged 13th-15th August

U(UUTxl) extruded & tested 15th November; logged 26th November 2018

Vocabulary of spacing:

Fissuring. Very close = 20 – 60mm. Extremely close = <20mm.

Thinly laminated = < 6mm

Loc'n	Depth	Type	Description	Geology
BH1			horizontal and sub-vertical fissuring. Although it looks disturbed (40° dips) no striated surfaces were found.	
	8.5-8.95	S	Stiff grey damp very well & thinly laminated clay. @PL	London Clay
	9.0-9.45	U	Stiff grey thinly laminated very closely fissured clay on dry side of PL, possibly silty. Fissures smooth and planar to undulating. No striations. (Undisturbed)	London Clay
	9.45	CS	Firm to stiff thinly laminated extremely closely fissured damp grey clay. Dry of PL	London Clay
	9.5-9.95	S	Stiff grey damp very well & thinly laminated clay. @PL	London Clay
	10.0-10.45	U		
	10.5	CS	Stiff thinly laminated extremely closely fissured damp grey clay. @ PL	London Clay
	10.5-10.95	S	Stiff grey damp very well & thinly laminated clay. @PL or just below	London Clay
	11.0-11.45	U		
	11.5-11.95	S	Stiff grey damp very well thinly laminated clay that breaks more easily and could contain more silt than above. Dry of PL	London Clay
	12.0-12.45	U	Stiff grey thinly laminated clay on dry side of PL, possibly silty. Very closely fissured.	London Clay
	12.5-12.95	S	Stiff to Very Stiff grey damp very well thinly laminated clay that breaks more easily and could contain more silt than that to 11.5m. Dry of PL	London Clay
	13.0-13.45	U		
	13.5-13.95	S	Stiff to Very Stiff grey damp very well thinly laminated clay that breaks more easily and could contain more silt than that to 11.5m. Dry of PL	London Clay

Descriptions of samples from 31 Willoughby Road recovered 13th to 15th August 2018 Logged by M.H. de Freitas

Bulk(B), SPT(S), Cutting shoe (CS) samples logged 13th-15th August

U(UUTxl) extruded & tested 15th November; logged 26th November 2018

Vocabulary of spacing:

Fissuring. Very close = 20 – 60mm. Extremely close = <20mm.

Thinly laminated = < 6mm

Loc'n	Depth	Type	Description	Geology
BH1	14.0-14.45	U	Firm grey thinly laminated very closely fissured clay with m/c close to PL; possibly silty. Occasional light brown 1mm thick bands of silt to fine sand	London Clay
	14.45	CS	Stiff thinly laminated extremely closely fissured damp grey clay. Occasional fragments of shell. More easily split than that at 190.5 and may contain more silt. Appears to be unfissured. Dry of PL	London Clay
	14.5-14.95	S	Stiff to Very Stiff grey extremely closely fissured damp thinly laminated clay that breaks more easily and could contain more silt than that to 11.5m. Fissures are fine and delicate in nature. No sign of polishing on them. Dry of PL	London Clay
BH2	0.5	B		
	1.0-1.45	B		
	1.5-1.95	U	Brown mottled green clay peds 2cm – 3cm just wet of PL, intermixed with lenticles of green silt/sand separated by a sharp horizontal boundary from structureless brown clay wet of PL with included angular fine gravel size fragments of red brick..	Made ground
	2.0	CS	Soft brown structureless clay matrix with sand and silt content supporting fragments of brick and stone fine gravel to medium sand in size. Rootlets and @ just dry of PL. Crumbles on remoulding	

Descriptions of samples from 31 Willoughby Road recovered 13th to 15th August 2018 Logged by M.H. de Freitas

Bulk(B), SPT(S), Cutting shoe (CS) samples logged 13th-15th August

U(UUTxl) extruded & tested 15th November; logged 26th November 2018

Vocabulary of spacing:

Fissuring. Very close = 20 – 60mm. Extremely close = <20mm.

Thinly laminated = < 6mm

Loc'n	Depth	Type	Description	Geology
BH2	2.0-2.45	S	Soft brown structureless clay matrix supporting fragments of brick and stone fine gravel to medium sand in size. Rootlets and @ PL or just wet of.	Made Ground
	2.5-2.95	B	Stiff light brown/orange structureless clay on wet side of PL containing rootlets and occasional rounded flint of fine/medium size gravel, and 1.5cm sub-horizontal layer of structureless black clay containing soft elongate fragments of wood (10mm long x 2mm across) and possibly peat.	Made Ground
	2.5-2.95	U	No recovery	
	2.95	CS	Soft brown clay with silt and occasional rounded flint med to coarse gravel size. Light brown 1mm peds of soil surrounded by darker mottled brown with light and dark hues clay matrix forming agglomerates ~ 1cm in diameter with an elliptical shape that has its long axis approx. sub-horizontal. Separates along the boundaries of the aggregates which often have blue veining and staining and sometimes rootlets. Overall @ PL.	Transported
	3.0-3.45	B	Soft brown clay with silt. Light brown 1mm peds of soil surrounded by darker clay matrix forming agglomerates ~ 1cm in diameter with an elliptical shape that has its long axis approx. sub-horizontal. Separates along the boundaries of the aggregates which often have blue veining and staining and sometimes rootlets. Overall @ PL.	Transported
	3.45	CS	Soft brown clay with silt. Light brown 1mm peds of soil surrounded by darker clay matrix forming agglomerates ~ 1cm in diameter with an elliptical shape that has its long axis approx. sub-horizontal. Separates along the boundaries	Transported

Descriptions of samples from 31 Willoughby Road recovered 13th to 15th August 2018 Logged by M.H. de Freitas

Bulk(B), SPT(S), Cutting shoe (CS) samples logged 13th-15th August

U(UUTxl) extruded & tested 15th November; logged 26th November 2018

Vocabulary of spacing:

Fissuring. Very close = 20 – 60mm. Extremely close = <20mm.

Thinly laminated = < 6mm

Loc'n	Depth	Type	Description	Geology
BH2			of the aggregates which often have blue veining and staining and sometimes rootlets. Overall @ PL.	
	3.5-3.95	U	Accumulation of stiff/firm brown thinly laminated clay peds at PL, clast supported but exhibiting extremely closely fissuring with green gleying 1mm on occasional sub-vertical surfaces.	Transported
	3.95	CS	Soft and highly remoulded sample on wet side of PL. Of dubious representativeness.	
	4.0-4.45	S	Soft to firm brown thinly laminated clay with blue staining on some laminae. @ PL (in situ).	London Clay
	4.5-4.95	U	Firm brown thinly laminated clay comprising of angular but rounded fragments of the clay 1cm – 2cm across at around PL, with much green gleying on sub-horizontal and 45° pervasive surfaces; no striations or polishing. 1cm thick orange brown lens of fine-medium sand that thins to nothing across the diameter of the core and containing fine network of black rootlets.	Disturbed
	4.95	CS	Firm brown thinly laminated London Clay just on dry side of PL and appears to be silty with blue staining on some laminae and blue veining on some fissures. Occasional rootlets penetrating fissures.	



Summary of Natural Moisture Content, Liquid Limit and Plastic Limit Results

Job No. 25366	Project Name 31 Willoughby Road, London NW3 1RT	Programme	
		Samples received	17/08/2018
Project No. G1808	Client Eldred Geotechnics Ltd	Schedule received	22/10/2018
		Project started	23/10/2018
		Testing Started	01/11/2018

Hole No.	Sample				Soil Description	NMC %	Passing 425µm %	LL %	PL %	PI %	Remarks
	Ref	Top m	Base m	Type							
BH1	4	1.50	1.95	B	Green silty clayey SAND with numerous brown slightly sandy silty clay lumps and rare fm sub-angular to sub-rounded gravel	21	91	43	17	26	
BH1	5	2.00	2.45	U	High strength brown mottled orangish brown clayey gravelly silty SAND with rare fine brick fragments (gravel is fmc and rounded to sub-angular)	17	80	41	17	24	
BH1	8	3.00	3.45	B	Brown and occasional greenish grey slightly gravelly sandy silty CLAY (gravel is fm and sub-angular to sub-rounded)	28	94	42	18	24	
BH1	10	4.00	4.45	U	Medium strength brown slightly mottled grey silty CLAY with rare pockets of orange fine sand / silt and traces of selenite crystals and rootlets	33	99	66	23	43	
BH1	12	5.00	5.45	U	High strength brown silty CLAY with rare pockets of orange fine sand / silt	32	100	68	27	41	
BH1	14	6.00	6.45	U	High strength dark brown slightly mottled orangish brown silty CLAY with occasional pockets of fine sand / silt	28	99	67	25	42	
BH1	16	7.00	7.45	U	High strength dark grey silty CLAY with rare pockets of fine sand	28	100	68	24	44	
BH1	18	8.00	8.45	U	High strength dark grey silty CLAY	29	100	66	25	41	
BH2	3	1.00	1.45	B	Greenish grey and occasional dark grey gravelly clayey very silty SAND with rare cobbles (gravel is fmc and sub-angular to sub-rounded)	20	87	36	18	18	
BH2	4	1.50	1.95	U	High strength brown and orangish brown mottled slightly gravelly sandy silty CLAY with rare brick fragments and traces of carbonaceous deposits (gravel is fm and sub-angular)	21	87	33	15	18	
BH2	8	2.50	2.95	U	Medium strength grey, brown and orangish brown mottled slightly gravelly sandy silty CLAY (gravel is fm and rounded to sub-angular)	27	74	42	20	22	
BH2	11	3.00	3.45	B	Brown slightly mottled grey slightly sandy silty CLAY	33	99	62	22	40	

	Test Methods: BS1377: Part 2: 1990: Natural Moisture Content : clause 3.2 Atterberg Limits: clause 4.3, 4.4 and 5.0	Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU Tel: 01923 711 288 Email: James@k4soils.com	Checked and Approved Initials J.P Date: 06/11/2018
	2519	Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)	MSF-5-R1

[illegible]



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

25366

Borehole/Pit No.

BH1

Site Name

31 Willoughby Road, London NW3 1RT

Sample No.

4

Project No.

G1808

Client

Eldred Geotechnics Ltd

Depth Top

1.50

m

Depth Base

1.95

m

Sample Type

B

Samples received

17/08/2018

Schedules received

22/10/2018

Project Started

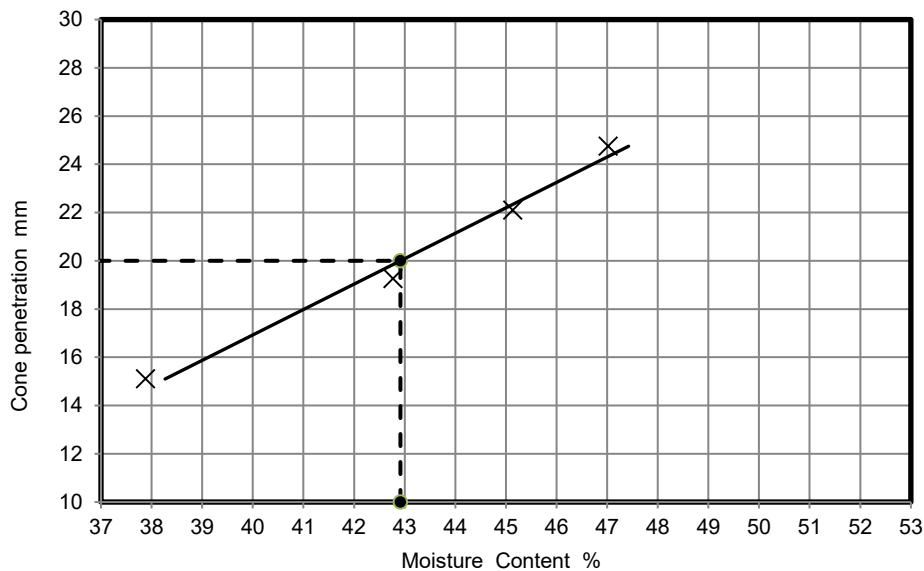
23/10/2018

Date Tested

01/11/2018

Soil Description

Green silty clayey SAND with numerous brown slightly sandy silty clay lumps and rare fm sub-angular to sub-rounded gravel



NATURAL MOISTURE CONTENT

21

%

% PASSING 425µm SIEVE

91

%

LIQUID LIMIT

43

%

PLASTIC LIMIT

17

%

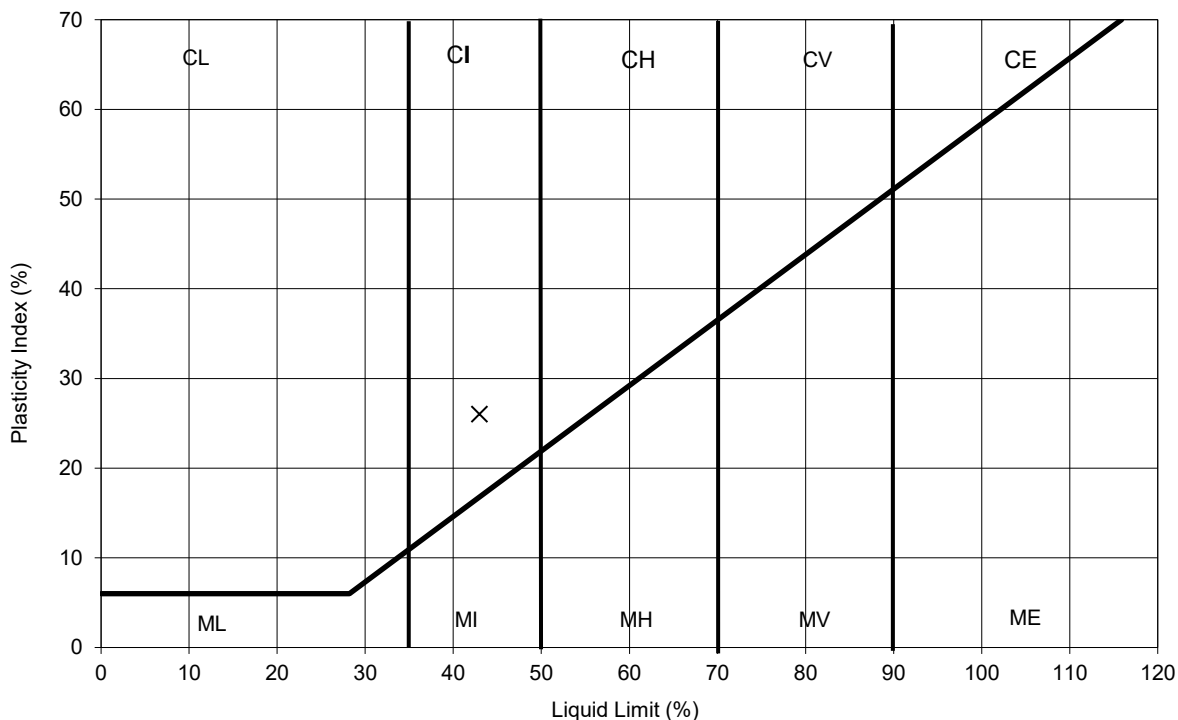
PLASTICITY INDEX

26

%

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved

Initials: J.P

Date: 06/11/2018

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2





LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

25366

Borehole/Pit No.

BH1

Site Name

31 Willoughby Road, London NW3 1RT

Sample No.

5

Project No.

G1808

Client

Eldred Geotechnics Ltd

Depth Top

2.00

m

Depth Base

2.45

m

Sample Type

U

Samples received

17/08/2018

Schedules received

22/10/2018

Project Started

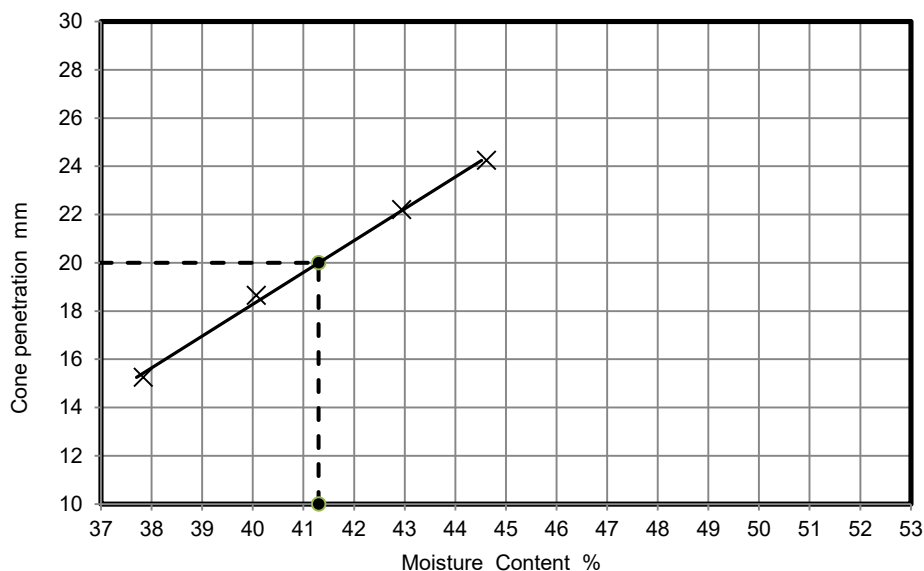
23/10/2018

Date Tested

01/11/2018

Soil Description

High strength brown mottled orangish brown clayey gravelly silty SAND with rare fine brick fragments (gravel is fmc and rounded to sub-angular)

**NATURAL MOISTURE CONTENT**

17

%

% PASSING 425µm SIEVE

80

%

LIQUID LIMIT

41

%

PLASTIC LIMIT

17

%

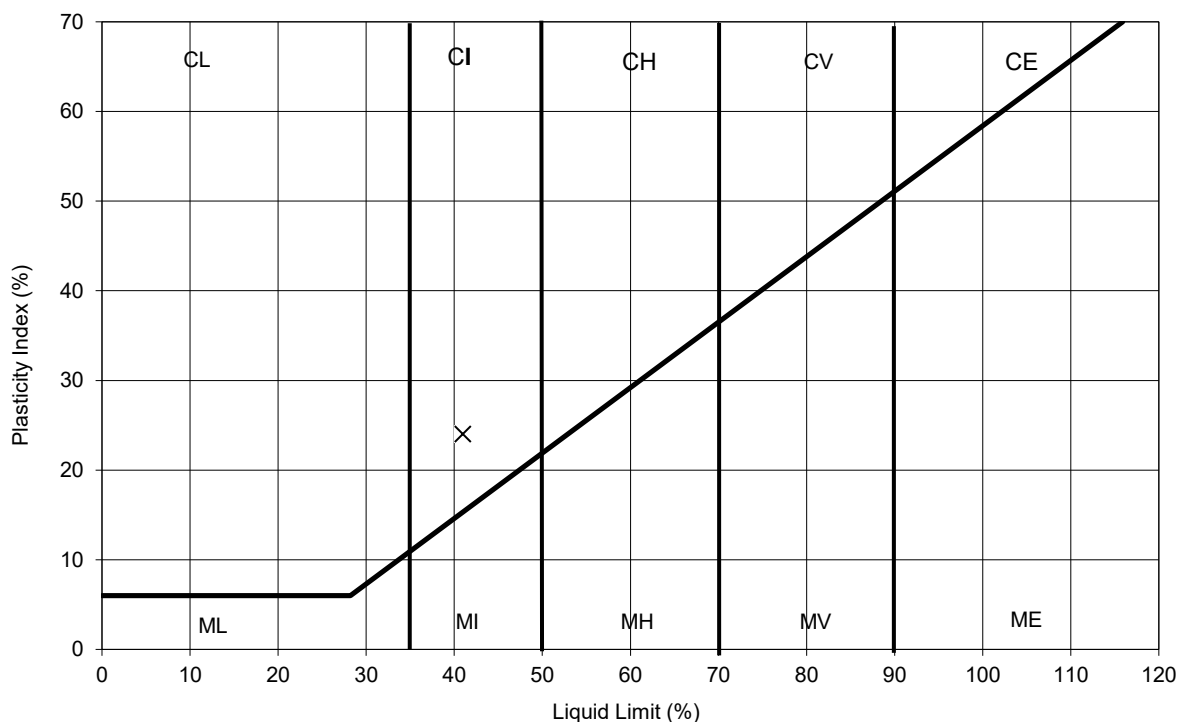
PLASTICITY INDEX

24

%

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990: Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved

Initials: J.P

Date: 06/11/2018

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

25366

Borehole/Pit No.

BH1

Site Name

31 Willoughby Road, London NW3 1RT

Sample No.

8

Project No.

G1808

Client

Eldred Geotechnics Ltd

Depth Top

3.00

m

Depth Base

3.45

m

Sample Type

B

Samples received

17/08/2018

Schedules received

22/10/2018

Project Started

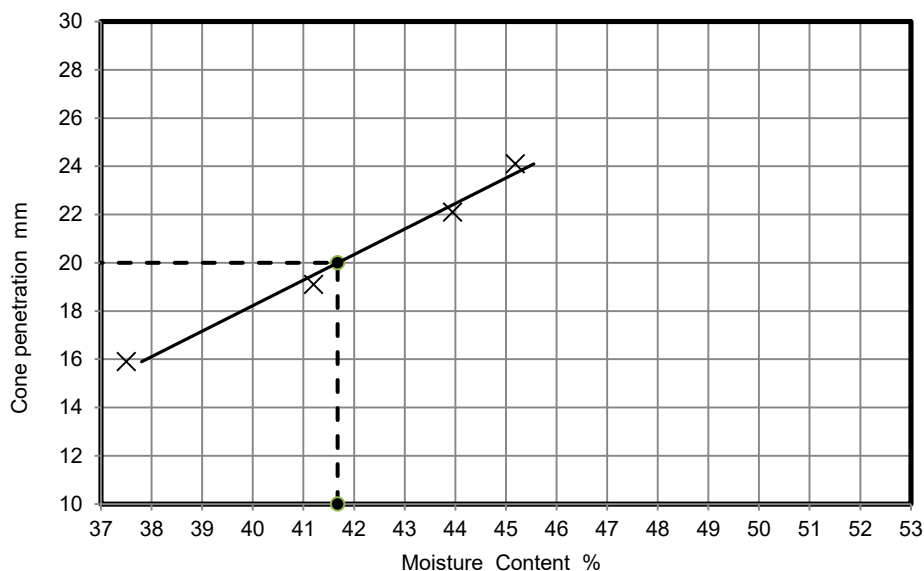
23/10/2018

Date Tested

01/11/2018

Soil Description

Brown and occasional greenish grey slightly gravelly sandy silty CLAY (gravel is fm and sub-angular to sub-rounded)



NATURAL MOISTURE CONTENT

28

%

% PASSING 425µm SIEVE

94

%

LIQUID LIMIT

42

%

PLASTIC LIMIT

18

%

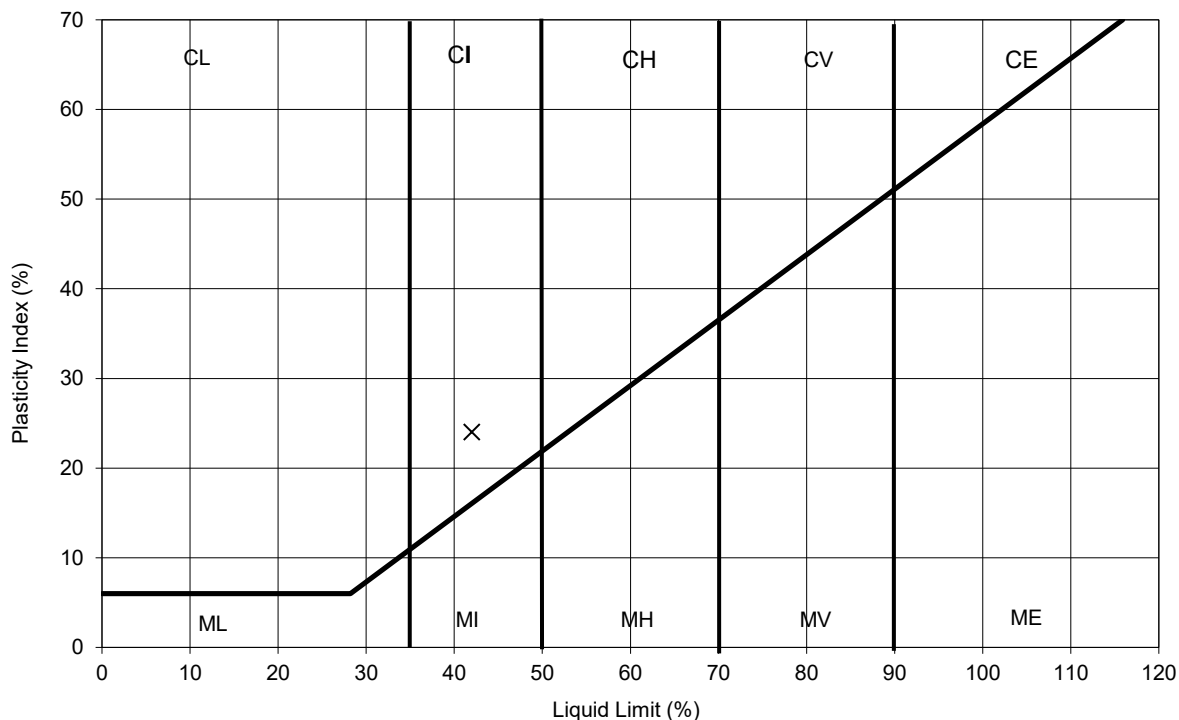
PLASTICITY INDEX

24

%

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

25366

Borehole/Pit No.

BH1

Site Name

31 Willoughby Road, London NW3 1RT

Sample No.

10

Project No.

G1808

Client

Eldred Geotechnics Ltd

Depth Top

4.00

m

Depth Base

4.45

m

Sample Type

U

Samples received

17/08/2018

Schedules received

22/10/2018

Project Started

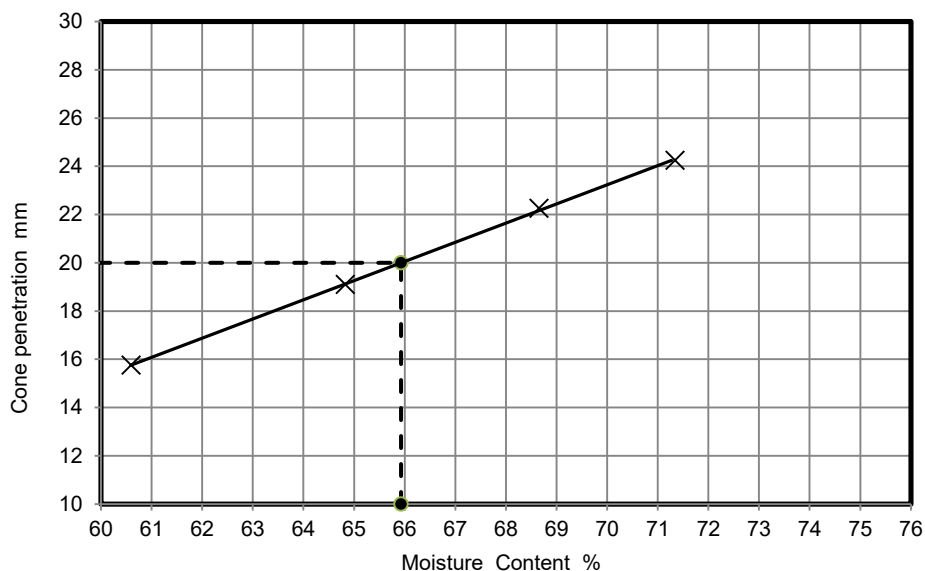
23/10/2018

Date Tested

01/11/2018

Soil Description

Medium strength brown slightly mottled grey silty CLAY with rare pockets of orange fine sand / silt and traces of selenite crystals and rootlets



NATURAL MOISTURE CONTENT

33

%

% PASSING 425µm SIEVE

99

%

LIQUID LIMIT

66

%

PLASTIC LIMIT

23

%

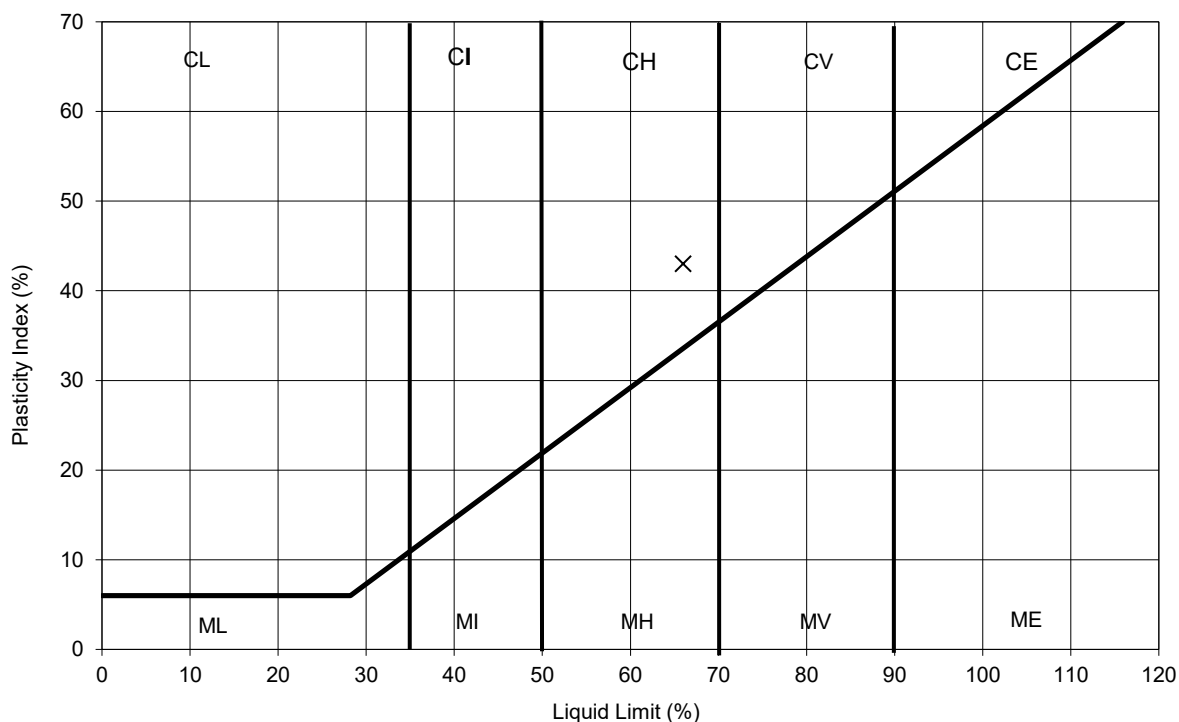
PLASTICITY INDEX

43

%

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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Initials: J.P

Date: 06/11/2018

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MSF-5 R2





LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

25366

Borehole/Pit No.

BH1

Site Name

31 Willoughby Road, London NW3 1RT

Sample No.

12

Project No.

G1808

Client

Eldred Geotechnics Ltd

Depth Top

5.00

m

Depth Base

5.45

m

Sample Type

U

Samples received

17/08/2018

Schedules received

22/10/2018

Project Started

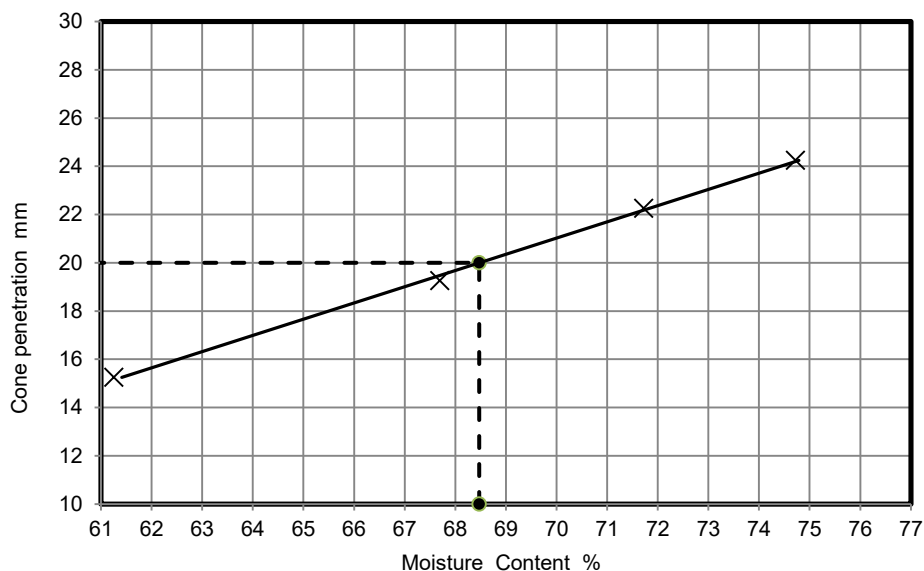
23/10/2018

Date Tested

01/11/2018

Soil Description

High strength brown silty CLAY with rare pockets of orange fine sand / silt



NATURAL MOISTURE CONTENT

32

%

% PASSING 425µm SIEVE

100

%

LIQUID LIMIT

68

%

PLASTIC LIMIT

27

%

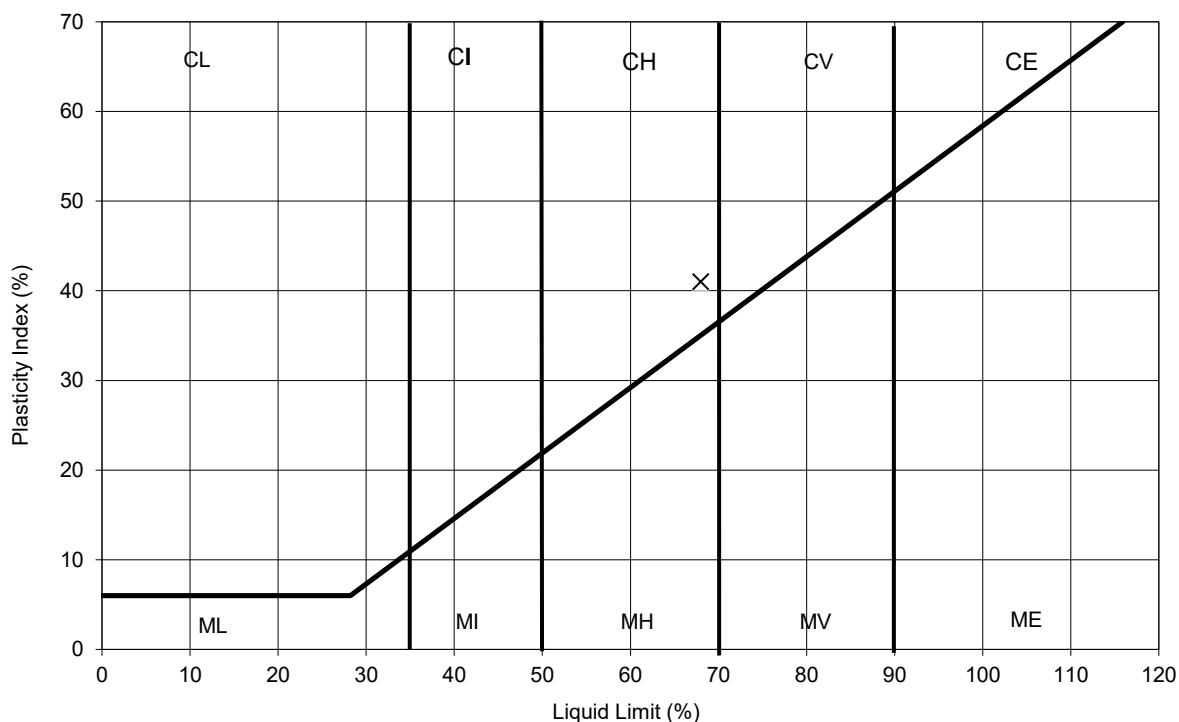
PLASTICITY INDEX

41

%

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

25366

Borehole/Pit No.

BH1

Site Name

31 Willoughby Road, London NW3 1RT

Sample No.

14

Project No.

G1808

Client

Eldred Geotechnics Ltd

Depth Top

6.00

m

Depth Base

6.45

m

Sample Type

U

Samples received

17/08/2018

Schedules received

22/10/2018

Project Started

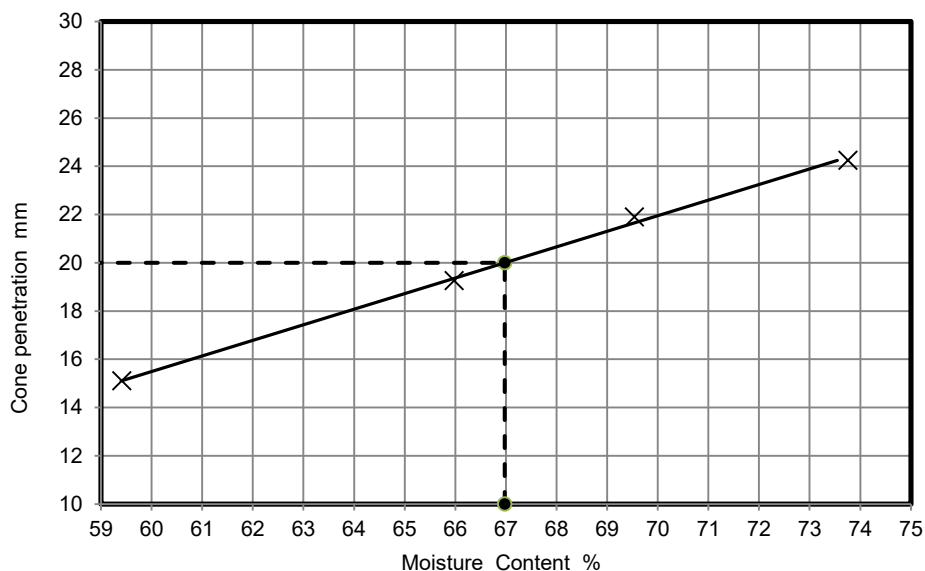
23/10/2018

Date Tested

01/11/2018

Soil Description

High strength dark brown slightly mottled orangish brown silty CLAY
with occasional pockets of fine sand / silt



NATURAL MOISTURE CONTENT

28

%

% PASSING 425µm SIEVE

99

%

LIQUID LIMIT

67

%

PLASTIC LIMIT

25

%

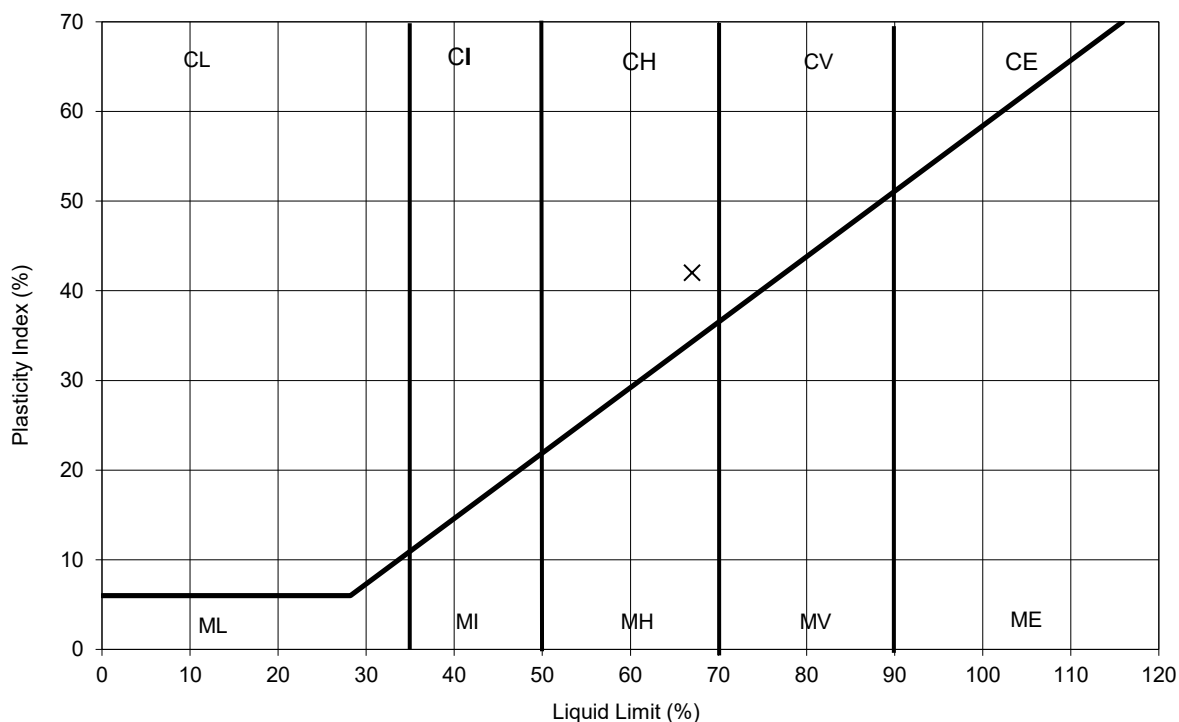
PLASTICITY INDEX

42

%

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

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Checked and Approved

Initials: J.P

Date: 06/11/2018

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MSF-5 R2





LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

25366

Borehole/Pit No.

BH1

Site Name

31 Willoughby Road, London NW3 1RT

Sample No.

16

Project No.

G1808

Client

Eldred Geotechnics Ltd

Depth Top

7.00

m

Depth Base

7.45

m

Sample Type

U

Samples received

17/08/2018

Schedules received

22/10/2018

Project Started

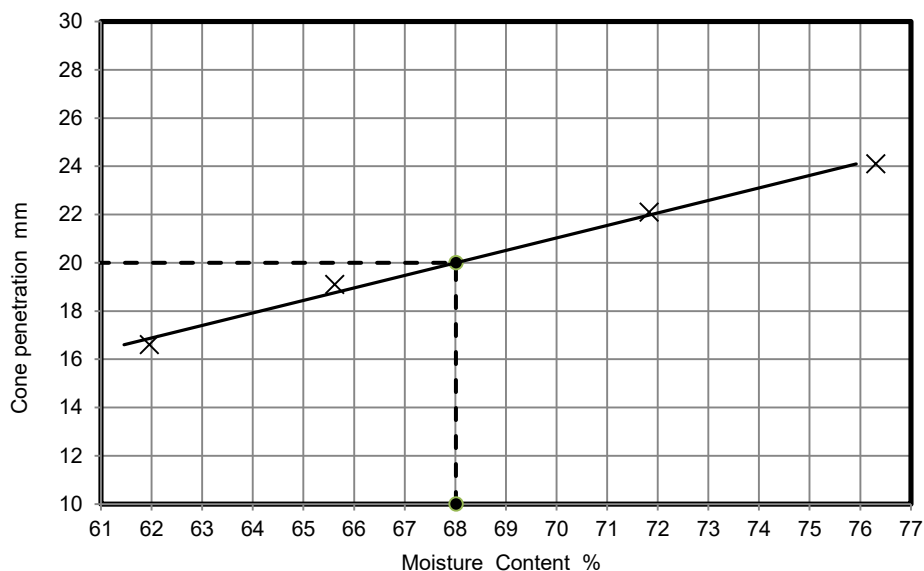
23/10/2018

Date Tested

01/11/2018

Soil Description

High strength dark grey silty CLAY with rare pockets of fine sand



NATURAL MOISTURE CONTENT

28

%

% PASSING 425µm SIEVE

100

%

LIQUID LIMIT

68

%

PLASTIC LIMIT

24

%

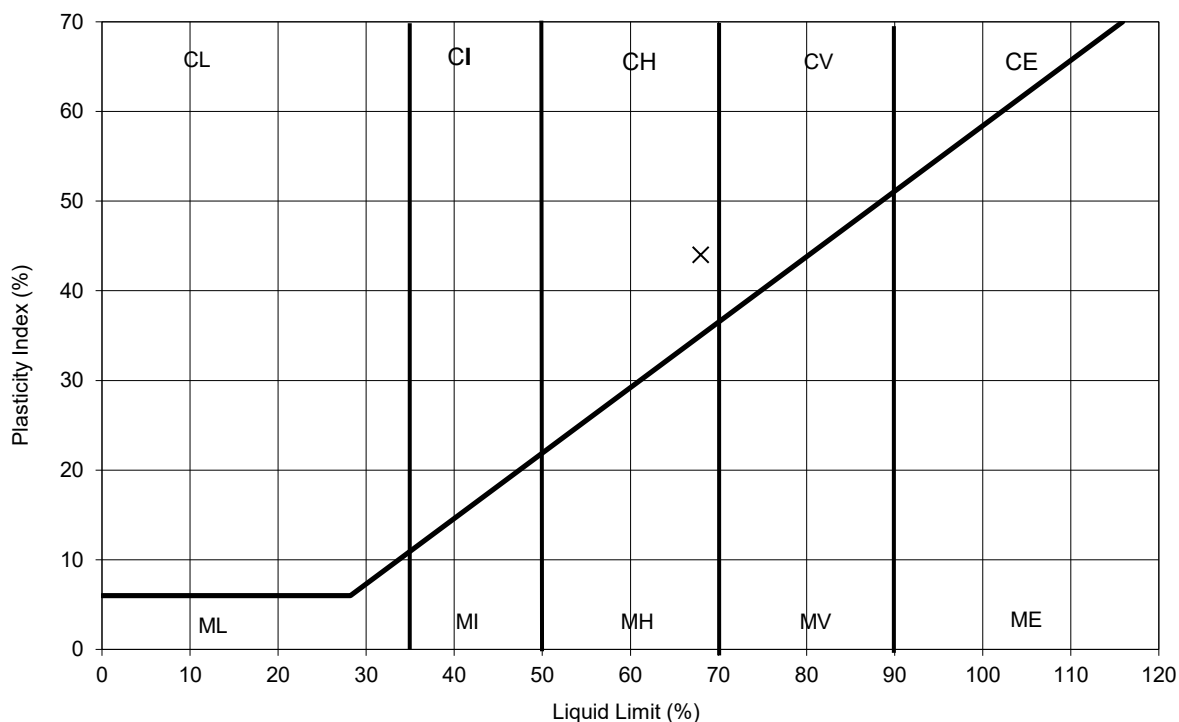
PLASTICITY INDEX

44

%

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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Checked and Approved

Initials: J.P

Date: 06/11/2018

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MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

25366

Borehole/Pit No.

BH1

Site Name

31 Willoughby Road, London NW3 1RT

Sample No.

18

Project No.

G1808

Client

Eldred Geotechnics Ltd

Depth Top

8.00

m

Depth Base

8.45

m

Sample Type

U

Samples received

17/08/2018

Schedules received

22/10/2018

Project Started

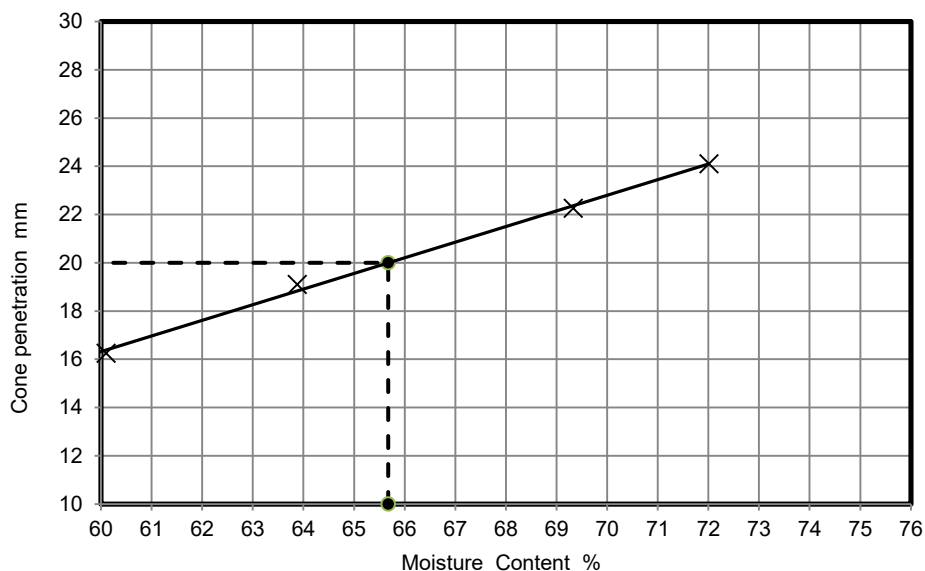
23/10/2018

Date Tested

01/11/2018

Soil Description

High strength dark grey silty CLAY



NATURAL MOISTURE CONTENT

29

%

% PASSING 425µm SIEVE

100

%

LIQUID LIMIT

66

%

PLASTIC LIMIT

25

%

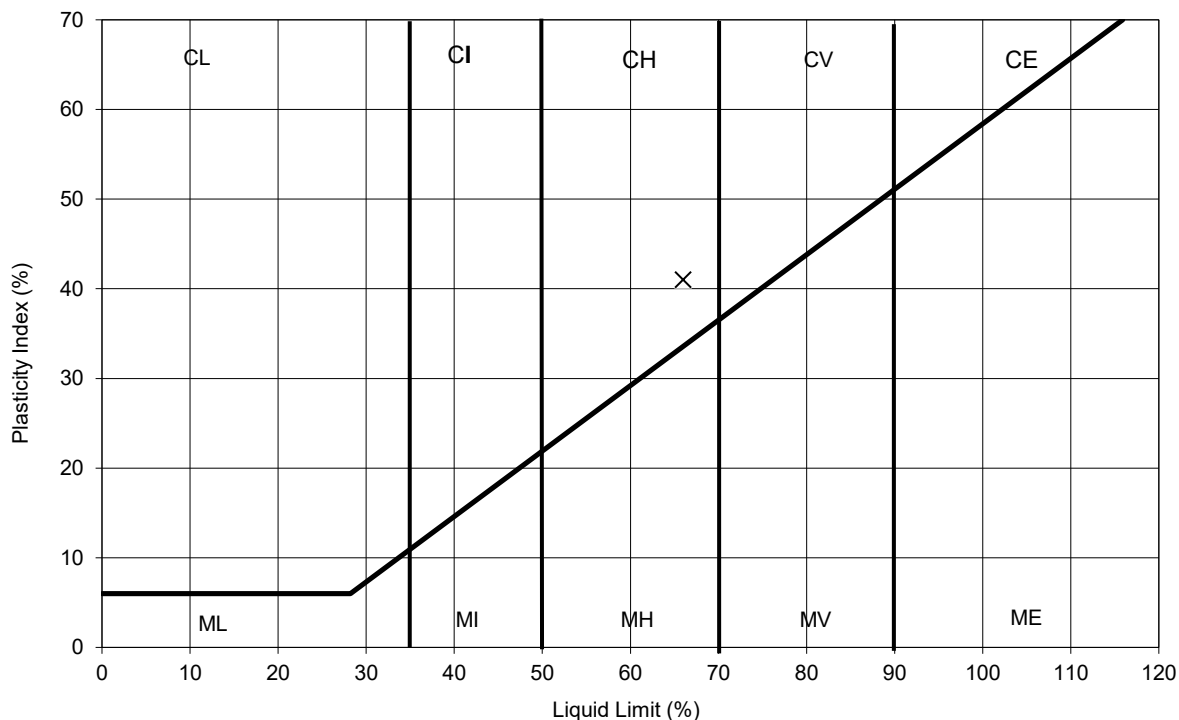
PLASTICITY INDEX

41

%

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

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Checked and Approved

Initials: J.P

Date: 06/11/2018

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2





LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

25366

Borehole/Pit No.

BH2

Site Name

31 Willoughby Road, London NW3 1RT

Sample No.

3

Project No.

G1808

Client

Eldred Geotechnics Ltd

Depth Top

1.00

m

Depth Base

1.45

m

Sample Type

B

Samples received

17/08/2018

Schedules received

22/10/2018

Project Started

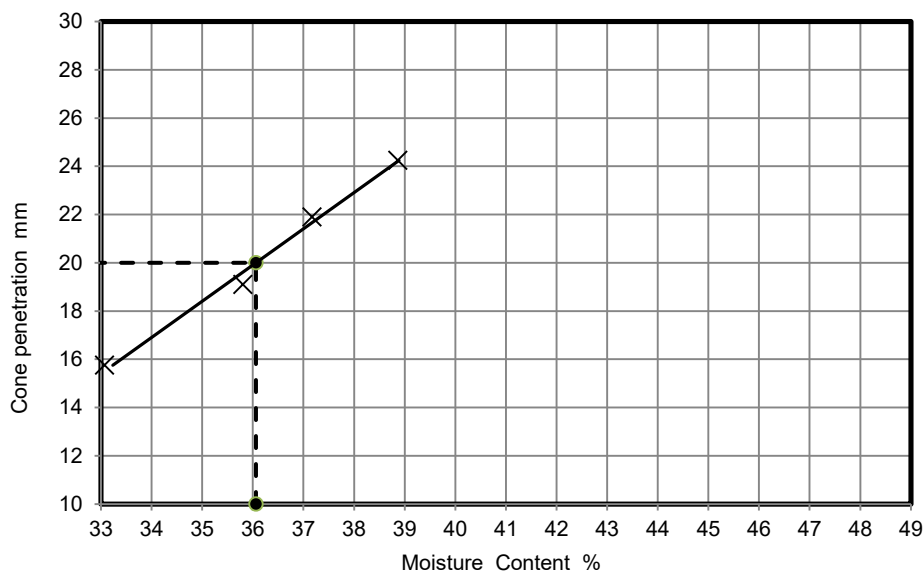
23/10/2018

Date Tested

01/11/2018

Soil Description

Greenish grey and occasional dark grey gravelly clayey very silty SAND with rare cobbles (gravel is fmc and sub-angular to sub-rounded)



NATURAL MOISTURE CONTENT

20

%

% PASSING 425µm SIEVE

87

%

LIQUID LIMIT

36

%

PLASTIC LIMIT

18

%

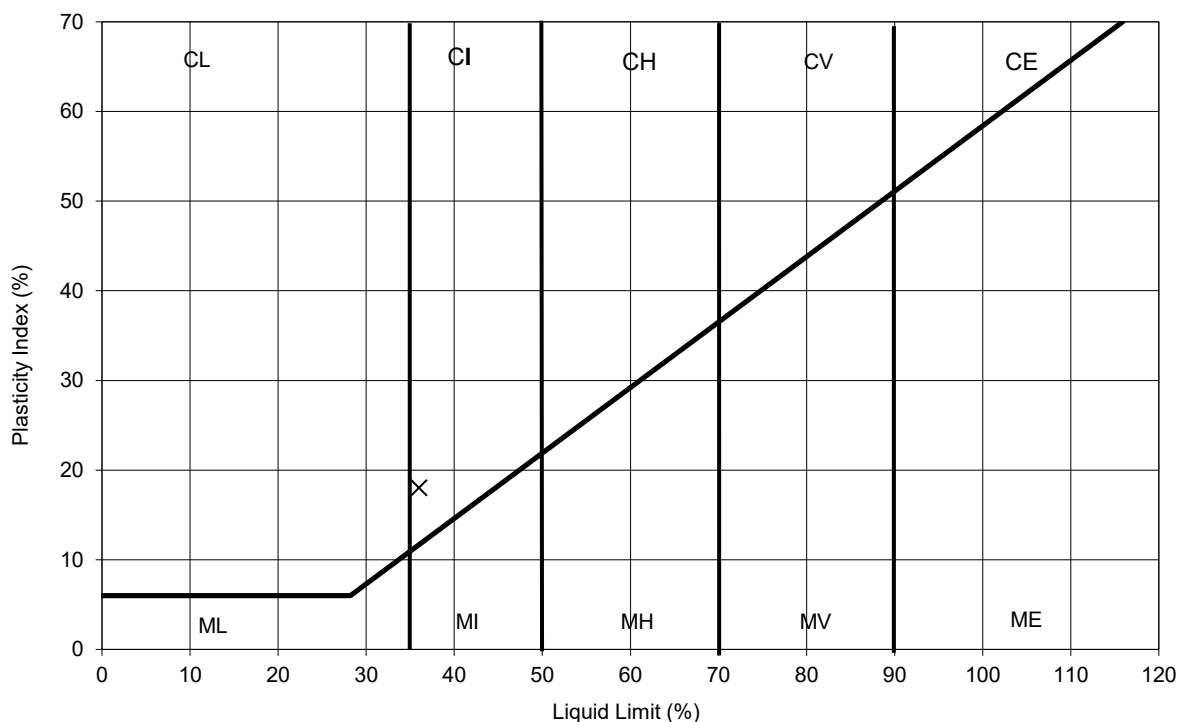
PLASTICITY INDEX

18

%

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

Tel: 01923 711 288 Email: James@k4soils.com

Checked and Approved

Initials: J.P

Date: 06/11/2018

2519

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MSF-5 R2





LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

25366

Borehole/Pit No.

BH2

Site Name

31 Willoughby Road, London NW3 1RT

Sample No.

4

Project No.

G1808

Client

Eldred Geotechnics Ltd

Depth Top

1.50

m

Depth Base

1.95

m

Sample Type

U

Samples received

17/08/2018

Schedules received

22/10/2018

Project Started

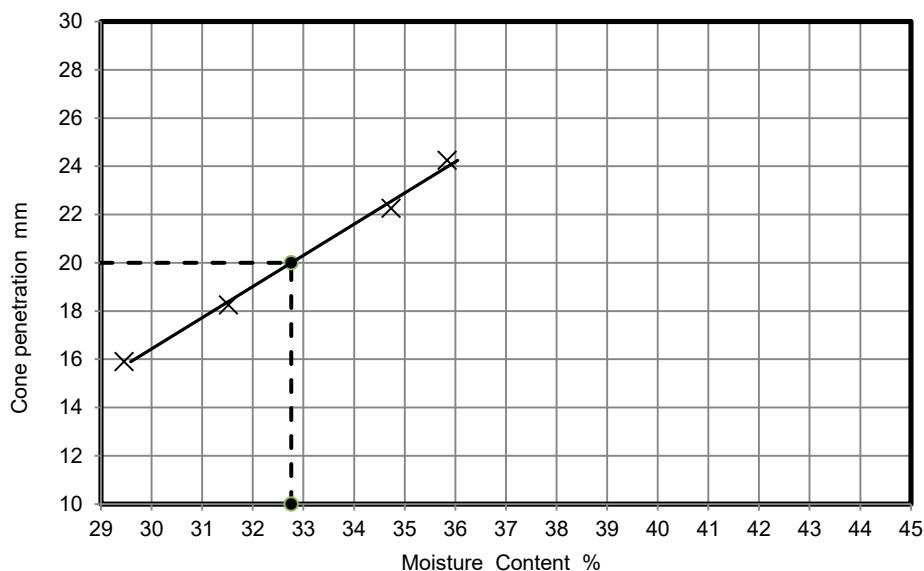
23/10/2018

Date Tested

01/11/2018

Soil Description

High strength brown and orangish brown mottled slightly gravelly sandy silty CLAY with rare brick fragments and traces of carbonaceous deposits (gravel is fm and sub-angular)

**NATURAL MOISTURE CONTENT**

21

%

% PASSING 425µm SIEVE

87

%

LIQUID LIMIT

33

%

PLASTIC LIMIT

15

%

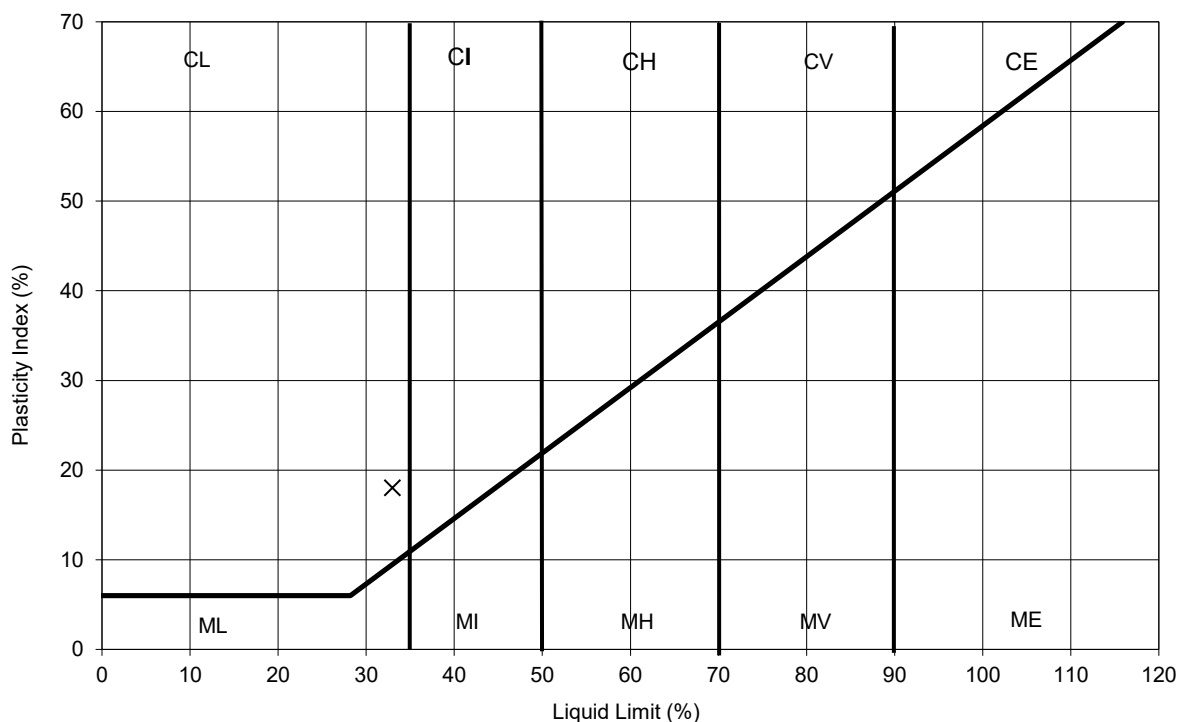
PLASTICITY INDEX

18

%

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

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Checked and Approved

Initials: J.P

Date: 06/11/2018

2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

25366

Borehole/Pit No.

BH2

Site Name

31 Willoughby Road, London NW3 1RT

Sample No.

8

Project No.

G1808

Client

Eldred Geotechnics Ltd

Depth Top

2.50

m

Depth Base

2.95

m

Sample Type

U

Samples received

17/08/2018

Schedules received

22/10/2018

Project Started

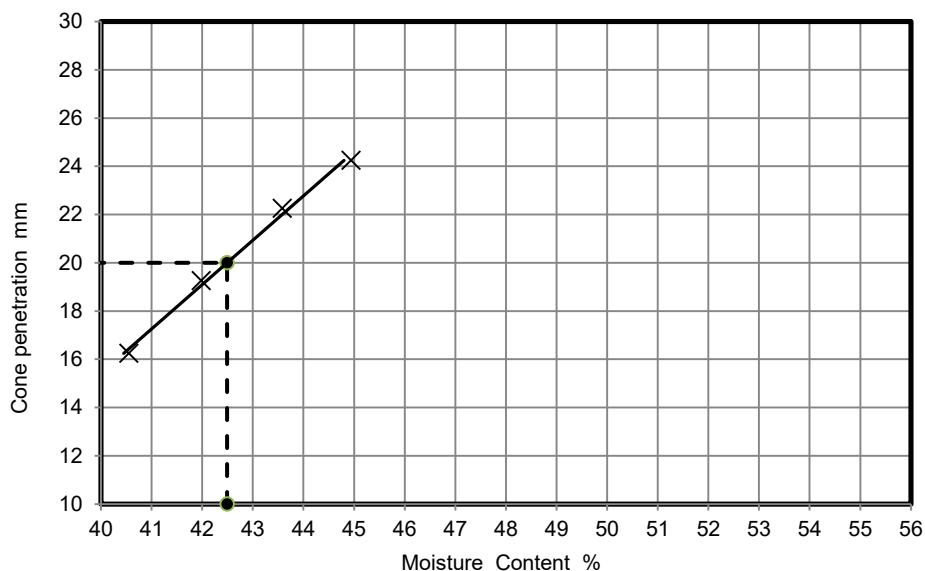
23/10/2018

Date Tested

01/11/2018

Soil Description

Medium strength grey, brown and orangish brown mottled slightly gravelly sandy silty CLAY (gravel is fm and rounded to sub-angular)



NATURAL MOISTURE CONTENT

27

%

% PASSING 425µm SIEVE

74

%

LIQUID LIMIT

42

%

PLASTIC LIMIT

20

%

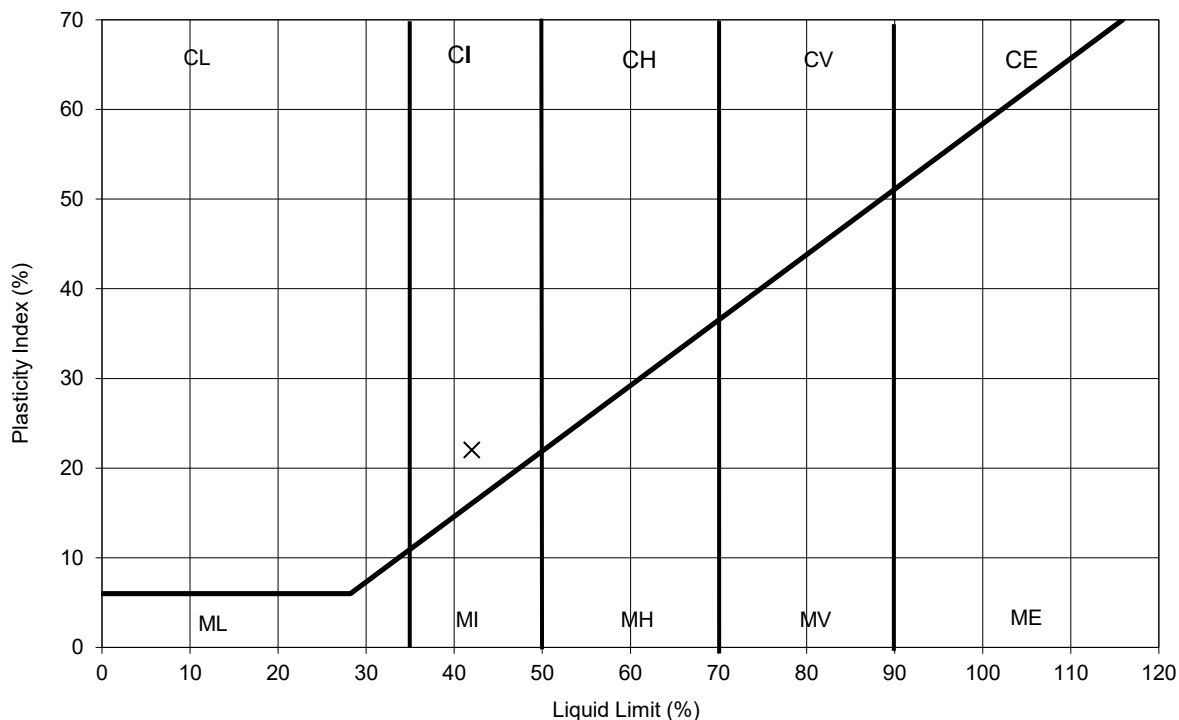
PLASTICITY INDEX

22

%

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

25366

Borehole/Pit No.

BH2

Site Name

31 Willoughby Road, London NW3 1RT

Sample No.

11

Project No.

G1808

Client

Eldred Geotechnics Ltd

Depth Top

3.00

m

Depth Base

3.45

m

Sample Type

B

Samples received

17/08/2018

Schedules received

22/10/2018

Project Started

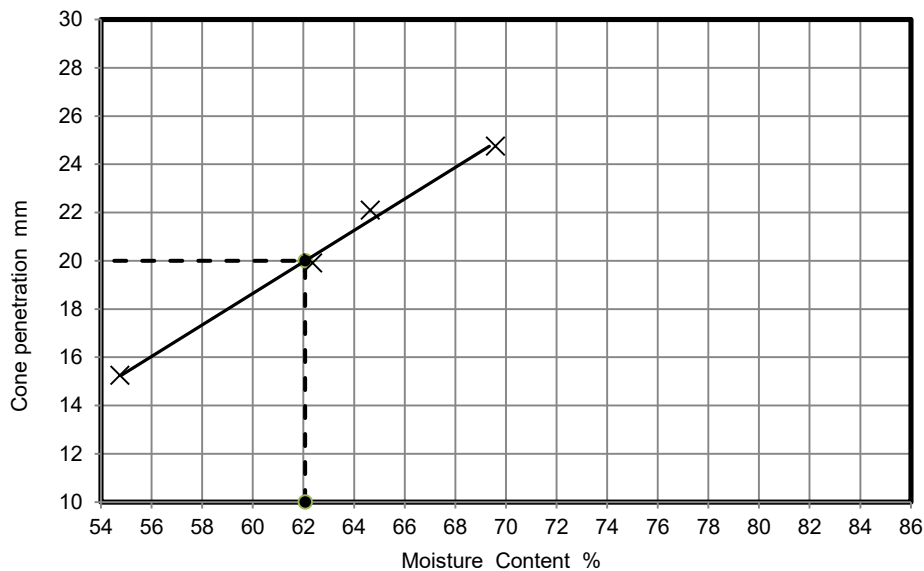
23/10/2018

Date Tested

01/11/2018

Soil Description

Brown slightly mottled grey slightly sandy silty CLAY



NATURAL MOISTURE CONTENT

33 %

% PASSING 425µm SIEVE

99 %

LIQUID LIMIT

62 %

PLASTIC LIMIT

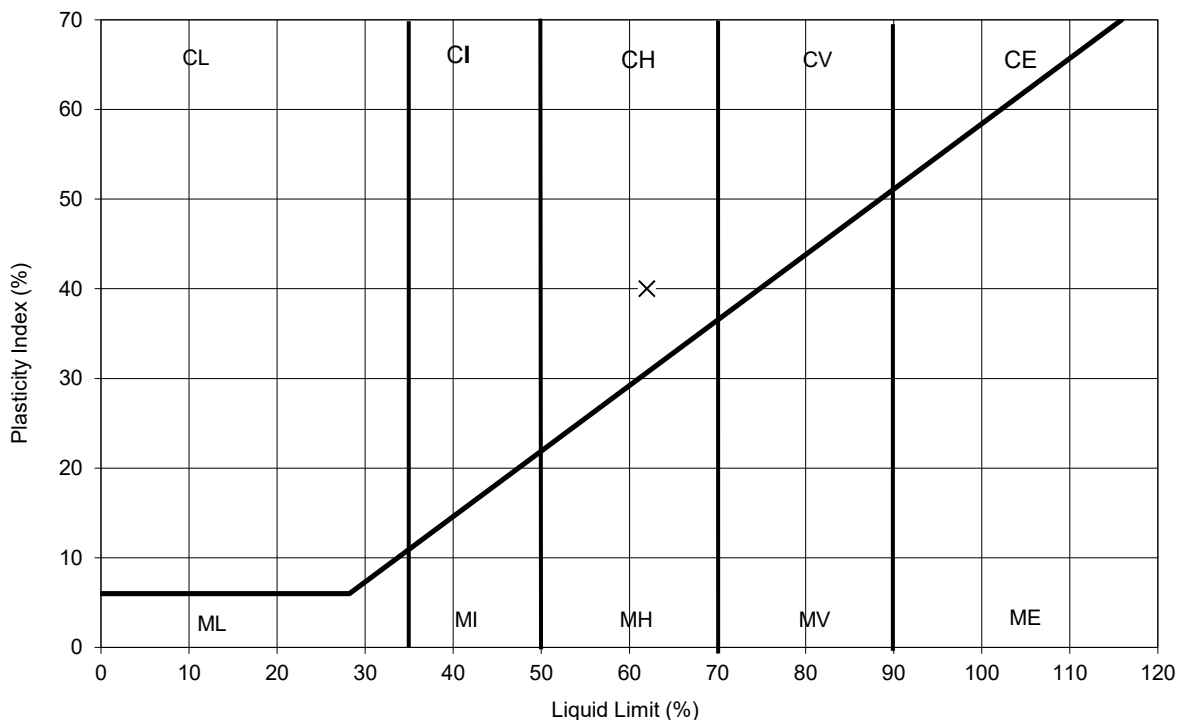
22 %

PLASTICITY INDEX

40 %

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

25366

Borehole/Pit No.

BH2

Site Name

31 Willoughby Road, London NW3 1RT

Sample No.

11

Project No.

G1808

Client

Eldred Geotechnics Ltd

Depth Top

3.50

m

Depth Base

3.95

m

Sample Type

U

Samples received

17/08/2018

Schedules received

22/10/2018

Project Started

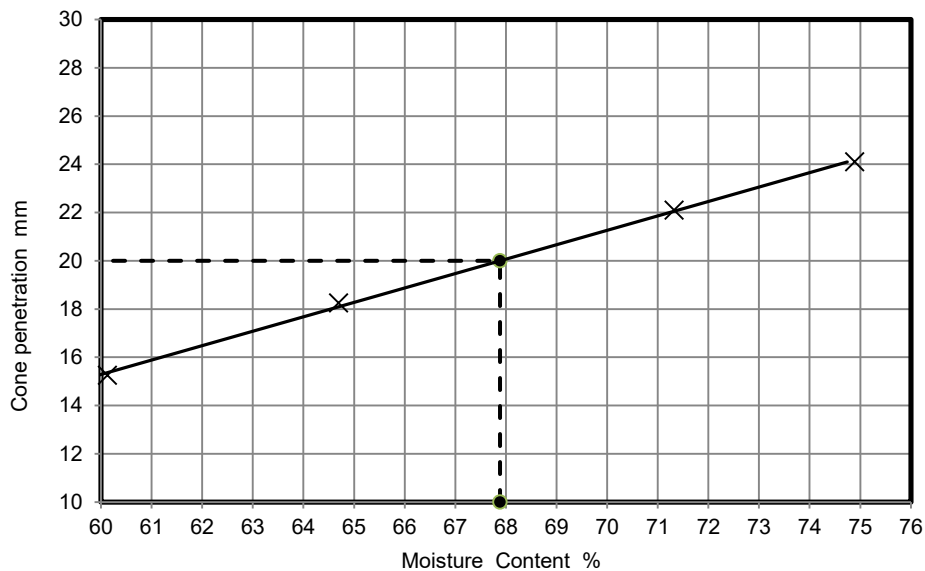
23/10/2018

Date Tested

01/11/2018

Soil Description

High strength brown and orangish brown mottled silty CLAY with occasional pockets of fine sand and rare fine gravel



NATURAL MOISTURE CONTENT

31

%

% PASSING 425µm SIEVE

99

%

LIQUID LIMIT

68

%

PLASTIC LIMIT

24

%

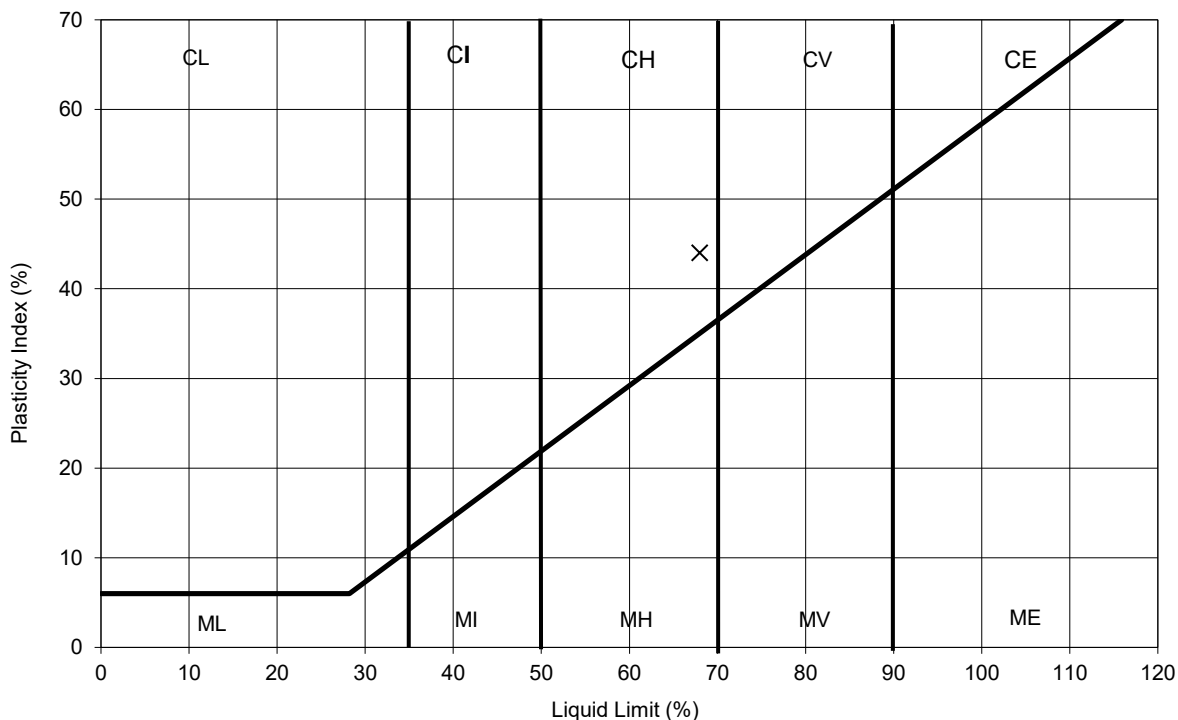
PLASTICITY INDEX

44

%

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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MSF-5 R2



LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX

Job No.

25366

Borehole/Pit No.

BH2

Site Name

31 Willoughby Road, London NW3 1RT

Sample No.

14

Project No.

G1808

Client

Eldred Geotechnics Ltd

Depth Top

4.50

m

Depth Base

4.95

m

Sample Type

U

Samples received

17/08/2018

Schedules received

22/10/2018

Project Started

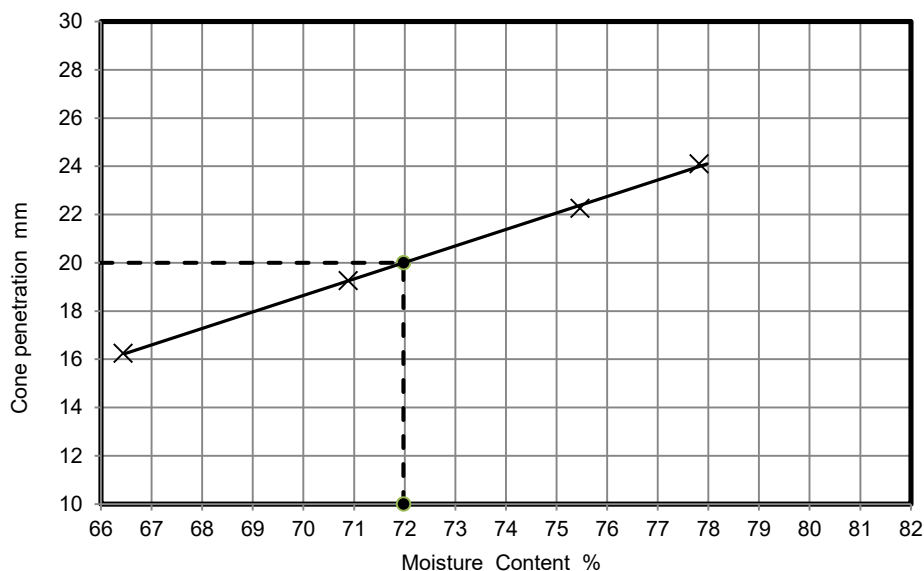
23/10/2018

Date Tested

01/11/2018

Soil Description

High strength slightly mottled orangish brown and grey silty CLAY with occasional pockets of fine sand



NATURAL MOISTURE CONTENT

34

%

% PASSING 425µm SIEVE

100

%

LIQUID LIMIT

72

%

PLASTIC LIMIT

24

%

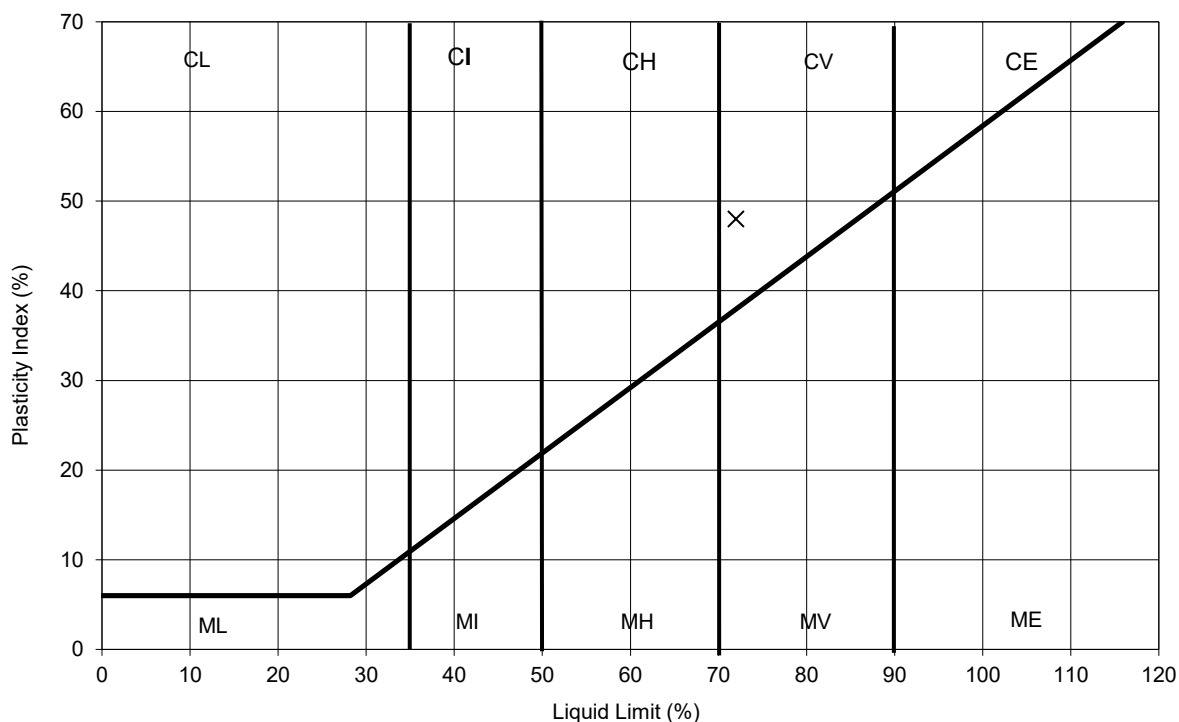
PLASTICITY INDEX

48

%

Remarks

PLASTICITY INDEX



TEST METHOD

BS1377: Part 2 :Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method

BS1377: Part 2 :Clause 5.0 : 1990: Determination of the plastic limit and plasticity index

BS1377: Part 2 :Clause 3.2 : 1990:Determination of the moisture content by the oven drying

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Checked and Approved

Initials: J.P

Date: 06/11/2018

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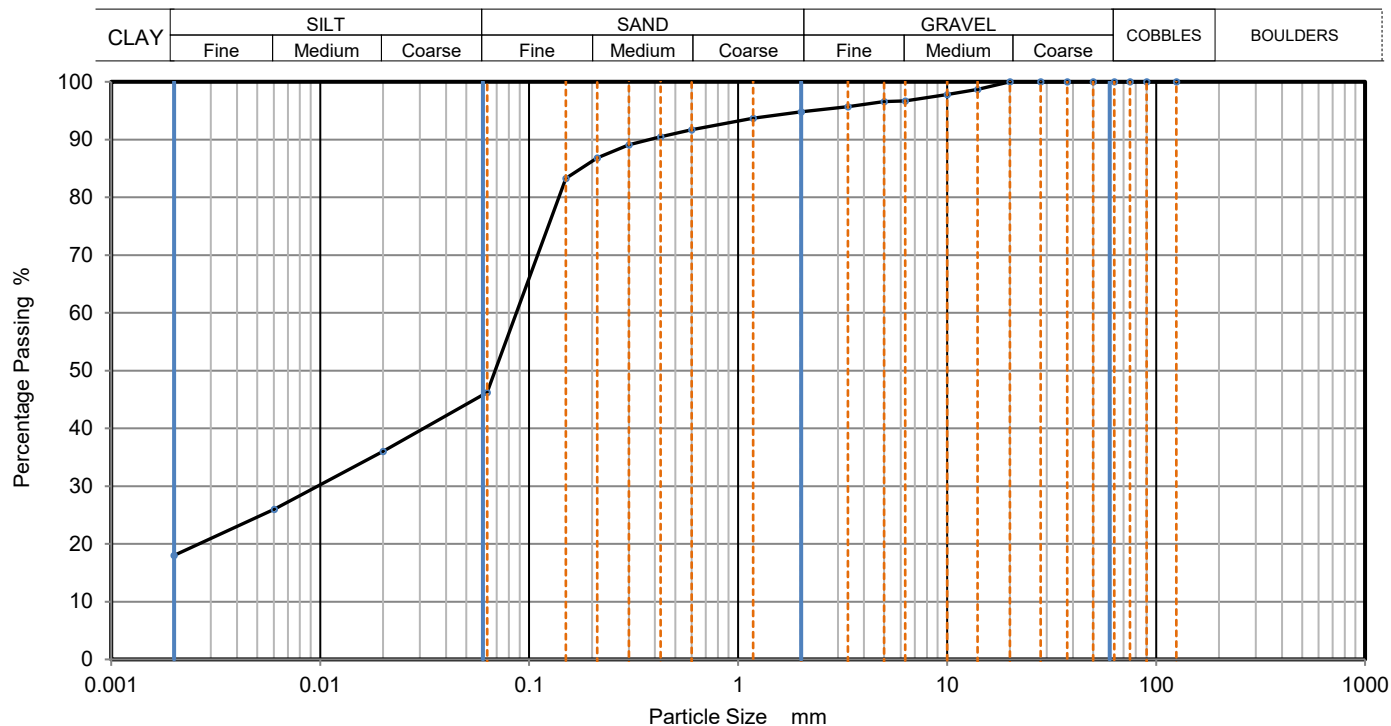
MSF-5 R2



PARTICLE SIZE DISTRIBUTION

Job Ref	25366
Borehole/Pit No.	BH1
Sample No.	4
Depth Top	1.50 m
Depth Base	1.95 m
Sample Type	B
Samples received	17/08/2018
Schedules received	22/10/2018
Project started	23/10/2018
Date tested	01/11/2018

Site Name	31 Willoughby Road, London NW3 1RT		
Project No.	G1808	Client	Eldred Geotechnics Ltd
Soil Description	Green silty clayey SAND with numerous brown slightly sandy silty clay lumps and rare fm sub-angular to sub-rounded gravel		
Test Method	BS1377:Part 2: 1990, clause 9.0		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	36
90	100	0.0060	26
75	100	0.0020	18
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	98		
6.3	97		
5	97		
3.35	96		
2	95		
1.18	94		
0.6	92	Particle density (assumed) 2.70 Mg/m ³	
0.425	91		
0.3	89		
0.212	87		
0.15	83		
0.063	46		

Dry Mass of sample, g

333

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	5.2
Sand	48.5
Silt	27.9
Clay	18.4

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

Preparation and testing in accordance with BS1377 unless noted below



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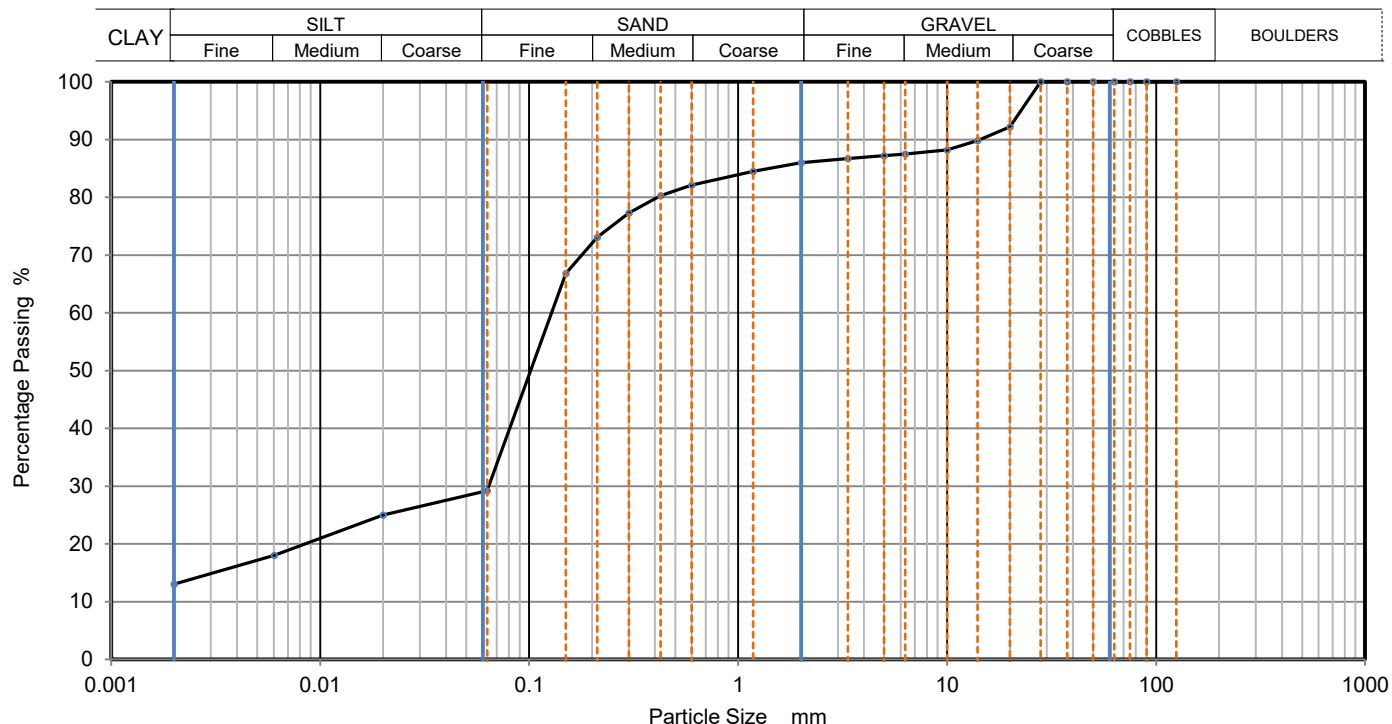
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 Date: 06/11/2018



PARTICLE SIZE DISTRIBUTION

Job Ref	25366
Borehole/Pit No.	BH1
Sample No.	5
Depth Top	2.00 m
Depth Base	2.45 m
Sample Type	U
Samples received	17/08/2018
Schedules received	22/10/2018
Project started	23/10/2018
Date tested	31/10/2018

Site Name	31 Willoughby Road, London NW3 1RT		
Project No.	G1808	Client	Eldred Geotechnics Ltd
Soil Description	High strength brown mottled orangish brown clayey gravelly silty SAND with rare fine brick fragments (gravel is fmc and rounded to sub-angular)		
Test Method	BS1377:Part 2: 1990, clause 9.0		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	25
90	100	0.0060	18
75	100	0.0020	13
63	100		
50	100		
37.5	100		
28	100		
20	92		
14	90		
10	88		
6.3	88		
5	87		
3.35	87		
2	86		
1.18	85		
0.6	82	Particle density (assumed) 2.70 Mg/m ³	
0.425	80		
0.3	77		
0.212	73		
0.15	67		
0.063	29		

Dry Mass of sample, g 189

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	14.0
Sand	56.8
Silt	16.5
Clay	12.7

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
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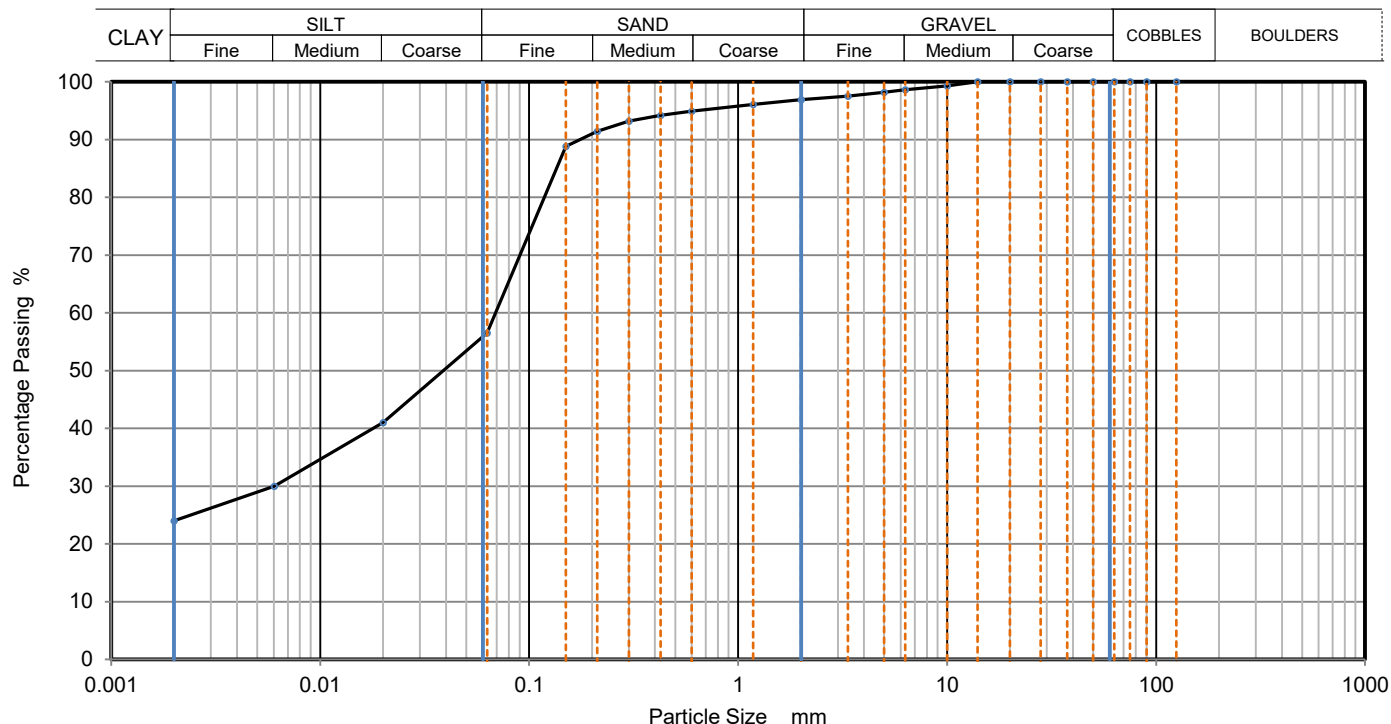
Initials: J.P
Date: 06/11/2018



PARTICLE SIZE DISTRIBUTION

Job Ref	25366
Borehole/Pit No.	BH1
Sample No.	8
Depth Top	3.00 m
Depth Base	3.45 m
Sample Type	B
Samples received	17/08/2018
Schedules received	22/10/2018
Project started	23/10/2018
Date tested	01/11/2018

Site Name	31 Willoughby Road, London NW3 1RT		
Project No.	G1808	Client	Eldred Geotechnics Ltd
Soil Description	Brown and occasional greenish grey slightly gravelly sandy silty CLAY (gravel is fm and sub-angular to sub-rounded)		
Test Method	BS1377:Part 2: 1990, clause 9.0		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	41
90	100	0.0060	30
75	100	0.0020	24
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	99		
6.3	99		
5	98		
3.35	98		
2	97		
1.18	96		
0.6	95	Particle density (assumed) 2.70 Mg/m ³	
0.425	94		
0.3	93		
0.212	91		
0.15	89		
0.063	57		

Dry Mass of sample, g

349

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	3.1
Sand	40.4
Silt	32.7
Clay	23.8

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

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Initials:	J.P
Date:	06/11/2018
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PARTICLE SIZE DISTRIBUTION

Job Ref 25366

Borehole/Pit No. BH1

Site Name 31 Willoughby Road, London NW3 1RT

Sample No. 10

Project No. G1808 Client Eldred Geotechnics Ltd

Depth Top 4.00 m

Soil Description

Medium strength brown slightly mottled grey silty CLAY with rare pockets of orange fine sand / silt and traces of selenite crystals and rootlets

Depth Base 4.45 m

Sample Type U

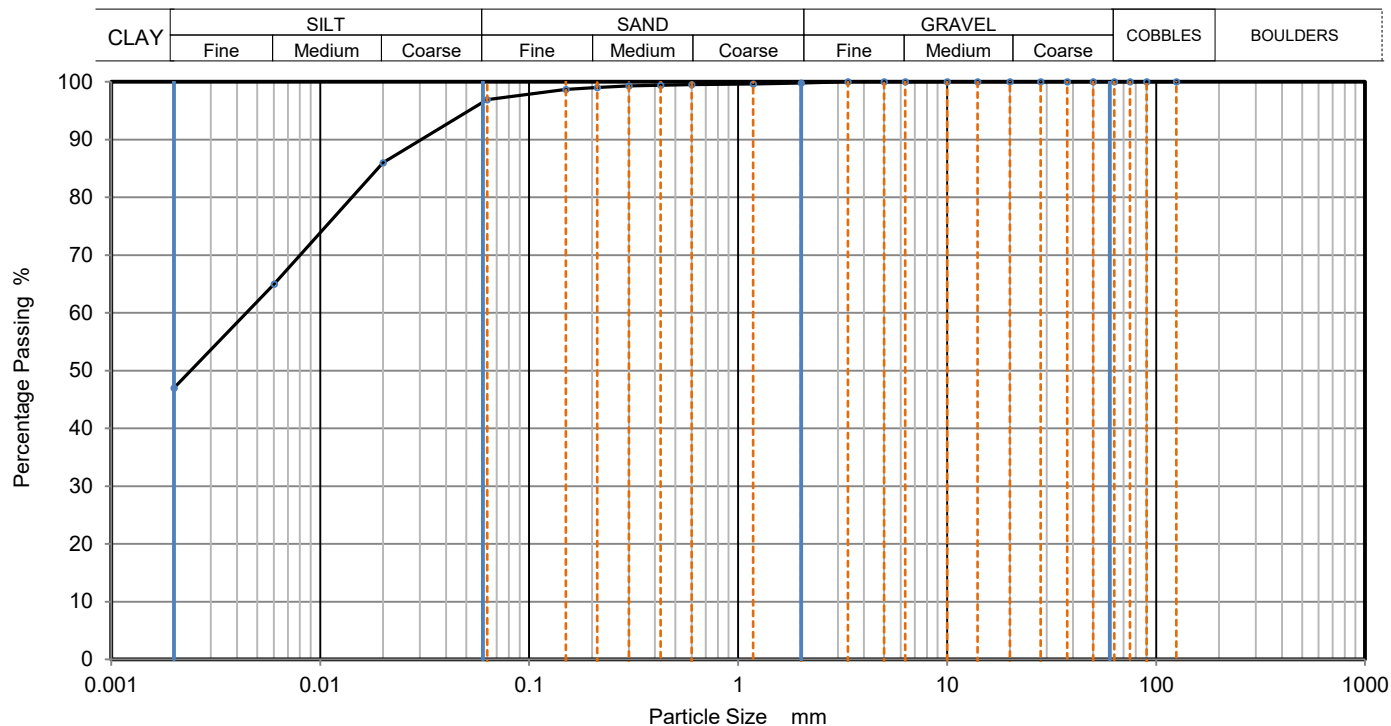
Samples received 17/08/2018

Schedules received 22/10/2018

Test Method BS1377:Part 2: 1990, clause 9.0

Project started 23/10/2018

Date tested 31/10/2018



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	86
90	100	0.0060	65
75	100	0.0020	47
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100	Particle density (assumed) 2.70 Mg/m ³	
0.425	99		
0.3	99		
0.212	99		
0.15	99		
0.063	97		

Dry Mass of sample, g

4

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.2
Sand	2.9
Silt	50.0
Clay	46.9

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

Preparation and testing in accordance with BS1377 unless noted below



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Initials: J.P

Date: 06/11/2018

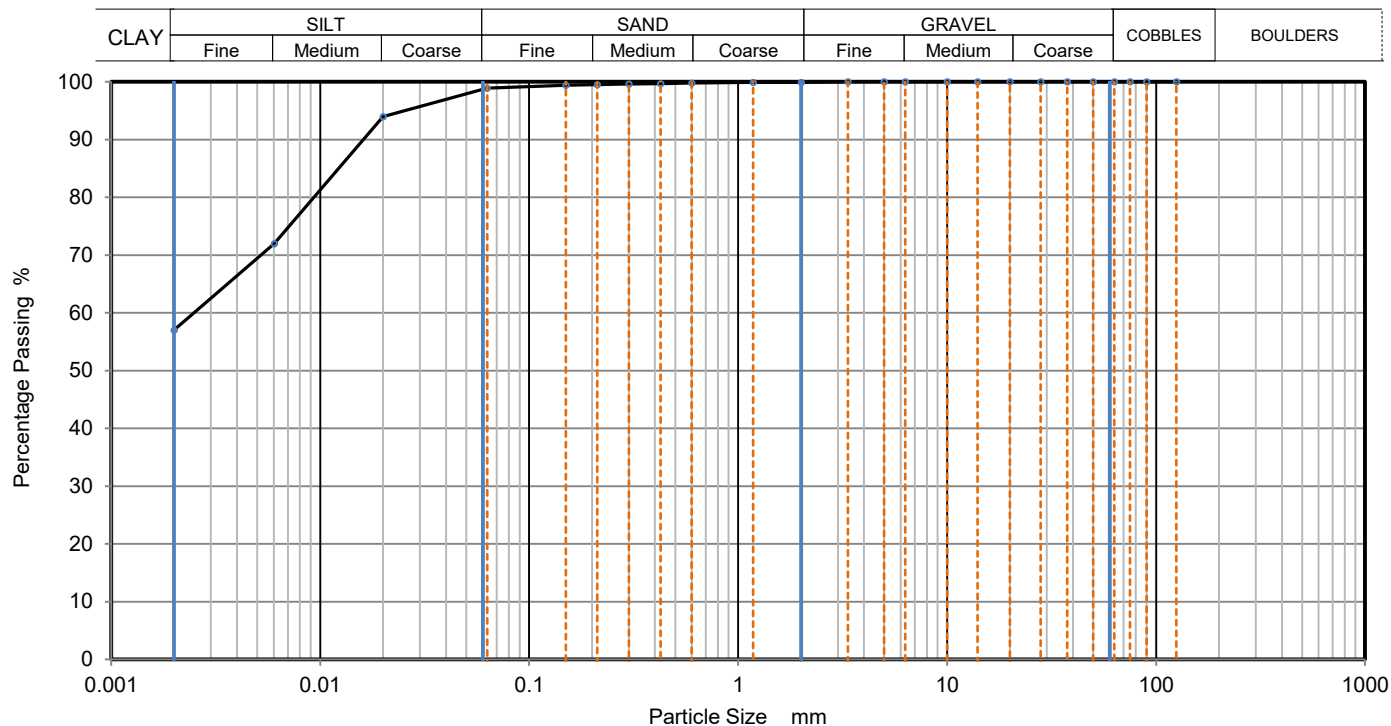
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PARTICLE SIZE DISTRIBUTION

Job Ref	25366
Borehole/Pit No.	BH1
Sample No.	12
Depth Top	5.00 m
Depth Base	5.45 m
Sample Type	U
Samples received	17/08/2018
Schedules received	22/10/2018
Project started	23/10/2018
Date tested	31/10/2018

Site Name	31 Willoughby Road, London NW3 1RT		
Project No.	G1808	Client	Eldred Geotechnics Ltd
Soil Description	High strength brown silty CLAY with rare pockets of orange fine sand / silt		
Test Method	BS1377:Part 2: 1990, clause 9.0		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	94
90	100	0.0060	72
75	100	0.0020	57
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100	Particle density (assumed) 2.70 Mg/m ³	
0.425	100		
0.3	100		
0.212	100		
0.15	99		
0.063	99		

Dry Mass of sample, g

3

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.1
Sand	1.1
Silt	42.2
Clay	56.6

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

Preparation and testing in accordance with BS1377 unless noted below



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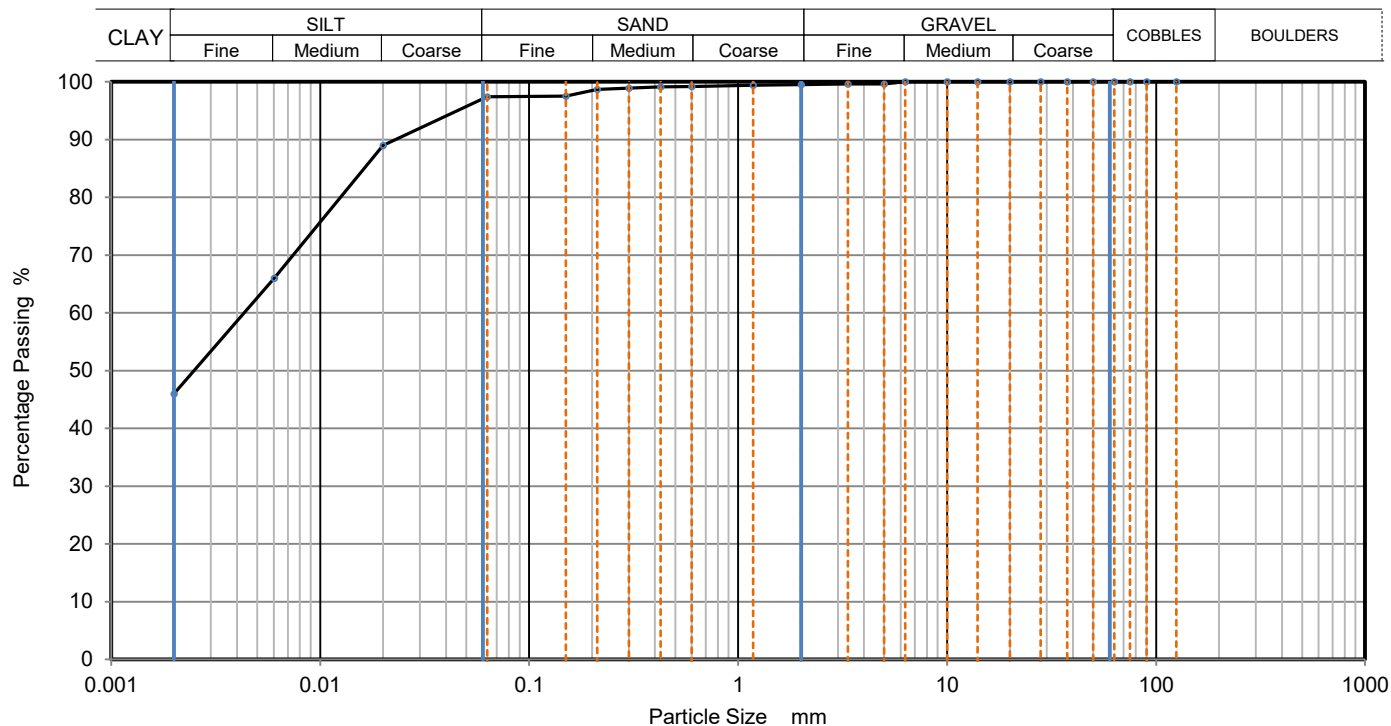
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PARTICLE SIZE DISTRIBUTION

Job Ref	25366
Borehole/Pit No.	BH1
Sample No.	14
Depth Top	6.00 m
Depth Base	6.45 m
Sample Type	U
Samples received	17/08/2018
Schedules received	22/10/2018
Project started	23/10/2018
Date tested	31/10/2018

Site Name	31 Willoughby Road, London NW3 1RT		
Project No.	G1808	Client	Eldred Geotechnics Ltd
Soil Description	High strength dark brown slightly mottled orangish brown silty CLAY with occasional pockets of fine sand / silt		
Test Method	BS1377:Part 2: 1990, clause 9.0		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	89
90	100	0.0060	66
75	100	0.0020	46
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	99	Particle density (assumed) 2.70 Mg/m ³	
0.425	99		
0.3	99		
0.212	99		
0.15	98		
0.063	97		

Dry Mass of sample, g

4

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.5
Sand	2.1
Silt	51.6
Clay	45.8

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

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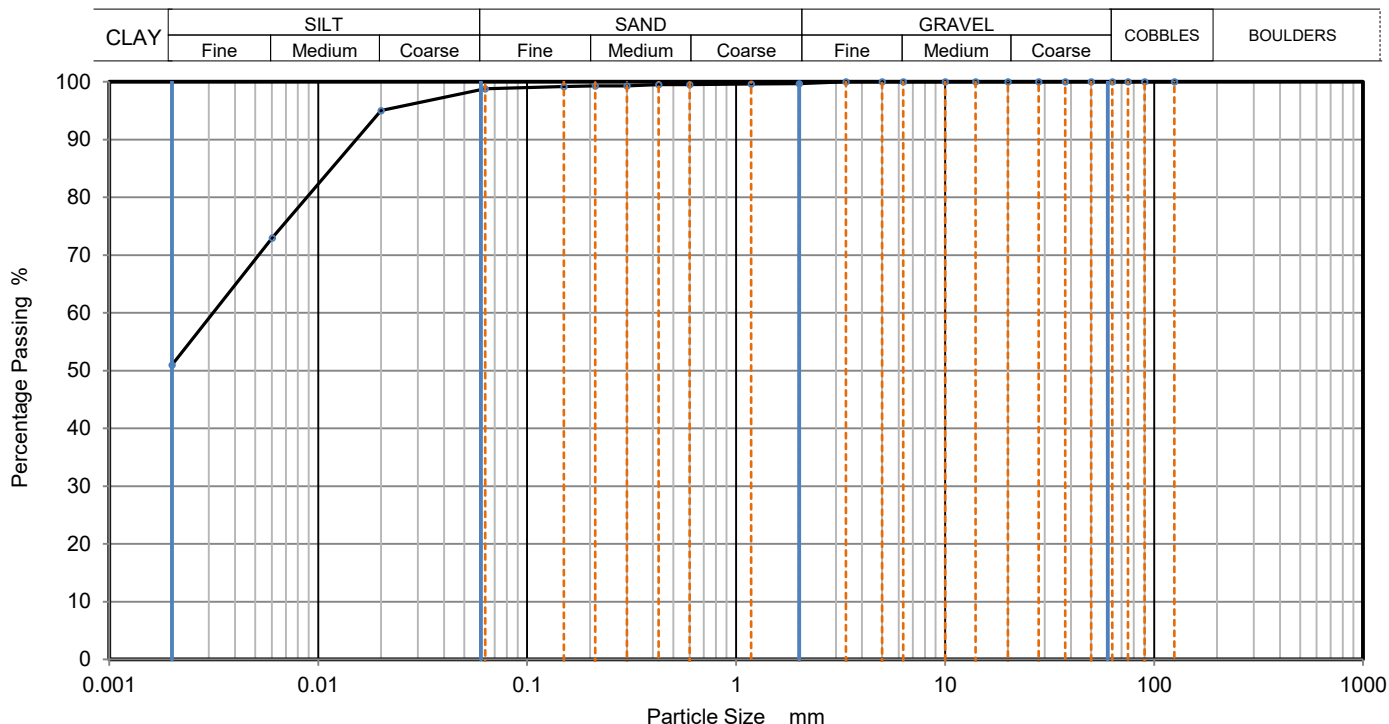
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Date:	06/11/2018
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PARTICLE SIZE DISTRIBUTION

Job Ref	25366
Borehole/Pit No.	BH1
Sample No.	16
Depth Top	7.00 m
Depth Base	7.45 m
Sample Type	U
Samples received	17/08/2018
Schedules received	22/10/2018
Project started	23/10/2018
Date tested	31/10/2018

Site Name	31 Willoughby Road, London NW3 1RT		
Project No.	G1808	Client	Eldred Geotechnics Ltd
Soil Description	High strength dark grey silty CLAY with rare pockets of fine sand		
Test Method	BS1377:Part 2: 1990, clause 9.0		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	95
90	100	0.0060	73
75	100	0.0020	51
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100	Particle density (assumed) 2.70 Mg/m3	
0.425	100		
0.3	99		
0.212	99		
0.15	99		
0.063	99		

Dry Mass of sample, g

1

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.3
Sand	1.0
Silt	47.3
Clay	51.4

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

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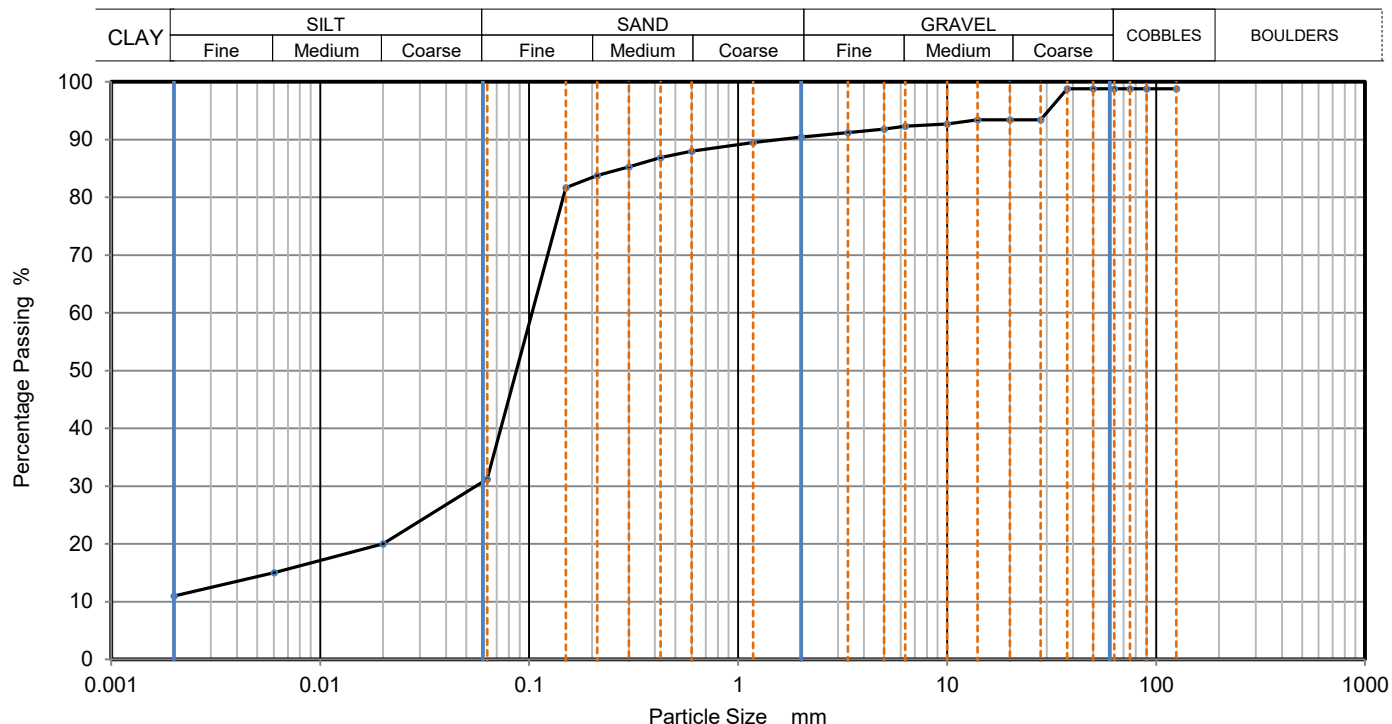
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 Date: 06/11/2018



PARTICLE SIZE DISTRIBUTION

Job Ref	25366
Borehole/Pit No.	BH2
Sample No.	3
Depth Top	1.00 m
Depth Base	1.45 m
Sample Type	B
Samples received	17/08/2018
Schedules received	22/10/2018
Project started	23/10/2018
Date tested	01/11/2018

Site Name	31 Willoughby Road, London NW3 1RT		
Project No.	G1808	Client	Eldred Geotechnics Ltd
Soil Description	Greenish grey and occasional dark grey gravelly clayey very silty SAND with rare cobbles (gravel is fmc and sub-angular to sub-rounded)		
Test Method	BS1377:Part 2: 1990, clause 9.0		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	99	0.0200	20
90	99	0.0060	15
75	99	0.0020	11
63	99		
50	99		
37.5	99		
28	93		
20	93		
14	93		
10	93		
6.3	92		
5	92		
3.35	91		
2	90		
1.18	90		
0.6	88	Particle density (assumed) 2.70 Mg/m3	
0.425	87		
0.3	85		
0.212	84		
0.15	82		
0.063	31		

Dry Mass of sample, g 601

Sample Proportions	% dry mass
Very coarse	1.2
Gravel	8.4
Sand	59.2
Silt	20.1
Clay	11.1

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
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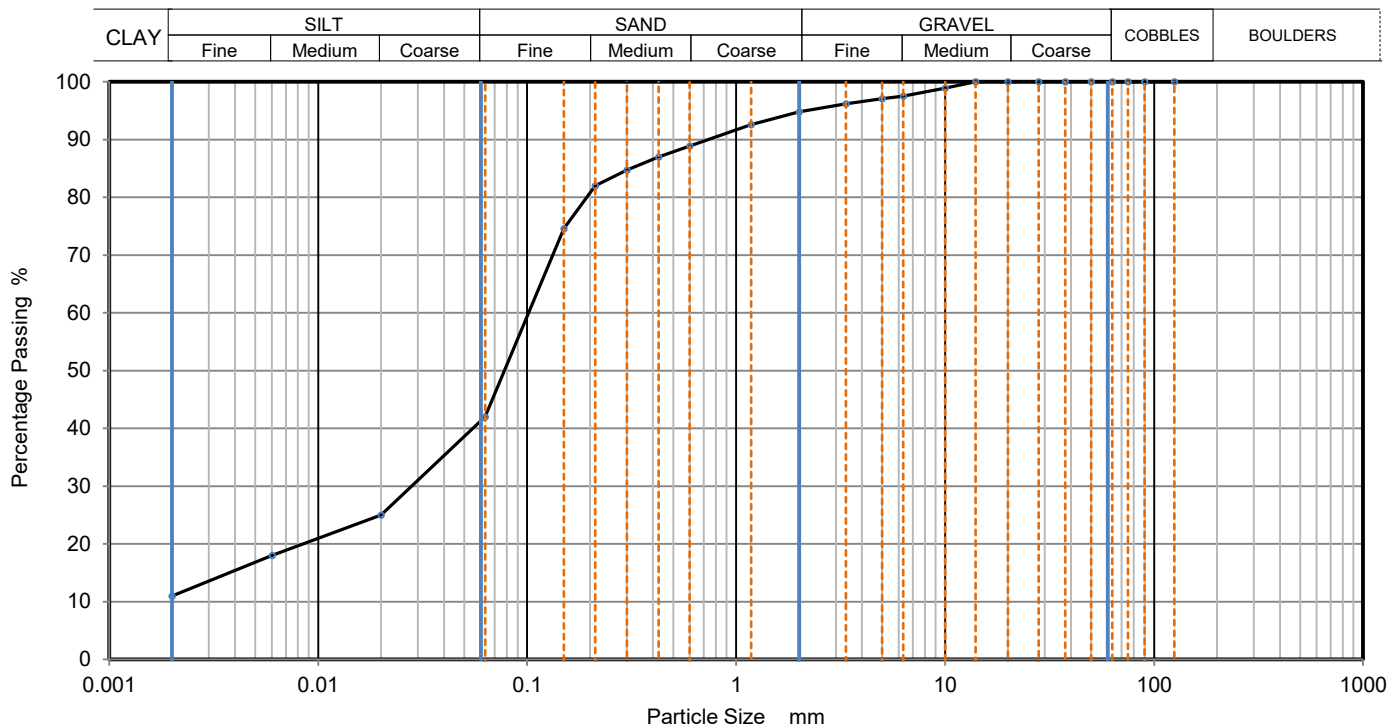
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Date: 06/11/2018



PARTICLE SIZE DISTRIBUTION

Job Ref	25366
Borehole/Pit No.	BH2
Sample No.	4
Depth Top	1.50 m
Depth Base	1.95 m
Sample Type	U
Samples received	17/08/2018
Schedules received	22/10/2018
Project started	23/10/2018
Date tested	31/10/2018

Site Name	31 Willoughby Road, London NW3 1RT		
Project No.	G1808	Client	Eldred Geotechnics Ltd
Soil Description	High strength brown and orangish brown mottled slightly gravelly sandy silty CLAY with rare brick fragments and traces of carbonaceous deposits (gravel is fm and sub-angular)		
Test Method	BS1377:Part 2: 1990, clause 9.0		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	25
90	100	0.0060	18
75	100	0.0020	11
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	99		
6.3	98		
5	97		
3.35	96		
2	95		
1.18	93		
0.6	89	Particle density (assumed) 2.70 Mg/m3	
0.425	87		
0.3	85		
0.212	82		
0.15	75		
0.063	42		

Dry Mass of sample, g 312

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	5.2
Sand	52.8
Silt	30.7
Clay	11.3

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks
Preparation and testing in accordance with BS1377 unless noted below



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PARTICLE SIZE DISTRIBUTION

Job Ref 25366

Borehole/Pit No. BH2

Site Name 31 Willoughby Road, London NW3 1RT

Sample No. 8

Project No. G1808 Client Eldred Geotechnics Ltd

Depth Top 2.50 m

Soil Description Medium strength grey, brown and orangish brown mottled slightly gravelly sandy silty CLAY (gravel is fm and rounded to sub-angular)

Depth Base 2.95 m

Sample Type U

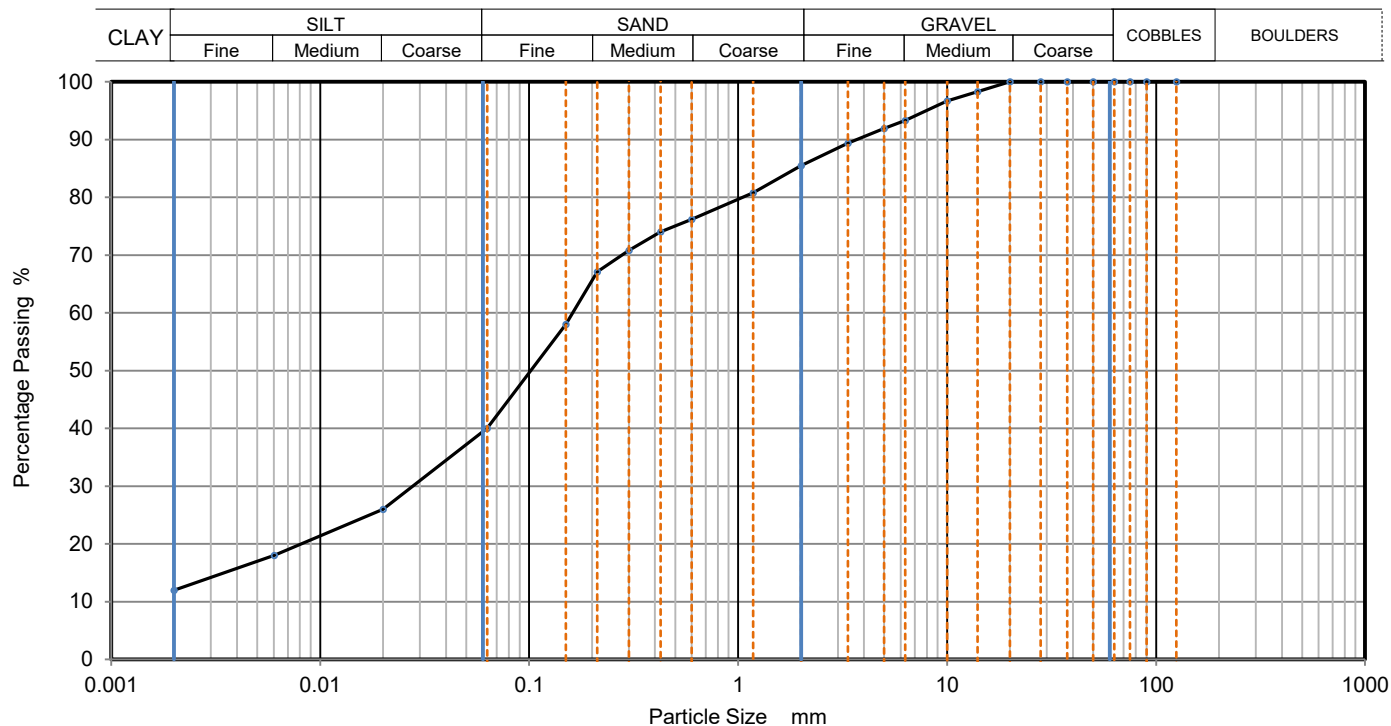
Samples received 17/08/2018

Schedules received 22/10/2018

Test Method BS1377:Part 2: 1990, clause 9.0

Project started 23/10/2018

Date tested 31/10/2018



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	26
90	100	0.0060	18
75	100	0.0020	12
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	98		
10	97		
6.3	93		
5	92		
3.35	89		
2	86		
1.18	81		
0.6	76	Particle density (assumed) 2.70 Mg/m ³	
0.425	74		
0.3	71		
0.212	67		
0.15	58		
0.063	40		

Dry Mass of sample, g 188

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	14.5
Sand	45.5
Silt	27.5
Clay	12.5

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

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Checked and Approved

Initials: J.P

Date: 06/11/2018

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PARTICLE SIZE DISTRIBUTION

Job Ref 25366

Borehole/Pit No. BH2

Site Name 31 Willoughby Road, London NW3 1RT

Sample No. 11

Project No. G1808 Client Eldred Geotechnics Ltd

Depth Top 3.00 m

Soil Description Brown slightly mottled grey slightly sandy silty CLAY

Depth Base 3.45 m

Sample Type B

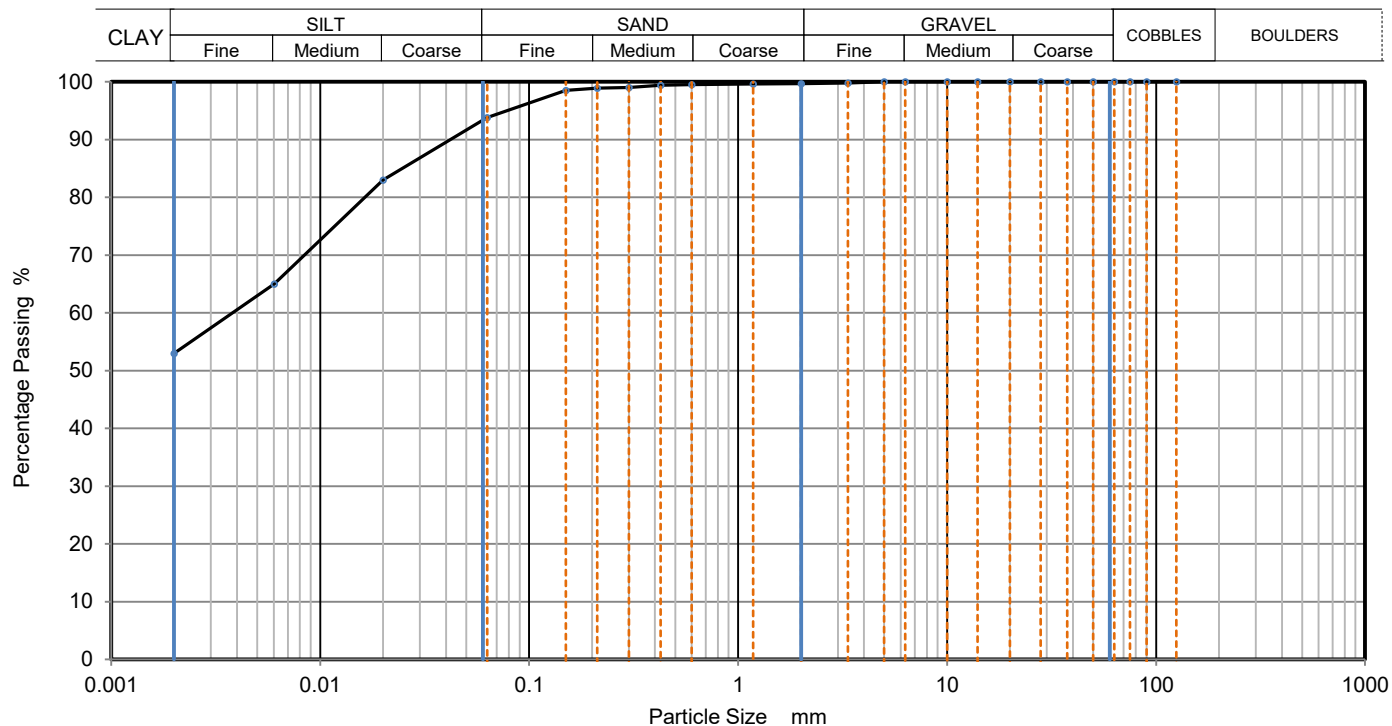
Samples received 17/08/2018

Schedules received 22/10/2018

Test Method BS1377:Part 2: 1990, clause 9.0

Project started 23/10/2018

Date tested 01/11/2018



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	83
90	100	0.0060	65
75	100	0.0020	53
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100	Particle density (assumed) 2.70 Mg/m ³	
0.425	99		
0.3	99		
0.212	99		
0.15	99		
0.063	94		

Dry Mass of sample, g

14

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.3
Sand	5.9
Silt	40.8
Clay	53.0

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

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Checked and Approved

Initials: J.P

Date: 06/11/2018

MSF-5-R3



PARTICLE SIZE DISTRIBUTION

Job Ref 25366

Borehole/Pit No. BH2

Site Name 31 Willoughby Road, London NW3 1RT

Sample No. 11

Project No. G1808 Client Eldred Geotechnics Ltd

Depth Top 3.50 m

Soil Description

High strength brown and orangish brown mottled silty CLAY with occasional pockets of fine sand and rare fine gravel

Depth Base 3.95 m

Sample Type U

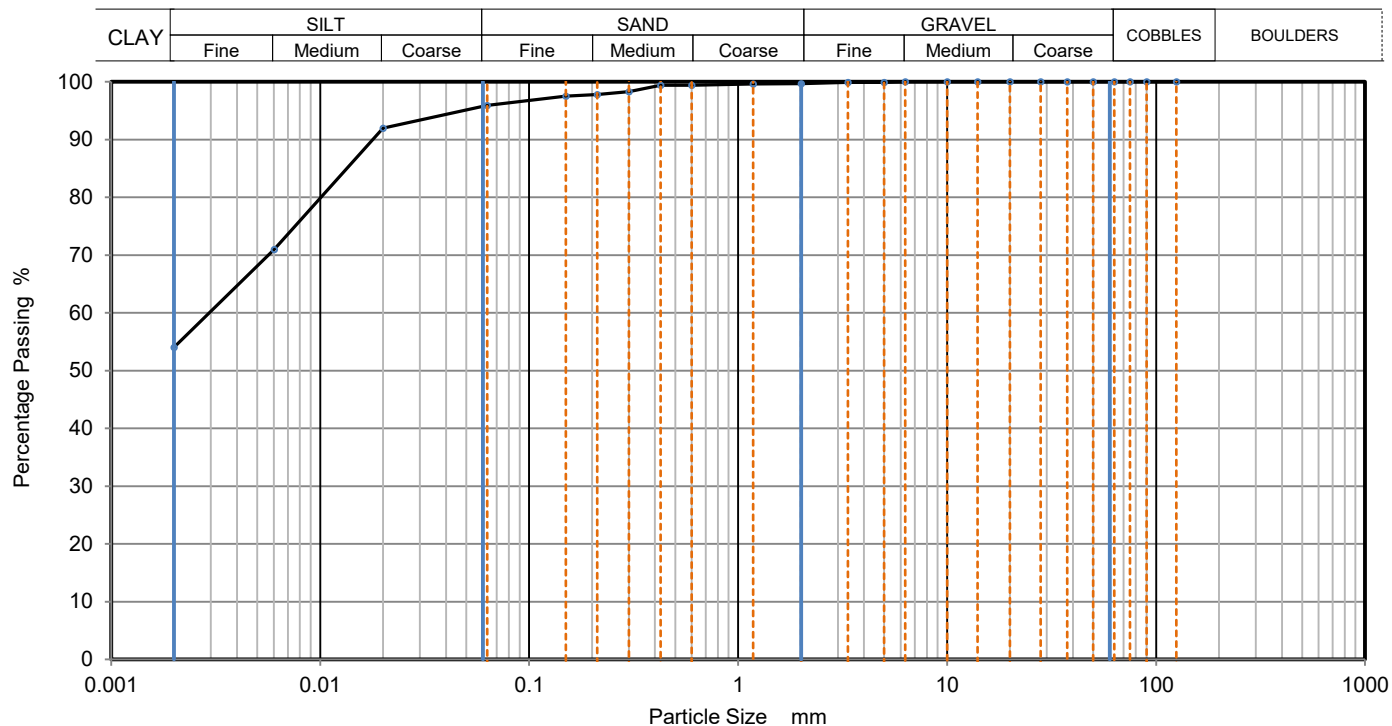
Samples received 17/08/2018

Schedules received 22/10/2018

Test Method BS1377:Part 2: 1990, clause 9.0

Project started 23/10/2018

Date tested 31/10/2018



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	92
90	100	0.0060	71
75	100	0.0020	54
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	99	Particle density (assumed) 2.70 Mg/m ³	
0.425	99		
0.3	98		
0.212	98		
0.15	98		
0.063	96		

Dry Mass of sample, g

4

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.3
Sand	3.8
Silt	41.9
Clay	54.0

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

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Initials: J.P

Date: 06/11/2018

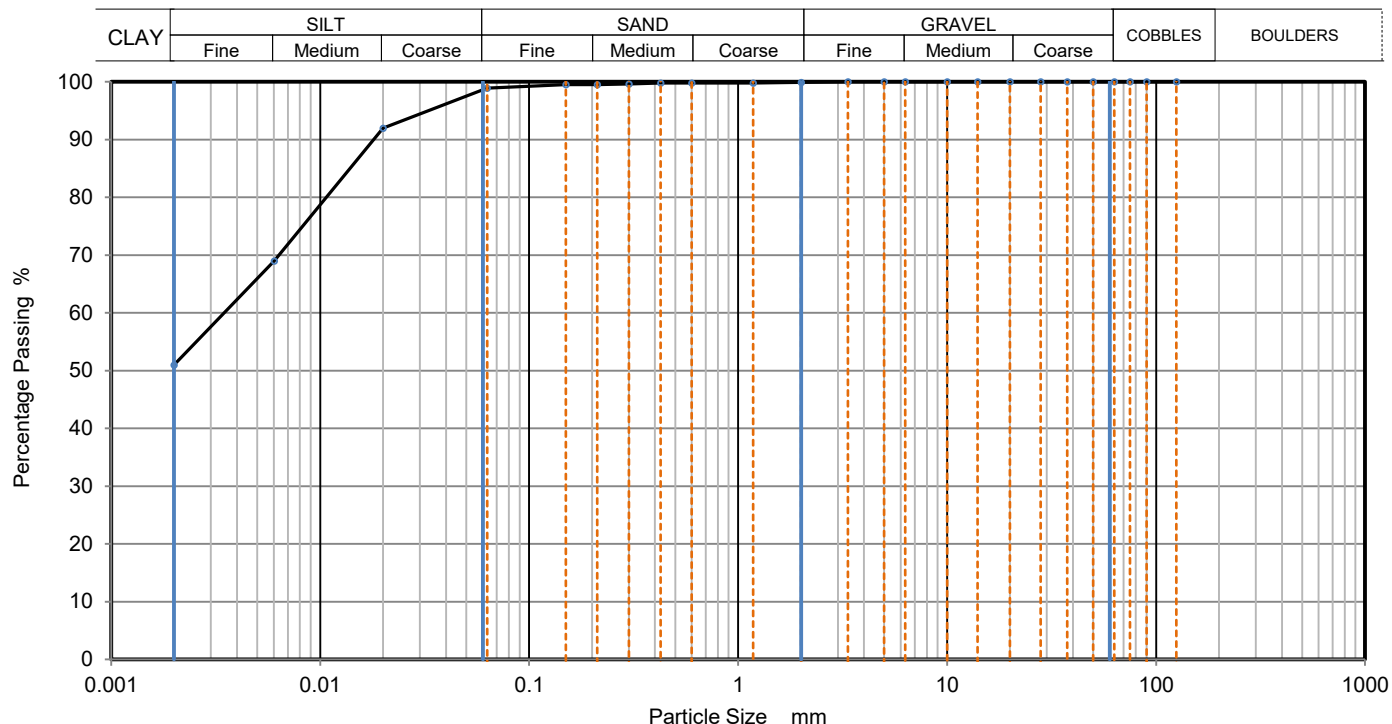
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PARTICLE SIZE DISTRIBUTION

Job Ref	25366
Borehole/Pit No.	BH2
Sample No.	14
Depth Top	4.50 m
Depth Base	4.95 m
Sample Type	U
Samples received	17/08/2018
Schedules received	22/10/2018
Project started	23/10/2018
Date tested	31/10/2018

Site Name	31 Willoughby Road, London NW3 1RT		
Project No.	G1808	Client	Eldred Geotechnics Ltd
Soil Description	High strength slightly mottled orangish brown and grey silty CLAY with occasional pockets of fine sand		
Test Method	BS1377:Part 2: 1990, clause 9.0		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	92
90	100	0.0060	69
75	100	0.0020	51
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100	Particle density (assumed) 2.70 Mg/m ³	
0.425	100		
0.3	100		
0.212	100		
0.15	100		
0.063	99		

Dry Mass of sample, g

2

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.1
Sand	1.0
Silt	47.8
Clay	51.1

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Remarks

Preparation and testing in accordance with BS1377 unless noted below



2519

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Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)	

Checked and Approved	
Initials:	J.P
Date:	06/11/2018
MSF-5-R3	



Unconsolidated Undrained Triaxial Compression tests without measurement of pore pressure Summary of Results

Tests carried out in accordance with BS1377:Part 7 : 1990 clause 8 or 9 as appropriate to test

Job No.	Project Name	Programme	
25366	31 Willoughby Road, London NW3 1RT	Samples received	17/08/2018
		Schedule received	22/10/2018
Project No.	Client	Project started	23/10/2018
G1808	Eldreds	Testing Started	29/10/2018

Hole No.	Sample				Soil Description	Test Type	Density		w	Length	Diameter	σ_3	At failure				Remarks
	Ref	Top m	Base m	Type			bulk Mg/m ³	dry					Axial strain %	$\sigma_1 - \sigma_3$ kPa	cu kPa	Mode	
BH1	5	2.00	2.45	U	High strength brown mottled orangish brown clayey gravelly silty SAND with rare fine brick fragments (gravel is fmc and rounded to sub-angular)	UU	1.83	1.48	23	198	102	50	5.6	170	85	B	
BH1	10	4.00	4.45	U	Medium strength brown slightly mottled grey silty CLAY with rare pockets of orange fine sand / silt and traces of selenite crystals and rootlets	UU	1.93	1.45	33	198	102	70	7.1	140	70	B	
BH1	12	5.00	5.45	U	High strength brown silty CLAY with rare pockets of orange fine sand / silt	UU	1.88	1.42	33	198	102	100	7.6	202	101	B	
BH1	14	6.00	6.45	U	High strength dark brown slightly mottled orangish brown silty CLAY with occasional pockets of fine sand / silt	UU	1.94	1.50	29	198	102	120	5.1	255	127	B	
BH1	16	7.00	7.45	U	High strength dark grey silty CLAY with rare pockets of fine sand	UU	1.99	1.52	30	198	102	140	7.6	204	102	B	
BH1	18	8.00	8.45	U	High strength dark grey silty CLAY	UU	2.03	1.57	29	198	102	160	11	190	95	C	
BH1	23	10.00	10.45	U	Very high strength dark grey silty CLAY with occasional pockets of fine sand	UU	2.03	1.59	28	198	102	200	5.1	360	180	B	
BH1	29	12.00	12.45	U	Very high strength dark grey silty CLAY with occasional pockets of fine sand	UU	2.02	1.63	24	198	102	240	2.5	340	170	B	Disturbed
BH1	35	14.00	14.45	U	Very high strength dark grey silty CLAY with frequent pockets of fine sand and rare decayed shell deposits	UU	2.11	1.69	25	198	102	280	19	335	168	C	
BH2	4	1.50	1.95	U	High strength brown and orangish brown mottled slightly gravelly sandy silty CLAY with rare brick fragments and traces of carbonaceous deposits (gravel is fm and sub-angular)	UU	2.05	1.62	27	198	102	50	17	172	86	C	
BH2	8	2.50	2.95	U	Medium strength grey, brown and orangish brown mottled slightly gravelly sandy silty CLAY (gravel is fm and rounded to sub-angular)	UU	2.04	1.66	23	198	102	50	20	83	41	P	
BH2	11	3.50	3.95	U	High strength brown and orangish brown mottled silty CLAY with occasional pockets of fine sand and rare fine gravel	UU	1.99	1.50	33	198	102	60	6.1	175	87	B	
BH2	14	4.50	4.95	U	High strength slightly mottled orangish brown and grey silty CLAY with occasional pockets of fine sand	UU	2.01	1.51	33	198	102	75	8.1	171	86	C	

Legend UU - single stage test (single and multiple specimens) σ_3 Cell pressure Mode of failure ; B - Brittle
 UUM - Multistage test on a single specimen $\sigma_1 - \sigma_3$ Maximum corrected deviator stress P - Plastic
 suffix R - remoulded or recompacted cu Undrained shear strength, $\frac{1}{2}(\sigma_1 - \sigma_3)$ C - Compound




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Date: 15/11/2018

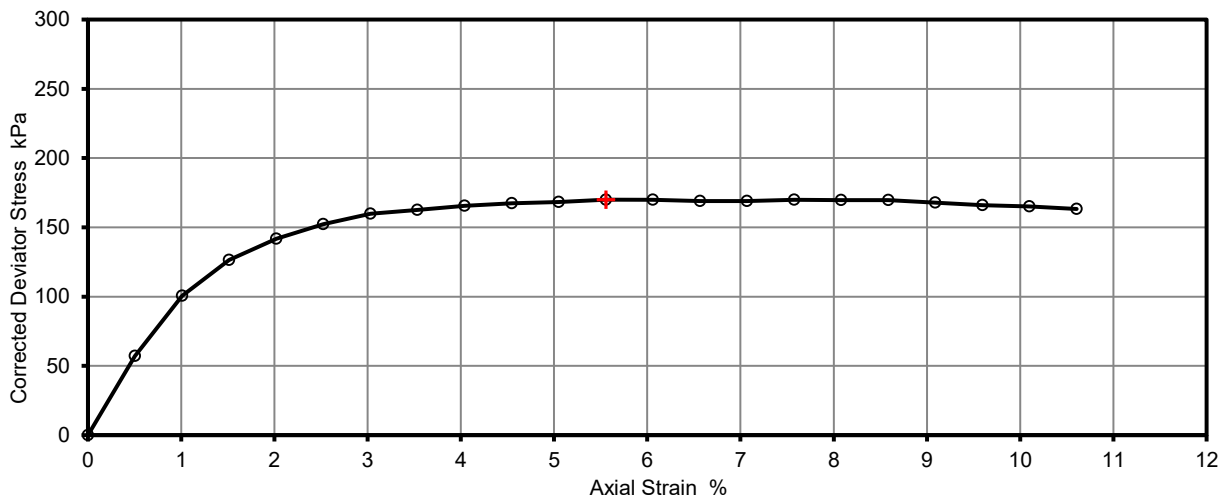
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	25366
				Borehole/Pit No.	BH1
Site Name	31 Willoughby Road, London NW3 1RT			Sample No.	5
Project No.	G1808	Client	Eldreds	Depth Top	2.00 m
Soil Description	High strength brown mottled orangish brown clayey gravelly silty SAND with rare fine brick fragments (gravel is fmc and rounded to sub-angular)			Depth Base	2.45 m
				Sample Type	U
				Samples received	17/08/2018
				Schedules received	22/10/2018
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	29/10/2018

Remarks

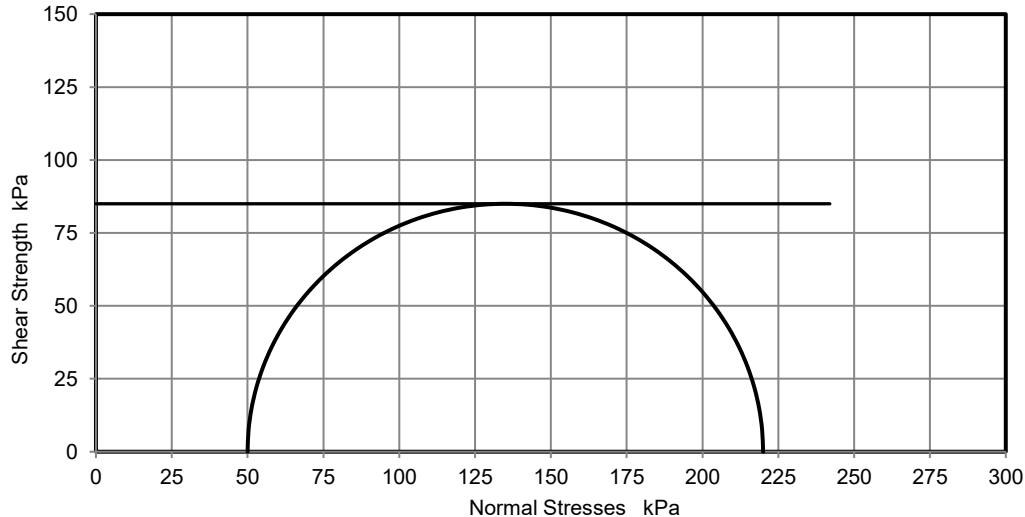
Position within sample

Test Number	1
Length	198.0 mm
Diameter	102.0 mm
Bulk Density	1.83 Mg/m ³
Moisture Content	23 %
Dry Density	1.48 Mg/m ³
Rate of Strain	2.0 %/min
Cell Pressure	50 kPa
Axial Strain	5.6 %
Deviator Stress, ($\sigma_1 - \sigma_3$)f	170 kPa
Undrained Shear Strength, cu	85 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)$ f
Mode of Failure	Brittle

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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Date 15/11/2018

MSF-5 R7

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)



Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen

Job Ref	25366
Borehole/Pit No.	BH1
Sample No.	10
Depth Top	4.00 m
Depth Base	4.45 m
Sample Type	U
Samples received	17/08/2018
Schedules received	22/10/2018
Date of test	28/10/2018

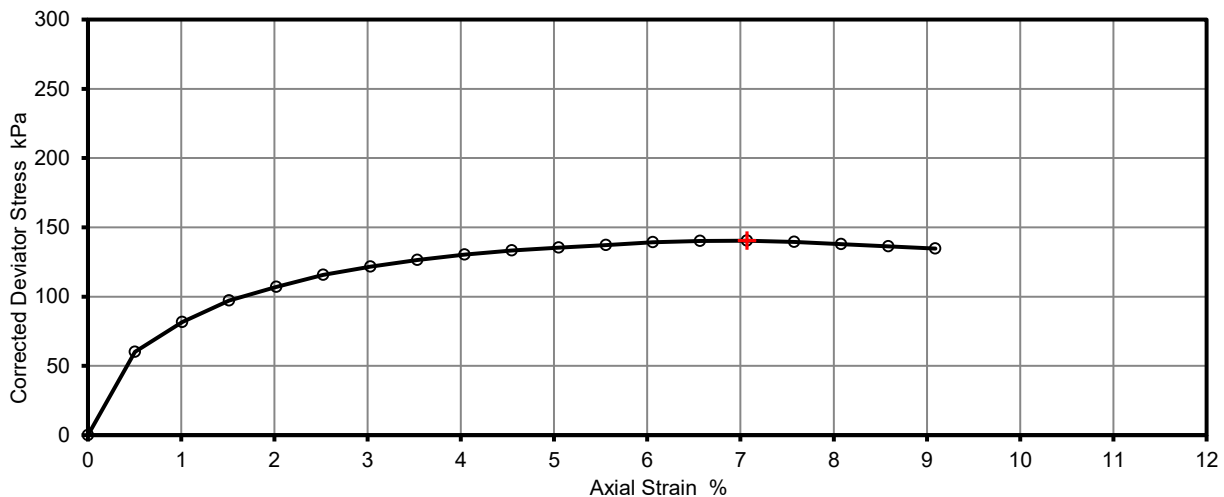
Site Name	31 Willoughby Road, London NW3 1RT		
Project No.	G1808	Client	Eldreds
Soil Description	Medium strength brown slightly mottled grey silty CLAY with rare pockets of orange fine sand / silt and traces of selenite crystals and rootlets		
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen		

Remarks

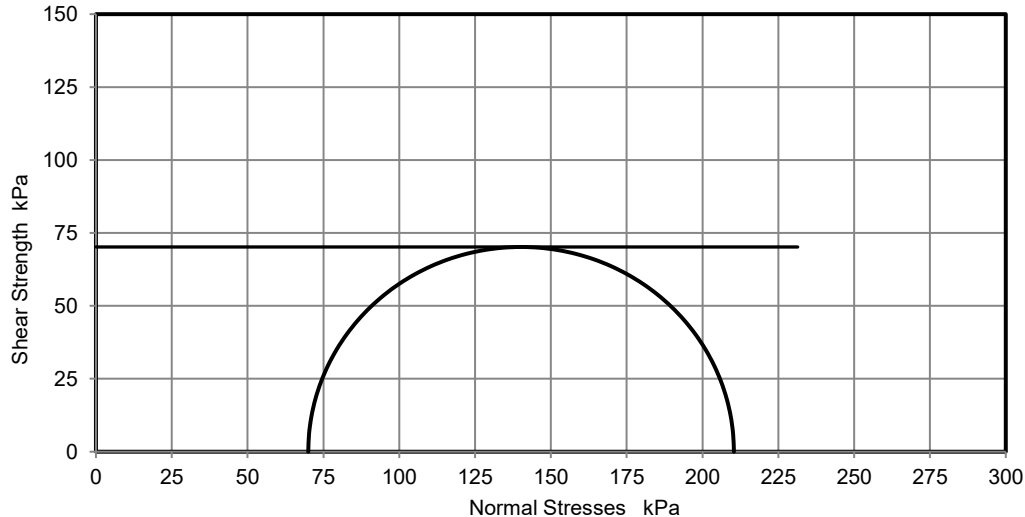
Position within sample

Test Number	1
Length	198.0 mm
Diameter	102.0 mm
Bulk Density	1.93 Mg/m3
Moisture Content	33 %
Dry Density	1.45 Mg/m3
Rate of Strain	2.0 %/min
Cell Pressure	70 kPa
Axial Strain	7.1 %
Deviator Stress, ($\sigma_1 - \sigma_3$) f	140 kPa
Undrained Shear Strength, cu	70 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)$ f
Mode of Failure	Brittle

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen

Job Ref	25366
Borehole/Pit No.	BH1
Sample No.	12
Depth Top	5.00 m
Depth Base	5.45 m
Sample Type	U
Samples received	17/08/2018
Schedules received	22/10/2018
Date of test	29/10/2018

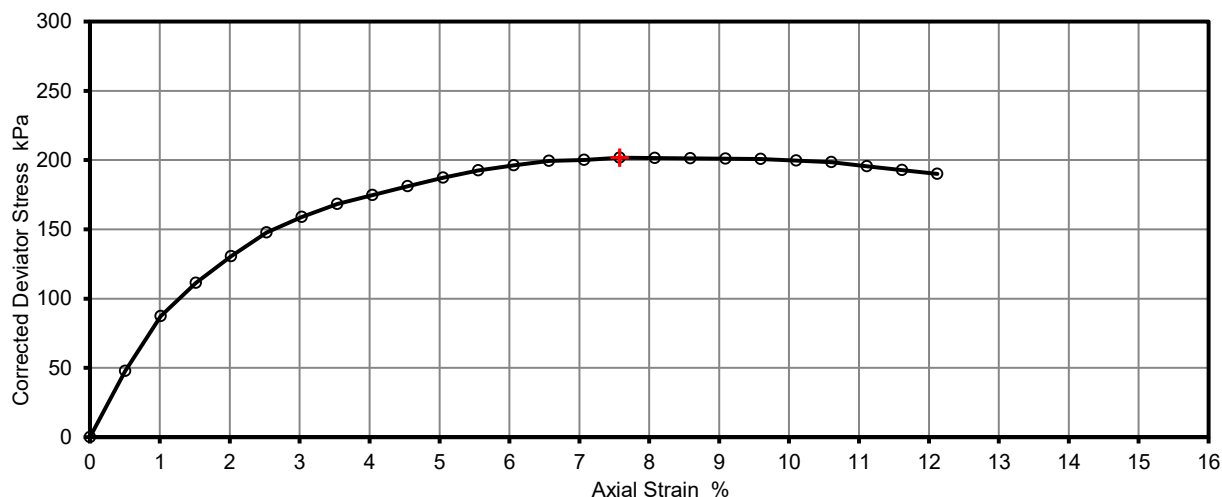
Site Name	31 Willoughby Road, London NW3 1RT		
Project No.	G1808	Client	Eldreds
Soil Description	High strength brown silty CLAY with rare pockets of orange fine sand / silt		
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen		

Remarks

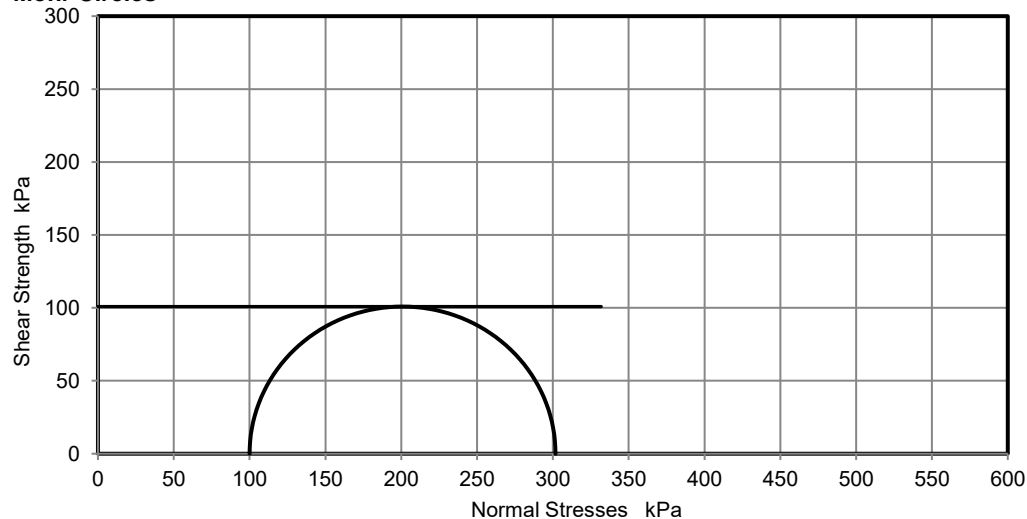
Position within sample

Test Number	1
Length	198.0 mm
Diameter	102.0 mm
Bulk Density	1.88 Mg/m3
Moisture Content	33 %
Dry Density	1.42 Mg/m3
Rate of Strain	2.0 %/min
Cell Pressure	100 kPa
Axial Strain	7.6 %
Deviator Stress, ($\sigma_1 - \sigma_3$)f	202 kPa
Undrained Shear Strength, cu	101 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)$ f
Mode of Failure	Brittle

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen

Job Ref 25366

Borehole/Pit No. BH1

Site Name 31 Willoughby Road, London NW3 1RT

Sample No. 14

Project No. G1808 Client Eldreds

Depth Top 6.00 m

Soil Description

High strength dark brown slightly mottled orangish brown silty
CLAY with occasional pockets of fine sand / silt

Depth Base 6.45 m

Sample Type U

Samples received 17/08/2018

Schedules received 22/10/2018

Test Method BS1377 : Part 7 : 1990, clause 8, single specimen

Date of test 29/10/2018

Remarks

Position within sample

Test Number

1

Length

198.0 mm

Diameter

102.0 mm

Bulk Density

1.94 Mg/m³

Moisture Content

29 %

Dry Density

1.50 Mg/m³

Rate of Strain

2.0 %/min

Cell Pressure

120 kPa

Axial Strain

5.1 %

Deviator Stress, ($\sigma_1 - \sigma_3$) f

255 kPa

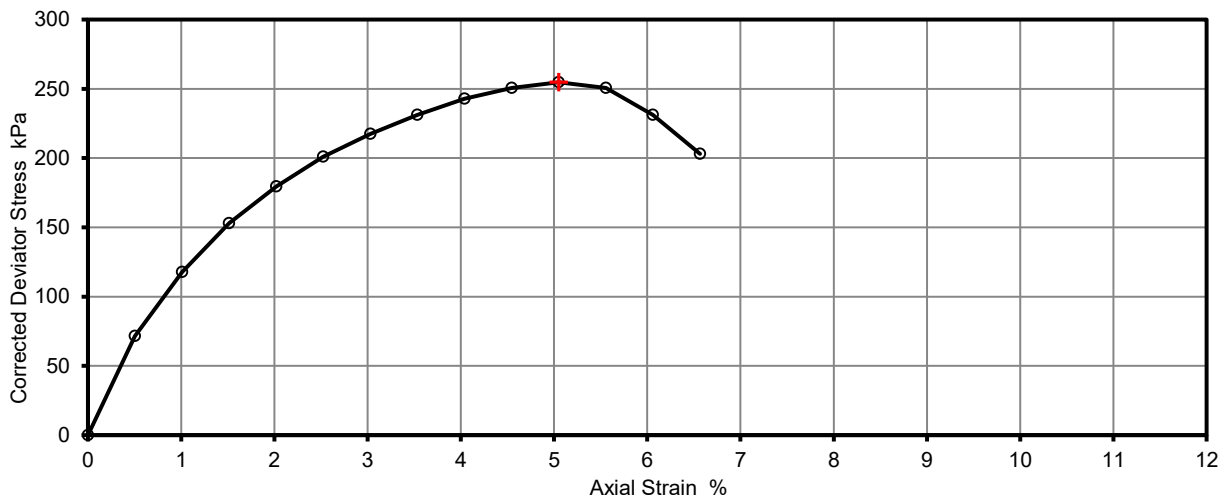
Undrained Shear Strength, c_u

127 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)$ f

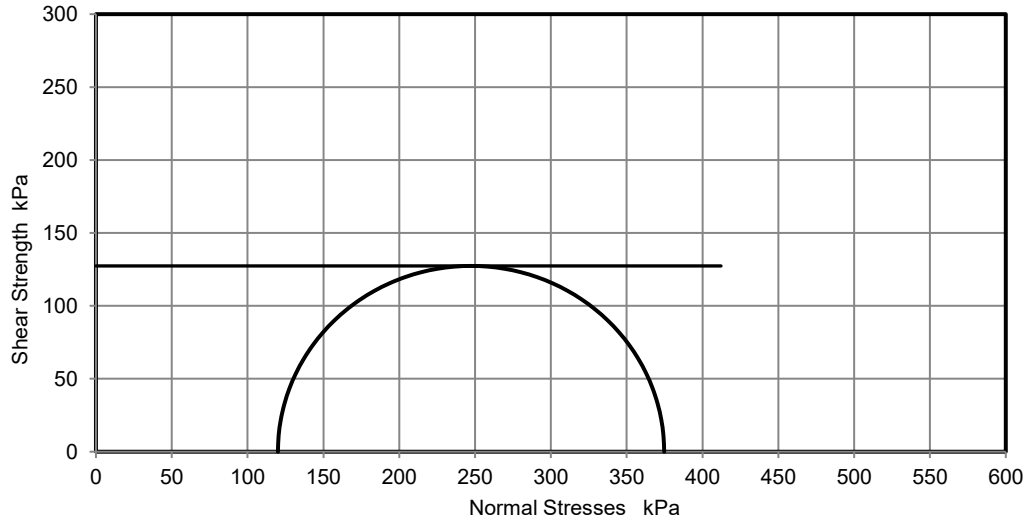
Mode of Failure

Brittle

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen

Job Ref	25366
Borehole/Pit No.	BH1
Sample No.	16
Depth Top	7.00 m
Depth Base	7.45 m
Sample Type	U
Samples received	17/08/2018
Schedules received	22/10/2018
Date of test	29/10/2018

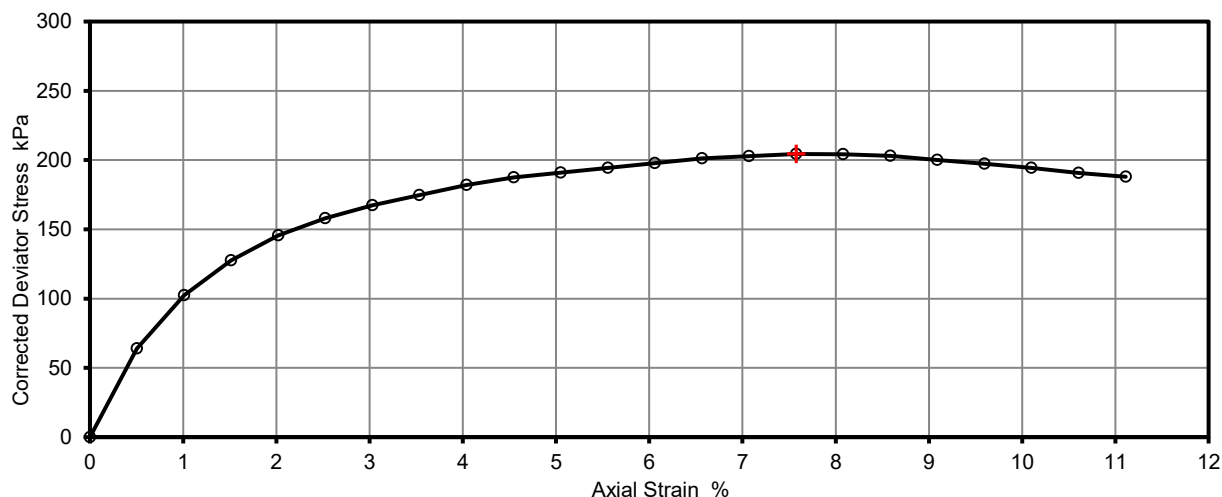
Site Name	31 Willoughby Road, London NW3 1RT		
Project No.	G1808	Client	Eldreds
Soil Description	High strength dark grey silty CLAY with rare pockets of fine sand		
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen		

Remarks

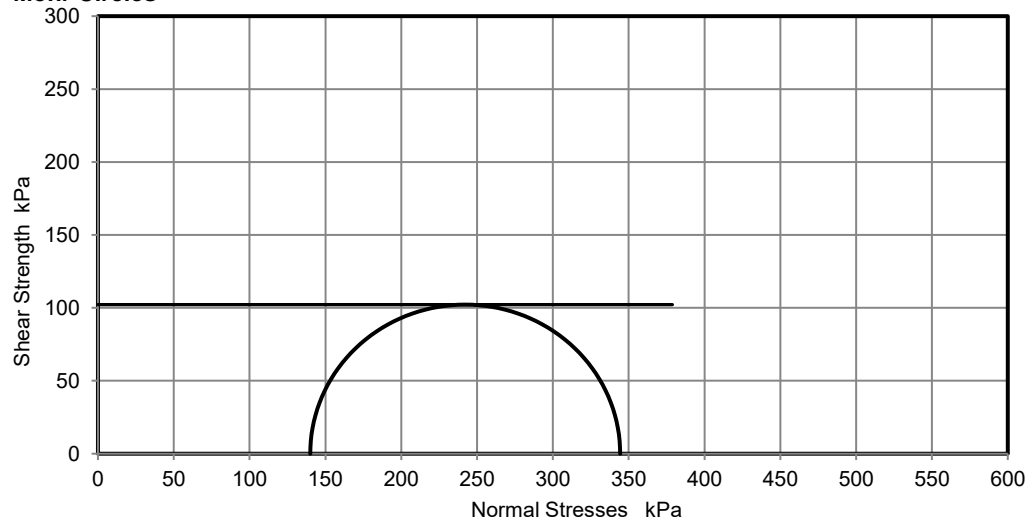
Position within sample

Test Number	1
Length	198.0 mm
Diameter	102.0 mm
Bulk Density	1.99 Mg/m3
Moisture Content	30 %
Dry Density	1.52 Mg/m3
Rate of Strain	2.0 %/min
Cell Pressure	140 kPa
Axial Strain	7.6 %
Deviator Stress, ($\sigma_1 - \sigma_3$)f	204 kPa
Undrained Shear Strength, cu	102 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)$ f
Mode of Failure	Brittle

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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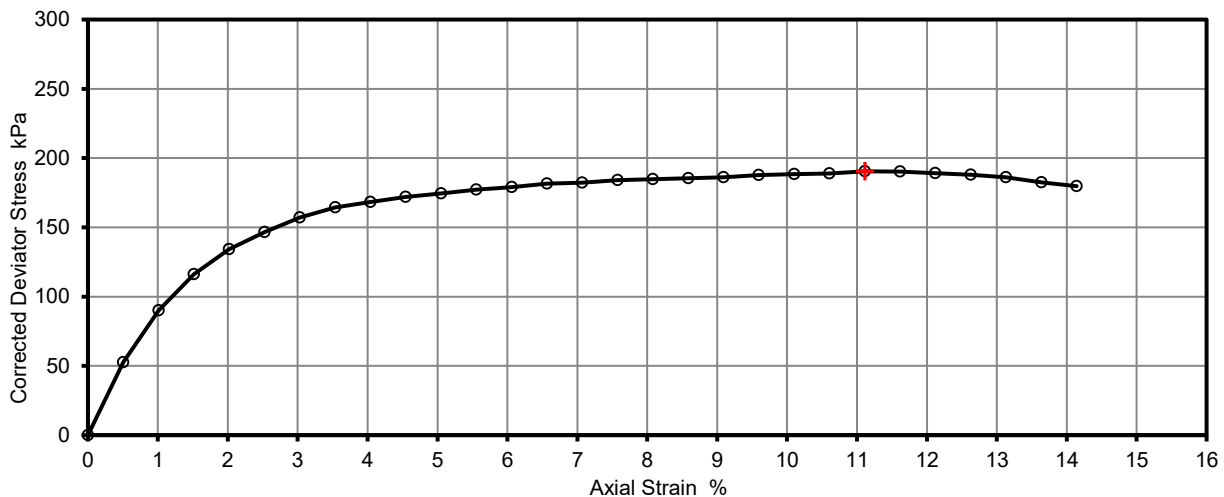
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	25366
				Borehole/Pit No.	BH1
Site Name	31 Willoughby Road, London NW3 1RT			Sample No.	18
Project No.	G1808	Client	Eldreds	Depth Top	8.00 m
Soil Description	High strength dark grey silty CLAY			Depth Base	8.45 m
				Sample Type	U
				Samples received	17/08/2018
				Schedules received	22/10/2018
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	29/10/2018

Remarks

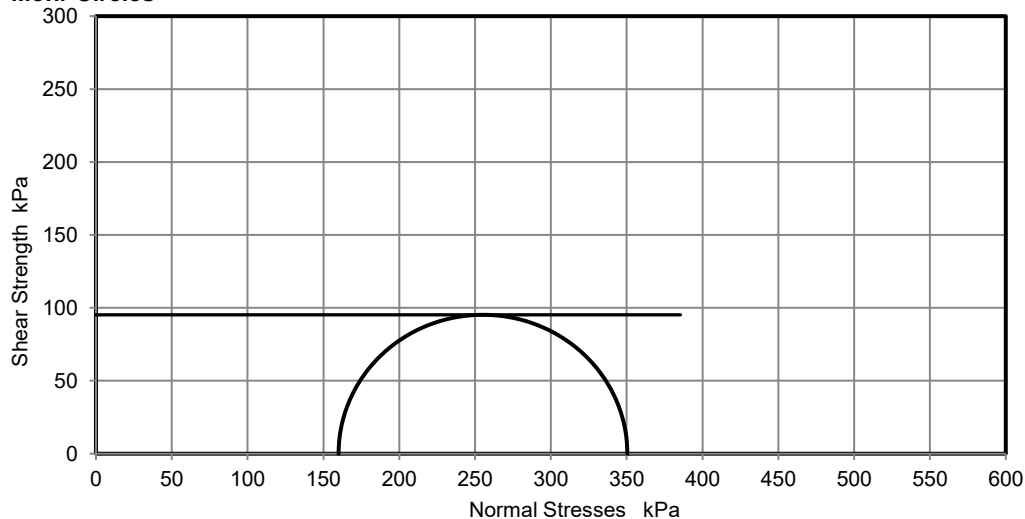
Position within sample

Test Number	1
Length	198.0 mm
Diameter	102.0 mm
Bulk Density	2.03 Mg/m ³
Moisture Content	29 %
Dry Density	1.57 Mg/m ³
Rate of Strain	2.0 %/min
Cell Pressure	160 kPa
Axial Strain	11 %
Deviator Stress, ($\sigma_1 - \sigma_3$)f	190 kPa
Undrained Shear Strength, cu	95 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)$ f
Mode of Failure	Compound

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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Date 15/11/2018

MSF-5 R7

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Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen

Job Ref	25366
Borehole/Pit No.	BH1
Sample No.	23
Depth Top	10.00 m
Depth Base	10.45 m
Sample Type	U
Samples received	17/08/2018
Schedules received	22/10/2018
Date of test	13/11/2018

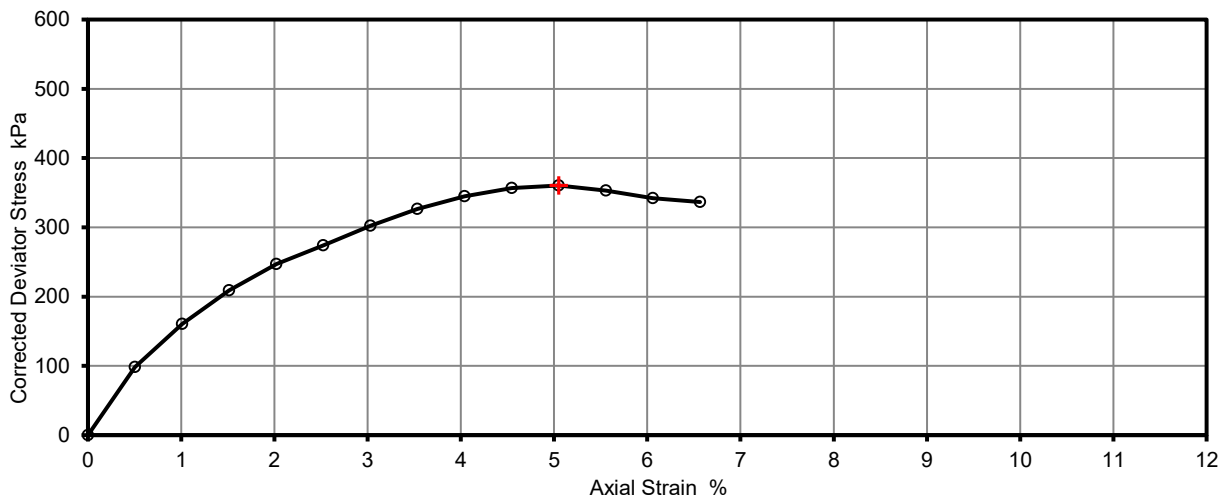
Site Name	31 Willoughby Road, London NW3 1RT		
Project No.	G1808	Client	Eldreds
Soil Description	Very high strength dark grey silty CLAY with occasional pockets of fine sand		
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen		

Remarks

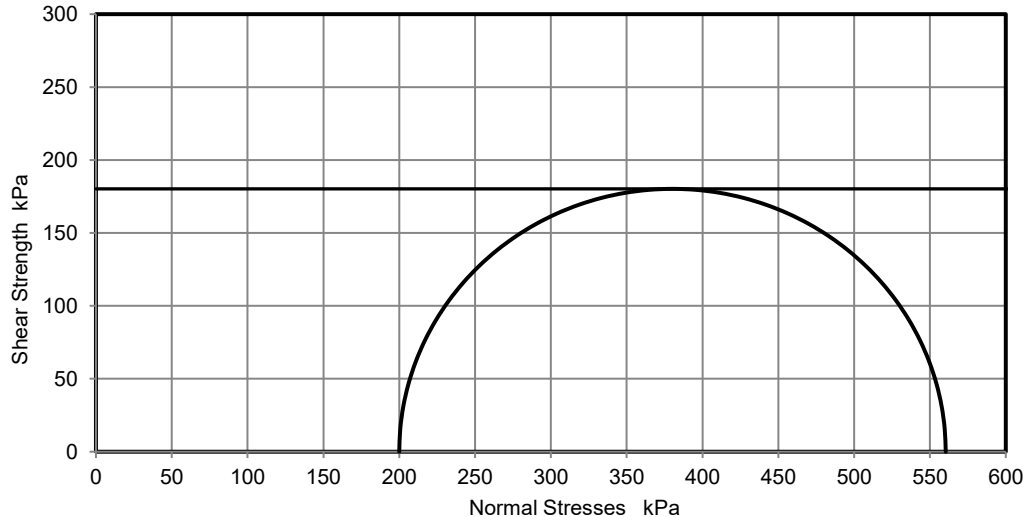
Position within sample

Test Number	1
Length	198.0 mm
Diameter	102.0 mm
Bulk Density	2.03 Mg/m ³
Moisture Content	28 %
Dry Density	1.59 Mg/m ³
Rate of Strain	2.0 %/min
Cell Pressure	200 kPa
Axial Strain	5.1 %
Deviator Stress, ($\sigma_1 - \sigma_3$)f	360 kPa
Undrained Shear Strength, cu	180 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)$ f
Mode of Failure	Brittle

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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Date 15/11/2018

MSF-5 R7

	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	25366
				Borehole/Pit No.	BH1
Site Name	31 Willoughby Road, London NW3 1RT			Sample No.	29
Project No.	G1808	Client	Eldreds	Depth Top	12.00 m
Soil Description	Very high strength dark grey silty CLAY with occasional pockets of fine sand			Depth Base	12.45 m
				Sample Type	U
				Samples received	17/08/2018
				Schedules received	22/10/2018
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	13/11/2018

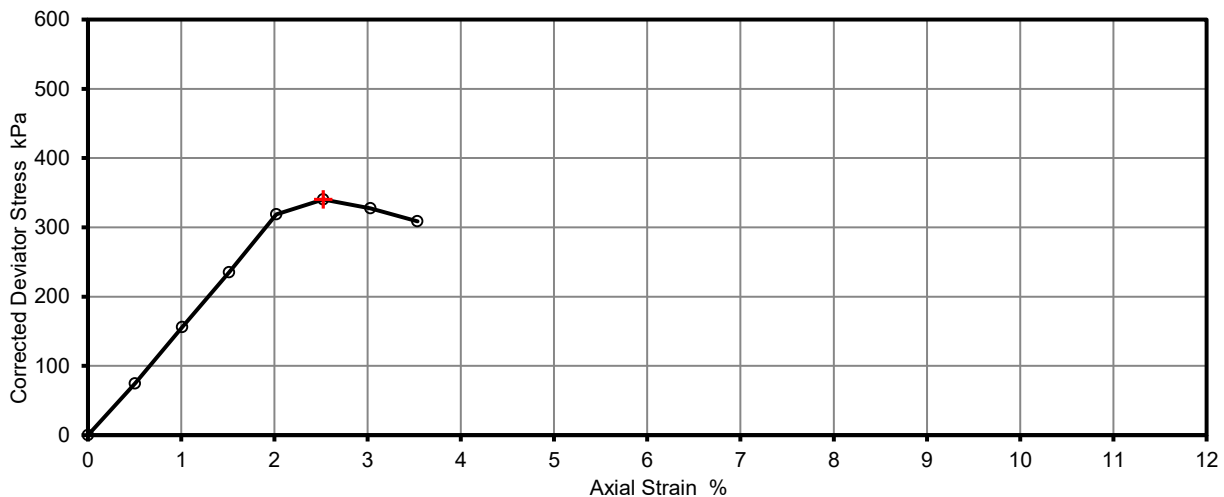
Remarks

Disturbed

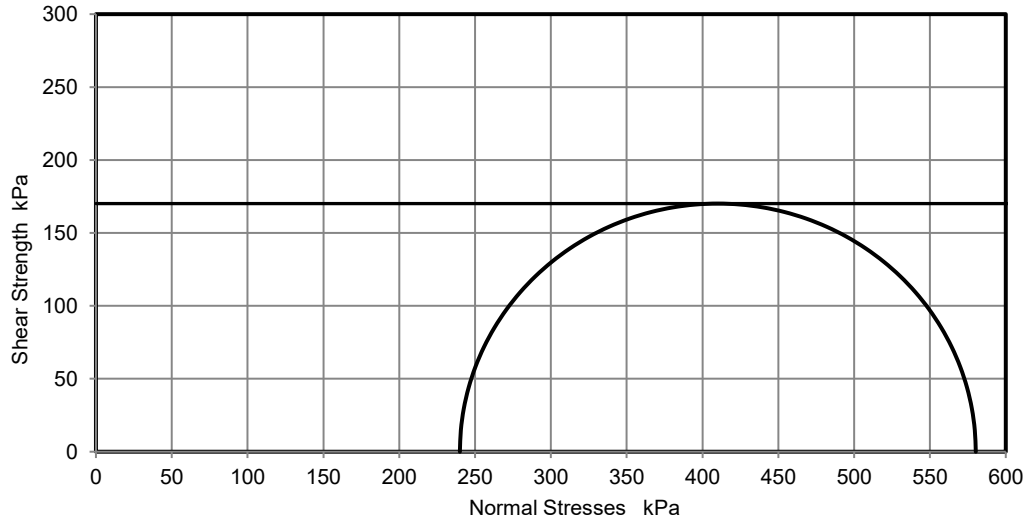
Position within sample

Test Number	1
Length	198.0 mm
Diameter	102.0 mm
Bulk Density	2.02 Mg/m ³
Moisture Content	24 %
Dry Density	1.63 Mg/m ³
Rate of Strain	2.0 %/min
Cell Pressure	240 kPa
Axial Strain	2.5 %
Deviator Stress, ($\sigma_1 - \sigma_3$)f	340 kPa
Undrained Shear Strength, cu	170 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)$ f
Mode of Failure	Brittle

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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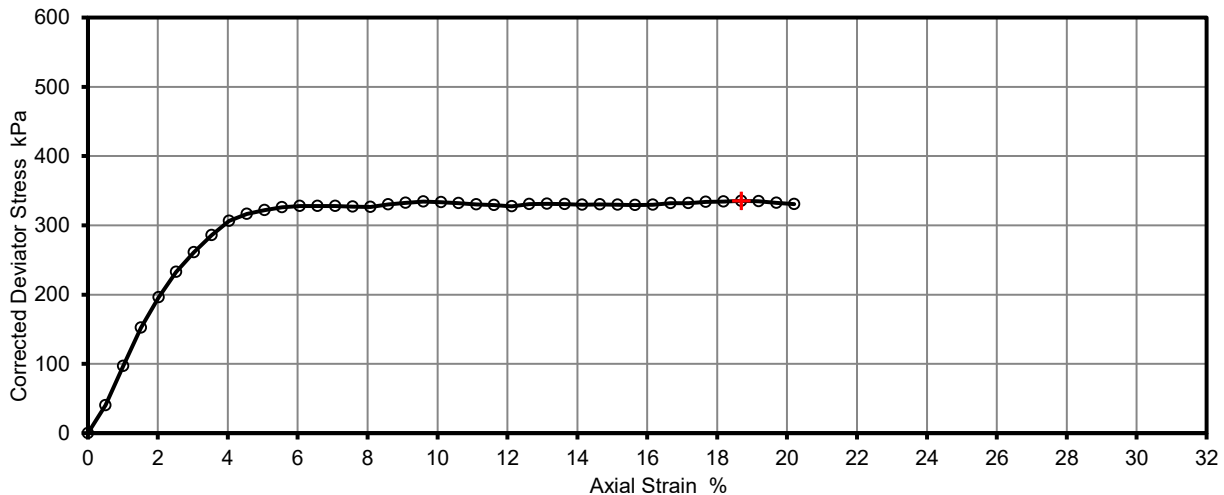
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	25366
				Borehole/Pit No.	BH1
Site Name	31 Willoughby Road, London NW3 1RT			Sample No.	35
Project No.	G1808	Client	Eldreds	Depth Top	14.00 m
Soil Description	Very high strength dark grey silty CLAY with frequent pockets of fine sand and rare decayed shell deposits			Depth Base	14.45 m
				Sample Type	U
				Samples received	17/08/2018
				Schedules received	22/10/2018
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	13/11/2018

Remarks

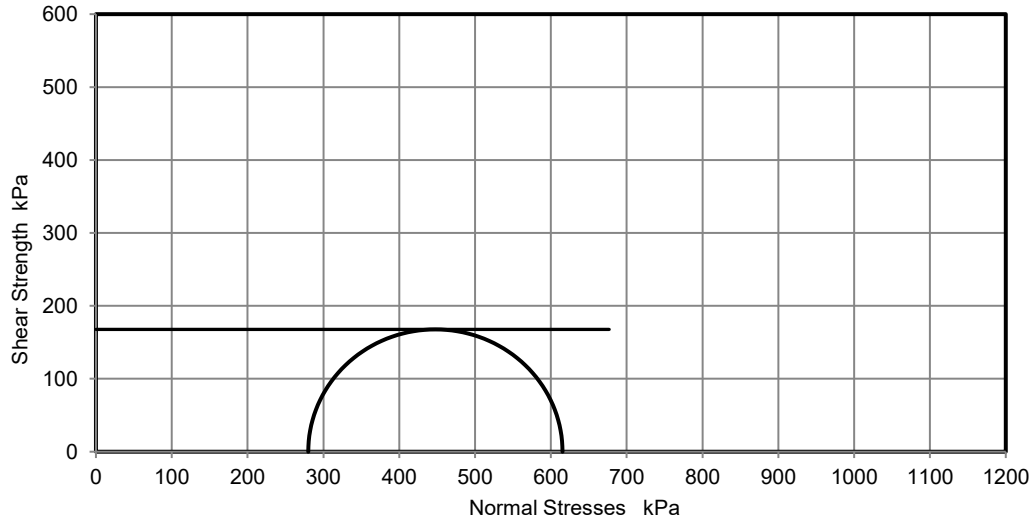
Position within sample

Test Number	1
Length	198.0 mm
Diameter	102.0 mm
Bulk Density	2.11 Mg/m ³
Moisture Content	25 %
Dry Density	1.69 Mg/m ³
Rate of Strain	2.0 %/min
Cell Pressure	280 kPa
Axial Strain	19 %
Deviator Stress, ($\sigma_1 - \sigma_3$) _f	335 kPa
Undrained Shear Strength, c_u	168 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)$ _f
Mode of Failure	Compound

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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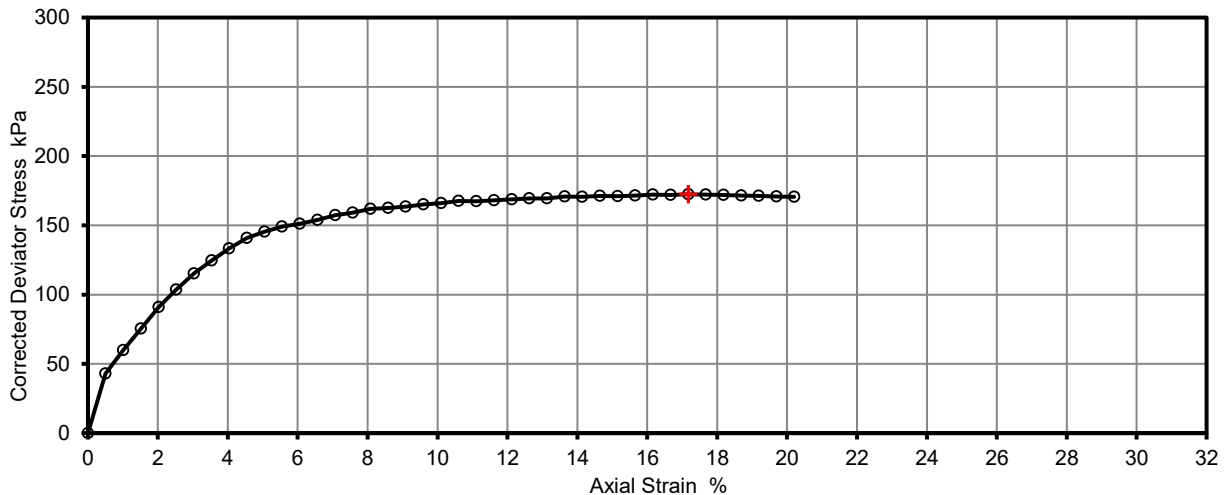
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	25366
				Borehole/Pit No.	BH2
Site Name	31 Willoughby Road, London NW3 1RT			Sample No.	4
Project No.	G1808	Client	Eldreds	Depth Top	1.50 m
Soil Description	High strength brown and orangish brown mottled slightly gravelly sandy silty CLAY with rare brick fragments and traces of carbonaceous deposits (gravel is fm and sub-angular)			Depth Base	1.95 m
				Sample Type	U
				Samples received	17/08/2018
				Schedules received	22/10/2018
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	29/10/2018

Remarks

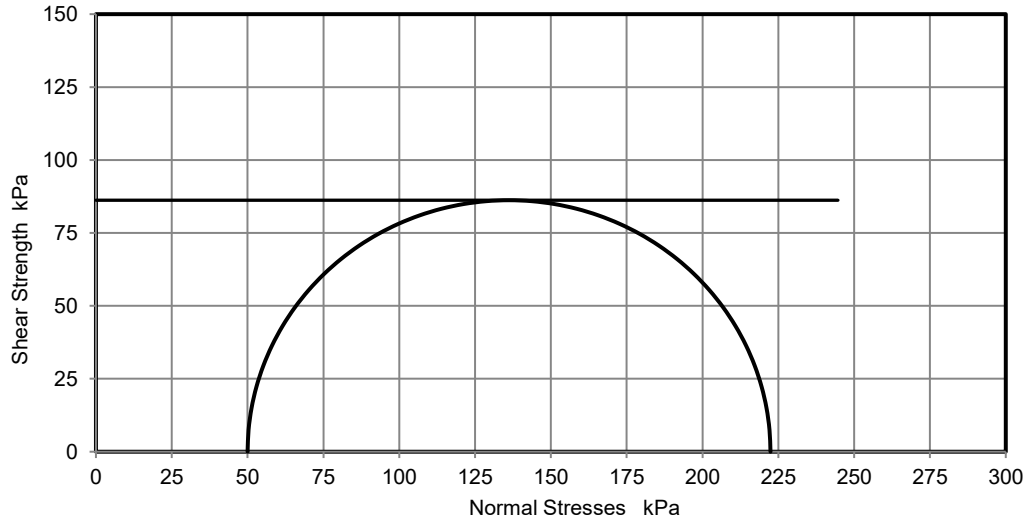
Position within sample

Test Number	1
Length	198.0 mm
Diameter	102.0 mm
Bulk Density	2.05 Mg/m3
Moisture Content	27 %
Dry Density	1.62 Mg/m3
Rate of Strain	2.0 %/min
Cell Pressure	50 kPa
Axial Strain	17 %
Deviator Stress, ($\sigma_1 - \sigma_3$)f	172 kPa
Undrained Shear Strength, cu	86 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)$ f
Mode of Failure	Compound

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377. This is provided for information only.



2519

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU
Tel: 01923 711 288
Email: James@k4soils.com


Checked and Approved

Initials: J.P

Date 15/11/2018

MSF-5 R7

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

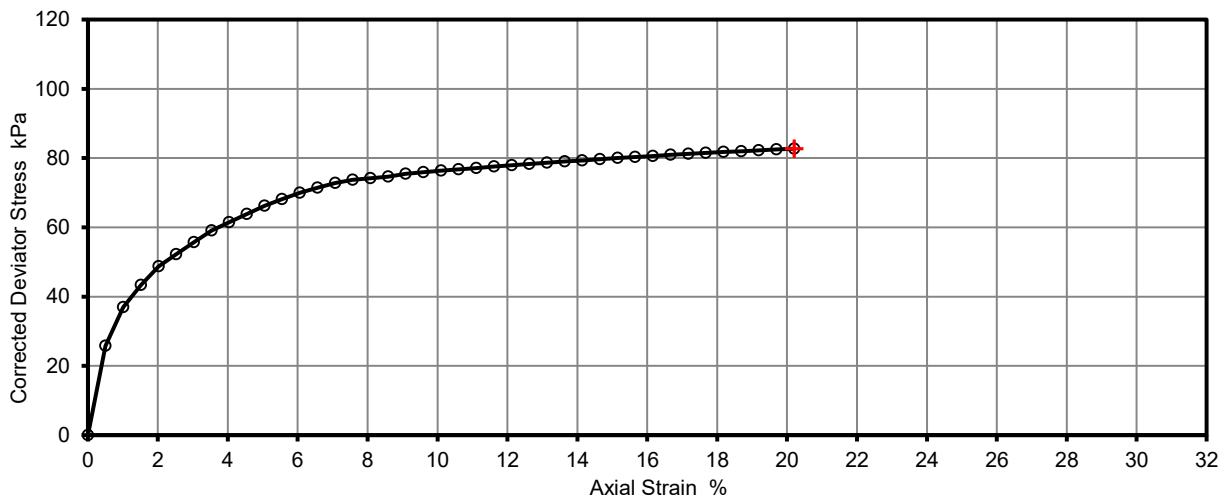
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	25366
				Borehole/Pit No.	BH2
Site Name	31 Willoughby Road, London NW3 1RT			Sample No.	8
Project No.	G1808	Client	Eldreds	Depth Top	2.50 m
Soil Description	Medium strength grey, brown and orangish brown mottled slightly gravelly sandy silty CLAY (gravel is fm and rounded to sub-angular)			Depth Base	2.95 m
				Sample Type	U
				Samples received	17/08/2018
				Schedules received	22/10/2018
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	29/10/2018

Remarks

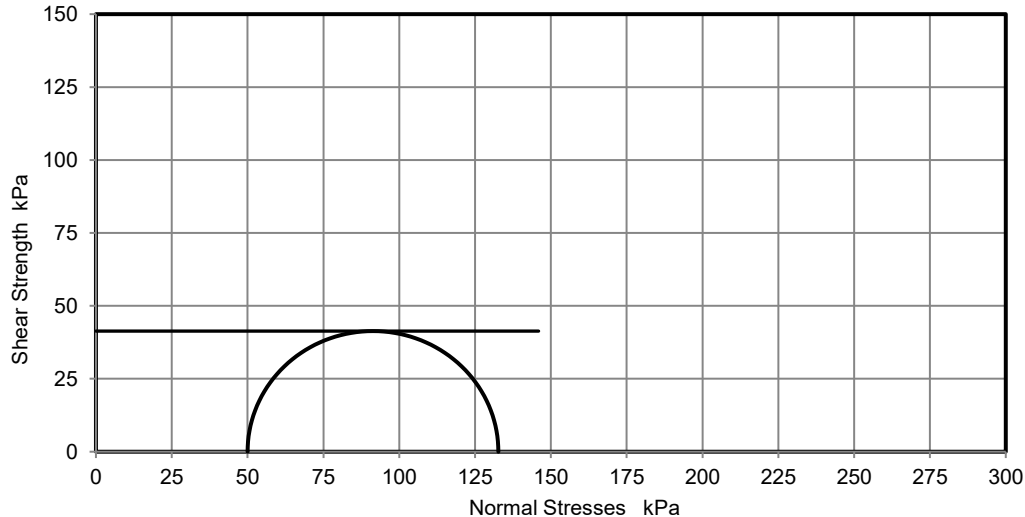
Position within sample

Test Number	1
Length	198.0 mm
Diameter	102.0 mm
Bulk Density	2.04 Mg/m ³
Moisture Content	23 %
Dry Density	1.66 Mg/m ³
Rate of Strain	2.0 %/min
Cell Pressure	50 kPa
Axial Strain	20 %
Deviator Stress, ($\sigma_1 - \sigma_3$)f	83 kPa
Undrained Shear Strength, cu	41 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)$ f
Mode of Failure	Plastic

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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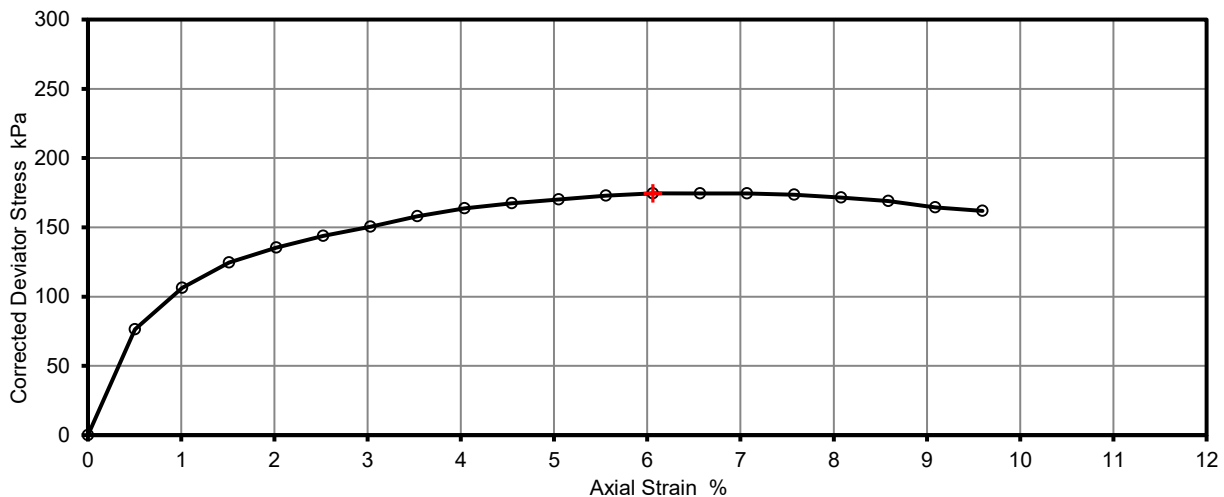
	Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen			Job Ref	25366
				Borehole/Pit No.	BH2
Site Name	31 Willoughby Road, London NW3 1RT			Sample No.	11
Project No.	G1808	Client	Eldreds	Depth Top	3.50 m
Soil Description	High strength brown and orangish brown mottled silty CLAY with occasional pockets of fine sand and rare fine gravel			Depth Base	3.95 m
				Sample Type	U
				Samples received	17/08/2018
				Schedules received	22/10/2018
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen			Date of test	29/10/2018

Remarks

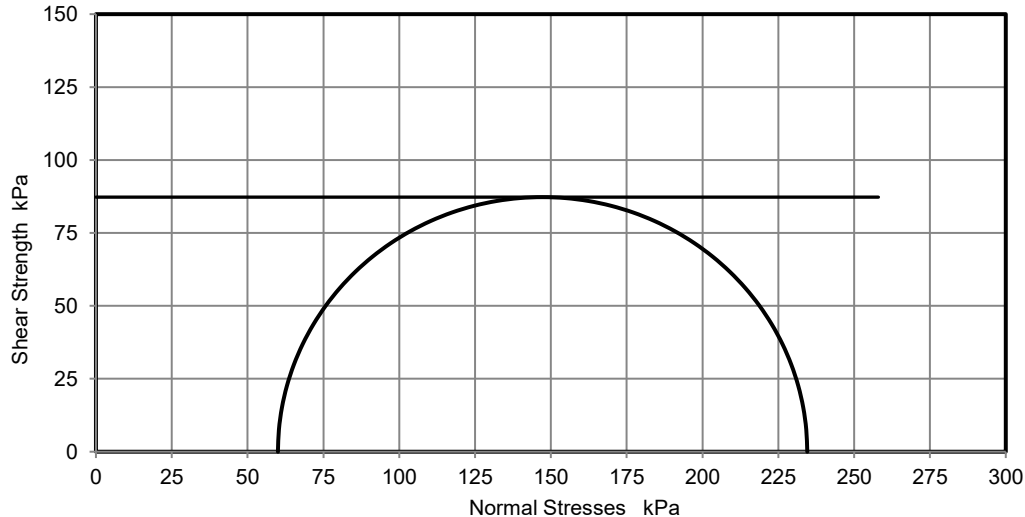
Position within sample

Test Number	1
Length	198.0 mm
Diameter	102.0 mm
Bulk Density	1.99 Mg/m ³
Moisture Content	32 %
Dry Density	1.50 Mg/m ³
Rate of Strain	2.0 %/min
Cell Pressure	60 kPa
Axial Strain	6.1 %
Deviator Stress, ($\sigma_1 - \sigma_3$)f	175 kPa
Undrained Shear Strength, cu	87 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)$ f
Mode of Failure	Brittle

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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Date 15/11/2018

MSF-5 R7

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)



Unconsolidated Undrained Triaxial Compression Test without measurement of pore pressure - single specimen

Job Ref	25366
Borehole/Pit No.	BH2
Sample No.	14
Depth Top	4.50 m
Depth Base	4.95 m
Sample Type	U
Samples received	17/08/2018
Schedules received	22/10/2018
Date of test	29/10/2018

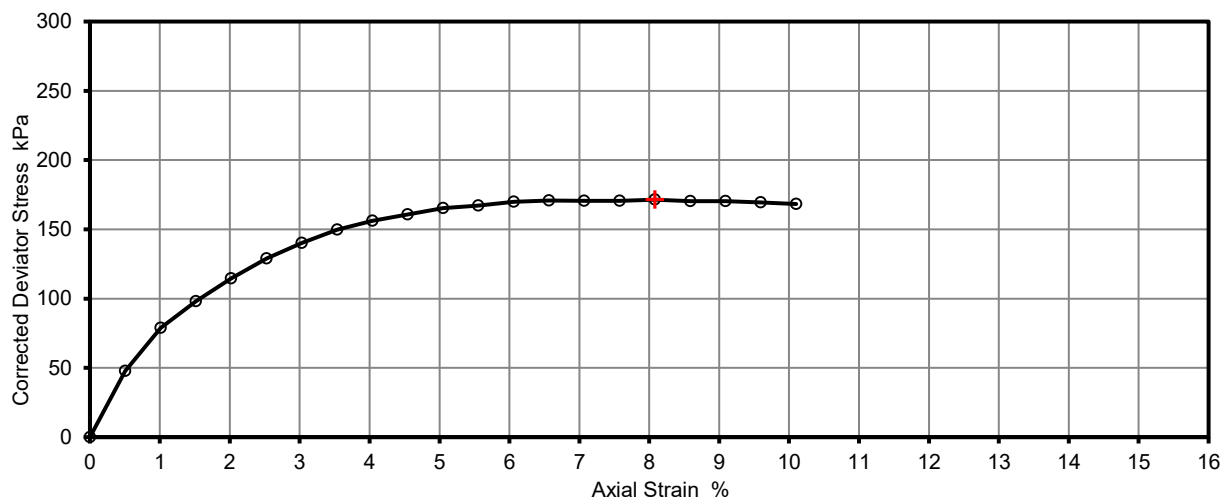
Site Name	31 Willoughby Road, London NW3 1RT		
Project No.	G1808	Client	Eldreds
Soil Description	High strength slightly mottled orangish brown and grey silty CLAY with occasional pockets of fine sand		
Test Method	BS1377 : Part 7 : 1990, clause 8, single specimen		

Remarks

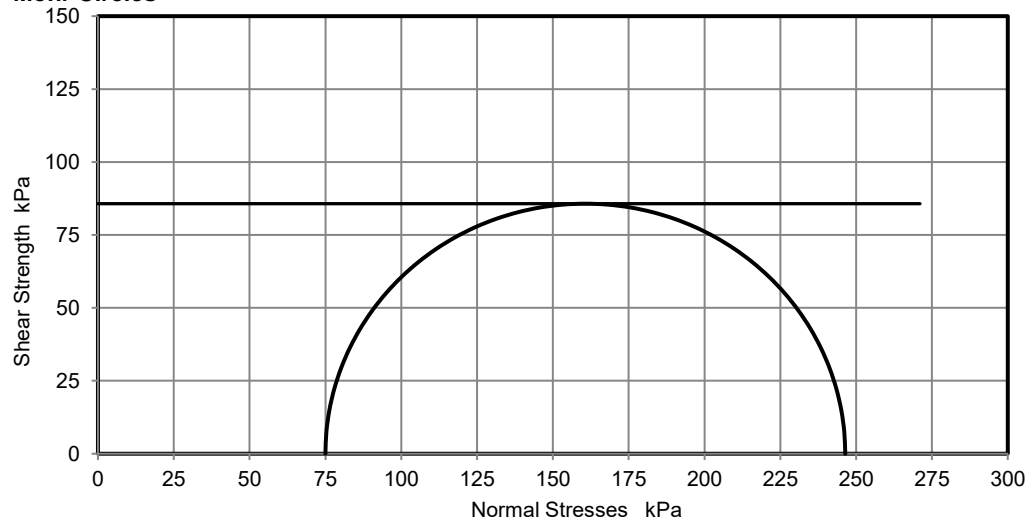
Position within sample

Test Number	1
Length	198.0 mm
Diameter	102.0 mm
Bulk Density	2.01 Mg/m3
Moisture Content	33 %
Dry Density	1.51 Mg/m3
Rate of Strain	2.0 %/min
Cell Pressure	75 kPa
Axial Strain	8.1 %
Deviator Stress, ($\sigma_1 - \sigma_3$)f	171 kPa
Undrained Shear Strength, cu	86 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)$ f
Mode of Failure	Compound

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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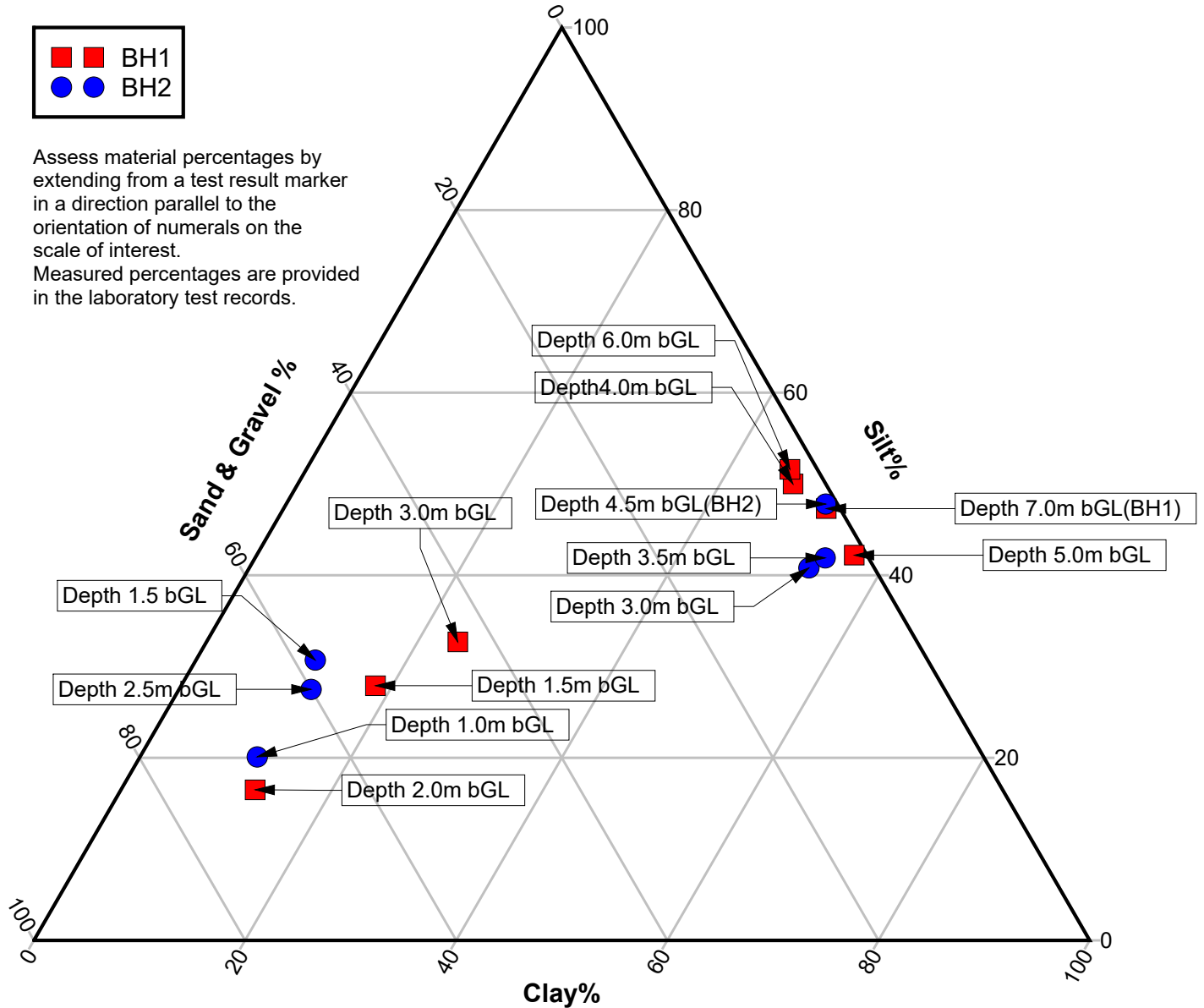
Date 15/11/2018

MSF-5 R7

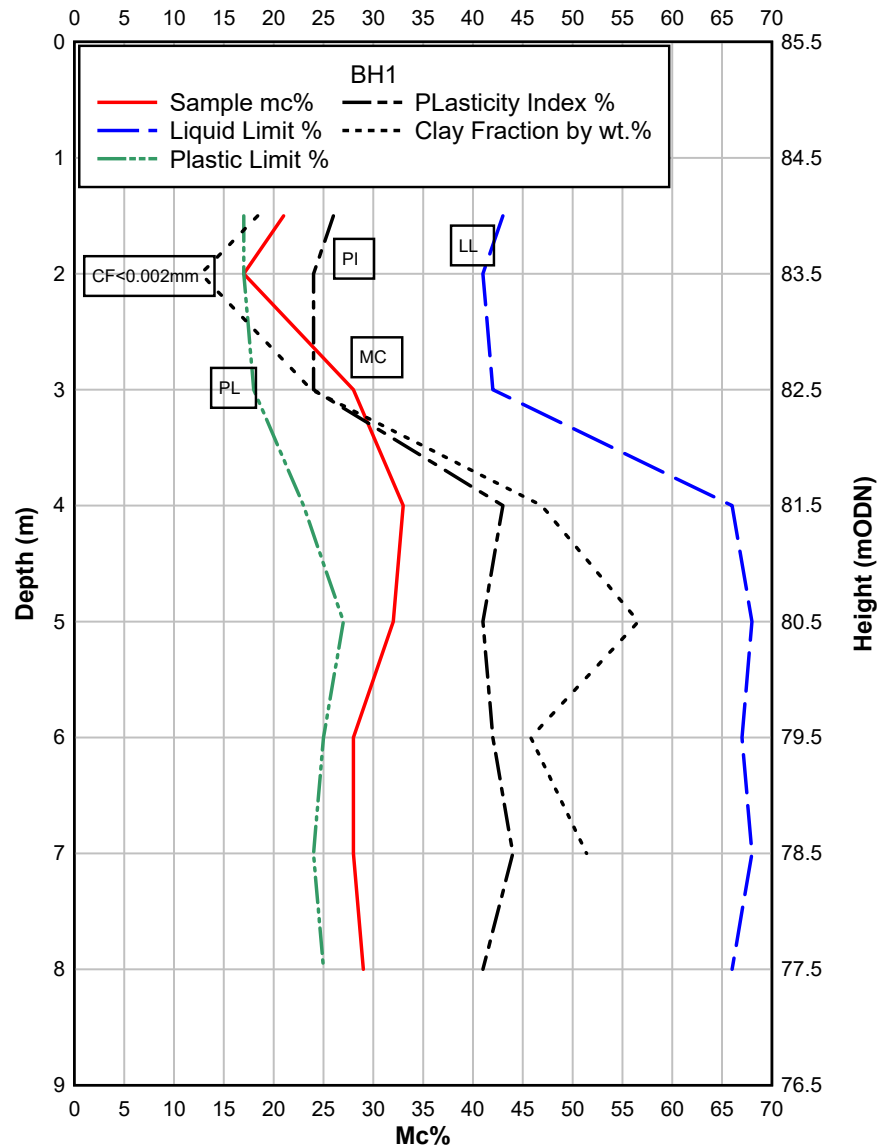
Groundwater instrumentation

Borehole	GEA BH2 (rear)	GEA BH4 (front)	EGL BH1 W1	EGL BH1 W2	EGL BH2 W1	EGL BH2 W2
Transducerr ref.	B12690	B12691	B12692	B12701	B12703	B12698
Well depth mbGL	3.75	4.00	7.79	4.00	5.10	3.16
Ground level mOD	85.50	85.40	85.50	85.50	85.50	85.50
Datum level mOD	85.50	85.40	85.61	85.70	85.65	85.64
Well base level mOD	81.75	81.40	77.71	81.50	80.40	82.34
Depth Datum to transducer m.	3.50	3.52	7.50	4.15	5.10	2.80
Transducer level mOD	82.00	81.88	78.11	81.55	80.55	82.84
Slots top level mOD	84.50	84.40	78.71	82.50	81.40	83.34
Slots btm level mOD	81.50	81.40	77.71	81.50	80.40	82.34
Filter top level mOD	84.50	84.40	78.71	82.50	81.40	83.34
Filter base level mOD	81.50	81.40	77.71	81.50	80.40	82.34
BH dia. at filter mm.	60	60	150	200	200	200
Well ID mm	30	30	50	50	50	50
Well OD mm	36	36	60	60	60	60

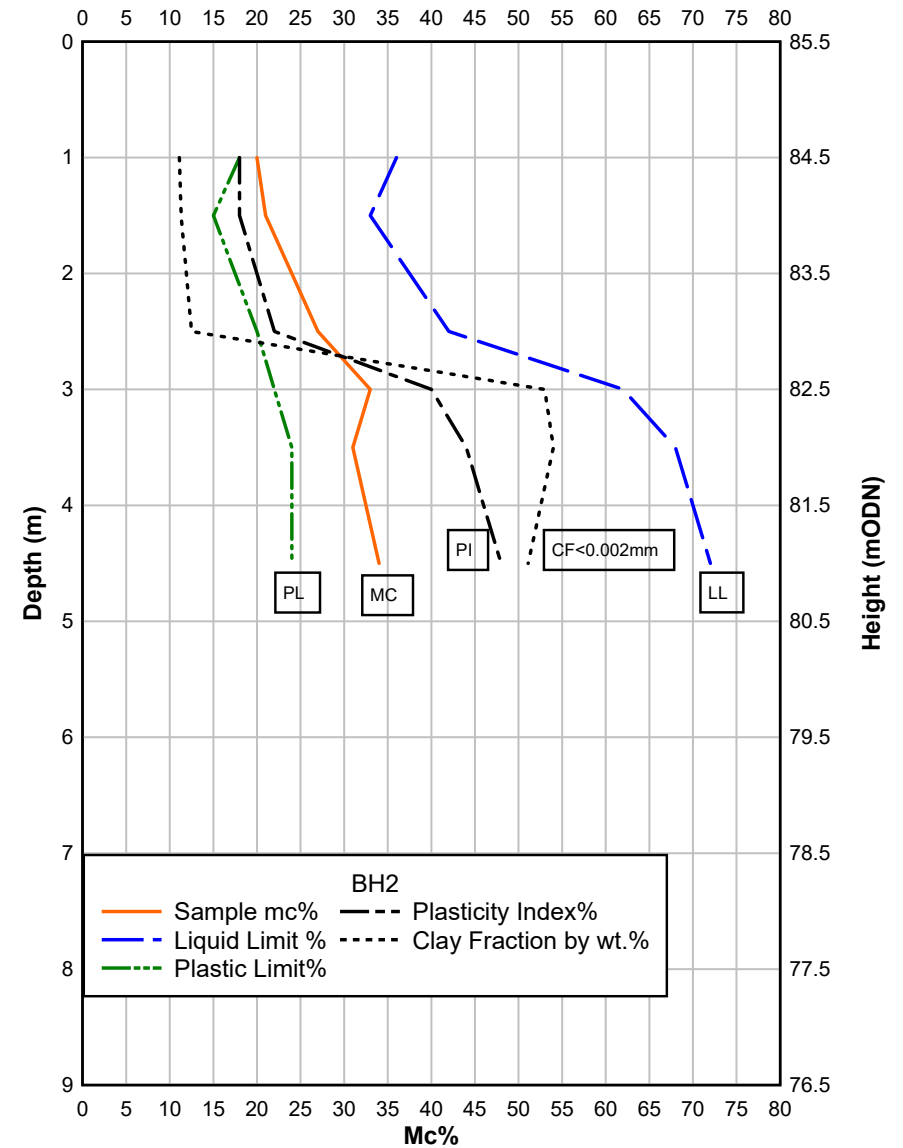
G1808 31 Willoughby Road NW3 1RT - Proposed Basement Sample Depths and Results of Particle Size Distribution Tests



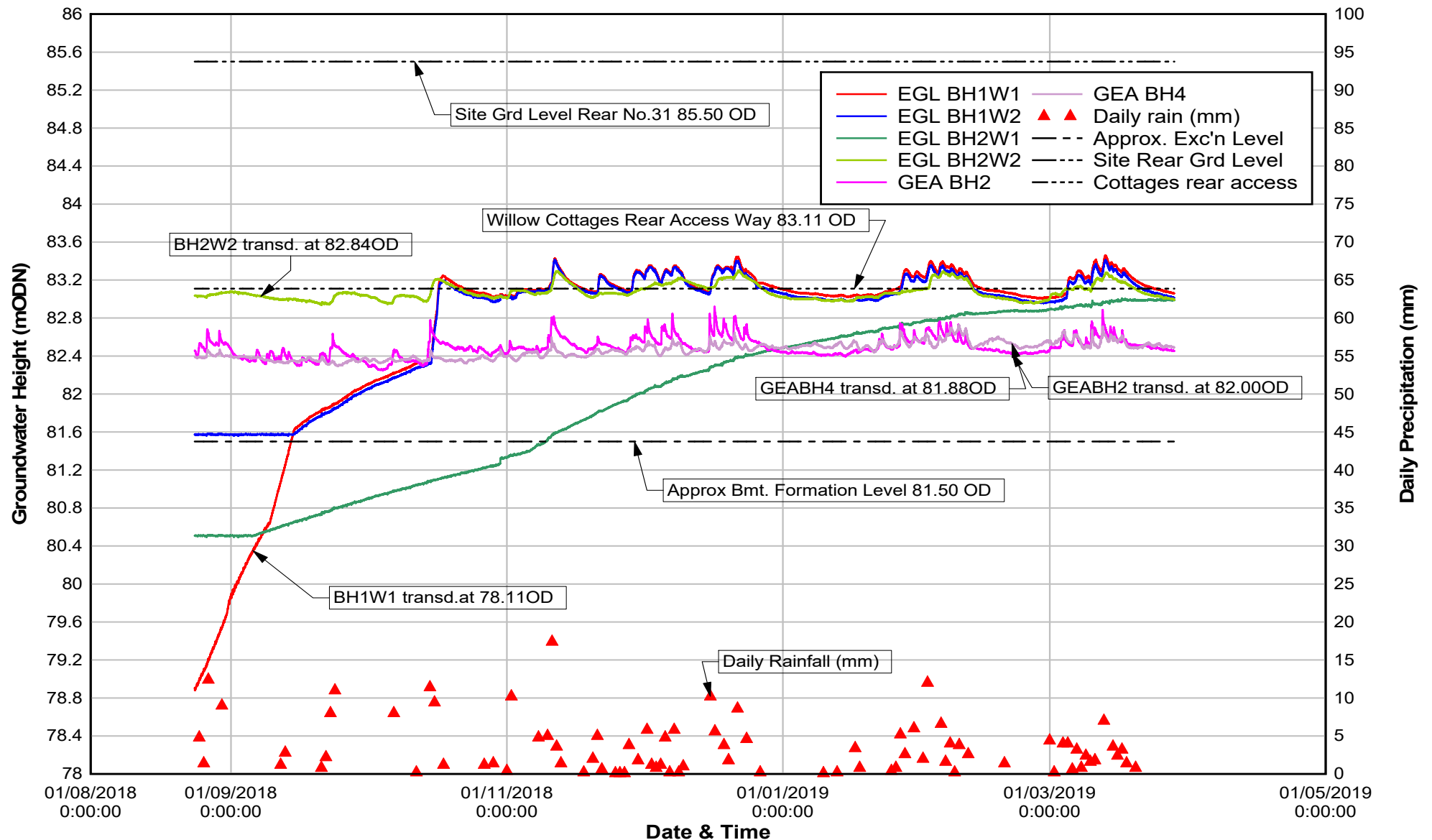
G1808 31 Willoughby Road NW3 1RT - Proposed Basement BH1 Moisture Content & Atterberg Limits vs Depth & ODN Height



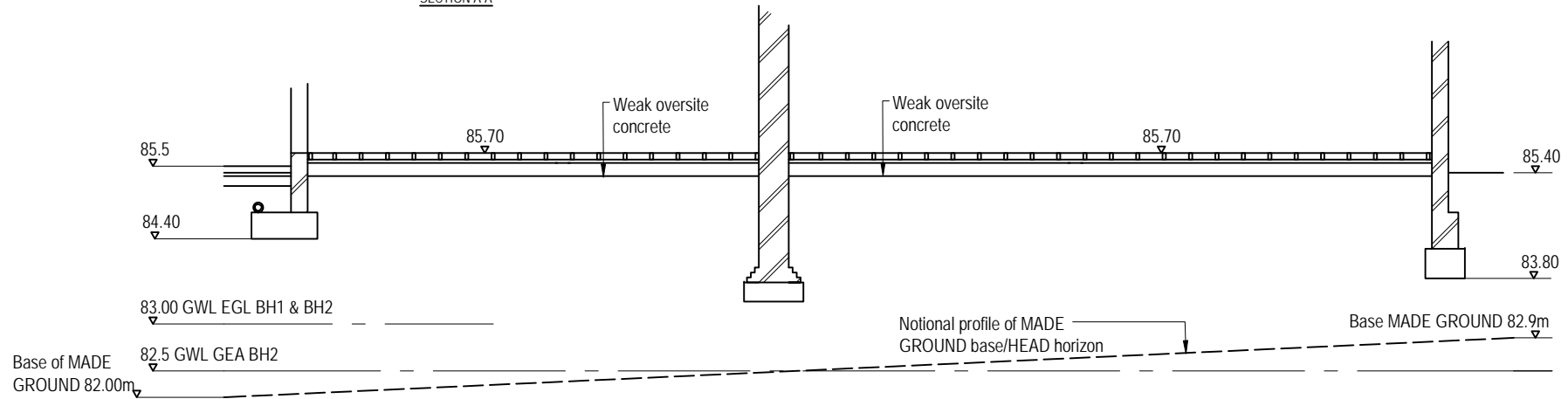
G1808 31 Willoughby Road NW3 1RT - Proposed Basement BH2 Moisture Content & Atterberg Limits vs Depth & ODN Height



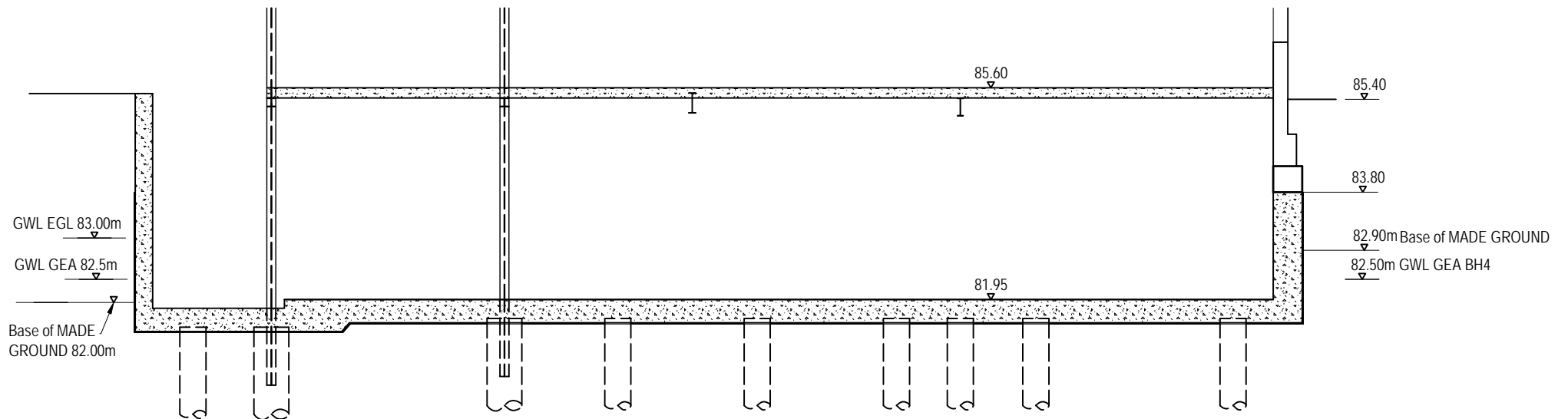
G1808 31 Willoughby Road NW3 1RT - Proposed Basement Groundwater Height (mODN) in Borehole Piezometers & Daily Rainfall



SECTION A-A



LONG SECTION EXISTING



LONG SECTION PROPOSED



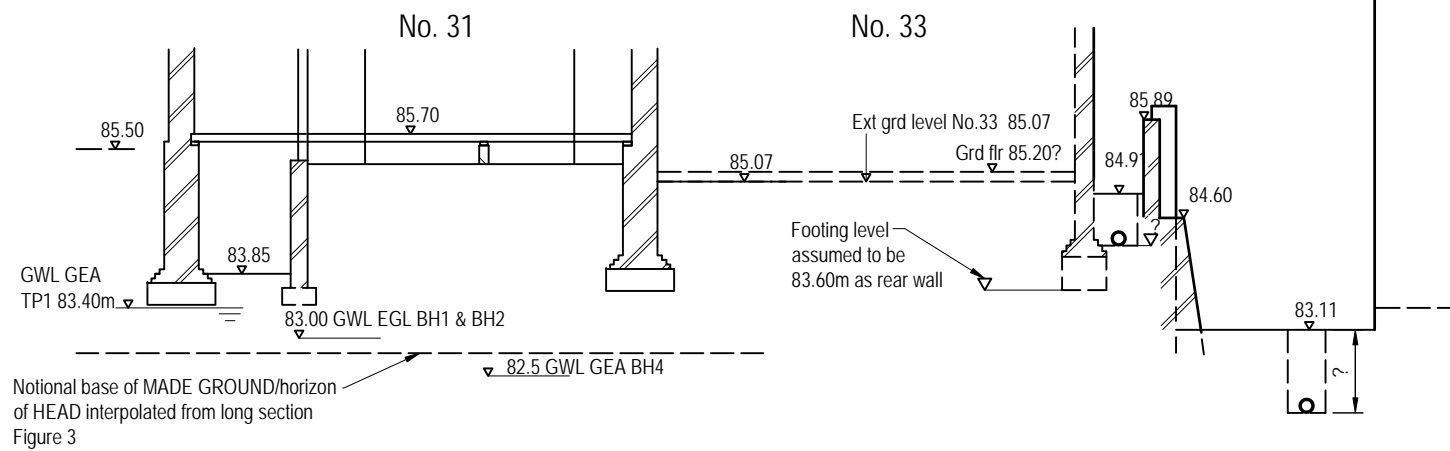
31 WILLOUGHBY ROAD NW3 1RT - PROPOSED BASEMENT
EXISTING & PROPOSED LONG SECTION SKETCHES



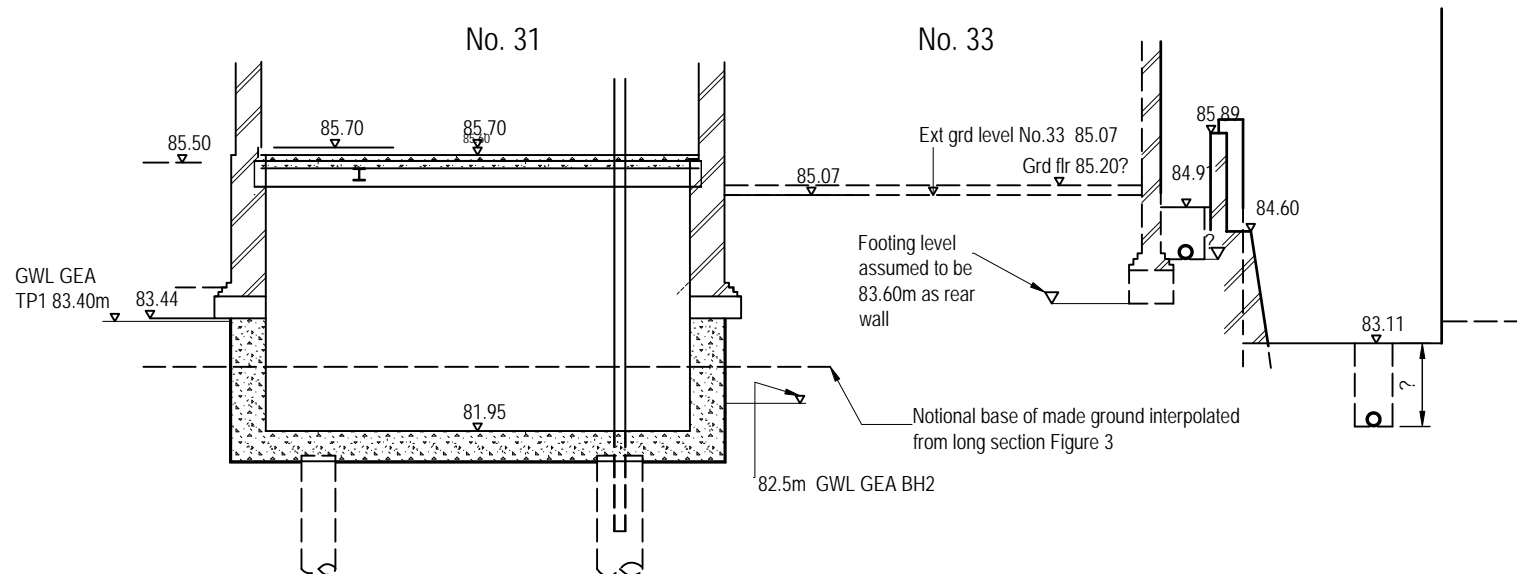
Report: G1808-RP-01-E1
Scale as shown

Figure

9.



**EXISTING CROSS SECTION
REAR EXTENSION**



**PROPOSED CROSS SECTION
FRONT OF HOUSE**



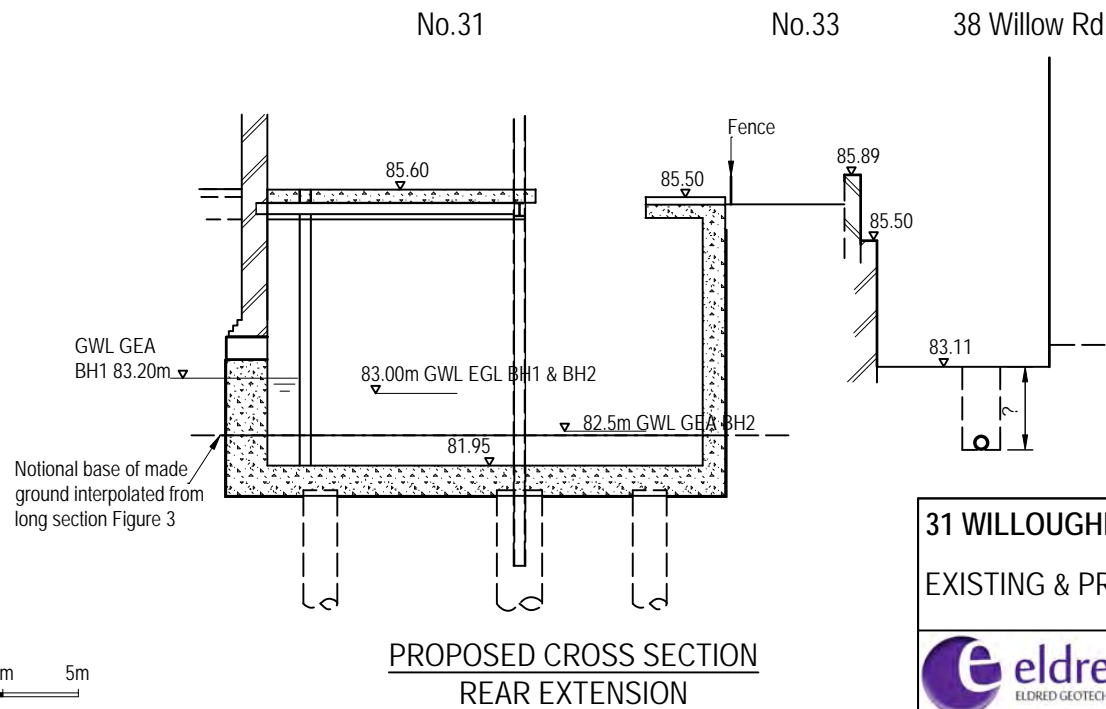
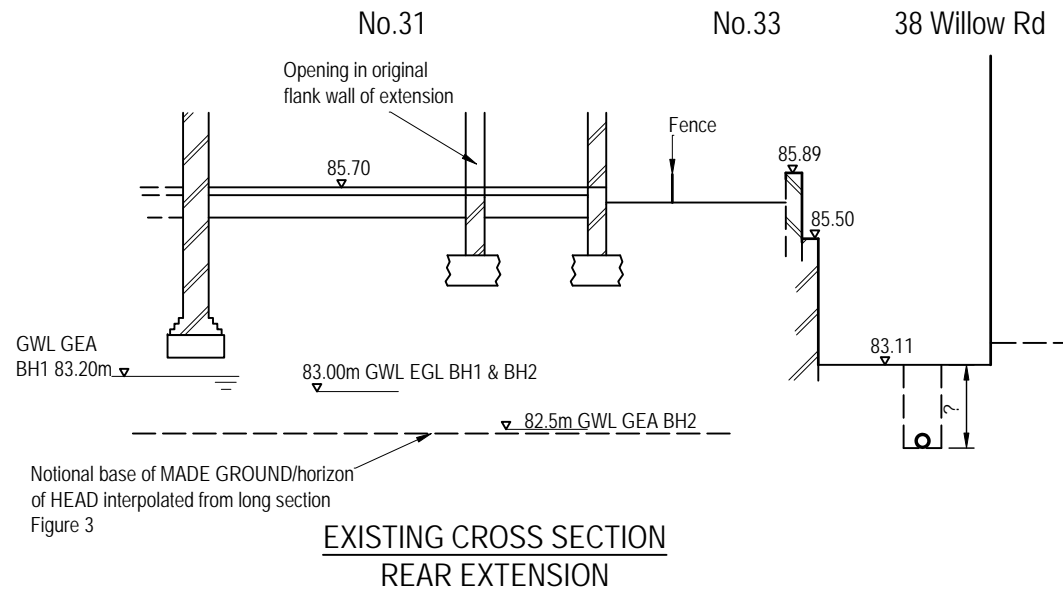
31 WILLOUGHBY ROAD NW3 1RT - PROPOSED BASEMENT
EXISTING & PROPOSED CROSS SECTION SKETCHES - FRONT



Report: G1808-RP-01-E1
Scale as shown

Figure

10



0m 1m 2m 3m 4m 5m

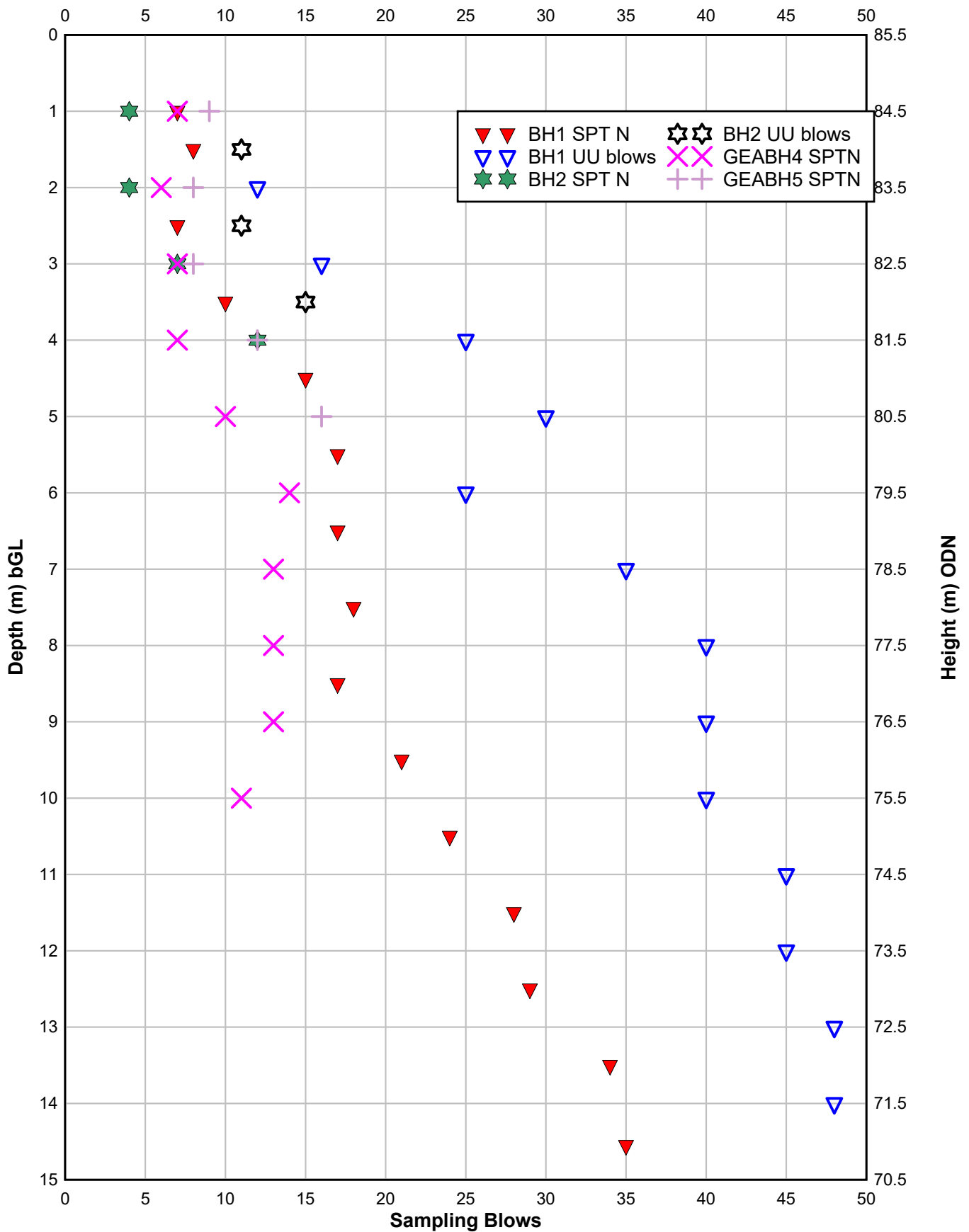
31 WILLOUGHBY ROAD NW3 1RT - PROPOSED BASEMENT
EXISTING & PROPOSED CROSS SECTION SKETCHES - REAR



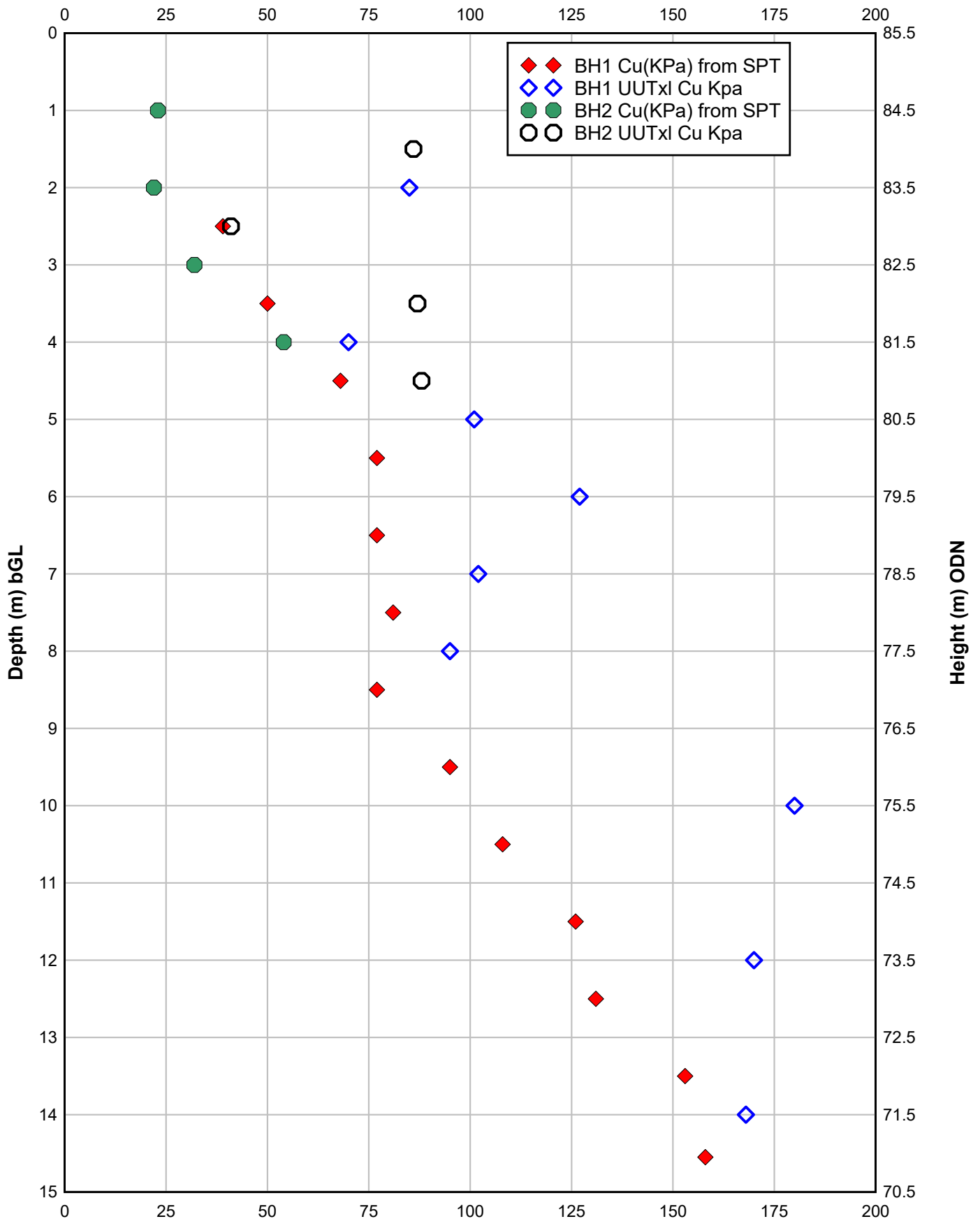
Report: G1808-RP-01-E1
Scale as shown

Figure 11

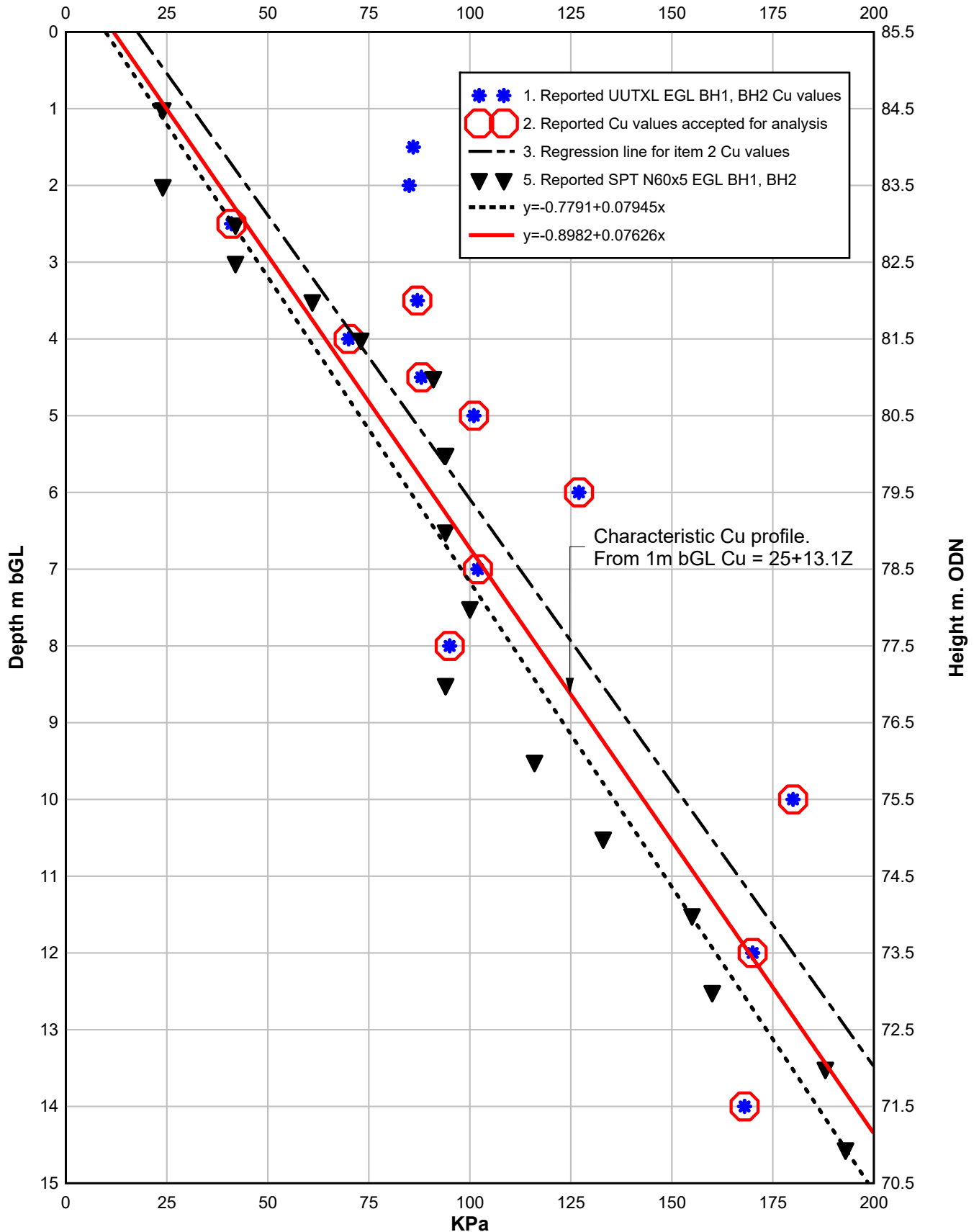
G1808 31 Willoughby Road NW3 1RT - Proposed Basement **Sampling Blow Counts vs Depth & ODN Height**



G1808 31 Willoughby Road NW3 1RT - Proposed Basement Undrained Shear Strength vs Depth & ODN Height



G1808 31 Willoughby Road NW3 1RT - Proposed Basement Assessed Characteristic Profile of Undrained Shear strength vs Depth



Appendix D Contents

Preliminary structural design report

Drawings of existing structure

G1808-PA-001 -E1 Existing site plan and sections

G1808-PA-002-E1 Existing sub-ground floor plan and sections

G1808-PA-003-E1 Existing ground floor plan showing first floor structure above

G1808-PA-004-E1 Existing first floor plan showing second floor structure above

G1808-PA-005-E1 Existing second floor plan showing study structure above

G1808-PA-006-E1 Existing third floor plan showing roof structure above

G1808-PA-007-E1 Existing sections

Drawings of proposed structure

G1808-PA-101 -E2 Proposed relationship of rear basement to boundary walls

G1808-PA-102-E2 Proposed basement plan and sections

G1808-PA-103-E2 Proposed ground floor plans showing ground & first floor
structure

G1808-PA-104-E2 Proposed general section A-A

G1808-PA-005-E2 Proposed general cross sections

Outline structural design report G1808-ST-01-E1 for basement extension of 31 Willoughby Road NW3 1RT

1 Criteria references

1. BS EN 1990 Basis of structural design
2. BS EN 1991 Actions on structures
3. BS EN 1992 Design of concrete structures
4. BS EN 1993 Design of steel structures
5. BS EN 1995 Design of timber structures
6. BS EN 1996 Design of masonry structures

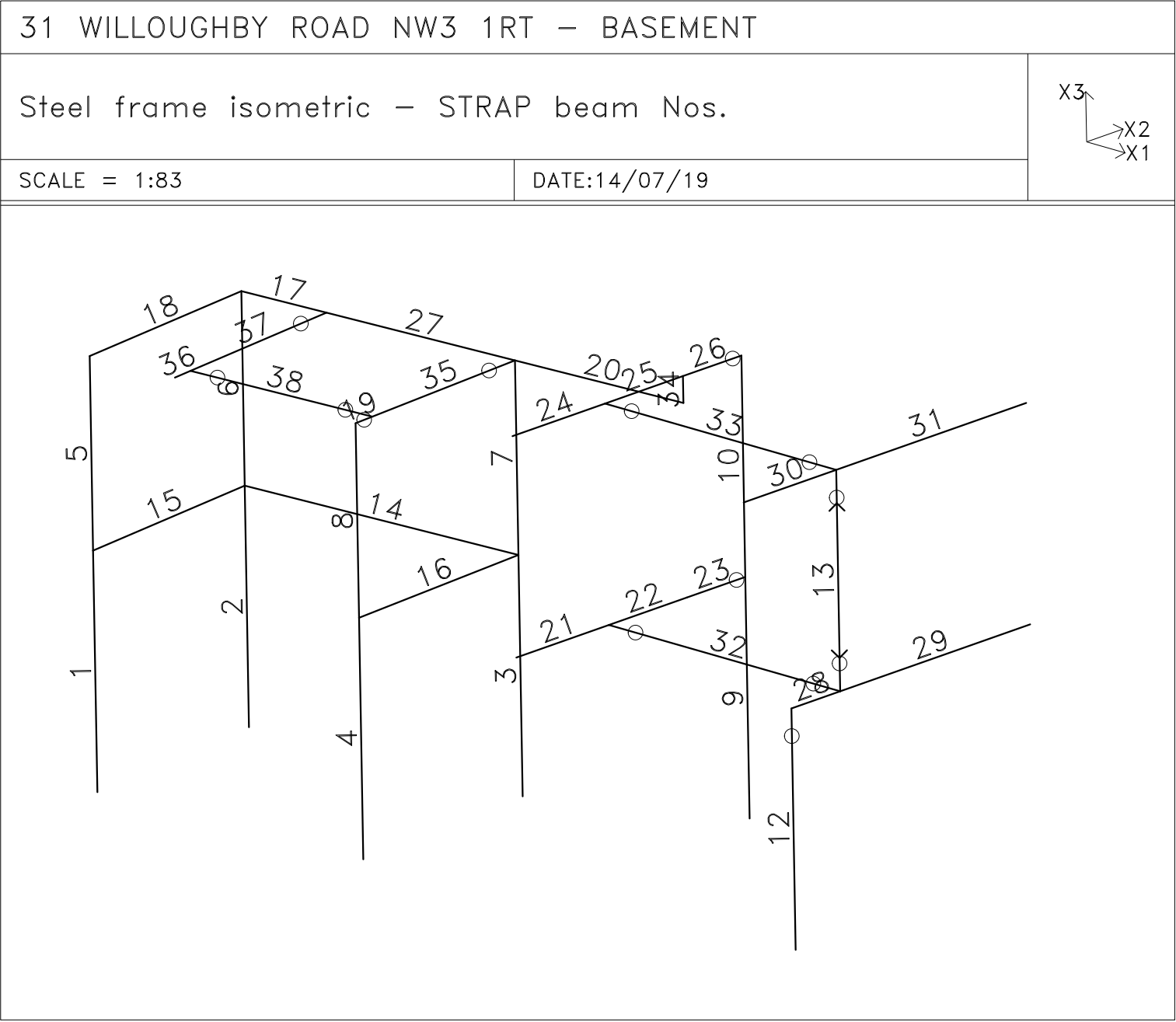
2 Overview

7. Structural alterations are required as part of a scheme to provide a single storey basement below the property. The structural proposal is for a steel framed solution which will be inserted as work proceeds to provide maximum working space for the basement and ground floor works. Refer to the engineering design illustrated by Eldreds' accompanying drawings and method statement.

3 Software

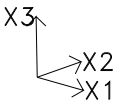
8. STRAP (STRuctural Analysis Programs) 2018 version by Atir Engineering Software Ltd has been used for analysis of the structure. At this preliminary stage no attempt has been made to model staged construction sequences or stress reversals that installation and removal of temporary supports will cause as the frame develops: the analysis allows for what are judged to be the worst conditions likely to occur.

4 Frame arrangement



31 WILLOUGHBY ROAD NW3 1RT – BASEMENT

Steel frame isometric rendered



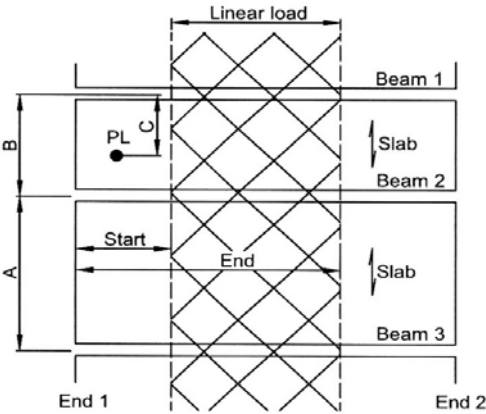
DATE:14/07/19



5 Loads

PROJECT	SUBJECT	DATE	JOB REF.	SHEET	REVISION
31 Willoughby Road NW3 1RT Proposed Basement Extension	Key to Excel tables used to calculate actions on structure	4/19	G1808	1	

Item	Table Column	Description
1	Member	Element of construction identified as receiving load
2	Action source	Element of construction or externally applied action causing load upon the member
3	Type	Load type: U = uniformly distributed (KN/m2); L = linearly distributed over a certain distance (KN/m); P = point load (KN)
4	Unit action	Characteristic force (KN), force/unit length or area (KN/m or KN/m2), or material density (KN/m3)
5	Factor	Factor converting the source action to the corresponding effective action upon the member; e.g. in the simplest case, if the member spreads a source point load to cause a uniformly distributed load of length X at the level considered, the effect at that level is given by a factor of 1/X. The converse, situation would require a factor of X.
6	Width or Ht.	Refer to diagram. Considering load on Beam 2, the width of the slab load and of the linear load is A+B. For the point load, the width is entered as 1 to preserve the calculation logic. Height is entered for vertical elements such as walls, when unit loads are given /unit area on elevation.. To preserve calculation logic, height is given as 1 for unit loads /m run.
7	Proportion	Proportion of load width or height attracted to the member considered. If slabs in the diagram are simply supported, the proportion of the slab and linear loads on Beam 2 is 0.5 and the proportion of the point load is C/B.
8	Perm. & Var.	End values of permanent and variable actions are the product of items 3, 4, 5 and 6



31 WILLOUGHBY ROAD NW3 1RT - BASEMENT

Prepared by: MLE

Units: kN meter

Page : 5
Date: 14/07/19

PROJECT				SUBJECT				DATE	JOB REF.	SHEET	REVISION
31 Willoughby Road NW3 1RT Proposed Basement Extension				Limit state factors				4/19	G1808	2	
Combination case		Persistent and transient design situations	Permanent actions (1G)		Leading variable action (2Q) [0 if favourable]	Accompanying variable action (1Q) [0 if favourable]					
			Unfavourable	Favourable		Main (if any)	Others				
1	EQU SetA	Eqn 6.10	1.10	0.90	1.50	N/A	1.5E _β				
2	STR/GEO Set B	Eqn 6.10	1.35	1.00	1.50	N/A	1.5N ₁				
2a		Eqn 6.10a	1.35	1.00	N/A	1.5X _x	1.5I ₁				
2b		Eqn 6.10b	1.25	1.00	1.50	N/A	1.5N _N				
3	STR/GEO Set C	Eqn 6.10	1.00	1.00	1.30	N/A	1.3X ₁				
4	ACCIDENT- AL	Eqn 6.11a/b	1.00	1.00	1.00	I ₁	I _N				
5	SERVICE- ABILITY	Characteristic	1.00	1.00	1.00	N/A	X _N				
5a		Frequent	1.00	1.00	S ₁	N/A	2 _N				
5b		Quasi-permanent	1.00	1.00	N/A	I _Σ	X _N				
Proposed Use Category		X _s	S _s	S _s	Design combination cases for actions		Comment				
A: Residential		0.70	0.50	0.30	ULS	1, 2					
					SLS	5	Alterations; Q/G small; deflection limit L/360 for Q+G				

31 WILLOUGHBY ROAD NW3 1RT - BASEMENT

Prepared by: MLE

Units: kN meter

Page : 6

Date: 14/07/19

PROJECT	SUBJECT	DATE	JOB REF.	SHEET	REVISION
31 Willoughby Road NW3 1RT Proposed Basement Extension	Construction notes and Characteristic Unit Loads	4/19	G1808	3	
EXISTING BUILDINGS: Refer to current editions of drawings G1808-GA-001 to 007					
Pitched roofs Nos 29 & 31					
Permanent	Slate	0.25			
	Battens	0.04			
	Rafters	0.10			
	Ceiling (P/Bd & skim)	0.17			
	Total	0.56 Kpa			
	30 deg. Pitch factor	1.15			
	Total on plan	0.64 KPa			
Variable		0.60 KPa			
Floors Nos 29-33					
Permanent	12mm HW overlay	0.09			
	Boards Joists, ceiling	0.50			
		0.59 Kpa			
Variable	No 31 upper	0.90 Kpa			
	All floors occupied	1.50 Kpa			
Patio roofs					
	Concrete tiles	0.38			
	50mm screed	1.15			
	Asphalt	0.42			
	Boards Joists, ceiling	0.50			
		2.45 Kpa			
Variable		1.50 KPa			

31 WILLOUGHBY ROAD NW3 1RT - BASEMENT

Prepared by: MLE

Units: kN meter

Page : 7

Date: 14/07/19

PROJECT	SUBJECT	DATE	JOB REF.	SHEET	REVISION
31 Willoughby Road NW3 1RT Proposed Basement Extension	Construction notes and Characteristic Unit Loads	4/19	G1808	4	
EXISTING BUILDINGS: Refer to current editions of drawings G1808-GA-001 to 007					
Flat roof No.33					
Permanent	Lead, code 5, underlay, paper	0.30			
	Boards Joists, ceiling	0.50			
		0.80	Kpa		
Variable		0.60	KPa		
Tiled roof No.33					
Permanent	Clay tiles plain	0.65			
	Battens	0.04			
	Rafters	0.10			
	Ceiling (P/Bd & skim)	0.17			
	Total	0.96	Kpa		
	30 deg. Pitch factor	1.15			
	Total on plan	1.10	KPa		
Variable		0.60	KPa		
Walls					
Permanent	Brick medium dense	21.53	KN.m3		
	Thickness (mm)	450	9.69	Kpa	
		340	7.32	Kpa	
		225	4.84	Kpa	
		112	2.41	KPa	
	Plaster/render per side	0.25	KPa		

31 WILLOUGHBY ROAD NW3 1RT - BASEMENT

Prepared by: MLE

Units: kN meter

Page : 8

Date: 14/07/19

PROJECT	SUBJECT	DATE	JOB REF.	SHEET	REVISION
31 Willoughby Road NW3 1RT Proposed Basement Extension	Construction notes and Characteristic Unit Loads	4/19	G1808	5	
EXISTING BUILDINGS: Refer to current editions of drawings G1808-GA-001 to 007					
Walls (contd)					
Partitions 1st flr & above, Nos.29,31					
Permanent	SW studwork	0.10			
	Lathing 2 sides	0.12			
	Plaster 2 sides 3 coats	1.00			
		1.22 Kpa			
Partitions 1st flr & above, No.33					
Permanent	SW studwork	0.10			
	P/Bd & skim 2 sides	0.40			
		0.50 Kpa			
Sash windows based on 1.8x1m frame					
		0.30 Kpa			
Rear Chimney Breast: notional load on 1st floor					
Permanent	340mm brick work 1.5m high	10.98 KN/m			

[illegible]

PROJECT			SUBJECT			DATE			JOB REF.		SHEET		REVISION	
31 Willoughby Road NW3 1RT Proposed Basement Extension			Characteristic Member Actions					4/19	G1808	7				
Member/Case		Load source	Type	Unit load	Factor	Width/height		Prop'n	Value		(m) from End 1			
						Start	End		Start	End	Start	End		
Party/Ext Wall Nos 31/33														
Front & back sections 2.5m long, Roof- Grd														
Permanent	Ridge beam No.31		U	2.90	0.11	6.00	6.00	0.50	0.97	0.97				
	225 Wall roof - 3rd (ave ht)		U	5.34	1.00	1.75	1.75	1.00	9.35	9.35				
		Stack 0.3m2 net	U	21.53	0.06	3.75	3.75	1.00	4.84	4.84	Stack 50% void			
		340 wall 3rd- 1st	U	7.82	1.00	6.20	6.20	1.00	48.49	48.49				
		450 wall 1st- grd	U	10.19	1.00	3.35	3.35	1.00	34.13	34.13				
		Stack 0.5m2 net	U	21.53	0.10	9.55	9.55	1.00	20.56	20.56	Stack 50% void			
		No.33 flat roof	U	0.80	1.00	3.50	3.50	0.50	1.40	1.40				
		No.33 1st &2nd flrs	U	0.59	1.00	4.00	4.00	0.50	1.18	1.18				
		Total at Grd (KN/m)							120.92	120.92				
Variable	Ridge beam No.31		U	2.70	0.11	6.00	6.00	0.50	0.90	0.90				
		No.33 flat roof	U	0.60	1.00	3.50	3.50	0.50	1.05	1.05				
		No.33 1st &2nd flrs	U	1.50	1.00	4.00	4.00	0.50	3.00	3.00				
		Total at Grd (KN/m)							4.95	4.95				
Middle section 4.5m long, Roof- Grd														
Permanent	Ridge beam No.31		U	2.90	0.11	6.00	6.00	0.50	0.97	0.97				
	225 Wall roof - 3rd (ave ht)		U	5.34	1.00	1.75	1.75	1.00	9.35	9.35				
		Stack 0.3m2 net	U	21.53	0.07	3.75	3.75	1.00	5.38	5.38	Stack 50% void			
		340 wall 3rd- 1st	U	7.82	1.00	6.20	6.20	1.00	48.49	48.49				
		450 wall 1st- grd	U	10.19	1.00	3.35	3.35	1.00	34.13	34.13				
		Stack 0.5m2 net	U	21.53	0.11	9.55	9.55	1.00	22.85	22.85	Stack 50% void			
		No.33 flat roof	U	0.80	1.00	3.50	3.50	0.50	1.40	1.40				
		No.33 1st &2nd flrs	U	0.59	1.00	4.00	4.00	0.50	1.18	1.18				
		Total at Grd (KN/m)							123.74	123.74				

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Units: kN meter

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PROJECT				SUBJECT				DATE	JOB REF.	SHEET	REVISION
31 Willoughby Road NW3 1RT Proposed Basement Extension				Characteristic Member Actions				4/19	G1808	8	
Member/Case	Load source	Type	Unit load	Factor	Width/height		Prop'n	Value		(m) from End 1	
					Start	End		Start	End	Start	End
Party/Ext Wall Nos 31/33 Contd											
Middle section 4.5m long, Roof- Grd Contd											
Variable	Ridge beam No.31	U	2.70	0.11	6.00	6.00	0.50	0.90	0.90		
	No.33 flat roof	U	0.60	1.00	3.50	3.50	0.50	1.05	1.05		
	No.33 1st & 2nd flrs	U	1.50	1.00	4.00	4.00	0.50	3.00	3.00		
	Total at Grd (KN/m)							4.95	4.95		
450mm Party wall Grd-Ftg. (2.5m deep)											
Permanent	Wall	U	9.69	1.00	2.00	2.00	1.00	19.38	19.38		
	Ftg spread	U	3.03	1.00	1.00	1.00	1.00	3.03	3.03		
	Concrete	U	6.90	1.00	0.90	0.90	1.00	6.21	6.21		
	Total							28.61	28.61		
Party Wall Nos 29/31 Rear Section											
Roof to Grd Flr.											
Permanent	Patio roof	U	2.45	2.00	3.50	3.50	0.50	8.58	8.58		
	Stack above r'f 0.4m2 net	U	21.53	0.07	4.00	4.00	1.00	5.74	5.74		
	225 wall roof-1st	U	5.34	1.00	3.25	3.25	1.00	17.37	17.37		
	Stack r'f-grd 0.6m2 net	U	21.53	0.10	5.80	5.80	1.00	12.49	12.49		
	340 wall 1st-grd	U	7.82	1.00	2.84	2.84	1.00	22.21	22.21		
	1st flr	U	0.59	2.00	3.50	3.50	0.50	2.07	2.07		
	Total at Grd (KN/m)							68.45	68.45		
Variable	Patio roof	U	1.50	2.00	3.50	3.50	0.50	5.25	5.25		
	1st Flr.	U	1.50	2.00	3.50	3.50	0.50	5.25	5.25		
	Total at Grd (KN/m)							10.50	10.50		

PROJECT				SUBJECT				DATE		JOB REF.		SHEET		REVISION	
31 Willoughby Road NW3 1RT Proposed Basement Extension				Characteristic Member Actions					4/19		G1808		9		
Member/Case		Load source		Type	Unit load	Factor	Width/height		Prop'n	Value		(m) from End 1			
							Start	End		Start	End	Start	End		
Party Wall Nos 29/31 Rear Section Contd															
340mm Party wall Grd-Ftg (1.5m deep)															
Permanent		Wall		U	7.32	1.00	1.00	1.00	1.00	7.32	7.32				
		Stack 1.2m2		U	21.53	0.30	1.00	1.00	1.00	6.46	6.46				
		Ftg spread		U	21.53	0.23	0.63	0.63	1.00	3.03	3.03				
		Concrete		U	23.00	0.30	0.90	0.90	1.00	6.21	6.21				
		Total (KN/m)								23.02	23.02				
Front Bay wall															
Roof-grd															
Permanent		Tiled roof		U	1.10	1.00	1.00	1.00	0.50	0.55	0.55				
		1st flr		U	0.59	1.00	1.00	1.00	0.50	0.30	0.30				
		225 brick		U	5.09	1.00	6.80	6.80	1.00	34.64	34.64				
		omit net of fenest'n 7m2		U	-4.54	7.00	0.29	0.29	1.00	-9.07	-9.07				
		Total (KN/m)								26.42	26.42				
Variable		Tiled roof		U	0.60	1.00	1.00	1.00	0.50	0.30	0.30				
		1st flr		U	1.50	1.00	1.00	1.00	0.50	0.75	0.75				
		Total (KN/m)								1.05	1.05				
Grd-Ftg															
Permanent		225mm brick		U	4.84	1.00	1.00	1.00	1.00	4.84	4.84				
		340mm brick		U	7.32	1.00	1.00	1.00	1.00	7.32	7.32				
		Concrete		U	5.52	1.00	1.00	1.00	1.00	5.52	5.52				
		Total (KN/m)								17.68	17.68				

[illegible]

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[illegible]

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PROJECT			SUBJECT			DATE			JOB REF.		SHEET		REVISION	
31 Willoughby Road NW3 1RT Proposed Basement Extension					Characteristic Member Actions					4/19	G1808	13		
Member/Case	Load source	Type	Unit load	Factor	Width/height		Prop'n	Value		(m) from End 1				
					Start	End		Start	End	Start	End			
<u>Main front wall Contd.</u>														
<u>Right (No.33) side of bay, 0.8m long at Grd Flr Contd</u>														
Variable	Roof		U	0.60	3.13	1.50	1.50	0.50	1.41	1.41				
	Eaves partns		U	1.35	3.13	1.00	1.00	1.00	4.22	4.22				
	3rd-1st floors		U	1.50	9.38	4.50	4.50	0.50	31.64	31.64				
	Total (KN/m)								37.27	37.27				
<u>Main rear wall</u>														
<u>Left(No.33) side of bay, 0.7m long at Grd Flr</u>														
Permanent	Roof		U	0.64	1.79	1.50	1.50	0.50	0.86	0.86				
	Eaves partns		U	2.67	1.79	1.00	1.00	1.00	14.30	14.30				
	3rd-1st floors		U	0.59	5.36	4.50	4.50	0.50	7.11	7.11				
	Wall 3rd-2nd		U	5.09	1.79	2.90	2.90	1.00	26.38	26.38				
	Ddt windows		U	-4.79	1.14	1.00	1.00	1.00	-5.48	-5.48				
	0.8m2													
	Wall 2nd-1st		U	7.57	1.79	3.30	3.30	1.00	44.61	44.61				
	Ddt windows		U	-7.27	1.43	1.00	1.00	1.00	-10.39	-10.39				
	1m2													
	Wall 1st-Grd		U	7.57	1.43	3.35	3.35	1.00	36.23	36.23				
	Total (KN/m)								113.63	113.63				
Variable	Roof		U	0.60	1.79	1.50	1.50	0.50	0.80	0.80				
	Eaves partns		U	1.35	1.79	1.00	1.00	1.00	2.41	2.41				
	3rd-1st floors		U	1.50	5.36	4.50	4.50	0.50	18.08	18.08				
	Total (KN/m)								21.29	21.29				
<u>Left(No.33) side of bay, 0.7m long at soffit 1st Flr</u>														
Permanent	As above								113.63	113.63				
	Deduct wall 1st								-36.23	-36.23				
	Total (KN/m)								77.40	77.40				

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31 Willoughby Road NW3 1RT Proposed Basement Extension				Characteristic Member Actions				4/19		G1808		14			
Member/Case		Load source		Type	Unit load	Factor	Width/height		Prop'n	Value		(m) from End 1			
							Start	End		Start	End	Start	End		
<u>Main rear wall Contd</u>															
<u>Mid section of wall 2m long at Grd Flr</u>															
Permanent		Roof		U	0.56	1.75	1.50	1.50	0.50	0.74	0.74				
		Eaves partns		U	2.67	1.75	1.00	1.00	1.00	4.67	4.67				
		3rd-1st		U	0.59	5.25	4.50	4.50	0.50	6.97	6.97				
		Wall 3rd-2nd		U	5.09	1.75	2.90	2.90	1.00	25.85	25.85				
		Ddt windows 2m2		U	-4.79	1.00	1.00	1.00	1.00	-4.79	-4.79				
		Wall 2nd-Grd		U	7.57	1.25	6.35	6.35	1.00	60.09	60.09				
		Ddt windows 2.25m2		U	-7.27	1.13	1.00	1.00	1.00	-8.18	-8.18				
		Total (KN/m)								85.34	85.34				
		Total at 1st flr soffit(KN/m)								65.31	65.31				
Variable		Roof		U	0.60	1.75	1.50	1.50	0.50	0.79	0.79				
		Eaves partns		U	1.35	1.75	1.00	1.00	1.00	2.36	2.36				
		3rd-1st floors		U	1.50	5.25	4.50	4.50	0.50	17.72	17.72				
		Total (KN/m)								20.87	20.87				
<u>Right(No.29) side, 1m long supported at 2nd flr.</u>															
Permanent		Roof		U	0.56	1.00	1.50	1.50	0.50	0.42	0.42				
		Eaves partns		U	2.67	1.00	1.00	1.00	1.00	2.67	2.67				
		3rd-2nd flrs		U	0.59	1.00	4.50	4.50	0.50	1.33	1.33				
		Wall 3rd-2nd		U	5.09	1.00	3.70	3.70	1.00	18.85	18.85				
		Ddt windows 1.25m2		U	-4.79	1.25	1.00	1.00	1.00	-5.99	-5.99				
		Total(KN/m) on beam								17.27	17.27				
Variable		Roof		U	0.60	1.75	1.50	1.50	0.50	0.79	0.79				
		Eaves partns		U	1.35	1.75	1.00	1.00	1.00	2.36	2.36				
		3rd-1st floors		U	1.50	5.25	4.50	4.50	0.50	17.72	17.72				
		Total(KN/m) on beam								20.87	20.87				

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PROJECT			SUBJECT					DATE	JOB REF.	SHEET	REVISION
31 Willoughby Road NW3 1RT Proposed Basement Extension			Characteristic Member Actions					4/19	G1808	15	
Member/Case	Load source	Type	Unit load	Factor	Width/height		Prop'n	Value		(m) from End 1	
					Start	End		Start	End	Start	End
Rear extension flank & rear walls											
<u>Flank wall at 1st floor</u>											
Permanent	Patio roof	U	2.45	1.00	3.50	3.50	0.50	4.29	4.29		
	1st Floor	U	0.59	1.00	3.50	3.50	0.50	1.03	1.03		
	Wall roof-1st	U	5.09	1.00	3.75	3.75	1.00	19.10	19.10		
	Total (KN/m)							24.42	24.42		
Variable	Roof	U	1.50	1.75	3.50	3.50	0.50	4.59	4.59		
	1st Floor	U	1.50	1.75	3.50	3.50	0.50	4.59	4.59		
	Total (KN/m)							9.19	9.19		
<u>Rear wall at 1st floor</u>											
Permanent	Wall roof-1st	U	5.09	1.00	3.75	3.75	1.00	19.10	19.10		
Longitudinal wall adj stair											
<u>3rd-1st flr</u>											
Permanent	Stud wall	U	1.22	1.00	7.70	7.70	1.00	9.39	9.39		
	Floors	U	0.59	3.00	2.00	2.00	0.50	1.77	1.77		
	Total (KN/m)							11.16	11.16		
Variable	Floors	U	1.50	3.00	2.00	2.00	0.50	4.50	4.50		
<u>1st-Grd floor brick 2.4m</u>		U	2.91	1.88	3.35	3.35	1.00	18.29	18.29		

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PROJECT					SUBJECT					DATE	JOB REF.	SHEET	REVISION
31 Willoughby Road NW3 1RT Proposed Basement Extension					Load Summaries					4/19	G1808	16	
EXISTING BUILDINGS: Refer to current editions of drawings G1808-GA-001 to 007													
Front Bay		Perm.	Var.		Page	Main rear wall adj PW33		Perm.	Var.		Page		
Total to Grd		26.42	1.05		B4	Total-Grd		113.63	21.29	KN/m	B8		
Grd-Ftg		17.68			B4	Grd-Ftg		23.88			B4		
Total to Ftg		44.11	1.05	KN/m		Total at Ftg		137.51	21.29	KN/m			
						Main rear wall mid section		Perm.	Var.		Page		
						Total-Grd		85.34	20.87		B9		
						Grd-Ftg		23.88			B4		
Front Wall adj PW 29		Perm.	Var.		Page	Total at Ftg		109.22	20.87	KN/m			
Total-Grd		34.89	11.48		B6								
Grd-Ftg		23.88			B4	Main rear wall adj PW29		Perm.	Var.		Page		
Total at Ftg		58.77	11.48	KN/m		Total on beam		17.27	20.87	KN/m	B9		
Front Wall LHS Bay		Perm.	Var.		Page	Rear wall back extn		Perm.	Var.		Page		
Total at Grd		98.83	29.81		B7	Total at 1st		19.10		KN/m	B10		
Grd-Ftg		23.88			B4								
		122.70	29.81	KN/m		Flank wal back extn		Perm.	Var.		Page		
						Total on beam at 1st		24.42	9.19	KN/m	B10		
Front Wall adj PW33		Perm.	Var.		Page								
Total at Grd		84.22	37.27		B7/8	Party Wall 33		Perm.	Var.		Page		
Grd-Ftg		23.88			B4	Total at Grd		123.74	4.95		B2/3		
		108.09	37.27	KN/m		Grd-Ftg		28.61			B3		
								152.36	4.95	KN/m			
Internal cross wall UDL in		Perm.	Var.		Page								
		52.17	54.77	KN/m	B5								

PROJECT	SUBJECT	DATE	JOB REF.	SHEET	REVISION
31 Willoughby Road NW3 1RT Proposed Basement Extension	Load Summaries	4/19	G1808	17	
EXISTING BUILDINGS: Refer to current editions of drawings G1808-GA-001 to 007					
Wall adj stair to grd	Perm.	Var.	Page		
Total to 1st	11.16	4.50	B10		
1st-grd brick 2.4m long	18.29		B10		
Total to Grd	29.45	4.50 KN/m			
PW 29 front	Perm.	Var.	Page		
Total to grd	97.44	9.40	B1		
Grd-ftg	28.61		B1		
Toptal to Ftg	126.06	9.40 KN/m			
PW 29 rear	Perm.	Var.	Page		
Total to grd	68.45	10.50	B3		
Grd-ftg	23.02		B4		
Toptal to Ftg	91.46	10.50 KN/m			

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31 Willoughby Road NW3 1RT Proposed Basement Extension	Load Summaries	4/19	G1808	18	
EXISTING BUILDINGS: Refer to current editions of drawings G1808-GA-001 to 007					
Total existing footing loads					
Wall	Perm.	Var.	Length	Total Perm.	Total Var.
Front Bay	44.11	1.05	5.00	220.53	5.25
Front Wall					
adj PW 29	58.77	11.48	2.00	117.54	22.96
Front Wall					
LHS Bay	122.70	29.81	1.00	122.70	29.81
Front Wall					
adj PW33	108.09	37.27	1.00	108.09	37.27
Internal cross					
wall	52.17	54.77	5.50	286.94	301.24
Main rear wall					
adj PW33	137.51	21.29	1.00	137.51	21.29
Main rear wall					
mid section	109.22	20.87	2.00	218.44	41.74
Main rear wall					
adj PW29	17.27	20.87	1.70	29.36	35.48
Rear wall					
back extn	19.10		3.50	66.86	0.00
Flank wal					
back extn	24.42	9.19	7.50	183.18	68.91
Party Wall 33	152.36	4.95	9.50	1447.40	47.03
Wall adj stair					
to grd	29.45	4.50	4.50	132.53	20.25
PW 29 front	126.06	9.40	9.50	1197.53	89.30
PW 29 rear	91.46	10.50	7.00	640.25	73.50
				4908.87	794.02

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STRAP LOADS INPUT

Load no. 1: Permanent SLS (units - kN meter)

/ BEAM LOADS

SELF X3 -1. B 1 TO 10 12 TO 35

DIST GL FX3 -20.39 B 31 30

/ BEAM LOADS

DIST GL FX3 -19.1 B 18

DIST GL FX3 -24.42 B 17 20 27

DIST GL FX3 -11.16 B 33

DIST GL FX3 -18.29 B 32

DIST GL FX3 -63.88 B 25

DIST GL FX3 -7.08 B 15 14

DIST GL FX3 -18.76 B 16

DIST GL FX3 -20.36 B 21 TO 23

DIST GL FX3 -24.43 B 28 29

/ BEAM LOADS

SELF X3 -1. B 38 37 36

DIST GL FX3 -10.98 B 38

/ END

FORCE SUMMATION

FX1=0. kN

FX2=0. kN

FX3=-1029.2 kN

*** PDELTA EFFECT WILL BE COMPUTED ***

Load no. 2: Variable SLS (units - kN meter)

/ BEAM LOADS

DIST GL FX3 -21.3 B 31 30

DIST GL FX3 -4.5 B 33

DIST GL FX3 -20.87 B 25

DIST GL FX3 -20.87 B 24

DIST GL FX3 -20.87 B 26

DIST GL FX3 -9.19 B 17 20 27

DIST GL FX3 -1.8 B 15 14

DIST GL FX3 -4.8 B 16

DIST GL FX3 -5.17 B 21 TO 23

DIST GL FX3 -6.2 B 28 29

/ END

FORCE SUMMATION

FX1=0. kN

FX2=0. kN

FX3=-403.75 kN

*** PDELTA EFFECT WILL BE COMPUTED ***

Load no. 3: Wind +X2 (units - kN meter)

/ GLOBAL LOADS

* WIND NAME Panel no. 1

* WIND PARAM EC1BS HEI X3 0. DIR +X2 TABLE 3

* WIND VAL B 30. CT 1. QREF 308.17 SEA 100. TOWN 1.

* WIND CP 1.15 ALL

* WIND ON BEAM -8.15 3.02 6.5 -3.105 3.317 6.5 -3.105 3.317 3.6 0. C

* WIND ON 2.9 E

DIST 0.6336 PLANE -8.15 3.02 6.5 -3.105 3.317 6.5 -3.105 3.317

3.6 P 0. 2.9 BEAMS

* WIND END

* WIND NAME Panel no. 2

* WIND PARAM EC1BS HEI X3 0. DIR +X2 TABLE 3

* WIND VAL B 30. CT 1. QREF 308.17 SEA 100. TOWN 1.

* WIND CP -1. ALL

* WIND ON BEAM -7.8 -0.46 3.6 -7.8 -0.46 6.5 -8.15 3.02 6.5 0. 3.4976 E

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Load no. 3: Wind +X2 (units - kN meter)											
DIST 0.551 PLANE -7.8 -0.46 3.6 -7.8 -0.46 6.5 -8.15 3.02 6.5											
P 0. 3.4976 BEAMS											
* WIND END											
/ END STATIC											
FORCE SUMMATION											
FX1=-6.1064 kN											
FX2=8.7107 kN											
FX3=0. kN											
*** PDELTA EFFECT WILL BE COMPUTED ***											

:

6 Steel Member check

6.1 Member references: STRAP correlated to Eldreds drawings

EGL	STRAP	EGL	STRAP	EGL	STRAP
B1	30,31	B10	21,22,23	C6	1
B2	24,25,26	B11	16	C7	13
B3	33	B12	15	C8	10
B4	17,27,20	B13	14	C9	7
B5	18	C1	12	C10	6
B6	37	C2	9	C11	8
B7	35	C3	3	C12	5
B8	38	C4	4		
B9	28,29	C5	2		

Results Summary Table

Beam	Section	Com	Defl L/	Slen	Nsd ----- Npl	Dir	Vsd ---- Vpl	M ---- Mc	M ---- Mb	Combined Axial+Mom	
										Loc.	Over.
1	UC 152x152x23	1	9999	97	-0.14	MJ	0.00	0.02	0.02	0.09	0.16
2	UC 152x152x23	1	1861	97	-0.38	MJ	0.01	0.13	0.13	0.34	0.53
3	UC 152x152x23	1	876	97	-0.63	MI	0.00	0.03	0.00	0.60	0.88
						MJ	0.00	0.01	0.01		
4	UC 152x152x23	1	1204	97	-0.17	MJ	0.02	0.21	0.21	0.29	0.37
5	UC 152x152x23	1	1687	78	-0.08	MJ	0.05	0.35	0.35	0.42	0.43
6	UC 152x152x30	1	987	76	-0.17	MI	0.00	0.02	0.00	0.39	0.62
						MJ	0.07	0.37	0.37		
7	UC 152x152x30	1	932	76	-0.27	MJ	0.07	0.26	0.26	0.36	0.68
8	UC 152x152x23	1	1210	78	-0.04	MI	0.01	0.28	0.00	0.28	0.29
						MJ	0.03	0.26	0.26		
9	UC 152x152x23	1	9999	97	-0.59	MI	0.00	0.00	0.00	0.28	0.60
10	UC 152x152x23	1	9999	89	-0.35	MI	0.00	0.00	0.00	0.19	0.35
12	UC 152x152x23	1	9999	97	-0.29	MI	0.00	0.00	0.00	0.14	0.29
13	UC 152x152x23	1	9999	89	0.00	MI	0.00	0.00	0.00	0.00	0.00
14	UB 178x102x19	1	507	0	0.02	MJ	0.15	0.38	0.00	0.29	0.00
15	UC 152x152x23	1	1825	0	0.01	MI	0.01	0.15	0.00	0.32	0.00
						MJ	0.11	0.22	0.00		
						MI	0.00	0.09	0.00		

31 WILLOUGHBY ROAD NW3 1RT - BASEMENT

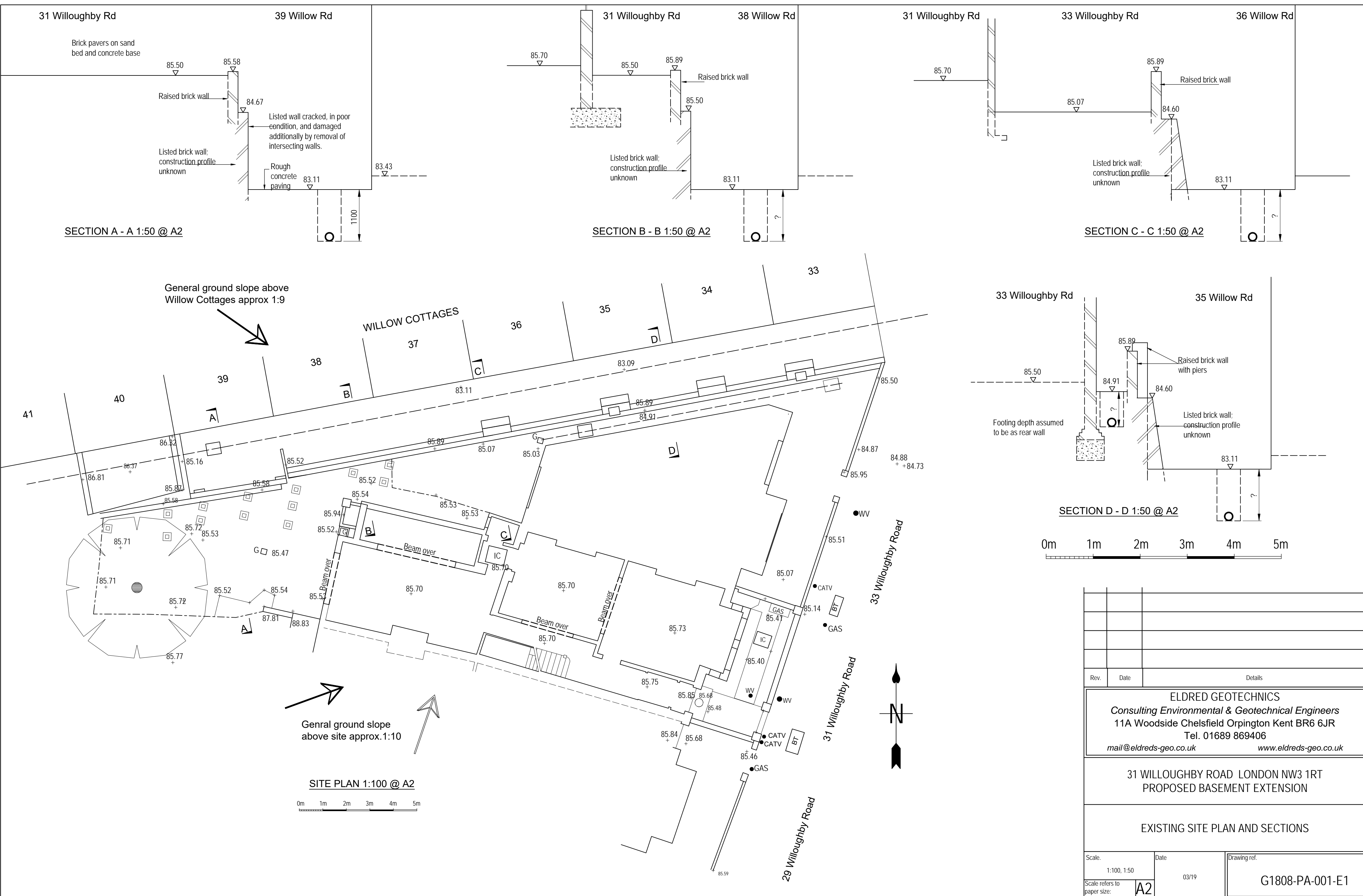
Prepared by: MLE

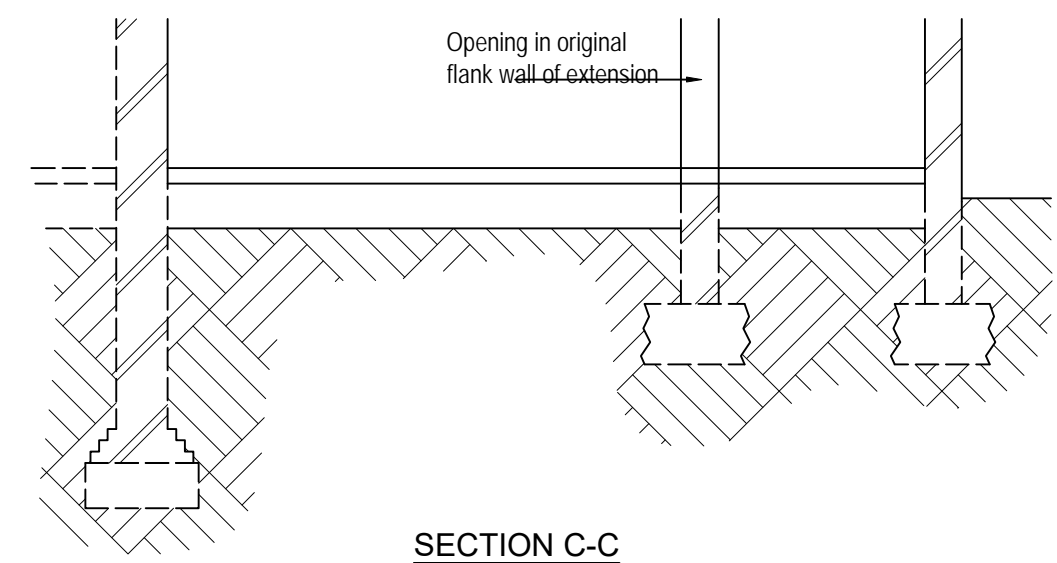
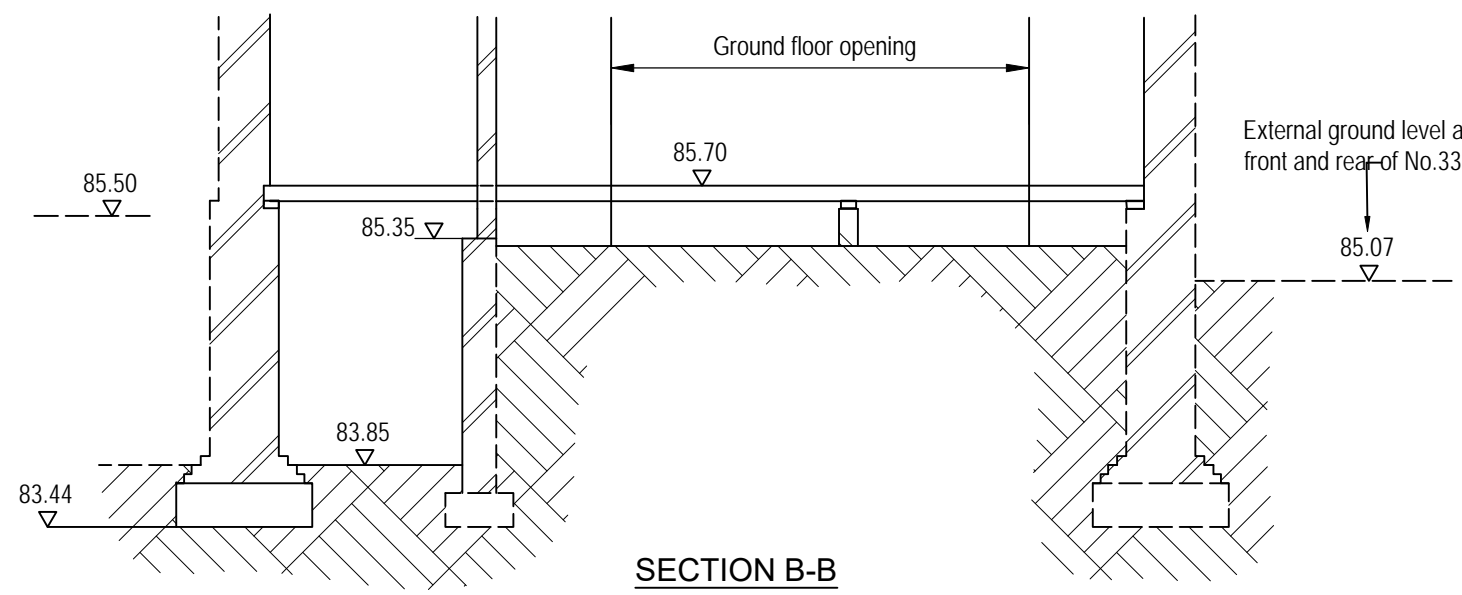
Units: kN meter

Page : 24
Date: 14/07/19

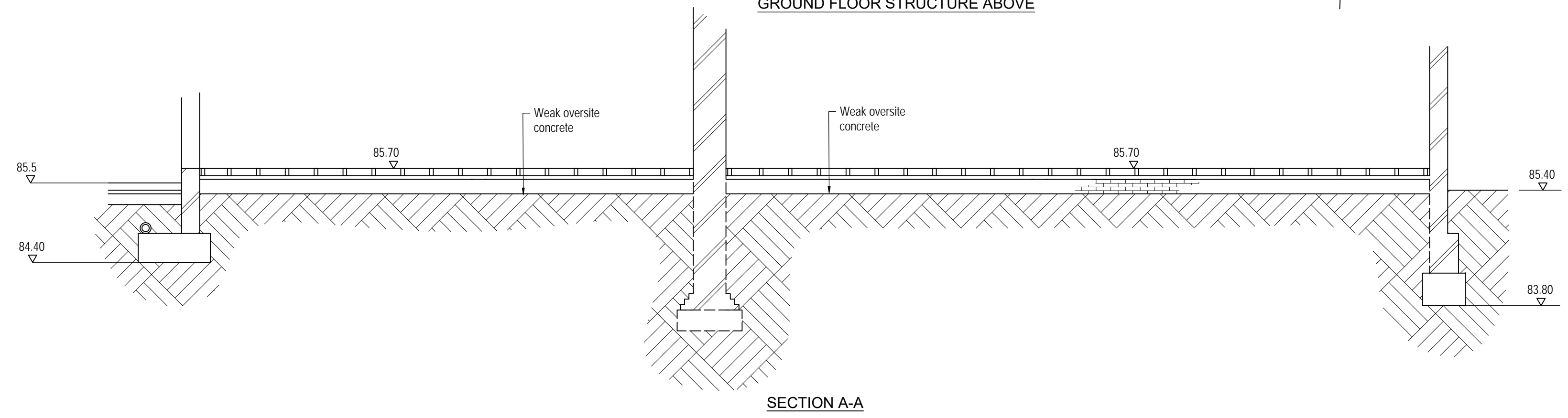
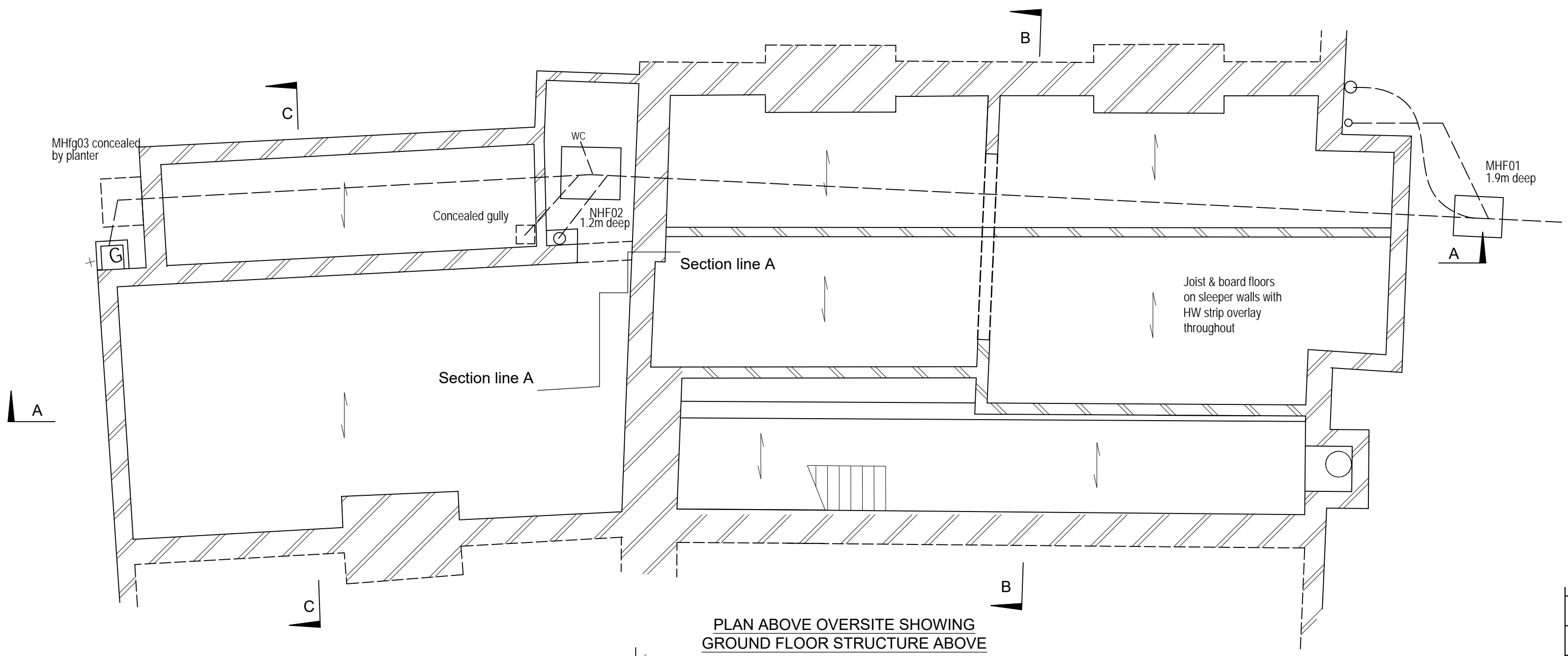
Results Summary Table

Beam	Section	Com	Defl L/	Slen	Nsd ----- Npl	Dir	Vsd ---- Vpl	M ---- Mc	M ---- Mb	Combined Axial+Mom	
										Loc.	Over.
16	UC 152x152x23	1	428	0	0.00	MJ	0.28	0.47	0.00	0.59	0.00
17	UB 305x102x28	1	811	167	-0.05	MI	0.00	0.11	0.00	0.69	0.98
18	UC 152x152x23	1	493	94	-0.01	MJ	0.32	0.80	0.95	0.43	0.44
						MI	0.01	0.05	0.00		
						MJ	0.23	0.38	0.39		
						MI	0.00	0.05	0.00		
19	UC 152x152x23	1	1558	84	0.00	MJ	0.11	0.14	0.14	0.14	0.14
21	UB 356x127x33	1	396	0	0.00	MJ	0.23	0.78	0.00	0.60	0.00
23	UB 305x102x25	1	1490	0	0.00	MJ	0.26	0.79	0.00	0.63	0.00
24][CHANNELS381x10	1	608	33	0.00	MJ	0.12	0.41	0.41	0.41	0.41
						MI	0.00	0.01	0.00		
28	UB 406x140x39	1	436	0	0.00	MJ	0.25	0.58	0.00	0.33	0.00
30	UB 457x152x60	1	407	121	0.00	MJ	0.23	0.60	0.71	0.36	0.71
32	UB 305x102x25	1	425	0	0.00	MJ	0.14	0.50	0.00	0.25	0.00
33	UC 203x203x46	1	504	88	0.00	MJ	0.13	0.30	0.32	0.09	0.32
34	UC 152x152x23	1	9999	11	0.04	MJ	0.01	0.01	0.01	0.06	0.01
						MI	0.00	0.01	0.00		
36	UC 152x152x23	1	1584	85	0.00	MJ	0.11	0.14	0.14	0.14	0.14
38	UC 152x152x23	1	478	91	0.00	MJ	0.12	0.35	0.37	0.35	0.37





- GENERAL NOTES
- 1 This drawing is based upon a topographical survey made by Blueprint Surveys Ltd in 2014 and referenced BPS1195, and site inspection. Broken lines indicate what are considered to be the probable outlines of construction features not visible during survey or inspection.
 - 2 Foundation depths have been taken from trial pit records or have been assessed provisionally by reference to the geotechnical investigation records. Where the party wall and external wall thicknesses are not evident from the survey or currently measurable they, together with dimensions of spread footings, have been determined by reference to the 1894 London Building Act.



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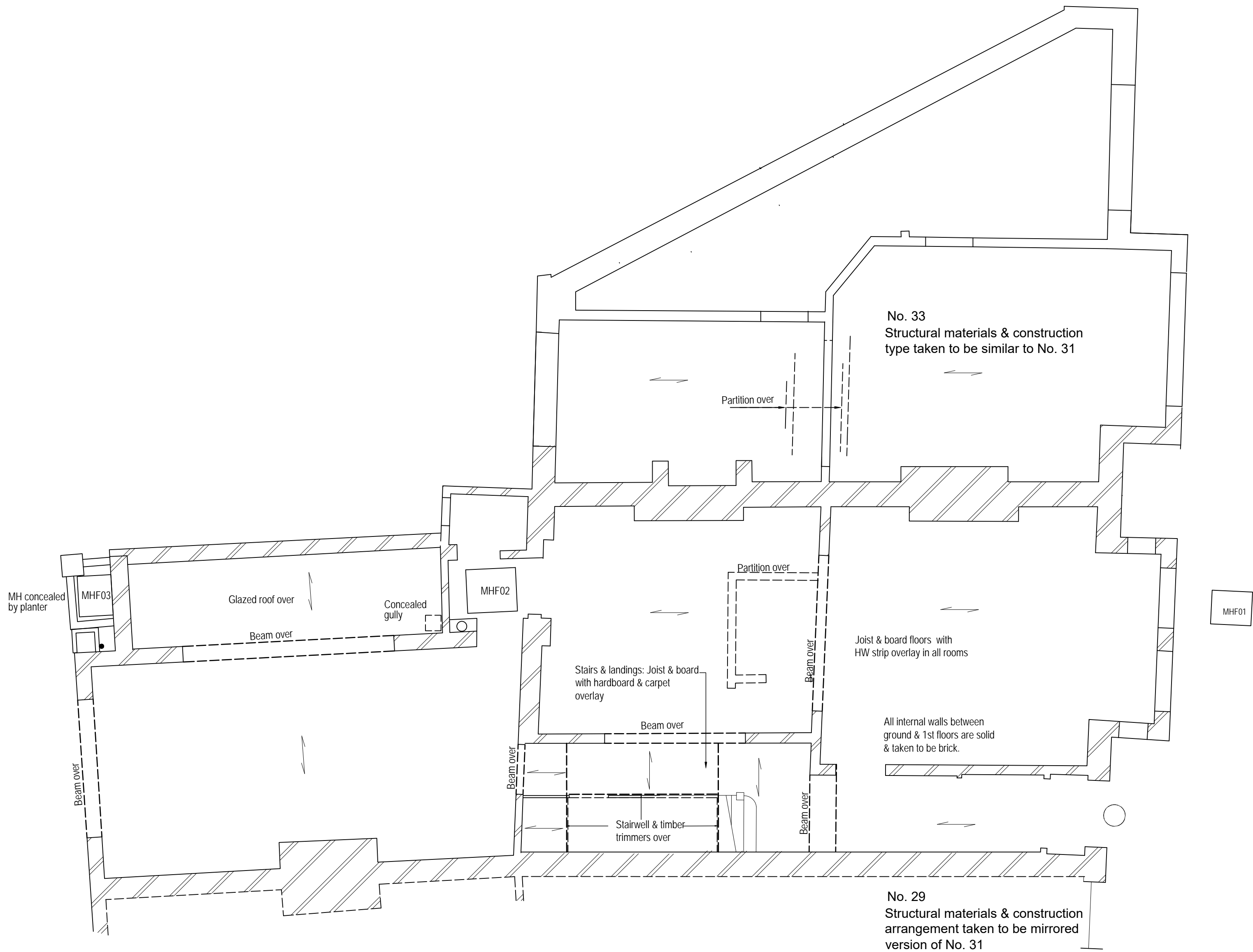
31 WILLOUGHBY ROAD LONDON NW3 1RT
PROPOSED BASEMENT EXTENSION

EXISTING SUB GROUND FLOOR PLAN
AND SECTIONS

Scale: 1:50 Scale refers to paper size:	Date: 03/19 A2	Drawing ref. G1808-PA-002-E1
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GENERAL NOTES

- 1 This drawing is based upon a topographical survey made by Blueprint Surveys Ltd in 2014 and referenced BPS1195 and site inspection. Broken lines indicate what are considered to be the probable outlines of construction features not visible during survey or inspection.



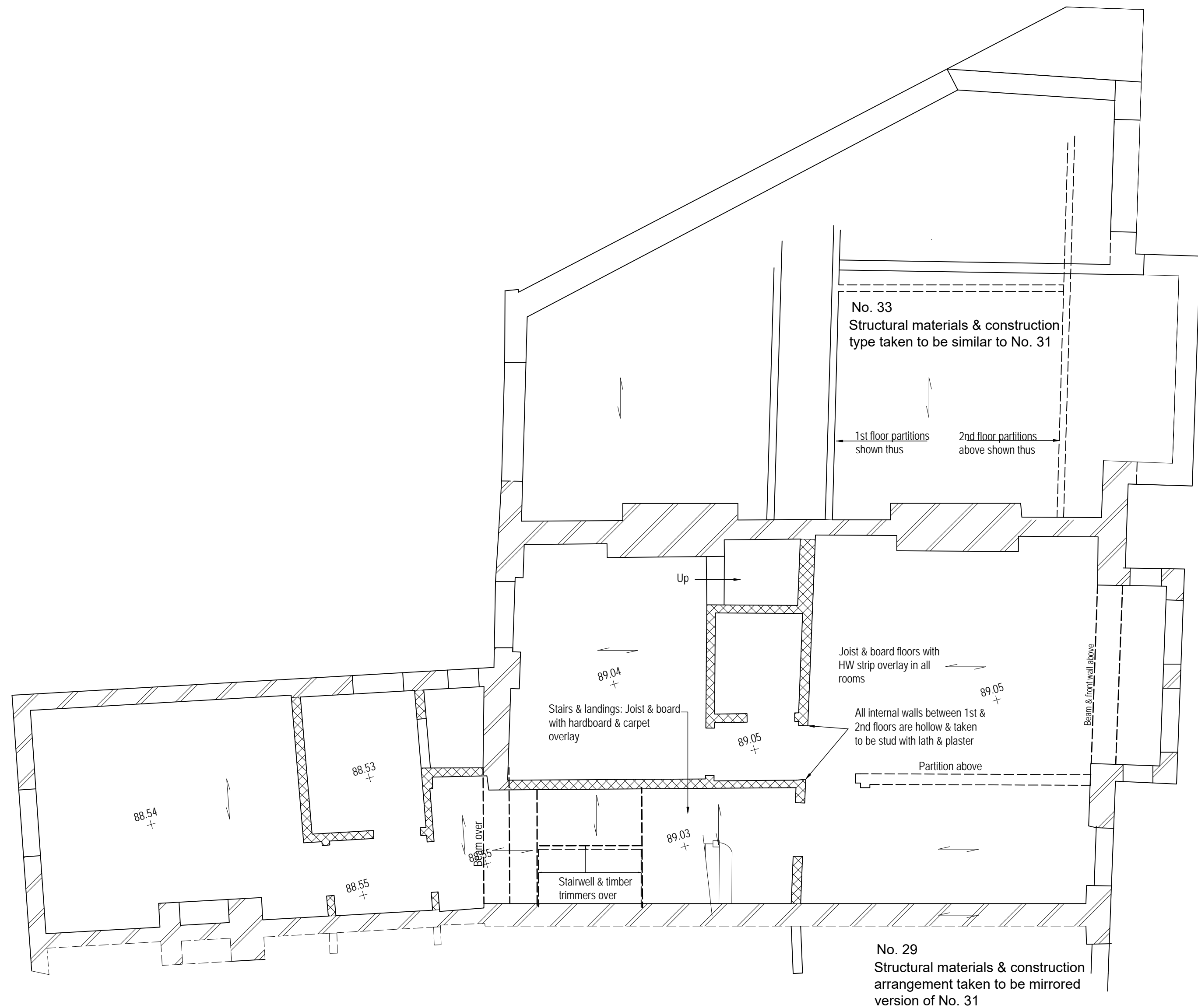
GROUND FLOOR PLAN SHOWING
FIRST FLOOR STRUCTURE ABOVE



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31 WILLOUGHBY ROAD LONDON NW3 1RT PROPOSED BASEMENT EXTENSION		
EXISTING GROUND FLOOR PLAN SHOWING FIRST FLOOR STRUCTURE ABOVE		
Scale. 1:50 Scale refers to paper size:	Date 03/19	Drawing ref. G1808-PA-003-E1

GENERAL NOTES

- This drawing is based upon a topographical survey made by Blueprint Surveys Ltd in 2014 and referenced BPS1195 and site inspection. Broken lines indicate what are considered to be the probable outlines of construction features not visible during survey or inspection.



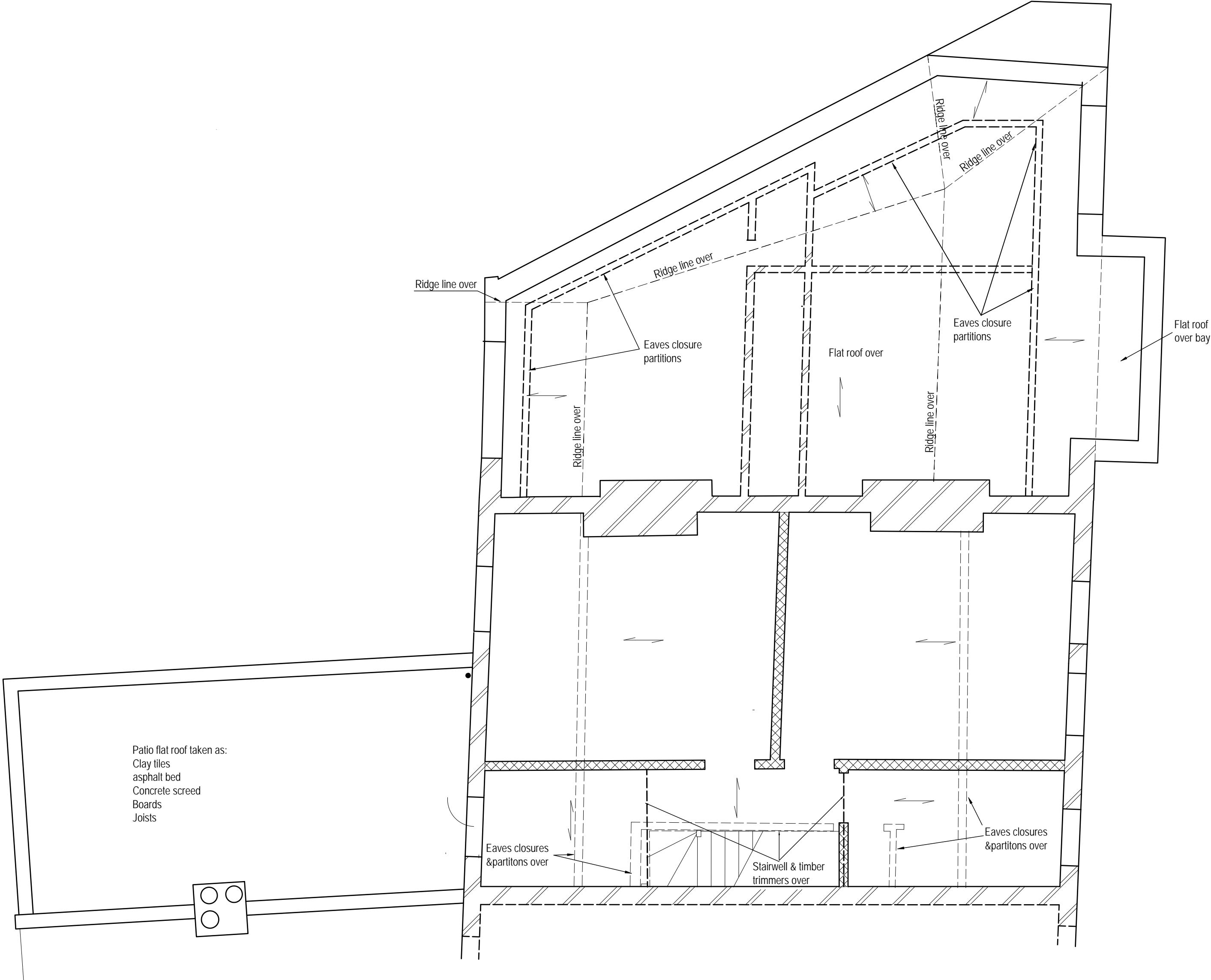
FIRST FLOOR PLAN SHOWING
SECOND FLOOR STRUCTURE ABOVE



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31 WILLOUGHBY ROAD LONDON NW3 1RT PROPOSED BASEMENT EXTENSION		
EXISTING FIRST FLOOR PLAN SHOWING SECOND FLOOR STRUCTURE ABOVE		
Scale. 1:100, 1:50	Date 03/19	Drawing ref. G1808-PA-004-E1
Scale refers to paper size:	A2	

GENERAL NOTES

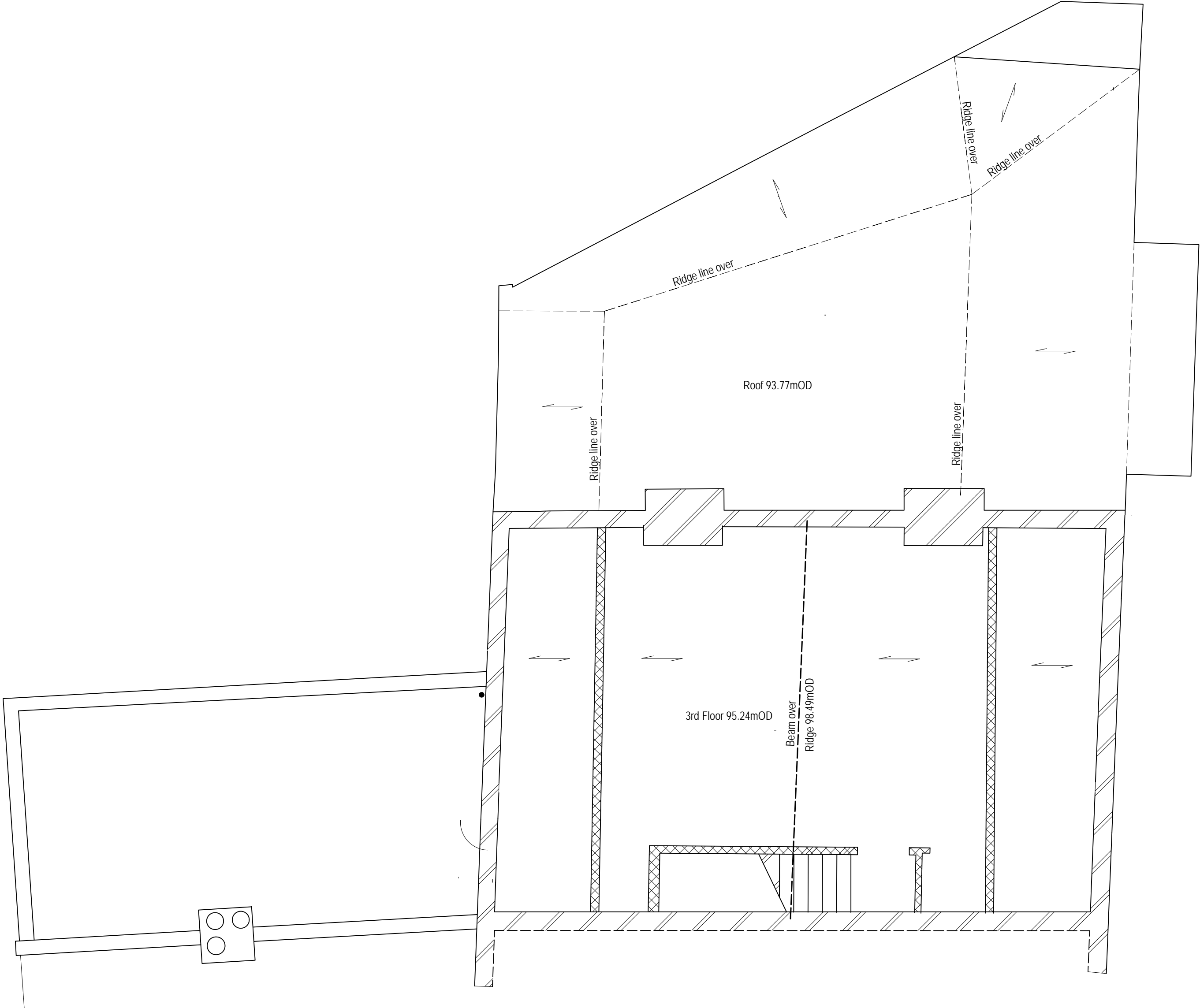
- 1 This drawing is based upon a topographical survey made by Blueprint Surveys Ltd in 2014 and referenced BPS1195 and site inspection. Broken lines indicate what are considered to be the probable outlines of construction features not visible during survey or inspection.



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31 WILLOUGHBY ROAD LONDON NW3 1RT PROPOSED BASEMENT EXTENSION		
EXISTING SECOND FLOOR PLAN SHOWING STUDY FLOOR STRUCTURE ABOVE		
Scale. 1:100, 1:50 Scale refers to paper size:	Date 03/19	Drawing ref. G1808-PA-005-E1

GENERAL NOTES

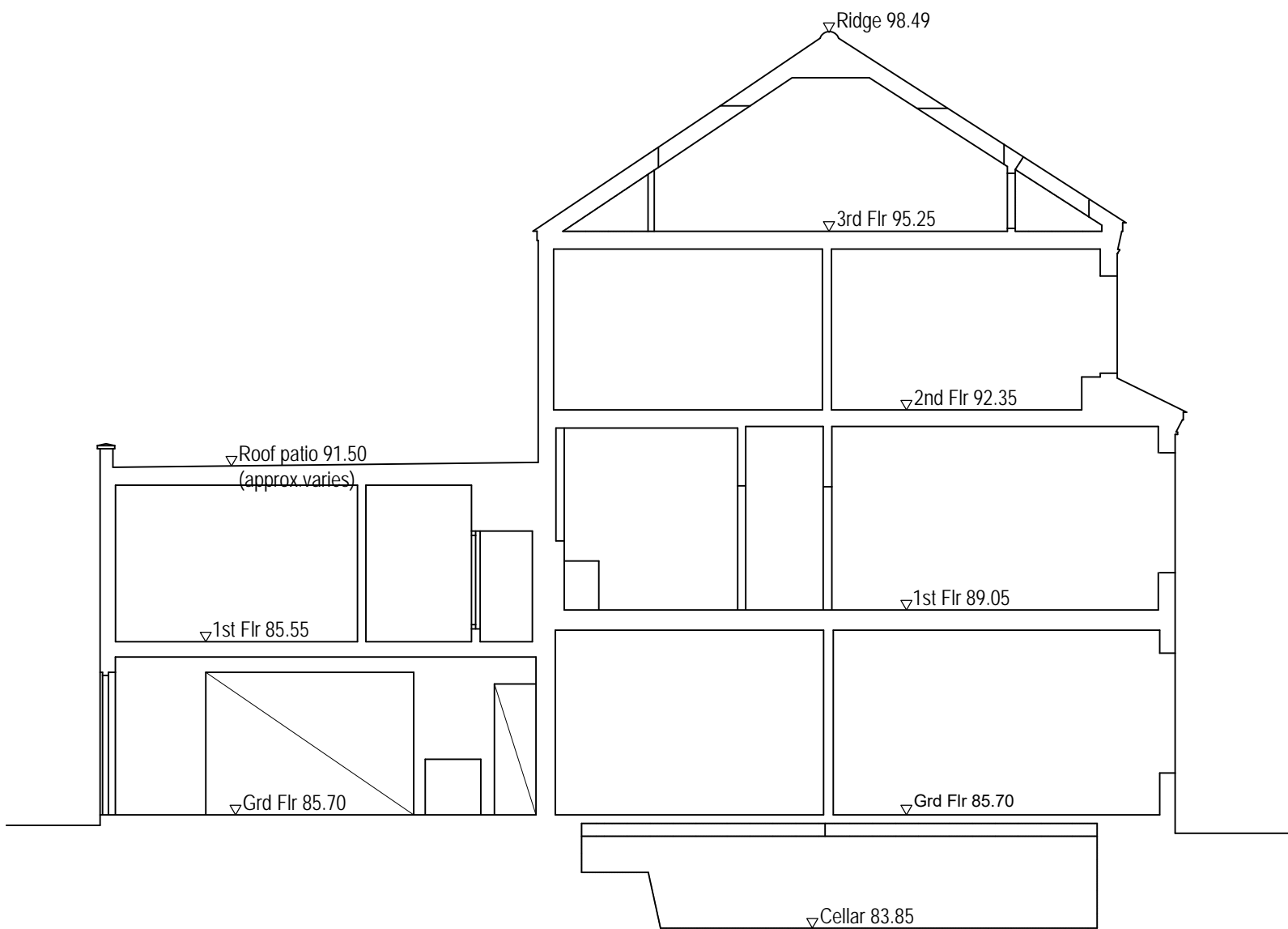
- 1 This drawing is based upon a topographical survey made by Blueprint Surveys Ltd in 2014 and referenced BPS1195 and site inspection. Broken lines indicate what are considered to be the probable outlines of construction features not visible during survey or inspection.



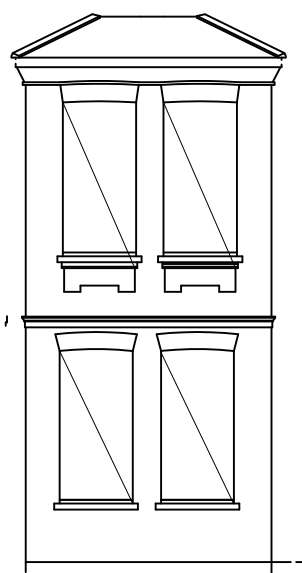
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31 WILLOUGHBY ROAD LONDON NW3 1RT PROPOSED BASEMENT EXTENSION		
EXISTING THIRD FLOOR PLAN SHOWING ROOF STRUCTURE ABOVE		
Scale. 1:100, 1:50 Scale refers to paper size:	Date 03/19	Drawing ref. G1808-PA-006-E1

GENERAL NOTES

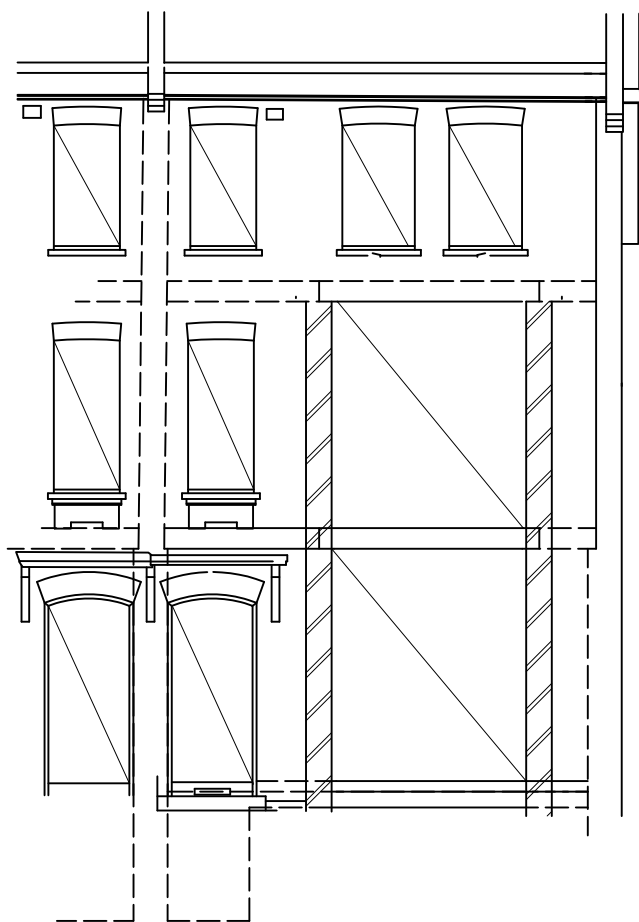
1 This drawing is based upon a topographical survey made by Blueprint Surveys Ltd in 2014 and referenced BPS1195 and site inspection.



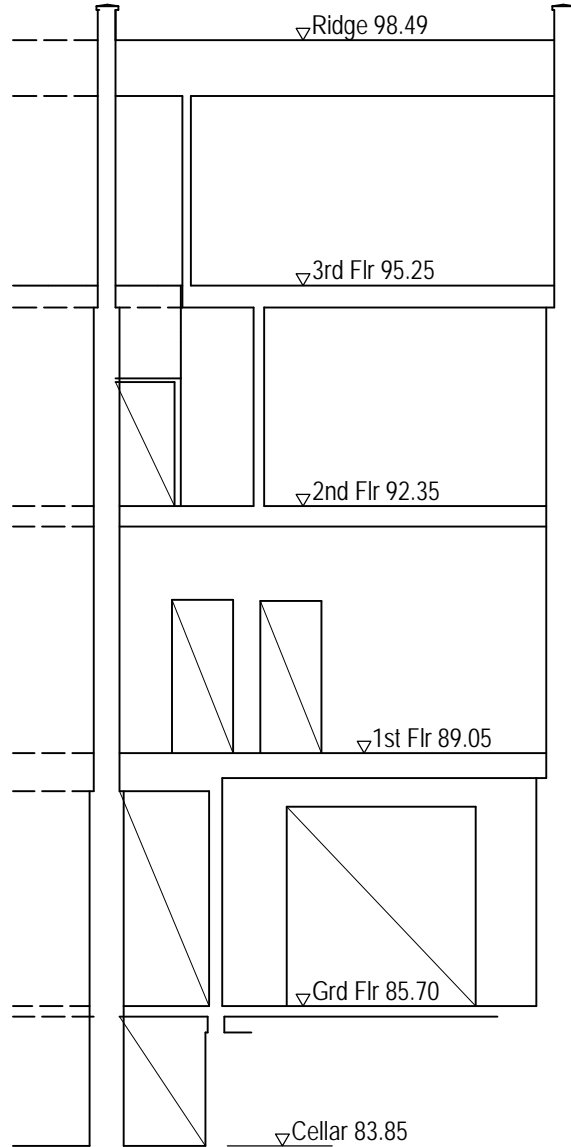
SECTION 1 - 1
1:100



ELEVATION 2 - 2
1:100



SECTION 3 - 3
1:100



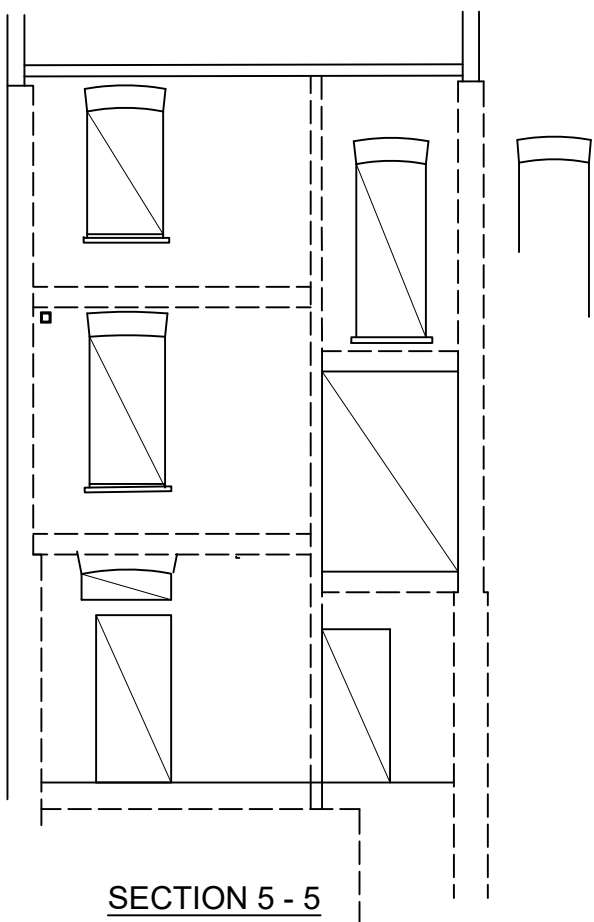
SECTION 4 - 4
1:100

No 33 approx Flat Roof

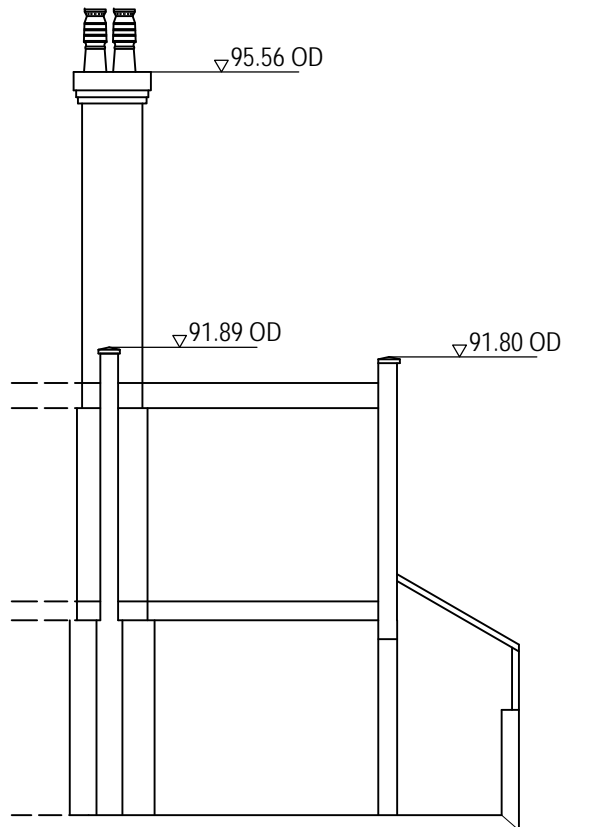
No 33 approx 2nd. Flr.

No 33 approx 1st. Flr.

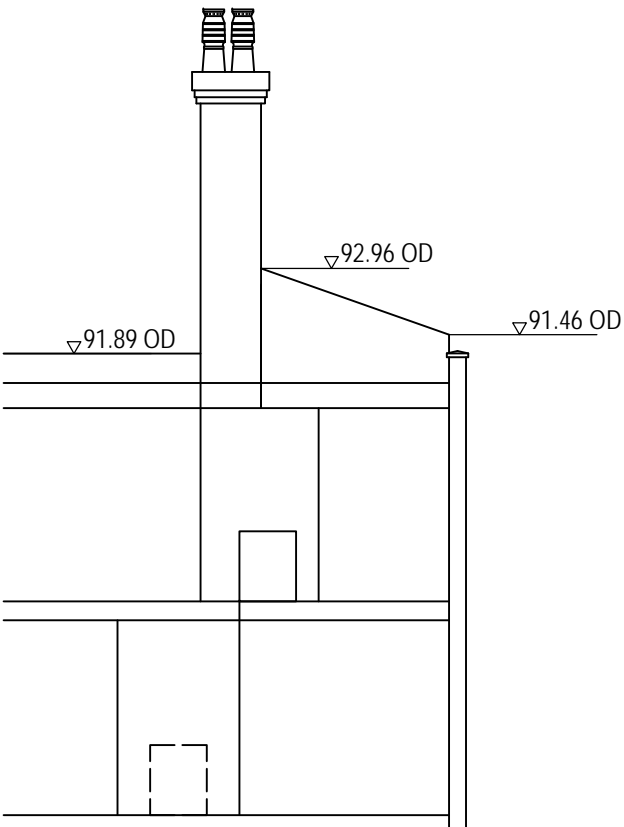
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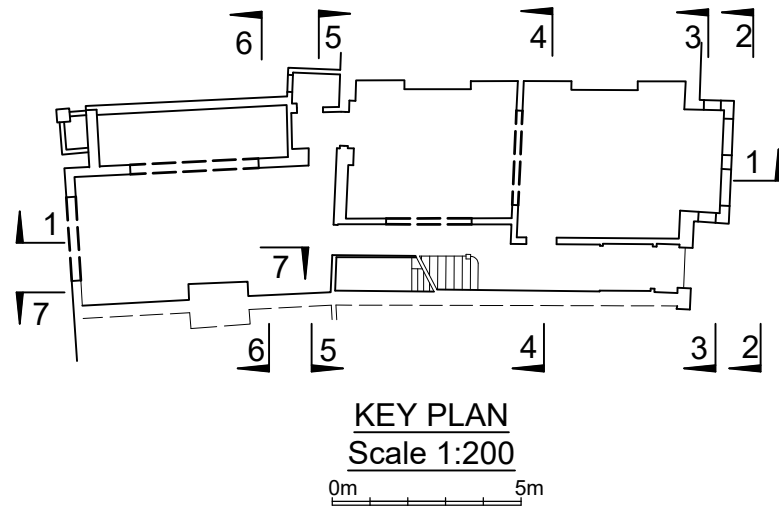
SECTION 5 - 5
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SECTION 6 - 6
1:100



SECTION 7 - 7
1:100

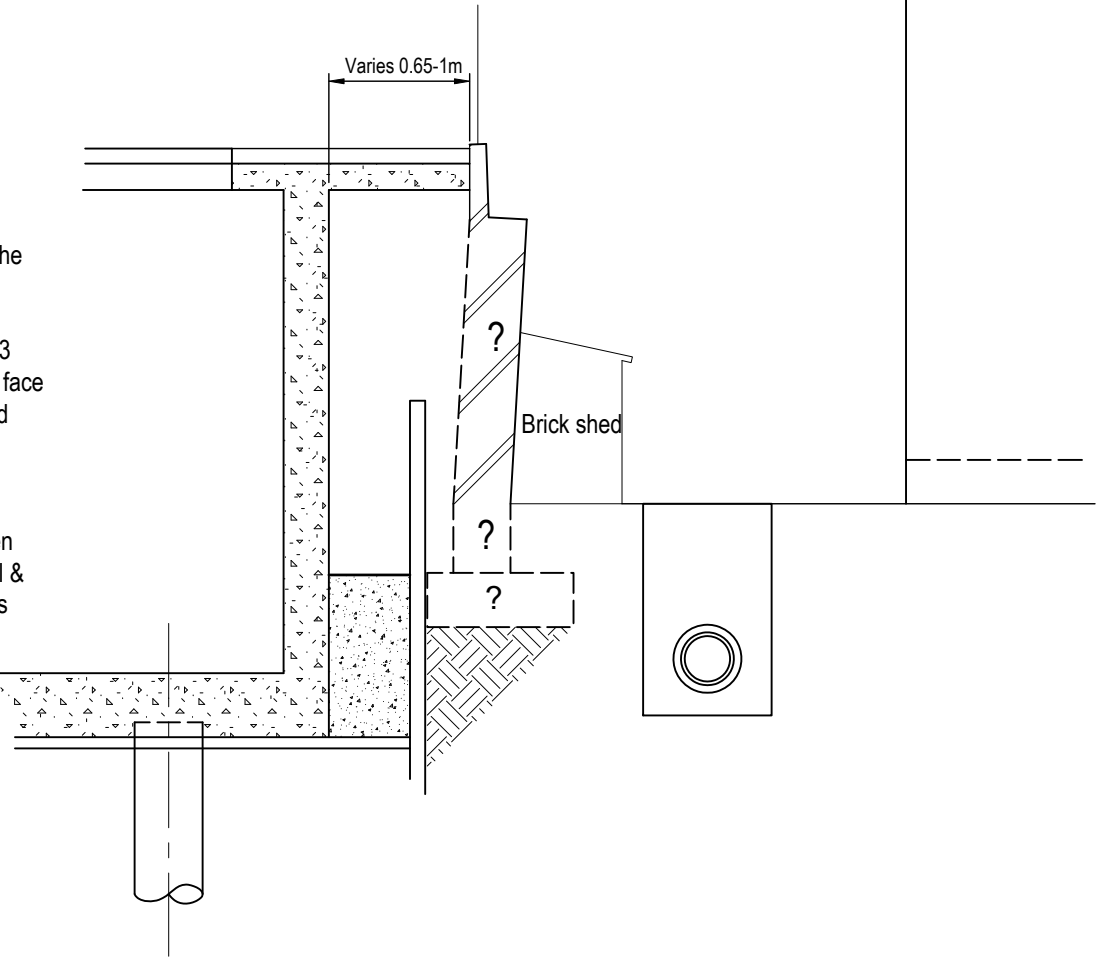


KEY PLAN
Scale 1:200

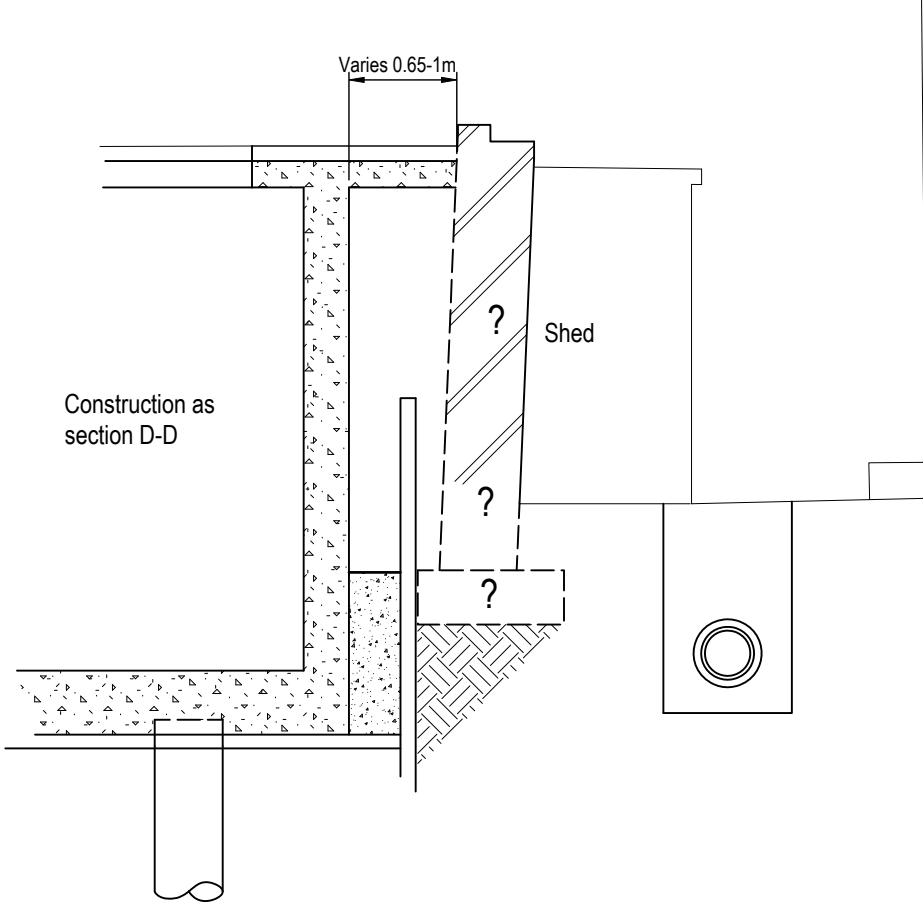


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31 WILLOUGHBY ROAD LONDON NW3 1RT PROPOSED BASEMENT EXTENSION		
EXISTING BUILDING SECTIONS & ELEVATIONS		
Scale. 1:100 & 1:200 Scale refers to paper size:	Date 03/19 A2	Drawing ref. G1808-PA-007-E1

BEFORE CONSTRUCTION:
A trial pit is to be hand excavated to determine the existing wall profile and footing details.
CONSTRUCTION:
Following construction of rear lightwell and No.33 boundary walls: Re-excavate to expose existing face of brick wall. Brace wall as required & retain and support ground below existing wall footing with sacrificial trench sheets supported by waling supported behind previously constructed walls. Construct new wall as free standing infill between existing RC walls. fill concrete between new wall & trench sheets. Remove waling, cut trench sheets down and backfill with lightly compacted soil

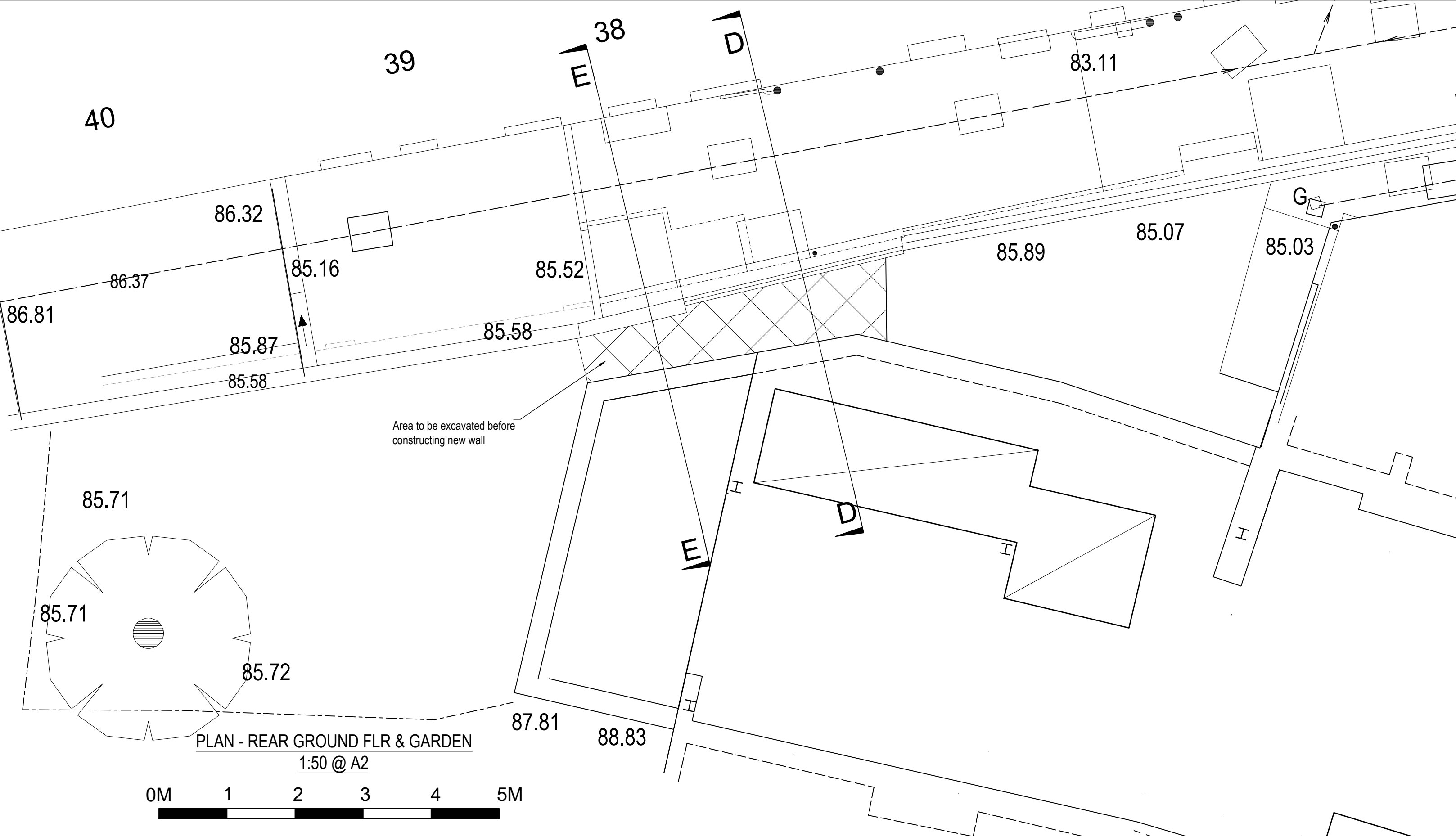


SECTION D - D 1:50 @ A2



SECTION E - E 1:50 @ A2

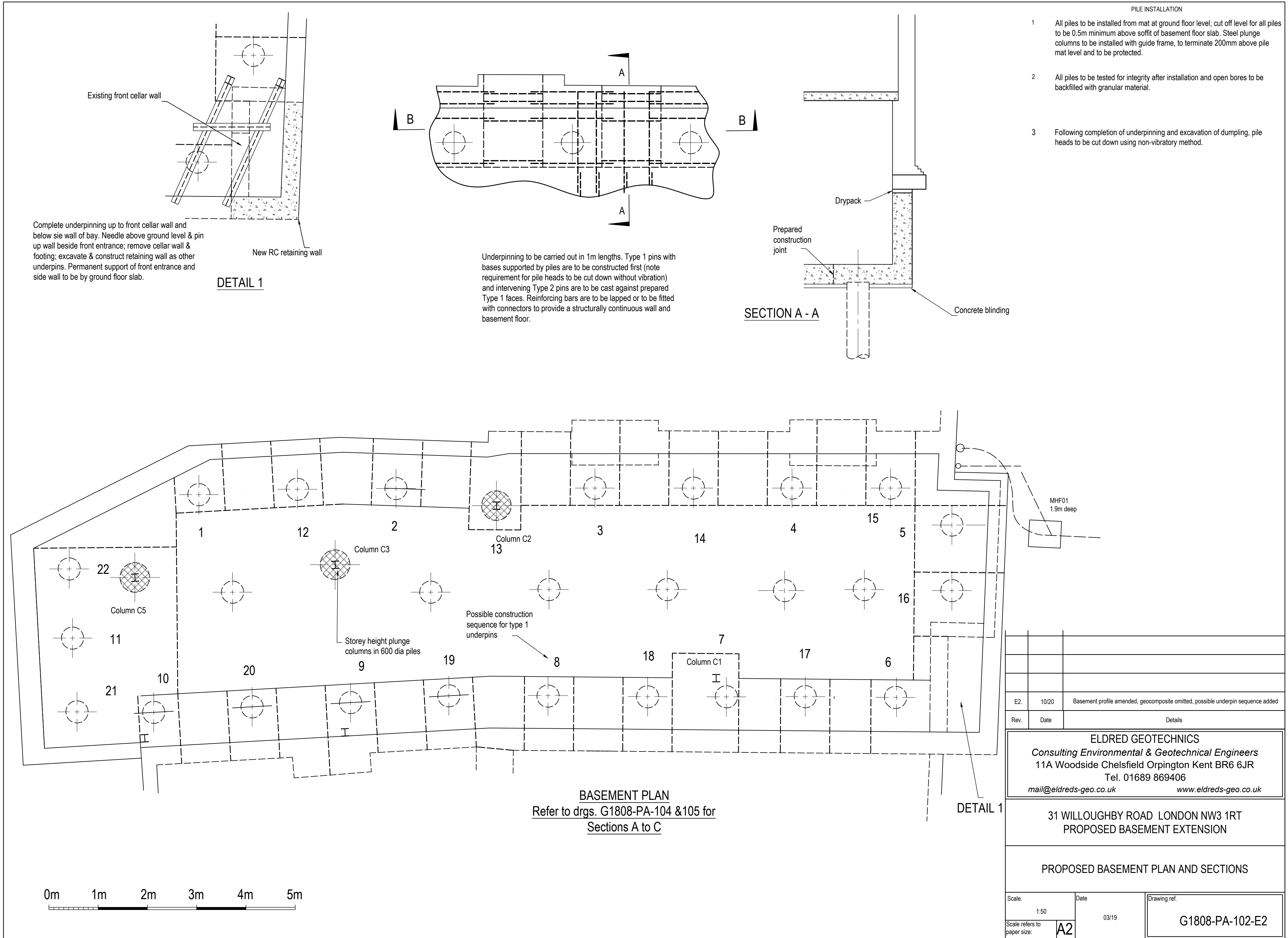
SECTION REFERENCES FOLLOW ARCHITECTS' DRG 109-PLA-BFP

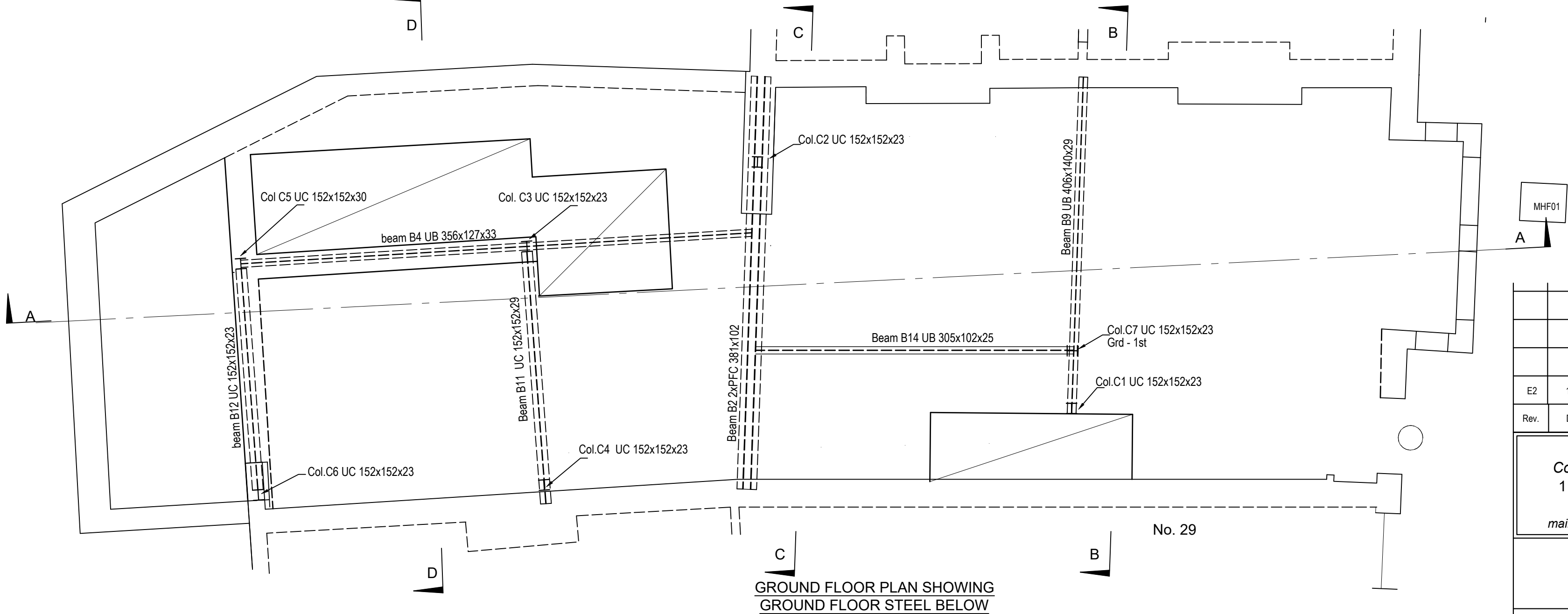
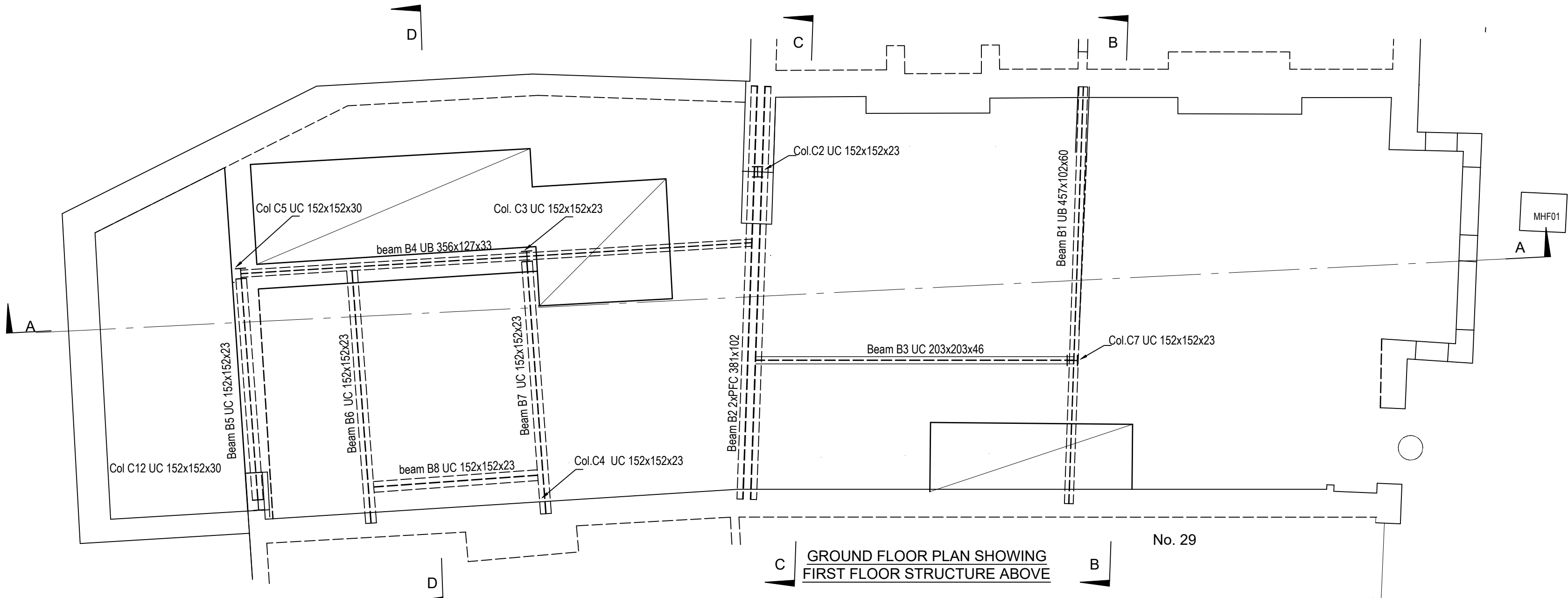


PLAN - REAR GROUND FLR & GARDEN
1:50 @ A2

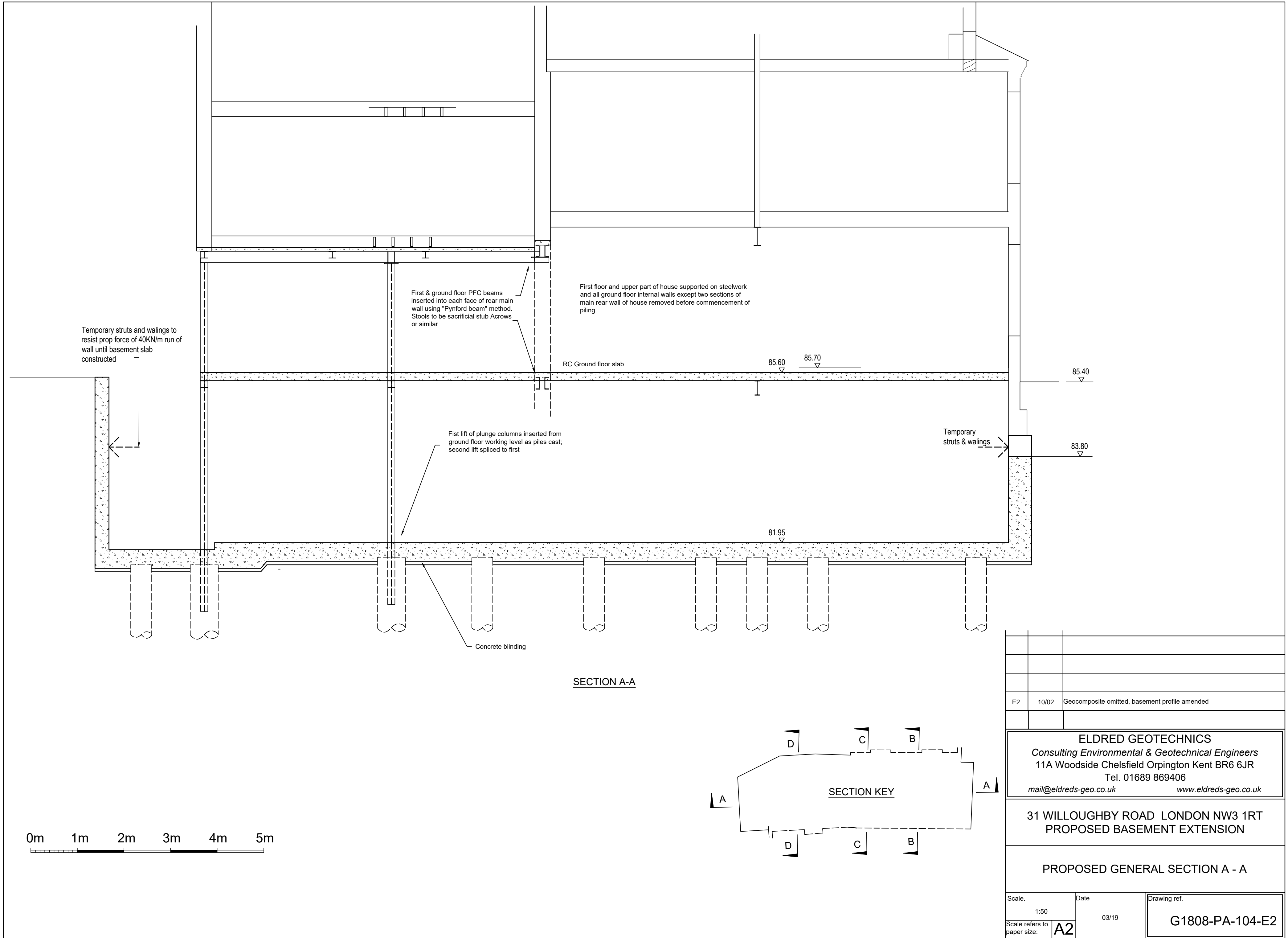


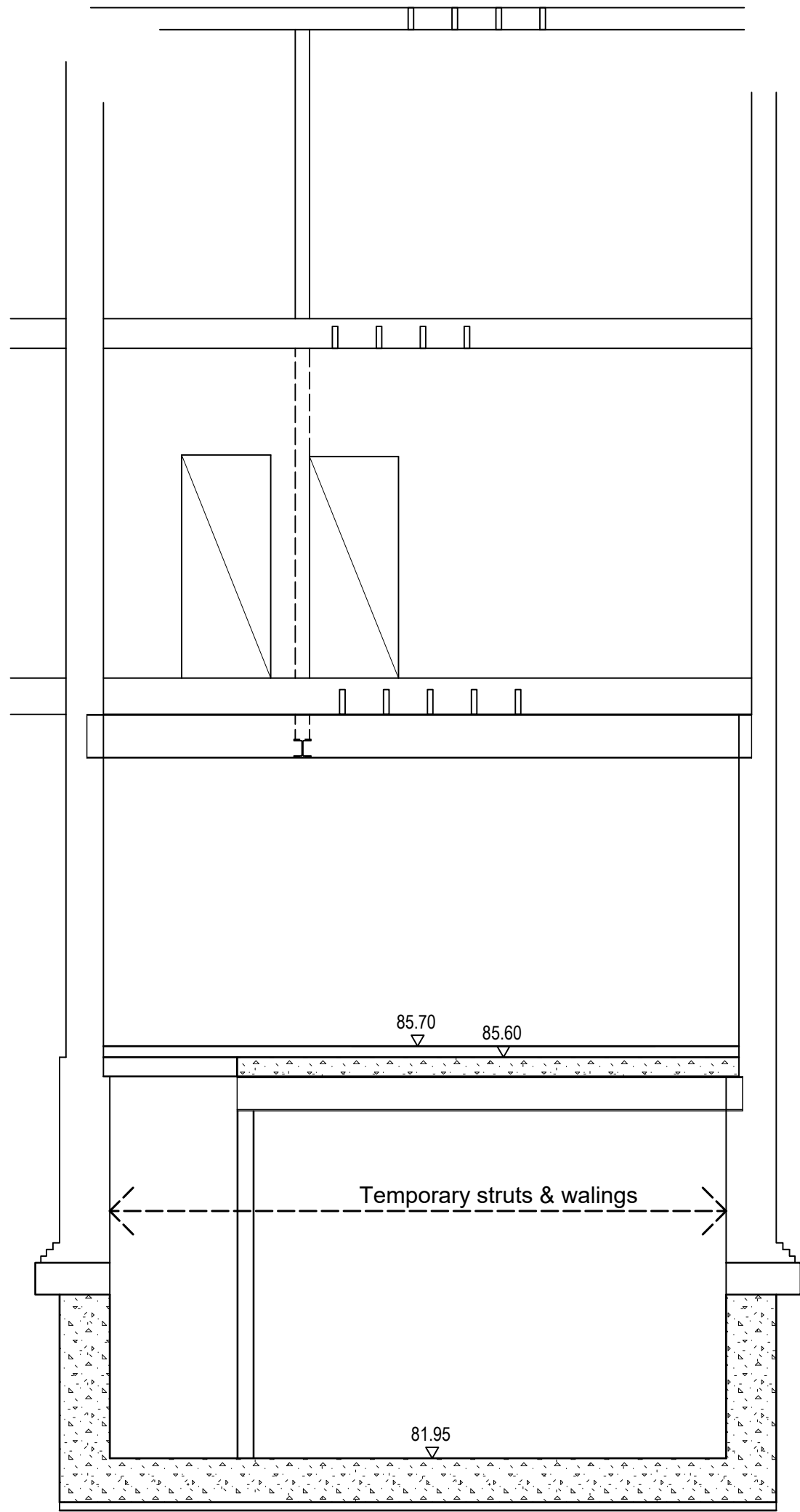
E2.	10/20	Basement profile and detail adjacent to existing wall altered
Rev.	Date	Details
ELDRED GEOTECHNICS Consulting Environmental & Geotechnical Engineers 11A Woodside Chelsfield Orpington Kent BR6 6JR Tel. 01689 869406 mail@eldreds-geo.co.ukwww.eldreds-geo.co.uk		
31 WILLOUGHBY ROAD LONDON NW3 1RT PROPOSED BASEMENT EXTENSION		
PROPOSED RELATIONSHIP OF REAR BASEMENT TO EXISTING BOUNDARY RETAINING WALLS		
Scale. 1:50 Scale refers to paper size.	Date 03/19	Drawing ref. G1808-PA-101-E2



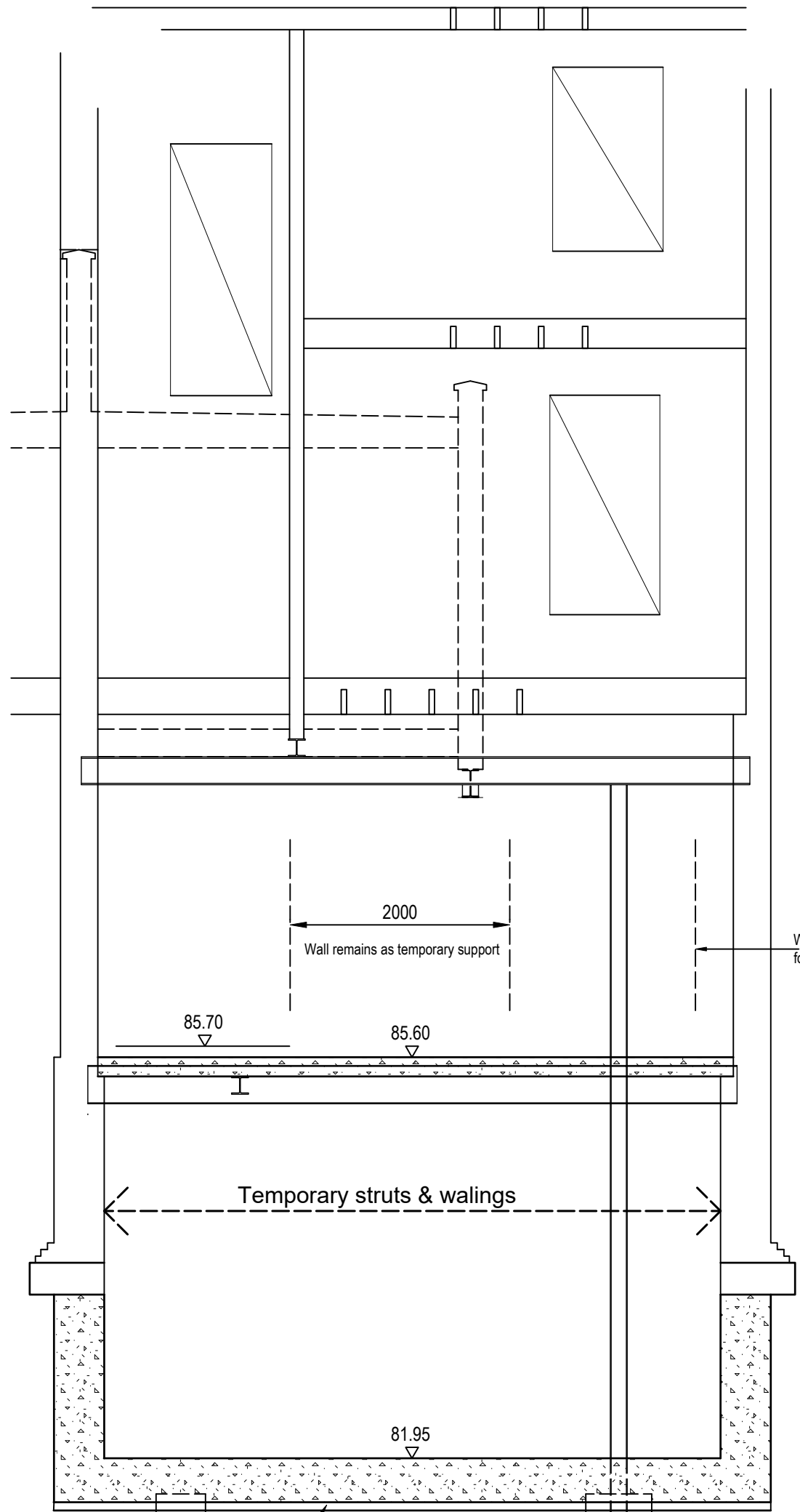


E2	10/20	Basement profile amended
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31 WILLOUGHBY ROAD LONDON NW3 1RT PROPOSED BASEMENT EXTENSION		
GROUND FLOOR PLANS SHOWING GROUND AND FIRST FLOOR STRUCTURE		
Scale. 1:100, 1:50	Date 03/19	Drawing ref. G1808-PA-103-E2
Scale refers to paper size:	A2	

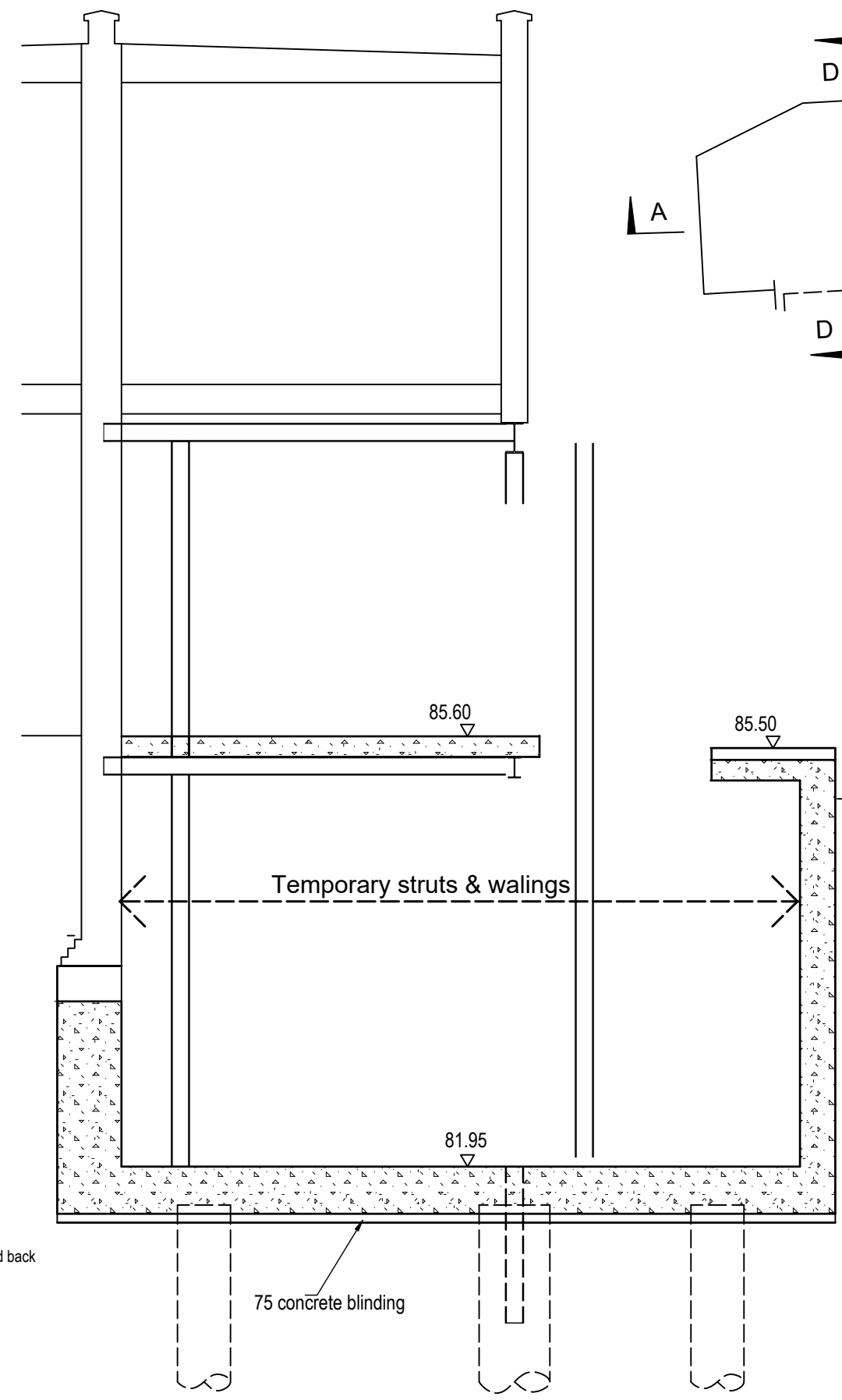




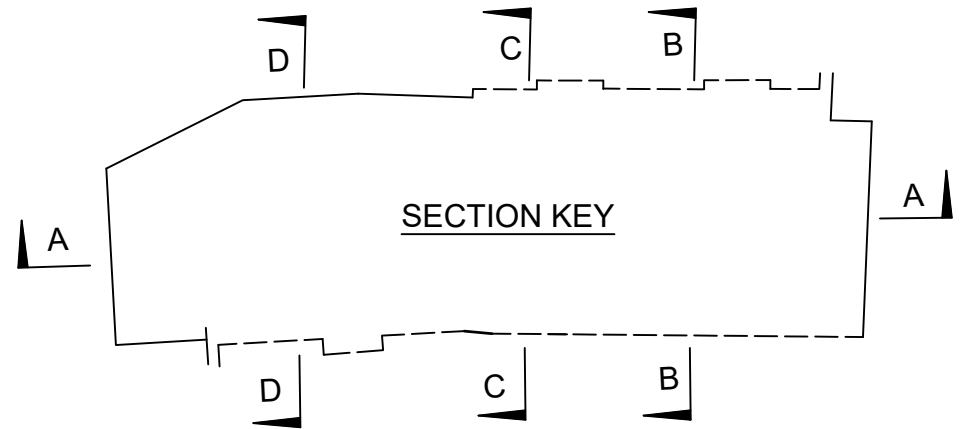
SECTION B-B



SECTION C-C



SECTION D - D



E2	10/02	Basement profile amended geocomposite deleted
Rev.	Date	Details

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31 WILLOUGHBY ROAD LONDON NW3 1RT
 PROPOSED BASEMENT EXTENSION

PROPOSED GENERAL CROSS SECTIONS

Scale. 1:50 Scale refers to paper size:	Date 03/19	Drawing ref. G1808-PA-105-E2
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Appendix E Contents

Preliminary geotechnical design report

Figure 14 – Plot of derived shear strengths and characteristic profile

Figure 15 – Groundwater flow direction & gradient

Figure 16 – Arrangement of analytical sections F1 to F4

Figure 17 – FLAC analysis geometry and monitor points section F1

Figure 18 – FLAC analysis monitor point detail section F1

Output data section F1

Figure 19 – FLAC analysis geometry and monitor points section F2

Figure 20 – FLAC analysis monitor point detail section F2

Output data section F2

Figure 21 – FLAC analysis geometry and monitor points section F3

Figure 22 – FLAC analysis monitor point detail section F3

Output data section F3

Figure 23 – FLAC analysis geometry and monitor points section F4

Output data section F4

Damage risk assessment

PROJECT	SUBJECT	DATE	JOB REF.	SHEET	REVISION
31 Willoughby Road NW3 1RT Proposed Basement Extension	Geotechnical report	08/19	G1808	1	

PROPOSED BUILDINGS: Refer to current editions of drawings G1808-GA-102 to 105

Front part of basement; preliminary estimate of unfactored loads imposed at basement floor soffit level (81.50 OD)

<u>Item</u>	<u>Permanent</u>	<u>Variable</u>
Existing: No.29 party wall	126.06	9.40
Existing: No.33 party wall	152.36	4.95
New; 2 No.300 RC party walls 1.5m high	21.60	
New; 450mm basement floor slab 6.5m wide	70.20	
New; basement floor finish	8.85	
New; basement floor variable		8.85
New 175mm ground floor slab	24.78	
New; ground floor finish	8.85	
New; ground floor variable		8.85
Total unfactored loads/m length of basement	412.69	32.05 KN/m
For preliminary purposes assume all load carried by piles close to external walls; piles @ 2m c/c		
SLS Loads/pile	412.69	32.05 KN/m
DA1 Comb A1	<u>557.14</u>	<u>48.08</u> KN/m
DA1 Comb A2	<u>412.69</u>	<u>41.67</u> KN/m

Rear part of basement; unfactored loads imposed at basement floor soffit level (81.50 OD)

<u>Item</u>	<u>Permanent</u>	<u>Variable</u>
Existing: No.29 party wall	91.46	10.50 KN/m
Other loads as front/2	<u>67.14</u>	<u>8.85</u> KN/m
Total unfactored loads/m length of basement	158.60	19.35 KN/m
For preliminary purposes assume all load carried by piles close to external walls; piles @ 2m c/c		
SLS Loads/pile	158.60	19.35 KN/m
DA1 Comb A1	<u>214.11</u>	<u>29.03</u> KN/m
DA1 Comb A2	<u>158.60</u>	<u>25.16</u> KN/m

PROJECT	SUBJECT	DATE	JOB REF.	SHEET	REVISION
31 Willoughby Road NW3 1RT Proposed Basement Extension	Geotechnical report	08/19	G1808	2	

Preliminary assessment of Pile Capacity

11m pile below basement soffit. 450 dia. Front. Refer to Cu profile Figure 14

Load	DA1 Comb. 2 =	Comp	454 KN	Tension	247 KN			
	Pile dia m.	Perimeter m.	α	Section length m	Cu	γ_{Cu}	Resistance	
Shaft	0.45	1.41	0.50	11.00	129.00	1.40	716.54	KN
End	CSA	0.16	9.00		196.00	1.40	201.60	KN
						Total	918.14	KN
Resistance factors	R4 Comp	2.02	R4 Tens	2.90	>2 Adequate			

	DA1 Comb. 1 =	605 KN	Tension	333 KN				
	Pile dia m.	Perimeter m.	α	Section length m	Cu	γ_{Cu}	Resistance	
Shaft	0.45	1.41	0.50	11.00	129.00	1.00	1003.16	KN
End	CSA	0.16	9.00		196.00	1.00	282.24	KN
							1285.40	KN
Resistance factors	R1 Comp	2.12	R1 Tens	3.01	>1 Adequate			

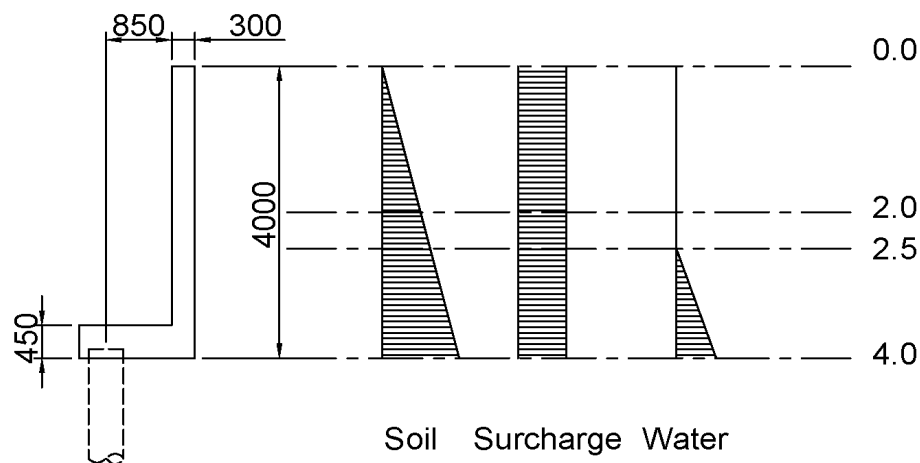
11m pile below basement soffit. 300 dia. Rear. Refer to Cu profile Figure 14

	DA1 Comb. 2 =	184 KN	Tension	247 KN				
	Pile dia m.	Perimeter m.	α	Section length m	Cu	γ_{Cu}	Resistance	
Shaft	0.30	0.94	0.50	11.00	129.00	1.40	477.70	KN
End	CSA	0.07	9.00		196.00	1.40	88.20	KN
							565.90	KN
Resistance factors	R4 Comp	3.08	R4 Tens	1.93	>=2 Adequate			

	DA1 Comb. 1 =	243 KN	Tension	333 KN				
	Pile dia m.	Perimeter m.	α	Section length m	Cu	γ_{Cu}	Resistance	
Shaft	0.30	0.94	0.50	11.00	129.00	1.00	668.77	KN
End	CSA	0.07	9.00		196.00	1.00	123.48	KN
							792.25	KN
Resistance factors	R1 Comp	3.26	R1 Tens	2.01	>1 Adequate			

PROJECT	SUBJECT	DATE	JOB REF.	SHEET	REVISION
31 Willoughby Road NW3 1RT Proposed Basement Extension	Geotechnical report	08/19	G1808	3	

Preliminary check on stability of cantilever retaining wall in rear extension - short term condition



Soil	γ_{sat}	18.00 KN/m ³
Conc.	γ	24.00 KN/m ³

< int. friction	ϕ'	25.00 deg.
Cohes.	c'	0.00 Kpa

Ka	0.41 frac'n
----	-------------

DA1	Char.	A1	A2		A1	A2	A1	A2
Action	Pv	Pah	Pah	Arm	M O/T	M O/T	MR	MR
Soil	72.00	40	30	1.33	53	39		
Surch	10.00	25	21	2.00	49	43		
Water	7.50	10	8	0.50	5	4		
Stem	28.80			1.00			28.80	28.80
Base	9.18			0.43			3.90	3.90
					107.27	85.65	32.70	32.70

Resistance factors R1/A1 0.30 R1/A2 0.38 Inadequate.

Provide struts 1.5m from top of wall ULS force/m run = $(107.27 - 32.7)/2.5 =$ 29.83 KN/m

PROJECT	SUBJECT	DATE	JOB REF.	SHEET	REVISION
31 Willoughby Road NW3 1RT Proposed Basement Extension	Geotechnical report	08/19	G1808	5	

FLAC Analysis -primary input values. Figures 15 to 23 show groundwater flow direction and model geometry together with tabled critical results extracted from output data.

Units are Mg - m - sec. Stress is expressed in Kpa.

For soils, FLAC does not accept input in terms of Youngs Modulus, which is replaced by drained bulk modulus K' of the solid matrix and shear modulus G . $E' = 3K'(1-2\nu) = 2G(1+\nu)$. The undrained bulk modulus is $K = K' + K_w/n$: K_w is the bulk modulus of water ($2E+9$ GPa), n is porosity.

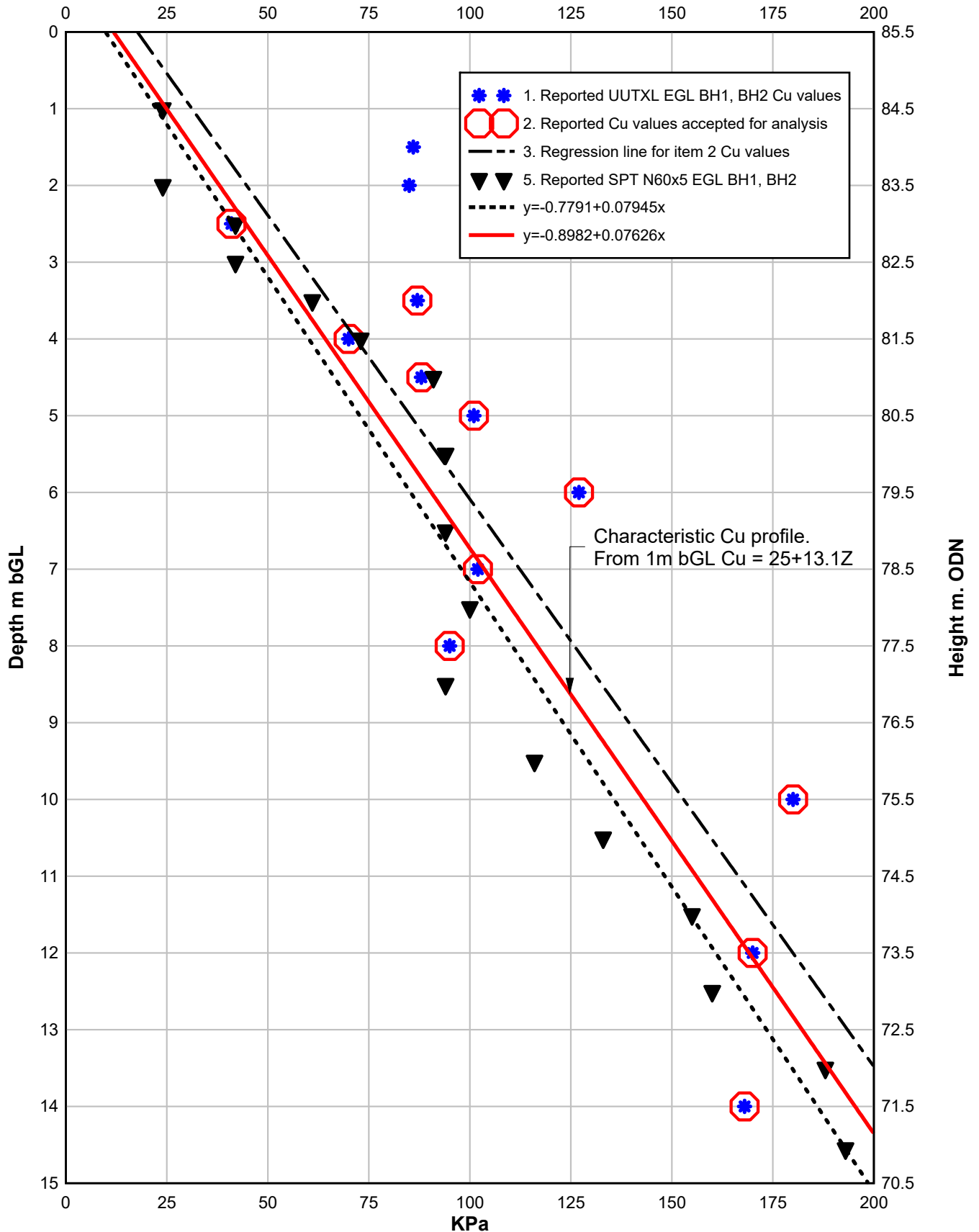
The permeability k used is not the hydraulic conductivity (m/sec) but the mobility coefficient ($m^2/KPa.sec$). The numerical conversion is $k(m^2/KPa.sec) = k(m/s)/10$.

Properties of structural members are input in conventional form.

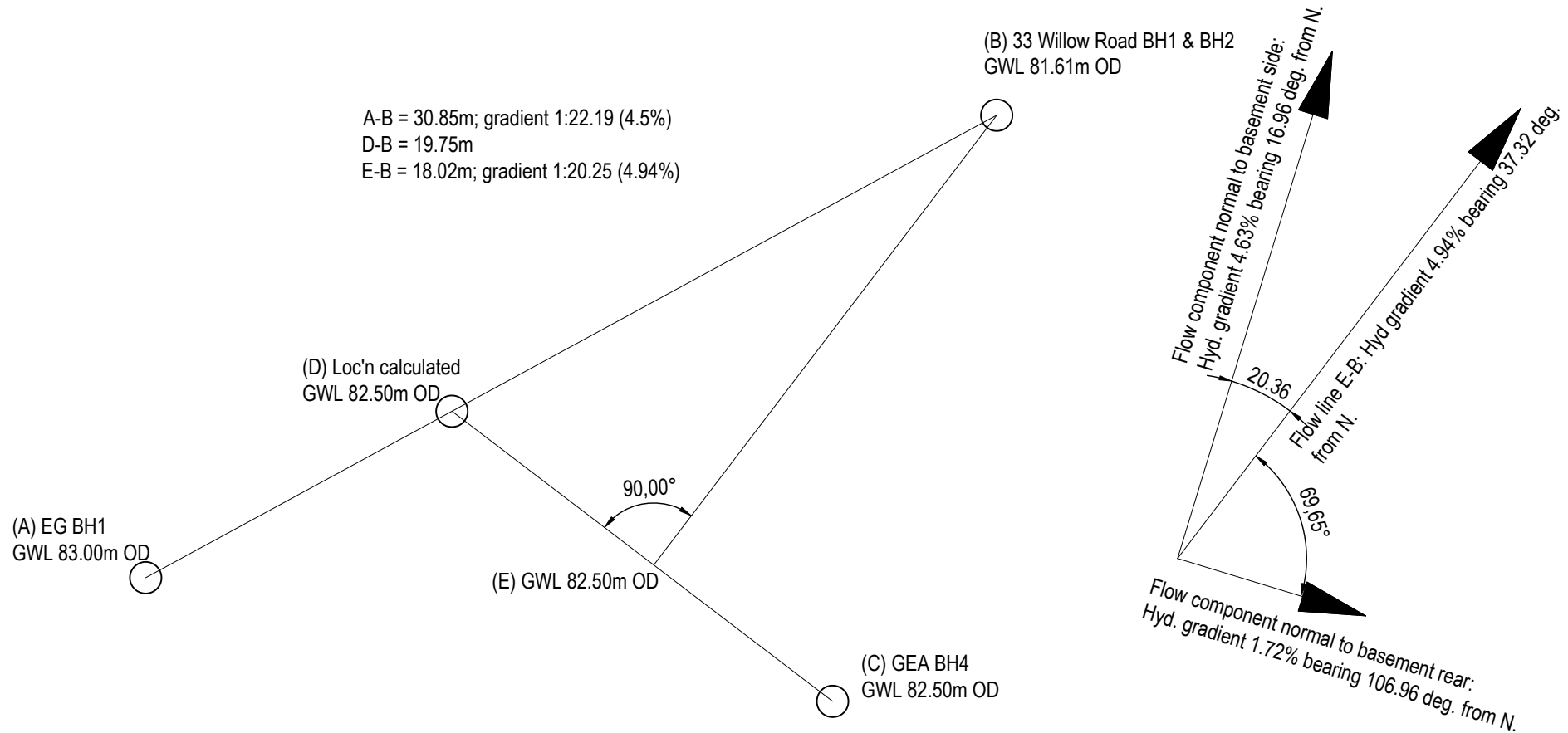
Soil Properties:	γ dry	ν	E'	Bulk K'	Shear G	C_u	C'	ϕ'
	Mg/m3		Kpa	Kpa	Kpa	Kpa	Kpa	Deg.
Soil 1 0 - 4m bGL	1.8	0.20	2.43E+04	1.35E+02	1.01E+04	38.0	2.0	25.0
Soil 2 4 - 6m bGL	1.9	0.20	5.24E+04	2.91E+04	2.18E+04	77.0	2.0	25.0
Soil 3 6 - 8m bGL	2.0	0.20	6.66E+04	3.70E+04	2.78E+04	104.0	2.0	25.0
Soil 4 8 - 15m bGL	2.0	0.20	1.04E+05	5.78E+04	4.33E+04	163.0	2.0	25.0
Soil 5 15 - 30m bGL	2.0	0.20	1.97E+05	1.09E+05	8.21E+04	307.0	2.0	25.0

Structural elements	Density	Dia or Thicken'	E	Rot'n stiffness KNm^2	Pitch m	Porosity & Permeability (see note)		
Concrete piles 10m long	2.4	0.45	2.60E+07	not used	2.00	n	k	
Concrete walls	2.4	0.40	2.60E+07	not used	Cont.	Soil 1	0.5	1.00E-09
UC 152x152x23	7.85		2.10E+08	not used	3.00	Soil 2	0.6	1.00E-09
Floor slabs	2.4	0.4*	2.60E+07	not used	Cont.	Soil 3	0.50	1.00E-10
		*increased to 0.5m below perimeter walls				Soil 4	0.50	1.00E-10
Interfaces	Normal spring stiffness Kpa/m	Shear spring stiffness Kpa/m	Cohesion Kpa	Friction Deg.				
Piles	6.30E+05	6.30E+05	2.00	16.5	Soil 5	0.50	1.00E-10	
Walls	5.38E+05	5.38E+05	2.00	16.5				
Wall bases	5.38E+05	5.38E+05	2.00	16.5				

G1808 31 Willoughby Road NW3 1RT - Proposed Basement Assessed Characteristic Profile of Undrained Shear strength vs Depth



A-B = 30.85m; gradient 1:22.19 (4.5%)
D-B = 19.75m
E-B = 18.02m; gradient 1:20.25 (4.94%)

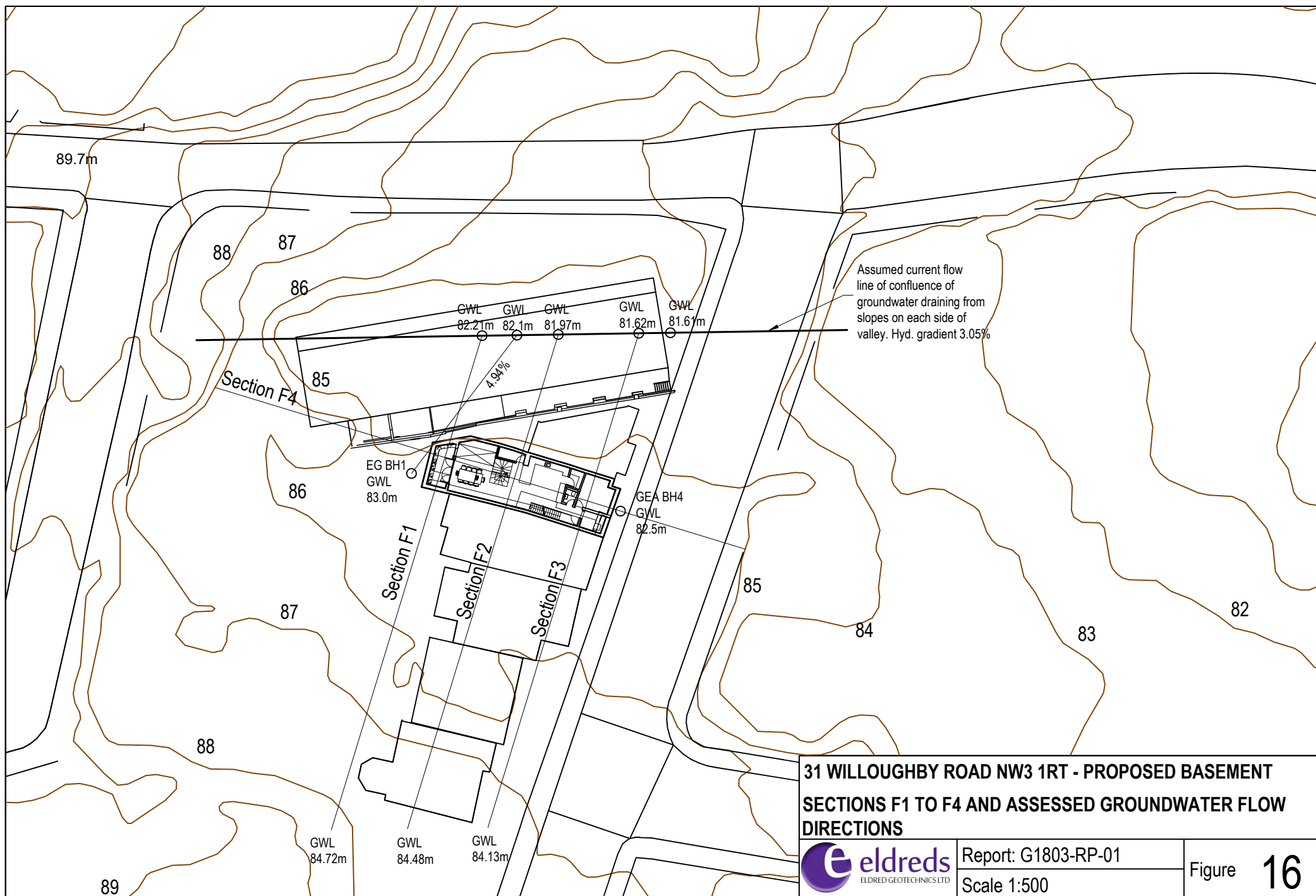


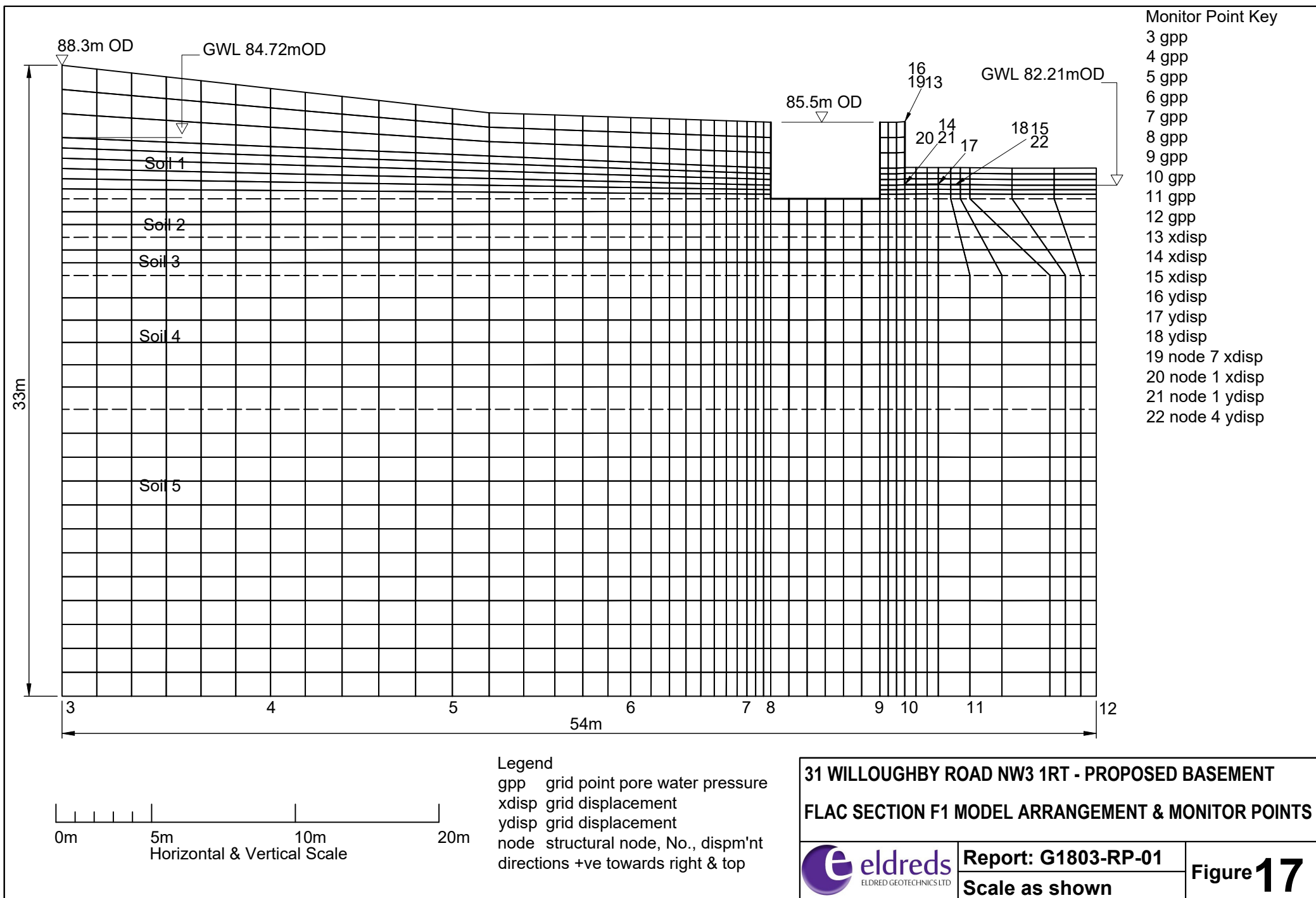
**31 WILLOUGHBY ROAD NW3 1RT - PROPOSED BASEMENT
ASSESSED GROUNDWATER FLOW DIRECTION AND
COMPONENTS FOR ANALYSES**

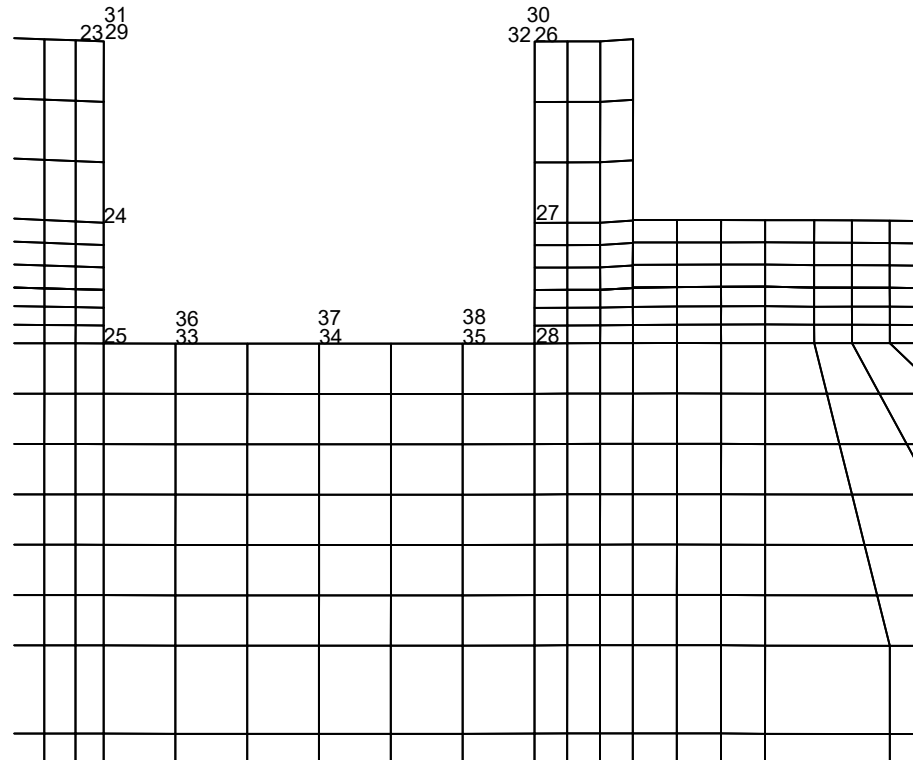


Report: G1803-RP-01
Scale as indicated

Figure **15**



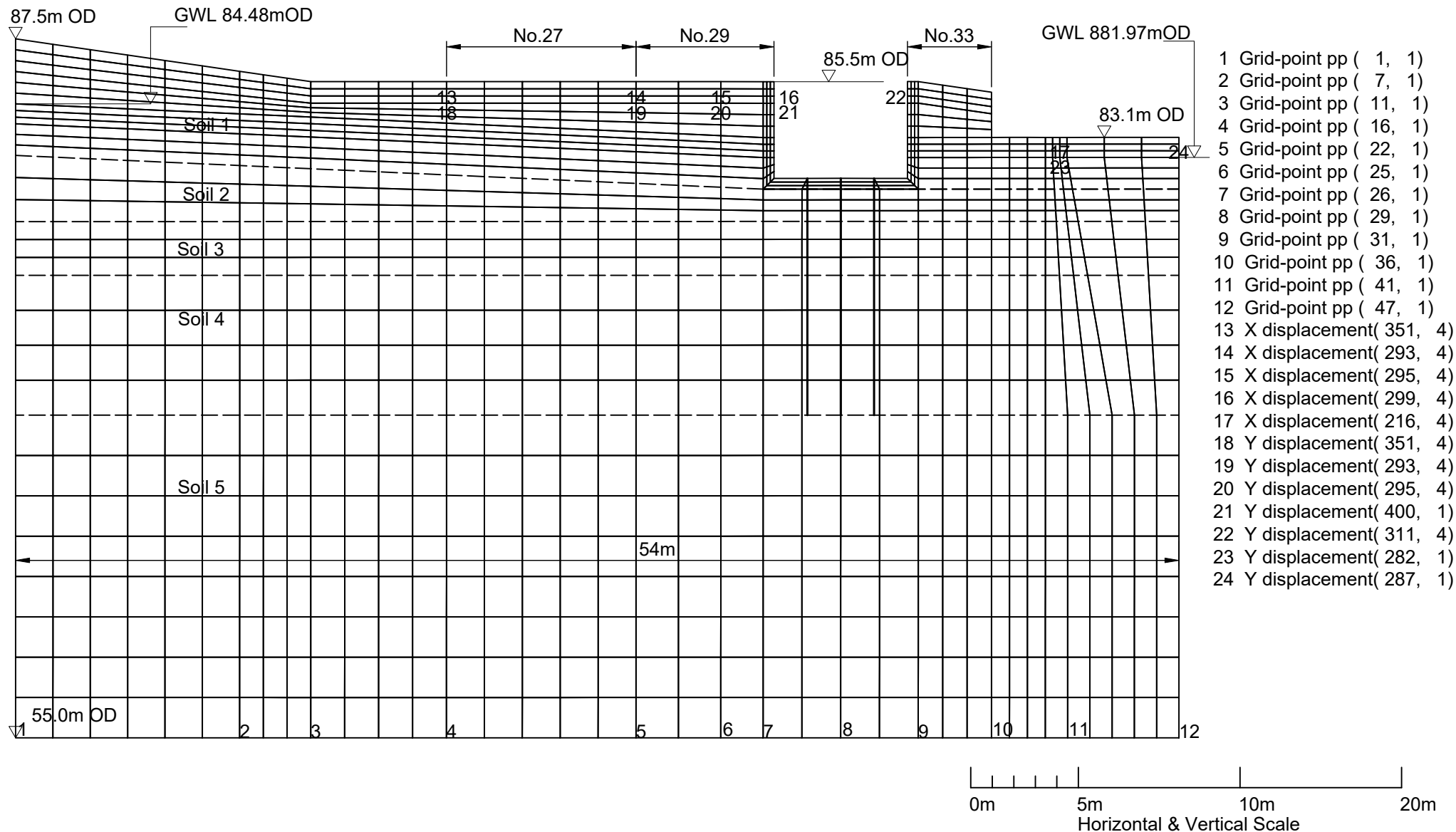




Condition/ Monitor points	MP3pp	MP3pp	MP5pp	MP6pp	MP7pp	MP8pp	MP9pp	MP10pp	MP11pp
1. Predevelopment c19 Kpa	2.92E+02	2.85E+02	2.80E+02	2.76E+02	2.73E+02	2.73E+02	2.70E+02	2.70E+02	2.69E+02
2. Existing state Kpa	2.92E+02	2.85E+02	2.80E+02	2.76E+02	2.73E+02	2.72E+02	2.70E+02	2.70E+02	2.68E+02
3. GWL change stages 1 to 2 (mm)	0.00	-19.92	-22.91	-22.31	-20.76	-20.30	-17.38	-16.44	-13.27
4. Basement exc. & dewatered Kpa	2.92E+02	2.82E+02	2.75E+02	2.69E+02	2.67E+02	2.67E+02	2.66E+02	2.65E+02	2.66E+02
5. GWL change stages 2 to 4 (mm)	0.00	-287.37	-503.75	-621.64	-603.02	-587.12	-458.73	-417.36	-291.26
6. Final state Kpa	2.92E+02	2.85E+02	2.80E+02	2.76E+02	2.73E+02	2.73E+02	2.70E+02	2.70E+02	2.69E+02
7. GWL change stages 4 to 6 (mm)	0.00	299.60	524.10	643.70	621.87	604.96	471.08	428.36	298.73
8. GWL change stages 2 to 6 (mm)	0.00	12.23	20.35	22.06	18.85	17.84	12.35	11.01	7.47
Condition/ Monitor points	MP12pp								
1. Predevelopment c19 Kpa	2.67E+02								
2. Existing state Kpa	2.67E+02								
3. GWL change stages 1 to 2 (mm)	0.00								
4. Basement exc. & dewatered Kpa	2.67E+02								
5. GWL change stages 2 to 4 (mm)	0.00								
6. Final state Kpa	2.67E+02								
7. GWL change stages 4 to 6 (mm)	0.00								
8. GWL change stages 2 to 6 (mm)	0.00								

Condition/ Monitor points	MP13X	MP14X	MP15X	MP16Y	MP17Y	MP18Y	MP19NX	MP20NX	MP21NY
1. Predevelopment c19 (m)	4.11E-03	1.14E-03	1.34E-04	-1.11E-02	-4.86E-03	-6.51E-03	4.07E-03	1.05E-03	-3.21E-03
2. Existing state (m)	7.01E-03	2.89E-03	5.53E-04	-8.17E-03	-1.87E-03	-4.87E-03	7.36E-03	3.01E-03	-2.14E-04
3. Disp. change stages 1 to 2 (mm)	2.91	1.75	0.42	2.93	2.99	1.63	3.29	1.96	2.99
4. Basement exc. & dewatered (m)	7.28E-03	2.68E-03	2.04E-04	-8.43E-03	-2.35E-03	-5.32E-03	7.57E-03	2.81E-03	-4.87E-04
5. Disp. change stages 2 to 4 (mm)	0.26	-0.20	-0.35	-0.26	-0.48	-0.45	0.21	-0.20	-0.27
6. Final state (m)	7.19E-03	2.87E-03	5.51E-04	-8.27E-03	-1.92E-03	-4.93E-03	7.41E-03	3.06E-03	-2.82E-04
7. Disp. change stages 4 to 6 (mm)	-0.08	0.19	0.35	0.17	0.42	0.40	-0.16	0.25	0.21
8. Disp. change stages 2 to 6 (mm)	0.18	-0.01	0.00	-0.10	-0.06	-0.05	0.05	0.05	-0.07
Condition/ Monitor points	MP22NY								
1. Predevelopment c19 (m)	-6.63E-03								
2. Existing state (m)	-5.02E-03								
3. Disp. change stages 1 to 2 (mm)	1.61								
4. Basement exc. & dewatered (m)	-5.47E-03								
5. Disp. change stages 2 to 4 (mm)	-0.45								
6. Final state (m)	-5.07E-03								
7. Disp. change stages 4 to 6 (mm)	0.39								
8. Disp. change stages 2 to 6 (mm)	-0.05								

Condition/ Monitor points	MP23X	MP24X	MP25X	MP26X	MP27X	MP28X	MP29Y	MP30Y	MPN31X
1. Predevelopment c19 (m)									
2. Existing state (m)	5.62E-03	4.84E-03	4.08E-03	5.22E-03	3.70E-03	3.27E-03	-3.79E-02	-3.96E-02	0.00E+00
3. Disp. change stages 1 to 2 (mm)									
4. Basement exc. & dewatered (m)	5.62E-03	4.84E-03	4.08E-03	5.21E-03	3.70E-03	3.27E-03	-3.79E-02	-3.95E-02	-1.06E-03
5. Disp. change stages 2 to 4 (mm)	-0.0025	-0.0048	-0.0033	-0.0023	0.0007	0.0000	0.0065	0.0047	-1.0593
6. Final state (m)	5.62E-03	4.83E-03	4.08E-03	5.21E-03	3.70E-03	3.27E-03	-3.79E-02	-3.95E-02	-1.07E-03
7. Disp. change stages 4 to 6 (mm)	-0.0015	-0.0029	-0.0020	-0.0014	0.0004	0.0000	0.0039	0.0028	-0.0086
8. Disp. change stages 2 to 6 (mm)	-0.0040	-0.0076	-0.0053	-0.0037	0.0011	0.0000	0.0104	0.0075	-1.0679
Condition/ Monitor points	MPN31X	MPN32X	MPN33X	MPN34X	MPN35X	MPN36Y	MPN37Y	MPN38Y	
1. Predevelopment c19 (m)									
2. Existing state (m)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
3. Disp. change stages 1 to 2 (mm)									
4. Basement exc. & dewatered (m)	-1.06E-03	4.41E-05	-5.59E-06	-1.80E-04	-7.71E-06	-7.40E-05	-9.94E-06	-8.71E-05	
5. Disp. change stages 2 to 4 (mm)	-1.0593	0.0441	-0.0056	-0.1801	-0.0077	-0.0740	-0.0099	-0.0871	
6. Final state (m)	-1.07E-03	4.01E-05	-5.99E-06	-1.80E-04	-7.84E-06	-8.33E-05	-1.31E-05	-9.27E-05	
7. Disp. change stages 4 to 6 (mm)	-0.0086	-0.0040	-0.0004	-0.0003	-0.0001	-0.0092	-0.0032	-0.0056	
8. Disp. change stages 2 to 6 (mm)	-1.0679	0.0401	-0.0060	-0.1804	-0.0078	-0.0833	-0.0131	-0.0927	

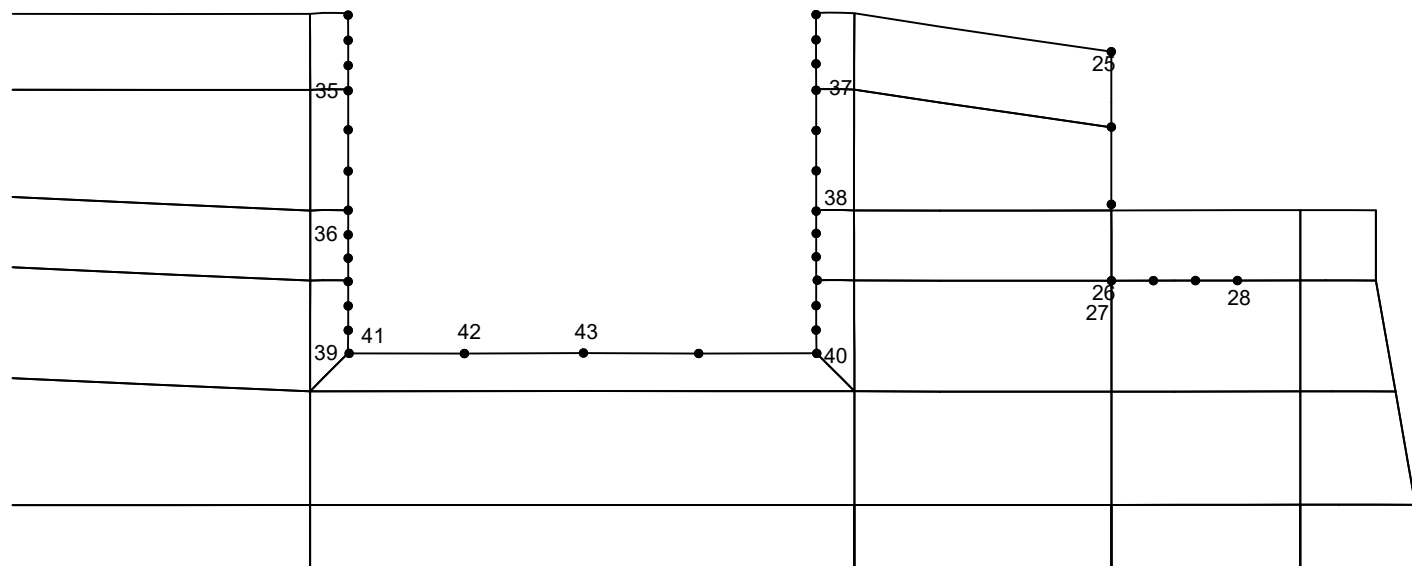


31 WILLOUGHBY ROAD NW3 1RT - PROPOSED BASEMENT
FLAC SECTION F2 MODEL ARRANGEMENT & MONITOR POINTS



Report: G1803-RP-01
Scale as shown

Figure 19



Pt.	Direction	Node
25	X Displacement (Nd	1)
26	X Displacement (Nd	2)
27	Y Displacement (Nd	2)
28	Y Displacement (Nd	3)
35	X Displacement (Nd	11)
36	X Displacement (Nd	15)
37	X Displacement (Nd	25)
38	X Displacement (Nd	29)
39	X Displacement (Nd	20)
40	X Displacement (Nd	34)
41	Y Displacement (Nd	20)
42	Y Displacement (Nd	21)
43	Y Displacement (Nd	37)

31 WILLOUGHBY ROAD NW3 1RT - PROPOSED BASEMENT

FLAC SECTION F2 MODEL ARRANGEMENT & STRUCTURAL
MONITOR POINTS



Report: G1803-RP-01

Scale as shown

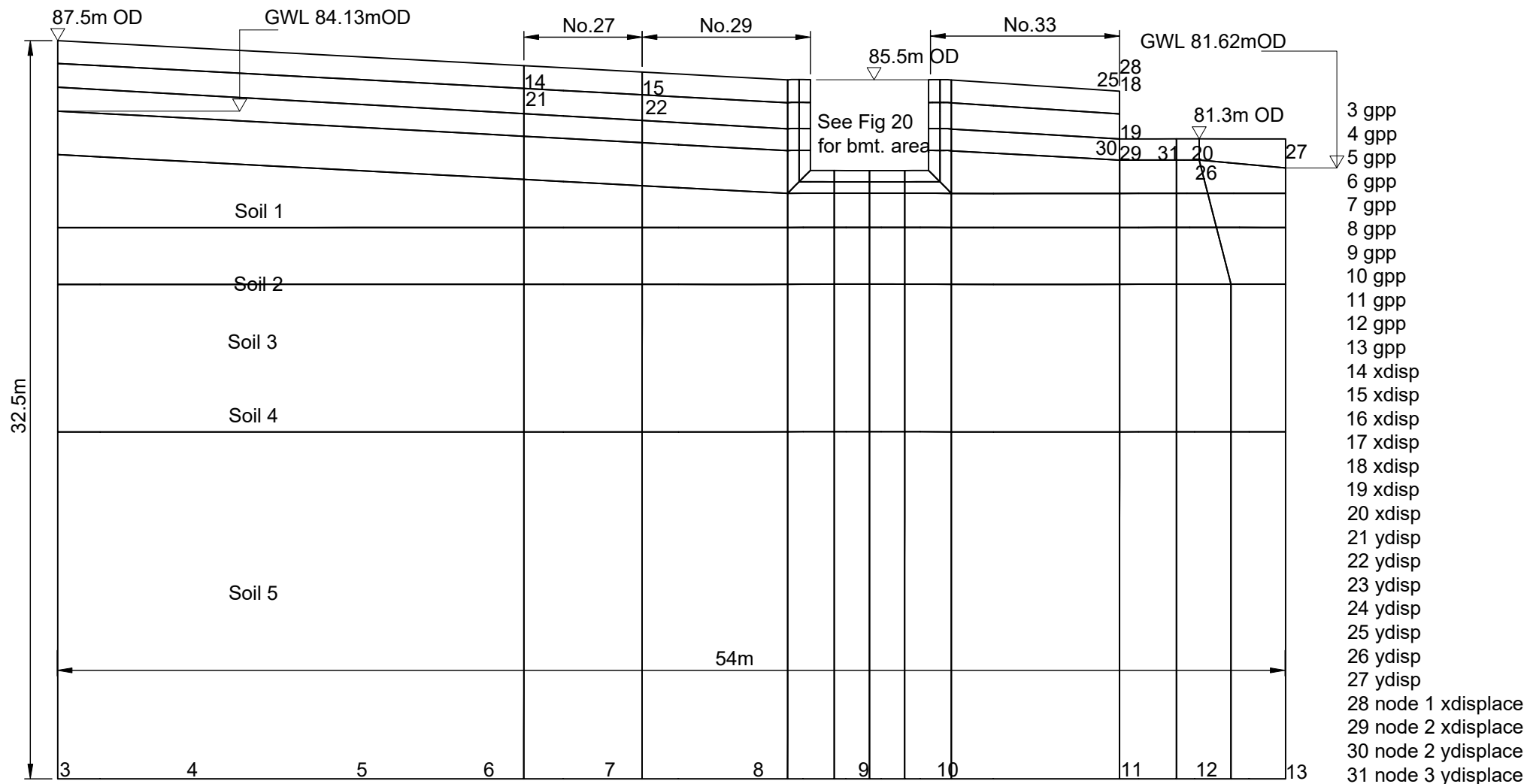
Figure **20**

Condition/ Monitor points	MP1pp	MP2pp	MP3pp	MP4pp	MP5pp	MP6pp	MP7pp	MP8pp	MP9pp
1. Predevelopment c19 Kpa	2.95E+02	2.88E+02	2.86E+02	2.83E+02	2.79E+02	2.77E+02	2.76E+02	2.75E+02	2.73E+02
2. Existing state Kpa	2.95E+02	2.88E+02	2.86E+02	2.83E+02	2.79E+02	2.77E+02	2.76E+02	2.75E+02	2.73E+02
3. GWL change stages 1 to 2 (mm)	0.00	-0.13	-0.13	-0.13	-0.13	-0.13	-0.13	-0.14	-0.13
4. Basement exc. & dewatered Kpa	2.95E+02	2.84E+02	2.81E+02	2.76E+02	2.70E+02	2.68E+02	2.68E+02	2.67E+02	2.67E+02
5. GWL change stages 2 to 4 (mm)	0.00	-395.02	-509.34	-701.72	-863.22	-868.96	-851.75	-782.45	-664.13
6. Final state Kpa	2.95E+02	2.88E+02	2.86E+02	2.83E+02	2.79E+02	2.77E+02	2.76E+02	2.75E+02	2.73E+02
7. GWL change stages 4 to 6 (mm)	0.00	395.73	513.00	710.40	873.40	877.04	858.25	785.55	663.81
8. GWL change stages 2 to 6 (mm)	0.00	0.71	3.66	8.68	10.18	8.08	6.50	3.10	-0.32
Condition/ Monitor points	MP10pp	MP11pp	MP12pp						
1. Predevelopment c19 Kpa	2.72E+02	2.71E+02	2.70E+02						
2. Existing state Kpa	2.72E+02	2.71E+02	2.70E+02						
3. GWL change stages 1 to 2 (mm)	-0.13	-0.13	0.00						
4. Basement exc. & dewatered Kpa	2.67E+02	2.68E+02	2.70E+02						
5. GWL change stages 2 to 4 (mm)	-511.64	-319.67	0.00						
6. Final state Kpa	2.72E+02	2.71E+02	2.70E+02						
7. GWL change stages 4 to 6 (mm)	508.83	315.71	0.00						
8. GWL change stages 2 to 6 (mm)	-2.81	-3.96	0.00						

Condition/ Monitor points	MP13X	MP14X	MP15X	MP16X	MP17X	MP18Y	MP19Y	MP20Y	MP21Y
1. Predevelopment c19 (m)	3.06E-03	3.02E-03	2.15E-03	3.00E-03	1.65E-03	-2.79E-02	-3.56E-02	-3.68E-02	-2.43E-02
2. Existing state (m)	3.13E-03	3.09E-03	2.20E-03	3.27E-03	1.77E-03	-2.80E-02	-3.60E-02	-3.81E-02	-3.01E-02
3. Disp. change stages 1 to 2 (mm)	0.07	0.07	0.05	0.28	0.12	-0.10	-0.41	-1.32	-5.81
4. Basement exc. & dewatered (m)	4.44E-03	4.28E-03	3.64E-03	6.60E-03	6.59E-04	-2.89E-02	-3.67E-02	-3.87E-02	-3.10E-02
5. Disp. change stages 2 to 4 (mm)	1.31	1.19	1.44	3.32	-1.11	-0.95	-0.70	-0.55	-0.85
6. Final state (m)	3.66E-03	4.04E-03	3.85E-03	7.00E-03	1.39E-03	-2.78E-02	-3.55E-02	-3.80E-02	-3.11E-02
7. Disp. change stages 4 to 6 (mm)	-0.78	-0.24	0.21	0.40	0.73	1.17	1.28	0.62	-0.14
8. Disp. change stages 2 to 6 (mm)	0.53	0.95	1.65	3.73	-0.39	0.22	0.58	0.07	-0.99
Condition/ Monitor points	MP22Y	MP23Y	MP24Y						
1. Predevelopment c19 (m)	-2.47E-02	-2.99E-02	-3.59E-02						
2. Existing state (m)	-2.59E-02	-2.88E-02	-3.08E-02						
3. Disp. change stages 1 to 2 (mm)	-1.17	1.18	5.08						
4. Basement exc. & dewatered (m)	-2.78E-02	-2.85E-02	-3.03E-02						
5. Disp. change stages 2 to 4 (mm)	-1.96	0.25	0.43						
6. Final state (m)	-2.77E-02	-2.80E-02	-3.02E-02						
7. Disp. change stages 4 to 6 (mm)	0.12	0.50	0.15						
8. Disp. change stages 2 to 6 (mm)	-1.84	0.76	0.58						

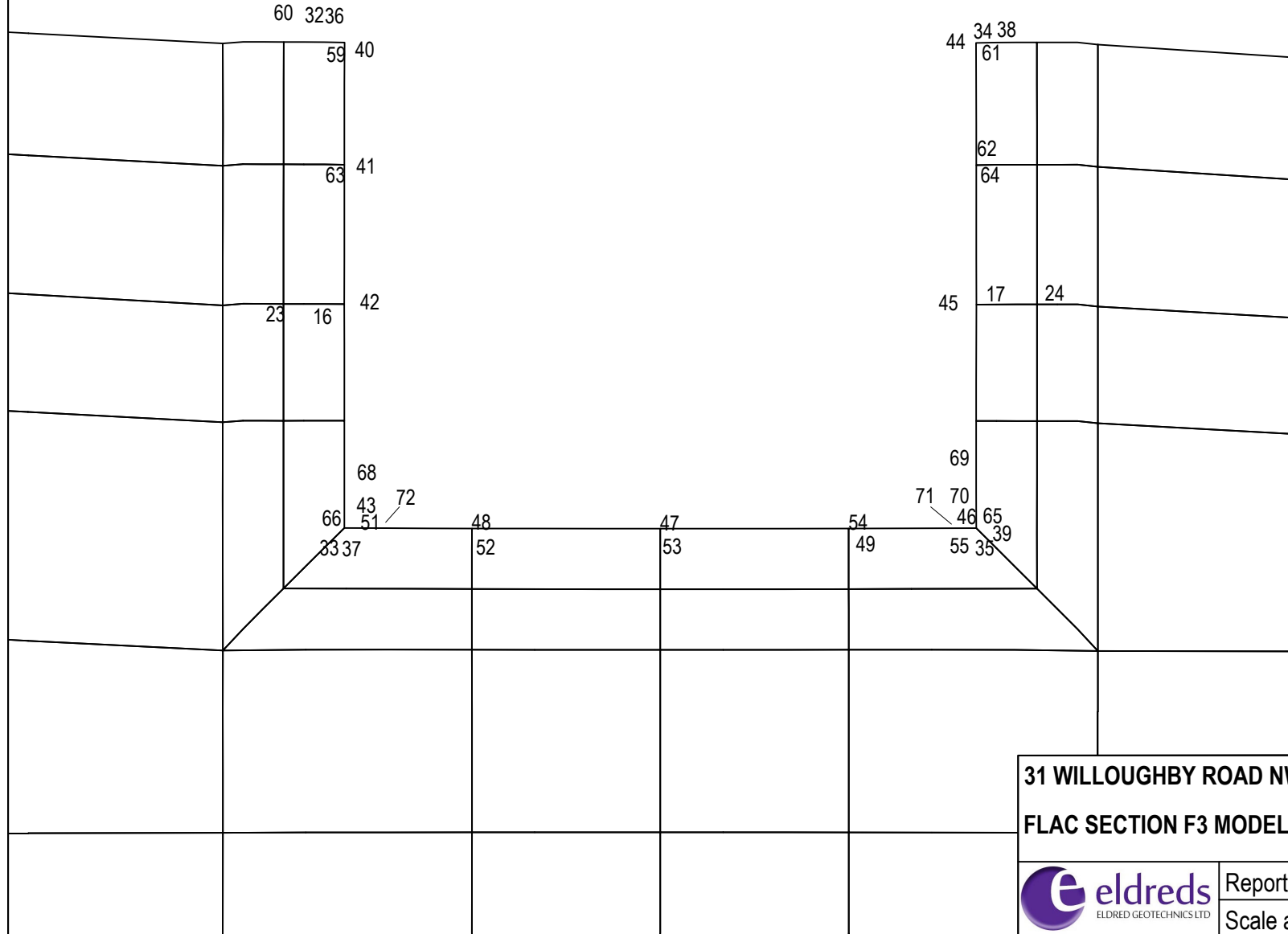
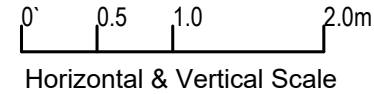
Condition/ Monitor points	MP25NX	MP26NX	MP27NX	MP28NX	MP35NX	MP36NX	MP37NX	MP39NX	MP40NY
1. Predevelopment c19 (m)	0.00E+00	0.00E+00	0.00E+00	0.00E+00					
2. Existing state (m)	6.63E-04	7.11E-04	6.34E-04	1.08E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3. Disp. change stages 1 to 2 (mm)	0.66	0.71	0.63	1.08					
4. Basement exc. & dewatered (m)	-9.35E-04	-6.05E-04	9.27E-04	1.48E-03	5.24E-04	9.73E-04	-8.44E-04	-1.57E-03	-1.68E-03
5. Disp. change stages 2 to 4 (mm)	-1.60	-1.32	0.29	0.40	0.52	0.97	-0.84	-1.57	-1.68
6. Final state (m)	-4.79E-04	1.71E-04	1.51E-03	2.15E-03	9.23E-04	1.43E-03	-5.35E-04	-1.25E-03	-1.22E-03
7. Disp. change stages 4 to 6 (mm)	0.46	0.78	0.58	0.68	0.40	0.46	0.31	0.31	0.46
8. Disp. change stages 2 to 6 (mm)	-1.14	-0.54	0.87	1.08	0.92	1.43	-0.54	-1.25	-1.22

Condition/ Monitor points	MP41NY	MP42NY	MP43NY
1. Predevelopment c19 (m)			
2. Existing state (m)	0.00E+00	0.00E+00	0.00E+00
3. Disp. change stages 1 to 2 (mm)			
4. Basement exc. & dewatered (m)	-2.70E-04	7.53E-04	8.08E-04
5. Disp. change stages 2 to 4 (mm)	-0.27	0.75	0.81
6. Final state (m)	-4.28E-04	6.06E-04	7.06E-04
7. Disp. change stages 4 to 6 (mm)	-0.16	-0.15	-0.10
8. Disp. change stages 2 to 6 (mm)	-0.43	0.61	0.71



Legend

gpp grid point pore water pressure
 xdisp grid displacement
 ydisp grid displacement
 node structural node, No., dispm't
 directions +ve towards right & top



- 16 xdisp 150 from wall
- 17 xdisp 150 from wall
- 23 ydisp 500 from wall
- 24 ydisp 500 from wall
- 32 xdisp 150 from wall
- 33 xdisp 150 from wall left & below
- 34 xdisp 150 from wall
- 35 xdisp 150 from wall right & below
- 36 ydisp 150 from wall
- 37 ydisp 150 from wall left & below
- 38 ydisp 150 from wall
- 39 ydisp 150 from wall right & below
- 40 node 8 xdisp
- 41 node 11 xdisp
- 42 node 15 xdisp
- 43 node 20 xdisp
- 44 node 25 xdisp
- 45 node 32 xdisp
- 46 node 37 xdisp
- 47 node 43 xdisp
- 48 node 23 xdisp
- 49 node 40 xdisp
- 50 node 75 ydisp
- 51 node 20 ydisp
- 52 node 23 ydisp
- 53 node 43 ydisp
- 54 node 40 ydisp
- 55 node 37 ydisp
- 56 node 42 ydisp
- 57 node 44 ydisp
- 58 node 45 ydisp
- 59 xdisp at wall
- 60 xdisp at wall
- 61 xdisp at wall
- 62 xdisp at wall
- 63 ydisp at wall
- 64 ydisp at wall
- 65 ydisp at wall
- 66 ydisp at wall
- 68 element 18 moment end 2
- 69 element 33 moment end 1
- 70 element 34 moment end 2
- 71 element 35 shear
- 72 element 19 shear

Structure nodes

31 WILLOUGHBY ROAD NW3 1RT - PROPOSED BASEMENT FLAC SECTION F3 MODEL MONITOR POINTS AT BASEMENT



Report: G1808-RP-01
 Scale as shown

Figure 22

Condition/ Monitor points	MP3PP	MP4PP	MP5PP	MP6PP	MP7PP	MP8PP	MP9PP	MP10PP	MP11PP
1. Predevelopment c19 Kpa	2.89E+02	2.86E+02	2.83E+02	2.81E+02	2.78E+02	2.75E+02	2.73E+02	2.72E+02	2.68E+02
2. Existing state Kpa	2.89E+02	2.86E+02	2.83E+02	2.81E+02	2.78E+02	2.75E+02	2.73E+02	2.72E+02	2.68E+02
3. GWL change stages 1 to 2 (mm)	0.00	-0.87	-0.89	-0.91	-0.92	-0.86	-0.75	-0.81	-0.90
4. Basement exc. & dewatered Kpa	2.89E+02	2.84E+02	2.79E+02	2.75E+02	2.71E+02	2.68E+02	2.66E+02	2.65E+02	2.64E+02
5. GWL change stages 2 to 4 (mm)	0.00	-191.74	-425.87	-576.05	-682.95	-736.70	-704.49	-638.57	-355.45
6. Final state Kpa	2.89E+02	2.86E+02	2.83E+02	2.81E+02	2.78E+02	2.75E+02	2.73E+02	2.71E+02	2.68E+02
7. GWL change stages 4 to 6 (mm)	0.00	181.85	412.08	561.53	668.10	721.14	688.40	622.67	343.29
8.GWL change stages 2 to 6 (mm)	0.00	-9.88	-13.79	-14.52	-14.85	-15.56	-16.08	-15.90	-12.16

Condition/ Monitor points	MP12PP	MP13PP
1. Predevelopment c19 Kpa	2.66E+02	2.64E+02
2. Existing state Kpa	2.66E+02	2.64E+02
3. GWL change stages 1 to 2 (mm)	-0.87	0.00
4. Basement exc. & dewatered Kpa	2.64E+02	2.64E+02
5. GWL change stages 2 to 4 (mm)	-202.07	0.00
6. Final state Kpa	2.66E+02	2.64E+02
7. GWL change stages 4 to 6 (mm)	193.72	0.00
8. GWL change stages 2 to 6 (mm)	-8.35	0.00

Condition/ Monitor points	MP14X	MP15X	MP16X	MP17X	MP18X	MP19X	MP20X	MP21Y	MP22Y
1. Predevelopment c19 (m)	5.17E-03	5.39E-03	3.70E-03	2.01E-03	-3.44E-04	9.65E-04	9.09E-04	-3.78E-02	-4.01E-02
2. Existing state (m)	5.61E-03	6.02E-03	3.30E-03	2.61E-03	-1.98E-04	1.08E-03	9.64E-04	-3.82E-02	-4.10E-02
3. Disp. change stages 1 to 2 (mm)	0.44	0.63	-0.40	0.60	0.15	0.11	0.06	-0.37	-0.87
4. Basement exc. & dewatered (m)	6.37E-03	6.31E-03	3.16E-03	2.86E-03	-1.09E-04	1.14E-03	9.95E-04	-3.92E-02	-4.17E-02
5. Disp. change stages 2 to 4 (mm)	0.76	0.29	-0.15	0.25	0.09	0.07	0.03	-0.96	-0.73
6. Final state (m)	5.81E-03	5.93E-03	3.14E-03	2.87E-03	-9.72E-05	1.15E-03	1.00E-03	-3.82E-02	-4.09E-02
7. Disp. change stages 4 to 6 (mm)	-0.56	-0.38	-0.02	0.01	0.01	0.01	0.01	0.92	0.81
8 .Disp. change stages 2 to 6 (mm)	0.20	-0.09	-0.16	0.26	0.10	0.08	0.04	-0.05	0.08
Condition/ Monitor points	MP23Y	MP24Y	MP25Y	MP26Y	MP27Y	MP28NX	MP29NX	MP30NY	MP31NY
1. Predevelopment c19 (m)	-2.25E-02	-2.28E-02	-4.05E-02	-3.52E-02	-3.77E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2. Existing state (m)	-3.22E-02	-3.60E-02	-4.05E-02	-3.53E-02	-3.78E-02	1.46E-04	1.33E-04	-3.59E-05	-1.81E-04
3. Disp. change stages 1 to 2 (mm)	-9.72	-13.18	-0.03	-0.02	-0.06	0.15	0.13	-0.04	-0.18
4. Basement exc. & dewatered (m)	-3.07E-02	-3.36E-02	-4.05E-02	-3.53E-02	-3.78E-02	2.35E-04	1.24E-04	-5.12E-05	-2.53E-04
5. Disp. change stages 2 to 4 (mm)	1.50	2.36	-0.02	-0.01	-0.03	0.09	-0.01	-0.02	-0.07
6. Final state (m)	-3.04E-02	-3.35E-02	-4.05E-02	-3.53E-02	-3.78E-02	2.47E-04	1.95E-04	-5.26E-05	-1.93E-04
7. Disp. change stages 4 to 6 (mm)	0.30	0.16	0.00	0.00	0.03	0.01	0.07	0.00	0.06
8 .Disp. change stages 2 to 6 (mm)	1.80	2.51	-0.02	-0.01	0.00	0.10	0.06	-0.02	-0.01

Condition/ Monitor points	MP32X	MP33X	MP34X	MP35X	MP36Y	MP37Y	MP38Y	MP39Y	MN40NX
1. Predevelopment c19 (m)									
2. Existing state (m)	5.30E-03	3.65E-03	9.93E-04	1.55E-03	-2.91E-02	-2.41E-02	-3.23E-02	-2.52E-02	0.00E+00
3. Disp. change stages 1 to 2 (mm)									
4. Basement exc. & dewatered (m)	5.40E-03	3.73E-03	8.78E-04	1.52E-03	-2.32E-02	-2.40E-02	-2.48E-02	-2.50E-02	7.44E-04
5. Disp. change stages 2 to 4 (mm)	0.10	0.08	-0.12	-0.03	5.97	0.06	7.49	0.17	0.74
6. Final state (m)	5.42E-03	3.63E-03	8.84E-04	1.64E-03	-2.28E-02	-2.39E-02	-2.46E-02	-2.49E-02	7.37E-04
7. Disp. change stages 4 to 6 (mm)	0.01	-0.10	0.01	0.12	0.34	0.11	0.19	0.11	-0.01
8. Disp. change stages 2 to 6 (mm)	0.12	-0.01	-0.11	0.10	6.31	0.18	7.68	0.27	0.74
Condition/ Monitor points	MP41NX	MP42NX	MP43NX	MP44NX	MP45NX	MP46NX	MP47NX	MP48NX	MP49NX
1. Predevelopment c19 (m)									
2. Existing state (m)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3. Disp. change stages 1 to 2 (mm)									
4. Basement exc. & dewatered (m)	4.65E-04	1.05E-04	2.93E-05	8.89E-04	5.41E-04	6.72E-06	1.05E-05	2.84E-05	8.51E-06
5. Disp. change stages 2 to 4 (mm)	0.47	0.11	0.03	0.89	0.54	0.01	0.01	0.03	0.01
6. Final state (m)	4.64E-04	1.11E-04	2.70E-05	8.70E-04	5.29E-04	1.67E-05	1.47E-05	2.61E-05	1.86E-05
7. Disp. change stages 4 to 6 (mm)	0.00	0.01	0.00	-0.02	-0.01	0.01	0.00	0.00	0.01
8. Disp. change stages 2 to 6 (mm)	0.46	0.11	0.03	0.87	0.53	0.02	0.01	0.03	0.02

Condition/ Monitor points	MP50Y	MP51Y	MP52Y	MP53Y	MP54Y	MP55Y	MP56Y	MP57Y	MP58Y
1. Predevelopment c19 (m)									
2. Existing state (m)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3. Disp. change stages 1 to 2 (mm)									
4. Basement exc. & dewatered (m)	-1.15E-03	-2.29E-04	-4.00E-05	-7.40E-06	-6.35E-07	-5.68E-04	-1.09E-05	1.73E-06	3.69E-05
5. Disp. change stages 2 to 4 (mm)	-1.15	-0.23	-0.04	-0.01	0.00	-0.57	-0.01	0.00	0.04
6. Final state (m)	-1.15E-03	-2.28E-04	-6.02E-05	-7.97E-05	-2.78E-05	-5.64E-04	-7.23E-05	-8.06E-05	-4.52E-05
7. Disp. change stages 4 to 6 (mm)	0.00	0.00	-0.02	-0.07	-0.03	0.00	-0.06	-0.08	-0.08
8. Disp. change stages 2 to 6 (mm)	-1.15	-0.23	-0.06	-0.08	-0.03	-0.56	-0.07	-0.08	-0.05
Condition/ Monitor points	MP59X	MP60X	MP61X	MP62X	MP63Y	MP64Y	MP65Y	MP66Y	MP67M1
1. Predevelopment c19 (m)									
2. Existing state (m)	6.74E-03	4.28E-03	-4.55E-04	1.90E-03	-3.62E-02	-3.95E-02	-2.61E-02	-2.50E-02	0.00E+00
3. Disp. change stages 1 to 2 (mm)									
4. Basement exc. & dewatered (m)	6.75E-03	4.30E-03	-4.31E-04	1.92E-03	-3.62E-02	-3.95E-02	-2.61E-02	-2.50E-02	3.29E+01
5. Disp. change stages 2 to 4 (mm)	0.01	0.01	0.02	0.02	0.00	0.00	0.00	0.00	32.86
6. Final state (m)	6.75E-03	4.30E-03	-4.27E-04	1.92E-03	-3.62E-02	-3.95E-02	-2.61E-02	-2.50E-02	3.11E+01
7. Disp. change stages 4 to 6 (mm)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1.71
8. Disp. change stages 2 to 6 (mm)	0.02	0.02	0.03	0.03	0.00	0.00	0.00	0.00	31.14

Condition/ Monitor points	MP68M2	MP69M1	MP70M2	MP71S	MP72S
1. Predevelopment c19 (m)					
2. Existing state (m)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3. Disp. change stages 1 to 2 (mm)					
4. Basement exc. & dewatered (m)	3.65E+01	-3.3E+01	-3.6E+01	1.08E+02	-6.44E+01
5. Disp. change stages 2 to 4 (mm)	36.46	-32.86	-36.38	107.58	-64.38
6. Final state (m)	3.46E+01	-3.1E+01	-3.4E+01	1.08E+02	-6.45E+01
7. Disp. change stages 4 to 6 (mm)	-1.87	1.71	1.90	0.35	-0.08
8 .Disp. change stages 2 to 6 (mm)	34.59	-31.14	-34.48	107.93	-64.46

Condition/ Monitor points
1. Predevelopment c19 (m)
2. Existing state (m)
3. Disp. change stages 1 to 2 (mm)
4. Basement exc. & dewatered (m)
5. Disp. change stages 2 to 4 (mm)
6. Final state (m)
7. Disp. change stages 4 to 6 (mm)
8 .Disp. change stages 2 to 6 (mm)

Condition/ Monitor points	MP3pp	MP4pp	MP5pp	MP6pp	MP7pp	MP8pp	MP9pp	MP10pp	MP11pp
1. Predevelopment c19 Kpa	2.89E+02	2.85E+02	2.84E+02	2.83E+02	2.83E+02	2.81E+02	2.80E+02	2.79E+02	2.78E+02
2. Existing state Kpa	2.89E+02	2.85E+02	2.84E+02	2.83E+02	2.82E+02	2.81E+02	2.80E+02	2.79E+02	2.78E+02
3. GWL change stages 1 to 2 (mm)	0.00	-20.70	-23.10	-23.50	-23.50	-23.00	-20.70	-19.00	-14.20
4. Basement exc. & dewatered Kpa	2.89E+02	2.79E+02	2.75E+02	2.73E+02	2.72E+02	2.71E+02	2.71E+02	2.72E+02	2.74E+02
5. GWL change stages 2 to 4 (mm)	0.00	-599.40	-854.80	-956.70	-1000.70	-1025.30	-854.60	-722.20	-424.10
6. Final state Kpa	2.89E+02	2.85E+02	2.84E+02	2.83E+02	2.82E+02	2.81E+02	2.80E+02	2.79E+02	2.78E+02
7. GWL change stages 4 to 6 (mm)	0.00	601.90	857.20	958.30	1001.60	1024.00	851.00	718.40	421.70
8. GWL change stages 2 to 6 (mm)	0.00	2.50	2.40	1.60	0.90	-1.30	-3.60	-3.80	-2.40
Condition/ Monitor points	MP12pp								
1. Predevelopment c19 Kpa	2.77E+02								
2. Existing state Kpa	2.77E+02								
3. GWL change stages 1 to 2 (mm)	0.00								
4. Basement exc. & dewatered Kpa	2.77E+02								
5. GWL change stages 2 to 4 (mm)	0.00								
6. Final state Kpa	2.77E+02								
7. GWL change stages 4 to 6 (mm)	0.00								
8. GWL change stages 2 to 6 (mm)	0.00								

Condition/ Monitor points	MP13 X di	MP14 X di	MP15Ydis	MP16 Y di	MP17Y di	MP18Y disp
1. Predevelopment c19 (m)	4.02E-04	8.63E-04	-4.62E-02	-4.31E-02	-4.18E-02	-4.08E-02
2. Existing state (m)	6.28E-04	1.15E-03	-4.66E-02	-4.41E-02	-4.23E-02	-4.15E-02
3. Disp. change stages 1 to 2 (mm)	0.23	0.29	-0.46	-0.94	-0.46	-0.74
4. Basement exc. & dewatered (m)	7.52E-04	1.31E-03	-4.69E-02	-4.46E-02	-4.25E-02	-4.08E-02
5. Disp. change stages 2 to 4 (mm)	0.12	0.16	-0.25	-0.51	-0.25	0.74
6. Final state (m)	8.53E-04	1.44E-03	-4.71E-02	-4.50E-02	-4.28E-02	-4.22E-02
7. Disp. change stages 4 to 6 (mm)	0.10	0.13	-0.21	-0.42	-0.21	-1.49
8 .Disp. change stages 2 to 6 (mm)	0.22	0.29	-0.46	-0.93	-0.46	-0.75

Condition/ Monitor points

1. Predevelopment c19 (m)
2. Existing state (m)
3. Disp. change stages 1 to 2 (mm)
4. Basement exc. & dewatered (m)
5. Disp. change stages 2 to 4 (mm)
6. Final state (m)
7. Disp. change stages 4 to 6 (mm)
- 8 .Disp. change stages 2 to 6 (mm)

Section	Property(s)	Element	Strain type	Location	Value mm	Eff. length	% disp.	Damage Cat'y
F1	Willow Cotts.	Rear wall-Bound'y	lateral	Notional excn face	-5	11000	-0.045	Cat 0
			lateral	MP15X	0	7000	<u>0.000</u>	
			Net total				<u>-0.045</u>	
			angular	MP22Ny	-0.05	7000	-0.001	
F2	Willow Cotts	Rear wall-Bound'y	lateral	Notional excn face	5	12000	0.042	Cat 0
			lateral	MP17X	0.39	7000	<u>0.006</u>	
			Net total				<u>0.028</u>	
			angular	MP23Y	0.76	5500	0.014	
				MP24Y	0.58	5500	<u>0.011</u>	
			Net total				<u>-0.020</u>	
	No.29	Width	lateral	Notional excn face	5	15000	0.033	Cat 0
			lateral	MP35NX	0.92	6400	0.014	
				MP14X	0.98	6400	<u>0.015</u>	
			Net total				<u>0.034</u>	
			angular	MPN41Y	-0.43			
F2	No.27	Width		MP20Y	0.58			Cat 0-1
				MP19Y	<u>0.07</u>			
			Net total (hog)		0.33	6400	<u>0.005</u>	
			lateral	Notional excn face	5	15000	0.033	
			lateral	MP13X	0.53	8800	0.006	
	No.27	Width		MP14X	0.98	8800	<u>0.011</u>	Cat 0-1
							<u>0.050</u>	
			ang. + No.29	MPN41Y	-0.43			
				MP19Y	0.07			
				MP18Y	0.22			
			Net total (hog)		0.175	15000	0.001	

Section	Property(s)	Element	Strain type	Location	Value mm	Eff. length	% disp.	Damage Cat'y
F3	No.33	Width	lateral	Notional excn face	-5	7900	-0.063	Cat 1
			lateral	MP44NX	0.87	7900	<u>0.011</u>	
			Net total	MP15X	0.1	7900	<u>-0.056</u>	
			angular	MP55NY	-0.56	7900	-0.007	
				MP25Y	-0.02	7900	<u>0.000</u>	
			Net total				<u>-0.007</u>	
	No.29	Width	lateral	Notional excn face	5	15000	0.033	Cat 0
			lateral	MP40NX	0.74	6400	0.012	
				MP14X	-0.09	6400	<u>-0.001</u>	
			Net total				<u>0.020</u>	
			angular	MP51NY	-0.23	6400	-0.004	
				MP22Y	0.08	6400	0.001	
			Net total				<u>0.005</u>	
	No.27	Width	lateral	Notional excn face	5	15000	0.033	Cat 0-1
			lateral	MP14X	0.2	8800	0.002	
				MP15X	-0.09	8800	<u>-0.001</u>	
							<u>0.035</u>	
			ang. + No.29	MPN51Y	-0.43			
				MP22Y	0.08			
All	Willow Cotts rear wall	F1 to F3		MP21Y	-0.05			Cat 0
			Net total (sag)		0.32	15000	0.002	
			angular	F1 MP22Y	-0.05			
				F2 MP23Y	0.76			
				F3 MP26Y	<u>-0.01</u>			
			Net total (hog)		<u>0.79</u>	17400	0.005	