The Coutyard House
Parfitt Close
Hampstead,
London,
NW3

DESIGN CONSTRUCTION STATEMENT

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APPENDICES

1.0 INTRODUCTION

1.1. This Design Construction Statement has been prepared by Taylor Whalley Spyra as requested by Canaway Fleming Architects as part of the current planning approval and the additional area of basement on the site.

1.2. This report considers the structural stability of the proposed development and the limited effect on the adjoining properties.

1.3. The proposal is to construct a 2 store single residential property including a basement.

1.4. A previous report by Barton Engineers has been undertaken for the planning application which outlined the general works. We reviewed this report and under took the Design Construction Statement with further ground investigation and amended the scheme in line with the latest Architects drawings and the installation of temporary sheet piles to the basement suitable propped to allow for an open excavation form of construction. We have updated this report to include the additional basement area

1.5. The information contained within this Construction Design Statement has been reviewed against Camdens Planning Guidance - Basements and Lightwells (CPG4) and Camden Development Policy DP27 and have indicated the site location on the Camden Geological Hydrogeolocical & Hydrological Study Extracts Figures 11, 12 ,14, 15 & 16 which confirm the site is outside the influence of these areas (refer to Appendix F).

2.0 EXISTING SITE

2.1. The site is at the end of Parfitt Close and adjacent to no.2 Parfitt Close and located at the end the large rear garden to Wildwood Lodge which is on the corner of North End and the entrance to Parfitt Close.

2.2. The site is approximately orientated North to South, existing level at the front is 107.600 and at the rear 108.200 (refer to Appendix A & H).

3.0 PROPOSED WORKS

3.1. The works involve the construction of a single RC basement with RC walls and RC ground floor slab with a steel framed structure over built off the ground floor slab to form the ground floor structure and roof (refer to Appendix B).

3.2. The level of the main basement area is 104.040 with the ground floor level of 107.660.

3.3. Sheet piling is to be installed around the perimeter of the proposed basement to provide the temporary support to retain the surrounding ground. This will allow for the open excavation construction of the basement. The sheet piling will be suitable propped and braced at a level of 107.00 from inside around the perimeter by the sheet pile contractor and at second level by main concrete contractor (refer to Appendix D).

3.4. The new RC basement raft with the RC retaining walls and RC ground floor slab over will form a solid RC box structure (refer to Appendix C).

3.5. The new basement structure when complete is designed to form the permanent support works. Once the basement structure is completed then the steel framed structure over will be constructed.

3.6. The main contractor has undertaken a construction & Traffic Management Plan (refer to Appendix I).

4.0 SOIL INVESTIGATION

4.1. In 2012 a full soil investigation was undertaken by MRH Geotechnical comprising 3 boreholes between 13 & 15m deep which confirms the ground conditions as Bagshot Beds approximately 4m deep overlaying Claygate Beds.

4.2. Monitoring of the groundwater has been undertaken with the water table level being at a level of 105.540 (refer to Appendix E).

4.3. In 2008 soil investigation has been undertaken on site by Ground Engineering comprising 3 Boreholes and 4 deep trial holes The perched ground water level was recorded at 105.560. Also a full ground investigation with 3 boreholes at the nearby site at No. 4 North End also confirms the surrounding ground conditions and ground water conditions.

4.4. The soil investigation ground water levels indicate that the main basement area is below the ground water level by 1500mm. During construction of the basement this will require temporary localised pumping and monitoring of the water with a couple of shallow well points positioned within the basement area. This will not affect the adjoining properties as dewater will be controlled and restricted local to the zone of the basement.

5.0 ADJACENT PROPERTIES

5.1. No. 2 Parfitt Close is a rectangular building approximately 7.5m x 21m to the north of the site and is set back approximately 3m from the closest point of the proposed basement with a wide passage way between. The house is a single residential property over 3 levels consisting of a 2 storey masonry construction at ground floor & first floor, with pitched timber roof structure at second floor and was constructed in the 1980's. The Foundation have been confirmed as Piled on RC Ground beams. Section A_A on drawing 8396_SK03 shows the permanent and temporary works (refer to Appendix D).

5.2. No.1 Parfitt Close is located to the north of the site and is of the same construction as that of no.2 and is set back 9m away from the basement at its closest point. It is positioned to the NW of no. 2 Parfitt Close and set back a further 7m (refer to Appendix A).

5.3. The Wildwood Cottage garden is adjacent to the East boundary with an existing boundary timber fence between. The Cottage is set back a considerable distance from the basement. Section B_B on drawing 8396_SK04 shows the permanent and temporary works (refer to Appendix D).

5.4. London Underground has a section of the Northern Line Tunnel running under the east of the site with a crown level of 73.800 above Ordnance Datum (refer to Appendix G).

5.5. This puts the tunnel crown 30m below the lowest point of the basement which is of sufficient depth not be affected by the proposed development.

5.6. All properties that are adjacent to the proposed developments and fall within The Party Wall Act 1996 will have condition surveys undertake.

5.7. The design of the basement and temporary support works is to be undertaken so as to minimise any structural disturbance to the adjoining properties, but as the nearest building foundations area reasonable deep and the 45 deg zone of influence is below the basement level and not directly adjacent to the proposed basement works at approximately 3m away, it is envisage that any structural disturbance to them will be minimal.

5.8. A final detailed design of calculations & layout drawings for the sheet pile and temporary propping and walling beams has been undertaken by Berryrange using CADS Piled Wall Suite Version 5.19. Berryrange are the specialist sheet piling sub-contractor for the temporary works construction stage. (refer to Appendix D).

5.9. Prior to this an initial analysis of the basement retaining walls and required temporary works scheme has been undertaken using WALLAP version 5.4.

6.0 ASSESSMENT OF THE EFFECTS OF MOVEMENT ON ADJACENT PROPERTIES

6.1. There are three possible causes of ground movement; the installation of the wall sheet piles, the excavation of the basement and the adjustment of the ground under the net load changes. The only structure outside the site which may be affected is no. 2 Parfitt Close which is solid 2 storey brick building with piled foundations and a with framed roof structure over.

6.2. The proposed design and analysis of the temporary sheet pile wall shows a section through the proposed basement adjacent the next door building. The basement is constructed just 600mm from the face of the existing free standing boundary wall, with the external building wall to no. 2 Parfitt Close a further 2.4m away. The area between is the long entrance passage for no. 2.

6.3. The installation of the sheet piles will result in some ground movement. CIRIA C580, which summarises empirical evidence on the effects of installing walls in London Clay, suggest that settlements are likely to fall within an envelop defined by 0.04% of the wall depth next to the wall, diminishing to zero at a distance of around 1 to 1.5 times the wall depth from the back of the wall, ie in this case 3 to 4 mm ext to the wall, decreasing to zero at 9 to 14 metres.

6.4. In our experience it is likely that a limited movement will take place with sheet piles as they displaced the ground with upward movement, if the wall is carefully constructed the movement at the wall to no.2 Parfitt Close will not exceed 2 mm.

6.5. The process of excavation will result in the forward translation of the sheet pile retaining wall and rise of ground inside the basement as the overburden is removed. Provided that the wall is carefully propped the movement affecting the property next door can be limited to acceptable amounts. Based on the empirical evidence presented in the CIRIA C580 document, a 3.6 metre dig would result in a forward movement of the wall at the base of the excavation of around 0. 2% of the excavation depth, i.e. around 7 mm, and we therefore asked the temporary sheet pile contractor to limit this to 5mm maximum. The ground movement might extend to around 3 to 4 times the excavation depth from the back of the wall. The empirical data from the CIRIA document shows that the settlement behind the wall is unlikely to exceed 0.08% of the depth, i.e. around 3 mm. The data also suggests that lateral movements lie within an envelop defined by 0.15% of the excavation depth at the back of the wall (i.e. 5.5 mm) and zero at a distance of around 4 times the excavation depth. Lateral movement of the foundation of no. 2 Parfitt Close can be constrained by installing a stiff prop at a high level and low level before significant excavation has taken place.

6.6. The above estimates are presented and checked from the sheet pile subcontractor, using a wall analysis program which also enables the structural design of the wall (refer to Appendix D).

6.7. The possible effect in terms of damage to the structure of the adjacent properties can be estimated based on the above values assuming that any differential settlement under the building is largely likely to result in a small forward rotation of the structure towards the basement as a result of a differential settlement of around 5 mm across the structure (taking account of the effect of installing the piles and the excavation). The attached table 1.1 gives ranges of lateral strains associated with different degrees of damage. If it

is assumed that the structure moves with the ground, and assuming that the structure is around 7.5 metres wide, the estimated horizontal strain would, at most be estimated from 4 mm differential lateral movement over 7.5 metres, i.e. a lateral strain of just over 0.05%. This would put the damage in the 'very slight' category.

Category of damage	Description of typical damage	Approximate crack width (mm)	Limiting tensile strain ε_{lim} (per cent)
0 Negligible	Hairline cracks of less than about 0.1 mm are classed as negligible	<0.1	0.0-0.05
1 Very slight	Fine cracks that can easily be treated during normal decoration. Perhaps isolated slight fracture in building. Cracks in external brickwork visible on inspection	<1	0.05-0.075
2 Slight	Cracks easily filled. Redecoration probably required. Several slight fractures showing inside of building. Cracks are visible externally and some repointing may be required externally to ensure weathertightness. Doors and windows may stick slightly.	<5	0.075-0.15
3 Moderate	The cracks require some opening up and can be patched by a mason. Recurrent cracks can be masked by suitable lining. Repointing of external brickwork and possibly a small amount of brickwork to be replaced. Doors and windows sticking. Service pipes may fracture. Weathertightness often impaired.	5-15 or a number of cracks > 3	0.15-0.3
4 Severe	Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Windows and frames distorted, floor sloping noticeably. Walls leaning or bulging noticeably, some loss of bearing in beams. Service pipes disrupted.	15-25 but also depends on number of cracks	>0.3
5 Very severe	This requires a major repair involving partial or complete rebuilding. Beams lose bearings, walls lean badly and require shoring. Windows broken with distortion, Danger of instability.	Usually > 25 but depends on number of cracks	

Damage Category Chart (CIRIA C580)

Table 1.1

6.8. In the long term the claygate within which the basement is constructed will adjust to the changes that have taken place as a result of the net load changes and water pressure will build up on the underside of the slab. In this case, there will be a net load reduction and there will be a tendency for the structure to rise a small amount. This re-adjustment may result in small upward movement of the surrounding ground, but this is unlikely to result in any significant effect on the adjacent structure.

7.0 BASEMENT CONSTRUCTION SEQUENCE OF WORKS

7.1. Proposed Sequence of Works.

- Install within the site area and surrounding area a number of fixed monitoring nodes to monitor possible movement during the works. (refer to drawing 8396_SK05)
- The existing garden top soil is to be stripped off and any garden walls removed and foundations are to be grubbed out. Cut roots as approved by arboricultural specialist and detailed in their report)
- The sheet piling is to be installed with a Silent Piler similar to a Giken Rig which presses the sheet piles into the ground using the resistance of the adjoining installed sheet piles.
- The ground is to be locally excavated 1.5m around the steel wailers and props at high level to allow their installation.
- The ground at the front of the site to No 2 Perfitt close and Wildwood Cottage Garden is to be retained to allow a ground retaining berm to be formed to retain the sheet piling
- The ground to the rear is then to be excavated to formation level.
- The drainage pipes and granular drainage channels are to be installed.
- The rear section of basement slab build-up is to be installed and then the RC basement slab to this area cast with 150mm high kickers for all the basement walls and internal columns.
- With the rear section of RC basement slab cast install the diagonal rakers to the waling beams and sheet piling at the front of the site and fixed to the rear section of RC basement slab
- With the rakers in and the slab having reached the required design strength remove the ground retaining berm.
- The ground to the front can now be excavated to formation level.
- The drainage pipes and granular drainage channels are to be installed.
- The front section of basement slab build-up is to be installed and then the RC basement slab to this area cast with 150mm high kickers for all the basement walls and internal columns.
- Install and cast all internal RC walls and columns to underside of ground floor slab.
- The basement RC walls are then to be cast to 600mm below the underside of the high level walling beams.
- Once the basement RC walls have gained the required design strength, install diagonal props fixed to the RC wall & RC basement slab and then remove the high level sheet piling walling beams and shoring.
- The RC ground floor slab and RC wall down stands can then be cast.
- Once the RC ground floor slab has gained the required design strength the additional diagonal props can be removed.
- Install the main steel frame fixed to the RC ground floor slab
- During the construction period the sheet piling and surrounding ground will be monitored at regular intervals to confirm the construction tolerances stays within the agreed design parameters.
- The RC basement structure now forms a solid box construction to retain the surround ground and structure over
- Continue with construction of remainder of the structure over.

8.0 CONCLUSIONS

8.1. The selection of the main contractor and sheet piling sub-contractor and designer of temporary works has been based on having previous experience constructing similar projects and a requirement to provide programmes and method statements detailing the final sequence of construction prior to carrying out works on site and is registered with The Considerate Constructers Scheme.

8.2. Site personnel have been selected based on experienced of similar projects. Selection of plant and machinery has been based on minimising noise and vibration.

8.3. Detailed analysis of the various aspects of construction has been reviewed to demonstrate that the level of sequencing will enable the basement to be constructed safely and with ground movements kept within acceptable tolerances.

8.4. The stability of the adjacent Parfitt properties and Wildwood House garden should not be affected by the basement works with the influence of adjoining building foundation outside the zone of the basement with depths as indicated by the 45° guide line on drawing 8396_SK03 & 8396_SK04 showing the retained garden.

8.5. Within the calculations an allowance has been allowed for surcharge from adjoining building/road and the detailed design calculations confirm that the selected sizes of sheet piles and walling & propping will keep ground movement within the specified design limits (refer to Appendix D).

8.6. The temporary dewater of the basement area is being designed and monitored to reduce the water level locally to the area of works and will only be needed for a short period of time. Water levels are being monitored on a weekly base.

8.7. The construction of the basement will incorporate perforated ground water pipes within a granular drainage channel installed under the basement slab and to the sides this will allow the existing ground water regime to be maintained This will stop ground water building up behind the basement walls and also stop any change in ground water flow effecting adjoining properties (refer to Appendix D).

8.8. The above ground surface water drainage design will incorporate SUDS and a number of soakaways within the rear garden.

8.9. The project as currently being undertaken on site is being monitored as further detailed design is undertaken and as works progress on site and to keep in terms of the general construction process, structural stability the long term integrity of adjacent buildings and the existing property and surrounding infrastructure.

Appendix A

TWS - 8396_SK01 – Site Location Plan Indicating Adjoining Properties

IMAGE 01

WILDWOOD

IMAGE 02

No. 15

IMAGE 03

North End

IMAGE 04

PUBLIC GREEN

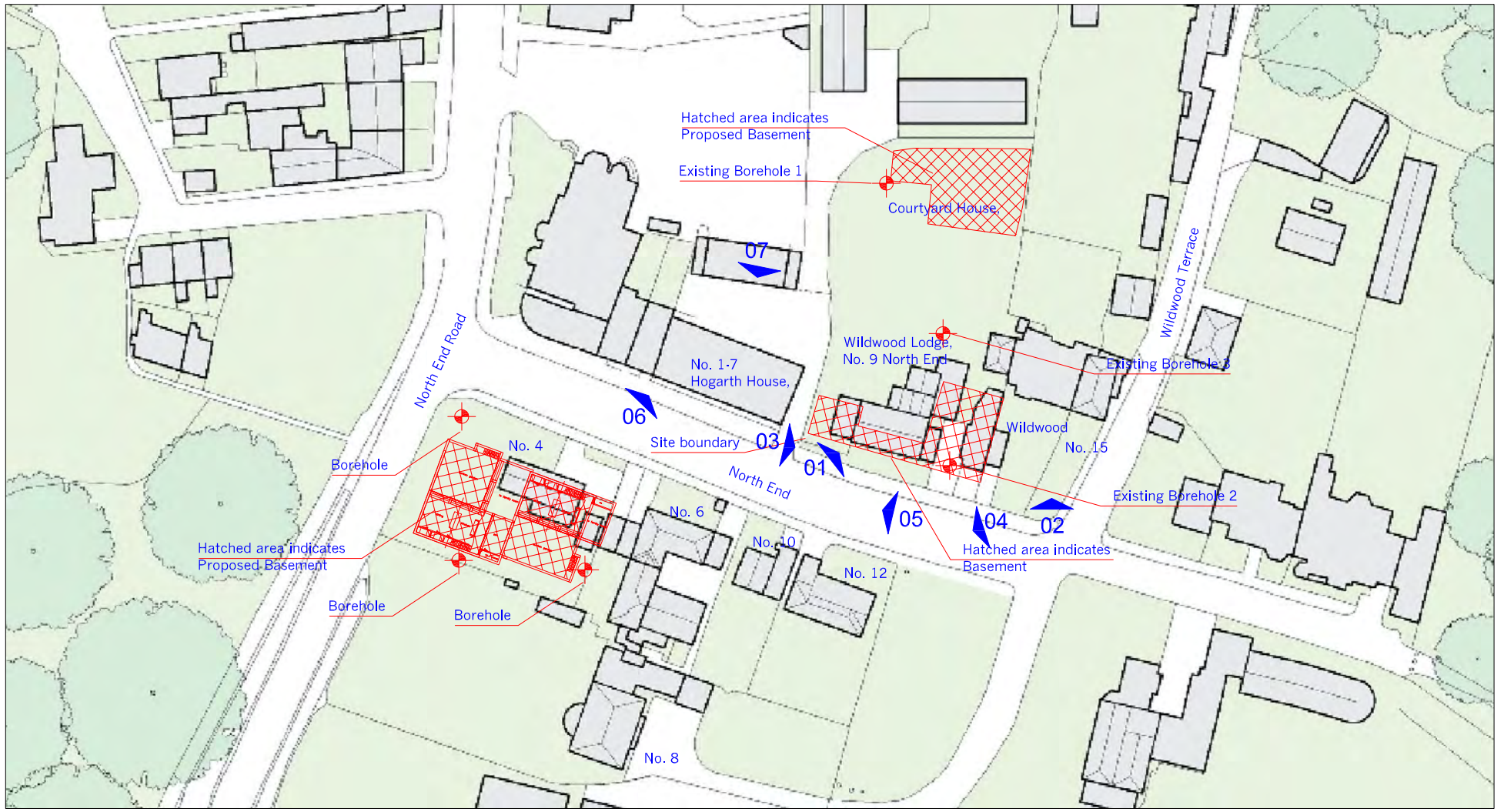

IMAGE 05

No. 12 No. 10 No. 6

IMAGE 06

1 -7 HOGARTH HOUSE

IMAGE 07

HOGARTH HOUSE
GARAGES

taylor whalley spyra
tws
consulting civil and structural engineers
3 Dufferin Avenue, Barbican, LONDON EC1Y 8PQ
Tel (020) 7253 2626 Fax (020) 7253 2767
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Contract

WILDWOOD LODGE,
9 NORTH END
LONDON NW3 7HH,

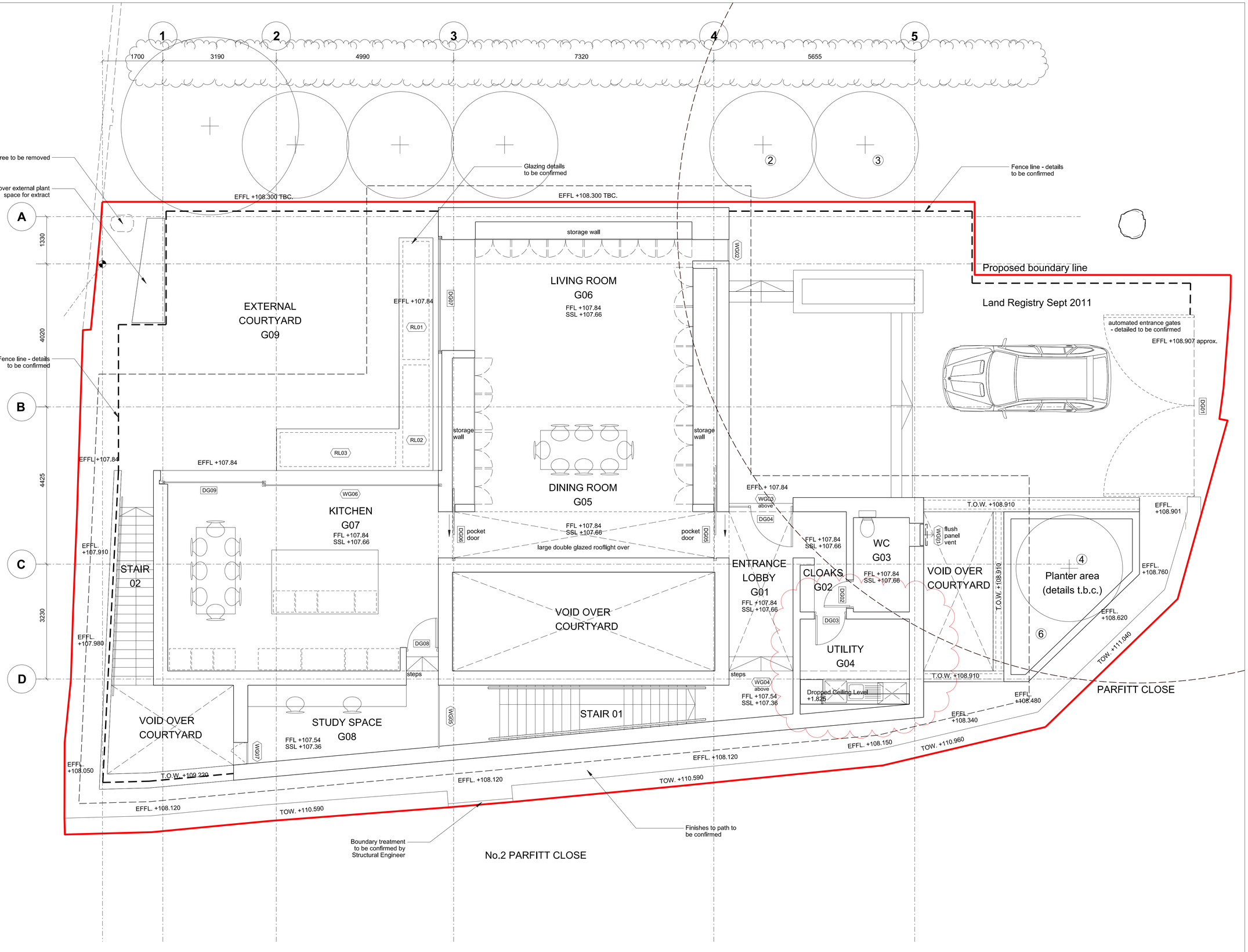
Title

SITE LOCATION PLAN ALSO
INDICATING ADJACENT PROPERTIES

Scale	Date	Drawn
NTS	24.03.11	GB
Job No.	Drawing No.	Rev.
8250	SK01	A

Appendix B

Architects Ground Floor Layout & Long Section



01 GROUND FLOOR PLAN
E088 PROPOSED

NOT FOR CONSTRUCTION

0 0.5 1
metres

NOTE: INTERNAL LAYOUTS ARE INDICATIVE ONLY AND ARE SUBJECT TO DETAILED DESIGN

N

Key

FFL :	Finished Floor Level
EFFL :	External Finished Floor Level
SSL :	Structural Slab Level
TOW :	Top of Wall
DB09	Door reference
WB05	Window reference
1	Acer Pseudoplatanus 'Brilliantissimum'
2	Betula ermanii
3	Betula Papyrifera
4	Cornus Kousa 'Chinesis'
5	Hedge: Laurus Nobilis
6	Shrub Planted Area: Mix of Hypericum Forrest, Escallonia Laevis and Potentilla Fruticosa

Revisions	D	06.09.2012	Utility room relocated to ground floor
	C	03.09.2012	Revised proposed boundary line
	B	30.08.2012	Land registry line added
	A	28.08.2012	Issued for client sign off

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Client
Mr Mickey Nurtman

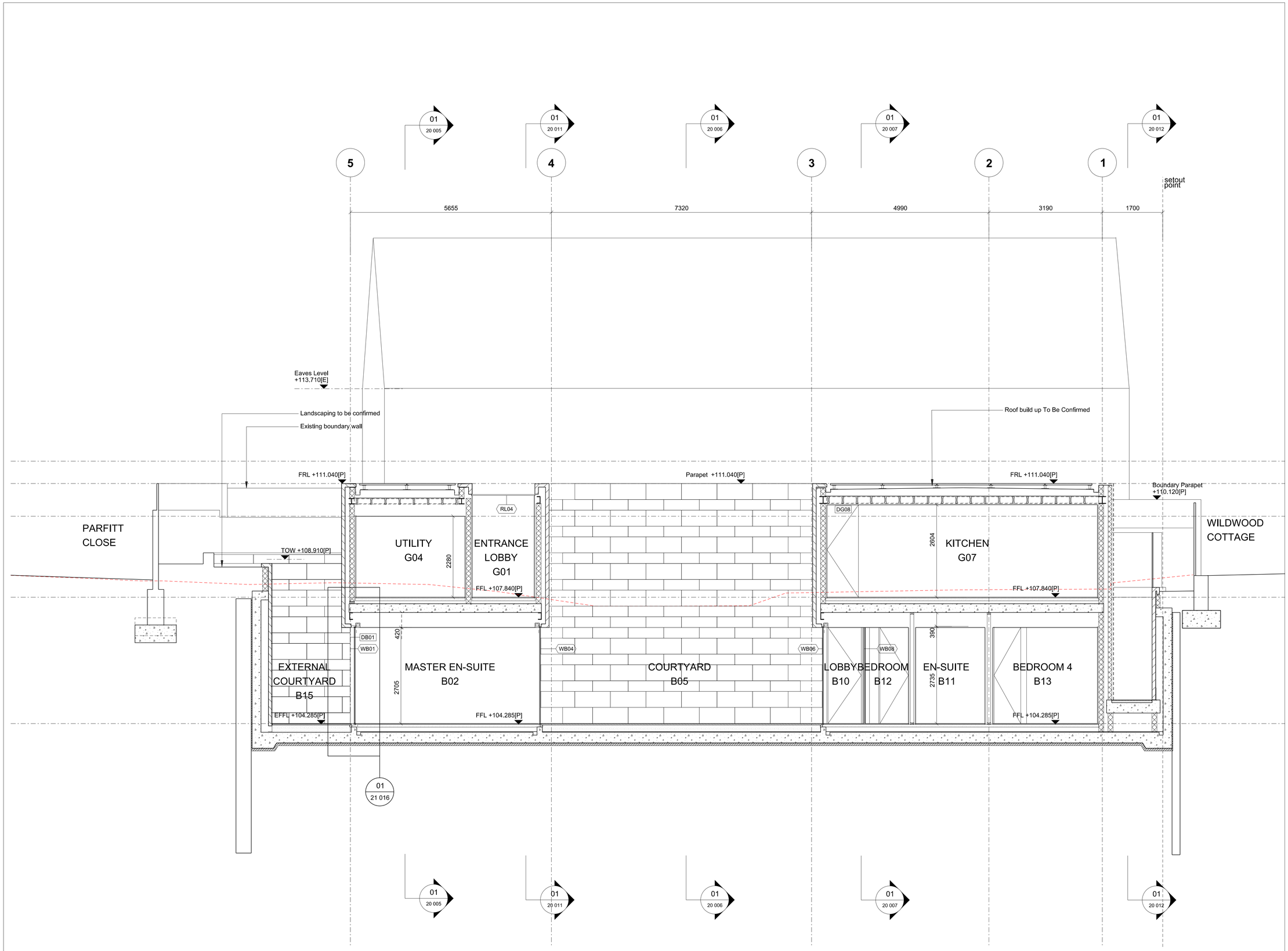
Project
The Courtyard House

Drawing Title
Proposed Ground Floor Plan for client sign off

Date
August 2012

Scale
1:50@A1

Project	Origin	Type	Level/View	Package Dwg No.	Revision
P12-101	A	P	00	E-088	D
Status: SKETCH				Drawn: CTs	Checked: -



01 20 009 SECTION EE
PROPOSED

NOT FOR CONSTRUCTION

0 0.5 1
metres

Notes

Do not scale from this drawing. All dimensions should be checked on site for accuracy.

Structural Work
All indications as to structure are for graphic purposes only and must not be relied upon for accuracy in terms of size, detail or position. All structure and temporary propping to be confirmed by a suitably qualified structural engineer before beginning works.

M&E Work
All indications as to M&E items are for graphic purposes only and must not be relied upon for accuracy in terms of size, detail or position. All services to service engineers detail

Survey Information
Topographical survey was produced by CAD survey. All levels are in meters and site datum corresponds with OS datum.

Landscaping
Interfaces between hard and soft landscaping to be confirmed in landscaping tender package.

FINAL STRUCTURAL SLAB LEVEL SUBJECT TO INSULATION THICKNESS TO MEET THE STATUTORY REQUIREMENT.

ALL STRUCTURAL UPSTANDS TO STRUCTURAL ENGINEER'S DETAIL. STRUCTURAL ENGINEER TO CONFIRM BELOW GROUND DRAINAGE LAYOUT TO INCORPORATE CAVITY DRAINAGE SYSTEM.

INTERNAL FIT OUT AND ABOVE GROUND CONSTRUCTION TO BE CONFIRMED

Key

FFL :	Finished Floor Level
EFFL :	External Finished Floor Level
CH :	Ceiling Height above finished floor level
SSL :	Structural Slab Level
DB09	Door reference
WB05	Window reference
	Existing Ground line
	External Stone Cladding To be confirmed
	Blockwork
	Concrete
	Screed
	Area in abeyance

Safety, Health and Environment Information
Notes below are additional to hazards/risks normally associated with this type of work:
Construction - Unknown condition of existing footings of boundary walls. - Conflict with buried uncharted services
Operations - Safe storage and disposal of waste materials on shared site - Conflict between construction vehicles and residents vehicle access to Hogarth Court and Parfitt Close
Maintenance - No significant/unusal residual hazards identified at this stage
Dismantling/Demolition - No significant/unusal residual hazards identified at this stage
These notes are based on the use of experienced and competent contractors carrying out the work using an approved safe method of working.

Revisions	B	04.10.2012	Drawing updated to reflect basement layout agreed with client 06.09.2012
	A	27.07.2012	Issued for ground works tender

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Client
TBC

Project
The Courtyard House

Drawing Title
Section EE (Courtyard)

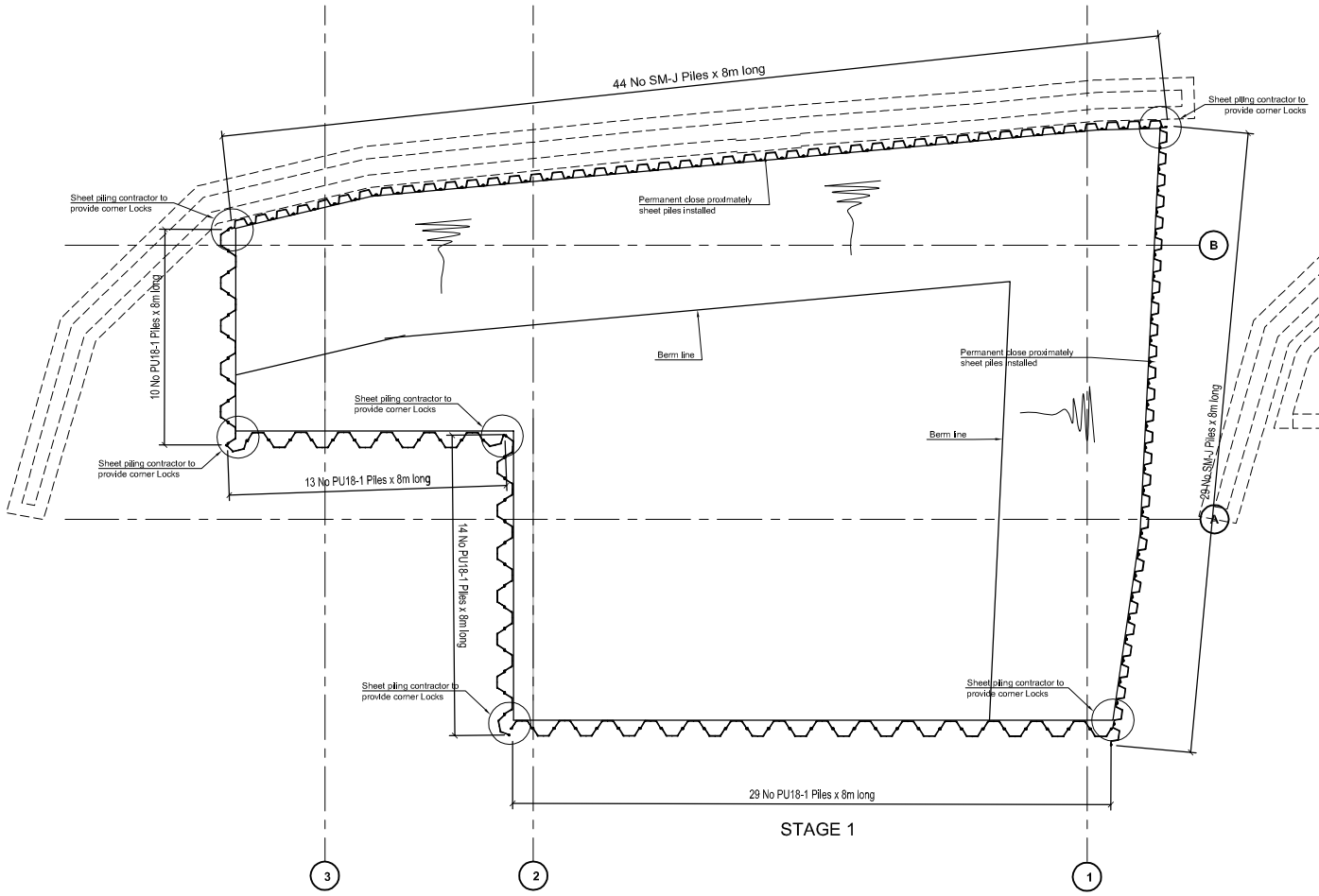
Date
March 2012

Scale
1:50@A1

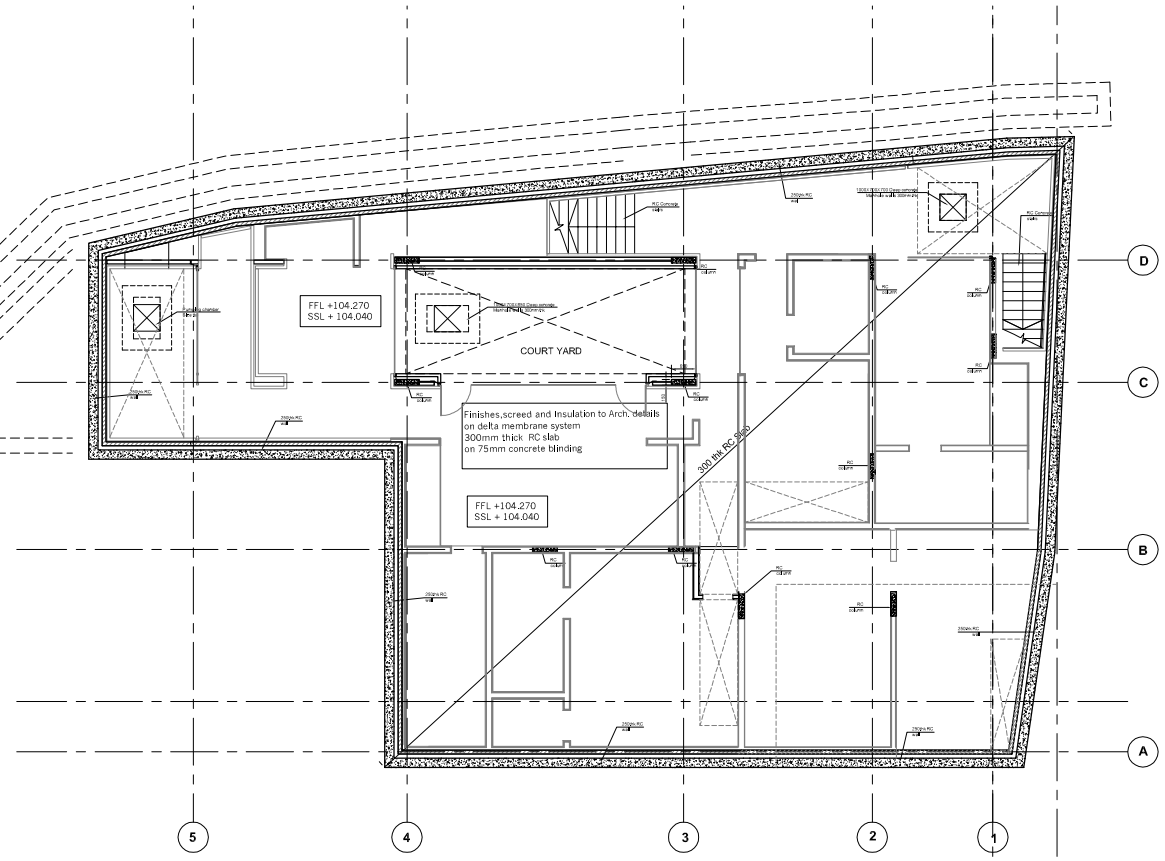
Project	Origin	Type	Level/View	Package Dwg No.	Revision
P12-101	A	X	EE	20009	B
Status: PRELIMINARY				Drawn: DH	Checked: -

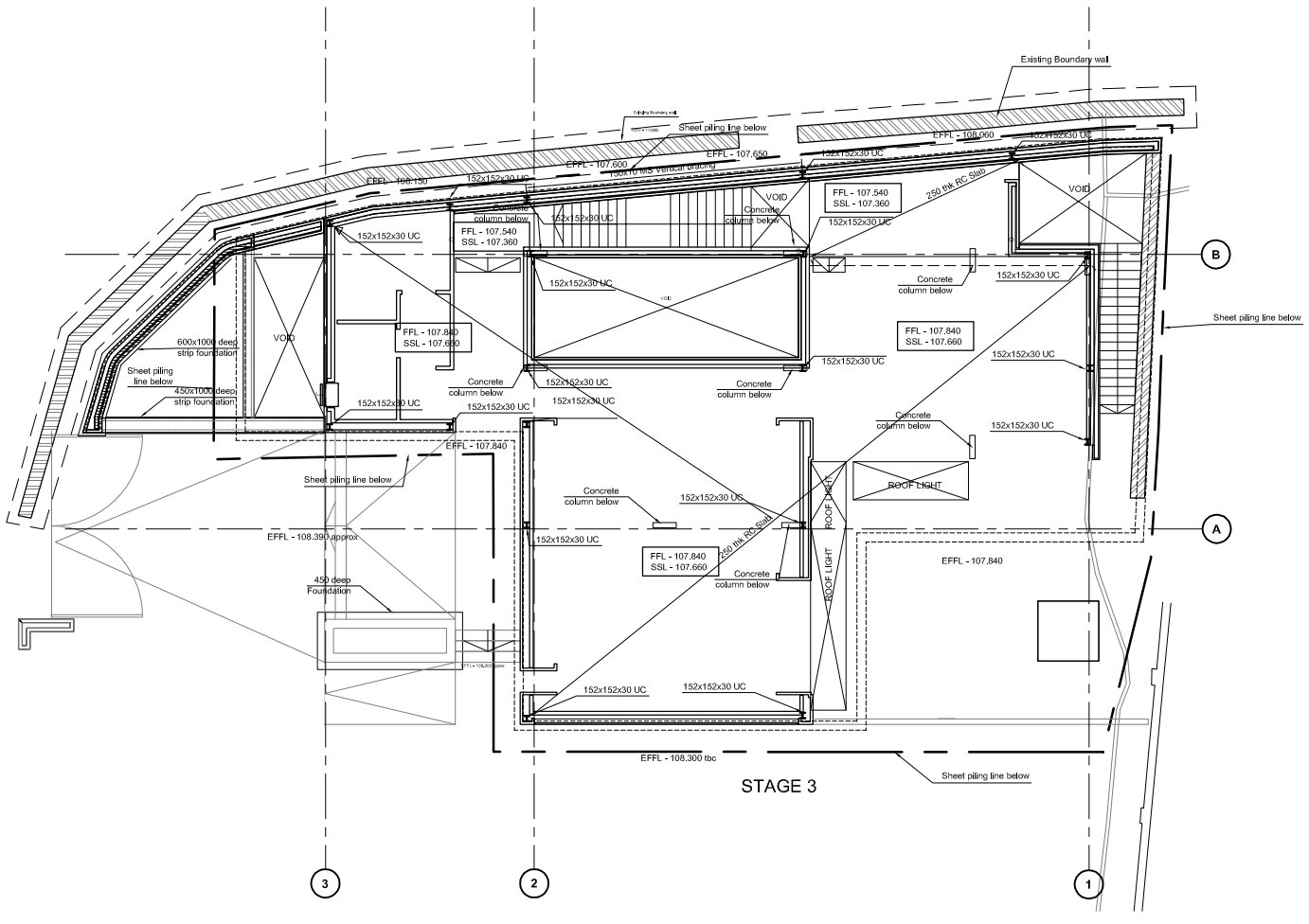
Appendix C

TWS - 8396_SK02 – Staged Sequence Showing Temporary and Permanent Works

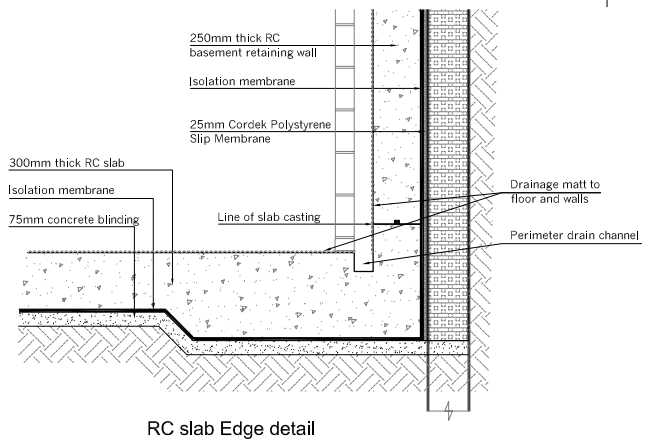


STAGE 1





STAGE 3



RC slab Edge detail

CONSTRUCTION METHOD SEQUENCE

- Install within the site area and surrounding area a number of fixed monitoring nodes to monitor possible movement during the works. (refer to drawing 8396_SK05)
- The existing garden top soil is to be stripped off and any garden walls removed and foundations are to be grubbed out. Cut roots as approved by arboricultural specialist and detailed in their report)
- The sheet pIling Is to be Installed with a Silent PIler slmIar to a GIken RIg whIch presses the sheet pIles Into the ground using the resistance of the adjoining installed sheet piles.
- The ground is to be locally excavated 1.5m around the steel wailers and props at high level to allow their installation.
- The ground at the front of the site to No 2 Perfitt close and Wildwood Cottage Garden is to be retained to allow a ground retaining berm to be formed to retain the sheet piling
- The ground to the rear is then to be excavated to formation level.
- The drainage pipes and granular drainage channels are to be installed.
- The rear section of basement slab build-up is to be installed and then the RC basement slab to this area cast with 150mm high kickers for all the basement walls and internal columns.
- With the rakers in and the slab having reached the required design strength remove the ground retaining berm.
- The ground to the front can now be excavated to formation level.
- The drainage pipes and granular drainage channels are to be installed.
- The front section of basement slab build-up is to be installed and then the RC basement slab to this area cast with 150mm high kickers for all the basement walls and internal columns.
- Install and cast all internal RC walls and columns to underside of ground floor slab.
- The basement RC walls are then to be cast to 600mm below the underside of the high level walling beams.
- Once the basement RC walls have gained the required design strength, install diagonal props fixed to the RC wall & RC basement slab and then remove the high level sheet piling walling beams and shoring.
- The RC ground floor slab and RC wall down stands can then be cast.
- Once the RC ground floor slab has gained the required design strength the additional diagonal props can be removed.
- Install the maln steel frame fixed to the RC ground floor slab
- During the construction period the sheet piling and surrounding ground will be monitored at regular intervals to confirm the construction tolerances stays within the agreed design parameters.
- The RC basement structure now forms a solid box construction to retain the surround ground and structure over
- Continue with construction of remainder of the structure over.

1. This Drawing to be read In conjunction with all other Engineers, Architects and Specialists drawings and specifications.
2. No dimensions are to be scaled from this drawing.
3. No deviation may be made from the details shown on this drawing without prior agreement of the Engineers.
4. Any discrepancy between this drawing and any other document should be referred Immediately to the Engineer.

Ref.	Revisions	By	Date
C	Adjusted Basement Layout Shown	BD	22.10.12
B	Berm Added	BD	2.07.12
A	Berm Removed	GB	27.06.12

The Courtyard House

STAGE SEQUENCE SHOWING TEMPORARY/PERMANENT WORKS

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consulting civil and structural engineers
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Scale at A1	Date	Drawn By	
1:100	25/06/12	BD	

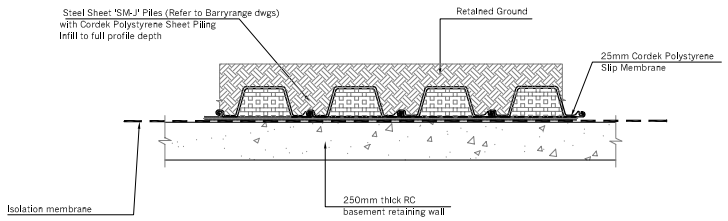
Project No.	Drg No.	Rev.
8396	SK02	C

Appendix D

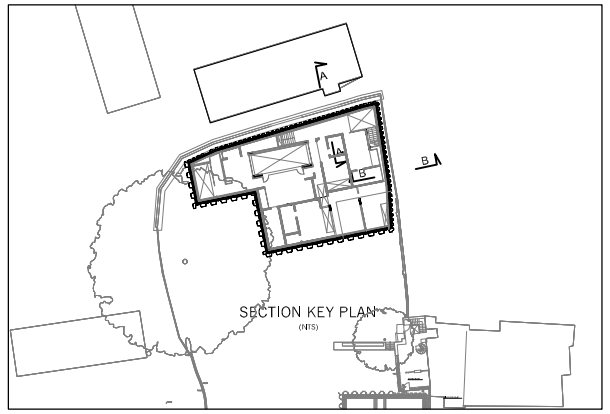
TWS - 8396_SK03 – Section A _ A - Adjacent No. 2 Parfett Close
TWS - 8396_SK04 – Section B _ B - Adjacent Wildwood Cottage Garden
TWS - 8396_SK06 – Monitoring Settlement of Surrounding Area

Berryrange Sheet Pile Design Calculation No. E3807_rev 1_25-6-12

SAMPLE PICTURE OF SIMILAR WORKS DESIGNED BY
TAYLOR WHALLEY SPYRA AT WEST HEATH ROAD, HAMPSTEAD, NW3



PLAN SECTION ON EXTERNAL BASEMENT
WALL SHOWING SHEET PILING BUILDUP
(SCALE 1:25)



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- The ground is to be locally excavated 1.5m around the steel wallers and props at high level to allow their installation.
- The ground at the front of the site to No 2 Perfitt close and Wildwood Cottage Garden is to be retained to allow a ground retaining berm to be formed to retain the sheet piling
- The ground to the rear is then to be excavated to formation level.
- The drainage pipes and granular drainage channels are to be installed.
- The rear section of basement slab build-up is to be installed and then the RC basement slab to this area cast with 150mm high kickers for all the basement walls and internal columns.
- With the rear section of RC basement slab cast Install the diagonal rakers to the walling beams and sheet pilling at the front of the site and fixed to the rear section of RC basement slab
- With the rakers in and the slab having reached the required design strength remove the ground retaining berm.
- The ground to the front can now be excavated to formation level.
- The drainage pipes and granular drainage channels are to be installed.
- The front section of basement slab build-up is to be installed and then the RC basement slab to this area cast with 150mm high kickers for all the basement walls and internal columns.
- Install and cast all internal RC walls and columns to underside of ground floor slab.
- The basement RC walls are then to be cast to 600mm below the underside of the high level walling beams.
- Once the basement RC walls have gained the required design strength, install diagonal props fixed to the RC wall & RC basement slab and then remove the high level sheet piling walling beams and shoring.
- The RC ground floor slab and RC wall down stands can then be cast.
- Once the RC ground floor slab has gained the required design strength the additional diagonal props can be removed.
- Install the main steel frame fixed to the RC ground floor slab
- During the construction period the sheet piling and surrounding ground will be monitored at regular intervals to confirm the construction tolerances stays within the agreed design parameters.
- The RC basement structure now forms a solid box construction to retain the surround ground and structure over
- Continue with construction of remainder of the structure over.

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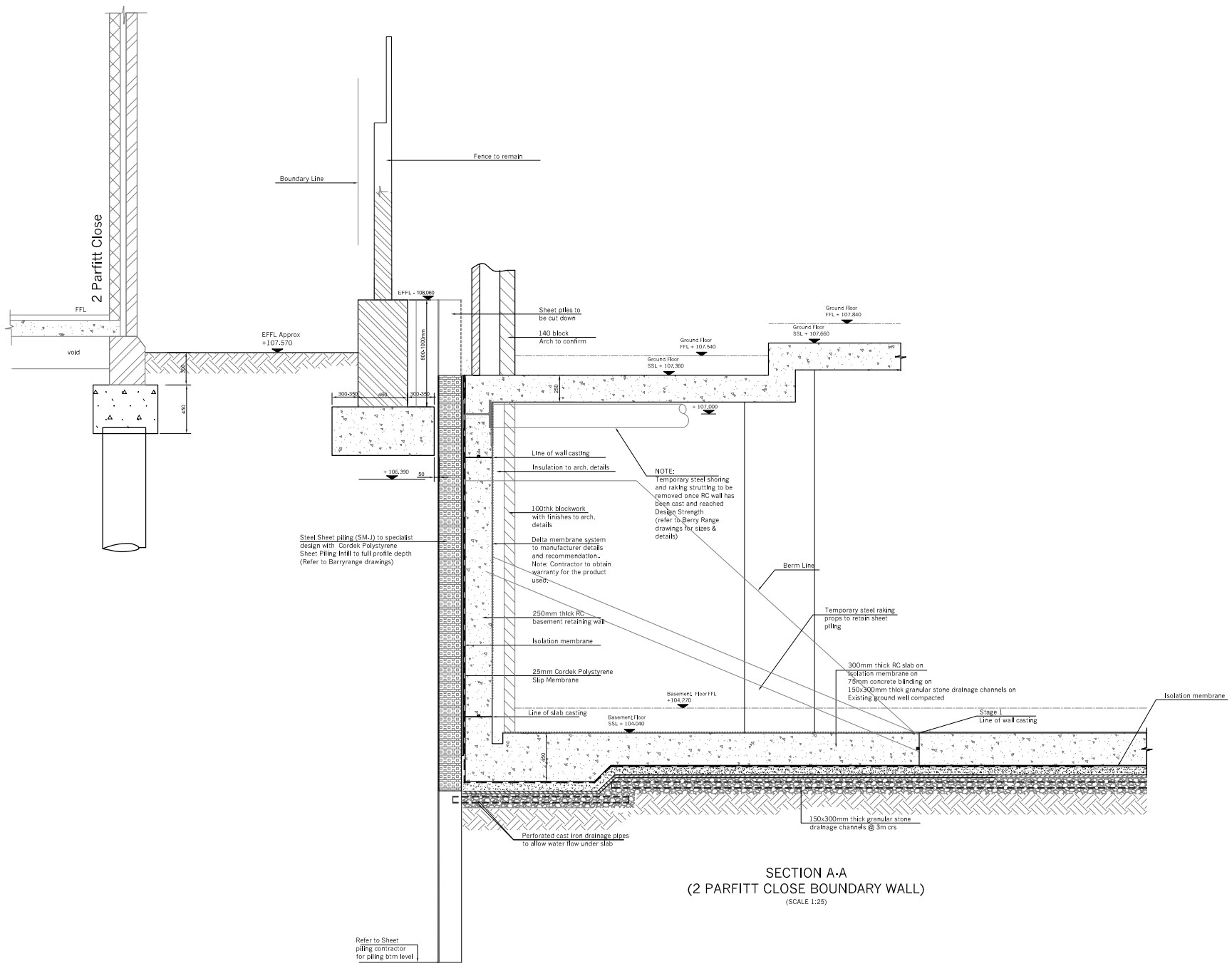
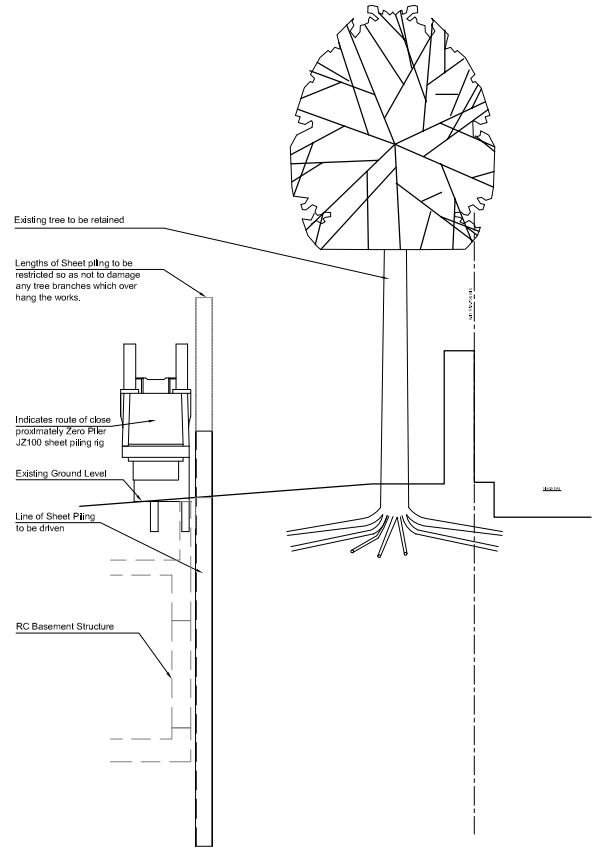


SECTION A-A
(2 PARFITT CLOSE BOUNDARY WALL)
(SCALE 1:25)



SECTION INDICATE SHEET PILING INSTALLATION
ADJACENT TO TREES TO BE RETAINED
(SCALE 1:50)

Ref.	Revisions	By	Date
D	Adjusted Basement Layout Shown	GB	22.10.12
C	Trial hole info added to 2 Parfitt Close. Correct sheet piles ref added. Temporary bottom props ommited	NB	21.09.12
B	Propping adjusted	BD	2.06.12
A	Propping adjusted	GB	27.06.12

The Courtyard House
Parfitt Close,
Hampstead, NW3

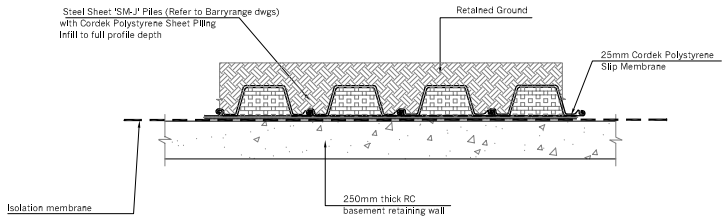
SECTION A _ A SHOWING
TEMPORARY/PERMANENT
SUPPORT WORKS

taylor whalley spyra
consulting civil and structural engineers
3 Dufferin Avenue, Barbican, LONDON EC1Y 8PQ
Tel (020) 7253 2929 Fax (020) 7253 2767
E-mail: tws@tws.uk.com Website: www.tws.uk.com

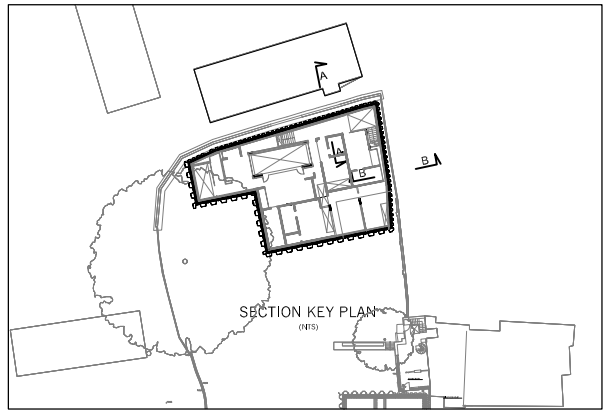
Scale at A1	Date	Drawn By	
1:20	26/06/11	BD	

Project No.	Drg No.	Rev.
8396	SK03	D

SAMPLE PICTURE OF SIMILAR WORKS DESIGNED BY
TAYLOR WHALLEY SPYRA AT WEST HEATH ROAD, HAMPSTEAD, NW3



PLAN SECTION ON EXTERNAL BASEMENT
WALL SHOWING SHEET PILING BUILDUP
(SCALE 1:25)



CONSTRUCTION METHOD SEQUENCE

- Install within the site area and surrounding area a number of fixed monitoring nodes to monitor possible movement during the works. (refer to drawing 8396_SK05)
- The existing garden top soil is to be stripped off and any garden walls removed and foundations are to be grubbed out. Cut roots as approved by arboricultural specialist and detailed in their report)
- The sheet piling is to be installed with a Silent Piler similar to a Giken Rig which presses the sheet piles into the ground using the resistance of the adjoining installed sheet piles.
- The ground is to be locally excavated 1.5m around the steel wailers and props at high level to allow their installation.
- The ground at the front of the site to No 2 Perfitt close and Wildwood Cottage Garden is to be retained to allow a ground retaining berm to be formed to retain the sheet piling
- The ground to the rear is then to be excavated to formation level.
- The drainage pipes and granular drainage channels are to be installed.
- The rear section of basement slab build-up is to be installed and then the RC basement slab to this area cast with 150mm high kickers for all the basement walls and internal columns.
- With the rear section of RC basement slab cast install the diagonal rakers to the waling beams and sheet piling at the front of the site and fixed to the rear section of RC basement slab
- With the rakers in and the slab having reached the required design strength remove the ground retaining berm.
- The ground to the front can now be excavated to formation level.
- The drainage pipes and granular drainage channels are to be installed.
- The front section of basement slab build-up is to be installed and then the RC basement slab to this area cast with 150mm high kickers for all the basement walls and internal columns.
- Install and cast all internal RC walls and columns to underside of ground floor slab.
- The basement RC walls are then to be cast to 600mm below the underside of the high level walling beams.
- Once the basement RC walls have gained the required design strength, install diagonal props fixed to the RC wall & RC basement slab and then remove the high level sheet piling walling beams and shoring.
- The RC ground floor slab and RC wall down stands can then be cast.
- Once the RC ground floor slab has gained the required design strength the additional diagonal props can be removed.
- Install the main steel frame fixed to the RC ground floor slab
- During the construction period the sheet piling and surrounding ground will be monitored at regular intervals to confirm the construction tolerances stays within the agreed design parameters.
- The RC basement structure now forms a solid box construction to retain the surround ground and structure over
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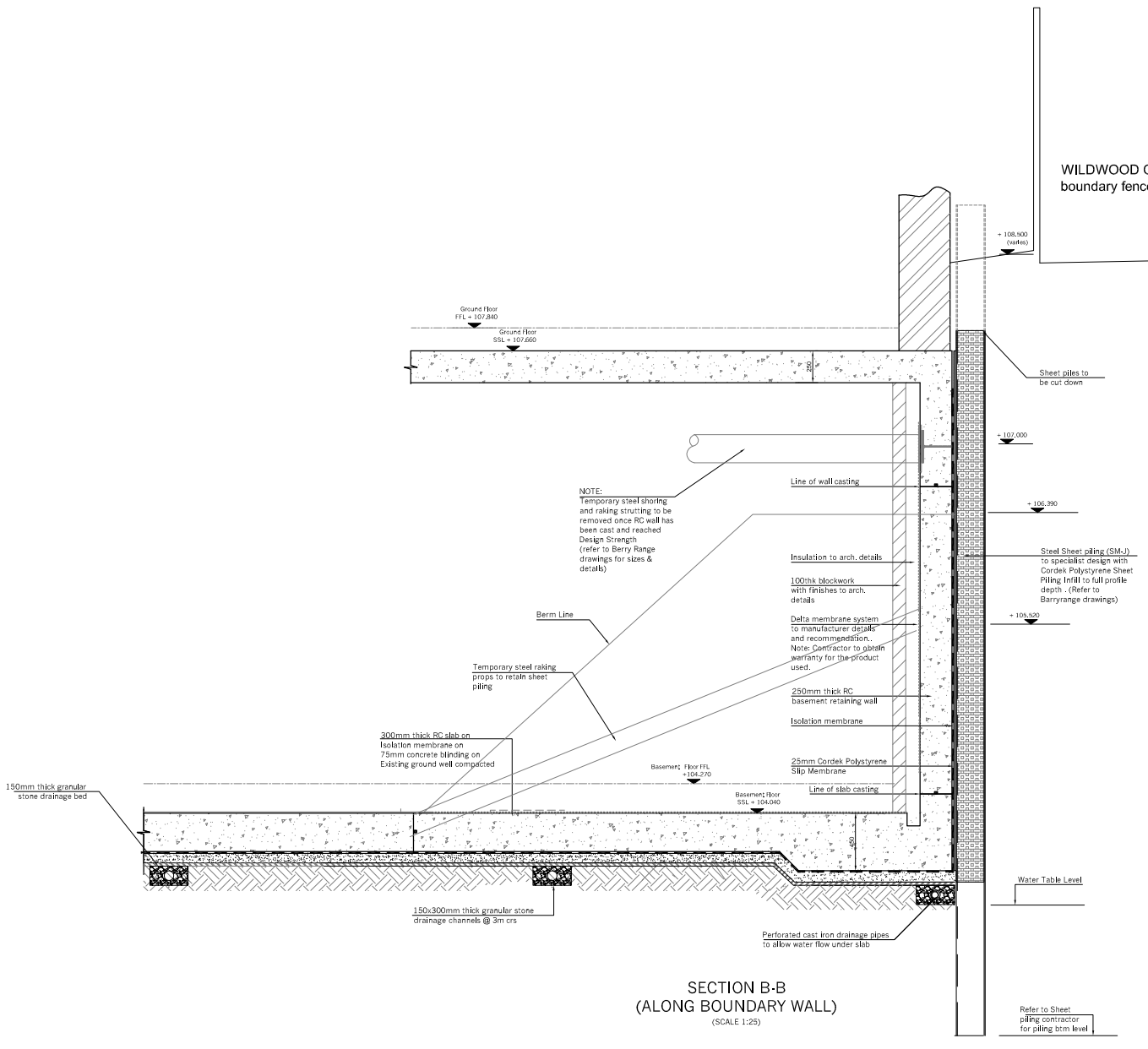
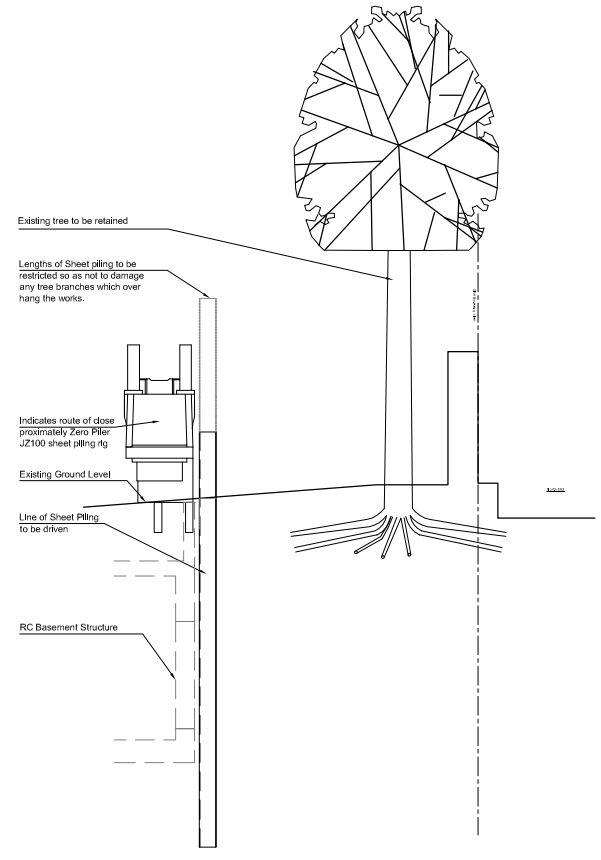


SECTION B-B
(ALONG BOUNDARY WALL)
(SCALE 1:25)



SECTION INDICATE SHEET PILING INSTALLATION
ADJACENT TO TREES TO BE RETAINED
(SCALE 1:50)

Ref.	Revisions	By	Date
D	Adjusted Basement Layout Shown	GB	22.10.12
C	Correct sheet piles ref added. Temporary bottom props ommitted	BD	2.06.12
B	Propping adjusted	BD	2.06.12
A	Propping adjusted	GB	27.06.12

The Courtyard House,
Parfitt Close,
Hampstead, NW3

SECTION B _ B SHOWING
TEMPORARY/PERMANENT
SUPPORT WORKS

taylor whalley spyra
consulting civil and structural engineers
3 Dufferin Avenue, Barbican, LONDON EC1Y 8PQ
Tel (020) 7253 2929 Fax (020) 7253 2767
Email: twslon@twsuk.com Website: www.twsuk.com

Scale at A1	Date	Drawn By	
1:20	26/06/11	BD	

Project No.	Drg No.	Rev.
8396	SK04	D

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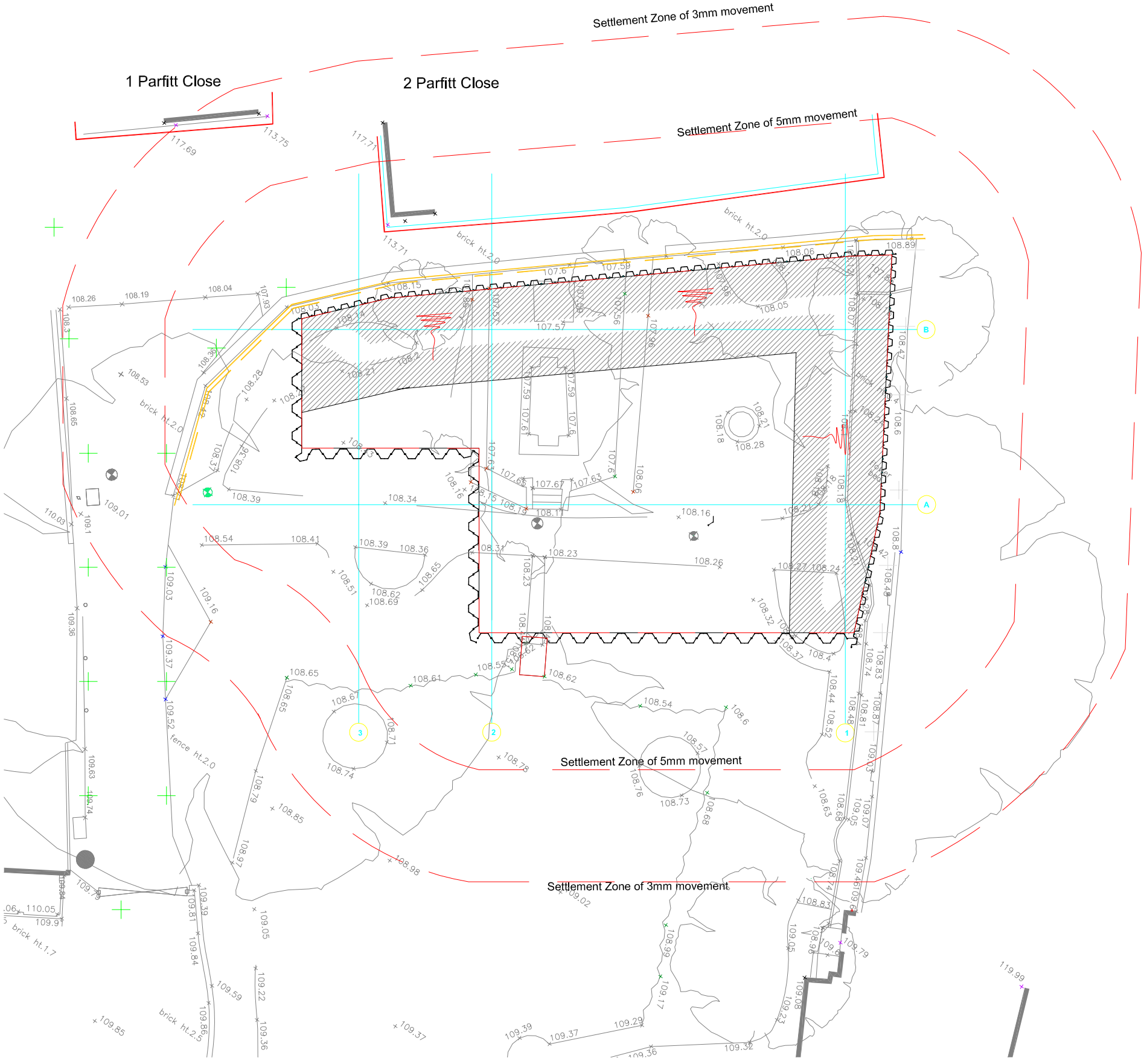


Wildwood Cottage

Notes :-

1. Survey of water level to be taken at weekly intervals (and at end of major excavation phases, ie at BL-1 and final dig levels).

2. Prior to works that might cause movement starting at least three weekly rounds of monitoring should be completed

3. Upon completion of base slab, survey & monitoring should continue weekly for 1 month and if a trend of reducing rate of movement is established, three further sets of readings at monthly intervals should be taken

4. Groundwater level monitoring should be maintained for a full year at quarterly intervals beyond this to establish what impact the works has had on water levels

5. Surveyor to propose a suitable pin detail for level monitoring in garden

Observations should be reported to the engineer In a timely fashion and no later than 48 hours after they have been made on site.

if any unusual observations or observations suggesting excessive deformation and/or possible instability are made these should be checked and if confirmed, reported to the engineer immedlately

KEY

- Standpipe piezometer (use one outside excavation)
- Leveling pins in garden along boundary fence
- Street surface leveling studs (~5m c/c)
- Wall(s); precise leveling at ground level (5m c/c by excavation, 10m c/c elsewhere)
- Wall(s); 3D retro targets top & bottom (5m c/c)
- Structures(s); 3D Retro-targets top & bottom of walls (6 per face, locations to be agreed)

Ref.	Revisions	By	Date
A	Adjusted Basement Layout Shown	GB	22.10.12

The Courtyard House
Parfitt Close,
Hampstead, NW3

Monitoring Settlement of surrounding area

taylor whalley spyra
consulting civil and structural engineers
3 Dufferin Avenue, Barbican, LONDON EC1Y 8PQ
Tel (020) 7253 2626 Fax (020) 7253 2767
Email:twslon@tws.uk.com Website:www.tws.uk.com

Scale at A1	Date	Drawn By	
1:100	2.06.12	BD	

Project No.	Drg No.	Rev.
8396	SK06	A

E3807

CLIENT: Roadfern Ltd
SITE: The Courtyard House

CALCULATIONS

For

Permanent Sheet Pile Design for proposed Courtyard House

Rev:	Date:	Author:	Comments:	Signature:
0	25/05/2012	Sara Vijayasarathy	For Approval	
A	11/06/12	Alan Herbert	For Approval	
B	25/06/2012	Sara Vijayasarathy	For Approval	

Unit 7, The Oaks Business Village
Revenge Road
Chatham
Kent
ME5 8LF
Tel 01622-794460
Fax 01634-863016
e-mail admin@berryrange.com

INDEX

1. Design Information

Ground Conditions & Groundwater

The ground conditions have been interpreted from MRH Geotechnical, Borehole Log No BH3. Top of the borehole is assumed to be commencing level. *Customer to confirm that this is a valid assumption.* The following values have been attributed to the ground conditions below commencing level.

Soil Description (WS2)	Depth (mAOD)	Bulk Density (kN/m^3)	Effective Angle of Shear Resistance, ϕ (Degrees)	Undrained Shear Strength, C_u (kN/m^2)
Made Ground (Clay Fill)	108.2	20	26	-
Silty CLAY	107	19.5	26	-
Silty SAND	105.9	17	30	-
Stiff CLAY	104.4	19.5	23	-
Stiff CLAY	101.1	20.5	23	100

Groundwater was encountered at 104.8mAOD. *If groundwater / ground conditions vary significantly from that shown in the design, please seek advice/re-design immediately.*

Surcharge / Live Loading

The following Live Load Surcharges have been considered within this sheet piling design:-

Design Case A

General Surcharge for Plant Load:

A ground level surcharge of $10kN/m^2$ has been adopted to consider a Construction Live Load (in accordance with CIRIA Special Publication 95 cl. 4.2.1 recommendation for adjacent plant laden wt. up to 30 Tonnes).

Design Case B

General Surcharge for Plant Load:

A ground level surcharge of 5kN/m^2 has been adopted to consider a Construction Live Load.

Additional Load for nearby/adjacent structures:

A strip load of 60kN/m at an offset of approximately 0.40m over a width of 1800mm has been adopted to consider load from the existing boundary wall.

The client should advise if there are any additional surcharges / loads to consider (other than those identified within this TWs design), and seek redesign immediately.

2. Design Approach

Bespoke software (CADS Retain) is used for the design and the software determines the earth pressure coefficients from the values of phi-dash and wall friction/adhesion.

The Burland and Potts Approach is to be used for the design.

Temporary Condition

1. A minimum overall FOS of 2.0 is achieved
2. Total stress soil parameters have been adopted in this design
3. Sheet piles are designed to act in Cantilever

3. Summary of Levels

Case 1 & 2

Commencing Level	:108.20mAOD
Formation Level	:103.2mAOD
Retained Height	:5m
Prop Level	:106.7

4. Design Summary & Stability Design

Method of Installation: Slient Vibration free method.

Case 1

Sheet Specification: 8.0m Long $PU18^{-1}$ (Grade S355) Sheet Piles

Bending moment capacity of the sheet pile is 382kNm/m.

Maximum anticipated moment on the sheet pile is 56kNm/m.

Maximum predicted deflection is 5mm**

For stability design, please refer to CADS Output, Appendix A

Case 2

Sheet Specification: 8.0m Long SMJ (Grade S270) Sheet Piles

Bending moment capacity of the sheet pile is 204kNm/m.

Maximum anticipated moment on the sheet pile is 59kNm/m.

Maximum predicted deflection is 10.2mm**

For stability design, please refer to CADS Output, Appendix B

***The customer must satisfy himself that this is an acceptable amount with consideration to any surrounding structures, surfaces, services and the construction of the permanent works.*

5. Frame Calculations

Appendix C- SPAN Analysis

6. Drawings

Appendix D AutoCAD drawing showing Sheet Pile Layout

APPENDIX A

Pile geometry

Pile top Level	108.2	m
Pile Length	8	m
Pile toe level	100.2	m
Active ground slope	0	Degrees (To horizontal)

Soils and ground water initial data (Soils data given for active and passive sides)

Initial Ground Water level 104.8

Top Level m	Description	Bulk Dens kN/m3	Sat' Dens kN/m3	Young Mod kN/m2	Young Inc. kN/m3	Cu C' kN/m2	C Inc. kN/m3	Phi Deg	Wall Shear Ratio	Ka Kp	Kac Kpc
108.20	Clay Fill	19.00	20.00	13867	0			26	.50	.35	
								26	.50	3.40	
107.00	Silty CLAY	19.50	19.50	24000	0			26	.50	.35	
								26	.50	3.40	
105.90	Silty SAND	17.00	20.00	14000	0			30	.50	.29	
								30	.50	4.29	
104.40	CLAY	19.50	19.50	30000	0			27	.50	.33	
						50			.50	1.00	2.45
101.10	CLAY	20.50	20.50	60000	0			28	.50	.32	
						100				1.00	2.00

Construction sequence

Stage Ref	Stage Type	Level or Angle m/deg.	Load kN(/m)	Offset m	Width m	Length m
1	Active surcharge	108.20	10.0	.0		
2 A	Passive side excavation	106.10				
3	Insert prop	106.50				
4	Passive side excavation	103.20				
5 A	Passive water level	103.20				

Code of practice

Code of practice or reference document	CIRIA R104 Burland and Potts Temporary Works (Drained)
Application of pressures for stability	FOS on available passive
FOS on moments (stability check)	1.50
ULS factor on Tan(Phi) values	1.00
ULS fFactor on drained cohesion values	1.00
ULS factor on undrained cohesion values	1.00
ULS factor on active soil pressures	1.00
ULS factor on passive soil pressures	1.00
ULS factor on active water pressures	1.00
ULS factor on passive water pressures	1.00
ULS factor on loads applied to the soil	1.00
ULS factor on loads applied to the wall	1.00
FOS on embedment (stability check)	1.00
Correction factor on cantilever embedment	1.20

Wall analysis detail options

Nominal Phi for load distribution	30.0	Degrees
Depth of water filled tension cracks	.0	m
Density of water	10.0	kN/m3
Minimum equivalent fluid density	5.0	kN/m3
Depth of passive softened soil	1.0	m
Continuity model for wall analysis	Pins at second and lower props	

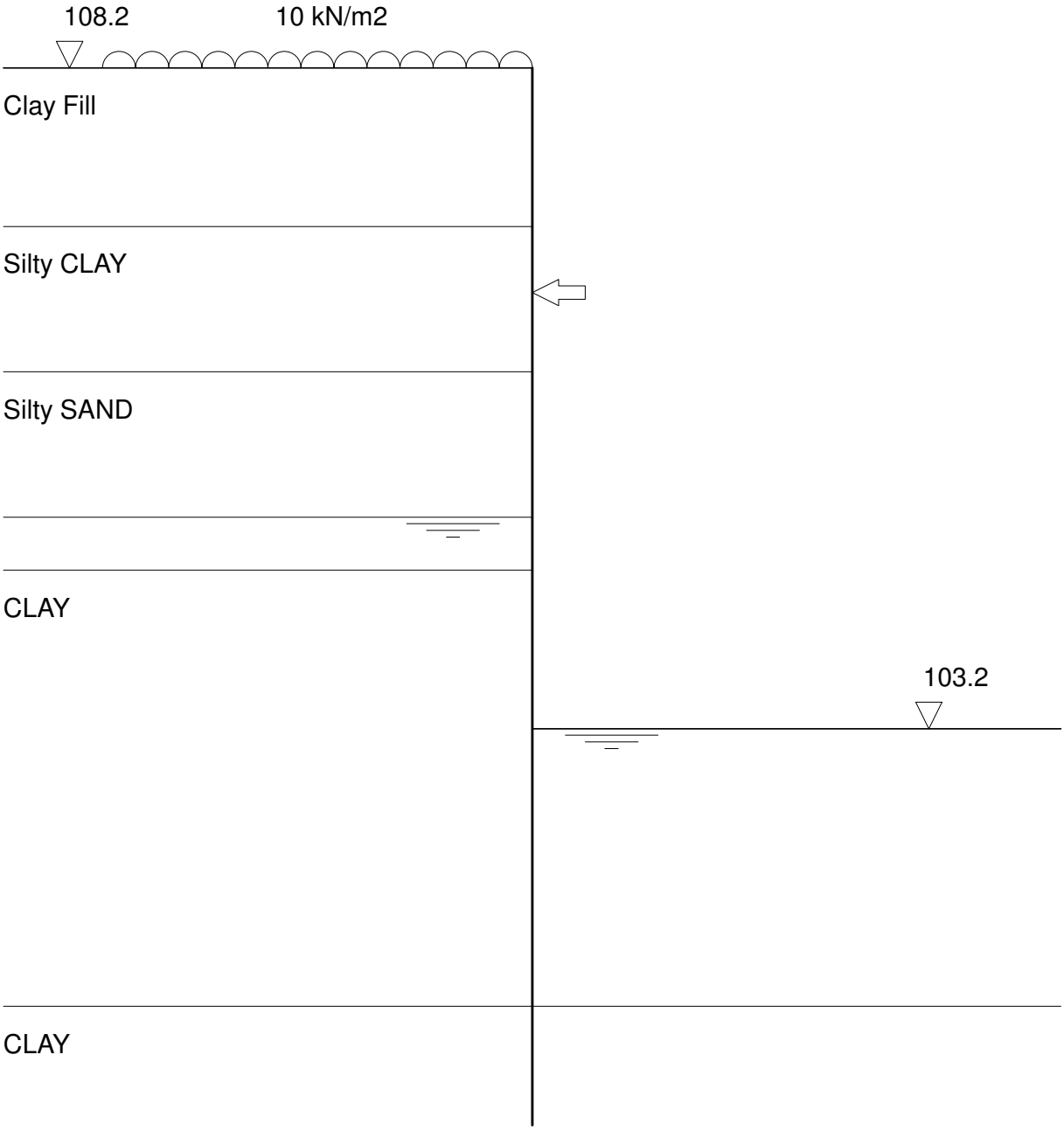
Deflection parameters

Wall moment of inertia	35905	cm4/m
Wall Youngs modulus	210000000	kN/m2

Properties for prop at 106.5

Prop/Tie cross sectional area	200	cm2 each
Prop/Tie Youngs modulus	210000000	kN/m2
Prop/Tie length	10.0	m
Prop/Tie spacing	6.0	m
Waling moment of inertia	Waling deflection not included	
Waling Youngs modulus	Waling deflection not included	
Prop/Tie preload	0	kN
Initial lack of fit	0.0	mm

Stage ref. 5
Stage type Passive water level



Tabular results from analysis of stage ref 5

Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
108.20	10.0	3.5	.0	.0	.0	.0	3.5	0	-.1	2.7		.00
108.00	13.8	4.8	.0	.0	.0	.0	4.8	.1	-.9	2.8		.00
107.00	32.8	11.4	.0	.0	.0	.0	11.4	4.5	-9.0	3.3		.00
107.00	32.8	11.4	.0	.0	.0	.0	11.4	4.5	-9.0	3.3		.00
106.50	42.5	14.8	.0	.0	.0	.0	14.8	10.6	-15.6	3.6	64.8	.00
106.50	42.6	14.8	.0	.0	.0	.0	14.8	10.6	49.2	3.6		.00
106.10	50.3	17.5	.0	.0	.0	.0	17.5	-7.7	42.8	3.8		.00
106.10	50.3	17.5	.0	.0	.0	.0	17.5	-7.8	42.8	3.8		.00
106.00	52.3	18.2	.0	.0	.0	.0	18.2	-12.0	41.0	3.9		.00
105.90	54.2	18.9	.0	.0	.0	.0	18.9	-16.0	39.1	3.9		.00
105.90	54.2	16.0	.0	.0	.0	.0	16.0	-16.1	39.1	3.9		.00
105.00	69.5	20.5	.0	.0	.0	.0	20.5	-44.2	22.7	4.2		.00
104.80	72.9	21.5	.0	.0	.0	.0	21.5	-48.3	18.5	4.3		.00
104.40	76.9	22.7	4.0	.0	.0	.0	26.7	-53.9	8.9	4.2		.00
104.40	76.9	25.7	4.0	.0	.0	.0	29.7	-53.9	8.9	4.2		.00
104.10	79.8	26.6	7.0	.0	.0	.0	33.6	-55.1	-.5	4.1		.00
104.00	80.7	27.0	8.0	.0	.0	.0	35.0	-54.9	-4.0	4.1		.00
103.20	88.3	29.5	16.0	.0	.0	.0	45.5	-39.4	-36.1	3.5		.00
103.20	88.3	29.5	16.0	.0	.0	.0	45.5	-39.4	-36.2	3.5		.00
103.00	90.2	30.1	18.0	3.9	28.4	.0	19.7	-31.4	-42.7	3.3		.05
102.00	99.7	33.3	28.0	23.4	145.9	.0	-84.6	0	-1.1	2.6		.99
101.99	99.9	33.3	28.1	23.7	146.1	.0	-84.7	0	0	2.5		1.00
101.10	108.3	36.2	37.0	40.9	163.4	.0	-90.3	0	0	1.9		1.57
101.10	108.3	34.7	37.0	40.9	241.0	.0	-169.3	0	0	1.9		1.57
101.00	109.3	35.0	38.0	43.0	243.0	.0	-170.0	0	0	1.8		1.67
100.20	117.8	37.7	46.0	59.4	259.4	.0	-175.7	0	0	1.2		2.23

Structural design of wall

Wall section properties

Sheet pile section ref PU18-1

Wall material properties

Yield stress of steel	355	N/mm2
Bending Stress Ratio	1.55	
Allowable bending stress	229	N/mm2
Allowable shear stress	137	N/mm2

Wall structural design checks

Check description	Required or Limit	Provided or Actual	Units
Max. bending moment Design stress check	55	382	kNm/m
Min. section modulus Design stress check	240	1670	cm3/m
Maximum shear force Design stress check	87	824	kN/m

APPENDIX B

Pile geometry

Pile top Level	108.2	m
Pile Length	8	m
Pile toe level	100.2	m
Active ground slope	0	Degrees (To horizontal)

Soils and ground water initial data (Soils data given for active and passive sides)

Initial Ground Water level 104.8

Top Level m	Description	Bulk Dens kN/m3	Sat' Dens kN/m3	Young Mod kN/m2	Young Inc. kN/m3	Cu C' kN/m2	C Inc. kN/m3	Phi Deg	Wall Shear Ratio	Ka Kp	Kac Kpc
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								26	.50	3.40	
105.90	Silty SAND	17.00	20.00	14000	0			30	.50	.29	
								30	.50	4.29	
104.40	CLAY	19.50	19.50	30000	0			27	.50	.33	
						50			.50	1.00	2.45
101.10	CLAY	20.50	20.50	60000	0			28	.50	.32	
						100				1.00	2.00

Construction sequence

Stage Ref	Stage Type	Level or Angle m/deg.	Load kN(/m)	Offset m	Width m	Length m
1	Active surcharge	108.20	5.0	.0		
2	Strip load	107.20	60.0	.4	1.8	
3 A	Passive side excavation	106.10				
4	Insert prop	106.50				
5	Passive side excavation	103.20				
6 A	Passive water level	103.20				

Code of practice

Code of practice or reference document	CIRIA R104 Burland and Potts Temporary Works (Drained)
Application of pressures for stability	FOS on available passive
FOS on moments (stability check)	1.50
ULS factor on Tan(Phi) values	1.00
ULS fFactor on drained cohesion values	1.00
ULS factor on undrained cohesion values	1.00
ULS factor on active soil pressures	1.00
ULS factor on passive soil pressures	1.00
ULS factor on active water pressures	1.00
ULS factor on passive water pressures	1.00
ULS factor on loads applied to the soil	1.00
ULS factor on loads applied to the wall	1.00
FOS on embedment (stability check)	1.00
Correction factor on cantilever embedment	1.20

Wall analysis detail options

Nominal Phi for load distribution	30.0	Degrees
Depth of water filled tension cracks	.0	m
Density of water	10.0	kN/m3
Minimum equivalent fluid density	5.0	kN/m3
Depth of passive softened soil	1.0	m
Continuity model for wall analysis	Pins at second and lower props	

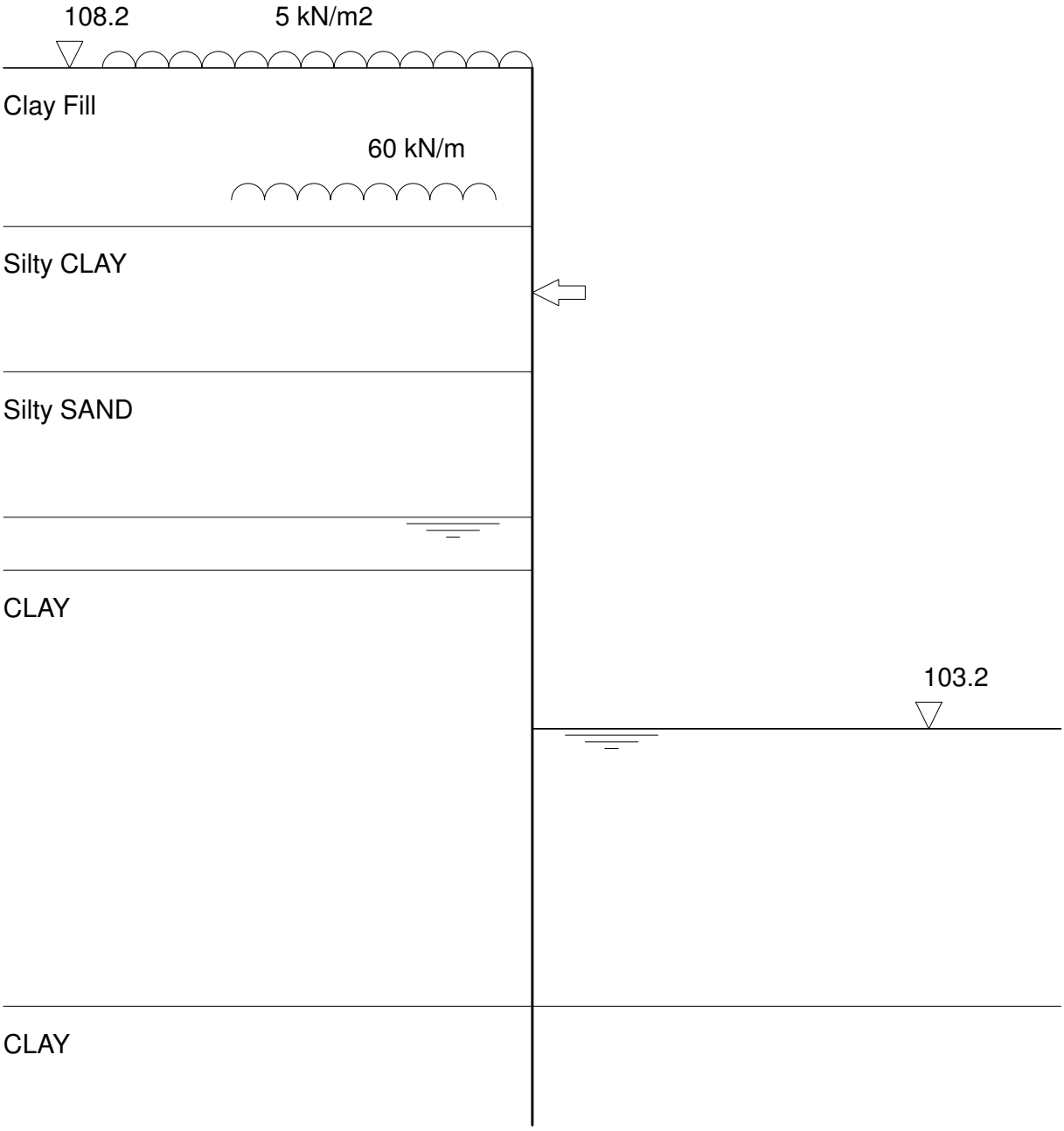
Deflection parameters

Wall moment of inertia	11750	cm4/m
Wall Youngs modulus	210000000	kN/m2

Properties for prop at 106.5

Prop/Tie cross sectional area	200	cm2 each
Prop/Tie Youngs modulus	210000000	kN/m2
Prop/Tie length	10.0	m
Prop/Tie spacing	6.0	m
Waling moment of inertia	Waling deflection not included	
Waling Youngs modulus	Waling deflection not included	
Prop/Tie preload	0	kN
Initial lack of fit	0.0	mm

Stage ref. 6
Stage type Passive water level



Tabular results from analysis of stage ref 6

Calc Level m	Active Vert kN/m2	Active Earth kN/m2	Active Water kN/m2	Pas' Vert kN/m2	Pas' Earth kN/m2	Pas' Water kN/m2	Total Nett kN/m2	Bend. Moment kNm/m	Shear Force kN/m	Defl't mm	Prop Force kN/m	FOS
108.20	5.0	1.7	.0	.0	.0	.0	1.7	0	0	4.0		.00
108.00	8.8	3.1	.0	.0	.0	.0	3.1	.1	-.5	4.4		.00
107.97	9.4	3.3	.0	.0	.0	.0	3.3	.1	-.6	4.5		.00
107.00	27.8	9.7	.0	.0	.0	.0	9.7	3.2	-6.9	6.5		.00
107.00	27.8	9.7	.0	.0	.0	.0	9.7	3.2	-6.9	6.5		.00
106.50	37.5	22.8	.0	.0	.0	.0	22.8	8.8	-16.4	7.6	73.3	.00
106.50	37.6	22.8	.0	.0	.0	.0	22.8	8.8	56.9	7.6		.00
106.10	45.3	24.2	.0	.0	.0	.0	24.2	-12.0	47.5	8.5		.00
106.10	45.3	24.2	.0	.0	.0	.0	24.2	-12.1	47.5	8.5		.00
106.00	47.3	24.6	.0	.0	.0	.0	24.6	-16.7	45.0	8.7		.00
105.90	49.2	25.0	.0	.0	.0	.0	25.0	-21.1	42.5	8.9		.00
105.90	49.2	22.3	.0	.0	.0	.0	22.3	-21.2	42.5	8.9		.00
105.00	64.5	24.0	.0	.0	.0	.0	24.0	-50.1	21.7	10.2		.00
104.80	67.9	24.4	.0	.0	.0	.0	24.4	-54.0	16.8	10.3		.00
104.40	71.9	24.3	4.0	.0	.0	.0	28.3	-58.7	6.3	10.2		.00
104.40	71.9	27.2	4.0	.0	.0	.0	31.2	-58.7	6.3	10.2		.00
104.39	72.0	27.2	4.1	.0	.0	.0	31.3	-58.7	6.0	10.2		.00
104.00	75.7	27.2	8.0	.0	.0	.0	35.2	-58.6	-7.0	9.8		.00
103.92	76.5	27.2	8.8	.0	.0	.0	36.0	-57.9	-9.9	9.6		.00
103.20	83.3	27.8	16.0	.0	.0	.0	43.8	-40.9	-38.4	8.0		.00
103.20	83.3	27.8	16.0	.0	.0	.0	43.8	-40.9	-38.4	8.0		.00
103.00	85.2	28.5	18.0	3.9	28.4	.0	18.1	-32.5	-44.6	7.5		.05
102.00	94.7	31.6	28.0	23.4	145.9	.0	-86.2	0	-1.4	5.3		.98
101.98	94.9	31.7	28.2	23.7	146.2	.0	-86.3	0	0	5.2		1.00
101.10	103.3	34.5	37.0	40.9	163.4	.0	-91.9	0	0	3.2		1.58
101.10	103.3	33.1	37.0	40.9	241.0	.0	-170.9	0	0	3.2		1.58
101.00	104.3	33.4	38.0	43.0	243.0	.0	-171.6	0	0	3.0		1.68
100.20	112.8	36.1	46.0	59.4	259.4	.0	-177.3	0	0	1.2		2.26

Structural design of wall

Wall section properties

Sheet pile section ref SMJ

Wall material properties

Yield stress of steel	270	N/mm2
Bending Stress Ratio	1.55	
Allowable bending stress	174	N/mm2
Allowable shear stress	104	N/mm2

Wall structural design checks

Check description	Required or Limit	Provided or Actual	Units
Max. bending moment Design stress check	59	204	kNm/m
Min. section modulus Design stress check	340	1175	cm3/m
Maximum shear force Design stress check	99	450	kN/m

APPENDIX C

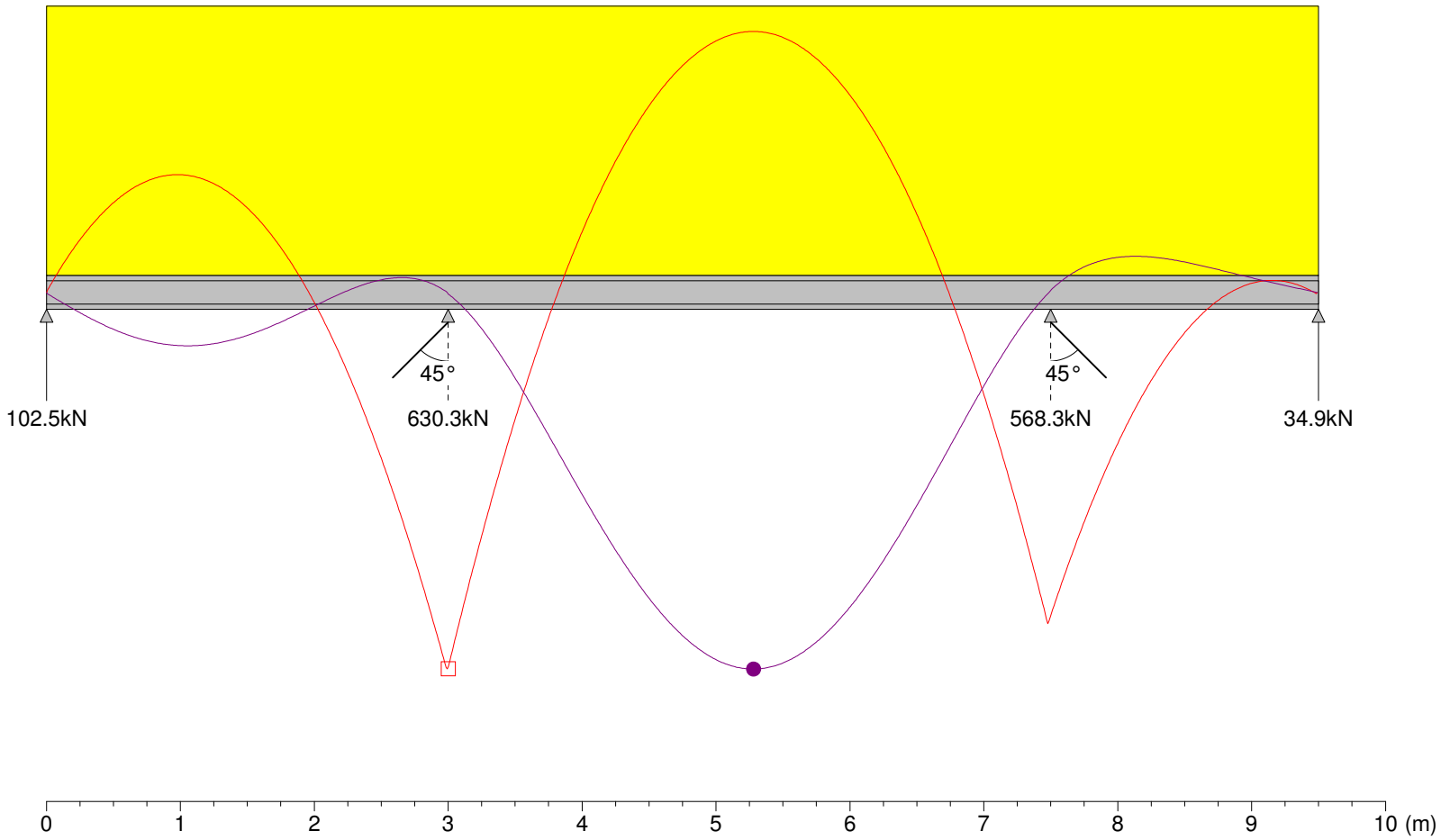
PU Piles

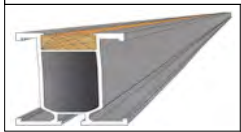
Page: 1
Date: 26.6.12

Beam: 254 x 254 x 73 UC
L = 9.500 m
I = 11400.0 cm^4
E = 2.1E+08 kN/m^2
EI = 23940.0 kNm^2

Maximum		x (m)
□	159.32 kNm	3.000
●	7.040 mm	5.282
R	445.7 kN	3.000

Max Prop Load x 1.6 = U.D.L





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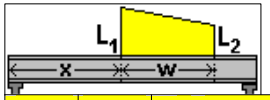
Max Prop Load x 1.6 = U.D.L

Input Data

Beam

Name	L (m)	b (mm)	h (mm)	A (cm^2)	W (kg/m)	E (kN/m^2)	I_{xx} (cm^4)	EI (kNm^2)	f (N/mm^2)	Z (cm^3)	M (kNm)
254 x 254 x 73 UC	9.500	254.600	254.100	20.40	73.10	2.1E+08	11400.0	23940.0	270.0	898.0	125.55

Distributed Loads



x (m)	w (m)	L_1 (kN/m)	L_2 (kN/m)
0.000	9.500	103.7	103.7

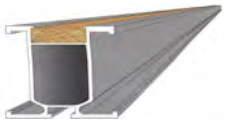
Solution

Supports

x (m)	Angle (°)	R (kN)	M (kNm)
0.000	0.0	102.5	0.0
3.000	-45.0	630.3	159.3
7.500	45.0	568.3	139.1
9.500	0.0	34.9	0.0

Maxima

	Maximum	x (m)
Reaction	445.7 kN	3.000
Shear Force	237.0 kN	3.000
Sagging Moment	110.40 kNm	5.273
Hogging Moment	-159.32 kNm	2.983
Sagging Deflection	7.040 mm	5.263
Hogging Deflection	-0.675 mm	8.123



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Page: 1
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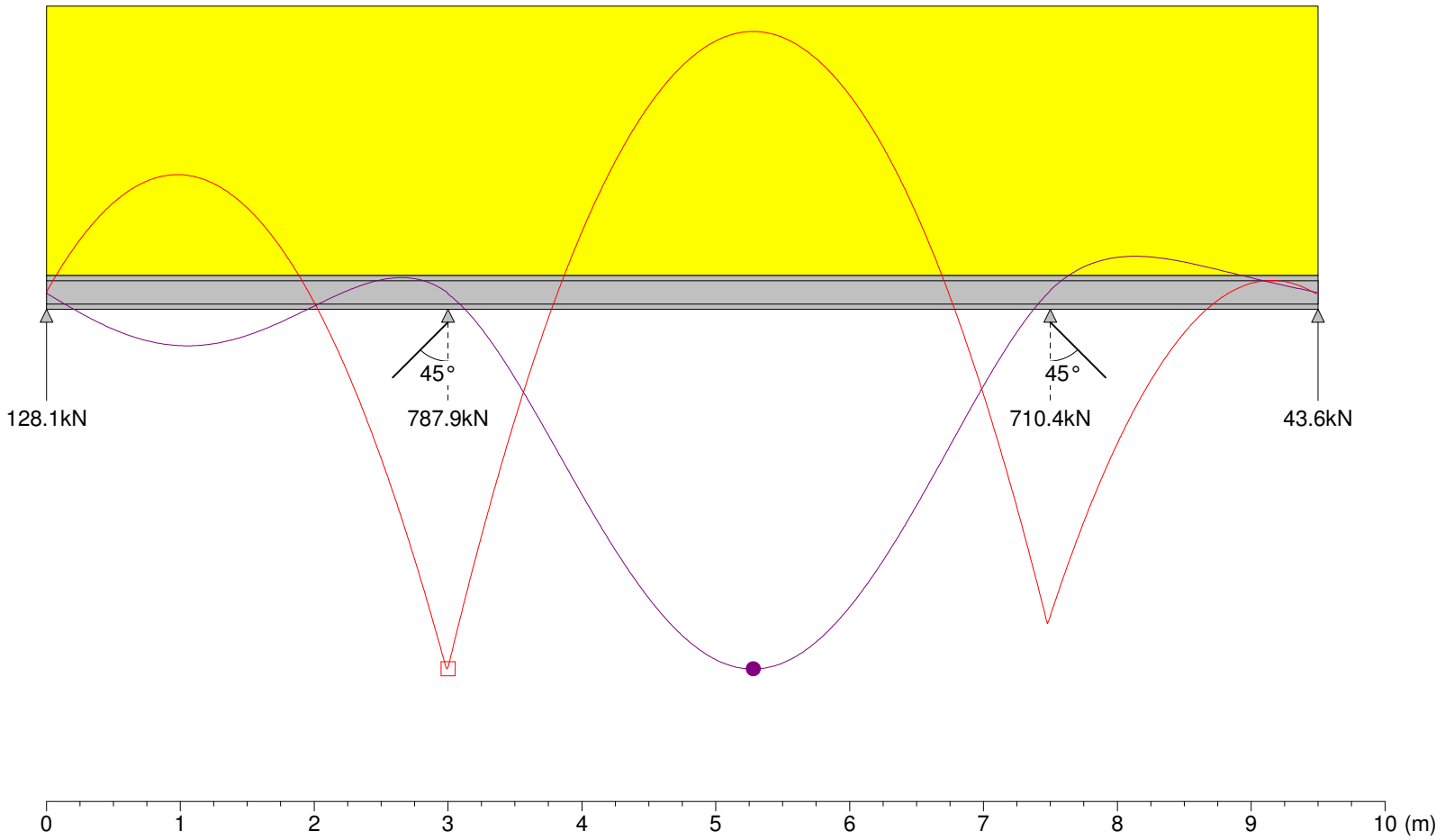
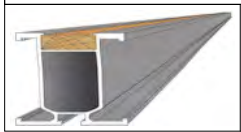
Beam: 254 x 254 x 73 UC
L = 9.500 m
I = 11400.0 cm^4
E = 2.1E+08 kN/m^2
EI = 23940.0 kNm^2

Maximum		x (m)
□	199.15 kNm	3.000
●	8.800 mm	5.282
R	557.1 kN	3.000

Max Prop Load x 1.6 x 1.25= U.D.L





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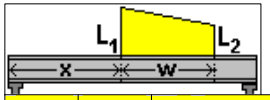
Max Prop Load x 1.6 x 1.25= U.D.L

Input Data

Beam

Name	L (m)	b (mm)	h (mm)	A (cm^2)	W (kg/m)	E (kN/m^2)	I_{xx} (cm^4)	EI (kNm^2)	f (N/mm^2)	Z (cm^3)	M (kNm)
254 x 254 x 73 UC	9.500	254.600	254.100	20.40	73.10	2.1E+08	11400.0	23940.0	270.0	898.0	125.55

Distributed Loads



x (m)	w (m)	L_1 (kN/m)	L_2 (kN/m)
0.000	9.500	129.6	129.6

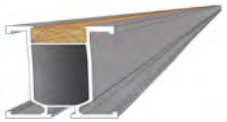
Solution

Supports

x (m)	Angle (°)	R (kN)	M (kNm)
0.000	0.0	128.1	0.0
3.000	-45.0	787.9	199.1
7.500	45.0	710.4	173.8
9.500	0.0	43.6	0.0

Maxima

	Maximum	x (m)
Reaction	557.1 kN	3.000
Shear Force	296.2 kN	3.000
Sagging Moment	137.99 kNm	5.273
Hogging Moment	-199.15 kNm	2.983
Sagging Deflection	8.800 mm	5.263
Hogging Deflection	-0.844 mm	8.123



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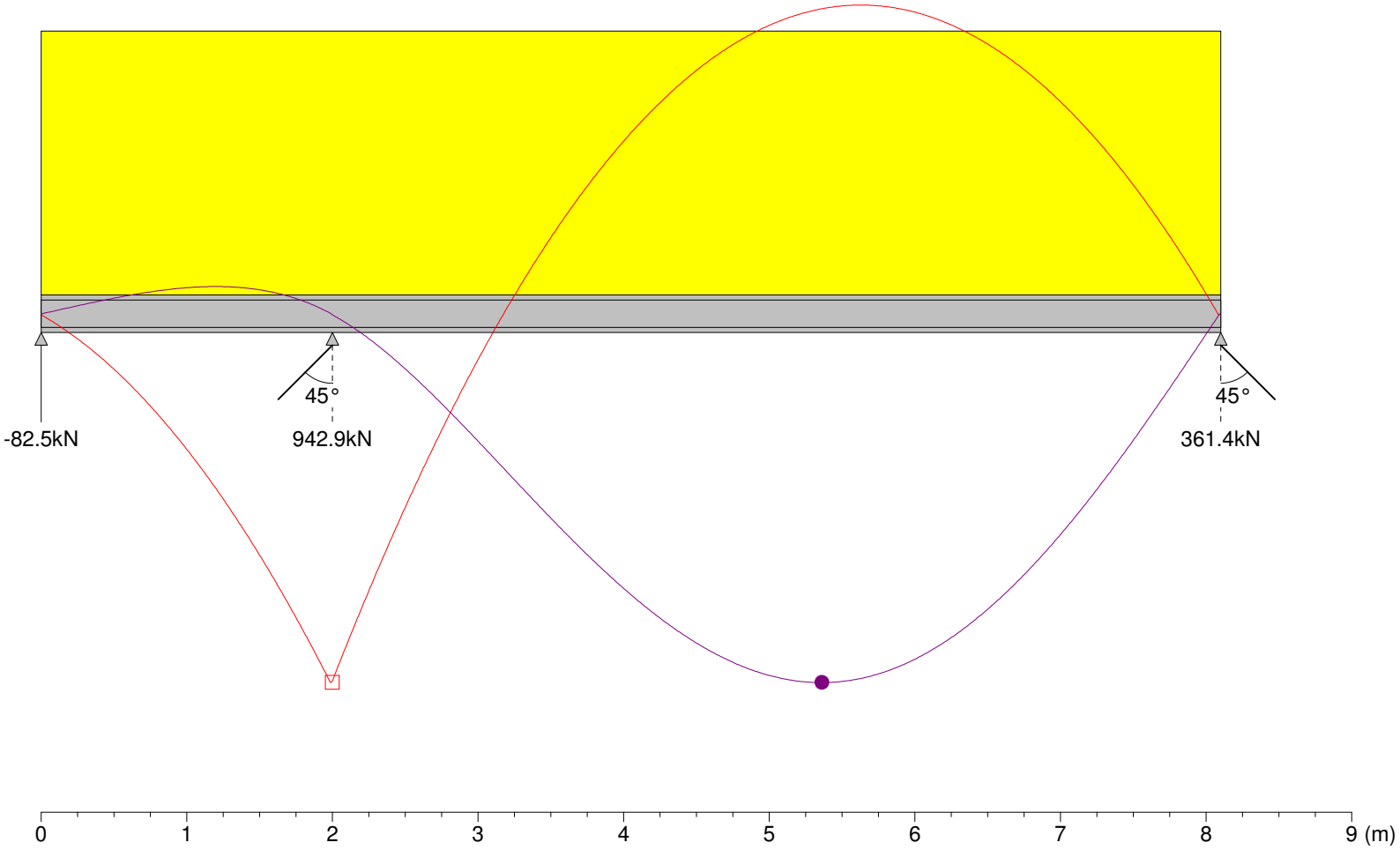
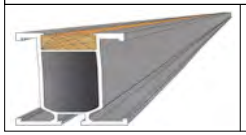
Beam: 254 x 254 x 89 UC
L = 8.100 m
I = 14300.0 cm^4
E = 2.1E+08 kN/m^2
EI = 30030.0 kNm^2

Maximum	x (m)
□ 372.38 kNm	2.000
● 33.518 mm	5.362
R 666.7 kN	2.000

Max Prop Load x 1.6 = U.D.L





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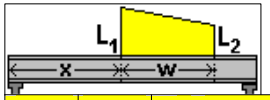
Max Prop Load x 1.6 = U.D.L

Input Data

Beam

Name	L (m)	b (mm)	h (mm)	A (cm^2)	W (kg/m)	E (kN/m^2)	I_{xx} (cm^4)	EI (kNm^2)	f (N/mm^2)	Z (cm^3)	M (kNm)
254 x 254 x 89 UC	8.100	256.300	260.300	16.90	88.90	2.1E+08	14300.0	30030.0	270.0	1100.0	329.40

Distributed Loads



x (m)	w (m)	L_1 (kN/m)	L_2 (kN/m)
0.000	8.100	103.7	103.7

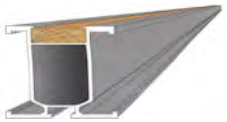
Solution

Supports

x (m)	Angle (°)	R (kN)	M (kNm)
0.000	0.0	-82.5	0.0
2.000	-45.0	942.9	372.4
8.100	45.0	361.4	0.0

Maxima

	Maximum	x (m)
Reaction	666.7 kN	2.000
Shear Force	376.8 kN	2.000
Sagging Moment	311.60 kNm	5.621
Hogging Moment	-372.38 kNm	1.985
Sagging Deflection	33.518 mm	5.346
Hogging Deflection	-2.469 mm	1.191



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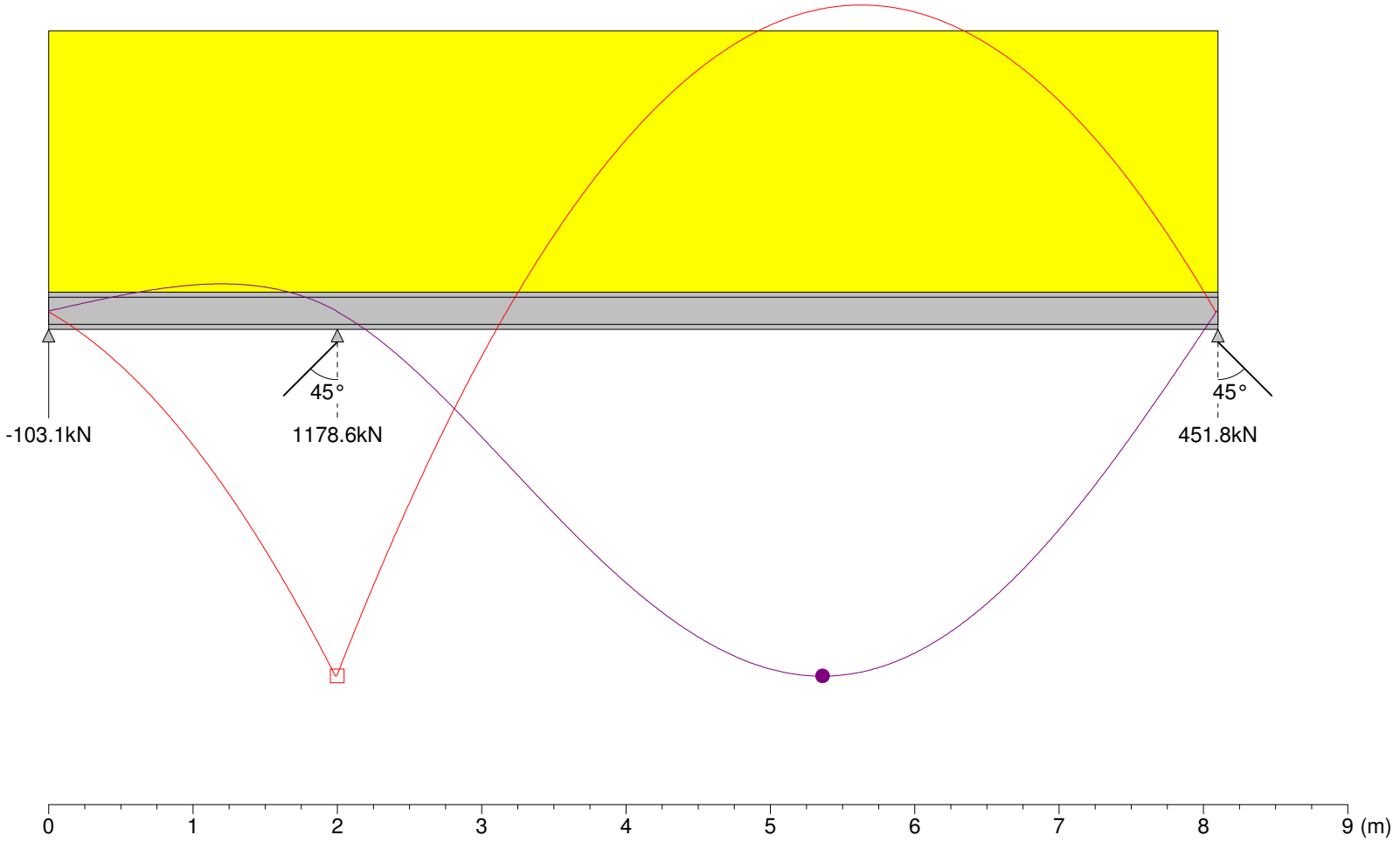
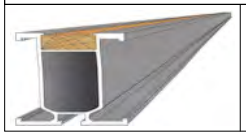
Beam: 254 x 254 x 89 UC
L = 8.100 m
I = 14300.0 cm^4
E = 2.1E+08 kN/m^2
EI = 30030.0 kNm^2

Maximum	x (m)
□ 465.48 kNm	2.000
● 41.898 mm	5.362
R 833.4 kN	2.000

Max Prop Load x 1.6 x 1.25= U.D.L





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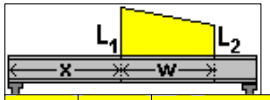
Max Prop Load x 1.6 x 1.25= U.D.L

Input Data

Beam

Name	L (m)	b (mm)	h (mm)	A (cm^2)	W (kg/m)	E (kN/m^2)	I_{xx} (cm^4)	EI (kNm^2)	f (N/mm^2)	Z (cm^3)	M (kNm)
254 x 254 x 89 UC	8.100	256.300	260.300	16.90	88.90	2.1E+08	14300.0	30030.0	270.0	1100.0	329.40

Distributed Loads



x (m)	w (m)	L_1 (kN/m)	L_2 (kN/m)
0.000	8.100	129.6	129.6

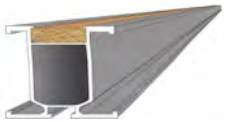
Solution

Supports

x (m)	Angle (°)	R (kN)	M (kNm)
0.000	0.0	-103.1	0.0
2.000	-45.0	1178.6	465.5
8.100	45.0	451.8	0.0

Maxima

	Maximum	x (m)
Reaction	833.4 kN	2.000
Shear Force	471.0 kN	2.000
Sagging Moment	389.50 kNm	5.621
Hogging Moment	-465.48 kNm	1.985
Sagging Deflection	41.898 mm	5.346
Hogging Deflection	-3.086 mm	1.191



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Page: 1
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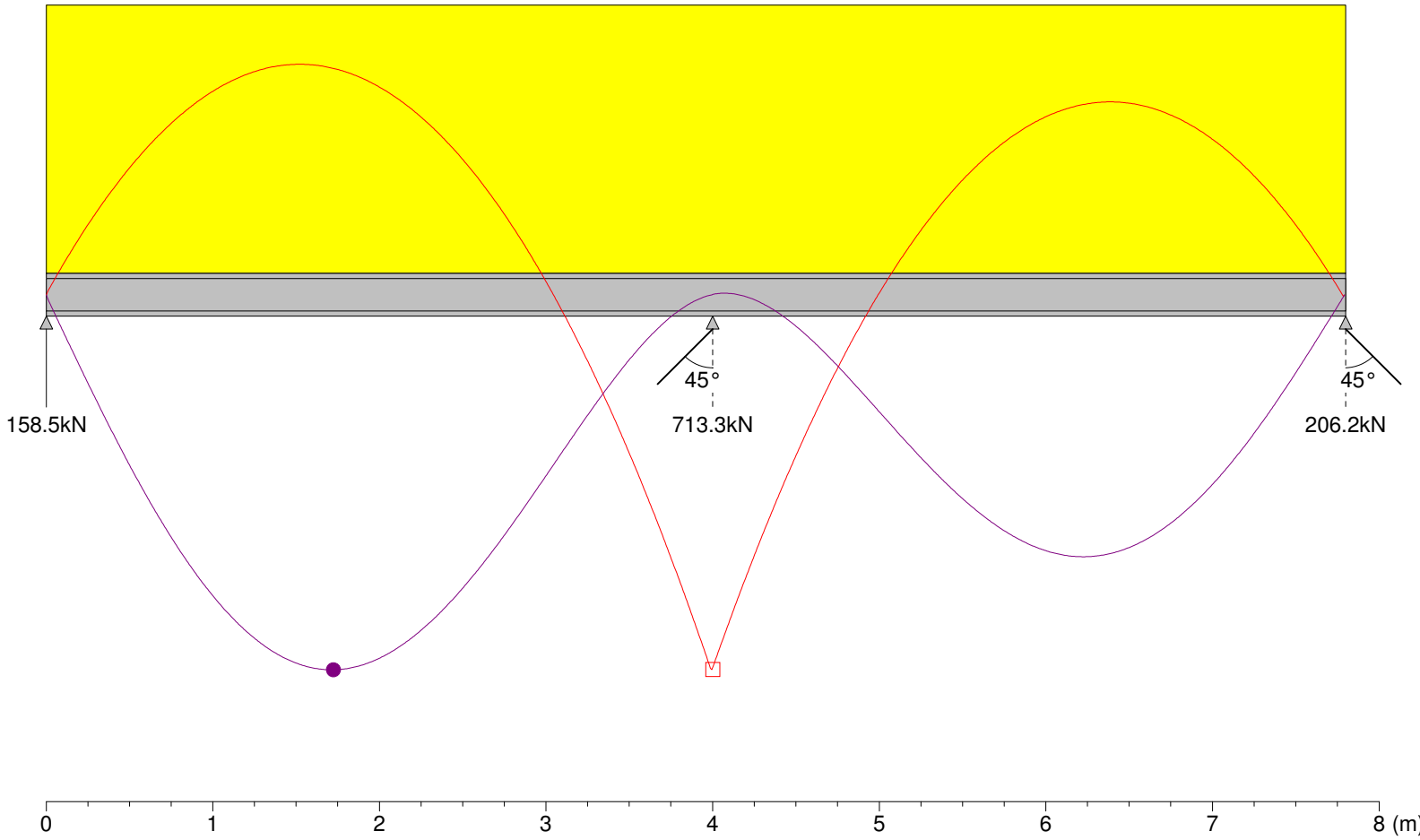
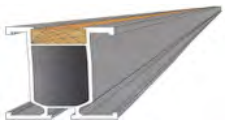
Beam: 254 x 254 x 89 UC
L = 7.800 m
I = 14300.0 cm^4
E = 2.1E+08 kN/m^2
EI = 30030.0 kNm^2

Maximum		x (m)
□	195.67 kNm	4.000
●	5.104 mm	1.724
R	504.4 kN	4.000

Max Prop Load x 1.6 = U.D.L





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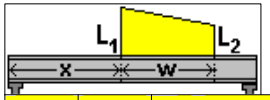
Max Prop Load x 1.6 = U.D.L

Input Data

Beam

Name	L (m)	b (mm)	h (mm)	A (cm^2)	W (kg/m)	E (kN/m^2)	I_{xx} (cm^4)	EI (kNm^2)	f (N/mm^2)	Z (cm^3)	M (kNm)
254 x 254 x 89 UC	7.800	256.300	260.300	16.90	88.90	2.1E+08	14300.0	30030.0	270.0	1100.0	329.40

Distributed Loads



x (m)	w (m)	L_1 (kN/m)	L_2 (kN/m)
0.000	7.800	103.7	103.7

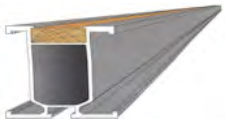
Solution

Supports

x (m)	Angle (°)	R (kN)	M (kNm)
0.000	0.0	158.5	0.0
4.000	-45.0	713.3	195.7
7.800	45.0	206.2	0.0

Maxima

	Maximum	x (m)
Reaction	504.4 kN	4.000
Shear Force	255.5 kN	4.000
Sagging Moment	120.25 kNm	1.513
Hogging Moment	-195.67 kNm	3.986
Sagging Deflection	5.104 mm	1.708
Hogging Deflection	-0.021 mm	4.064



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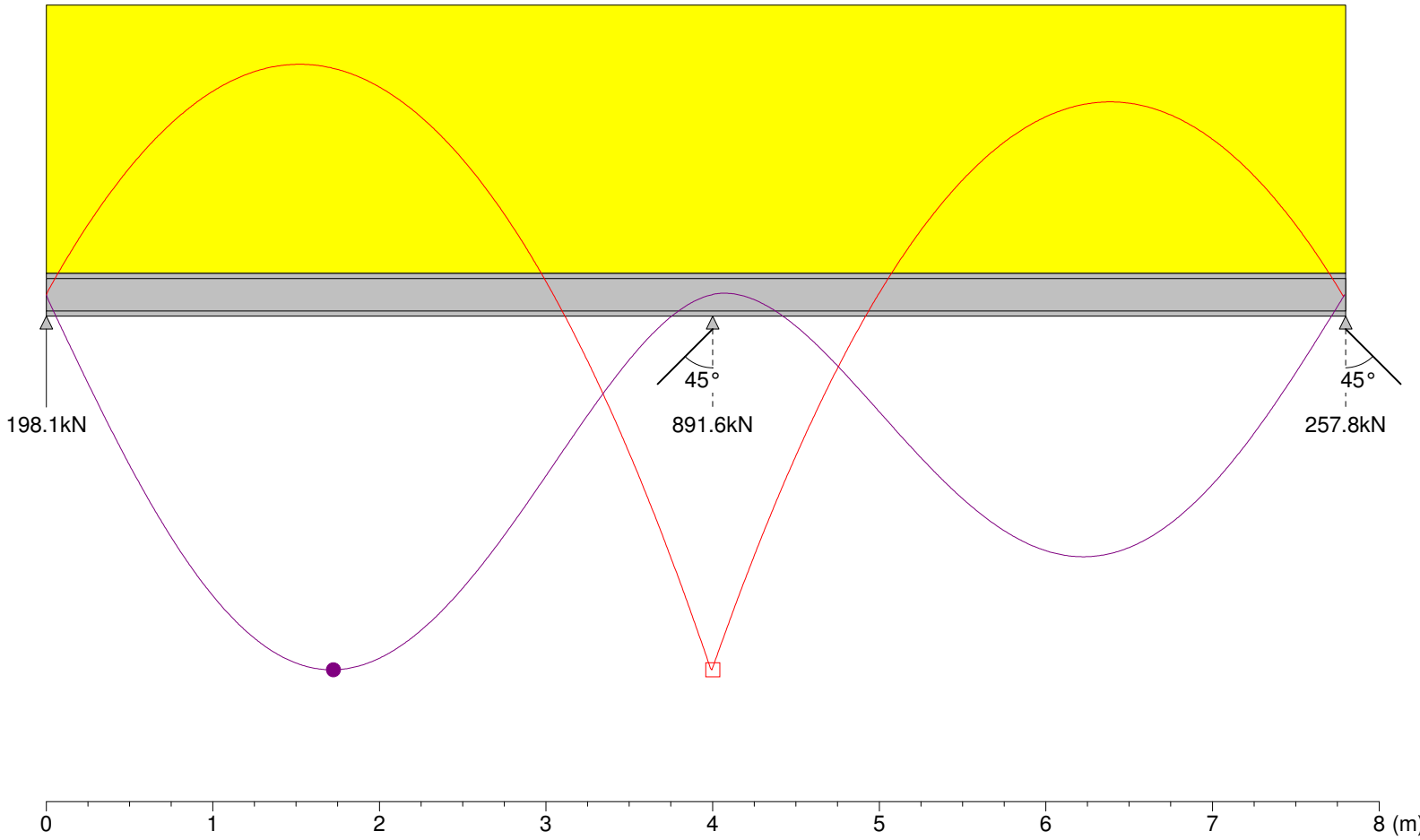
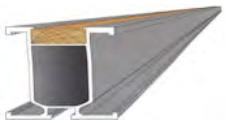
Page: 1
Date: 26.6.12

Beam: 254 x 254 x 89 UC
L = 7.800 m
I = 14300.0 cm^4
E = 2.1E+08 kN/m^2
EI = 30030.0 kNm^2

Maximum		x (m)
□	244.58 kNm	4.000
●	6.380 mm	1.724
R	630.4 kN	4.000

Max Prop Load x 1.6 x 1.25= U.D.L





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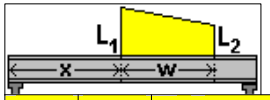
Max Prop Load x 1.6 x 1.25= U.D.L

Input Data

Beam

Name	L (m)	b (mm)	h (mm)	A (cm^2)	W (kg/m)	E (kN/m^2)	I_{xx} (cm^4)	EI (kNm^2)	f (N/mm^2)	Z (cm^3)	M (kNm)
254 x 254 x 89 UC	7.800	256.300	260.300	16.90	88.90	2.1E+08	14300.0	30030.0	270.0	1100.0	329.40

Distributed Loads



x (m)	w (m)	L_1 (kN/m)	L_2 (kN/m)
0.000	7.800	129.6	129.6

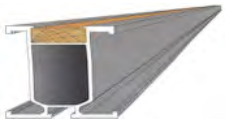
Solution

Supports

x (m)	Angle (°)	R (kN)	M (kNm)
0.000	0.0	198.1	0.0
4.000	-45.0	891.6	244.6
7.800	45.0	257.8	0.0

Maxima

	Maximum	x (m)
Reaction	630.4 kN	4.000
Shear Force	319.4 kN	4.000
Sagging Moment	150.31 kNm	1.513
Hogging Moment	-244.58 kNm	3.986
Sagging Deflection	6.380 mm	1.708
Hogging Deflection	-0.027 mm	4.064



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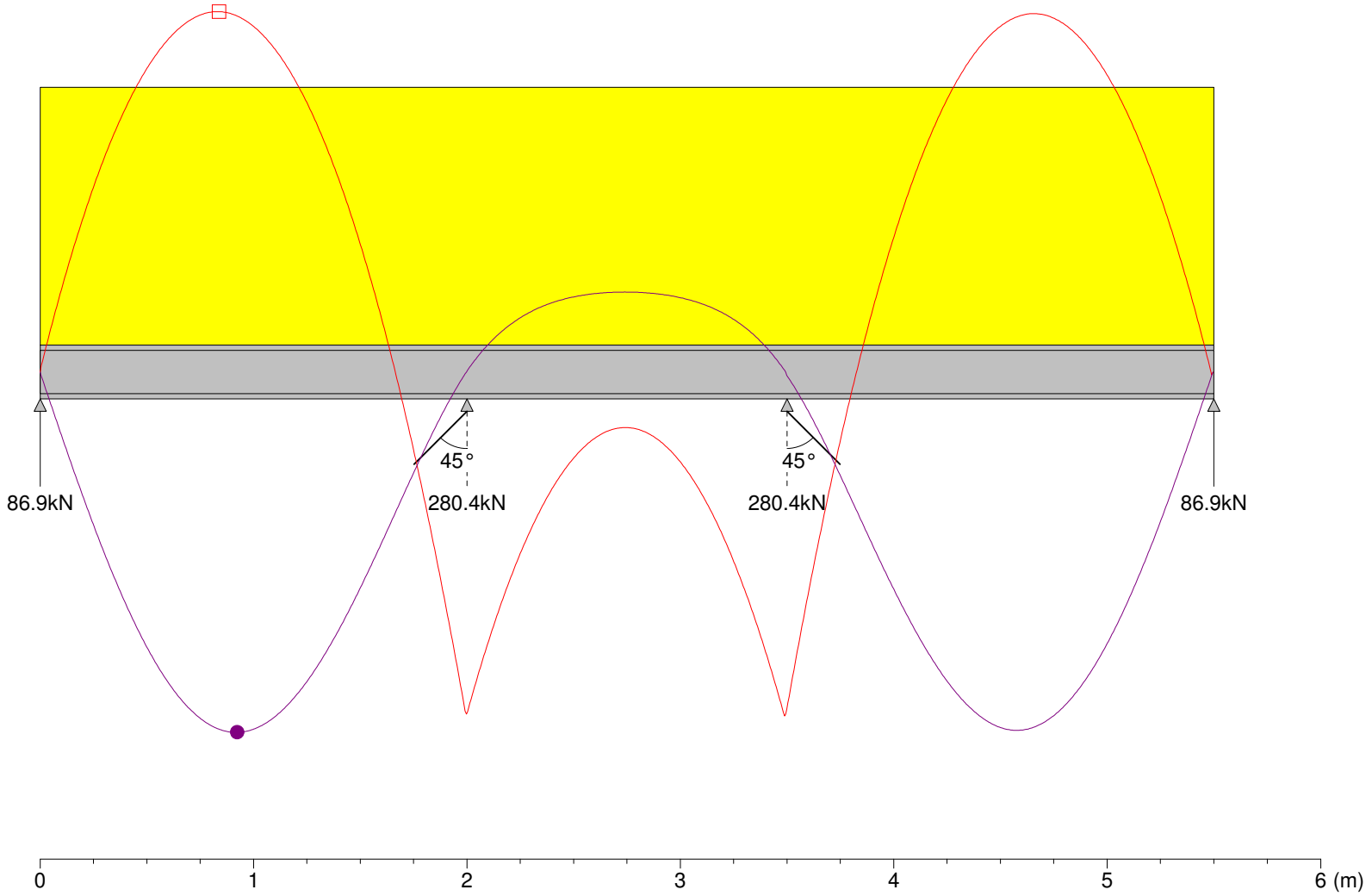
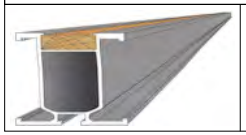
Beam: 254 x 254 x 73 UC
L = 5.500 m
I = 11400.0 cm^4
E = 2.1E+08 kN/m^2
EI = 23940.0 kNm^2

Maximum		x (m)
□	35.96 kNm	0.838
●	0.546 mm	0.924
R	198.3 kN	2.000

Max Prop Load x 1.6 = U.D.L





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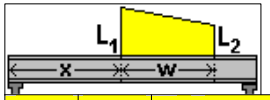
Max Prop Load x 1.6 = U.D.L

Input Data

Beam

Name	L (m)	b (mm)	h (mm)	A (cm^2)	W (kg/m)	E (kN/m^2)	I_{xx} (cm^4)	EI (kNm^2)	f (N/mm^2)	Z (cm^3)	M (kNm)
254 x 254 x 73 UC	5.500	254.600	254.100	20.40	73.10	2.1E+08	11400.0	23940.0	270.0	898.0	125.55

Distributed Loads



x (m)	w (m)	L_1 (kN/m)	L_2 (kN/m)
0.000	5.500	103.7	103.7

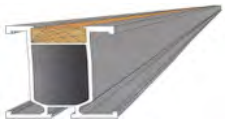
Solution

Supports

x (m)	Angle (°)	R (kN)	M (kNm)
0.000	0.0	86.9	0.0
2.000	-45.0	280.4	34.1
3.500	45.0	280.4	34.1
5.500	0.0	86.9	0.0

Maxima

	Maximum	x (m)
Reaction	198.3 kN	2.000
Shear Force	120.7 kN	3.500
Sagging Moment	35.96 kNm	0.825
Hogging Moment	-34.33 kNm	3.481
Sagging Deflection	0.546 mm	0.913
Hogging Deflection	-0.121 mm	2.734



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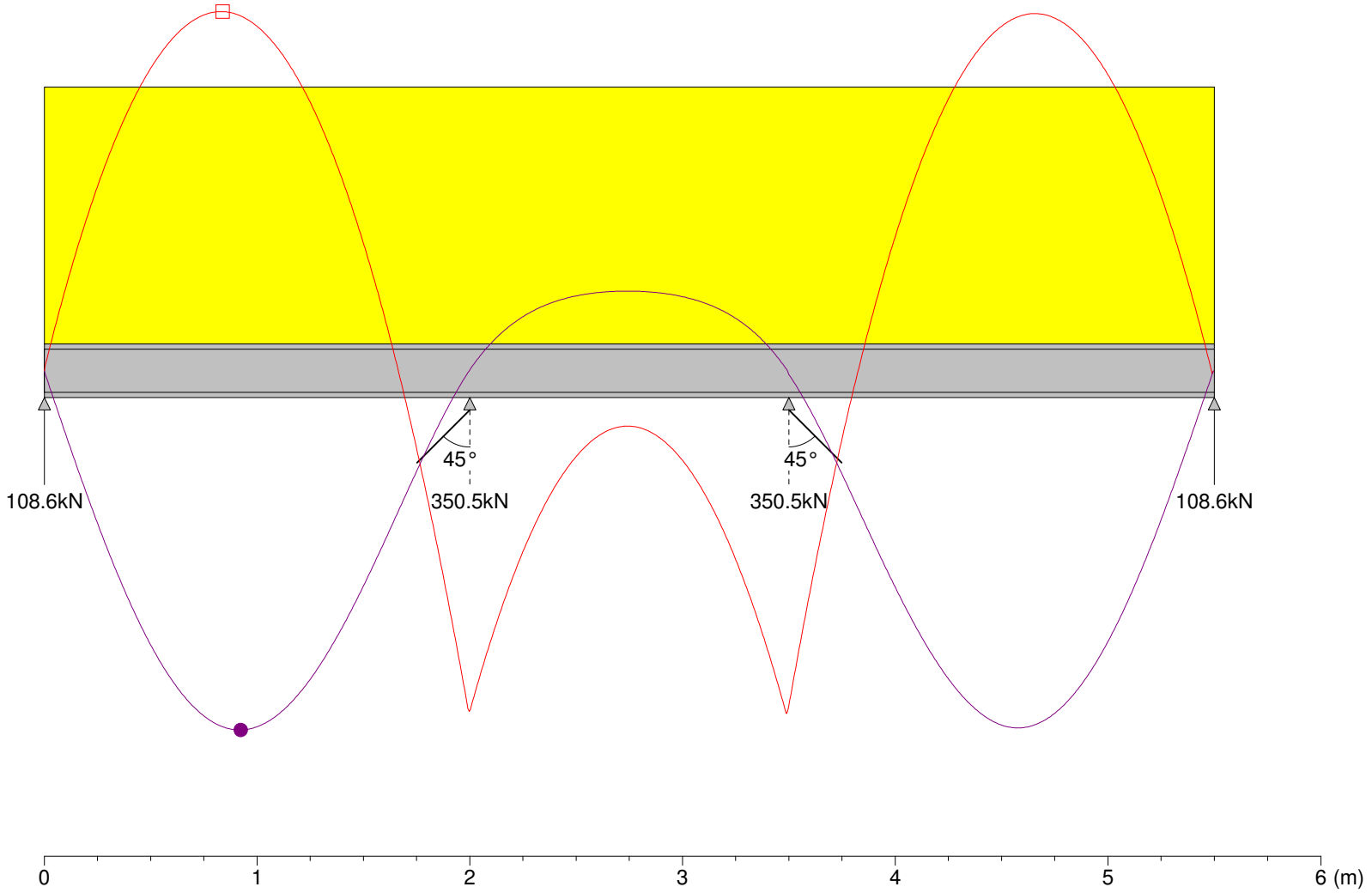
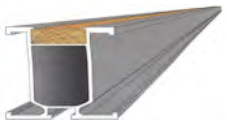
Beam: 254 x 254 x 73 UC
L = 5.500 m
I = 11400.0 cm^4
E = 2.1E+08 kN/m^2
EI = 23940.0 kNm^2

Maximum		x (m)
□	44.95 kNm	0.838
●	0.683 mm	0.924
R	247.8 kN	2.000

Max Prop Load x 1.6 x 1.25= U.D.L





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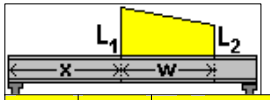
Max Prop Load x 1.6 x 1.25= U.D.L

Input Data

Beam

Name	L (m)	b (mm)	h (mm)	A (cm^2)	W (kg/m)	E (kN/m^2)	I_{xx} (cm^4)	EI (kNm^2)	f (N/mm^2)	Z (cm^3)	M (kNm)
254 x 254 x 73 UC	5.500	254.600	254.100	20.40	73.10	2.1E+08	11400.0	23940.0	270.0	898.0	125.55

Distributed Loads



x (m)	w (m)	L_1 (kN/m)	L_2 (kN/m)
0.000	5.500	129.6	129.6

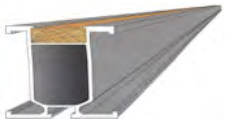
Solution

Supports

x (m)	Angle (°)	R (kN)	M (kNm)
0.000	0.0	108.6	0.0
2.000	-45.0	350.5	42.6
3.500	45.0	350.5	42.6
5.500	0.0	108.6	0.0

Maxima

	Maximum	x (m)
Reaction	247.8 kN	2.000
Shear Force	150.9 kN	3.500
Sagging Moment	44.95 kNm	0.825
Hogging Moment	-42.91 kNm	3.481
Sagging Deflection	0.683 mm	0.913
Hogging Deflection	-0.152 mm	2.734



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Z Piles

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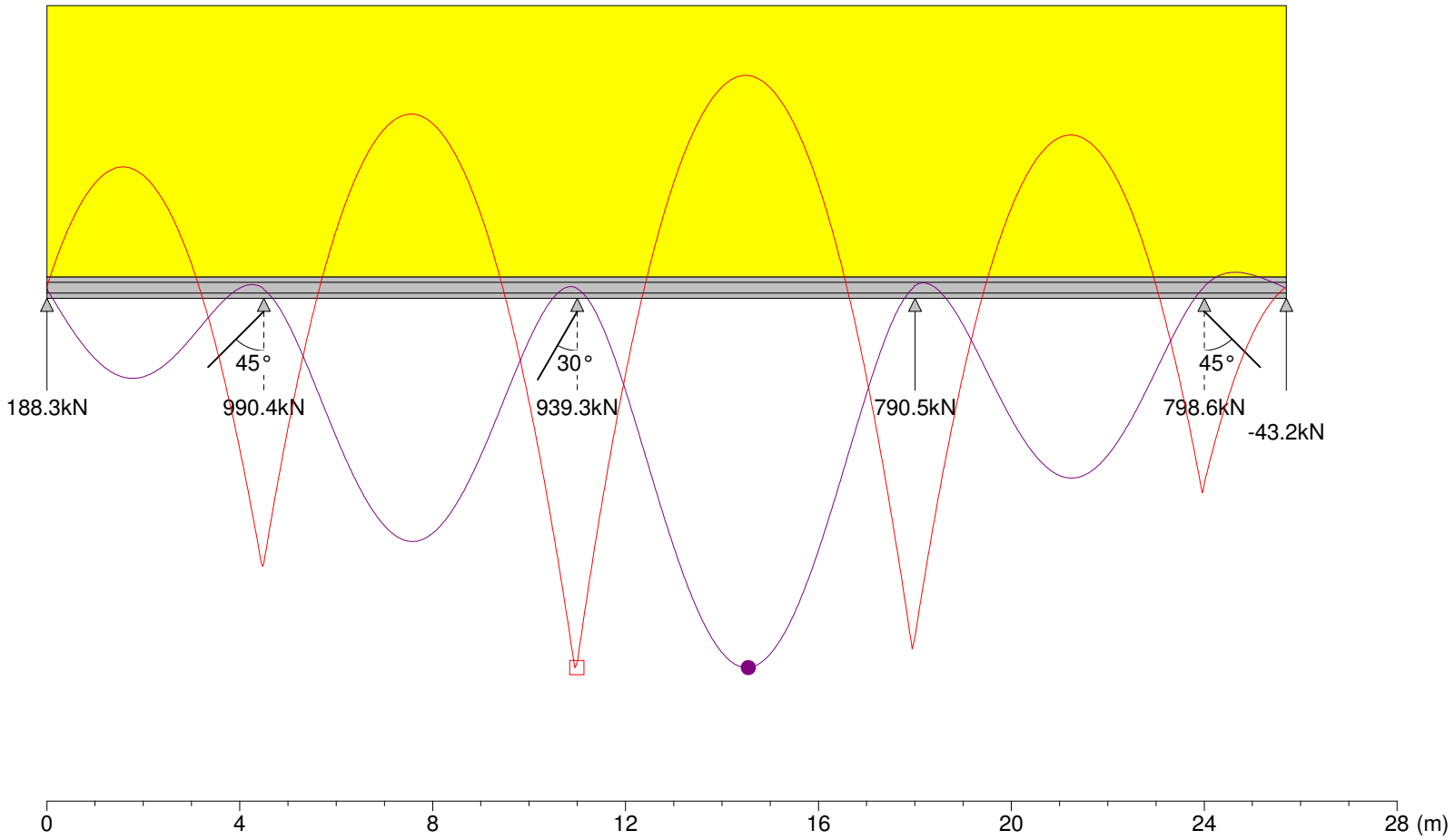
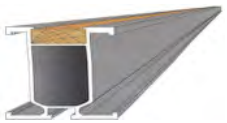
Beam: 305 x 305 x 97 UC
L = 25.700 m
I = 22300.0 cm^4
E = 2.1E+08 kN/m^2
EI = 46830.0 kNm^2

Maximum	x (m)
□ 462.73 kNm	10.987
● 18.163 mm	14.546
R 813.5 kN	11.000

Max Prop Load x 1.6 = U.D.L





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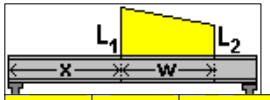
Max Prop Load x 1.6 = U.D.L

Input Data

Beam

Name	L (m)	b (mm)	h (mm)	A (cm^2)	W (kg/m)	E (kN/m^2)	I_{xx} (cm^4)	EI (kNm^2)	f (N/mm^2)	Z (cm^3)	M (kNm)
305 x 305 x 97 UC	25.700	305.300	307.900	18.50	96.90	2.1E+08	22300.0	46830.0	270.0	1450.0	429.30

Distributed Loads



x (m)	w (m)	L_1 (kN/m)	L_2 (kN/m)
0.000	25.700	117.3	117.3

Solution

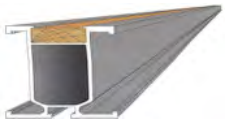
Supports

x (m)	Angle (°)	R (kN)	M (kNm)
0.000	0.0	188.3	0.0
4.500	-45.0	990.4	339.3
11.000	-30.0	939.3	460.2

x (m)	Angle (°)	R (kN)	M (kNm)
18.000	0.0	790.5	434.5
24.000	45.0	798.6	245.1
25.700	0.0	-43.2	0.0

Maxima

	Maximum	x (m)
Reaction	813.5 kN	11.000
Shear Force	412.1 kN	11.000
Sagging Moment	258.58 kNm	14.469
Hogging Moment	-462.73 kNm	10.923
Sagging Deflection	18.163 mm	14.495
Hogging Deflection	-0.737 mm	24.621



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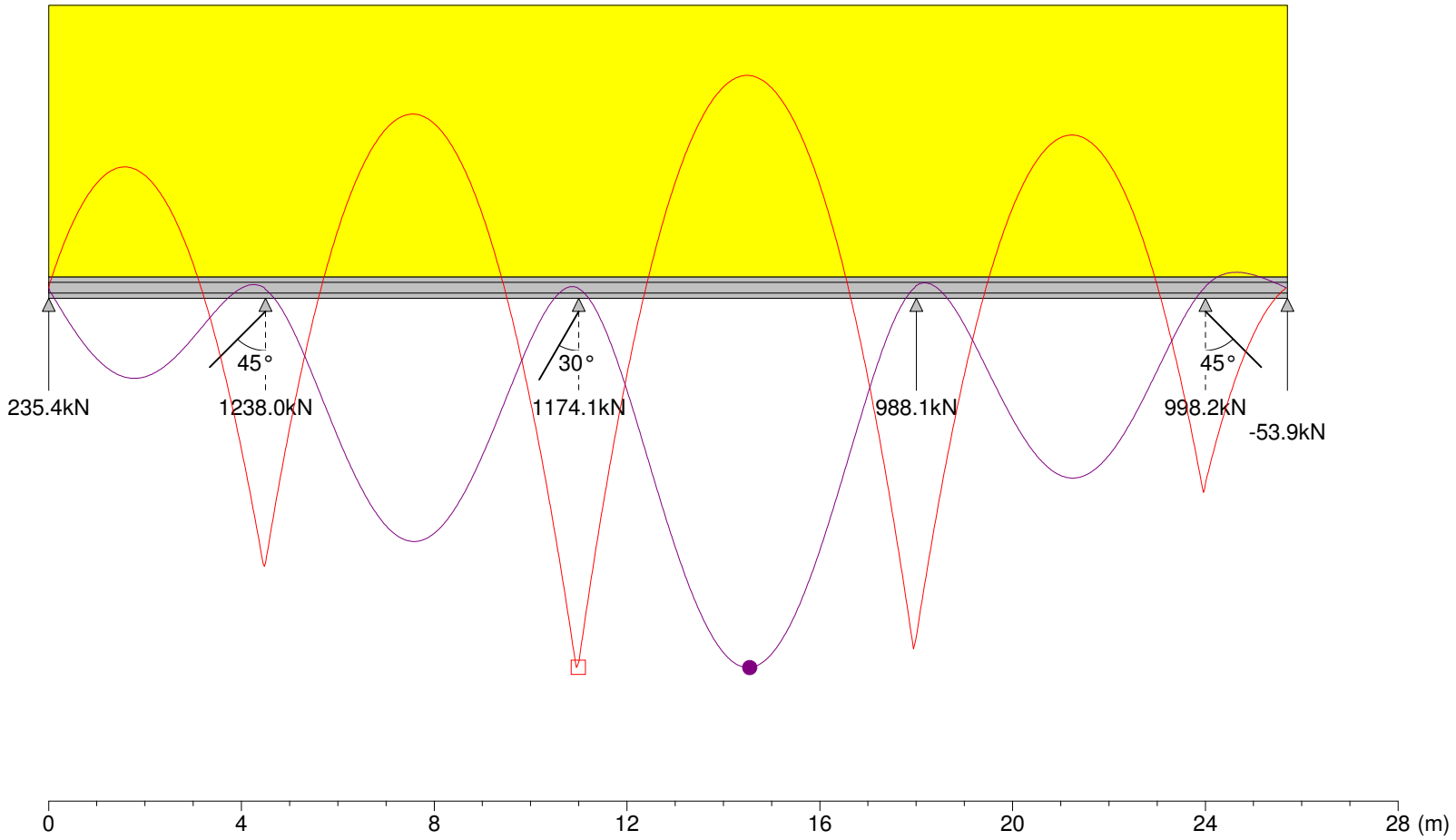
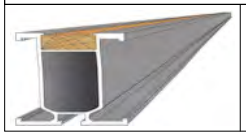
Beam: 305 x 305 x 97 UC
L = 25.700 m
I = 22300.0 cm^4
E = 2.1E+08 kN/m^2
EI = 46830.0 kNm^2

Maximum	x (m)
□ 578.39 kNm	10.987
● 22.700 mm	14.546
R 1016.8 kN	11.000

Max Prop Load x 1.6 X 1.25 = U.D.L





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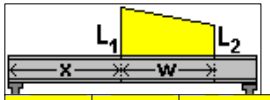
Max Prop Load x 1.6 X 1.25 = U.D.L

Input Data

Beam

Name	L (m)	b (mm)	h (mm)	A (cm^2)	W (kg/m)	E (kN/m^2)	I_{xx} (cm^4)	EI (kNm^2)	f (N/mm^2)	Z (cm^3)	M (kNm)
305 x 305 x 97 UC	25.700	305.300	307.900	18.50	96.90	2.1E+08	22300.0	46830.0	270.0	1450.0	429.30

Distributed Loads



x (m)	w (m)	L_1 (kN/m)	L_2 (kN/m)
0.000	25.700	146.6	146.6

Solution

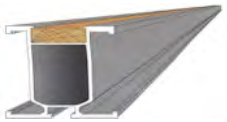
Supports

x (m)	Angle (°)	R (kN)	M (kNm)
0.000	0.0	235.4	0.0
4.500	-45.0	1238.0	424.2
11.000	-30.0	1174.1	575.3

x (m)	Angle (°)	R (kN)	M (kNm)
18.000	0.0	988.1	543.1
24.000	45.0	998.2	306.3
25.700	0.0	-53.9	0.0

Maxima

	Maximum	x (m)
Reaction	1016.8 kN	11.000
Shear Force	515.1 kN	11.000
Sagging Moment	323.20 kNm	14.469
Hogging Moment	-578.39 kNm	10.923
Sagging Deflection	22.700 mm	14.495
Hogging Deflection	-0.921 mm	24.621



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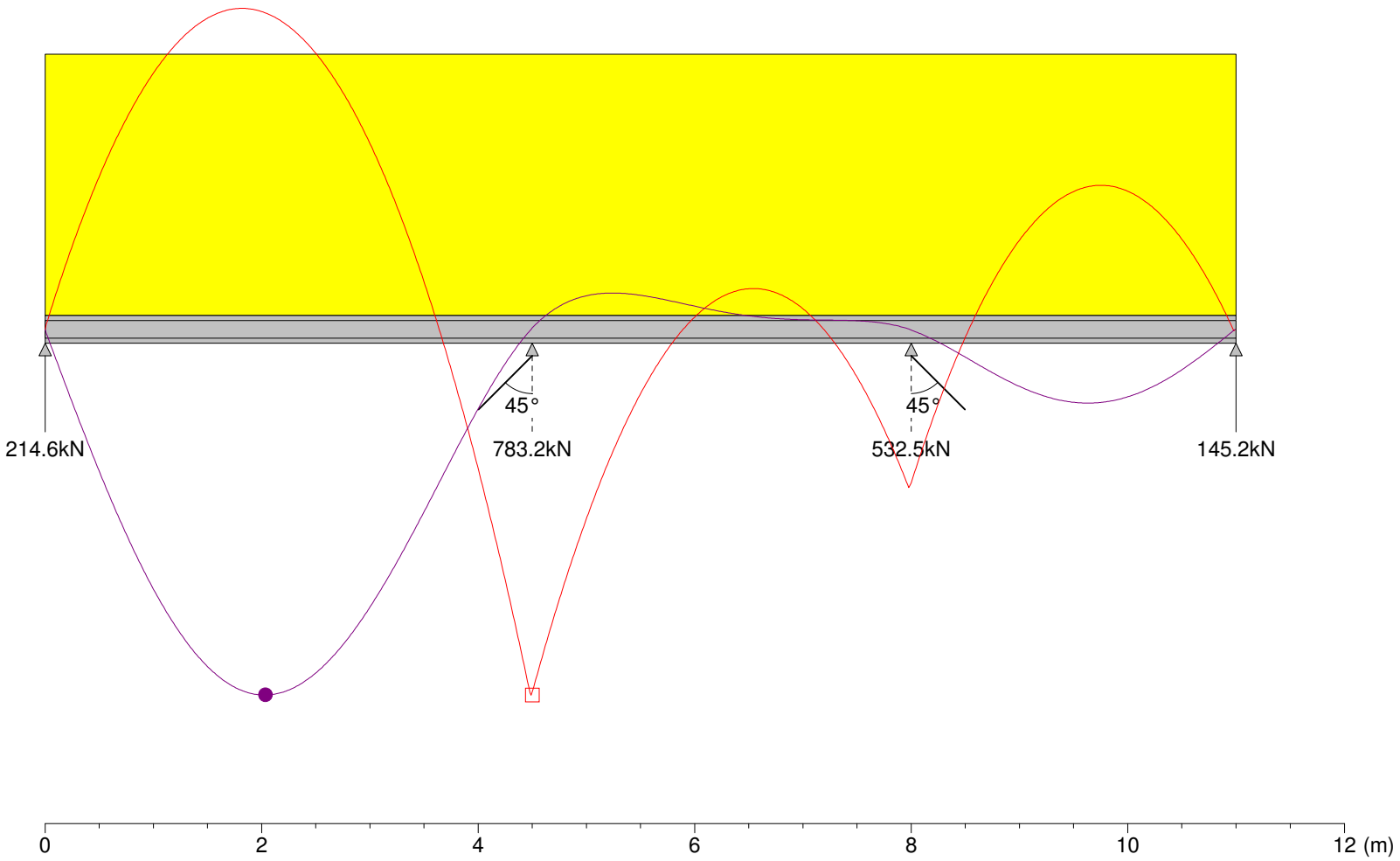
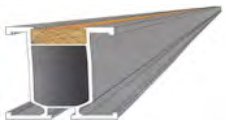
Beam: 254 x 254 x 89 UC
L = 11.000 m
I = 14300.0 cm^4
E = 2.1E+08 kN/m^2
EI = 30030.0 kNm^2

Maximum	x (m)
□ 221.66 kNm	4.500
● 11.504 mm	2.035
R 553.8 kN	4.500

Max Prop Load x 1.6 = U.D.L





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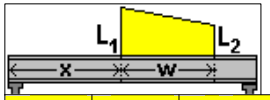
Max Prop Load x 1.6 = U.D.L

Input Data

Beam

Name	L (m)	b (mm)	h (mm)	A (cm^2)	W (kg/m)	E (kN/m^2)	I_{xx} (cm^4)	EI (kNm^2)	f (N/mm^2)	Z (cm^3)	M (kNm)
254 x 254 x 89 UC	11.000	256.300	260.300	16.90	88.90	2.1E+08	14300.0	30030.0	270.0	1100.0	329.40

Distributed Loads



x (m)	w (m)	L_1 (kN/m)	L_2 (kN/m)
0.000	11.000	117.3	117.3

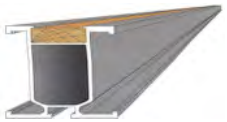
Solution

Supports

x (m)	Angle (°)	R (kN)	M (kNm)
0.000	0.0	214.6	0.0
4.500	-45.0	783.2	221.7
8.000	45.0	532.5	94.7
11.000	0.0	145.2	0.0

Maxima

	Maximum	x (m)
Reaction	553.8 kN	4.500
Shear Force	311.8 kN	4.500
Sagging Moment	194.58 kNm	1.804
Hogging Moment	-221.66 kNm	4.477
Sagging Deflection	11.504 mm	2.013
Hogging Deflection	-1.143 mm	5.225



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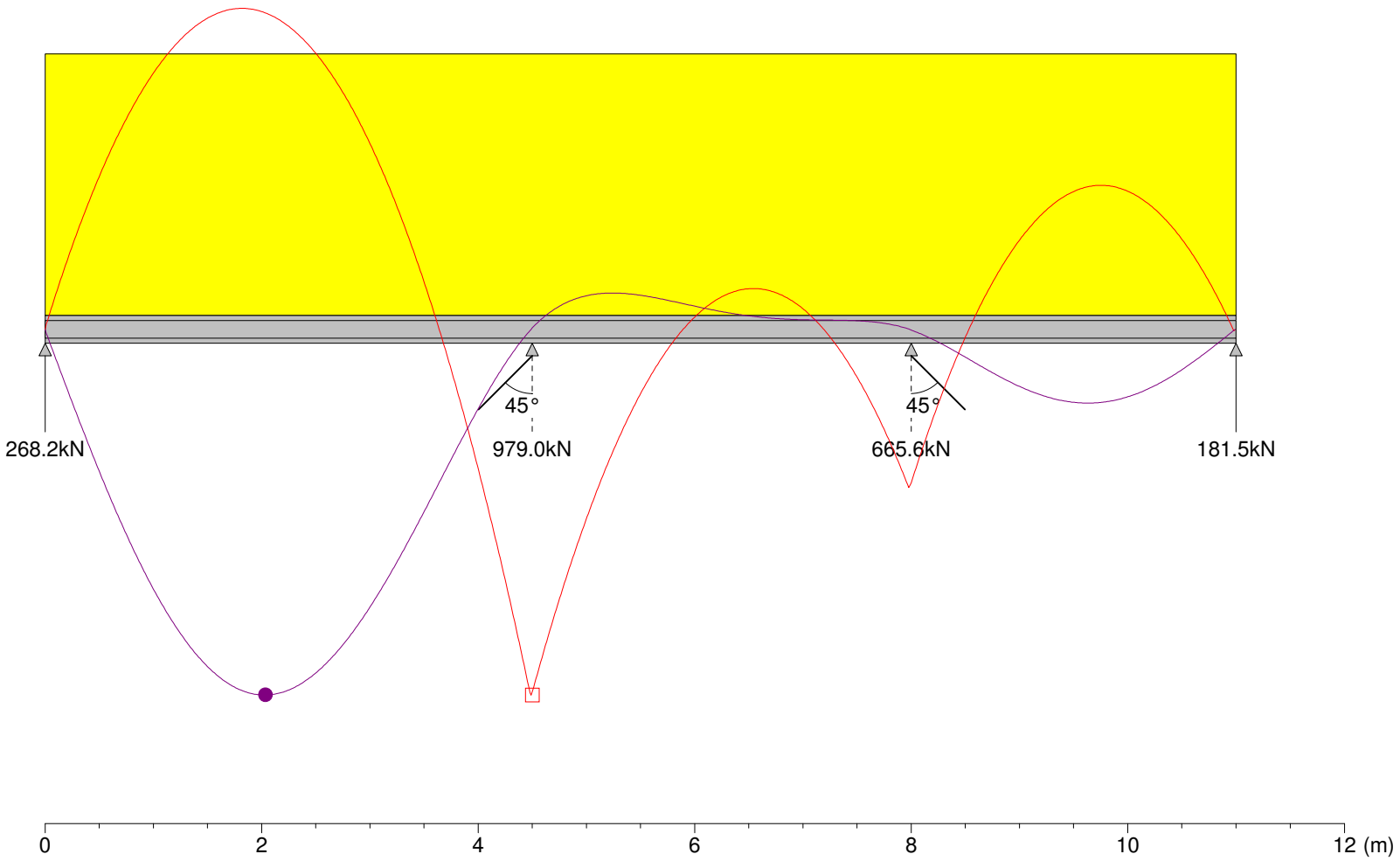
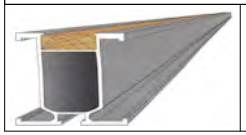
Date: 26.6.12

Beam: 254 x 254 x 89 UC
L = 11.000 m
I = 14300.0 cm^4
E = 2.1E+08 kN/m^2
EI = 30030.0 kNm^2

Maximum	x (m)
□ 277.07 kNm	4.500
● 14.380 mm	2.035
R 692.3 kN	4.500

Max Prop Load x 1.6 x 1.25= U.D.L





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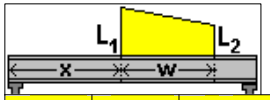
Max Prop Load x 1.6 x 1.25= U.D.L

Input Data

Beam

Name	L (m)	b (mm)	h (mm)	A (cm^2)	W (kg/m)	E (kN/m^2)	I_{xx} (cm^4)	EI (kNm^2)	f (N/mm^2)	Z (cm^3)	M (kNm)
254 x 254 x 89 UC	11.000	256.300	260.300	16.90	88.90	2.1E+08	14300.0	30030.0	270.0	1100.0	329.40

Distributed Loads



x (m)	w (m)	L_1 (kN/m)	L_2 (kN/m)
0.000	11.000	146.6	146.6

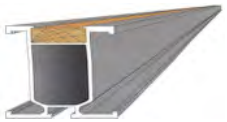
Solution

Supports

x (m)	Angle (°)	R (kN)	M (kNm)
0.000	0.0	268.2	0.0
4.500	-45.0	979.0	277.1
8.000	45.0	665.6	118.4
11.000	0.0	181.5	0.0

Maxima

	Maximum	x (m)
Reaction	692.3 kN	4.500
Shear Force	389.7 kN	4.500
Sagging Moment	243.23 kNm	1.804
Hogging Moment	-277.07 kNm	4.477
Sagging Deflection	14.380 mm	2.013
Hogging Deflection	-1.429 mm	5.225



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Appendix E

MRH Ground Investigation Report Ref 121311-January 2012

CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING,
CONTAMINATED LAND SURVEYS, DESK
STUDIES, RISK ASSESSMENT.

MRH GEOTECHNICAL

GROUND INVESTIGATION FOR

WILDWOOD LODGE
9 NORTH END
LONDON
NW3 7HH

Job No: 121311

Date January 2012

60 Station Road, Chingford, London E4 7BE Tel: 020 8559 3134 Fax: 020 8559 3135

REPORT ON A GROUND INVESTIGATION AT WILDWOOD LODGE, 9 NORTH END, HAMPSTEAD, LONDON NW3 7HH

1 INTRODUCTION

1.1 This report has been prepared for Taylor Whalley Spyra, who are acting on behalf of Allenton Ltd.

1.2 Our brief for the investigation was to:

a) Construct three boreholes with associated soil sampling and in situ testing
b) Laboratory testing of soil samples for classification

2 DETAILS OF FIELD WORK

2.1 The fieldwork comprised the construction of three boreholes at the positions indicated in appendix A.

2.2 Soil samples were recovered at regular intervals during the drilling operations, sealed in inert, airtight containers and transported to the laboratory for testing and detailed descriptions.

2.3 Water level observations were made during the drilling works and noted on the borehole logs.

2.4 The fieldwork was carried out on the 23rd and 24th January 2012.

3 GENERAL GEOLOGY AND REVEALED STRATA

3.1 The boreholes proved Made Ground to depths varying from 1.20m - 1.60m.

3.2 The boreholes then penetrated firm silty Clay with clayey Sands and Gravels from 1.80m - 3.60m (BH 2) and 2.30m - 3.80m (BH 2).

3.3 The boreholes were extended and encountered firm to stiff, becoming stiff silty Clay with laminations of silt.

3.4 Details of the boreholes, sample depths, in situ test results and revealed stratum are given in appendix B.

3.5 The 1:50,000 scale geological map indicates the natural deposits of area to be near a boundary of The Bagshot Formation and Claygate Beds with London Clay at depth.

4 GROUNDWATER

4.1 Water seepage's were noted at depths of 3.30m (BH 1), 2.10m (BH 2) and 3.40m (BH 3).

4.2 In order to allow long term monitoring, piezometers were installed in each borehole. On completion of the drilling works, water levels of 2.80m (BH's 1 and 3), and 2.75m (BH 2) were recorded.

5 LABORATORY TESTING

5.1 The recovered soil samples were tested for moisture levels, together with ten Atterberg Limit determinations.

5.2 The results and detailed sample descriptions are tabulated in appendix C, categorising the Clay elements to be of medium to high plasticity (Plasticity Index 28% - 42%).

5.3 Although this is indicative of a moderately high susceptibility to moisture related cyclic volume change there were no indications of desiccation within the samples tested.

6 CONCLUSIONS

6.1 The findings of the boreholes indicate natural ground at depths of 1.20m - 1.60m.

6.2 We understand that the proposed development will comprise the construction of a new structure incorporating basements

6.3 The in situ tests carried out in the boreholes indicate the following bearing capacities for foundation design purposes within the natural ground. However, any open excavations would require shoring and the facility of pumping groundwater, due to the instability of the ground and high water table.:

BH No	**Depth (m)**	**Allowable Bearing Capacity (KN/m^2)**
1	2.00	105
1	2.50	110
2	1.50	110
2	2.00-2.45	160 (SPT)
3	1.50	120
3	2.00	110
3	2.50-2.95	120 SPT)

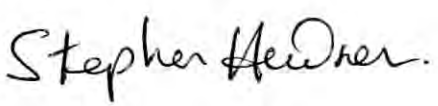
6.4 Plots of the Shear Strengths versus depth profiles are presented in appendix B (Sheet 7), while the SPT (N) values are noted on the borehole logs.

6.5 The soluble sulphate contents of the samples tested from boreholes 1 and 3 at a depth of 2.00m were 340mg/l and 360mg/l with corresponding pH values of 7.4 and 7.5 respectively.

6.6 The site can therefore be categorised as DS1 in accordance with BRE guidelines, thus not requiring any special precautions for concrete in contact with the ground.

7 REFERENCES

1) British Standard EN ISO 14688-1:2002
2) British Standard 5930: 1999
3) British Standard 1377: Parts 1-9
4) British Geological Survey Sheet 256 (1:50,000 scale) North London
5) BRE Special Digest 1: Concrete in aggressive ground (2005)
6) NHBC Standards, Chapter 4.2
7) Foundation Design and Construction (M.J. Tomlinson, Fifth Edition)



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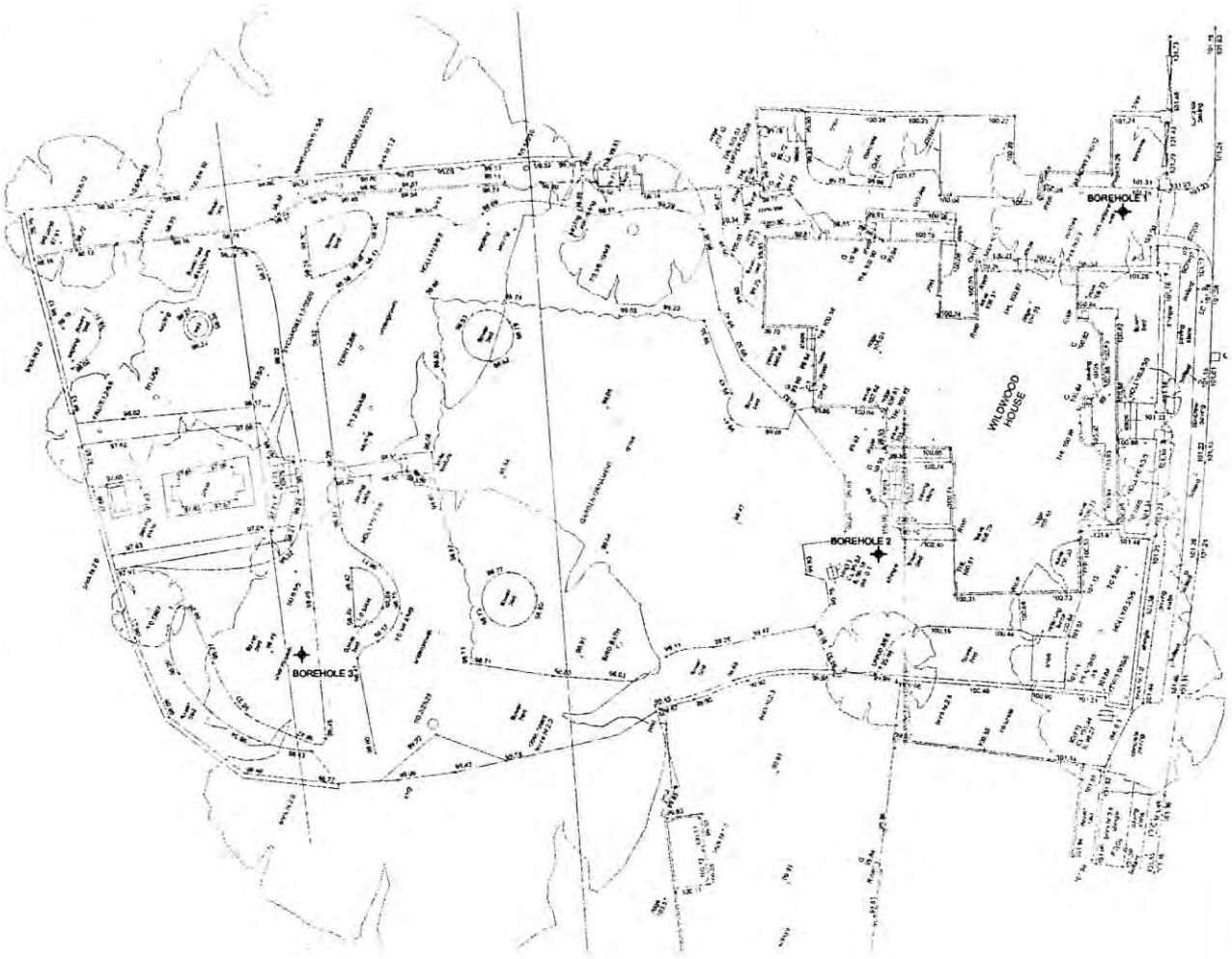
APPENDIX A

BOREHOLE LOCATION PLAN

BOREHOLE LOCATION PLAN



N.T.S.

Location:	Wildwood Lodge 9 North End London NW3 7HH	**Appendix:**	A
		Job No:	121311
		Date:	January 2012

APPENDIX B

BOREHOLE LOGS

BOREHOLE LOG - M R H GEOTECHNICAL

HOLE NO. BH 1
Sheet 1 of 2

CLIENT	SITE
Allenton Ltd	Wildwood Lodge, 9 North End, London NW3 7HH

DATE OF FIELDWORK	SCALE	LEVEL/POSITION	OPERATOR	LOGGED BY	JOB NO.
23/01/12 - 23/01/12	1:50	GROUND / AS APPENDIX A	PA/SA	SH	121311

SAMPLE DEPTH	RECORD TYPE	SPT N (Cu-kN/m^2)	Standp/ Piezo	DESCRIPTION OF STRATUM (thickness)	DEPTH
				Cobble paving (0.10)	0.10
				Sand (0.05)	0.15
0.50	D1			Soft grey very silty, sandy clay with rounded stones and brick fragments. MADE GROUND (1.45)	
1.00	D2	(38)			
1.50	D3	(40)			
					1.60
2.00	D4	(52)		Firm pale brown laminated orange brown very silty slightly sandy CLAY with traces of gravel (2.20)	
2.50	D5	(54)			
3.00	D6	(54)		Water standing at 2.80m	
3.50	D7	(56)		Water seepage at 3.30m	
					3.80
4.00	D8	(60)		Firm dark greenish brown with traces of orange brown very silty CLAY (0.90)	
4.50	D9	(58)			
					4.70
5.00	D10	(60)		Firm grey very silty CLAY with laminations of silt (2.40)	
5.50	D11				
6.00	D12	(64)		Piezometer installed	
6.50	D13				
7.00	D14	(74)			
					7.10
7.50	D15			Firm to stiff grey very silty CLAY (3.70)	
8.00	D16	(78)			
9.00	D17	(76)			
10.00	D18	(88)		Borehole continues on Sheet 2	

LEGEND

GROUNDWATER AND CASING INFORMATION

DEPTH STRUCK	DEPTH CASED	ELAPSED TIME	WATER LEVEL	DEPTH SEALED	REMARKS ON GROUNDWATER AND CASING
3.30	-	1HOUR	2.80	-	Water seepage at 3.30m, piezometer installed

BORING METHOD AND REMARKS

Mechanical auger
Piezometer installed

KEY: D = Disturbed Sample B = Bulk Sample
U = Undisturbed Sample W = Water Sample
All dimensions are in metres unless otherwise stated

BOREHOLE LOG - M R H GEOTECHNICAL

HOLE NO. BH 1
Sheet 2 of 2

CLIENT	SITE
Allenton Ltd	Wildwood Lodge, 9 North End, London NW3 7HH

DATE OF FIELDWORK	SCALE	LEVEL/POSITION	OPERATOR	LOGGED BY	JOB NO.
23/01/12 - 23/01/12	1:50	GROUND / AS APPENDIX A	PA/SA	SH	121311

SAMPLE DEPTH	RECORD TYPE	SPT N (Cu-kN/m^2)	Standp/ Piezo	DESCRIPTION OF STRATUM (thickness)	DEPTH	LEGEND
				Firm to stiff grey very silty CLAY		
11.00	D19	(110)		Stiff grey very silty CLAY (2.40)	10.80	
12.00	D20	(114)				
13.00	D21	(122)				
				Borehole ends, unable to penetrate obstruction	13.20	

GROUNDWATER AND CASING INFORMATION

DEPTH STRUCK	DEPTH CASED	ELAPSED TIME	WATER LEVEL	DEPTH SEALED	REMARKS ON GROUNDWATER AND CASING
3.30	-	1HOUR	2.80	-	Water seepage at 3.30m, piezometer installed

BORING METHOD AND REMARKS

Mechanical auger
Piezometer installed

KEY: D = Disturbed Sample B = Bulk Sample
U = Undisturbed Sample W = Water Sample
All dimensions are in metres unless otherwise stated

BOREHOLE LOG - M R H GEOTECHNICAL

HOLE NO. BH 2
Sheet 1 of 2

CLIENT	SITE
Allenton Ltd	Wildwood Lodge, 9 North End, London NW3 7HH

DATE OF FIELDWORK	SCALE	LEVEL/POSITION	OPERATOR	LOGGED BY	JOB NO.
23/01/12 - 24/01/12	1:50	GROUND / AS APPENDIX A	PA/SA	SH	121311

SAMPLE DEPTH	RECORD TYPE	SPT N (Cu-kN/m^2)	Standp/ Piezo	DESCRIPTION OF STRATUM (thickness)	DEPTH	LEGEND
				Turf over topsoil (0.20)	0.20	
0.50	D1			Firm greyish brown laminated dark orange brown silty, sandy clay with occasional gravel and brick fragments. MADE GROUND (1.10)		
1.00	D2	(58)				
1.50	D3	(52)		Firm yellowish brown laminated pale bluish grey and dark orange brown very silty CLAY (0.50)	1.30	
2.00 - 2.45	D4	N=16		Medium dense orange brown silty, clayey SAND and GRAVEL (0.30)	1.80	
				Firm orange brown very silty, slightly sandy CLAY with traces of gravel (1.30)	2.10 ▽	
2.50	D5	(50)		Water seepage at 2.10m		
3.00	D6	(58)		Water standing at 2.75m		
3.50	D7	(72)		Firm to stiff dark grey very silty CLAY (2.90)	3.40	
4.00	D8	(78)				
4.50	D9	(76)				
5.00	D10	(76)				
5.50	D11					
6.00	D12	(80)		Piezometer installed		
6.50	D13			Firm to stiff dark bluish grey very silty CLAY with laminations of silt (4.50)	6.30	
7.00	D14	(76)				
7.50	D15					
8.00	D16	(76)				
9.00	D17	(82)				
10.00	D18	(94)		Borehole continues on Sheet 2		

GROUNDWATER AND CASING INFORMATION

DEPTH STRUCK	DEPTH CASED	ELAPSED TIME	WATER LEVEL	DEPTH SEALED	REMARKS ON GROUNDWATER AND CASING
2.10	-	1HOUR	2.75	-	Water seepage at 2.10m. Piezometer installed

BORING METHOD AND REMARKS

Mechanical auger
Piezometer installed

KEY: D = Disturbed Sample B = Bulk Sample
U = Undisturbed Sample W = Water Sample
All dimensions are in metres unless otherwise stated

BOREHOLE LOG - M R H GEOTECHNICAL

HOLE NO. BH 2
Sheet 2 of 2

CLIENT	SITE
Allenton Ltd	Wildwood Lodge, 9 North End, London NW3 7HH

DATE OF FIELDWORK	SCALE	LEVEL/POSITION	OPERATOR	LOGGED BY	JOB NO.
23/01/12 - 24/01/12	1:50	GROUND / AS APPENDIX A	PA/SA	SH	121311

SAMPLE DEPTH	RECORD TYPE	SPT N (Cu-kN/m^2)	Standp/ Piezo	DESCRIPTION OF STRATUM (thickness)	DEPTH	LEGEND
				Firm to stiff dark bluish grey very silty CLAY with laminations of silt		
11.00	D19	(118)		Stiff dark grey very silty CLAY (4.20)	10.80	
12.00	D20	(114)				
13.00	D21					
14.00	D22	(128)				
15.00	D23	(130)		Borehole ends	15.00	

GROUNDWATER AND CASING INFORMATION

DEPTH STRUCK	DEPTH CASED	ELAPSED TIME	WATER LEVEL	DEPTH SEALED	REMARKS ON GROUNDWATER AND CASING
2.10	-	1HOUR	2.75	-	Water seepage at 2.10m. Piezometer installed

BORING METHOD AND REMARKS

Mechanical auger
Piezometer installed

KEY: D = Disturbed Sample B = Bulk Sample
U = Undisturbed Sample W = Water Sample
All dimensions are in metres unless otherwise stated

BOREHOLE LOG - M R H GEOTECHNICAL

HOLE NO. BH 3
Sheet 1 of 2

CLIENT	SITE
Allenton Ltd	Wildwood Lodge, 9 North End, London NW3 7HH

DATE OF FIELDWORK	SCALE	LEVEL/POSITION	OPERATOR	LOGGED BY	JOB NO.
24/01/12 - 24/01/12	1:50	GROUND / AS APPENDIX A	PA/SA	SH	121311

SAMPLE DEPTH	RECORD TYPE	SPT N (Cu-kN/m^2)	Standp/ Piezo	DESCRIPTION OF STRATUM (thickness)	DEPTH
				Black sandy topsoil with traces of fine gravel and brick fragments. MADE GROUND (0.60)	
0.50	D1				0.60
				Friable pale brown silty clay with traces of brick fragments. MADE GROUND (0.60)	
1.00	D2				1.20
1.50	D3	(60)		Firm pale brown laminated bluish grey and yellowish brown silty CLAY (1.10)	
2.00	D4	(54)			
2.50 - 2.95	D5	N=12		Medium dense yellowish brown silty clayey SAND with some gravel and black rounded pebbles (1.50)	2.30
3.00	D6			Water standing at 2.80m	
3.50 - 3.95	D7	N=19		Water seepage at 3.40m	
4.00	D8	(66)		Firm to stiff dark grey laminated dark bluish grey very silty CLAY with laminations of silt (3.30)	3.80
4.50	D9	(58)			
5.00	D10	(64)			
5.50	D11				
6.00	D12	(76)		Piezometer installed	
6.50	D13				
7.00	D14	(94)			
				Stiff dark grey very silty CLAY with laminations of silt (6.10)	7.10
7.50	D15				
8.00	D16	(104)			
9.00	D17	(112)			
10.00	D18	(106)		Borehole continues on Sheet 2	

LEGEND

GROUNDWATER AND CASING INFORMATION

DEPTH STRUCK	DEPTH CASED	ELAPSED TIME	WATER LEVEL	DEPTH SEALED	REMARKS ON GROUNDWATER AND CASING
3.40	-	1HOUR	2.80	-	Water seepage at 3.40m. Piezometer installed

BORING METHOD AND REMARKS

Mechanical auger
Piezometer installed

KEY: D = Disturbed Sample B = Bulk Sample
U = Undisturbed Sample W = Water Sample
All dimensions are in metres unless otherwise stated

BOREHOLE LOG - M R H GEOTECHNICAL

HOLE NO. BH 3
Sheet 2 of 2

CLIENT	SITE
Allenton Ltd	Wildwood Lodge, 9 North End, London NW3 7HH

DATE OF FIELDWORK	SCALE	LEVEL/POSITION	OPERATOR	LOGGED BY	JOB NO.
24/01/12 - 24/01/12	1:50	GROUND / AS APPENDIX A	PA/SA	SH	121311

SAMPLE DEPTH	RECORD TYPE	SPT N (Cu-kN/m^2)	Standp/ Piezo	DESCRIPTION OF STRATUM (thickness)	DEPTH	LEGEND
				Stiff dark grey very silty CLAY with laminations of silt		
11.00	D19	(116)				
12.00	D20	(126)				
13.00	D21	(130)				
				Borehole ends, unable to penetrate obstruction	13.20	

GROUNDWATER AND CASING INFORMATION

DEPTH STRUCK	DEPTH CASED	ELAPSED TIME	WATER LEVEL	DEPTH SEALED	REMARKS ON GROUNDWATER AND CASING
3.40	-	1HOUR	2.80	-	Water seepage at 3.40m. Piezometer installed

BORING METHOD AND REMARKS

Mechanical auger
Piezometer installed

KEY: D = Disturbed Sample B = Bulk Sample
U = Undisturbed Sample W = Water Sample
All dimensions are in metres unless otherwise stated

TEST REPORT.

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Appendix B PAGE 7

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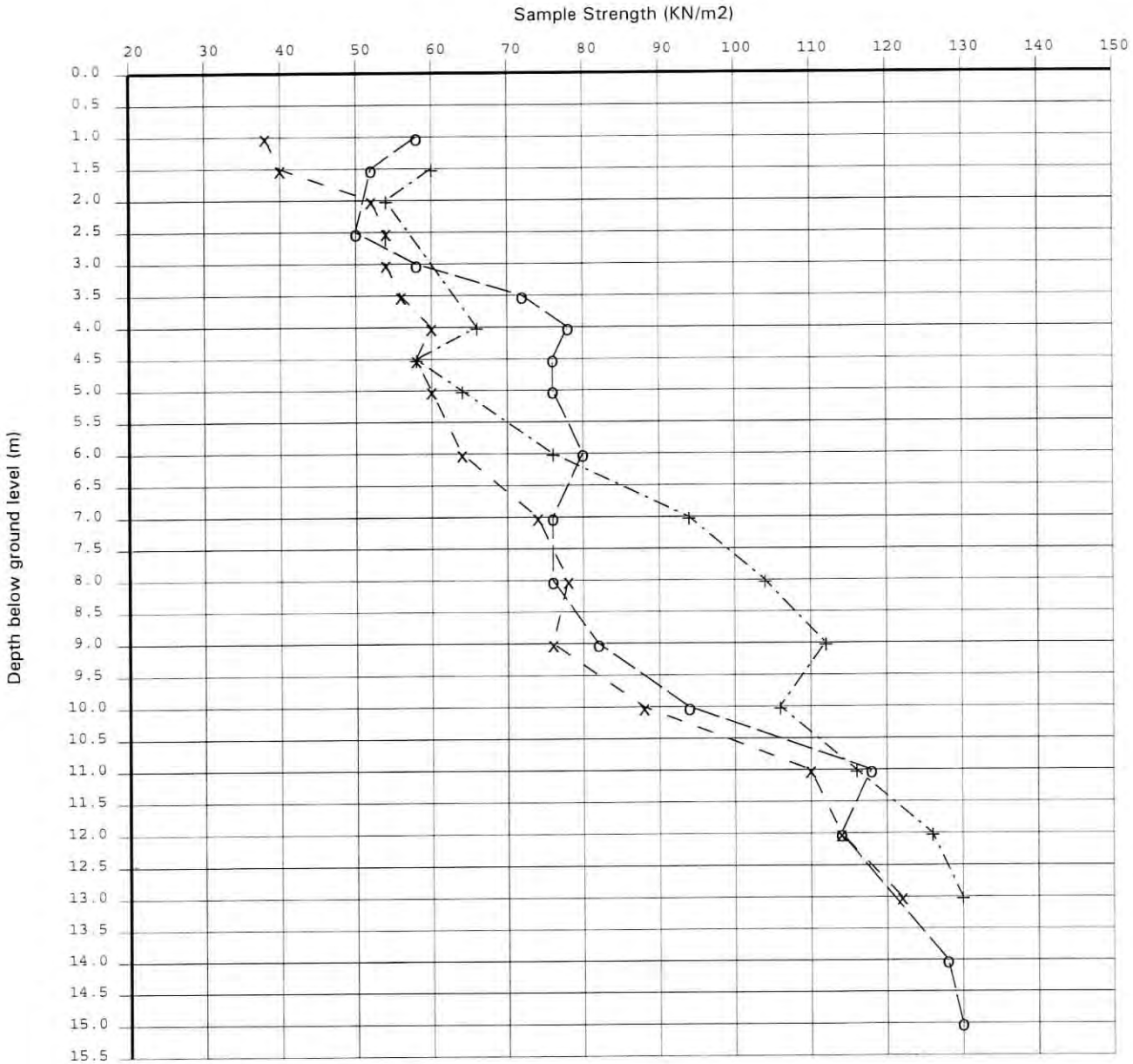
Sample Strength (KN/m2) vs Depth below ground level (m)



Key to Data Points	x : BH 1	o : BH 2	+ : BH 3					

MRPLOT

APPENDIX C

MOISTURE CONTENT TEST RESULTS
AND
ATTERBERG LIMIT DETERMINATIONS

TEST REPORT.

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Appendix C PAGE 1

Contract Job No.
Wildwood Lodge, 9 North End, 121311
London NW3 7HH

SUMMARY OF MOISTURE CONTENT, LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole/ Pit No.	Depth m.	Sample	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquidity Index (%)	Description (BS 5930:1981:41)
BH 1	0.50	D1	32	-	-	-		Soft grey very silty, sandy clay with rounded stones and brick fragments. MADE GROUND
BH 1	1.00	D2	30	-	-	-		Soft grey very silty, sandy clay with rounded stones and brick fragments. MADE GROUND
BH 1	1.50	D3	30	-	-	-		Soft grey very silty, sandy clay with rounded stones and brick fragments. MADE GROUND
BH 1	2.00	D4	20	46	16	30	0.13	Firm pale brown laminated orange brown very silty slightly sandy CLAY with traces of gravel. CI: CLAY of medium plasticity. (97% passing 425um)
BH 1	2.50	D5	21	-	-	-		Firm pale brown laminated orange brown very silty slightly sandy CLAY with traces of gravel
BH 1	3.00	D6	23	48	19	29	0.14	Firm pale brown laminated orange brown very silty slightly sandy CLAY with traces of gravel. CI: CLAY of medium plasticity. (94% passing 425um)
BH 1	3.50	D7	27	-	-	-		Firm pale orange brown very silty CLAY
BH 1	4.00	D8	27	59	24	35	0.09	Firm dark greenish brown with traces of orange brown very silty CLAY with laminations of silt. CH: CLAY of high plasticity. (100% passing 425um)
BH 1	4.50	D9	29	-	-	-		Firm dark greenish brown with traces of orange brown very silty CLAY with laminations of silt
BH 1	5.00	D10	30	66	26	40	0.10	Firm grey very silty CLAY with laminations of silt. CH: CLAY of high plasticity. (100% passing 425um)
BH 1	5.50	D11	30	-	-	-		Firm grey very silty CLAY with laminations of silt
BH 1	6.00	D12	29	-	-	-		Firm grey very silty, slightly sandy CLAY
BH 1	6.50	D13	32	-	-	-		Firm grey very silty CLAY
BH 1	7.00	D14	32	-	-	-		Firm grey very silty CLAY with laminations of silt
BH 1	7.50	D15	31	-	-	-		Firm to stiff grey very silty CLAY
BH 1	8.00	D16	31	-	-	-		Firm to stiff grey very silty CLAY

METHOD OF PREPARATION : BS 1377:PART 1:1990:7.4 & PART 2:1990:4.2

METHOD OF TEST : BS 1377:PART 2:1990:3.2, 4.4, 5.3, 5.4

TYPE OF SAMPLE KEY : U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter

COMMENTS :

REMARKS TO INCLUDE : Sample disturbance, loss of moisture, variation from test procedure, location and origin of test specimen within original sample. Oven drying temperature if not 105-110 deg C.

TEST REPORT.

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Appendix C PAGE 2

Contract
Wildwood Lodge, 9 North End,
London NW3 7HH

Job No.
121311

SUMMARY OF MOISTURE CONTENT, LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole/ Pit No.	Depth m.	Sample	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquidity Index (%)	Description (BS 5930:1981:41)
BH 1	9.00	D17	36	-	-	-		Firm to stiff grey very silty CLAY with numerous laminations of silt
BH 1	10.00	D18	32	-	-	-		Firm to stiff grey very silty CLAY with laminations of silt
BH 1	11.00	D19	30	-	-	-		Stiff grey very silty CLAY
BH 1	12.00	D20	29	-	-	-		Stiff grey very silty CLAY
BH 1	13.00	D21	29	-	-	-		Stiff grey very silty CLAY
BH 2	0.50	D1	23	-	-	-		Firm greyish brown silty, sandy clay with occasional gravel, topsoil and brick fragments. MADE GROUND
BH 2	1.00	D2	22	-	-	-		Firm dark brown laminated dark orange brown very silty, sandy clay with occasional gravel and brick fragments. MADE GROUND
BH 2	1.50	D3	23	48	19	29	0.14	Firm yellowish brown laminated pale bluish grey and dark orange brown very silty CLAY. CI: CLAY of medium plasticity. (98% passing 425um)
BH 2	2.00 -2.45	D4	15	-	-	-		Medium dense orange brown silty, clayey SAND and GRAVEL
BH 2	2.50	D5	23	-	-	-		Firm orange brown very silty, slightly sandy CLAY with traces of gravel
BH 2	3.00	D6	27	-	-	-		Firm orange brown very silty, slightly sandy CLAY with traces of gravel
BH 2	3.50	D7	28	66	24	42	0.10	Firm to stiff dark grey laminated brown very silty CLAY. CH: CLAY of high plasticity. (100% passing 425um)
BH 2	4.00	D8	28	-	-	-		Firm to stiff dark grey very silty CLAY
BH 2	4.50	D9	28	-	-	-		Firm to stiff dark grey very silty CLAY with laminations of silt
BH 2	5.00	D10	29	-	-	-		Firm to stiff dark grey very silty CLAY
BH 2	5.50	D11	29	-	-	-		Firm to stiff dark bluish grey very silty CLAY

METHOD OF PREPARATION : BS 1377:PART 1:1990:7.4 & PART 2:1990:4.2

METHOD OF TEST : BS 1377:PART 2:1990:3.2, 4.4, 5.3, 5.4

TYPE OF SAMPLE KEY : U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter

COMMENTS :

REMARKS TO INCLUDE : Sample disturbance, loss of moisture, variation from test procedure, location and origin of test specimen within original sample. Oven drying temperature if not 105-110 deg C.

TEST REPORT.

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Appendix C PAGE 3

Contract
Wildwood Lodge, 9 North End, London NW3 7HH

Job No.
121311

SUMMARY OF MOISTURE CONTENT, LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole/ Pit No	Depth m.	Sample	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquidity Index (%)	Description (BS 5930:1981:41)
BH 2	6.00	D12	31	68	28	40	0.08	Firm to stiff dark grey very silty CLAY. CH: CLAY of high plasticity. (100% passing 425um)
BH 2	6.50	D13	34	-	-	-		Firm to stiff dark bluish grey very silty CLAY with numerous laminations of silt
BH 2	7.00	D14	31	-	-	-		Firm to stiff dark bluish grey very silty CLAY with laminations of silt
BH 2	7.50	D15	30	-	-	-		Firm to stiff dark bluish grey very silty CLAY
BH 2	8.00	D16	31	-	-	-		Firm to stiff dark bluish grey very silty CLAY with laminations of silt
BH 2	9.00	D17	31	-	-	-		Firm to stiff dark bluish grey very silty CLAY with laminations of silt
BH 2	10.00	D18	29	-	-	-		Firm to stiff dark bluish grey very silty CLAY
BH 2	11.00	D19	28	-	-	-		Stiff dark grey very silty CLAY
BH 2	12.00	D20	29	-	-	-		Stiff dark grey very silty CLAY with laminations of silt
BH 2	13.00	D21	28	-	-	-		Stiff dark grey very silty CLAY
BH 2	14.00	D22	27	-	-	-		Stiff dark grey with traces of orange brown very silty CLAY, occasional laminations of silt
BH 2	15.00	D23	27	-	-	-		Stiff dark bluish grey very silty CLAY
BH 3	0.50	D1	30	-	-	-		Black sandy topsoil with traces of fine gravel and brick fragments. MADE GROUND
BH 3	1.00	D2	15	-	-	-		Friable pale brown silty clay with traces of brick fragments. MADE GROUND
BH 3	1.50	D3	23	47	19	28	0.14	Firm pale brown laminated bluish grey and yellowish brown silty CLAY. CI: CLAY of medium plasticity. (99% passing 425um)
BH 3	2.00	D4	26	-	-	-		Firm pale brown laminated bluish grey and yellowish brown silty CLAY

METHOD OF PREPARATION : BS 1377:PART 1:1990:7.4 & PART 2:1990:4.2

METHOD OF TEST : BS 1377:PART 2:1990:3.2, 4.4, 5.3, 5.4

TYPE OF SAMPLE KEY : U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter

COMMENTS :

REMARKS TO INCLUDE : Sample disturbance, loss of moisture, variation from test procedure, location and origin of test specimen within original sample. Oven drying temperature if not 105-110 deg C.

TEST REPORT.

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Appendix C PAGE 4

Contract
Wildwood Lodge, 9 North End, London NW3 7HH

Job No. 121311

SUMMARY OF MOISTURE CONTENT, LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole/ Pit No.	Depth m.	Sample	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Liquidity Index (%)	Description (BS 5930:1981:41)
BH 3	2.50 -2.95	D5	14	-	-	-		Medium dense yellowish brown silty clayey SAND with some gravel
BH 3	3.00	D6	15	-	-	-		Medium dense yellowish brown silty clayey SAND and GRAVEL with some black rounded pebbles
BH 3	3.50 -3.95	D7	11	-	-	-		Medium dense yellowish brown silty, clayey, sandy GRAVEL
BH 3	4.00	D8	29	66	25	41	0.10	Firm to stiff dark bluish grey very silty CLAY. CH: CLAY of high plasticity. (100% passing 425um)
BH 3	4.50	D9	29	-	-	-		Firm to stiff dark grey very silty CLAY with numerous laminations of silt
BH 3	5.00	D10	31	-	-	-		Firm to stiff dark grey laminated dark bluish grey very silty CLAY with laminations of silt
BH 3	5.50	D11	30	68	27	41	0.07	Firm to stiff dark grey laminated dark bluish grey very silty CLAY. CH: CLAY of high plasticity. (100% passing 425um)
BH 3	6.00	D12	28	-	-	-		Firm to stiff dark grey silty CLAY
BH 3	6.50	D13	28	-	-	-		Firm to stiff dark grey laminated dark bluish grey very silty CLAY
BH 3	7.00	D14	28	-	-	-		Firm to stiff dark grey silty CLAY with occasional white shell debris
BH 3	7.50	D15	28	-	-	-		Stiff dark grey silty CLAY with occasional white shell debris
BH 3	8.00	D16	29	-	-	-		Stiff dark bluish grey very silty CLAY
BH 3	9.00	D17	29	-	-	-		Stiff dark bluish grey very silty CLAY
BH 3	10.00	D18	33	-	-	-		Stiff dark grey very silty CLAY with laminations of silt
BH 3	11.00	D19	32	-	-	-		Stiff dark grey very silty CLAY with laminations of silt
BH 3	12.00	D20	29	-	-	-		Stiff dark grey very silty CLAY
BH 3	13.00	D21	30	-	-	-		Stiff dark grey silty CLAY

METHOD OF PREPARATION : BS 1377:PART 1:1990:7.4 & PART 2:1990:4.2

METHOD OF TEST : BS 1377:PART 2:1990:3.2, 4.4, 5.3, 5.4

TYPE OF SAMPLE KEY : U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter

COMMENTS :

REMARKS TO INCLUDE : Sample disturbance, loss of moisture, variation from test procedure, location and origin of test specimen within original sample. Oven drying temperature if not 105-110 deg C.

Appendix F

Camden Geological-Hydrogeological & Hydrological Study
Extracts Figures 11, 12, 14, 15 & 16

THE COURTYARD HOUSE

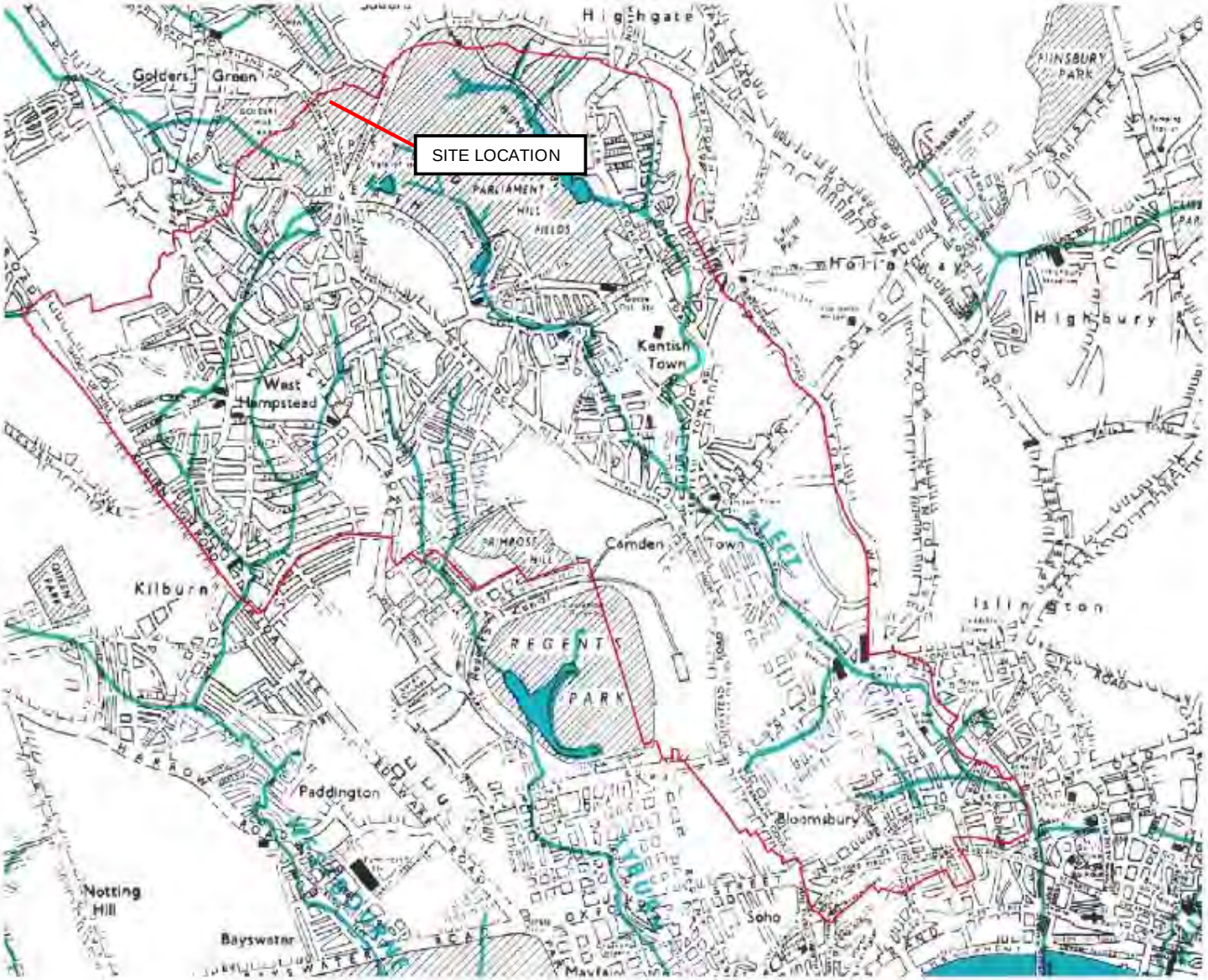
HAMPSTEAD

LONDON, NW3

CAMDEN GEOLOGICAL, HYDROGEOLOGICAL AND HYDROLOGICAL STUDY EXTRACTS

FIGURES 11 - WATERCOURSES
FIGURES 12 – CAMDEN SURFACE WATER FEATURES
FIGURES 14 – HAMPSTEAD HEATH SURFACE WATER CATCHMENTS AND DRAINAGE
FIGURES 15 – FLOOD MAP
FIGURES 16 – SLOPE ANGLE MAP

3 Dufferin Avenue,
Barbican, London, EC1Y 8PQ
T: 020 7253 2626
F: 020 7253 2767
E: tws@tws.uk.com
W: www.tws.uk.com

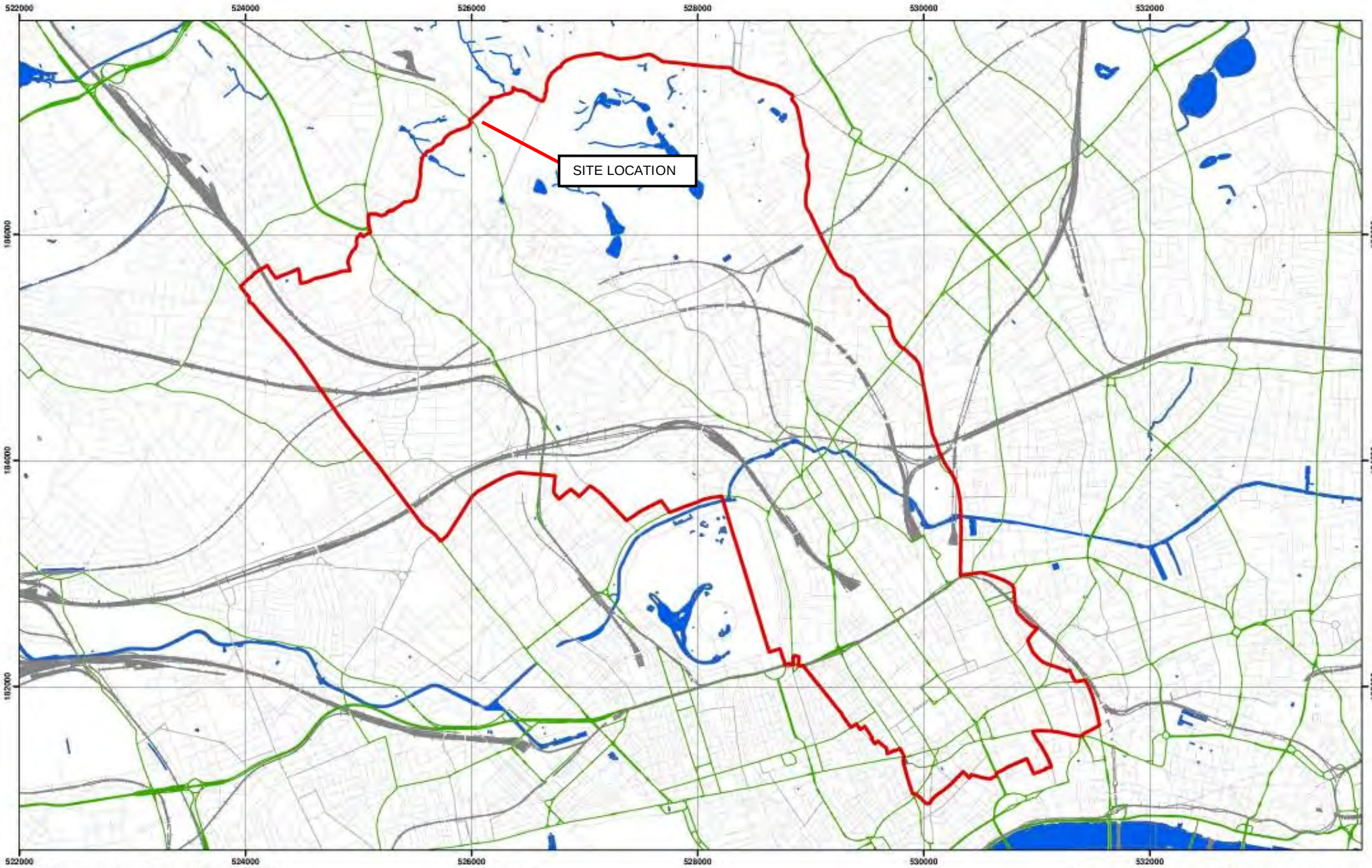


Source – Barton, Lost Rivers of London

Camden Geological, Hydrogeological and Hydrological Study
Watercourses

213923

FIGURE **11**



Data Source: London Borough of Camden, 2010

N

Scale at A3: 1:30,000

Coordinate System:
British National Grid
GCS_OSGB_1936

0 0.5 1 2 3
Kilometers

Legend

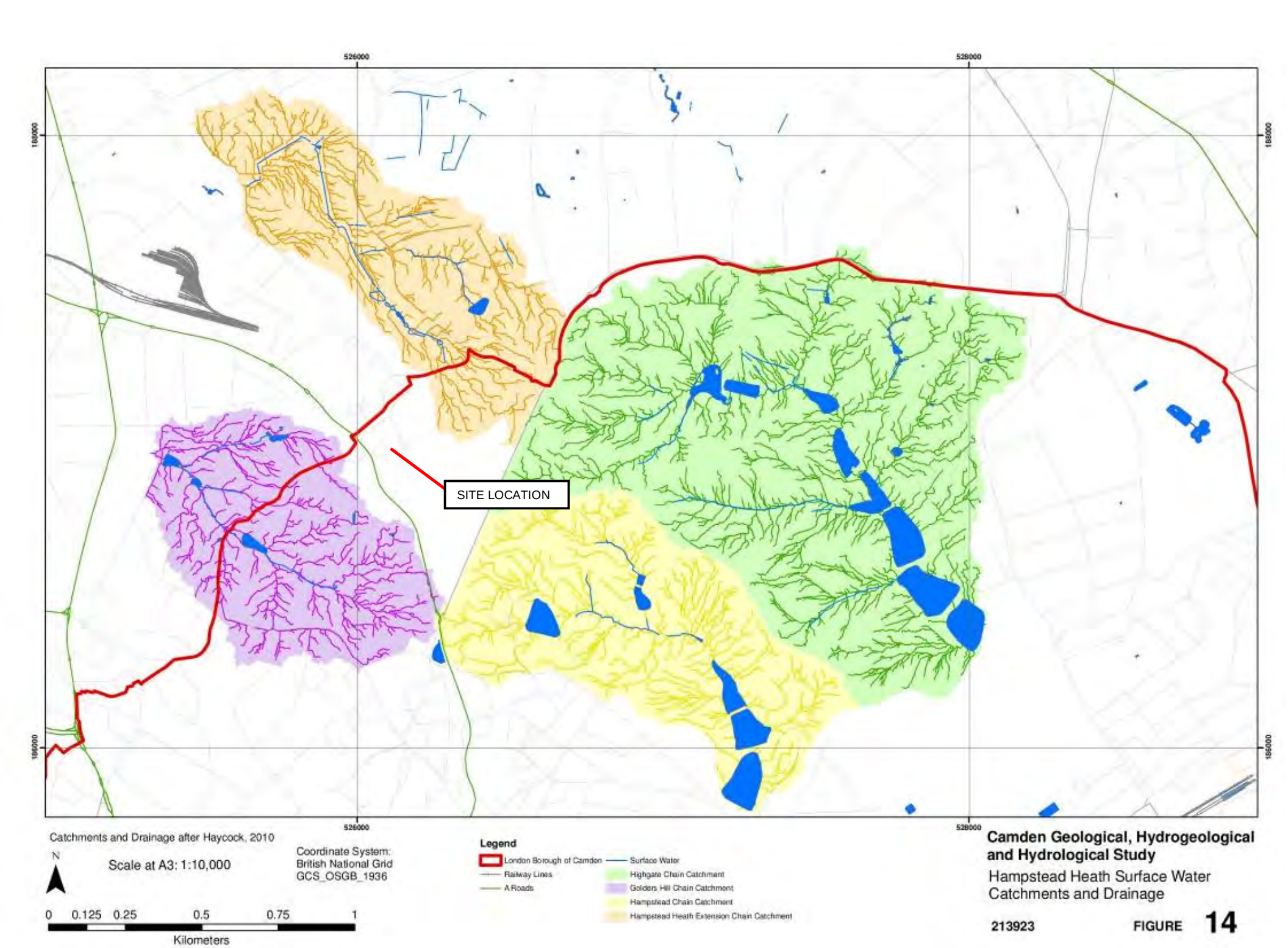
- London Borough of Camden
- Surface water
- Railway Lines
- A Roads

Camden Geological, Hydrogeological and Hydrological Study

Camden Surface Water Features

213923

FIGURE **12**



Camden Geological, Hydrogeological and Hydrological Study

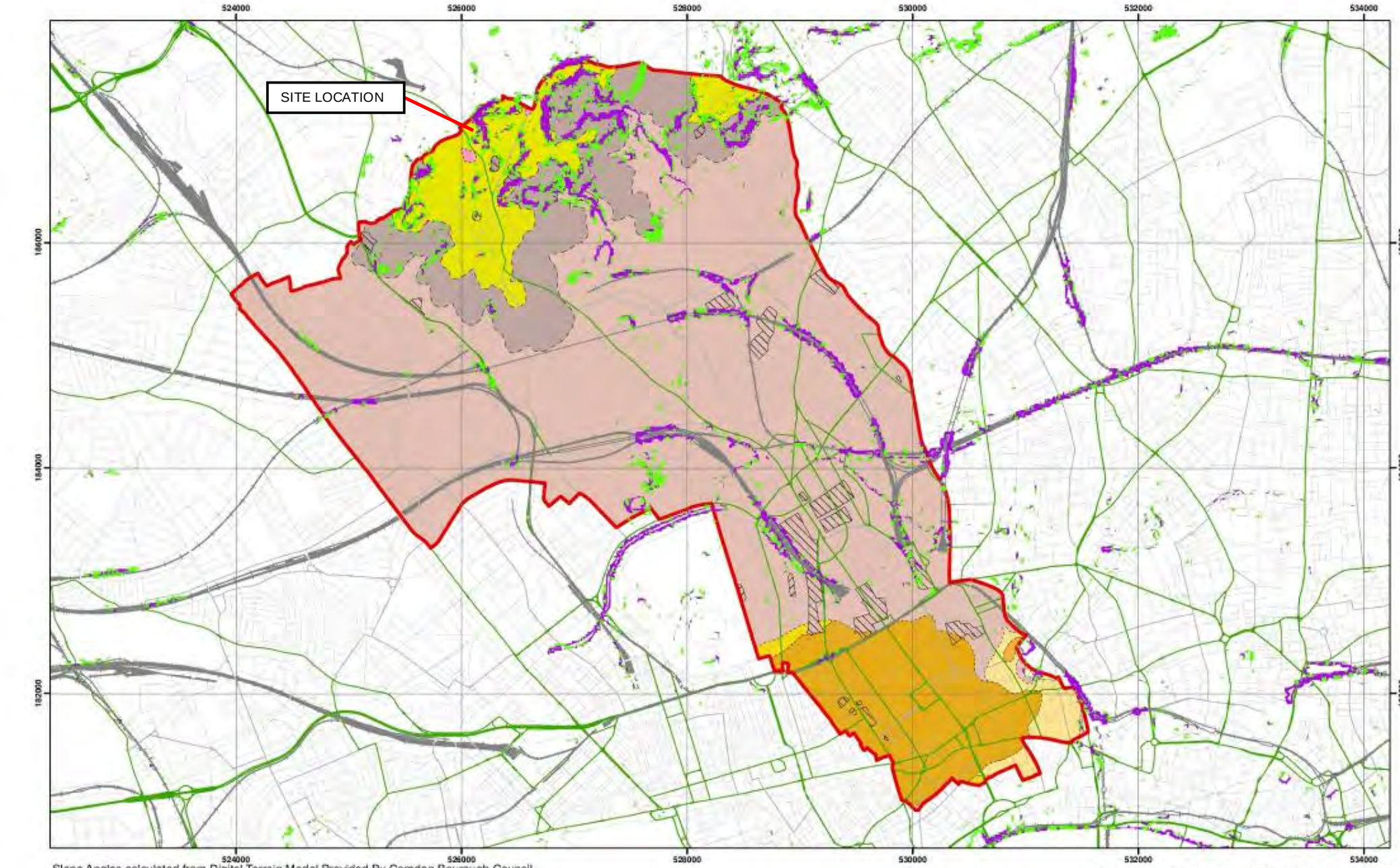
Hampstead Heath Surface Water Catchments and Drainage

213923 FIGURE **14**

Figure 5 from Core Strategy, London Borough of Camden

Camden Geological, Hydrogeological and Hydrological Study
Flood Map

213923 FIGURE **15**



Slope Angles calculated from Digital Terrain Model Provided By Camden Bourough Council

N

Scale at A3: 1:30,000

1:10,000 BGS Mapping
Coordinate System:
British National Grid
GCS_OSGB_1936

0 0.5 1 2 3
Kilometers

Legend

Slope
0° - 7°
7° - 10°
> 10°
London Borough of Camden
Railway Lines
A Roads

BGS 1:10K Artificial Ground
MADE GROUND
WORKED GROUND

BGS 1:10K Drift Geology
ALLUVIUM
HACKNEY GRAVEL FORMATION
LANGLEY SILT FORMATION
LYNCH HILL GRAVEL FORMATION
STANMORE GRAVEL FORMATION

BGS 1:10K Solid Geology
BAGSHOT FORMATION
CLAYGATE MEMBER
LAMBETH GROUP
LONDON CLAY FORMATION

NB. Geological boundaries are largely indicative based on available geological mapping data

Camden Geological, Hydrogeological and Hydrological Study

Slope Angle Map

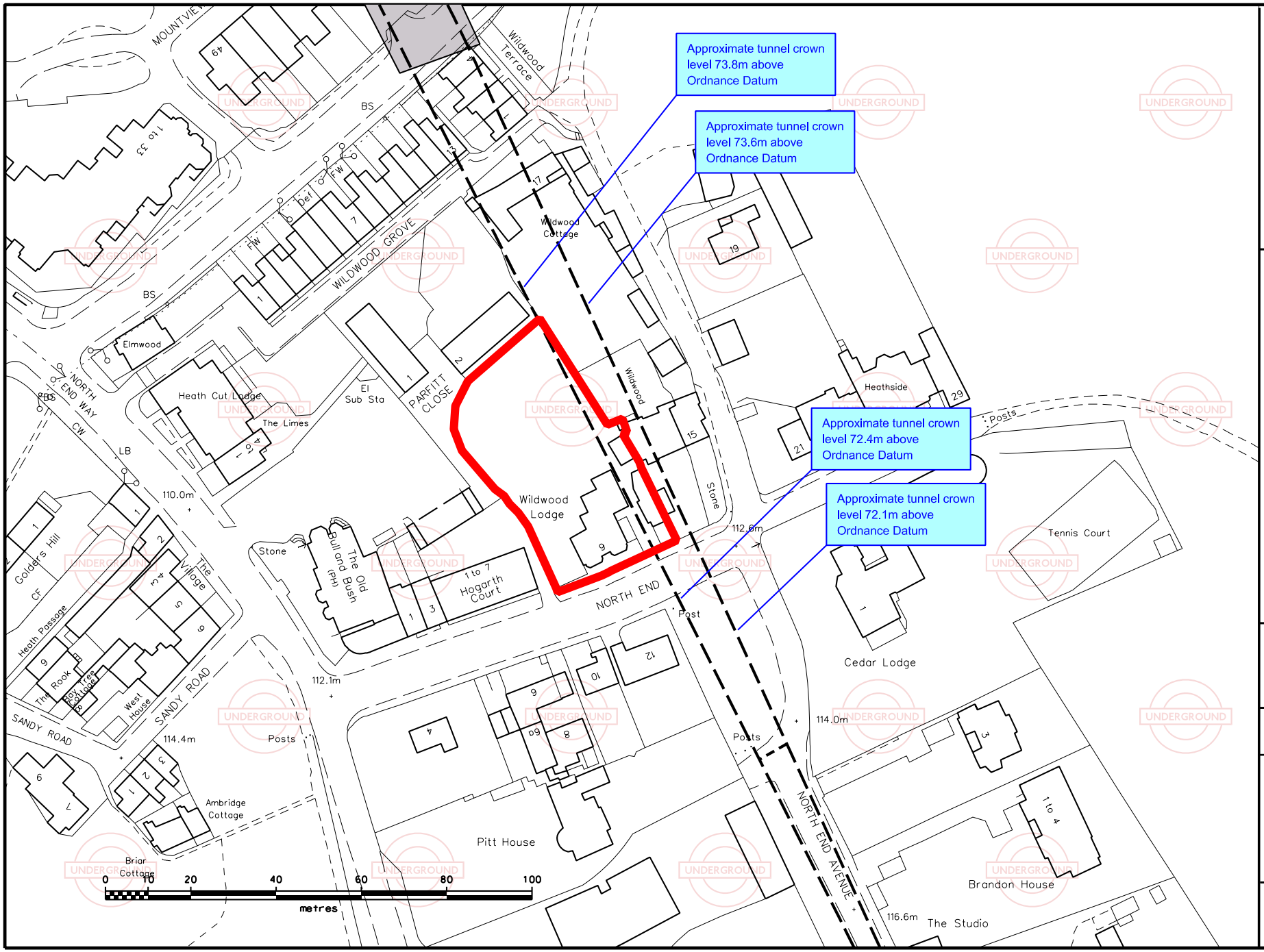
213923

FIGURE **16**

Appendix G

London Underground Limited Tunnel Location Drawing ND-W001
TWS - 8396_SK05 – Basement Layout Showing LUL Tunnel Crowns

distill_pdf_inprotA4L
V:*WIP*LUPESV8*PLTDRV*LUPES_PEN.TBL



UNDERGROUND

London Underground Limited

Infrastructure Protection
2nd Floor - 25 Eccelstone Place,
London, SW1W 9NF
Telephone: 0207 126 2774
Email: nathan.darroch@tube.tfl.gov.uk

Positions and depths of the LUL structures are approximate

Do Not Scale

Note:

Contact LU at Planning Stage

N

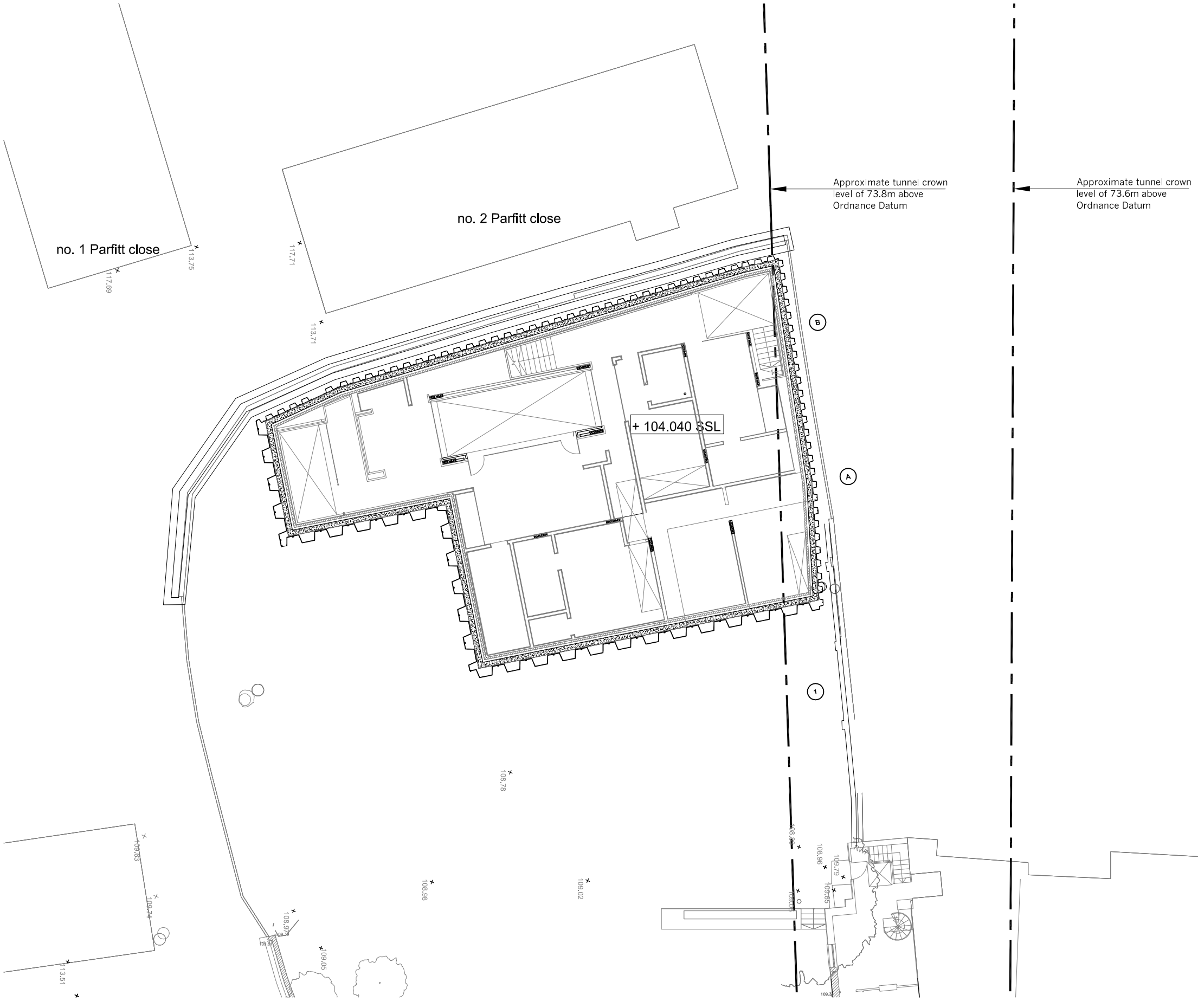
Location Code	W001
LUPES ID	ND-W001

Site address

The Courtyard House/Wildwood Lodge and 4 North End ,
Hampstead,
London,
NW3 7HH

Date	19-Apr-10	
Scale	1:1250	at A4
Author	darrocNa1	

1. This Drawing to be read in conjunction with all other Engineers, Architects and Specialists drawings and specifications.
2. No dimensions are to be scaled from this drawing.
3. No deviation may be made from the details shown on this drawing without prior agreement of the Engineers.
4. Any discrepancy between this drawing and any other document should be referred immediately to the Engineer.



Ref.	Revisions	By	Date
A	Adjusted Basement Layout Shown	GB	22.10.12

COURTYARD HOUSE,
LONDON, NW3

BASEMENT LAYOUT SHOWING LOCATIONS OF LUL TUNNEL CROWNS

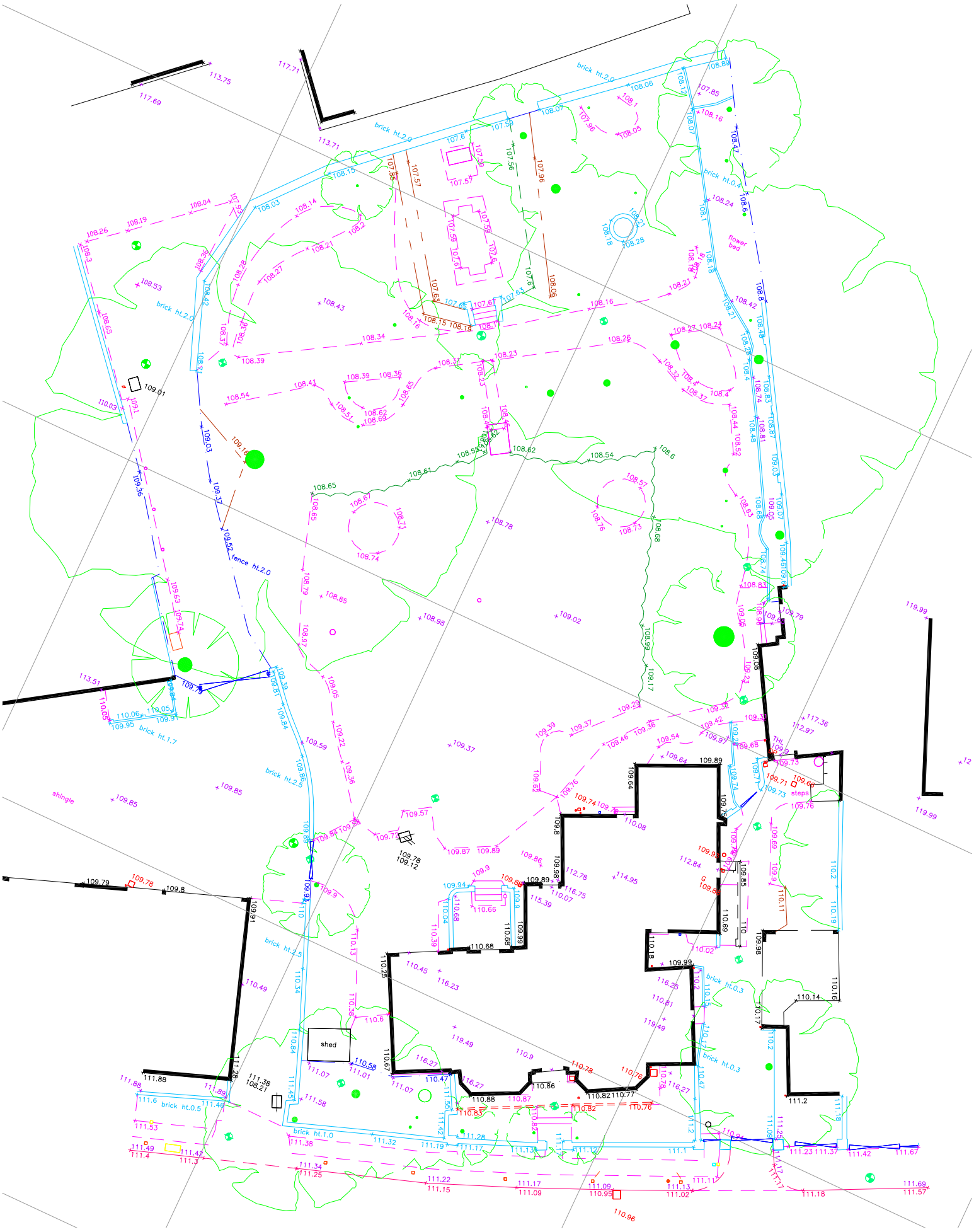
taylor whalley spyra
consulting civil and structural engineers
3 Dufferin Avenue, Barbican, LONDON EC1Y 8PQ
Tel (020) 7253 2626 Fax (020) 7253 2767
E-mail: tws@tws.uk.com Website: www.tws.uk.com

Scale at A1	Date	Drawn By	
1:100	26/06/12	NB	

Project No.	Drg No.	Rev.
8396	SK05	A

Appendix H

Topographical Survey Drawing 11025-P-SI-rev 2


brick ht.2.0
brick ht.2.0
brick ht.2.0
brick ht.0.3
flower bed
brick ht.2.0
fence ht.2.0
brick ht.1.7
brick ht.2.5
shingle
brick ht.2.5
brick ht.0.3
brick ht.0.5
brick ht.1.0
shed
steps
THL

Appendix I

Construction & Traffic Management Plan (J & Z Construction Lid)

J & Z Construction Ltd

TRAFFIC MANAGEMENT PLAN

For works at rear of 9 North End, London NW3 7HH
with access from Parfitt Close

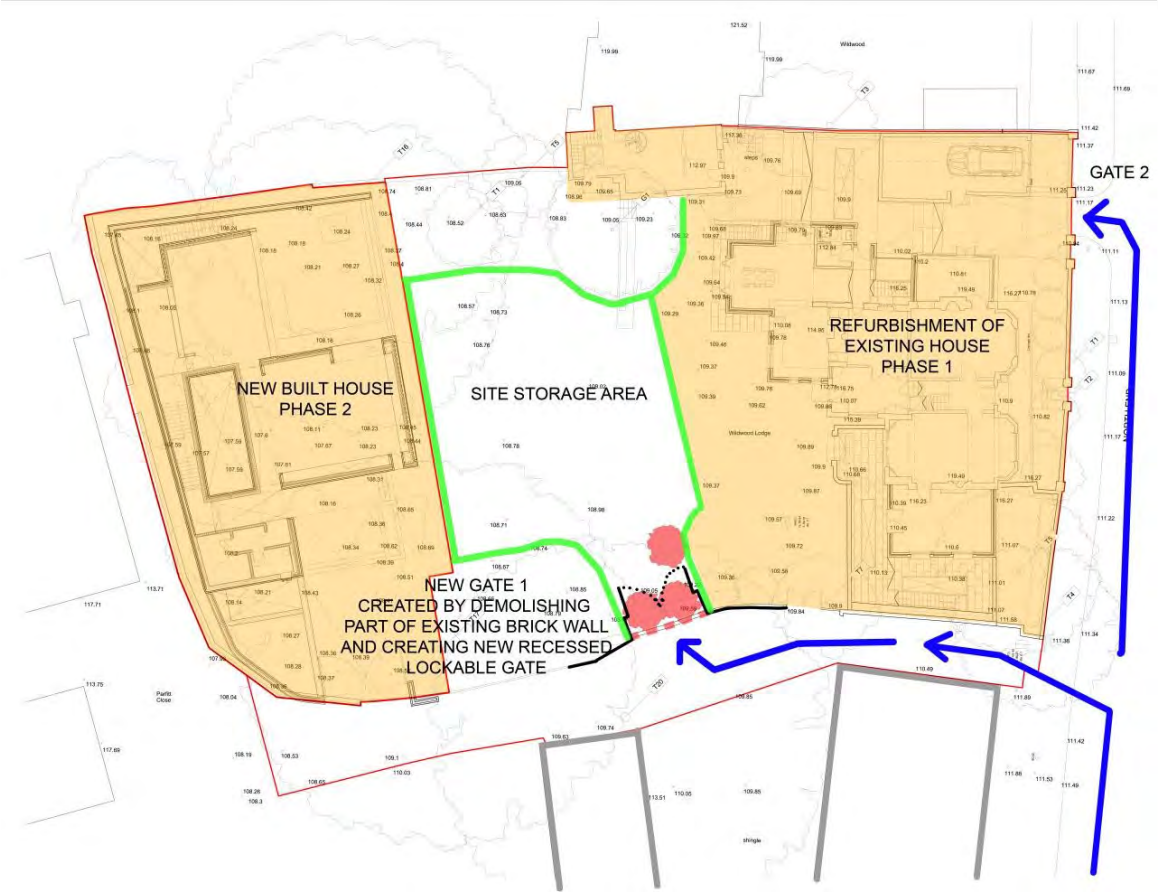
This document is to supplement the granted planning decisions / listed building consents 2009/5102/P.
Furthermore, it covers the steps that will be taken to reduce potential traffic congestion outside of the property, during deliveries and waste removal.

Background Information	
Property information	The property is in a residential area with two way traffic.
Proposal	Renewal of planning permission granted on 05/02/2007 (ref 2006/4989/P) for the erection of a singley storey plus 4-bedroom courtyard dwelling house with access from Parfitt Close.
Main contractor	J & Z Construction Ltd. Unit 14, 715 North Circular Road, London NW2 7AQ Tel : 020 8830 5038, Fax : 020 8450 1206 Mobile : 07770 472507
Ground works subcontractor	TBC
Architect	Canaway Fleming Architects The Dutch House 307-308 High Holborn London WC1V 7LL Tel. 020 7430 2252 Fax. 020 7430 2274 mailbox@canawayfleming.com
Structural Engineer	Taylor Whalley Spyra 3 Dufferin Avenue, London, EC1Y 8PQ T: 020 7253 2626 F: 020 7253 2767
CDM / H&S	N/A

J & Z Construction Ltd

Building Control	Assent Building Control Ltd Unit 3 Brook Farm | Salford Road Milton Keynes MK17 8BS Tel: 01525 288614 | Fax: 01525 288615 | www.assentbc.co.uk
Site address contact name / number	Zbigniew Niemiec - 07770 472507
Duration of works (estimated)	The project is estimated to start at the end of July 2012, estimated duration is 18 months.
Key timescales	Site start : End of July 2012 (day to be confirmed) Ground works and Construction : 9 months Finishes and fit out : 9 months

Proposed Site Plan (not to scale)



TRAFFIC MANAGEMENT PLAN

For works at rear of 9 North End, London NW3 7HH with access from Parfitt Close

View 1:

Existing view from North End onto the front of the site – seeing the existing building surrounded by temporary hoarding, and the entrance along the site to the left into Parfitt Close, an internal road.

View 2:

Existing view when entering into Parfitt Close.

Proposed demolition of a part of existing brick wall (shown in red) in order to allow construction traffic to enter construction site.

Some shrubs visible behind proposed the entrance gate (shown in red) will need to be removed and replaced with matching plants at completion

proposed the entrance gate (in red)

Blue indicates the construction vehicle route.

View 3:

Existing gate is too close to 9 Wildwood Lodge development therefore cannot be used. New proposed gate and adjacent existing gate.

Parfitt Close provides joint access to Hogarth Court therefore the road should be kept accessible at all times.

TRAFFIC MANAGEMENT PLAN

For works at rear of 9 North End, London NW3 7HH with access from Parfitt Close

Site control	
Hours of work (in line with planning decision 2009/5102/P)	No construction work will be carried out on the premises at any time on Sundays, Bank or Public Holidays, **before 8.00 am or after 1.00 pm on Saturdays, or before 8.00 am or after 6.00pm on other days**. If any other times are required due to yet unforeseen circumstances, consent will be sought from the Local Planning Authority.
Deliveries	All deliveries are aimed to be scheduled after **9 or 10am and finish by 4pm** to avoid congesting the street and become a hindrance to neighbours. Should this not be possible to achieve, the delivery hours will be in line with the planning decision. Deliveries are scheduled to arrive on smaller lorries (non-articulated) as often as possible. Any necessary additional licenses or permits will be applied for in advance.
Traffic volume (estimated)	We estimate the maximum number of vehicles coming to site in any one day to be **four**. This would typically be two grab lorries, one concrete wagon and periodically miscellaneous deliveries of materials. The estimated dwell time would be 15-20minutes.
Traffic control	Traffic management will consist of temporary signage and cones as required to sufficiently warn all pedestrians and passing traffic of our operations. The main construction site entrance is created as shown on the site plan above. An existing site entrance just off North End will be utilised for smaller deliveries.
Traffic route for demolition / excavation / construction and delivery vehicles (see diagram below)	The route for site related traffic would be : 1) Vehicle entering North End by way of North End Way 2) Turning left into Parfitt Close 3) Turning right into the site – for details refer to site plan as shown above 4) Unloading procedures as described 5) Reversing on site and returning via Parfitt Close onto North End and eventually North End Way. We aim to leave a reasonable time between scheduled deliveries to avoid area congestion.

TRAFFIC MANAGEMENT PLAN

For works at rear of 9 North End, London NW3 7HH with access from Parfitt Close

Delivery call-up procedure	We will operate a call-up procedure, in which the delivery companies are asked to notify the site foreman of any changes in the agreed arrival time, and additionally 5min prior to arrival. Upon arrival, the site foreman sets up the site and confirms that the delivery can take place. Banksmen will clear off the pavement and access on Parfitt Close and alert any pedestrians of a delivery taking place and take all necessary steps to ensure safety of third parties.
Traffic diversion	No diversion of traffic will be required.
Parking suspension	There is no parking suspension proposed.
Strategy for coordinating the connection of services on site	We will apply for new services at the beginning of the contract and we will work closely with utility companies to program connections at suitable rate. We will remove any temporary structures and skip from affected parking bays for utility companies to enable them to carry out their work. We will make sure that no other deliveries will be done while utilities company carries out their work.
Waste disposal	Construction waste will be disposed using grab lorries which will be loaded directly from construction site.

Street / pavement cleaning	The street close to the property entrance and the whole length of associated paving will be kept clean and regularly checked after each delivery and collection.
On-site storage	Construction materials will be stored on site as needed. No hazardous materials will be stored on site. Tools, equipment and noxious materials (e.g. cement) will be stored in designated areas which will be kept under supervision and locked after working hours.
Site security	The site will be secured after working hours using a scaffolding alarm, or boundary alarm at all times. The alarm will be concealed and connected to the site foreman's mobile phone and audible external sounder. This will be clearly labeled.

Construction management plan (brief)	
Hazardous Task / Risk	**Method of Control**
General notes	This method statement should be read in conjunction with the structural engineers and architects drawings. Following site set up, pilling will commence and temporary support will be installed to provide safety support and stability to adjacent land and properties. Excavation will commence afterwards with basement concrete work, wall construction and roof over formation. A more detailed breakdown of any of the sequence of work described above will be supplied if required.
Demolition of brick fence wall	A 4.5m wide opening is proposed to be created in the existing brick fence facing Parfitt Close and the adjacent car park.
Shrubs clearence	Some shrubs need to be removed at proposed construction access. The appointed arboricultural consultant will be assessing the importance of these trees if required.
New site entrance gate and wall	The proposed gate is to be 4.5m clear to allow for adequate access to delivery vehicles to site. The gate will be lockable and recessed by about 1m into the site to create better maneuvering space for construction traffic. Construction site will be surrounded by hoarding to create safe and secure access space.

TRAFFIC MANAGEMENT PLAN

For works at rear of 9 North End, London NW3 7HH with access from Parfitt Close

Installation of temporary safety barrier within 1m of the site boundary.	For Health and Safety, a highly visible barrier will be erected marking the area designated for works and excavation. All contractors will be made aware.
Ground protection / handling of noxious substances during construction	To prevent leakage into the soil area under the ground protection, fuels, oils, chemicals and cement will be carried in a portable bowser and petrol will be stored in a ventilated tool box. There will be no mixing/preparation of noxious substances (e.g. cement) on the ground protection surface).
Ground protection	Install temporary ground protection to whole tree protection zone as described by arboricultural consultant.
Hoarding	Erect plywood hoarding with vertical standards, anchored to the ground. The hoarding will be fully secured with a lockable door for access.
Site office	A site office is to be erected at the front of the property, with social facilities for the builders – changing room, WC and a room for breaks.
Temporary supply	Install temporary electrical and water supplies from existing permanent connections at No 9 Wildwood Lodge until separate supply is in place.
Site drainage	All drainage pipes, following routes specified by the M&E consultants, will be laid according to their design and specification. Drainage runs to be connected into existing sewer. Permission and point of connection to be agreed with Thames Water
Scaffolding / dust protection	Scaffolding will be erected as/when needed to allow safe and secure method of construction. A dust protection system will be implemented as/when required to minimize the impact on the surrounding area.