GREEN STRUCTURAL ENGINEERING

42 Teddington High St
TW11

CONSTRUCTION METHOD STATEMENT
Including Structural Impact Assessment

March 2024

Project Ref: J001237

REVISION HISTORY

Rev	Purpose	Date	Issued By	Approved
Rev 0	Initial report	29-10-18	GG	PB
Rev A	Updated to reflect new scheme	25-03-24	GG	PB

Unit 5 Quayside Lodge, William Morris Way, SW6 2UZ
Registered in England Number 06533911

CONTENTS

APPENDICES

The following appendices are included with this report:

Appendix A - Geotechnical report by GabrielGeo

Appendix B - GSE Design Calculations for Basement

Appendix C - GSE Structural Drawings For New Basement

Appendix D - GSE Temporary Works Outline Scheme

Appendix E - GSE Construction Sequence

Unit 5 Quayside Lodge, William Morris Way, SW6 2UZ
Registered in England Number 06533911

CONSTRUCTION METHOD STATEMENT

This Construction Method Statement is produced for submission to the London Borough of Richmond upon Thames planning department for planning application purposes only and should not be used for any other purposes, e.g. Party Wall Awards.

SCOPE OF WORKS

The existing building on the site is to be demolished to make way for a new mixed-use scheme. The new scheme will be built up against the Teddington Arms on one side but is open on the other three sides due to the plot being located on a corner.

The new scheme will be built over four levels including a basement. At ground and basement level it is proposed to create retail space, while the first to fourth floors will be residential.

DESCRIPTION OF THE PROPERTY AND ADJOINING PROPERTIES

The existing property is built over two stories and was a former bank. It is of masonry construction with concrete floors.

Although the property looks to be in a sound condition structurally, it is not an attractive building architecturally and is proposed to be demolished to make way for the new development.

Being on a corner plot the building is only adjacent to the Teddington Arms to the West, the East side and to the rear is clear. The adjoining property is of masonry construction with timber floors and roof and looks to be in sound condition from an external visual examination.

SOIL CONDITIONS

Please see attached report by GabrielGeo Consulting for site investigations and the site-specific report to include:

1. A desk top study.
2. Site specific site investigation.
3. Report on geology and hydrology across the site.
4. Analysis of the upper aquifer.
5. An assessment of ground movements expected and how these will affect adjoining or adjacent properties.

STRUCTURAL DESIGN PROPOSALS

The proposed structural works to 42 Teddington High St will involve the following structural works:

i) Underpinning the existing party wall with the Teddington Arms in shallow reinforced concrete ‘L’- shaped underpins cast in 1 m wide sections and designed to be stable in their own right.

ii) Excavating for the new basement.

Unit 5 Quayside Lodge, William Morris Way, SW6 2UZ
Registered in England Number 06533911

The new basement will be constructed in reinforced concrete with the basement slabs tied into the new retaining walls to provide lateral support in the permanent case. The basement slab will be designed to resist uplift pressures due to heave and accidental water pressure.

The stability of the reinforced concrete underpins in the permanent case is provided by designing them as monolithic cantilever retaining walls propped at basement level by the slab and at ground level by the proposed floor. The vertical loads from the party walls and structure over are allowed for in the designs but considered differently in the permanent and temporary conditions. In the permanent condition the full load is considered as this generates the maximum soil pressures under the walls while in the temporary condition only the self-weight of the wall is considered.

As stated previously, the 'L'-shaped reinforced concrete underpins are designed to be stable in both the temporary and permanent conditions which reduces the amount of temporary works required. These walls will be carried out using an underpinning type method, with each pin constructed no wider than 1000 mm and no adjacent underpin shall be constructed within a 48 hour period.

Based on the site investigations the following soil parameters have been used for initial structural calculations:

	Made ground	**Kempton Park Gravels**
Bulk density, kg/m^3	1800	1900
Effective cohesion, kN/m^2	0	0
Effective friction angle, degrees	25	30
Allowable bearing pressure, kN/m^2	--	150

Bearing capacities at the depth of the proposed basement from the geotechnical report are stated as 140kPA and this value has been adopted.

The borehole was also noted to contain standing water at 3.3m below ground level on completion. The new walls will be designed for groundwater up to ground level in the permanent condition. This allows for any variation in the groundwater level and any accidental events, such as burst water mains, which may occur.

CONSTRUCTION DRAWINGS

Structural drawings for the new basement are included in the appendices. The basement drawings indicate the proposed basement structural layout, sequencing and structural sections for the party walls of the property.

Unit 5 Quayside Lodge, William Morris Way, SW6 2UZ
Registered in England Number 06533911

TEMPORARY WORKS

The temporary works required during construction will be designed such that the stability of the adjacent buildings is maintained and will be the responsibility of the contractor, once the contractor is appointed they are to confirm the full temporary works proposals.

In the temporary condition propping will be required to the new basement walls until the new structure is completed.

The scope of the Temporary Works included within this project can be separated into the following parts:

i) Underpinning the existing party walls using reinforced concrete retaining walls, in order to transfer the loads from the party wall down to suitable bearing strata;

ii) Lateral support across site during formation of the new basement.

Existing party walls are to be underpinned in short sections in fully shored shafts. This will be achieved by maintaining a central berm which can be propped from. At low level the magnitude of the earth forces means that the propping, required to prevent sliding of the wall, until the basement slab is cast will need to be in structural steelwork. Typically this will be set 500mm above the basement slab level.

Any local ingress of groundwater into excavations will be dealt with using temporary local sumps and pumping.

An outline temporary works scheme is included in the appendices for information only as the temporary works will need careful consideration and discussion with the contractor to ensure that the design meets the requirements of their proposed method of working. Temporary works will be designed and specified in accordance with BS 5975. 2011. “Code of Practice for Temporary Works Procedures and the Permissible Stress Design of Falsework” and other relevant design codes. This will reduce the impact on the neighbouring properties by stabilizing excavations, load bearing walls and party walls of the property under construction.

CONSTRUCTION SEQUENCE FOR PROPOSED BASEMENT EXTENSION

The outline construction sequence below sets out the sequence assumed in the scheme design and will help minimise the impact on neighbouring properties by streamlining the works, reducing time on site and therefore reducing the risk of movement during the construction phase whilst ensuring the works are undertaken in a safe manner by the contractor.

The following sequence has been assumed for the formation of the new basement in the preparation of this CMS. The sequencing of works in the basement in relation to those for the superstructure requires a contractor’s input and it has been assumed that any works above ground will follow on from the newly constructed basement.

Unit 5 Quayside Lodge, William Morris Way, SW6 2UZ
Registered in England Number 06533911

CONSTRUCTION DRAWINGS

See drawings GA/01, S/01 and 02, MS/01 and MS/02 in the Appendices for underpinning layout, sequencing and sections to the party walls of the property.

CONSTRUCTION SEQUENCE

1. Site setup will be established with hoarding and welfare facilities erected and installed on site.
2. The existing building will be demolished carefully from top down taking note of the surveys undertaken on the existing building. Particular attention will be given to the demolition of the existing bank wall adjacent to the Teddington Arms (gridline E) as it has been assumed this wall is independent of the neighbouring wall.
3. Once the site is cleared, excavation will commence from the location where the new basement abuts the boundary wall of the Teddington Arms. The excavations and construction will then work away from that location.
4. The existing boundary wall will be underpinned in a 1 to 5 'hit and miss' underpinning sequence using mass concrete. A new RC retaining wall will be constructed in front of this mass concrete underpinning as part of the basement.
5. See drawing MS/01 & MS/02 for the construction sequence of a typical underpin.
6. The underpins to form the new basement will require horizontal propping until completion of the basement slab.
7. As excavation progresses, any existing foundations discovered will be broken out and removed from site to make way for the new basement construction.
8. New concrete pad foundations and strip foundations will be constructed, where specified on the structural drawings.
9. New concrete beams and columns will be installed, as specified on the structural drawings. These will be supported on the underpins or on the new concrete foundations.
10. The ground floor RC concrete floor will be poured and supported by the RC structure in the basement.
11. When all the underpins across the site have been completed, bulk excavation to the whole site will be carried out.
12. Once the bulk excavation is down to approximately 500mm above the proposed basement level, a second level of horizontal props will be installed, if required by the design.
13. Excavation will then be carried out down to formation level.
14. The below – slab drainage for foul & ground water, sumps and pumps will then be installed. The pumps will discharge the foul / ground water into the existing sewer system to the front of the property.
15. The new basement RC slab (ground – bearing slab) will then be constructed.
16. Once the new basement slab has gained sufficient strength, the horizontal propping across the site will be removed.

Unit 5 Quayside Lodge, William Morris Way, SW6 2UZ
Registered in England Number 06533911

17. After the new basement slab has cured, a drained – cavity layer will be laid to the slab and walls.
18. A layer of insulation will be placed on top of the drained – cavity layer on the slab, and in front of the drained – cavity layer on the walls.
19. Finally a layer of screed will be laid to form the finished basement floor.

POTENTIAL IMPACT ON THE PROPERTY AND ADJOINING PROPERTIES

The proposed basement will be formed using an underpinning method, constructed in sections each no wider than 1000mm, with no adjacent underpins constructed within a 48-hour period. This method of construction reduces the amount of potential ground movement and so minimises the effects of settlement of the adjacent structures.

The proposed works, if executed correctly and in accordance with the appointed Engineer's details and procedures, will pose no significant threat to the structural stability of the property or indeed adjoining properties.

POTENTIAL IMPACT ON EXISTING AND SURROUNDING UTILITIES, INFRASTRUCTURE AND MAN – MADE CAVITIES

Any local services on the property's land will be maintained during construction and re – routed if necessary. The exact location of these services will not be known until the works commence. However, the impact will be negligible as these services will be maintained. If it is necessary to relocate or divert any utilities, the Contractor and Design Team will be under a statutory obligation to notify the utility owner prior to any works. This will be so that they can assess the impact of the works and grant or refuse their approval. There is no known man – made cavities (e.g. tunnels) in the vicinity of the proposed basement.

POTENTIAL IMPACT ON DRAINAGE, SEWAGE, SURFACE AND GROUND WATER LEVELS AND FLOWS

The proposed drainage for the new development will make use of the existing drainage system, where it will feed under gravity in to the existing sewer. All pumps will be fitted with non-return valves to prevent flooding in the event of the surcharging of the public sewer.

Please see the report by GabrielGeo for impacts on the drainage and hydrology across the site.

Unit 5 Quayside Lodge, William Morris Way, SW6 2UZ
Registered in England Number 06533911

POTENTIAL IMPACT ON EXISTING AND PROPOSED TREES

No existing trees will be felled during the construction of the proposed basement.

Prepared By

Geoff Green B.Eng (Hons)

Approved by

Paul Bennett
B.Sc (Hons), C. Eng, MICE

Green Structural Engineering Ltd.

Unit 5 Quayside Lodge, William Morris Way, SW6 2UZ
Registered in England Number 06533911

APPENDIX A

GEOTECHNICAL REPORT

APPENDIX B

GSE INITIAL DESIGN CALCULATIONS FOR BASEMENT

	Project		Job Ref	
	42 HIGH ST TEDDINGTON		J001237	
	Drawing Ref	Calculations by	Checked by	Sheet No
		SK		
	Part of Structure		Date	
	LOAD TAKE DOWN		5/10/18	

Preliminary load take down

Assumptions :
- Concrete frame
- 250 RC slabs
- Concrete core around lift / staircase (shear walls)

	Project	Job Ref
GSE GREEN STRUCTURAL ENGINEERING	42 HIGH STREET TEDDINGTON	J001237
	Drawing Ref / Calculations by: SK / Checked by / Sheet No	
	Part of Structure: PARTY WALL LOADTAKEDOWN	Date: 16/10/18

TEDDINGTON ARMS PARTY WALL, (13 storeys)
↳ ASSUME TJ's FRONT TO BACK (// TO PARTY WALL)

ROOF

$w_{DL} = 0.5 \times 1.0$

$w_{IL} = 0.5 \times 1.0$

2nd FLOOR

$w_{DL} = 0.5 \times 0.8$

$w_{IL} = 0.5 \times 1.5$

1st FLOOR

$w_{DL} = 0.5 \times 0.8$

$w_{IL} = 0.5 \times 1.5$

GROUND FLOOR (ASSUME RC GBS) → no existing basement?
↳ Take nominal load

$w_{DL} = 1.0 \times 24 \times 0.125$

$w_{IL} = 1.0 \times 1.5$

MASONRY WALL

$w_{DL} = (4.3 \times 7.4) + (7.58 \times 5.3)$

	DL	IL (kN/m)
ROOF	0.5	0.5
2nd FLOOR	0.4	0.75
1st FLOOR	0.4	0.75
GROUND FLOOR	6	1.5
MASONRY WALL	72	
TEDDINGTON ARMS CONTRIBUTION	85.3	3.5 kN/m

	Project	Job Ref
GSE GREEN STRUCTURAL ENGINEERING	42 HIGH STREET TEDDINGTON	J001237
	Drawing Ref / Calculations by: SK	Checked by / Sheet No
	Part of Structure: PARTY WALL LOADTAKEDOWN	Date: 16/10/18

N° 42 RC FRAME

ROOF

$W_{DL} = 0.125 \times 24 \times 2.5 + 0.13 \times 2.5$ (tributary width)

$W_{IL} = 1.0 \times 2.5$

3rd FLOOR

$W_{DL} = 0.125 \times 24 \times 2.5 + 0.13 \times 2.5$

$W_{IL} = 1.5 \times 2.5$

2nd → same as 3rd

1st → same as 3rd

GF → same as 3rd

	DL	IL (KN/m)
ROOF	15.8	2.5
3rd FLOOR	15.8	3.75
2nd	15.8	3.75
1st	15.8	3.75
GF	15.8	3.75
	79	17.5 KN/m

TOTAL PARTY WALL LOADS

DL = 85.3 + 79 = 164.3 KN/m (SLS)

IL = 21 KN/m (SLS)

	Project		Job Ref	
GSE GREEN STRUCTURAL ENGINEERING	42 HIGH ST TEDDINGTON		500 1237	
	Drawing Ref	Calculations by	Checked by	Sheet No
		SK		
	Part of Structure		Date	
	'NON' PARTY WALL LOADTAKEDOWN		16/10/18	

TRIBUTARY AREA FOR TYPICAL EDGE COLUMN ASSUMING FLAT SLAB DESIGN $= 3.5 \times 6.2 = 21.7 m^2$

ROOF, 3rd, 2nd, 1st, GF assume all the same

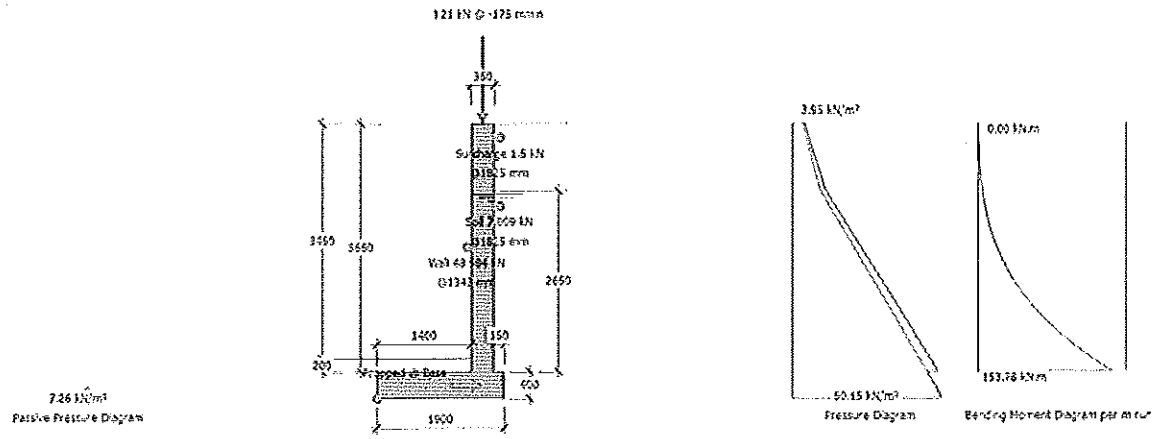
$$W_{DL} = 5 \times [0.25 \times 24 + 0.3] \times \frac{21.7}{6.2} = \underline{110.25} \text{ KN/m}$$

$$W_{IL} = 5 \times 1.5 \times \frac{21.7}{6.2} = \underline{26.25} \text{ KN/m}$$

Green Structural Engineering Ltd 25642
Unit 5, Quayside Lodge
William Morris Way, Fulham, SW6 2UZ
Tel: (0203) 4053120
Email: info@gseltd.co.uk Web: www.gseltd.co.uk

Job Ref	:
Sheet	: /10000
Made by	:
Date	: 17 October 2018 / Ver. 2017.10
Checked	:
Approved	:

MasterKey : Retaining Wall Design to BS 8002 and BS 8110 : 1997
Party wall Permanent case
Reinforced Concrete Retaining Wall with Reinforced Base



Summary of Design Data

Notes	All dimensions are in mm and all forces are per metre run
Material Densities (kN/m³)	Dry Soil 18.00, Saturated Soil 20.80, Submerged Soil 10.80, Concrete 24.00
Concrete grade	fcu 30 N/mm², Permissible tensile stress 0.250 N/mm²
Concrete covers (mm)	Wall inner cover 30 mm, Wall outer cover 30 mm, Base cover 50 mm
Reinforcement design	fy 460 N/mm² designed to BS 8110: 1997
Surcharge and Water Table	Surcharge 10.00 kN/m², Water table level 2660 mm
Unplanned excavation depth	Front of wall 406 mm

† The Engineer must satisfy him/herself to the reinforcement detailing requirements of the relevant codes of practice

Additional Loads

Wall Propped at Base Level	Therefore no sliding check is required
Vertical Line Loads	164.3 kN/m @ X -175 mm and Y 0 mm - Load type Dead 21 kN/m @ X -175 mm and Y 0 mm - Load type Live
† Dimensions	Ties, line loads and partial loads are measured from the inner top edge of the wall

Soil Properties

Soil bearing pressure	Allowable pressure @ front 150.00 kN/m², @ back 150.00 kN/m²
Back Soil Friction and Cohesion	ϕ_b = Atn(Tan(30)/1.2) = 25.69°
Base Friction and Cohesion	δ = Atn(0.75xTan(Atn(Tan(30)/1.2))) = 19.84°
Front Soil Friction and Cohesion	ϕ = Atn(Tan(30)/1.2) = 25.69°

Loading Cases

G_{Soil}- Soil Self Weight, G_{Wall}- Wall & Base Self Weight, Fv_{Heel}- Vertical Loads over Heel,
P_a- Active Earth Pressure, $P_{surcharge}$- Earth pressure from surcharge, P_p- Passive Earth Pressure

Case 1: Geotechnical Design	1.00 G_{Soil}+1.00 G_{Wall}+1.00 Fv_{Heel}+1.00 P_a+1.00 $P_{surcharge}$+1.00 P_p
Case 2: Structural Ultimate Design	1.40 G_{Soil}+1.40 G_{Wall}+1.60 Fv_{Heel}+1.00 P_a+1.00 $P_{surcharge}$+1.00 P_p

Geotechnical Design

Wall Stability - Virtual Back Pressure

Case 1 Overturning/Stabilising	129.765/373.126	0.348	OK

Wall Sliding - Virtual Back Pressure

$Fx/(Rx_{Friction}+Rx_{Passive})$	0.000/(87.610+0.709)	0.000	OK
Prop Reaction Case 2 (Service)	97.7 kN @ Base		

Soil Pressure

Virtual Back (No uplift)	Max(106.664/150, 148.907/150) kN/m²	0.993	OK
Wall Back (No uplift)	Max(133.497/150, 122.075/150) kN/m²	0.890	OK

Green Structural Engineering Ltd 25642
Unit 5, Quayside Lodge
William Morris Way, Fulham, SW6 2UZ
Tel: (0203) 4053120
Email: info@gseltd.co.uk Web: www.gseltd.co.uk

Job Ref :
Sheet : /10001
Made by :
Date : 17 October 2018 / Ver. 2017.10
Checked :
Approved :

Structural Design

At Rest Earth Pressure

At rest earth pressures magnification	$(1+\text{Sin}(\phi)) \times \sqrt{OCR} = (1+\text{Sin}(25.69)\times\sqrt{1}$	1.43

Prop Reaction

Maximum Prop Reaction (Ultimate)	152.4 kN @ Base

Wall Design (Inner Steel)

Critical Section	Critical @ 0 mm from base, Case 2		
Steel Provided (Cover)	Main B16@150 (30 mm) Dist. B10@150 (46 mm)	1340 mm²	OK
Compression Steel Provided (Cover)	Main B10@300 (30 mm) Dist. B10@300 (40 mm)	262 mm²	
Leverarm z=fn(d,b,As,fy,Fcu)	312 mm, 1000 mm, 1340 mm², 460 N/mm², 30.0 N/mm²	290 mm	
Mr=fn(above,As',d',x,x/d)	262 mm², 35 mm, 48 mm, 0.16	170.0 kN.m	
Moment Capacity Check (M/Mr)	M 153.8 kN.m, Mr 170.0 kN.m	0.905	OK
Wall Axial Design (N/Ncap)	N 306.7 kN, Ncap 4200.0 kN	0.073	OK
Wall Slenderness λ	Leff/tk =2.00x3660.0/350.0	20.9	OK
Kmin = (Nuz-N)/(Nuz-Nbal)	Min(1.0, 4666.7 - 306.7)/(4666.7 - 1719.3)	1.0	
M_{add}= N.Kmin.h.λ^2/2000	306.7x1.0x350.0x20.9²/2000	23.3kN.m	
(M+Madd)/Mr_{Axial}	M+Madd 177.1 kN, Mr_{Axail}207.0 kN.m	0.856	OK
Shear Capacity Check	F 125.2 kN, vc 0.539 N/mm², Fvr 168.2 kN	0.74	OK

Base Top Steel Design

Steel Provided (Cover)	Main B10@125 (50 mm) Dist. B10@125 (60 mm)	628 mm²	OK
Compression Steel Provided (Cover)	Main B25@125 (50 mm) Dist. B10@125 (75 mm)	3927 mm²	
Leverarm z=fn(d,b,As,fy,Fcu)	345 mm, 1000 mm, 628 mm², 460 N/mm², 30 N/mm²	328 mm	
Mr=fn(above,As',d',x,x/d)	3927 mm², 63 mm, 23 mm, 0.07	90.0 kN.m	
Moment Capacity Check (M/Mr)	M 0.0 kN.m, Mr 90.0 kN.m	0.000	OK
Shear Capacity Check	F 0.0 kN, vc 0.395 N/mm², Fvr 136.3 kN	0.00	OK

Base Bottom Steel Design

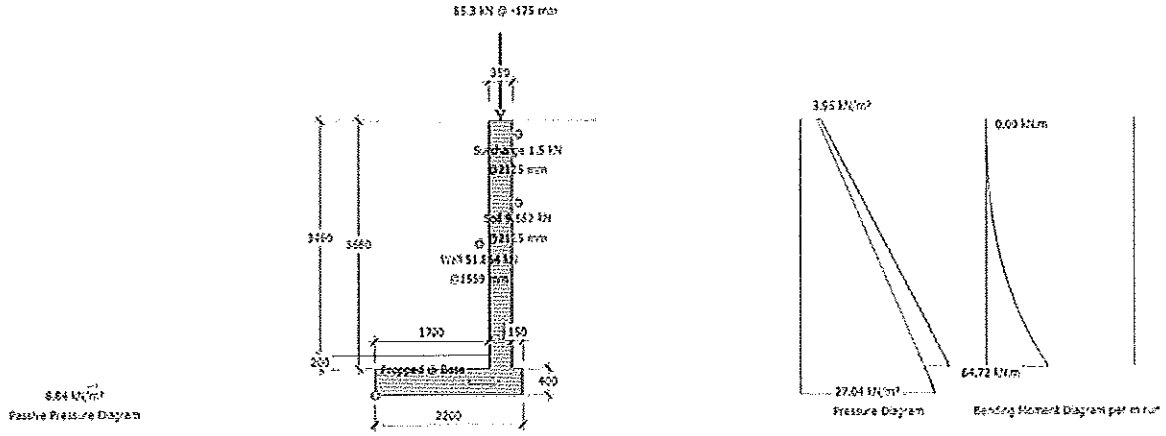
Steel Provided (Cover)	Main B25@125 (50 mm) Dist. B10@125 (75 mm)	3927 mm²	OK
Compression Steel Provided (Cover)	Main B10@125 (50 mm) Dist. B10@125 (60 mm)	628 mm²	
Leverarm z=fn(d,b,As,fy,Fcu)	338 mm, 1000 mm, 3927 mm², 460 N/mm², 30 N/mm²	274 mm	
Mr=fn(above,As',d',x,x/d)	628 mm², 55 mm, 142 mm, 0.42	469.4 kN.m	
Moment Capacity Check (M/Mr)	M 170.1 kN.m, Mr 469.4 kN.m	0.362	OK
Shear Capacity Check	F 239.1 kN, vc 0.737 N/mm², Fvr 248.7 kN	0.96	OK

Green Structural Engineering Ltd
Unit 5, Quayside Lodge
William Morris Way, Fulham, SW6 2UZ
Tel: (0203) 4053120
Email: info@gseltd.co.uk Web: www.gseltd.co.uk

25642

Job Ref :
Sheet : /10002
Made by :
Date : 17 October 2018 / Ver. 2017.10
Checked :
Approved :

MasterKey : Retaining Wall Design to BS 8002 and BS 8110 : 1997
Party wall Temporary case
Reinforced Concrete Retaining Wall with Reinforced Base



Summary of Design Data

Notes	All dimensions are in mm and all forces are per metre run
Material Densities (kN/m³)	Soil 18.00, Concrete 24.00
Concrete grade	fcu 30 N/mm², Permissible tensile stress 0.250 N/mm²
Concrete covers (mm)	Wall inner cover 30 mm, Wall outer cover 30 mm, Base cover 50 mm
Reinforcement design	fy 460 N/mm² designed to BS 8110: 1997
Surcharge and Water Table	Surcharge 10.00 kN/m², Fully drained
Unplanned excavation depth	Front of wall 406 mm

† The Engineer must satisfy him/herself to the reinforcement detailing requirements of the relevant codes of practice

Additional Loads

Wall Propped at Base Level	Therefore no sliding check is required
Vertical Line Load	85.3 kN/m @ X -175 mm and Y 0 mm - Load type Dead
† Dimensions	Ties, line loads and partial loads are measured from the inner top edge of the wall

Soil Properties

Soil bearing pressure	Allowable pressure @ front 150.00 kN/m², @ back 150.00 kN/m²
Back Soil Friction and Cohesion	ϕ_b = Atn(Tan(30)/1.2) = 25.69°
Base Friction and Cohesion	δ = Atn(0.75xTan(Atn(Tan(30)/1.2))) = 19.84°
Front Soil Friction and Cohesion	ϕ = Atn(Tan(30)/1.2) = 25.69°

Loading Cases

G_{Soil}- Soil Self Weight, G_{Wall}- Wall & Base Self Weight, Fv_{Heel}- Vertical Loads over Heel,
P_a- Active Earth Pressure, $P_{surcharge}$- Earth pressure from surcharge, P_p- Passive Earth Pressure

Case 1: Geotechnical Design	1.00 G_{Soil}+1.00 G_{Wall}+1.00 Fv_{Heel}+1.00 P_a+1.00 $P_{surcharge}$+1.00 P_p
Case 2: Structural Ultimate Design	1.40 G_{Soil}+1.40 G_{Wall}+1.60 Fv_{Heel}+1.00 P_a+1.00 $P_{surcharge}$+1.00 P_p

Geotechnical Design

Wall Stability - Virtual Back Pressure

Case 1 Overturning/Stabilising	93.080/265.001	0.351	OK

Wall Sliding - Virtual Back Pressure

$Fx/(Rx_{Friction}+Rx_{Passive})$	0.000/(53.602+0.862)	0.000	OK
Prop Reaction Case 2 (Service)	62.0 kN @ Base		

Soil Pressure

Virtual Back (No uplift)	Max(56.958/150, 78.084/150) kN/m²	0.521	OK
Wall Back (No uplift)	Max(79.827/150, 55.215/150) kN/m²	0.532	OK

Green Structural Engineering Ltd
25642
Unit 5, Quayside Lodge
William Morris Way, Fulham, SW6 2UZ
Tel: (0203) 4053120
Email: info@gseltd.co.uk Web: www.gseltd.co.uk

Job Ref :
Sheet : /10003
Made by :
Date : 17 October 2018 / Ver. 2017.10
Checked :
Approved :

Structural Design

Prop Reaction

Maximum Prop Reaction (Ultimate)	72.4 kN @ Base

Wall Design (Inner Steel)

Critical Section	Critical @ 0 mm from base, Case 2		
Steel Provided (Cover)	Main B16@125 (30 mm) Dist. B10@150 (46 mm)	1608 mm²	OK
Compression Steel Provided (Cover)	Main B10@300 (30 mm) Dist. B10@300 (40 mm)	262 mm²	
Leverarm z=fn(d,b,As,fy,Fcu)	312 mm, 1000 mm, 1608 mm², 460 N/mm², 30.0 N/mm²	286 mm	
Mr=fn(above,As',d',x,x/d)	262 mm², 35 mm, 58 mm, 0.19	200.9 kN.m	
Moment Capacity Check (M/Mr)	M 84.7 kN.m, Mr 200.9 kN.m	0.422	OK
Wall Axial Design (N/Ncap)	N 162.5 kN, Ncap 4200.0 kN	0.039	OK
Wall Slenderness λ	Leff/tk =2.00x3660.0/350.0	20.9	OK
Kmin = (Nuz-N)/(Nuz-Nbal)	Min(1.0, 4666.7 - 162.5)/(4666.7 - 1602.1)	1.0	
M_{add}= N.Kmin.h.λ^2/2000	162.5x1.0x350.0x20.9²/2000	12.4kN.m	
(M+Madd)/Mr_{Axial}	M+Madd 97.1 kN, Mr_{Axial}220.0 kN.m	0.441	OK
Shear Capacity Check	F 62.1 kN, vc 0.573 N/mm², Fvr 178.8 kN	0.35	OK

Base Top Steel Design

Steel Provided (Cover)	Main B10@150 (50 mm) Dist. B10@150 (60 mm)	524 mm²	OK
Compression Steel Provided (Cover)	Main B25@100 (50 mm) Dist. B10@150 (75 mm)	4909 mm²	
Leverarm z=fn(d,b,As,fy,Fcu)	345 mm, 1000 mm, 524 mm², 460 N/mm², 30 N/mm²	328 mm	
Mr=fn(above,As',d',x,x/d)	4909 mm², 63 mm, 19 mm, 0.05	75.0 kN.m	
Moment Capacity Check (M/Mr)	M 0.0 kN.m, Mr 75.0 kN.m	0.000	OK
Shear Capacity Check	F 0.0 kN, vc 0.372 N/mm², Fvr 128.2 kN	0.00	OK

Base Bottom Steel Design

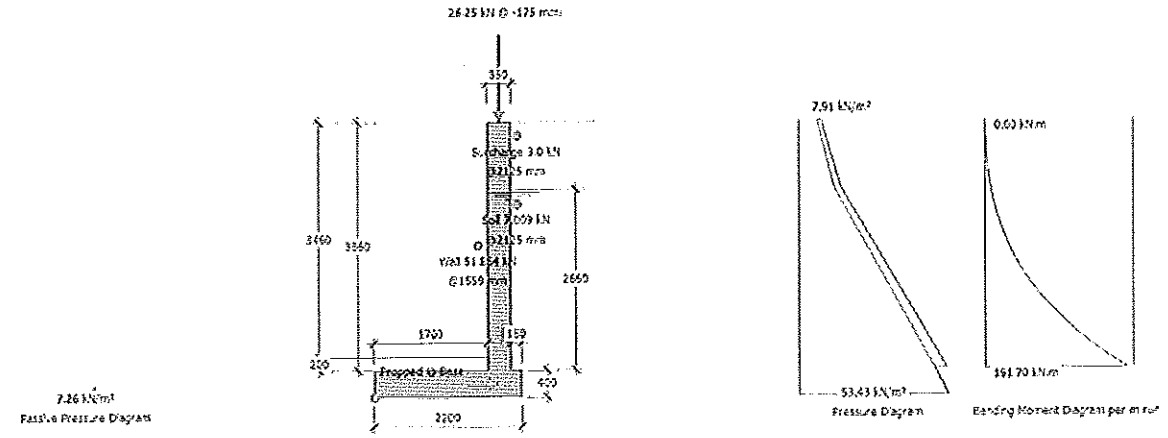
Steel Provided (Cover)	Main B25@100 (50 mm) Dist. B10@150 (75 mm)	4909 mm²	OK
Compression Steel Provided (Cover)	Main B10@150 (50 mm) Dist. B10@150 (60 mm)	524 mm²	
Leverarm z=fn(d,b,As,fy,Fcu)	338 mm, 1000 mm, 4909 mm², 460 N/mm², 30 N/mm²	261 mm	
Mr=fn(above,As',d',x,x/d)	524 mm², 55 mm, 169 mm, 0.50	533.4 kN.m	
Moment Capacity Check (M/Mr)	M 90.4 kN.m, Mr 533.4 kN.m	0.170	OK
Shear Capacity Check	F 123.2 kN, vc 0.794 N/mm², Fvr 268.0 kN	0.46	OK

Green Structural Engineering Ltd
Unit 5, Quayside Lodge
William Morris Way, Fulham, SW6 2UZ
Tel: (0203) 4053120
Email: info@gseltd.co.uk Web: www.gseltd.co.uk

25642

Job Ref	:
Sheet	: /10004
Made by	:
Date	: 17 October 2018 / Ver. 2017.10
Checked	:
Approved	:

MasterKey : Retaining Wall Design to BS 8002 and BS 8110 : 1997
'Non' party wall Permanent case
Reinforced Concrete Retaining Wall with Reinforced Base



Summary of Design Data

Notes	All dimensions are in mm and all forces are per metre run
Material Densities (kN/m³)	Dry Soil 18.00, Saturated Soil 20.80, Submerged Soil 10.80, Concrete 24.00
Concrete grade	fcu 30 N/mm², Permissible tensile stress 0.250 N/mm²
Concrete covers (mm)	Wall inner cover 30 mm, Wall outer cover 30 mm, Base cover 50 mm
Reinforcement design	fy 460 N/mm² designed to BS 8110: 1997
Surcharge and Water Table	Surcharge 20.00 kN/m², Water table level 2660 mm
Unplanned excavation depth	Front of wall 406 mm

† The Engineer must satisfy him/herself to the reinforcement detailing requirements of the relevant codes of practice

Additional Loads

Wall Propped at Base Level	Therefore no sliding check is required
Vertical Line Loads	110.25 kN/m @ X -175 mm and Y 0 mm - Load type Dead 26.25 kN/m @ X -175 mm and Y 0 mm - Load type Live
† Dimensions	Ties, line loads and partial loads are measured from the inner top edge of the wall

Soil Properties

Soil bearing pressure	Allowable pressure @ front 150.00 kN/m², @ back 150.00 kN/m²
Back Soil Friction and Cohesion	ϕ_h = Atn(Tan(30)/1.2) = 25.69°
Base Friction and Cohesion	δ = Atn(0.75xTan(Atn(Tan(30)/1.2))) = 19.84°
Front Soil Friction and Cohesion	ϕ = Atn(Tan(30)/1.2) = 25.69°

Loading Cases

G_{Soil}- Soil Self Weight, G_{Wall}- Wall & Base Self Weight, Fv_{Heel}- Vertical Loads over Heel,
P_a- Active Earth Pressure, $P_{surcharge}$- Earth pressure from surcharge, P_p- Passive Earth Pressure

Case 1: Geotechnical Design	1.00 G_{Soil}+1.00 G_{Wall}+1.00 Fv_{Heel}+1.00 P_a+1.00 $P_{surcharge}$+1.00 P_p
Case 2: Structural Ultimate Design	1.40 G_{Soil}+1.40 G_{Wall}+1.60 Fv_{Heel}+1.00 P_a+1.00 $P_{surcharge}$+1.00 P_p

Geotechnical Design

Wall Stability - Virtual Back Pressure

Case 1 Overturning/Stabilising	156.787/358.084	0.438	OK

Wall Sliding - Virtual Back Pressure

Fx/($Rx_{Friction}$+ $Rx_{Passive}$)	0.000/(71.582+0.709)	0.000	OK
Prop Reaction Case 2 (Service)	111.0 kN @ Base		

Soil Pressure

Virtual Back (No uplift)	Max(111.137/150, 69.202/150) kN/m²	0.741	OK
Wall Back (No uplift)	Max(137.936/150, 42.403/150) kN/m²	0.920	OK

Green Structural Engineering Ltd
25642
Unit 5, Quayside Lodge
William Morris Way, Fulham, SW6 2UZ
Tel: (0203) 4053120
Email: info@gseltd.co.uk Web: www.gseltd.co.uk

Job Ref	:
Sheet	: /10005
Made by	:
Date	: 17 October 2018 / Ver. 2017.10
Checked	:
Approved	:

Structural Design

At Rest Earth Pressure

At rest earth pressures magnification	$(1+\text{Sin}(\phi)) \times \sqrt{OCR} = (1+\text{Sin}(25.69)\times\sqrt{1}$	1.43

Prop Reaction

Maximum Prop Reaction (Ultimate)	174.9 kN @ Base	

Wall Design (Inner Steel)

Critical Section	Critical @ 0 mm from base, Case 2		
Steel Provided (Cover)	Main B16@125 (30 mm) Dist. B10@150 (46 mm)	1608 mm²	OK
Compression Steel Provided (Cover)	Main B10@300 (30 mm) Dist. B10@300 (40 mm)	262 mm²	
Leverarm z=fn(d,b,As,fy,Fcu)	312 mm, 1000 mm, 1608 mm², 460 N/mm², 30.0 N/mm²	286 mm	
Mr=fn(above,As',d',x,x/d)	262 mm², 35 mm, 58 mm, 0.19	200.9 kN.m	
Moment Capacity Check (M/Mr)	M 191.7 kN.m, Mr 200.9 kN.m	0.954	OK
Wall Axial Design (N/Ncap)	N 239.4 kN, Ncap 4200.0 kN	0.057	OK
Wall Slenderness λ	Leff/tk =2.00x3660.0/350.0	20.9	OK
Kmin = (Nuz-N)/(Nuz-Nbal)	Min(1.0, 4666.7 - 239.4)/(4666.7 - 1602.1)	1.0	
M_{add}= N.Kmin.h.λ^2/2000	239.4x1.0x350.0x20.9²/2000	18.2kN.m	
(M+Madd)/Mr_{Axial}	M+Madd 209.9 kN, Mr_{Axial}228.2 kN.m	0.920	OK
Shear Capacity Check	F 146.0 kN, vc 0.573 N/mm², Fvr 178.8 kN	0.82	OK

Base Top Steel Design

Steel Provided (Cover)	Main B10@150 (50 mm) Dist. B10@150 (60 mm)	524 mm²	OK
Compression Steel Provided (Cover)	Main B20@100 (50 mm) Dist. B10@150 (70 mm)	3142 mm²	
Leverarm z=fn(d,b,As,fy,Fcu)	345 mm, 1000 mm, 524 mm², 460 N/mm², 30 N/mm²	328 mm	
Mr=fn(above,As',d',x,x/d)	3142 mm², 60 mm, 19 mm, 0.05	75.0 kN.m	
Moment Capacity Check (M/Mr)	M 0.5 kN.m, Mr 75.0 kN.m	0.007	OK
Shear Capacity Check	F 6.9 kN, vc 0.372 N/mm², Fvr 128.2 kN	0.05	OK

Base Bottom Steel Design

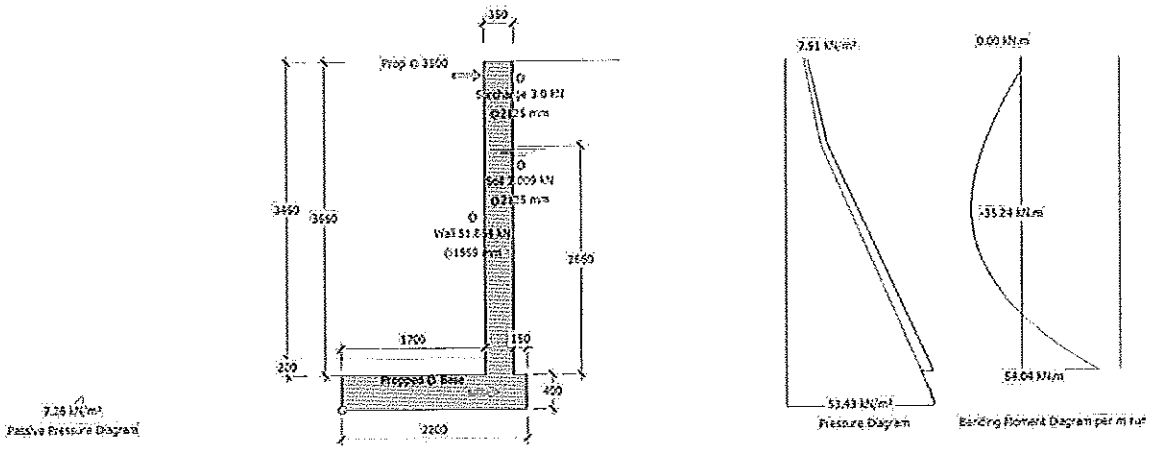
Steel Provided (Cover)	Main B20@100 (50 mm) Dist. B10@150 (70 mm)	3142 mm²	OK
Compression Steel Provided (Cover)	Main B10@150 (50 mm) Dist. B10@150 (60 mm)	524 mm²	
Leverarm z=fn(d,b,As,fy,Fcu)	340 mm, 1000 mm, 3142 mm², 460 N/mm², 30 N/mm²	289 mm	
Mr=fn(above,As',d',x,x/d)	524 mm², 55 mm, 114 mm, 0.33	396.5 kN.m	
Moment Capacity Check (M/Mr)	M 214.8 kN.m, Mr 396.5 kN.m	0.542	OK
Shear Capacity Check	F 222.7 kN, vc 0.681 N/mm², Fvr 231.6 kN	0.96	OK

Green Structural Engineering Ltd
Unit 5, Quayside Lodge
William Morris Way, Fulham, SW6 2UZ
Tel: (0203) 4053120
Email: info@gseltd.co.uk Web: www.gseltd.co.uk

25642

Job Ref :
Sheet : /10006
Made by :
Date : 17 October 2018 / Ver. 2017.10
Checked :
Approved :

MasterKey : Retaining Wall Design to BS 8002 and BS 8110 : 1997
'Non' party wall Temporary case
Reinforced Concrete Retaining Wall with Reinforced Base



Summary of Design Data

Notes	All dimensions are in mm and all forces are per metre run
Material Densities (kN/m³)	Dry Soil 18.00, Saturated Soil 20.80, Submerged Soil 10.80, Concrete 24.00
Concrete grade	fcu 30 N/mm², Permissible tensile stress 0.250 N/mm²
Concrete covers (mm)	Wall inner cover 30 mm, Wall outer cover 30 mm, Base cover 50 mm
Reinforcement design	fy 460 N/mm² designed to BS 8110: 1997
Surcharge and Water Table	Surcharge 20.00 kN/m², Water table level 2660 mm
Unplanned excavation depth	Front of wall 406 mm

† The Engineer must satisfy him/herself to the reinforcement detailing requirements of the relevant codes of practice

Additional Loads

Wall Propped at Base Level	Therefore no sliding check is required
Additional Wall Prop	Prop @ 3.5 m
† Dimensions	All props are measured from the top of the base

Soil Properties

Soil bearing pressure	Allowable pressure @ front 150.00 kN/m², @ back 150.00 kN/m²
Back Soil Friction and Cohesion	ϕ_h = Atn(Tan(30)/1.2) = 25.69°
Base Friction and Cohesion	δ = Atn(0.75x'Tan(Atn(Tan(30)/1.2))) = 19.84°
Front Soil Friction and Cohesion	ϕ = Atn(Tan(30)/1.2) = 25.69°

Loading Cases

G_{Soil}- Soil Self Weight, G_{Wall}- Wall & Base Self Weight, Fv_{Heel}- Vertical Loads over Heel,
P_a- Active Earth Pressure, $P_{surcharge}$- Earth pressure from surcharge, P_p- Passive Earth Pressure

Case 1: Geotechnical Design	1.00 G_{Soil}+1.00 G_{Wall}+1.00 Fv_{Heel}+1.00 P_a+1.00 $P_{surcharge}$+1.00 P_p
Case 2: Structural Ultimate Design	1.40 G_{Soil}+1.40 G_{Wall}+1.60 Fv_{Heel}+1.00 P_a+1.00 $P_{surcharge}$+1.00 P_p

Geotechnical Design

Wall Stability - Virtual Back Pressure

Case 1 Overturning/Stabilising	156.787/194.555	0.806	OK

Wall Sliding - Virtual Back Pressure

Fx/($Rx_{Friction}$+ $Rx_{Passive}$)	0.000/(22.327+0.709)	0.000	OK
Prop Reactions Case 2 (Service)	87.3 kN @ Base, 23.7 kN @ 3.900 m		

Soil Pressure

Virtual Back	67.575/150 kN/m², Length under pressure 1.831 m	0.451	OK
Wall Back	83.003/150 kN/m², Length under pressure 1.491 m	0.553	OK
Note:	Length under pressure is less than 75% of the base width		Warning

Green Structural Engineering Ltd 25642
Unit 5, Quayside Lodge
William Morris Way, Fulham, SW6 2UZ
Tel: (0203) 4053120
Email: info@gseltd.co.uk Web: www.gseltd.co.uk

Job Ref :
Sheet : /10007
Made by :
Date : 17 October 2018 / Ver. 2017.10
Checked :
Approved :

Structural Design

At Rest Earth Pressure

At rest earth pressures magnification	$(1+\text{Sin}(\phi)) \times \sqrt{OCR} = (1+\text{Sin}(25.69)\times\sqrt{1}$	1.43

Prop Reactions

Maximum Prop Reactions (Ultimate)	135.6 kN @ Base, 39.3 kN @ 3.500 m

Wall Design (Inner Steel)

Critical Section	Critical @ 0 mm from base, Case 2		
Steel Provided (Cover)	Main B10@150 (30 mm) Dist. B10@150 (40 mm)	524 mm²	OK
Compression Steel Provided (Cover)	Main B10@150 (30 mm) Dist. B10@150 (40 mm)	524 mm²	
Leverarm z=fn(d,b,As,fy,Fcu)	315 mm, 1000 mm, 524 mm², 460 N/mm², 30.0 N/mm²	299 mm	
Mr=fn(above,As',d',x,x/d)	524 mm², 35 mm, 19 mm, 0.06	68.5 kN.m	
Moment Capacity Check (M/Mr)	M 54.0 kN.m, Mr 68.5 kN.m	0.789	OK
Shear Capacity Check	F 106.6 kN, vc 0.392 N/mm², Fvr 123.5 kN	0.86	OK

Wall Design (Outer Steel)

Critical Section	Critical @ 1901 mm from base, Case 2		
Steel Provided (Cover)	Main B10@150 (30 mm) Dist. B10@150 (40 mm)	524 mm²	OK
Compression Steel Provided (Cover)	Main B10@150 (30 mm) Dist. B10@150 (40 mm)	524 mm²	
Leverarm z=fn(d,b,As,fy,Fcu)	315 mm, 1000 mm, 524 mm², 460 N/mm², 30.0 N/mm²	299 mm	
Mr=fn(above,As',d',x,x/d)	524 mm², 35 mm, 19 mm, 0.06	68.5 kN.m	
Moment Capacity Check (M/Mr)	M 35.2 kN.m, Mr 68.5 kN.m	0.515	OK
Shear Capacity Check	F 0.5 kN, vc 0.392 N/mm², Fvr 123.5 kN	0.00	OK

Base Top Steel Design

Steel Provided (Cover)	Main B10@150 (50 mm) Dist. B10@150 (60 mm)	524 mm²	OK
Compression Steel Provided (Cover)	Main B10@125 (50 mm) Dist. B10@150 (60 mm)	628 mm²	
Leverarm z=fn(d,b,As,fy,Fcu)	345 mm, 1000 mm, 524 mm², 460 N/mm², 30 N/mm²	328 mm	
Mr=fn(above,As',d',x,x/d)	628 mm², 55 mm, 19 mm, 0.05	75.0 kN.m	
Moment Capacity Check (M/Mr)	M 1.2 kN.m, Mr 75.0 kN.m	0.017	OK
Shear Capacity Check	F 16.6 kN, vc 0.372 N/mm², Fvr 128.2 kN	0.13	OK

Base Bottom Steel Design

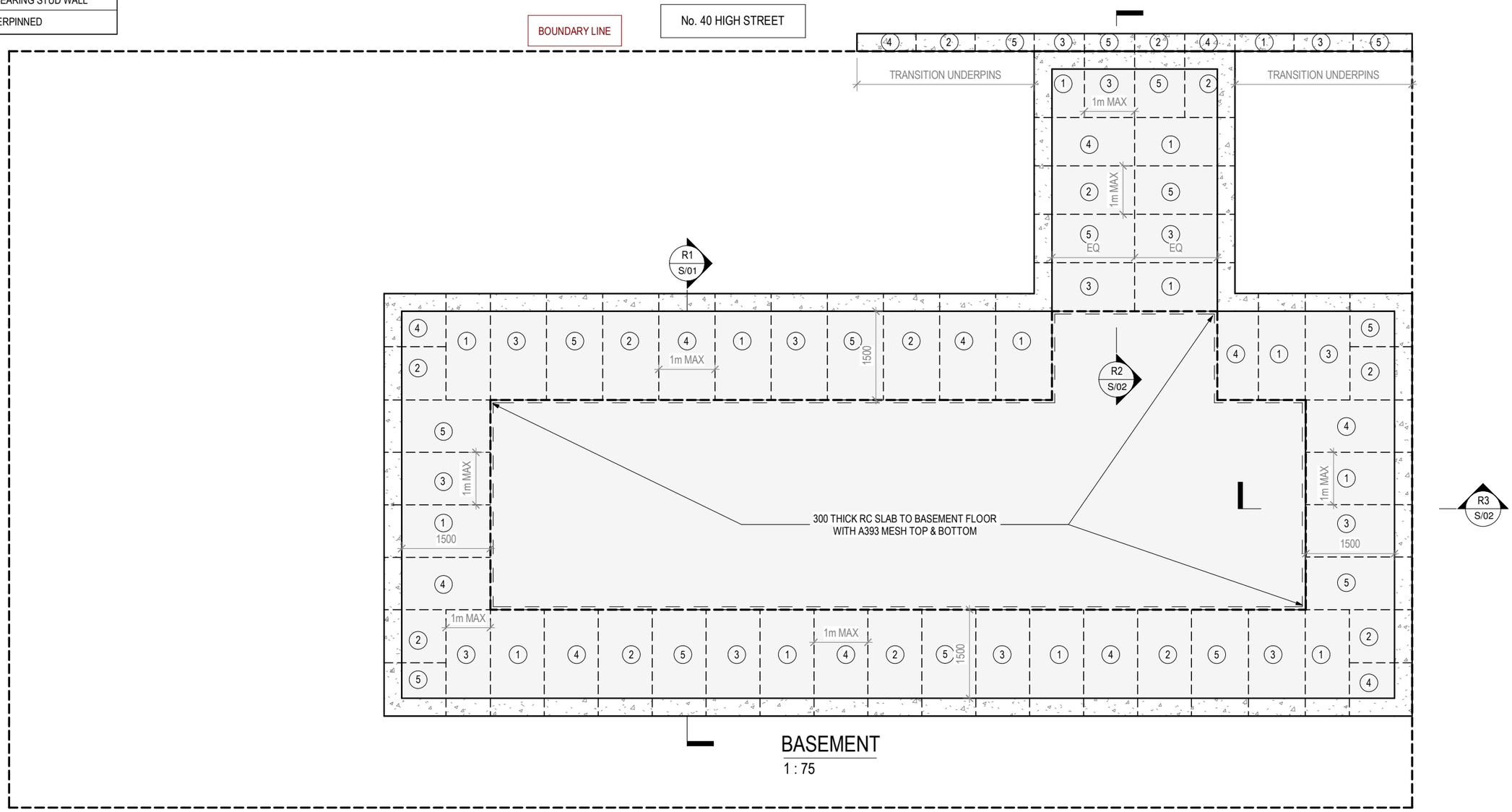
Steel Provided (Cover)	Main B10@125 (50 mm) Dist. B10@150 (60 mm)	628 mm²	OK
Compression Steel Provided (Cover)	Main B10@150 (50 mm) Dist. B10@150 (60 mm)	524 mm²	
Leverarm z=fn(d,b,As,fy,Fcu)	345 mm, 1000 mm, 628 mm², 460 N/mm², 30 N/mm²	328 mm	
Mr=fn(above,As',d',x,x/d)	524 mm², 55 mm, 23 mm, 0.07	90.0 kN.m	
Moment Capacity Check (M/Mr)	M 85.7 kN.m, Mr 90.0 kN.m	0.953	OK
Shear Capacity Check	F 67.8 kN, vc 0.395 N/mm², Fvr 136.3 kN	0.50	OK

APPENDIX C

GSE STRUCTURAL DRAWINGS FOR NEW BASEMENT

NOTES:
1. BELOW GROUND WATERPROOFING AND DRAINAGE BY OTHERS.
2. UNDERPINS WILL NOT BE STABLE WHILST UNDER CONSTRUCTION. CONTRACTOR MUST PROVIDE ADEQUATE LATERAL SUPPORT TO ALL PINS UNTIL BASEMENT SLAB HAS BEEN CAST.
3. NON COMPRESSIBLE WATER RESISTANT CEMENTITIOUS BOARD LINER TO BACK OF ALL UNDERPIN SUPPORTING PARTY WALLS.
4. RAISE RETAINING WALL LOCALLY (440 LONG x 100 WIDE) TO SUPPORT NEW STEEL WORK.

KEY:	
	EXISTING STRUCTURE
	NEW LOAD BEARING CONCRETE
	NEW LOAD BEARING BRICKWORK (20N/mm²)
	NEW LOAD BEARING BLOCKWORK (7N/mm²)
	NEW LOAD BEARING STUD PARTITION WALL
	NEW NON-LOAD BEARING STUD WALL
— — —	AREA TO BE UNDERPINNED



BASEMENT
1 : 75

P1	30.10.18	INITIAL ISSUE
P2	26.03.24	INITIAL ISSUE

J001237

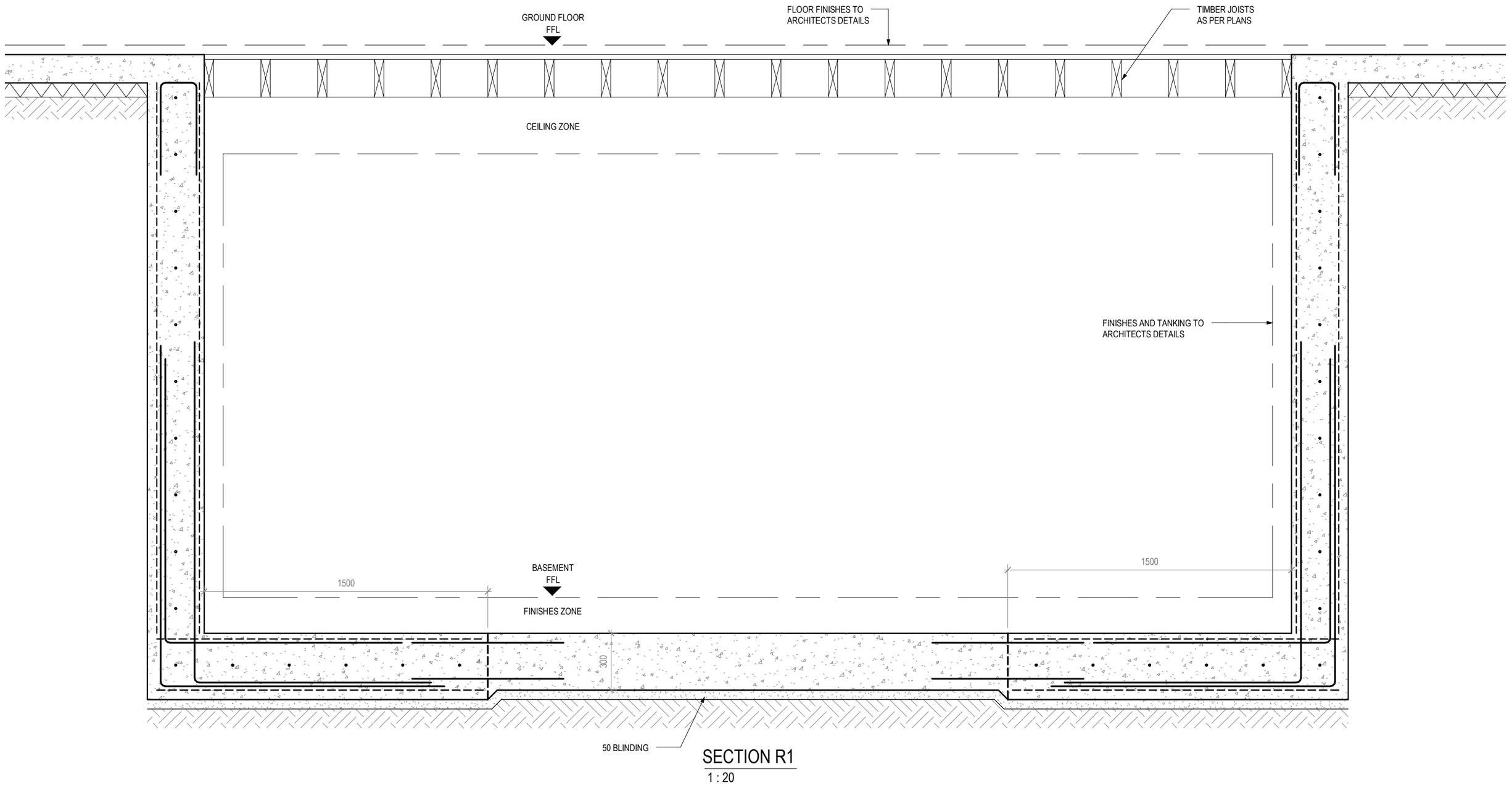
42 TEDDINGTON HIGH STREET

GREEN STRUCTURAL ENGINEERING
www.gseltd.co.uk
Unit 5 Quayside Lodge,
William Morris Way,
Fulham, SW6 2UZ
020 3405 3120

BASEMENT GA- CMS

PRELIMINARY

DRAWN	CHECKED	DATE	PAPER SIZE	SCALE	DRAWING NO.	REV.
IB	SK	30.10.2018	A3	As indicated	GA/01	P2



SECTION R1

1 : 20

J001237

42 TEDDINGTON HIGH STREET

P1	03.10.18	INITIAL ISSUE
P2	26.03.24	INITIAL ISSUE

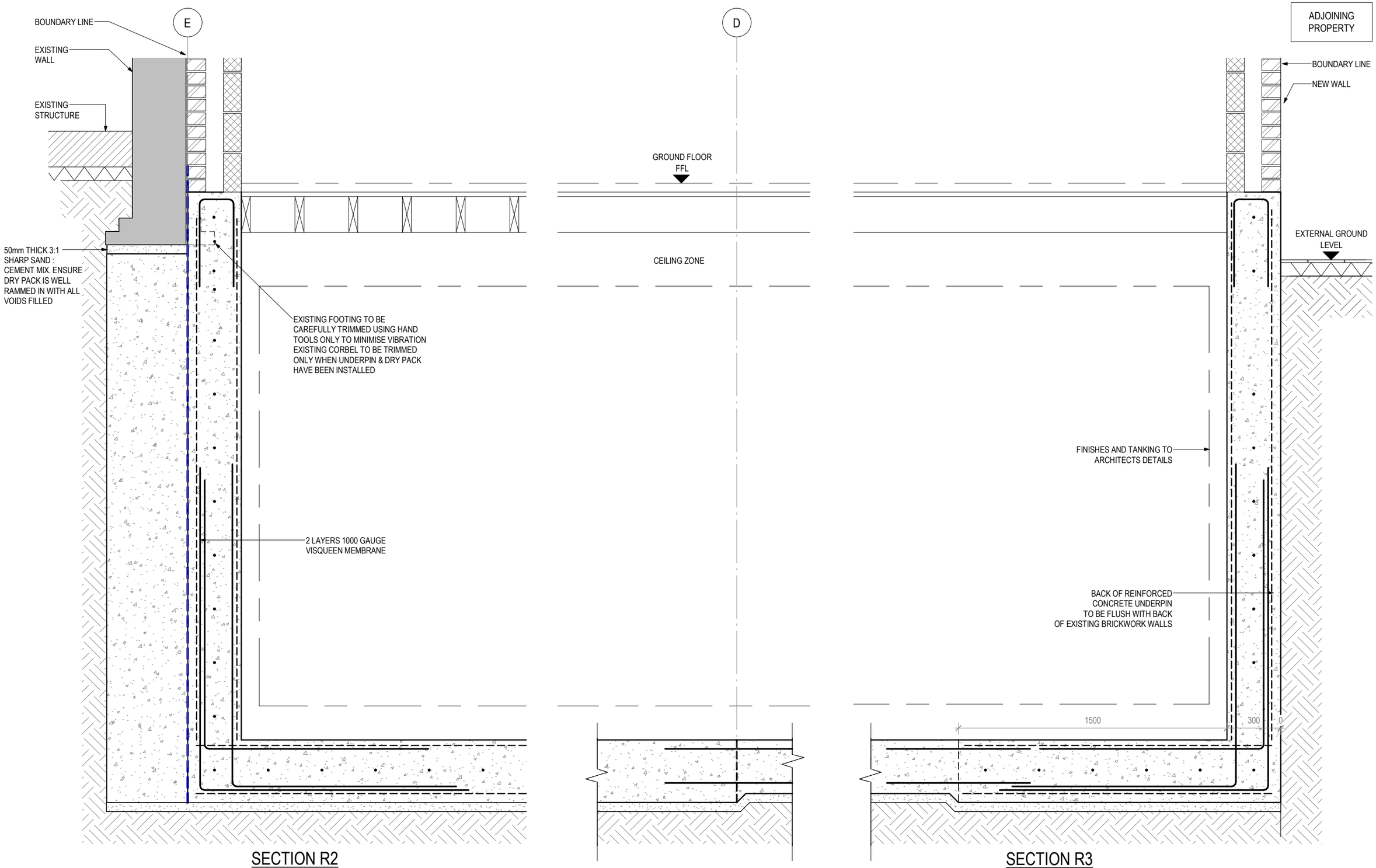
GREEN STRUCTURAL ENGINEERING
www.gseltd.co.uk
Unit 5 Quayside Lodge,
William Morris Way,
Fulham, SW6 2UZ
020 3405 3120

SECTION SHEET 1

DRAWN	CHECKED	DATE	PAPER SIZE	SCALE
IB	SK	03.10.2018	A3	1 : 20

PRELIMINARY

DRAWING NO.	REV.
S/01	P2



SECTION R2
1:20

SECTION R3
1:20

DO NOT SCALE FROM THIS DRAWING THIS DRAWING IS SUBJECT TO COPYRIGHT.
THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL SITE DIMENSIONS BEFORE COMMENCING ANY WORK.
ALL DIMENSIONS IN mm UNLESS OTHERWISE NOTED.
ALL DIMENSIONS AND LEVELS TO BE CONFIRMED BY ARCHITECT.
SETTING OUT TO BE CONFIRMED ON SITE.

J001237

42 TEDDINGTON HIGH STREET

P1	30.10.18	INITIAL ISSUE			
P2	26.03.24	INITIAL ISSUE			

GREEN STRUCTURAL ENGINEERING
www.gseltd.co.uk
Unit 5 Quayside Lodge,
William Morris Way,
Fulham, SW6 2UZ
020 3405 3120

SECTION SHEET 2

DRAWN	CHECKED	DATE	PAPER SIZE	SCALE
RMM	GG	30.10.2018	A3	1 : 20

PRELIMINARY

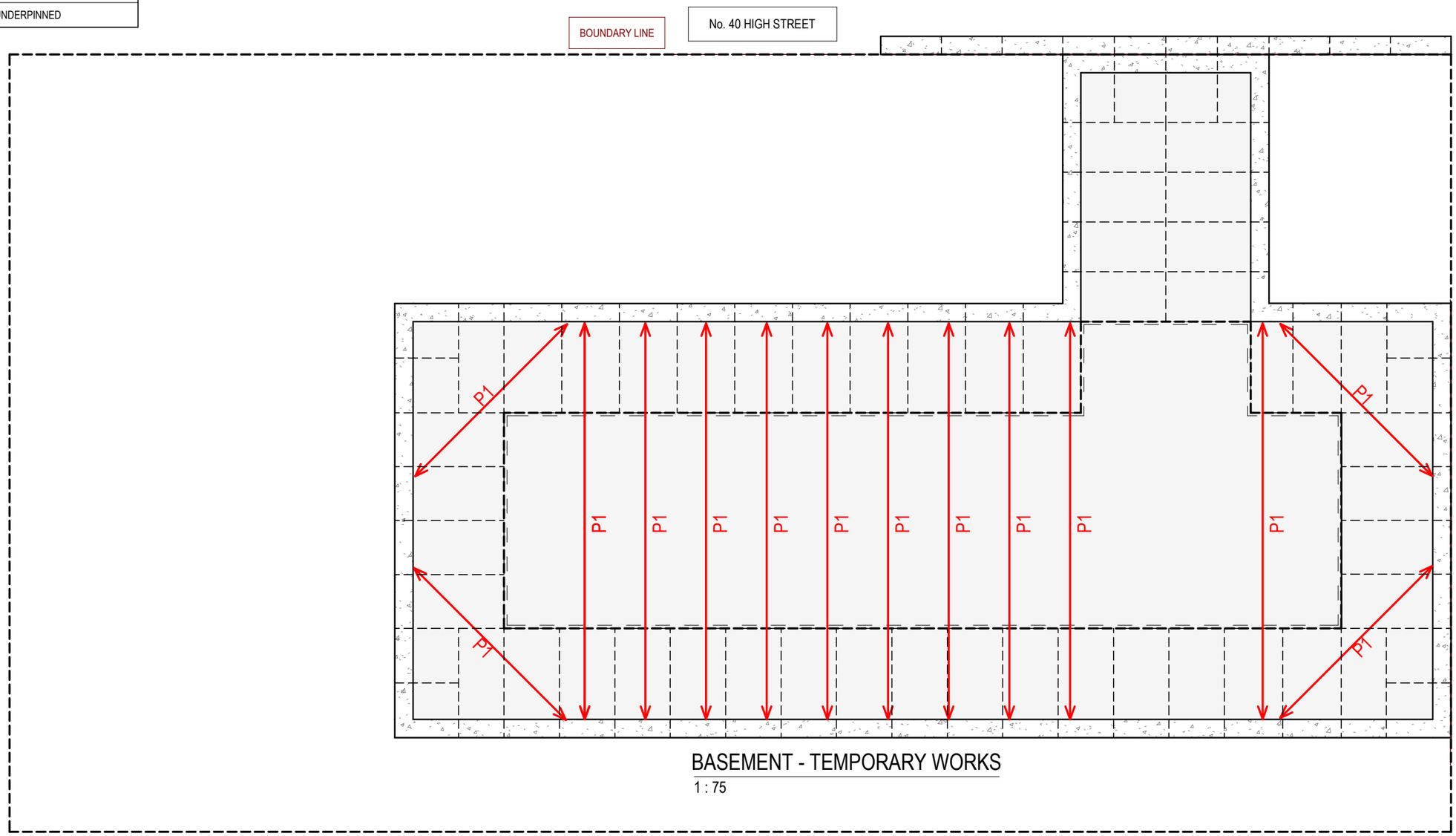
DRAWING NO.	REV.
S/02	P2

APPENDIX D

GSE TEMPORARY WORKS OUTLINE SCHEME

P1 - RMD SUPER SLIM SOLDIER
GB - GALLOWS BRACKET
SK - SHEAR KEY
W1 - RMD SLIMSHORE WALER
TP - SUPERSLIM TILT PLATE

KEY:	
	EXISTING STRUCTURE
	NEW LOAD BEARING CONCRETE
	NEW LOAD BEARING BRICKWORK (20N/mm²)
	NEW LOAD BEARING BLOCKWORK (7N/mm²)
	NEW LOAD BEARING STUD PARTITION WALL
	NEW NON-LOAD BEARING STUD WALL
— — —	AREA TO BE UNDERPINNED



BASEMENT - TEMPORARY WORKS
1 : 75

J001237		
P1	30.10.18	INITIAL ISSUE
P2	26.03.24	INITIAL ISSUE

42 TEDDINGTON HIGH STREET

GREEN STRUCTURAL ENGINEERING
www.gseltd.co.uk
Unit 5 Quayside Lodge,
William Morris Way,
Fulham, SW6 2UZ
020 3405 3120

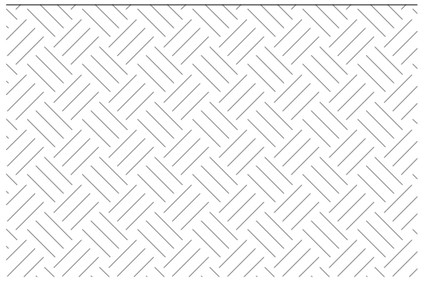
TEMPORARY WORKS TO BASEMENT GA

PRELIMINARY

DRAWN	CHECKED	DATE	PAPER SIZE	SCALE	DRAWING NO.	REV.
RMM	GG	30.10.2018	A3	As indicated	TW/01	P2

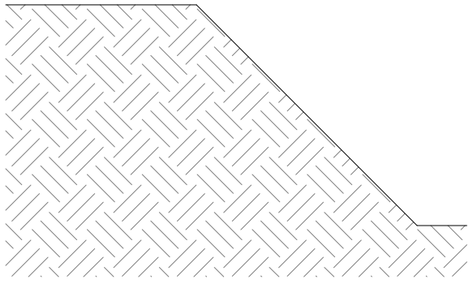
APPENDIX E

GSE TYPICAL CONSTRUCTION SEQUENCE



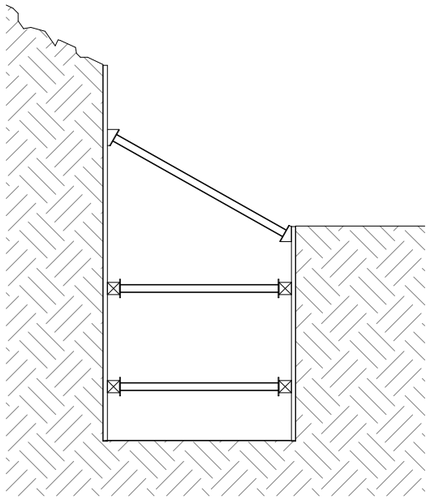
STAGE 0

EXISTING CONDITION



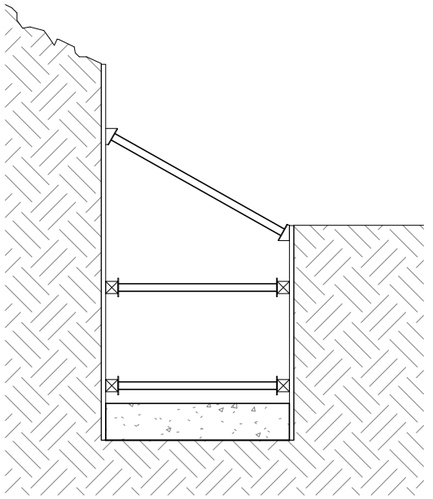
STAGE 1

GENERAL LEVEL REDUCTION



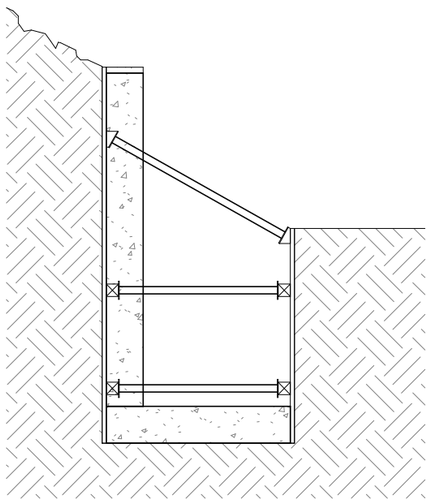
STAGE 2

EXCAVATE TO FORM UNDERPIN



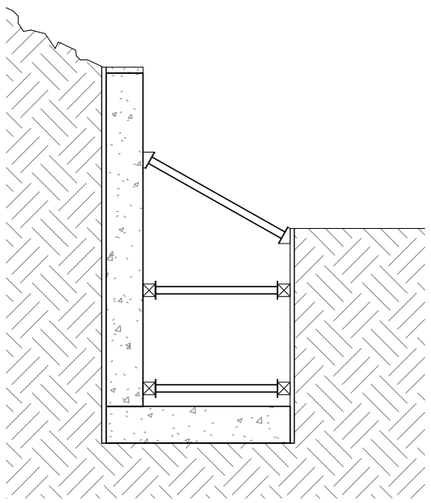
STAGE 3

CONCRETE BASE OF UNDERPIN



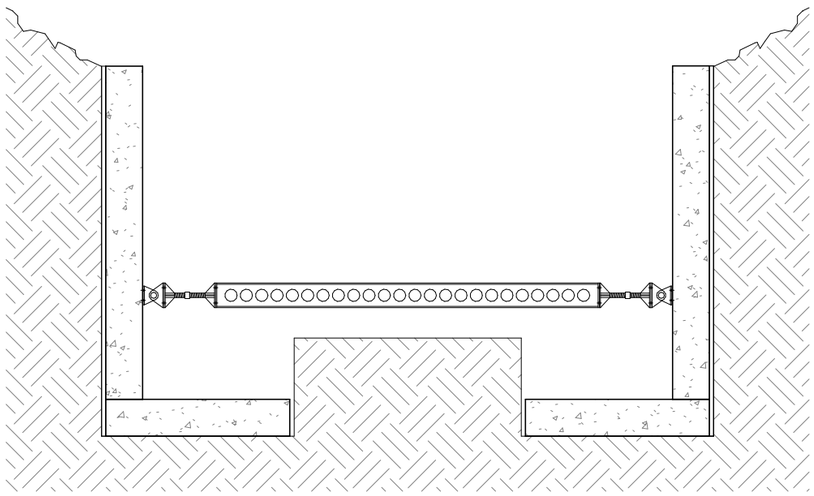
STAGE 4

ERECT SHUTTER
CONCRETE STEM OF UNDERPIN



STAGE 5

STRIKE SHUTTER WHEN CONCRETE HAS GAINED SUFFICIENT STRENGTH, DRYPACK, TRIM - OFF PROJECTING FOOTING, RE-PROP UNTIL BASEMENT SLAB IS CAST.



STAGE 6

COMMENCE EXCAVATION OF CENTRAL BERM.
ONCE EXCAVATION IS 500mm ABOVE FORMATION LEVEL
ISNTALL SUPER SLIM SOLDIER ACROSS SITE AT LOW LEVEL.

J001237

42 TEDDINGTON HIGH STREET

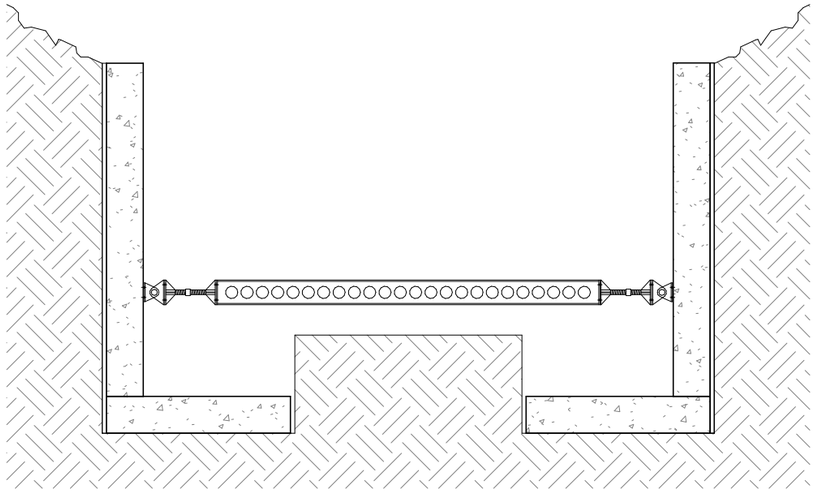
P1	30.10.18	INITIAL ISSUE			

GREEN STRUCTURAL ENGINEERING
www.gseltd.co.uk
Unit 5 Quayside Lodge,
William Morris Way,
Fulham, SW6 2UZ
020 3405 3120

CONSTRUCTION SEQUENCE FOR TYP. UNDERPIN SECTION

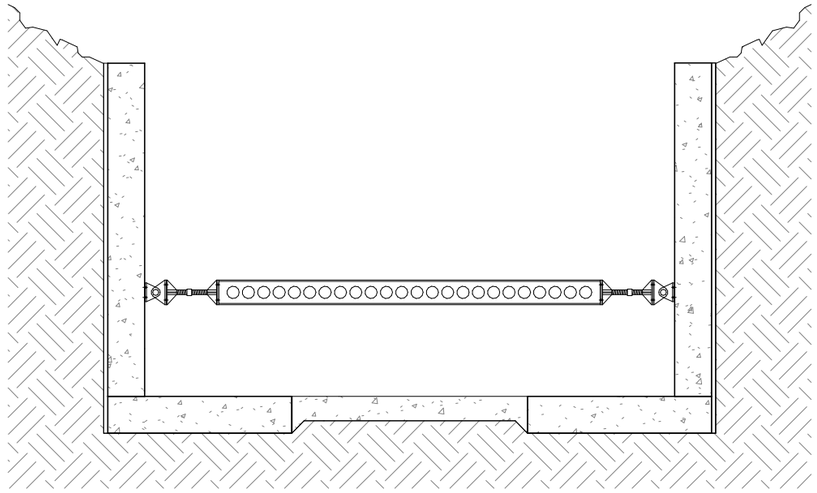
PRELIMINARY

DRAWN	CHECKED	DATE	PAPER SIZE	SCALE	DRAWING NO.	REV.
IB	SK	30.10.2018	A3	1 : 50	MS/01	P1



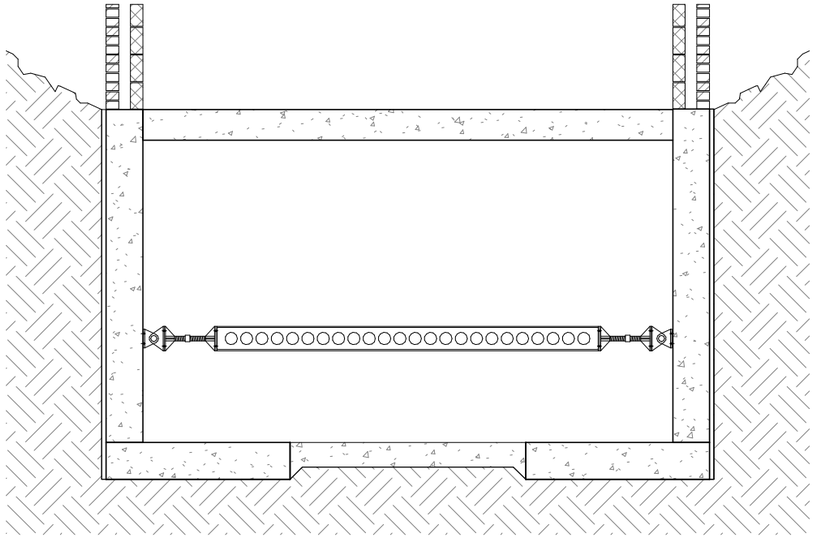
STAGE 7

COMPLETE STAGES 4-6 FOR OTHER SIDE OF EXCAVATION AREA.



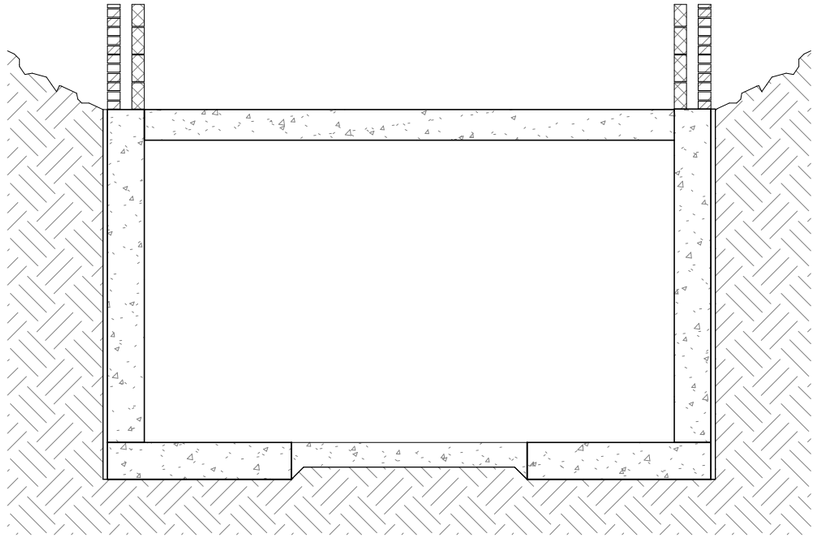
STAGE 8

CAST BASEMENT SLAB AND LET CURE



STAGE 9

POUR GROUND FLOOR SLAB.



STAGE 10

ALL PROPS REMOVED.

J001237

42 TEDDINGTON HIGH STREET

P1	30.10.18	INITIAL ISSUE			

GREEN STRUCTURAL ENGINEERING
www.gseltd.co.uk
Unit 5 Quayside Lodge,
William Morris Way,
Fulham, SW6 2UZ
020 3405 3120

CONSTRUCTION SEQUENCE FOR TYP. UNDERPIN SECTION

PRELIMINARY

DRAWN	CHECKED	DATE	PAPER SIZE	SCALE	DRAWING NO.	REV.
IB	SK	30.10.2018	A3	1 : 50	MS/02	P1