56 Platt's Lane
London
NW3 7NT

Proposal for basement extension

SRB
STRUCTURES

Table of Contents:

INTRODUCTION

This document has been prepared for the purposes of Approval in Principle (AIP) of the proposed structural design and details for a new basement to be located within the existing outline of 56 Platt's Lane. S R Brunswick has been appointed by the client, i.e. the owner of 56 Platt's Lane to carry out the structural design for works for the project. Land Science were also appointed by the client with the purpose of carrying out a full geotechnical investigation of the property.

1.1 HIGHWAY DETAILS

1.2 Type of Highway

The proposed works are to be constructed adjacent to Platt's Lane, London NW3 7NT. The highway is a narrow single lane two-way carriageway with pavements to either side and is used for local access to private residential properties. The road is ground bearing.

Figure 1.1 – Google Maps View showing 56 Platt's Lane

1.3 Permitted Traffic Speed

From road signage in place along Platt's Lane it is apparent that the legal speed limit on Platt's Lane is 20mph.

1.4 Existing Restrictions

Loading and vehicle restrictions currently in place on the road only apply between the hours of 6:30pm – 8:00am, outside of working hours allowed by the by the local authority.

2.1 SITE DETAILS

2.2 Obstacles Crossed

Generally, the properties along either side of the public highway of Platt's Lane have lower ground floors or basements.

On the boundary between the property and the public highway there is an existing masonry wall.

Figure 2.1.1 – Image of Front Elevation

3.1 PROPOSED STRUCTURE

3.2 Description of Structure and Design Working Life

The proposed works will include underpinning to the existing masonry boundary external walls as well as providing a new 350mm thick RC retaining wall and base slab. For further information refer to SR Brunswick permanent works drawings included in Appendix A at the back of this document. The minimum design working life of the proposed structure is to be 60 years. Additionally, a movement monitoring proposal has been prepared by SR Brunswick, also included in Appendix A.

3.3 Structural Type

The new RC retaining wall will be 350mm thick in-situ reinforced concrete. Concrete strength for underpinning is to have a minimum strength class of C25/30 and concrete strength for the new RC retaining wall is to have a minimum strength class of C32/40.

3.4 Foundation Type

The RC retaining walls will be founded on a ground bearing base slab, 350mm thick reinforced concrete with a minimum strength class of C32/40.

3.5 Span Arrangements

The basement is designed as a reinforced concrete box formed by underpinning the existing property and linking the underpins to a structural raft slab. The raft slab will act as a restraint to the perimeter retaining walls and transfer the load to the ground. The retaining walls have been designed as free standing cantilevers as this is the worst case and will have continuity reinforcement to link all the sections together. The internal loadbearing walls are to be carried by new structural support beams spanning between the new external retaining walls and any internal column support as appropriate.

3.6 Articulation Arrangements

Not applicable.

3.7 Road Restraint Systems Requirements

Not applicable.

3.8 Proposed Arrangements for Future Maintenance and Inspection of Structure

3.8.1 Traffic Management – See traffic Management Plan below.

3.8.2 Arrangements for future maintenance and inspection of structure.

Access is to be the same as existing.

3.8.3 Intrusive or further investigations proposed – Not currently required, ground test and soil report carried out, see Appendix B.

3.9 Environment and Sustainability

The new structure is to be installed where there is existing masonry structure and hard standing area so there is little or no impact on the environment. From an overall sustainability perspective, the proposed new concrete structure has been specified to contain a percentage of recycled aggregate, min. 20% as well as the option for a cement replacement such as GGBS (ground granulated blast-furnace slag) which will serve to minimise the carbon footprint of the proposed new structure.

3.10 Durability, Materials and Material Strengths

For durability purposes the minimum nominal cover to reinforcement in the RC retaining wall will be 40mm which is adequate for 'severe' exposure conditions as per Table 4.8 from BS 8110 - Part 1. The minimum concrete strength class is to be cube strength 40N/mm² at 28 days. Steel reinforcement is to be high yield grade 500B in accordance with BS 4449.

3.11 Risks and Hazards Considered for Design, Execution, Maintenance and Demolition

The proposed alterations have been designed so that all temporary loads from the building above, adjacent properties and the highway / pavement have been considered and designed into the permanent design.

The existing property is of traditional masonry and timber design for a domestic property and so care will be required in executing the underpinning and because of the depth the reinforced underpins will be constructed on a hit and miss basis in 2 staggered lifts to minimise and movement of the property.

The design parameters used in the design are on the basis of a 60 year life to reflect the standards used for new build property and it is expected that the new basement structure will last for the life time of the property. The detailing and concrete cover / strength reflect the permanent works design life and requirements of the Building Regulations and appropriate design codes.

There are no residual risks from this work as no voids are being left outside of the structure and as the water table is well below the raft level, no water courses in the ground will be affected.

3.12 Estimated Cost of Structure and other Structural forms Considered

The cost of the proposed new structure has been factored into the overall cost of the refurbishment of 56 Platt's Lane. The proposed cost for the structural works are £180,000.00.

3.13 Proposed Arrangements for Construction

3.13.1 Construction of Structure

The following outline construction sequence is to be followed;

- Remove existing structural floors from ground floor.
- Underpin operation to be carried out in sequence. 1m long sections and reduce dig to formation of new RC base slab including waling beams to support as underpin progresses.
- Temporary support to existing structural partitions to be fixed during underpin operation.
- Cast new ground bearing RC slab and remove temporary waling beams and props.

Refer to sketches in Appendix B.

3.13.2 Traffic Management – Access to be via front of property, road is of sufficient width to allow for wide vehicles to offload.

3.13.3 Service Diversions – Not Applicable.

3.13.4 Interface with Existing Structures.

The new RC retaining walls are to be cast below the existing masonry wall 75mm dry packing to be inserted between underpin and existing masonry wall.

3.14 Year of Construction

2019

3.15 Reason for Assessment

In preparing the design proposal it was necessary to review the condition of the existing property and assess its condition and ability to accommodate the proposed works without causing any damage. This is also applicable to the neighbors and adjacent highway bearing in mind that the property is on a slope and the potential for slippage of the ground during the excavation. To facilitate this trial holes were dug and a bore hole undertaken which has demonstrated that the building is founded on sandy clay which extends to below the new proposed foundations,

3.16 Part of Structure Assessed

The assessment undertaken comprised the existing property and immediate areas on the boundary. The Property is in good condition and comprises load bearing walls and timber floors as would be expected for this property. Foundations are traditional spread footings founded on the underlying sandy clay

4.1 DESIGN CRITERIA

4.2 Design Codes of Practice

The proposed works have been designed in accordance with the following British Standards:

- BS 6399 - Part 1: Code of Practice for Dead and Imposed Loads
- BS 6399 - Part 2: Code of Practice for Wind Loads
- BS 8110 – All Parts: Codes of Practice for the Structural Use of Concrete
- BS 5950 – All Parts: Codes of Practice for Structural Use of Steelwork
- BS 8002: Code of Practice for Earth Retaining Structures
- BS 8102: Code of Practice for Protection of Structures against Ground Water

4.3 Live Load Surcharge for Retaining Wall

A live load surcharge of 10kN/m² is deemed appropriate and has been used in the structural design of the RC retaining wall as per BS 5400: Part 2, Clause 5.8.2.1 (a), HA loading.

4.4 Authorities Consulted – London Borough of Camden

The maximum deflection at road level is to be less than 5mm.

5.1 STRUCTURAL ANALYSIS

5.2 Method of Analysis

The structure has been analyzed as a vertical cantilevered retaining wall which is to be supported by a ground bearing base slab. Detailed design calculations have been carried out.

5.3 Soil Parameters

With regard to soil parameters for the purposes of design of the retaining wall to the public footpath an angle of shearing resistance of 24 degrees has been assumed resulting in an active pressure co-efficient of 0.42. See the Basement Impact Assessment for addition details.

6.0 GEOTECHNICAL CONDITIONS

6.1 Site Investigation

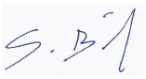
SR Brunswick & Land Science have carried out an intrusive ground investigation which can be found in the Basement Impact Assessment prepared by Geotechnical & Environmental Associates Limited. The recommendations included in this report with respect to safe bearing capacities, angle of shearing resistance and other parameters have been adopted in the design.

7.0 CATEGORY CHECK

7.1 In accordance with BD2/12, CLAUSE 3.4.2 (c), it is recommended that the proposed development be classed as a Category 1 structure, i.e. *"earth retaining structure with an effective height of 2m or greater but less than 7m"*.

8.0 STATEMENT BY DESIGNER

8.1 The design is submitted for Approval in Principle on behalf of SR Brunswick, 138 Woodcock Hill, Kenton, Middlesex HA3 0JN. As part of my design I have reviewed the soils investigation results and incorporated them into my design for the basement at 56 Platt's Lane.

Signed: 
Name: Steven Brunswick
Position Held: Director

APPENDIX A – Monitoring Proposal

S R BRUNSWICK C Eng, FICE, FCIOB

138 Woodcock Hill
Kenton, Middx.
HA3 0JN

56 Platt's Lane

Monitoring Plan

The following system of control shall be employed by the main contractor for the construction of the basement, in this case as the property is detached the monitoring will be the flank wall for 54 Platts lane, the path to 1 Telegraph Hill and the back edge of pavement for the width of the property plus 2m each side. Readings are to be taken according to the following events schedule rather than at arbitrary time intervals:

- 1 week prior to commencement of first excavations to establish the base tine. This to be done twice to ensure consistency,
- Immediately following the first reduced dig i.e. the removal of the existing ground floor and initial preliminary access trenches.
- Upon completion of excavation of the first pin.
- Upon completion of the casting of the concrete and drypacking of the last pin marked "1" and prior to the excavation of pins marked "2"
- Weekly thereafter
- Final reading one week following completion of the ground floor installation

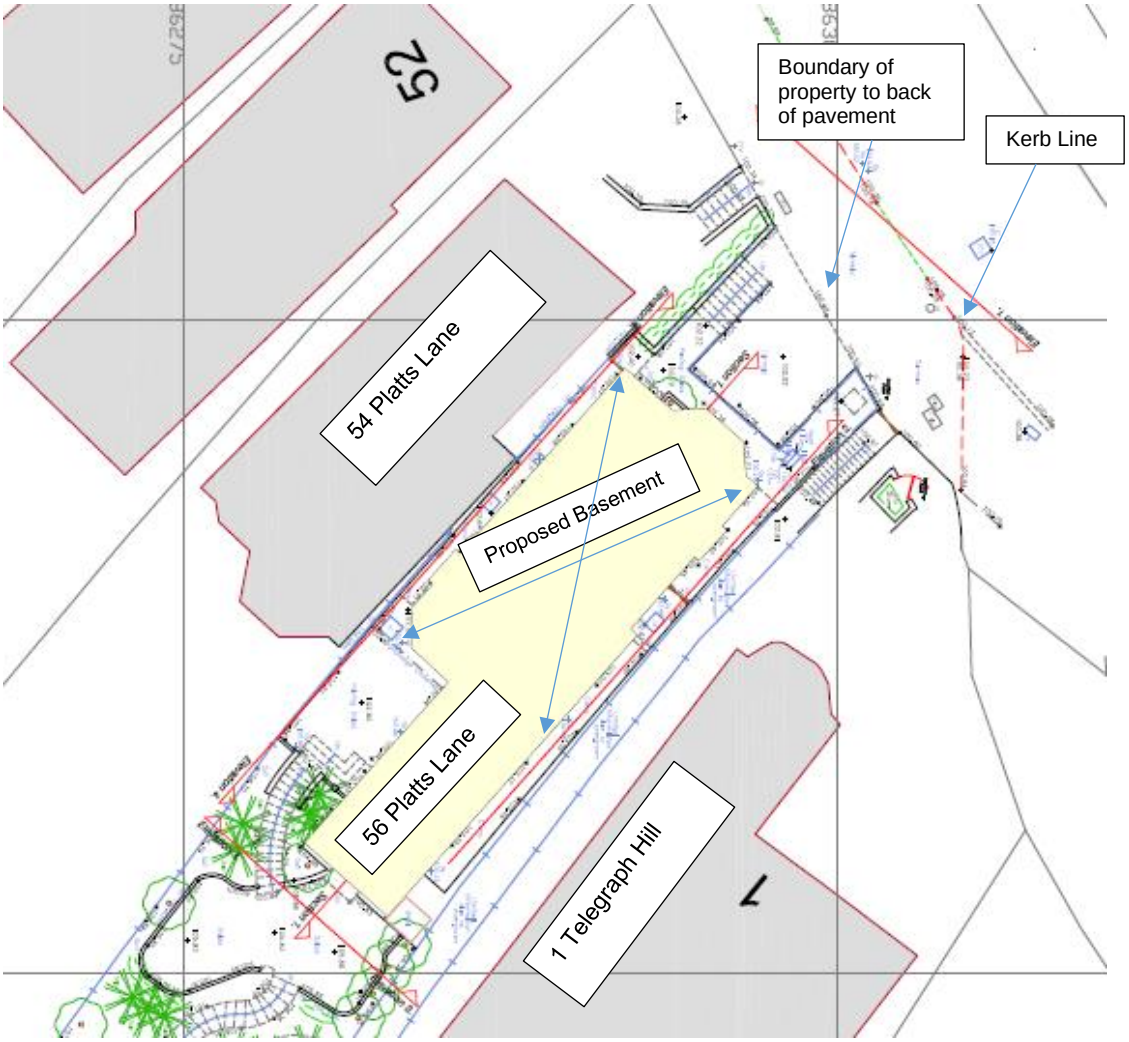
Monitoring points are to be no greater than 2.5 m apart and located at approximately existing ground floor level, The Trigger value, at which the appropriate action shall be taken, for each section, is given in the table below. The method of construction by use of sequential underpins

Limits the deflections in the surrounding areas. The maximum horizontal movement across the length of the party wall must not exceed height of excavation ratio as below. Vertical limits based on ratio of length of wall under consideration. Any movement (H or V) between the monitoring points must be limited to a red limit of 3mm. During works measurements are taken, these are compared with the limits set out below:

Horizontal	Category	Action
<11/900 i.e.	Green	No action required
H/500-900 i.e. 4.5-8mm	Amber	Crack Monitoring: Carry out a local structural review; Preparation for the implementation of remedial measures should be required.
>F1/500 i.e. >13mm	Red	Crack Monitoring: Implement structural support as required; Cease works with the exception of necessary works for the safety and stability of the structure and personnel; Review monitoring data and implement revised method of works
Vertical		
<L/2000 i.e.	Green	No action required
L/2000-1000 i.e. 5-10mm	Amber	Crack Monitoring: Carry out a local structural review; Preparation for the implementation of remedial measures should be required.
>L/1000 i.e. 10mm	Red	Crack Monitoring: Implement structural support as required; Cease works with the exception of necessary works for the safety and stability of the structure and personnel; Review monitoring data and implement revised method of works

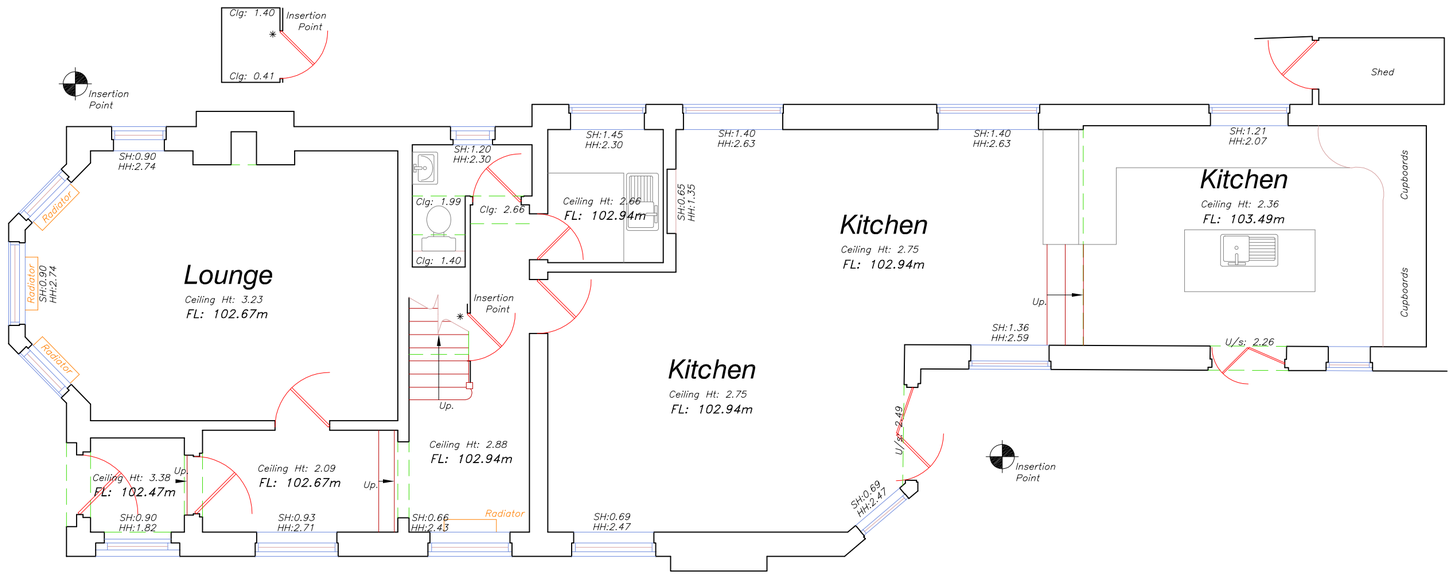
Any movements which exceed the individual amber bigger levels for a monitoring measure given in the table shall be immediately reported to the PWS and design engineer, and a review of all of the current monitoring data for all monitoring measures must be implemented to determine the

possible causes of the bigger level being exceeded. Monitoring of the affected location must be increased and the actions described above implemented. Assessment of exceeded bigger levels must not be carried out in isolation from an assessment of the entire monitoring regime as the monitoring measures are inter-related. Where required, measures may be implemented or prepared as determined by the specific situation and combination of observed monitoring measurement data.

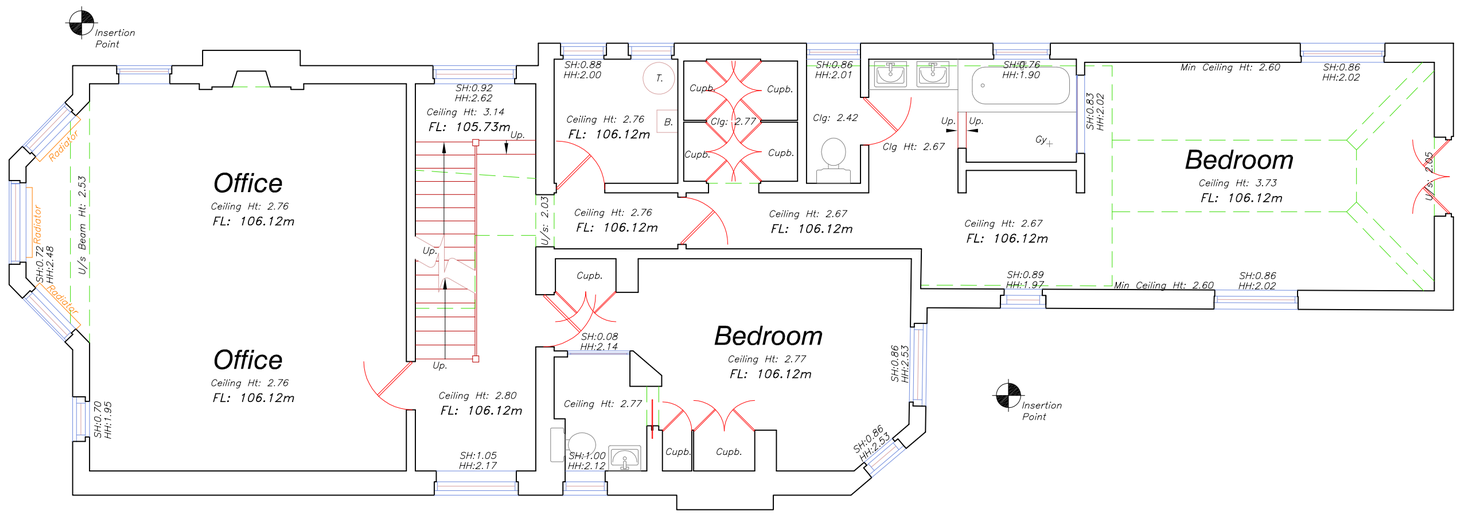


APPENDIX B – Permanent Works Drawings

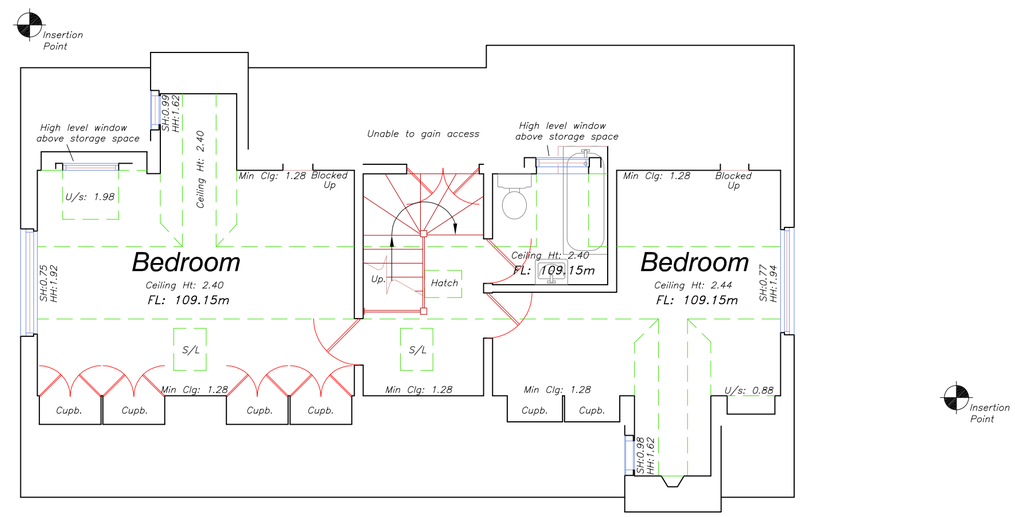
Ground Floor Plan



First Floor Plan



Second Floor Plan



Note:

Some services may have been omitted due to parked vehicles. The Ordnance Survey tile is to be used as a guide only.

OS Buildings Surveyed Buildings

This survey has been orientated to the Ordnance Survey (O.S) National Grid (OSGB36) via Global Navigational Satellite Systems (GNSS) and the O.S. Active Network (OS Net).

A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN15 & OSGM15 transformation models.
The survey has been correlated to this point and a further one or more OSGB36 points established to create a true O.S. bearing for angle orientation.

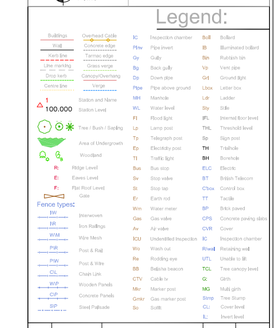
No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a scale factor applied.

Please refer to Survey Station Table to enable establishment of the on-site grid.

Building Survey Legend:

SHt 1.00 HHt 2.12	Sill Height from FFL. Head Height from FFL.
SL 51.03m HL 52.82m	Sill Level from defined datum. Head Level from defined datum.
Susp CHt: 2.00 Struct CHt: 3.00	Suspended Ceiling Height from FFL. Structural Ceiling Height from FFL.
Susp Ceil: 30.00m Struct Ceil: 31.00m	Suspended Ceiling Level from datum. Structural Ceiling Level from datum.
IFL: 100.00m +100.00m	Internal Floor Level (General). Internal Floor Level (Specific).
Insertion Point	Insertion Point for overlay drawings of other floors or details.

Legend:



Rev	Date	Description	Drawn	Q. Ref

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- Topographical Surveys
- Site Engineering
- Utility / CCTV Surveys
- Measured Building Surveys
- 3D Laser Scanning
- Revit & BIM Models

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Poland: ul. Panewnicka 91, 40-763 Katowice, Poland, t. 0048 32 202 2292, www.greenhatch.pl

CLIENT
Amirilan

PROJECT
56 Platts Lane, London, NW3 7NT

TITLE
Existing Floor Plans

SCALE	DATE
A3@ 1: 100	14/02/2017
DRAWN: Gy	QUALITY REF

Level datum	See OS Note
Grid orientation	See OS Note
Job number	26113
Drawing No.	Rev.
26113_02_P	

Comments
This plan should only be used for its original purpose. Greenhatch Group accepts no responsibility for this plan if supplied to any party other than the original client.
All dimensions should be checked on site prior to design and construction.
Dralnage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

Notes.

Datum: 100.00m.

Elevation 1.

Datum: 100.00m.

Elevation 2.

Datum: 100.00m.

Elevation 3.

Datum: 100.00m.

Elevation 4.

Datum: 100.00m.

Section 1.

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Legend:

Buildings
Wall
Kerb line
Line marking
Dropped kerb
Centre line
Overhead Cable
Concrete edge
Tarmac edge
Gates verge
Canopy/Overhang
Verge
Station and Name
Station Level
Tree / Bush / Sapling
Area of Undergrowth
Woodland
RL Ridge Level
EL Eaves Level
FL Flat Roof Level
Gate
Fence types
IW Interwoven
IR Iron Railings
WM Wire Mesh
PR Post & Rail
PW Post & Wire
CL Chain Link
WP Wooden Panels
CP Concrete Panels
BP Steel Palisade

IC	Inspection chamber	BoB	Bollard
PInv	Pipe invert	IB	Illuminated bollard
Gy	Gully	Bin	Rubbish bin
Bg	Back gully	Vp	Vent pipe
Do	Down pipe	GrS	Ground light
Pipe	Pipe above ground	Lbox	Letter box
MH	Manhole	Ldr	Ladder
WL	Water level	Sty	Stile
FI	Flood light	IFL	Internal floor level
Lp	Lamp post	THL	Threshold level
Tp	Telegraph post	Sp	Sign post
Ep	Electricity post	TH	Trafficlite
Tl	Traffic light	BH	Bollardlite
Bus	Bus stop	ELC	Electric
Sv	Stop valve	BT	British Telecom
St	Stop tap	Ctrbx	Control box
Er	Earth rod	TT	Tactile
Wm	Water meter	BP	Brick paved
Gas	Gas valve	CPS	Concrete paving slabs
Av	Air valve	CVR	Cover
IOU	Unidentified Inspection	IC	Inspection chamber
Wo	Wash out	RWall	Retaining wall
Re	Rodding eye	UTL	Unsafe to fill
BB	Bellisha beacon	TCL	Tree canopy level
CTV	Cable tv	Gr	Girth
Mkr	Marker post	MG	Multi girth
Grav	Gas marker post	Stmp	Tree Stump
Sc	Scaffg	CL	Cover level
		IL	Invert level

Rev.	Date	Description	Drawn	Q. Ref.

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- Site Engineering
- Utility / CCTV Surveys
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CLIENT
Amirilan

PROJECT
56 Platts Lane, London, NW3 7NT

TITLE
Existing Elevations & Section

SCALE	DATE
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DRAWN: **Gy**	QUALITY REF

Level datum	See OS Note
Grid orientation	See OS Note
Job number	26113

Drawing No. **26113_03_ES** Rev. **0**

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Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

Notes:

Proposed Section
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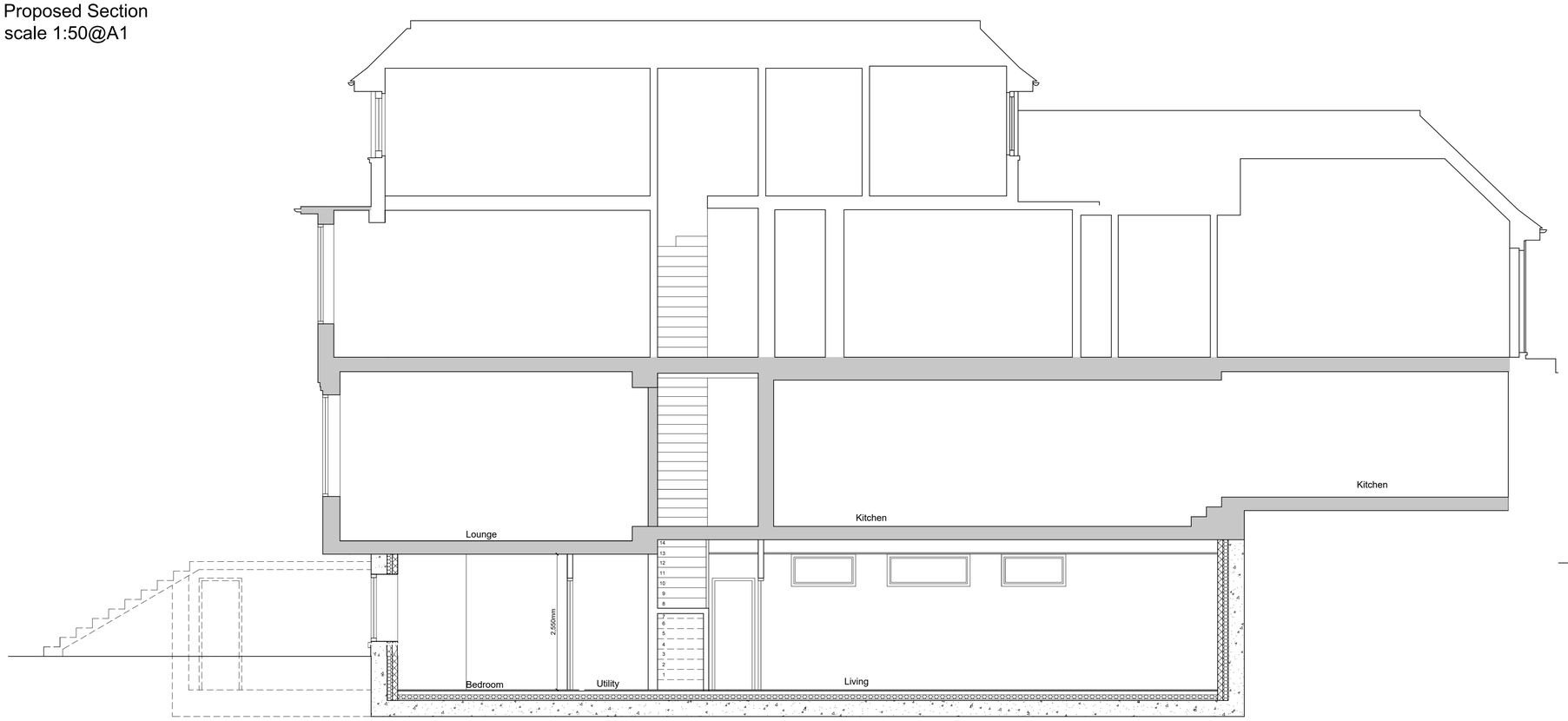
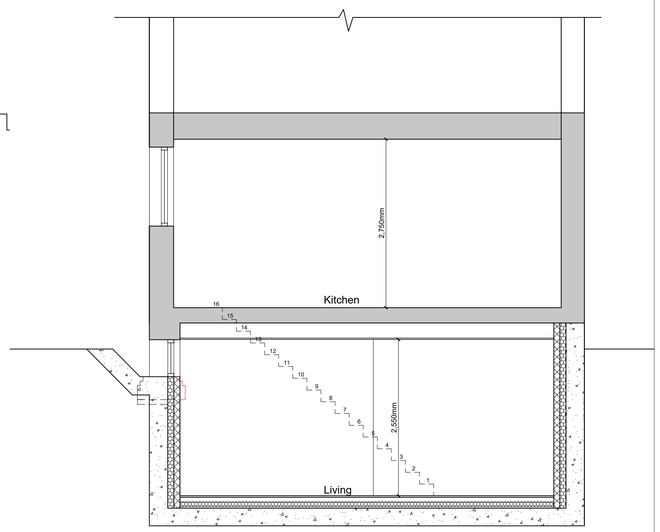
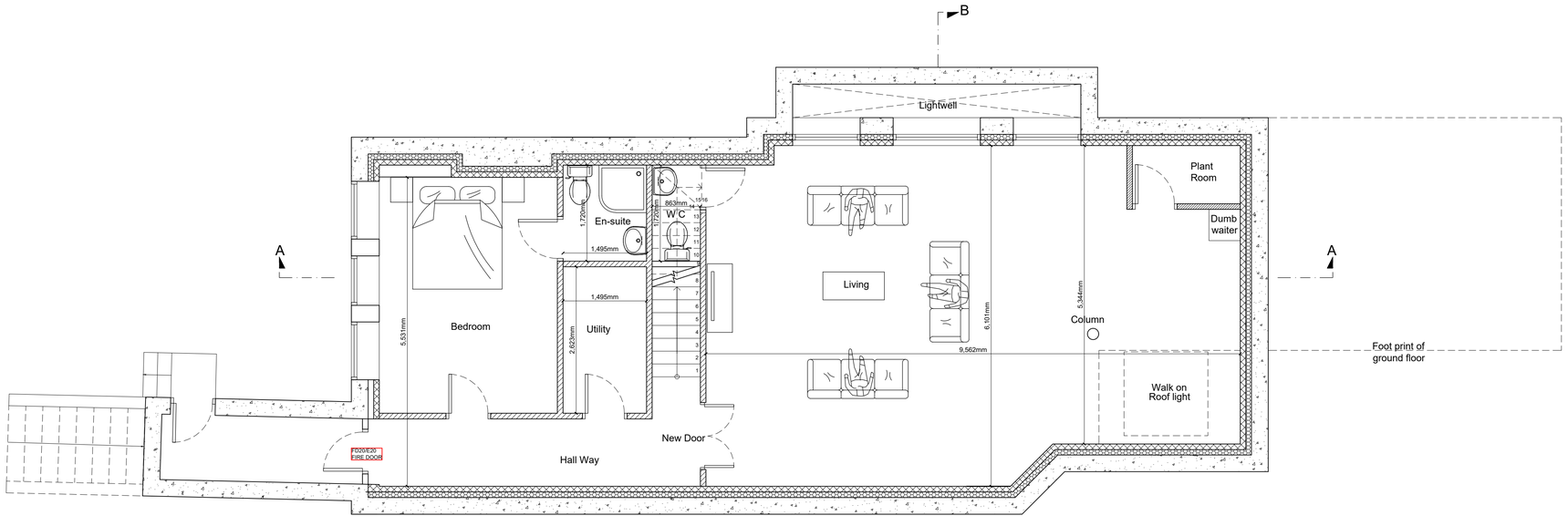




0m .5m 1m 2m 3m 4m 5m
SCALE BAR IN METERS

PROPOSED SECTION A-A

PROPOSED SECTION B-B



PROPOSED BASEMENT FLOOR FLAN

studio 136 architects
6 The Broadway, Wembley, Middlesex, HA9 8JT
Tel/Fax: 020 8907 7131 e-mail: info@studio136.co.uk

Project

PROPOSED BASEMENT CONVERSION AT
56 PLATTS LANE
W4 1BX
LONDON

Client

Mr Fedak
56 PLATTS LANE
W4 1BX
LONDON

Drawing Title

PROPOSED PLAN AND SECTION

Scale	Drawn	Checked	Authorised
1:50 @A1	--	--	--
	27th APRIL 2017	--	--

Drawing Number	Rev
ST_17_56PLATTS_01	B

Proposed Elevation
scale 1:50@A1

PROPOSED FRONT ELEVATION

PROPOSED SIDE ELEVATION

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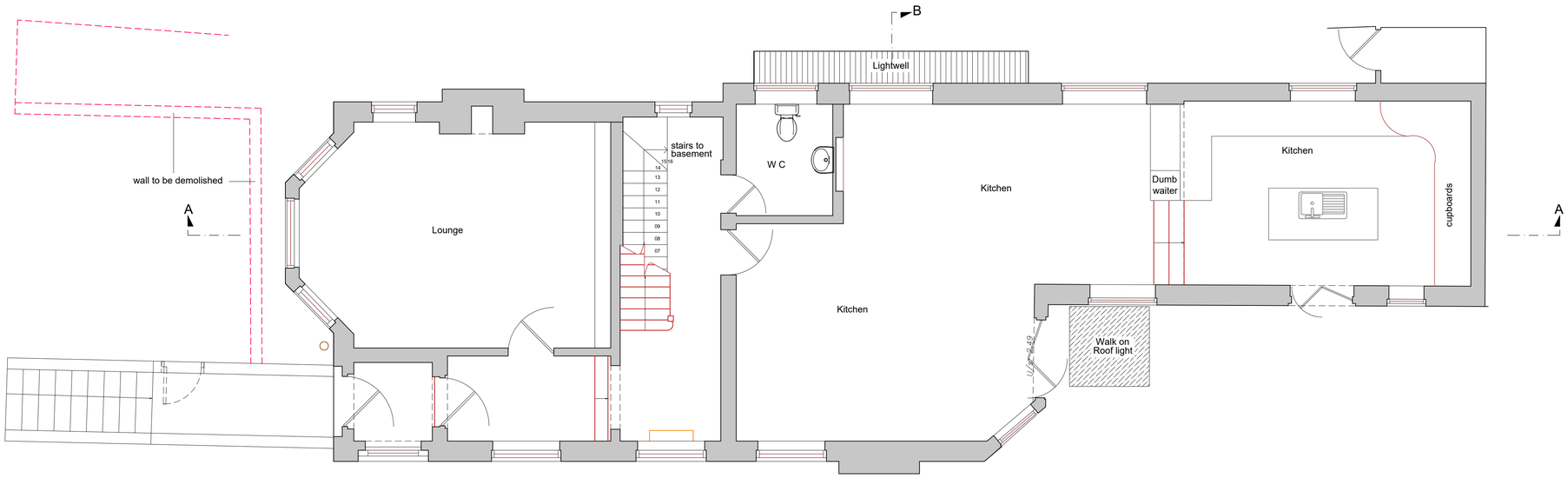
SCALE BAR IN METERS



PROPOSED GROUND FLOOR PLAN

studio 136 architects

6 The Broadway, Wembley, Middlesex, HA9 8JT
Tel/Fax: 020 8907 7131 e-mail: info@studio136.co.uk

Project

PROPOSED BASEMENT CONVERSION AT
56 PLATTS LANE
W4 1BX
LONDON

Client

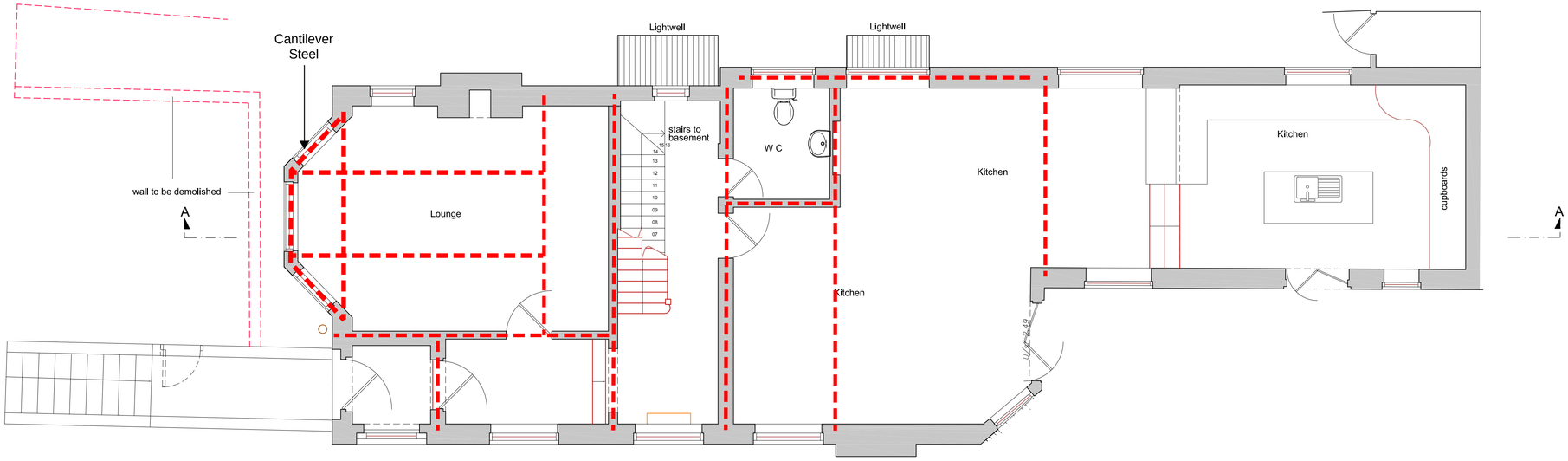
Mr Fedak
56 PLATTS LANE
W4 1BX
LONDON

Drawing Title

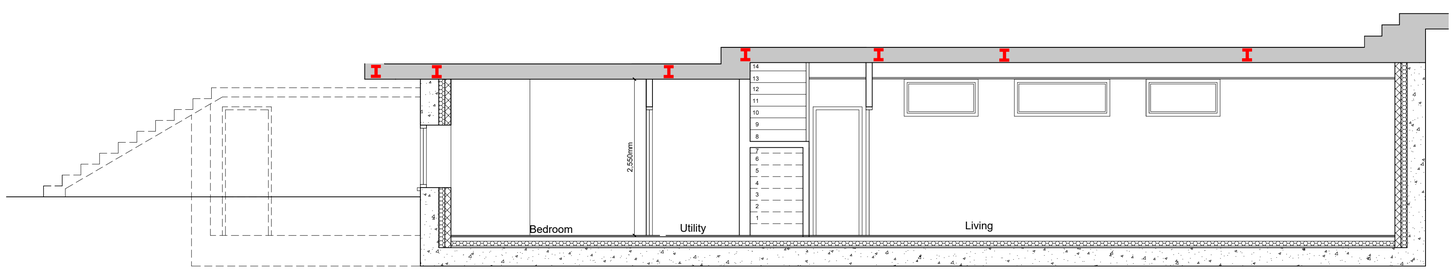
PROPOSED PLAN AND ELEVATION

Scale	Drawn	Checked	Authorised
1:50 @A1	--	--	--
	27th APRIL 2017	--	--

Drawing Number	Rev
ST_17_56PLATTS_02	B



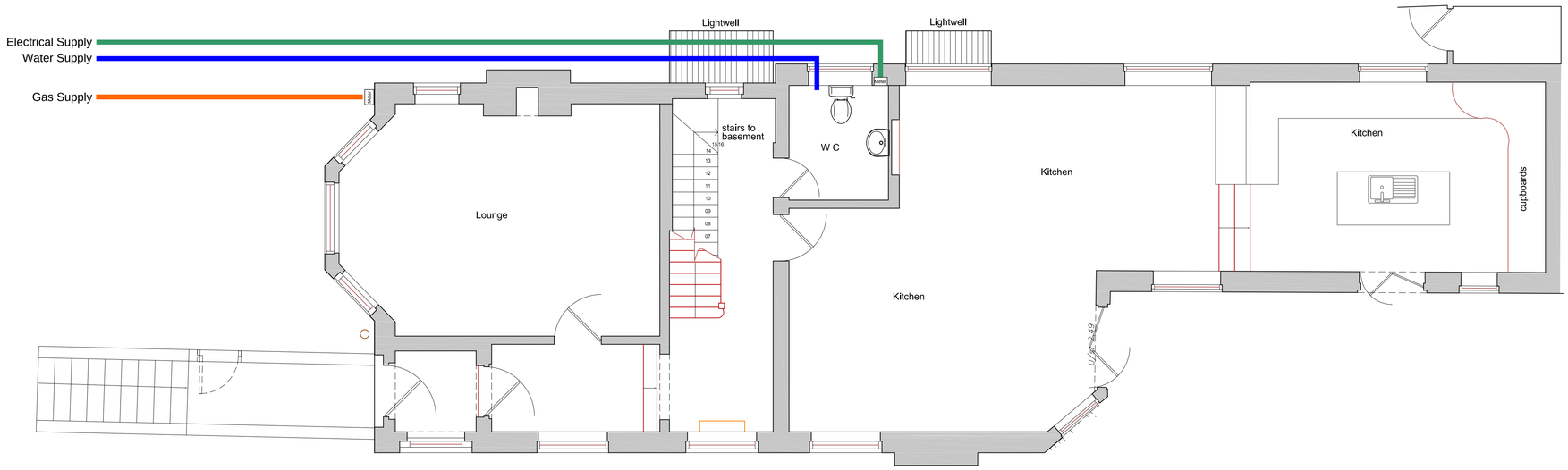
PROPOSED GROUND FLOOR PLAN



PROPOSED SECTION A-A

AMIR LAN DESIGN LTD
Unit 3, London Business Park, London, NW2 7AH
Tel: 0208 452 9400 Email:info@amirilan.com

Project: 56 Platt's Lane
Drawing Ref: Engineering Plan
Date: 08.01.19
Revision:



PROPOSED GROUND FLOOR PLAN

AMIRILAN DESIGN LTD
Unit 3, London Business Park, London, NW2 7AH
Tel: 0208 452 9400 Email:info@amirilan.com

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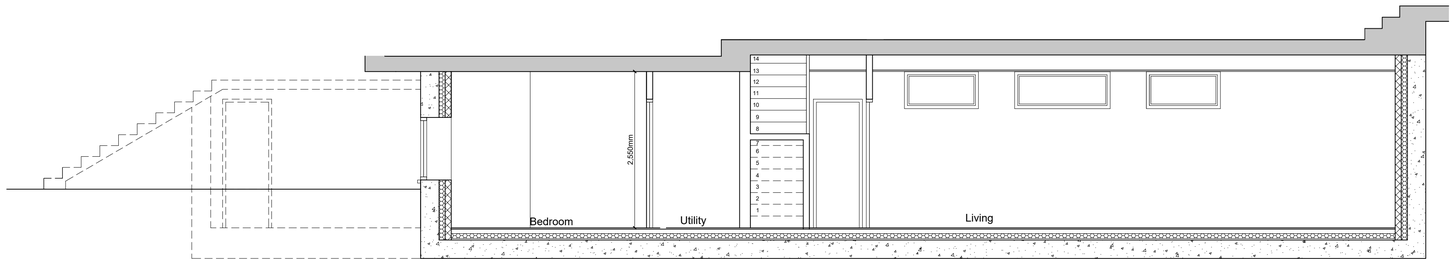
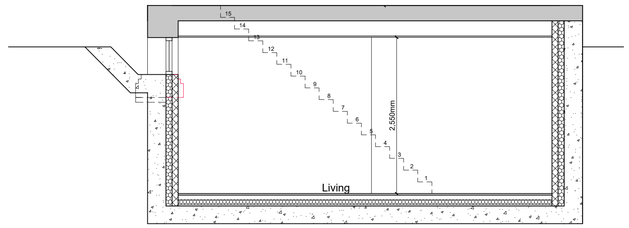
Drawing Ref: Services Layout
Date: 17.01.19
Revision:

APPENDIX C – Underpinning Sequencing & Temporary Works

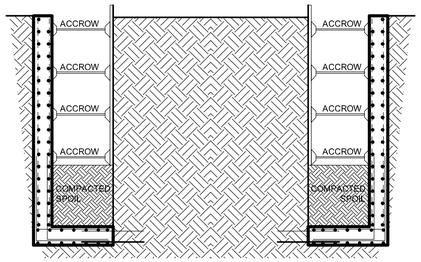


PROPOSED SECTION A-A



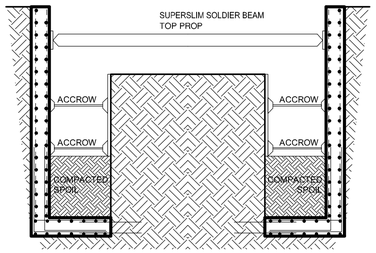
PROPOSED SECTION B-B

SECTION 1-1



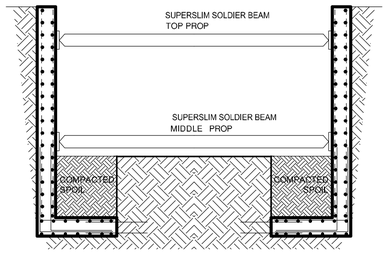
Step 1
Install retaining walls

SECTION 1-1



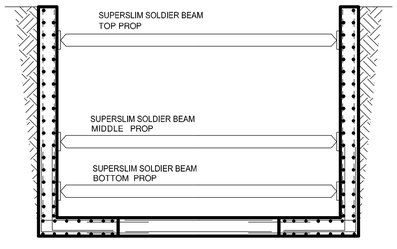
Step 2
Reduce ground level
Install top prop

SECTION 1-1



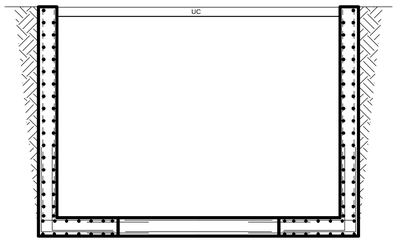
Step 3
Reduce ground level
Install middle prop

SECTION 1-1

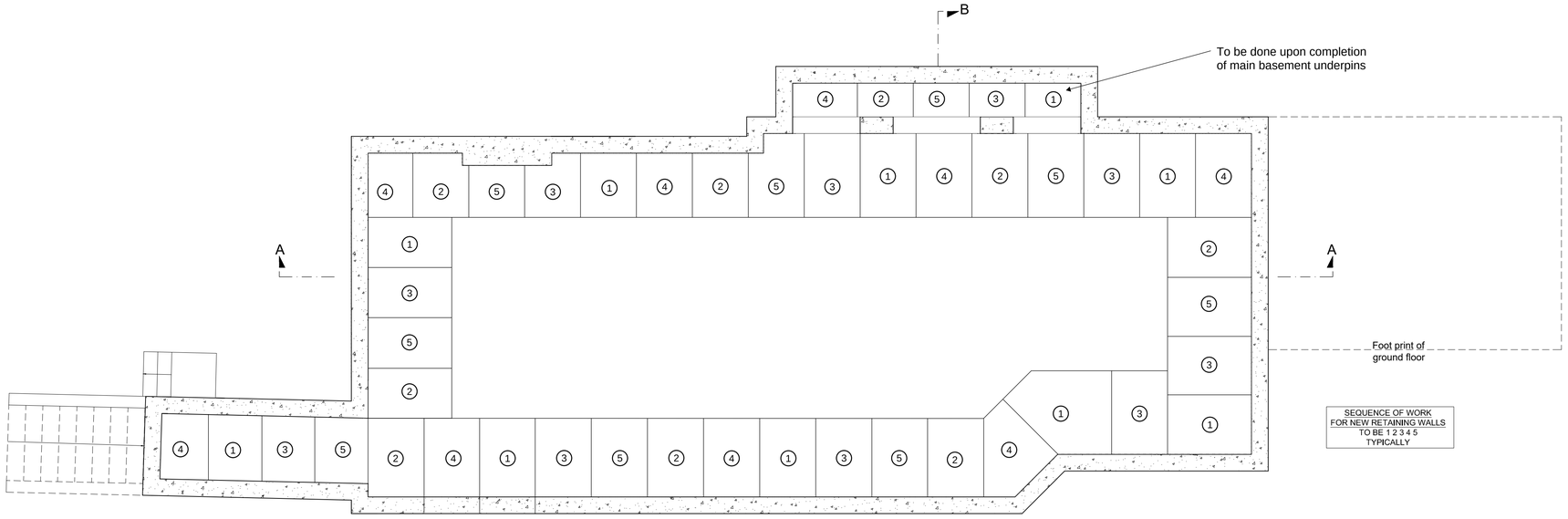


Step 4
reduce ground level
install middle prop
place concrete for new slab
install UC ground floor supporting beams

SECTION 1-1

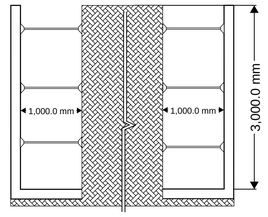


Step 5
after min 14 days remove props



PROPOSED BASEMENT UNDERPIN SEQUENCE PLAN

UNDERPIN
SECTION DETAIL



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Project: 56 Platt's Lane
Drawing Ref: Underpin Details
Date: 08.01.19
Revision:

APPENDIX D – Structural Calculations

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The following calculations are for the design of internal alterations and new basement to this traditional property.

These calculations should be read in conjunction with all relevant Architects Drawings. The caculations have been prepared to comply with all relevant British Standards and Building Regulations.

Loadings

Roof - 35 degree pitch

slates	0.50	KN/m2
Battens & Felt	0.10	KN/m2
Rafters	0.10	KN/m2
P/bd and skim	0.30	KN/m2
	1.00	KN/m2

Plan load	1	1.22	KN/m2
	cos 35		
Super		0.6	KN/m2
		1.82	KN/m2

say 1.9 KN/m2

Flat roof to dormer = 1.9 KN/m2

Floor

Boards	0.15	KN/m2
Joists	0.15	KN/m2
Plasterboard & Skim	0.30	KN/m2
Super	1.50	KN/m2
	2.10	KN/m2

Partitions - stud	say	0.60	KN/m2
Cavity Wall		3.60	KN/m2
Solid wall 215	say	4.50	KN/m2
Solid wall 340	say	7.2	KN/m2

Dormer cheek say 1.5 KN/m2

Timber to be Grade C16 to BS 5268

Steel to be Grade 43 to BS 449

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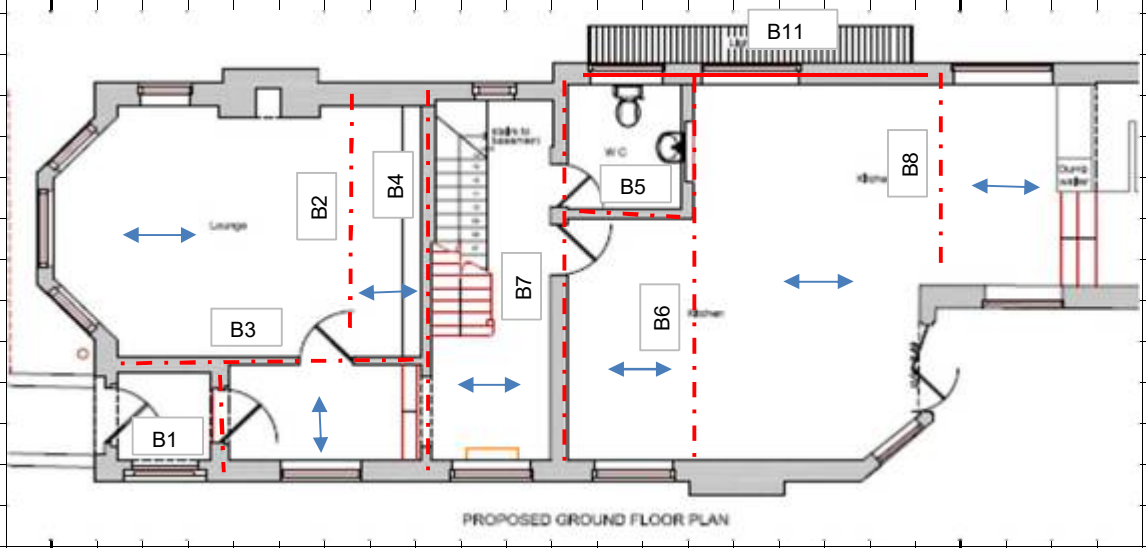
Rev A Basement layout amended B9 & B10 deleted

Ground Floor Plan Showing Supporting Structure Under

Ground floor to be reconstructed in timber



B1 - 152 UC 23 with 200 x 6 top plate

B2 - 152 UC 30

B3 - 203 UC 60

B4 - 305 UC 158

B5 - 152 UC 23

B6 - 254 UC 73

B7 - 305 UC 198

B8 - 152 UC 23

~~B9 - 203 UC 46~~

~~B10 - 203 UC 46~~

B11 - 203 UC 46

Column 139.7 CHS founded on 1.2 x 1.2 x 500 thickening in raft
(150mm deeper section locally)

Beam to Beam connection to be with 10mm end plate and 4M20 Grade 8.8 bolts, 6mm full profile fillet weld

Where beams sit on retaining wall provide 2 M20 Grade 8.8 anchor bolts

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Design of floor joists

Case 1 to lounge over Bedroom Span 4100

UDL 2.1 KN/m2

Max BM 2.1 x 4.1Sq / 8 = 4.4 KNm/m

Z Reqd 4.4e6 / 5.3 x 1.1 = 757 mm3 / m

Try 225 x 50 @ 400 ctrs (Z = 940 e3 mm3)

Deflection

5 x 2.1 x 0.4 x (4.1)4 x e3 / 384 x 8.8 x 41.1 = 8.5mm

span x 0.002 OK

Worst case so provide 225 x 50 @ 400 ctrs in all areas

Beam B1

Span 1800

Loading

225 wall 4.5 KN/m2 x 2.5 x 90% = 10.1 KN/m

Floor say 2.1 KN/m2 x 1.5m = 3.2 KN/m

13.3 KN/m Reaction 12 KN

BM 13.3 x 1.8Sq / 8 = 5.4 KNM

By inspection provide 152 UC 23 in floor depth

Beam B2

Span 4400

Loading

Udl floor = 2.1 KN/m2 x 6 / 2 = 6.3 KN/m Reaction = 13.9 KN

Max BM 6.3 x 4.4Sq / 8 = 15.3 KNm

Try 152 UC 23

L/Ry = 1.2 x 4400 / 36.8 = 144

Pbc = 98 N/mm2

Fbc = 15.3 e6 / 165.7 e3 = 92 N/mm2

OK

Provide 152 UC 30

Deflection

5 x 6.3 x (4.4)4 x e5 / 384 x 210 x 1263 = 11.5mm Deflection = 8.3mm

too high

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Bwam B3

Span 5100

Loading

UDL 1

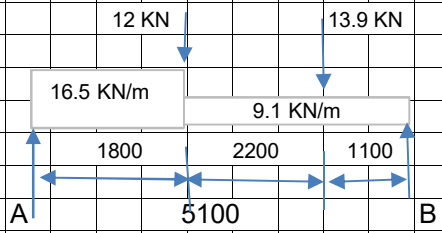
Wall 2.2 KN/m2 x 3.2 = 7.0 KN/m
Floor 2.1 KN/m2 x 2 / 2 = 2.1 KN/m
9.1 KN/m

UDL 2

Wall 4.5 KN/m2 x 3.2 = 14.4 KN/m
Floor 2.1 KN/m2 x 2 / 2 = 2.1 KN/m
16.5 KN/m

Point load B1 = 12 KN
B2 = 13.9 KN

Ra = 9.1 x 3.3 x 1.65 / 5.1 +
16.5 x 1.8 x 4.2 / 5.1 +
12 x 3.3 / 5.1 +
13.9 x 1.1 / 5.1 =
44.9 KN



Rb = 9.1 x 3.3 x 3.45 / 5.1 +
16.5 x 1.8 x 0.9 / 5.1 +
12 x 1.8 / 5.1 +
13.9 x 4.0 / 5.1 = 40.7 KN

Point of zero shear from B = (40.7 - 13.9) / 9.1 = 2.945m

Max BM 40.7 x 2.945 - 13.9 x 1.845 - 9.1 x 2.945 Sq / 2 =
54.8 KNm

Try 201 UC 46

L / Ry = 1.2 x 5100 / 51.1 = 120

Pbc = 125 N/mm2

Fbc = 54.8 e6 / 449.2 e3 = 122 N/mm2

Deflection

Equivalent UDL = 8 x 54.8 / 5.1Sq = 16.9 KN/m

5 x 16.9 x (5.1)4 x e5 / 384 x 210 x 4564 = 15.5 mm

Too high

Provide
203 UC 60
Deflection = 11.6mm
Span / 435

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Beam B4

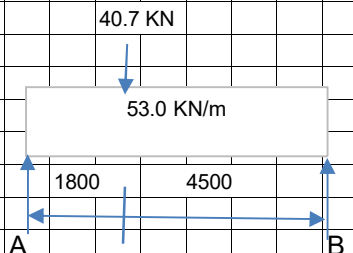
Span 6300

Loading

Roof	1.9 KN/m2 x 8 / 2	= 7.6 KN/m
2nd Flr	2.1 Kn/m2 x say 3m	= 6.3 KN/m
1st Flr	2.1 Kn/m2 x 8 / 2	= 8.4 KN/m
Grd Flr	2.1 KN/m2 x 3.5 / 2	= 3.7 KN/m
Wall	say 3Kn/m2 ave x 9m	= 27.0 KN/m

53.0 KN/m

Point load B3 = 40.7 KN



Ra = 53 x 6.3 / 2 +
40.7 x 4.5 / 6.3 =
196.0 KN

Rb = 53 x 6.3 / 2 +
40.7 x 1.8 / 6.3 =
178.5 KN

Point of zero shear from B = 178.5 / 53 = 3.368

Max BM 178.5 x 3.368 / 2 = 300.6 KNM

Try 305 UC 158

L / Ry = 1.2 x 6300 / 78.9 = 96

Pbc = 149 N/mm2

Fbc = 300.6 e6 / 2368 e3 = 127 N/mm2

OK

Deflection

Equivalent UDL 8 x 300.6 / 6.3Sq = 60.6 KN/m

5 x 60.6 x (6.3)4 x e5 / 384 x 210 x 38740 = 15.2mm

Provide
305 UC 158

Span / 412

OK

Beam B5

Span 2000

Loading

wall	2.2 Kn/m2 x 2.7	= 5.9 KN/m
Floor	2.1 Kn/m2 x say 1	= 2.1 KN/m

8.0 KN/m

Reaction 8 KN

Max BM 8 x 2 Sq / 8 = 4 KNm

Provide
152 UC 23

By inspection provide 152 UC 23 as B1

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Beam B6

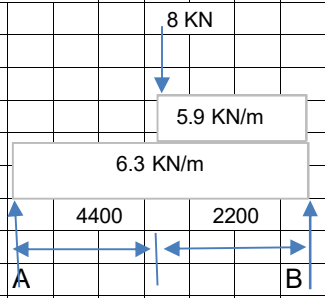
Span 6600

Loading

|Floor 2.1 KN/m2 x 6 / 2 = 6.3 KN/m

e/o wall as B5 = 5.9 KN/m

Point load B5 = 8 KN



Ra = 6.3 x 6.6 / 2 + 8 x 2.2 / 6.6 +
5.9 x 2.2 x 1.1 / 6.6 =
25.6 KN

Ra = 6.3 x 6.6 / 2 + 8 x 4.4 / 6.6 +
5.9 x 2.2 x 5.5 / 6.6 =
36.9 KN

Point of zero shear from A = 25.6 / 6.3 = 4.06m

Max BM 25.6 x 4.06 / 2 = 52 KNm

Try 203 UC 52

L / ry = 1.2 x 6600 / 51.6 = 154

Pbc = 106 N/mm2

Fbc = 52 e6 / 510.4 e3 = 102 N/mm2

OK

Deflection

Equivalent UDL 8 x 52 / 6.6 Sq = 9.6 Kn/m

5 x 9.6 x (6.6)4 x e5 / 384 x 210 x 5263 = 21.5 mm

too high

Provide 254 UC 73 deflection = 9.9mm

Beam B7

Span 6300

Loading

Roof	1.9 Kn/m2 x 8 / 2 = 7.6 KN/m
2nd flr	2.1 KN/m2 x 8 / 2 = 8.4 KN/m
1st flr	2.1Kn/m2 x 8 / 2 = 8.4 KN/m
Partitions	0.6KN/m2 x 2.7 x 3 = 4.9 Kn/m
Grd flr	2.1 KN/m2 x 8 / 2 = 8.4 Kn/m2
Wall grd & 1st	4.5 KN/m2 x 6.5m = 29.3 KN/m
Wall 2nd	0.6 KN/m2 x 2.7 = 1.6 KN/m
	68.6 KN/m

Point load B5 = 8 KN

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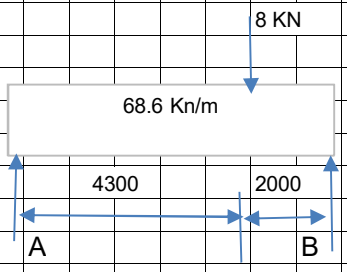
Ra = 68.6 x 6.3 / 2 + 8 x 2 / 6.3 =

218.6 KN

Rb = 68.6 x 6.3 / 2 + 8 x 4.3 / 6.3 =

221.6 KN



Point of zero shear from A

218.6 / 68.6 = 3.19m

Max BM 218.6 x 3.19 / 2 = 348.3 KNm

Try 305 UC 158

L / Ry = 1.2 x 6300 / 78.9 = 96

Pbc = 152 N/mm2

Fbc = 348.3 e6 / 2368 e3 = 147 N/mm2

Deflection

Equivalent UDL = 8 x 348.3 / 6.3Sq = 70.2 KN/m

5 x 70.2 x (6.3)4 x e5 / 384 x 210 x 38740 = 17.7mm

Too high Provide 305 UC 198

Deflection = 13.5mm

Span / 465

Beam B8

Span 3600

UDL floor 2.1 KN/m2 x 6.5 / 2 = 6.8 Kn/m

Reaction 13 KN

Max BM 6.8 x 3.6Sq / 8 = 11 KNm

Try 152 UC 23

L / Ry = 1.2 x 3600 / 36.8 = 117

Pbc = 119 N/mm2

Fbc = 11 e6 / 165.7 e3 = 66 N/mm2

Deflection

5 x 6.8 x (3.6)4 x e5 / 384 x 210 x 1263 = 5.6mm

Provide 152 UC 23

Span / 640

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Beam B9

Span 3000

Loading

225 wall	4.5 KN/m2 x 5.5	=	24.8 Kn/m
Roof	1.9 KN/m2 x 4 / 2	=	3.8 Kn/m
1st Flr	2.1 KN/m2 x 4 / 2	=	4.2 KN/m
Grd Flr	2.1 KN/m2 x say 1	=	2.1 KN/m
Ext slab	6.3 KN/m x 2.3 / 2	=	7.3 KN/m

42.2 KN/m

Reaction 63.3 KN

Max BM 42.2 x 3Sq / 8 = 47.5 KNm

Try 203 UC 46

L / Ry = 1.2 x 3000 / 51.1 = 70

Pbc = 163 N/mm2

Fbc = 47.5 e6 / 449.2 e3 = 106 N/mm2

OK

Deflection

5 x 42.2 x (3)^4 x e5 / 384 x 210 x 4564 = 4.6mm

Span / 645

Provide 203 UC 46

Beam 10

Span 2300

Loading

225 wall	4.5 KN/m2 x 5.5	=	24.8 Kn/m
Roof	1.9 KN/m2 x 6 / 2	=	5.7 Kn/m
1st Flr	2.1 KN/m2 x 4 / 2	=	4.2 KN/m
Grd Flr	2.1 KN/m2 x 4 / 2	=	4.2 KN/m
Ext slab	6.3 Kn/m2 x 3 / 2	=	9.5 KN/m

48.4 KN

Reaction 55.7 KN

Max BM 48.4 x 2.3 Sq / 8 = 32 KNm

By inspection provide 203 UC 46

Beam 11 - over light well

Beam to be in 3 spans — Sapn 2300 max

Loading

225 wall	4.5 KN/m2 x 6.5	=	29.3 Kn/m
Roof	1.9 KN/m2 x 7 / 2	=	6.7 Kn/m
2nd Flr	2.1 KN/m2 x say 2m	=	4.2 KN/m
1st Flr	2.1 KN/m2 x 7 / 2	=	7.4 KN/m
Grd Flr	2.1 KN/m2 x say 1	=	2.1 KN/m

49.7 KN/m

Reaction 57.2 KN

Max BM 49.7 x 2.3Sq / 8 = 32.9 KNm

By inspection Provide 203 UC 46

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Column Support to B8, 9 & 10

Height 3200

Loading

B8	13 KN
B9	63.3 KN
B10	55.7 KN
	132 KN

Connection to top of column will be a cap connection with B9 sitting on the column and B8 and B10 bolting to it

BM say 132KN x 0.075 = 9.9 KNm

Try 139.7 CHS t = 10mm

L / Ry = 1.5 x 3200 / 46 = 104

Pbc = 180 N/mm2 Pc = 78 N/mm2

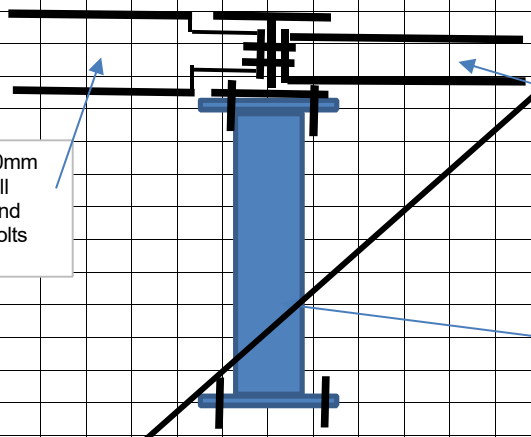
Fbc = 9.9 e6 / 123 e3 = 81 N/mm2

Fc = 132 e3 / 40.7 e2 = 33 N/mm2

UF 81 / 180 + 33 / 78 = 0.87

OK

Provide
139.7 dia CHS
t = 10mm



203 UC 46 with 10mm end plate. 6mm full profile fillet weld and 4M20 grade 8.8 bolts

152 UC 23 with 10mm end plate. 6mm full profile fillet weld and 4M20 grade 8.8 bolts

139.7 dia CHS T = 10mm with 10mm end plates. 6mm full profile fillet weld and 4M20 grade 8.8 bolts to steel and 4 M16 anchor bolts to slab

Column bearing on basement slab
GBP = 132 / 1.2 x 1.2 = 92 KN/m2

OK

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Design of Basement

The basement is formed within the slope of the ground with a maximum retained height of 3.5m. The walls are to be constructed as reinforced concrete underpins connected to the raft and built in strips. to provide stability.

Maximum height 3.5m

Assumed soil parameters for dense sand as found in trial holes

density 18 KN/m2 Angle of internal friction 40 degrees

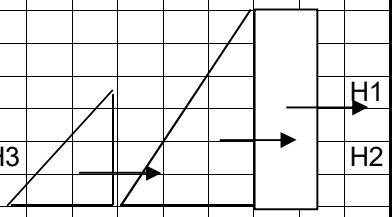
Ka = 0.26

Surcharge say 5 KN/m2

H1 5 KN/m2 x 0.26 x 3.5 = 4.6 KN/m

H2 soil = 18 x 0.26 x 3.5Sq/2

28.7 KN/m



H3 Water = 10KN/m2 x 2.5Sq/2

31.3 KN/m

Max BM at base of wall

4.6 x 3.5/2 + 28.7 x 3.5 / 3 + 31.3 x 2.5/3 = 67.6 KNm

Ult load say 67.6 KN/m x 1.55 = 104.8 KNm

Try 350 thick RC wall

Cover say 40mm d = 300

M/b*dsq*fcu = 105 e6 / (e3 x 300Sq x 35) = 0.033

a1 = 0.94

Ast = 105 e6 / (0.87 x 500 x 0.94 x 300) = 856 mm2 / m

Provide T16 @ 150 ctrs (1340 mm2) in each face vertically

Distribution steel T12 @ 150 ctrs (754 mm2 / m in each face)

min steel 0.13% area = 455 mm2/m

Check slenderness

Span / depth = 7 M/bdSq = 1.17

Mf = 1.75

Mf compression steel 1.12

Allowable span = 7 x 1.75 x 1.12 x 300 = 4110

OK

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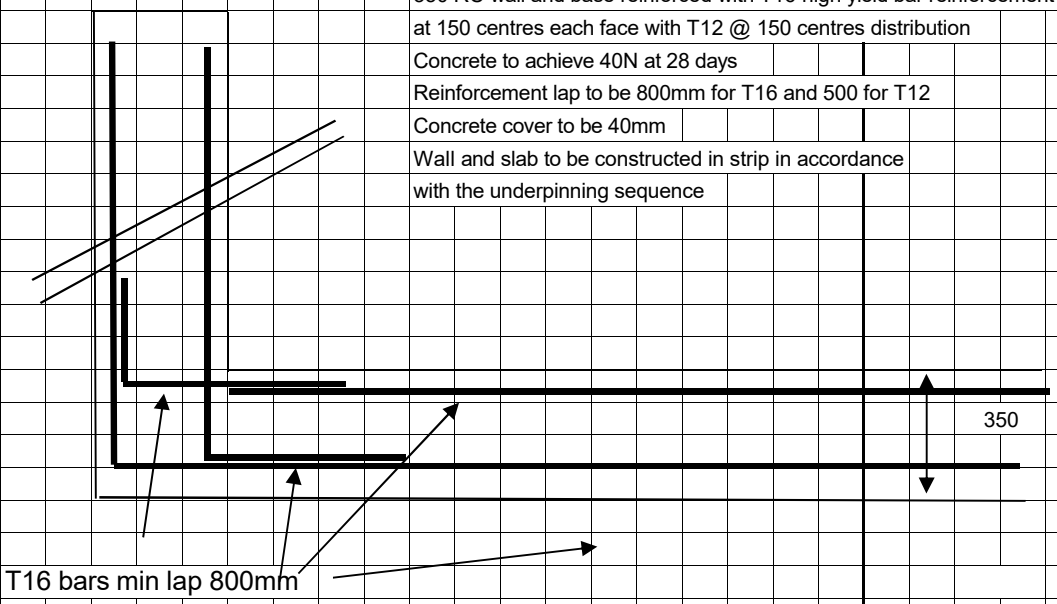
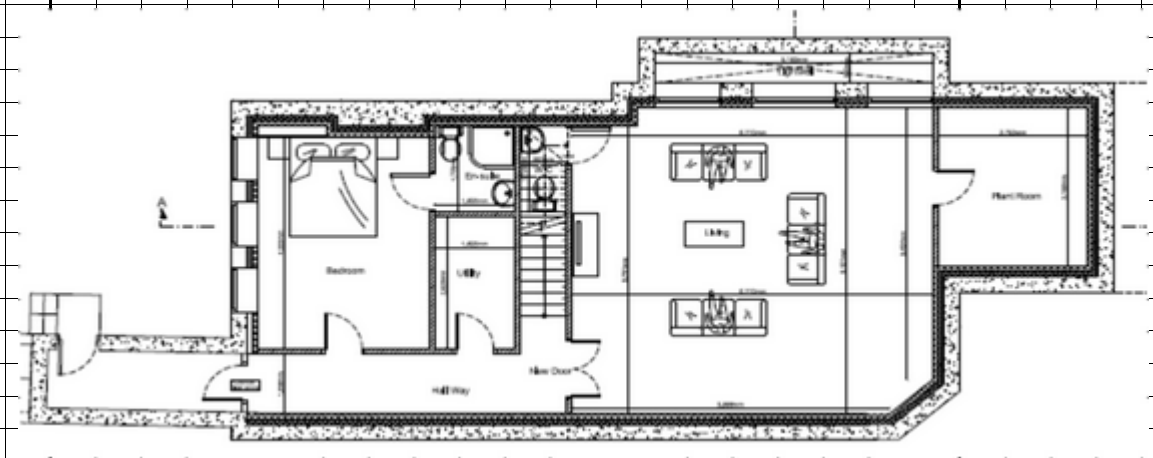
350 RC wall and base reinforced with T16 high yield bar reinforcement
at 150 centres each face with T12 @ 150 centres distribution
Concrete to achieve 40N at 28 days
Reinforcement lap to be 800mm for T16 and 500 for T12
Concrete cover to be 40mm
Wall and slab to be constructed in strip in accordance
with the underpinning sequence

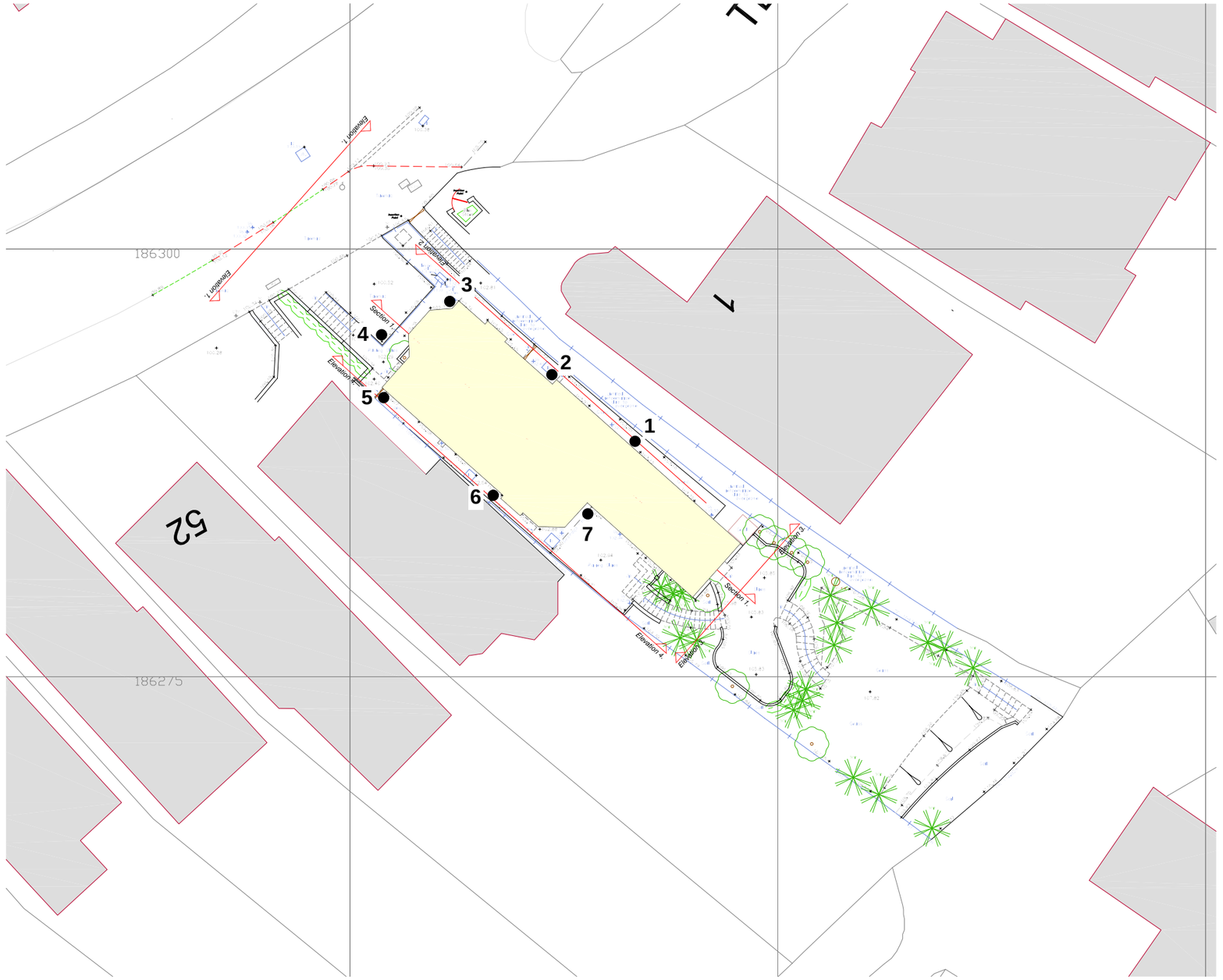


Typical RC detail, Applicable for whole basement



Basement Plan

APPENDIX E – Trial Hole Details



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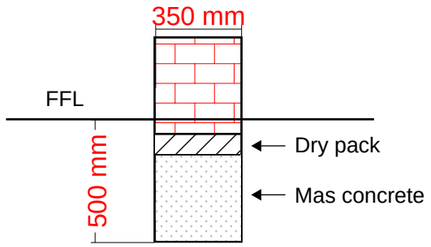
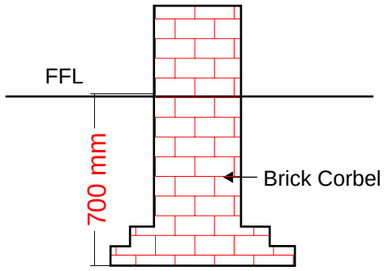
Project: 56 Platt's Lane
Drawing Ref: Trial Holes Layout
Date: 01.08.18
Revision:

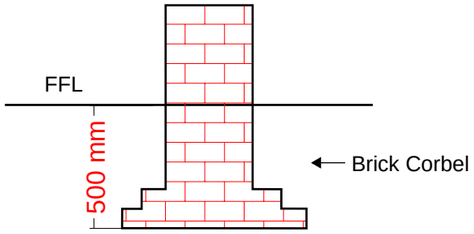
Trial Hole 1 & 2



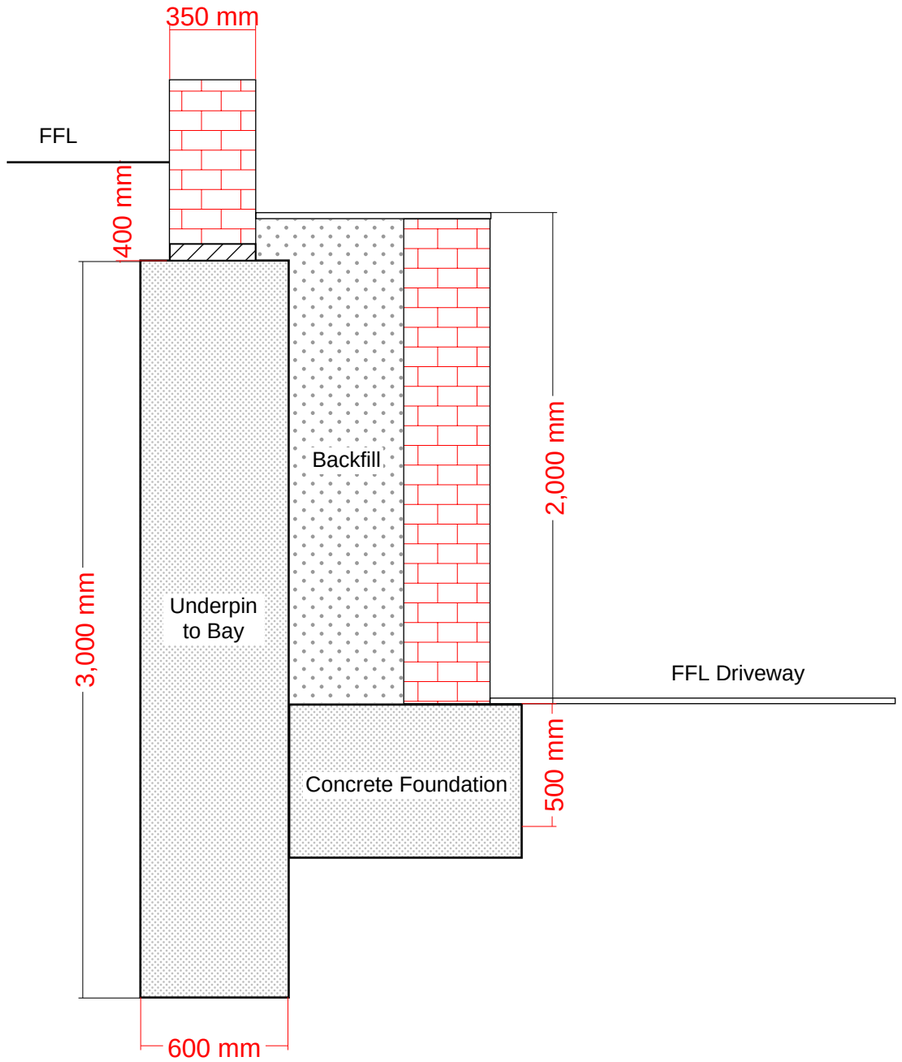
Trial Hole 3 & 5



Trial Hole 6 & 7



Trial Hole 4 & Section 1



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