ECP Partnership

Construction Method Statement

Westminster House
Kew Road, Richmond, TW9 2ND

Creation of two additional levels of Class C3 accommodation comprising 7no.units, conversion and excavation of the existing Class E basement and part conversion of existing floorspace at basement, ground, first, second, and third floor levels to provide internal access and ancillary residential floorspace with external alterations and associated development

Date	Rev	Revision History

	Name	Position	Date
Created by	C.Patel	Consultant	Dec 2023

Content

1. INTRODUCTION

This Construction Method Statement Plan report has been prepared by ECP Partnership Ltd based on the scheme proposals prepared by Architect Child Graddon Lewis and Structural Engineer Axiom Structures.

The report has been prepared to support the planning application for the creation of two additional storeys of residential accommodation comprising 7no. dwellings and alteration and part conversion of the existing Class E floorspace at basement, ground, first, second, and third floor levels to provide internal access and ancillary residential floorspace with associated external refurbishment and associated development.

This report should be read in conjunction with structural drawings which are included in the Appendix and in conjunction with all relevant information provided by Child Graddon Lewis and Axiom Structures.

The proposed structural works comprises of following key main works:

- Two additional storey roof extension.
- Convert existing basement car park and loading bay info Class E floorspace.
- Structural alternations for internal access and ancillary residential floorspace with external alterations and associated development

The proposed superstructure is a steelwork construction whilst the substructure is of reinforced concrete construction. This report considers the construction methodology for forming the basement, taking into account the proximity of the neighbouring properties and site specific soil conditions that exist beneath the property.

1.1. Groundwater, below ground services and existing ground conditions

A geotechnical investigation has been undertaken for the project to design the basement sub-structure.

The monitoring of groundwater in trial holes (refer to Appendix A) indicated that there is unlikely to be any significant ground water flow from upper aquifers within the depth of the proposed excavation. The groundwater was standing at about 1.3m below the basement slab, and hence the excavation is expected to be kept above the groundwater table. Where required, localized dewatering using well-pointing will be feasible and could be adopted to ensure that the excavation is undertaken in dry conditions.

No below ground services are known to be in area where the works is proposed, with exception of drainage serving the property.

1.2. Temporary Works

The proposed works are based on proven construction techniques. Method statements and associated temporary works design will be submitted by the contractor for approval by prior to commencement.

A preliminary approach to the construction and associated temporary works is annotated with the preliminary drawings which are appended to our report.

The Contractor will also be required to appoint Temporary Works Co-Ordinator for the duration of the contractor.

2. Proposed Basement Works

2.1. Proposed Basement Construction & Temporary Retaining Structures.

The proposed basement is located approximately on the existing footprint of the building.

Where the proposed basement is in close proximity to the site boundaries, it is considered that temporary support will be required to the excavations in order to support the adjoining soils, boundary walls and buildings.

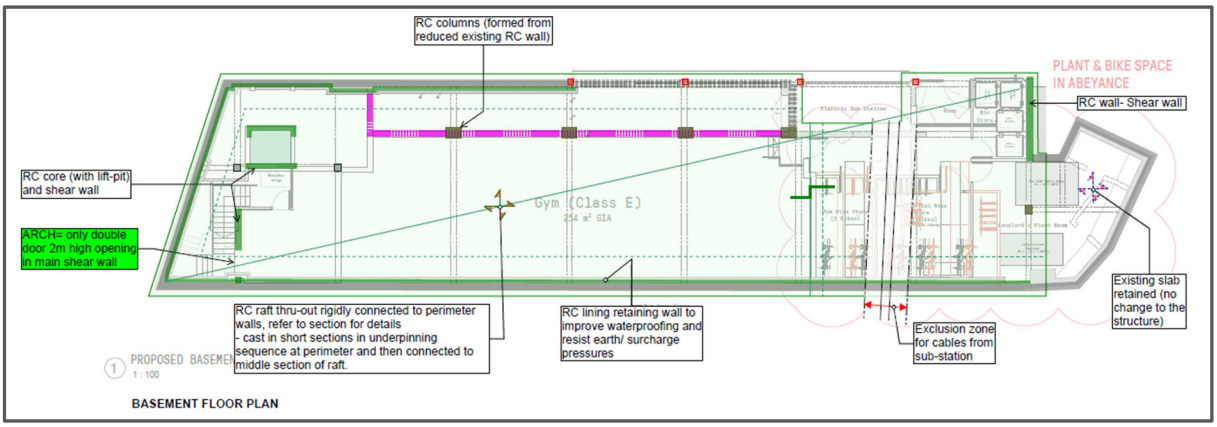
The existing basement already has car access at the rear elevation, which will be used for the proposed basement works.

2.2. Construction Sequence

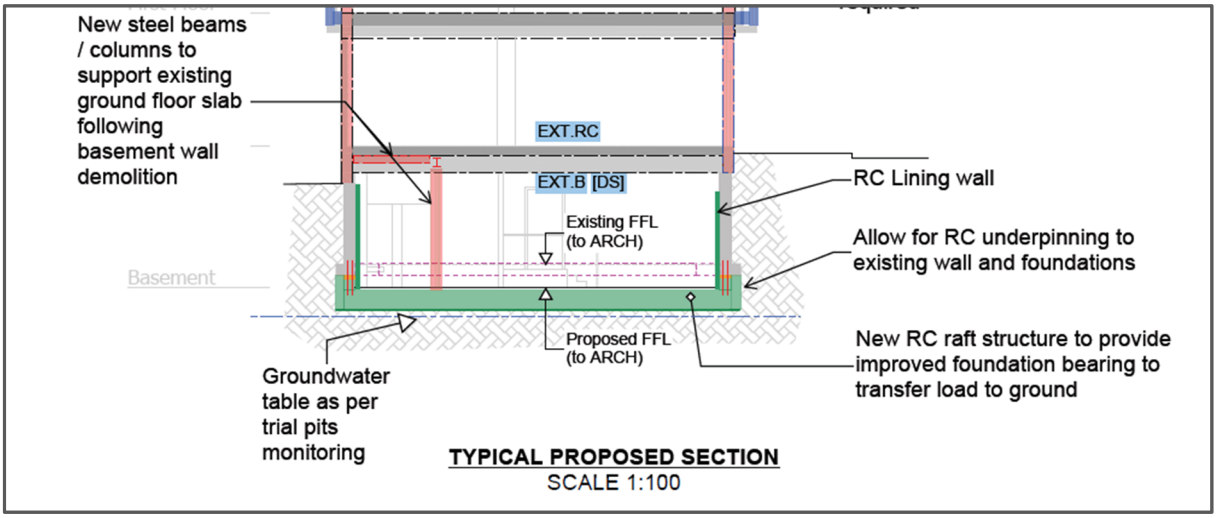
The following sequence of works could be considered for the construction of the basement:

1. Installation of lateral propping to existing wall and closest wall a low level.
2. Reduced levels without undermining existing footings and excavate for underpin sequence.
3. Carefully remove existing footing projections and any loose/weak material from the underside of existing footings.
4. Cast underpin below perimeter party wall and closet wing wall and including linking slab section. Wait 24 hours before completing pinning up using high strength non shrink mortar well rammed in.
5. Repeat items 2 to 4 for underpin, including new stub retaining wall section adjacent new steps.
6. Repeat similar process for mass concrete (transitional) underpin to existing wall and mass concrete underpin to closet wing footing adjacent new steps
7. Install concrete underpins in a similar manner as required to suit the existing footing configurations encountered.
8. Complete RC works to new steps and remove temporary lateral props once underpins and connecting slab has achieved full design strength.

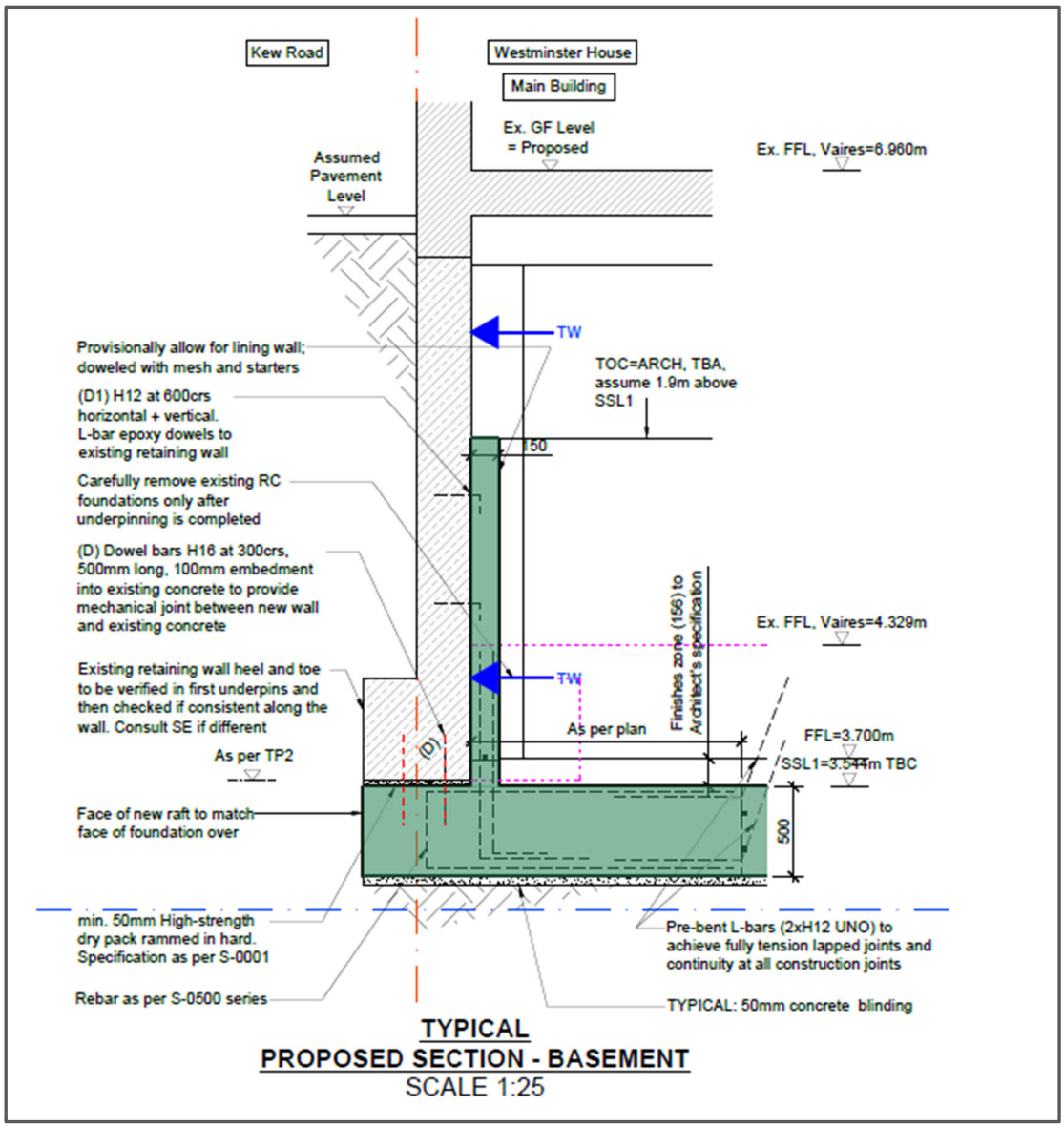
See Appendix B for the Structural Engineer's Feasibility Report



Basement floor plan from page 11 from Structural Engineer's Feasibility Report



Typical Section page 20 from Structural Engineer's Feasibility Report



TYPICAL
PROPOSED SECTION - BASEMENT
SCALE 1:25

Typical basement section page 20 from Structural Engineer's Feasibility Report

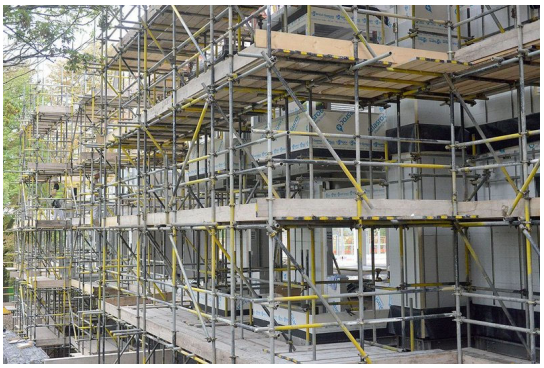
3. Traditional Roof Steel Frame

3.1 Roof Steel Frame Works

The next section illustrates construction method to form the super-structure of two-storey roof extension.

Th commentary provide this proposal is feasible using conventional and proven construction method.

	**Stage 1 - Transfer podium steelwork** Erected roof transfer podium steelwork that is fixed to existing structure. A hiab crane to be cited on Kew Road to load out floors with steelwork into roof.
	**Stage 2 – Steel superstructure** A hiab crane to cited on Kew Road to load steel members into roof ready for erection using MEWP.
	**Stage 4 - Overview of the Infill Walling System** Light gauge steel infill walling forms a secondary structure which is fixed primary steelworks at floor and soffit. It is generally positioned at the slab edge allowing insulation and external finishes to be installed continuously outside the main structural frame.

	**Stage 5 – Lining External walls** External sheathing boards are designed to make buildings watertight prior to the completion of a façade. This means that not only is the building frame itself protected from the weather but internal trades, such as dry liners and heating engineers, can progress with their installations

Refer to Appendix B for the Structural Engineer's Feasibility Report

4. Conclusion

Based on the information available as this time it is possible conclude that there is a safe and effective method of the excavating and construction basement without significant impact on the public highway or neighbouring properties.

The proposal for basement and roof extension is feasible using conventional and proven construction methods.

5. Appendix A - Geotechnical Investigation

Soil Consultants
Ground Investigation
Geotechnical Analysis
Contamination Assessment

Ref: 10213/JRCB/OT/Rev 1 11th April 2018

Pringuer-James Consulting Engineers Ltd
10 Beulah Road, Wimbledon
London SW19 3SB
(Attention: John Lange Esq)

Dear Sirs

Supplementary Ground Investigation: Westminster House, Kew Road, Richmond TW9 2ND

We understand that re-structuring of this 4-storey mixed-use building is proposed, involving the addition of two floors together with deepening of the existing basement. On behalf of the Client, Baden Prop Limited, we were requested by Pringuer-James Consulting Engineers Ltd (PJCE) to undertake ground investigation works to establish the ground sequence and groundwater conditions. A previous phase of investigation was undertaken by others in 2015/2016, comprising two hand-excavated trial pits. Soil Consultants Limited (SCL) were requested to examine the trial pits and to provide preliminary advice on foundation performance (Letter report ref: 9897/JRCB/SCW, 14th January 2016). We understand that the Client has legal reliance on this previous investigation and its findings have therefore been taken in to account in this current report.

A summary of the current investigation together with pour observations and foundation advice follows.

1.0 Site description

Westminster House is located on the eastern side of Kew Road (A307), immediately to the north of Richmond railway station. It is a 4-storey building which incorporates a single basement level which is mainly used for car parking. Kew Road at the front of the building lies at about +7mOD, corresponding to ground floor level. At the rear the ground level slopes down to permit vehicular access to the basement car park where the ground level is between about +4.9mOD to +5mOD. The existing site levels have been taken from the McDaniel Woolf 'Existing Basement + Ground Floor Plans' drawing (Ref: 104.05.002, 06/06/05).

2.0 Ground investigation

The ground investigation was specified by PJCE ('Geotechnical Investigation Specification', Ref L1739-SPEC-001, Oct 2017) and comprised the following elements:

Small diameter borehole and dynamic probing

The borehole (WS1) was carried out using dynamic sampling equipment mounted on a small tracked rig. A casing system was used but due to the density of the natural soils and the presence of groundwater, it was not possible to extend the borehole deeper than 2.70m. Dynamic probing (DP1) was continued from the base of the borehole and this extended to 4.50m depth, where refusal occurred with blowcounts of >50/100mm. A 35mm ID water monitoring pipe was installed to 1.60m depth on completion.

Harwich Office
Haven House, Albemarle Street
Harwich, Essex
CO12 3HL
t: 01255 241639
e: harwich@soilconsultants.co.uk

Head Office
Chiltern House, Earl Howe Road, Holmer Green
High Wycombe, Buckinghamshire HP15 6QT
t: 01494 712 494
e: mail@soilconsultants.co.uk
w: www.soilconsultants.co.uk

Cardiff Office
23 Romilly Road
Cardiff
CF5 1FH
t: 02920 403575
e: cardiff@soilconsultants.co.uk

Trial pit

The trial pit (designated TP3) was hand-excavated and was taken to a depth of 0.75m. Its purpose was to expose the existing foundation

Geotechnical and contamination laboratory testing

Geotechnical classification testing comprised particle size distribution analysis on one sample of the natural soils. Contamination testing (including ACEC sulphate/pH testing) was carried out on two soil samples with WAC testing on one sample. Soluble sulphate/pH testing was also carried out on one water sample.

3.0 Ground sequence

The British Geological Survey map indicates that the Kempton Park Gravel is present overlying the London Clay. The following sequence was encountered in the borehole and trial pits:

Basement slab/made ground

The existing concrete basement slab varied in thickness between 450mm (TP1-2016) and 250mm (TP3-2018). A thin layer of brick hardcore with sandy gravel was present beneath the slab in TP1, extending to about 0.70m depth. In WS1, TP2 and TP, the slab rested directly upon natural strata.

Kempton Park Gravel

This natural stratum was met at depths of between 0.25m and 0.70m below basement slab level, comprising brown/orange slightly silty sand and gravel/very sandy gravel. Standard Penetration Test (SPT) N-values of 48 and 28 were measured, indicating a dense becoming medium dense state of compaction. The dynamic probe measured N_{100} values (ie blows/100mm) of between 6 and 10 and this again would suggest medium dense to dense conditions. The gravel extended to the full 2.70m depth of WS1.

London Clay

The London Clay was not encountered in the trial pits or the borehole. The dynamic probe (DP1) which continued from the base of the borehole exhibited a significant drop in N_{100} values at about 3.50m depth (+1.4mOD). Two scenarios which could be inferred from the DP1 profile are as follows:

- The lower blowcounts at about 3.50m depth could represent the level of the gravel/London Clay interface. The picture is, however, confused by the rapid increase in N100 value below about 4.30m, with refusal (N100>50) at 4.50m. The only realistic explanation if this is the London Clay would be the presence of a cemented claystone causing refusal
- The alternative is that the Kempton Park Gravel contains localised loose granular or softer cohesive zones and extended beyond the base of the probing

We have examined published information, and a BGS borehole immediately to west of the site (see appended sheet) identifies the level of the gravel/London Clay interface at approximately +1.2mOD. This would therefore tend to support the first scenario above, with the lower N_{100} values reflecting the presence of London Clay.

Groundwater

In the previous phase of investigation, groundwater was measured at between 1.35m and 1.38m below the basement slab level (23rd November 2015), corresponding to about +3.55mOD to +3.62mOD. In the current 2018 investigation, a standing water level was measured in WS1 at 1.28m depth, corresponding to about +3.61mOD.

4.0 Geotechnical appraisal

The proposed scheme will involve basement deepening and the construction of two or more additional floors on the existing building.

Basement deepening

The proposed basement level has not yet been finalised, although we understand that the intention would be to provide approximately 3m headroom. For any deepening which remains above the groundwater, the construction process is expected to be relatively straightforward. The natural gravel will obviously require support at the periphery of the excavation and this would probably be provided by a new concrete wall cast in a 'hit-and-miss' sequence. The gravel is competent and casting the new slab directly on the exposed formation, subject to proof-rolling/inspection, should be satisfactory.

If the proposed level involves excavation below the groundwater, then this would be a significantly more onerous operation. The natural gravel is highly permeable and localised pumping from within the excavation will almost certainly not be effective in lowering/controlling the groundwater. Loss of fines from beneath existing foundations and increases in effective stress can contribute to foundation settlement. In our opinion, the optimum method of deepening the basement beneath the groundwater would be to install a watertight embedded wall sealed into the London Clay, such as a secant bored pile wall. The alternative of a steel sheet pile wall is not likely to be acceptable due to a) the noise/vibration during installation and b) the difficulty in penetrating through the dense gravel. Both techniques will be affected by the limited access and low-headroom rigs will be necessary. If only limited excavation beneath the groundwater is required then the option of permeation grouting could possibly be considered, although this would need to be confirmed by a specialist contractor.

The groundwater level during the current investigation is consistent with the previous investigation; the overall range of measured water levels was between +3.55mOD and +3.62mOD. It should be noted that groundwater levels vary seasonally and can rise following sustained wet periods. We recommend that a programme of water level monitoring is instigated to establish the potential variation.

Foundations

The trial pits indicate that the existing concrete foundations have a projection of about 600mm from the column/wall faces. Assuming a 300mm column/wall thickness, this would suggest that square pads would measure about 1.5m x 1.5m. Provisional loads have been provided by PJCE and taking this pad size, the existing and proposed applied pressures would be as follows:

Location	Existing load	Existing applied pressure	Anticipated increase	New applied pressure
Central column	1,600kN	710kPa	20%	852kPa
Edge column	1,000kN	444kPa	35%	599kPa

We have carried out preliminary bearing resistance analysis assuming an angle of friction (ϕ') of 37°; this, we consider, to be a reasonable estimate for the dense/medium dense sand and gravel. For the various geometries, the following factors of safety have been calculated using traditional bearing capacity theory for the present condition:

Location	Existing applied pressure	Foundation depth	Ultimate bearing capacity for 1.5m square pad	Current Factor of Safety*
Central column	711kPa	0.70m	860kPa	1.21
Central column	711kPa	1.10m	1,180kPa	1.68
Edge column	444kPa	0.70m	860kPa	1.97
Edge column	444kPa	1.10m	1,180kPa	2.74

(* defined in terms of net ultimate bearing capacity, with groundwater at foundation base level)

These preliminary calculations indicate that the overall factor of safety currently in operation is likely to be <3. This value was traditionally (ie pre-EC7) taken for ULS design and can still be used to provide an indication of the performance and degree of utilisation of a foundation. The proposed works will result in an increase in column loads and this will inevitably lead to 'less safe' foundations, with lower overall factors of safety. When the existing and proposed loads have been accurately determined, we recommend that foundation-specific analysis is undertaken to establish the stability of the foundations in terms of ULS and also the potential settlements which may occur. If the provisional loads provided by PJCE are of the correct magnitude, underpinning of the foundations will almost certainly be required. Indeed, underpinning would be necessary as a matter of course where/if the excavation for the basement lowering extends below the existing foundation level.

Due consideration will need to be given to the potential presence of the less competent London Clay within the zone of influence of the foundation. We have carried out preliminary calculations based upon the London Clay surface being at 3.40m depth. Even accounting for a 35% increase in load on a foundation at 1.1m depth, the stress increase should be well within the capabilities of typical London Clay. A further check should of course be carried out when the structural/foundation loads are finalised. It would be advisable to confirm the level of the London Clay at some point. Dynamic sampling techniques have proven unsuccessful in penetrating the dense Kempton Park Gravel and a cable percussive borehole will probably be required. A low headroom unit would be necessary to work within the building or alternatively an external borehole could possibly be carried out with a full-sized, near to the car park entrance.

5.0 Contamination and chemical testing

Testing for a general suite of contaminants was undertaken on two soil samples, with WAC testing on one sample. The following preliminary observations are made:

- No elevated levels of contamination with respect to human health were measured. Based upon the two samples tested we consider that the risks to potential receptors such as end users, aquifer and construction workers should be low
- With respect to disposal, we anticipate an 'inert' classification for any made ground and the natural soils. This should be confirmed with the relevant regulatory body/disposal site
- Low concentrations of soluble sulphates were measured in soil and groundwater samples, with alkaline pH values. The results results fall into Site Design Class DS-1 of Table C2 given in BRE Special Digest 1 (2005). We assess the site as having 'mobile' ground water and this will result in an ACEC Class AC-1

It should be noted that these results are based on a limited number of samples and there may of course be areas of undetected contamination. A careful watching brief should be kept during construction to ensure that any potentially contaminated soil encountered is handled and disposed of in a safe and controlled manner. Site workers should observe normal hygiene precautions when handling soils and if material suspected of being contaminated is identified during construction, this should be set aside under protective cover and further tests undertaken to verify the nature and levels of contamination present.

We trust that the above comments are of assistance.

Yours faithfully
For Soil Consultants Limited

John Bartley

Encls:

- General information, limitations and exceptions
- Borehole record
- Dynamic probe record
- Trial pit records (2015 and 2018)
- Particle size distribution result
- Contamination and chemical testing results (QTS Environmental)
- BGS borehole information
- Site plan

GENERAL INFORMATION, LIMITATIONS AND EXCEPTIONS

Unless otherwise stated, our Report should be construed as being a Ground Investigation Report (GIR) as defined in BS EN1997-2. Our Report is not intended to be and should not be viewed or treated as a Geotechnical Design Report (GDR) as defined in EN1997-2. Any 'design' recommendations which are provided are for guidance only and are intended to allow the designer to assess the results and implications of our investigation/testing and to permit preliminary design of relevant elements of the proposed scheme.

The methods of investigation used have been chosen taking into account the constraints of the site including but not limited to access and space limitations. Where it has not been possible to reasonably use an EC7 compliant investigation technique we have adopted a practical technique to obtain indicative soil parameters and any interpretation is based upon our engineering experience and relevant published information.

The Report is issued on the condition that Soil Consultants Ltd will under no circumstances be liable for any loss arising directly or indirectly from ground conditions between the exploratory points which differ from those identified during our investigation. In addition, Soil Consultants Ltd will not be liable for any loss arising directly or indirectly from any opinion given on the possible configuration of strata both between the exploratory points and/or below the maximum depth of the investigation; such opinions, where given, are for guidance only and no liability can be accepted as to their accuracy. The results of any measurements taken may vary spatially or with time and further confirmatory measurements should be made after any significant delay in using this Report.

Comments made relating to ground-water or ground-gas are based upon observations made during our investigation unless otherwise stated. Ground-water and ground-gas conditions may vary with time from those reported due to factors such as seasonal effects, atmospheric effects and and/or tidal conditions. We recommend that if monitoring installations have been included as part of our investigation, continued monitoring should be carried out to maximise the information gained.

Specific geotechnical features/hazards such as (but not limited to) areas of root-related desiccation and dissolution features in chalk/soluble rock can exist in discrete localised areas - there can be no certainty that any or all of such features/hazards have been located, sampled or identified. Where a risk is identified the designer should provide appropriate contingencies to mitigate the risk through additional exploratory work and/or an engineered solution.

Where a specific risk of ground dissolution features has been identified in our Report (anything above a 'low' risk rating), reference should be made to the local building control to establish whether there are any specific local requirements for foundation design and appropriate allowances should be incorporated into the design. If such a risk assessment was not within the scope of our investigation and where it is deemed that the ground sequence may give rise to such a risk (for example near-surface chalk strata) it is recommended that an appropriate assessment should be undertaken prior to design of foundations.

Where spread foundations are used, we recommend that all excavations are inspected and approved by suitably experienced personnel; appropriate inspection records should be kept. This should also apply to any structures which are in direct contact with the soil where the soil could have a detrimental effect on performance or integrity of the structure.

Ground contamination often exists in small discrete areas - there can be no certainty that any or all such areas have been located, sampled or identified.

The findings and opinions conveyed in this Report may be based on information from a variety of sources such as previous desk studies, investigations or chemical analyses. Soil Consultants Limited cannot and does not provide any guarantee as to the authenticity, accuracy or reliability of such information from third parties; such information has not been independently verified unless stated in our Report.

Our Report is written in the context of an agreed scope of work between Soil Consultants Ltd and the Client and should not be used in any different context. In light of additional information becoming available, improved practices and changes in legislation, amendment or re-interpretation of the assessment or the Report in part or in whole may be necessary after its original publication.

Unless otherwise stated our investigation does not include an arboricultural survey, asbestos survey, ecological survey or flood risk assessment and these should be deemed to be outside the scope of our investigation.

We will identify tree and plant species if possible, but a suitably qualified arboriculturalist/botanist should be consulted to provide definitive identification.

Site & Location:	**Westminster House** **Kew Road, Richmond, Surrey TW9 2ND**		Borehole No: **WS1**
Client:	**Baden Prop Limited**	Coordinates: 518071E, 175213N	Sheet 1 of 1
Engineer:	**Pringuer-James Consulting Engineers Ltd**	Ground Level: +4.89mOD	Report No: 10213/JRCB

Progress & Observations	Samples & Tests Type	Samples & Tests Depth (m)	Field Test Results	Strata Depth (m)	Strata Level (m)	Legend	Strata Descriptions	Backfill / Installation
BH carried out: 22/02/18							CONCRETE	
	E	0.30		0.30	4.59		Dense becoming medium dense brown/orange slightly silty SAND and GRAVEL. Locally grading to very sandy flint gravel. Gravel is fine to coarse grained and sub-angular to rounded	
BH dia: 100m reducing with depth								
	D	0.75						
	SPT/C	1.00	N=48 N_{60}=48					
	D	1.25						
Monitoring pipe (35mm ID) installed to 1.60m depth								
	D	1.75						
	SPT/C	2.00	N=28 N_{60}=28					
	D	2.60						
BH complete at 2.70m Groundwater standing at 1.28m				2.70	2.19		End of hole at 2.70m	

Key: U = Undisturbed B = Bulk D = Small disturbed W = Water ES = glass jar & plastic tub E = glass jar SPT/S = split spoon SPT/C = solid cone PP = Pocket Penetrometer [kg/cm²] HV = Hand Vane [kPa] PID = Photo Ionisation Detector [ppm - Isobutylene Equivalent, PhoCheck Tiger, 10.6eV lamp] * = full SPT penetration not achieved - see summary sheet

Borehole type: Dynamic Sampler

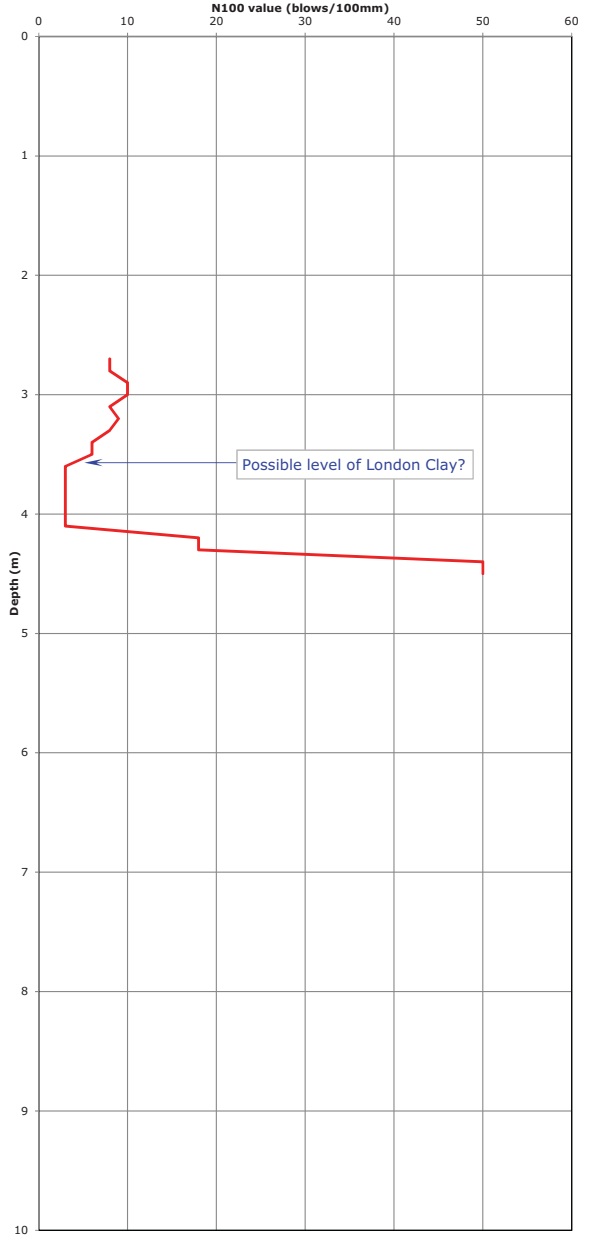
Remarks:
a) borehole commenced at basement car park level
b) strata too dense to install casing; borehole collapsing below groundwater level
c) DP1 continued from base of borehole

Borehole No: **WS1**

Site & Location:	**Westminster House** **Kew Road, Richmond, Surrey TW9 2ND**		DP No: **DP1**
Client:	Baden Prop Limited	Co-ords (E-N): 518071 175213	Sheet No: 1 of 1
Eng:	Pringuer-James Consulting Engineers Ltd	Ground level (mOD): 4.89	Report No: 10213/JRCB

Dynamic Probe Record

Depth (m)	DP blows/100mm
0.50	8
1.00	8
1.50	10
2.00	10
2.50	8
3.00	9
3.50	8
4.00	6
4.50	6
5.00	3
5.50	3
6.00	3
6.50	3
7.00	3
7.50	18
8.00	18
8.50	50
9.00	50
9.50	
10.00	

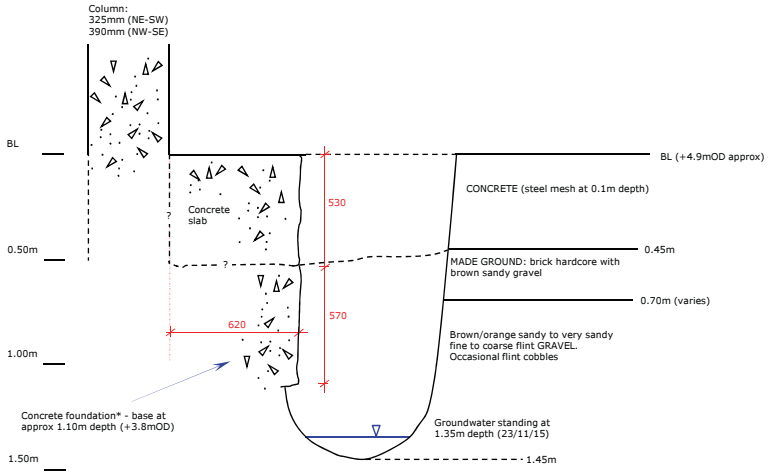


Torque (Nm)

Probing by:	GEH Groundworks Specialists Ltd		Remarks: From base of WS1
Equipment:	DPSH-B	Hammer weight (kg): 63.5	Date: 22 Feb 18
Cone area (cm2): 20		Hammer drop (mm): 750	Rod dia (mm) 35

Site Location	Westminster House Kew Road, Richmond TW9 2ND	Trial Pit No: TP 1 (1 of 1)
Client:	Thamesis Asset Management	Report No: 9897/JRCB
Engineer:	Pringuer-James Consulting Engineers Ltd	

SECTION (looking SW)



*Corner of foundation protrudes approx 750mm from column face, SW to NE

Note: foundation dimensions in millimetres

PHOTOGRAPHS

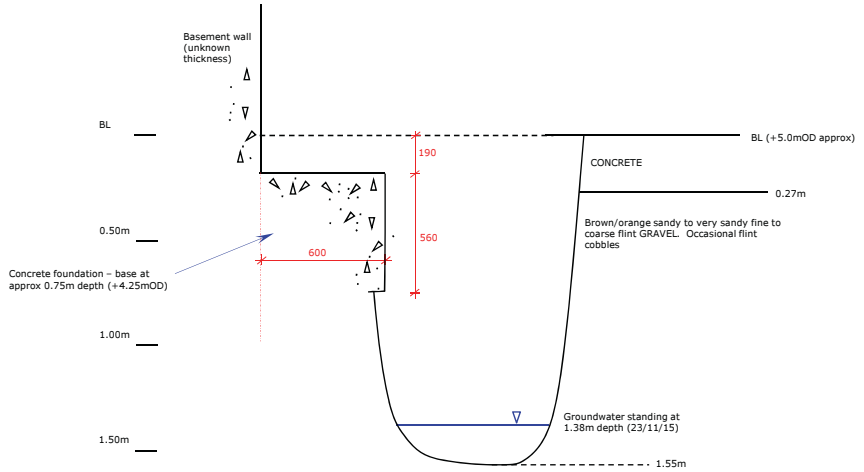
D = small disturbed sample, E = environmental sample (glass jar and tub), HV = hand shear vane test (kPa), pp = pocket penetrometer (kg/cm²)

Date:	23/11/15 (logged)	Groundwater details	Samples
Equipment:	Hand excavation (by others)	• Standing at 1.35m depth	Disturbed samples: 0.80m
Stability:	Stable		
Remarks:			Logged by: JRCB

Soil Consultants

Site Location	Westminster House Kew Road, Richmond TW9 2ND	Trial Pit No: TP 2 (1 of 1)
Client:	Thamesis Asset Management	Report No: 9897/JRCB
Engineer:	Pringuer-James Consulting Engineers Ltd	

SECTION (looking NE)



Note: foundation dimensions in millimetres

PHOTOGRAPHS

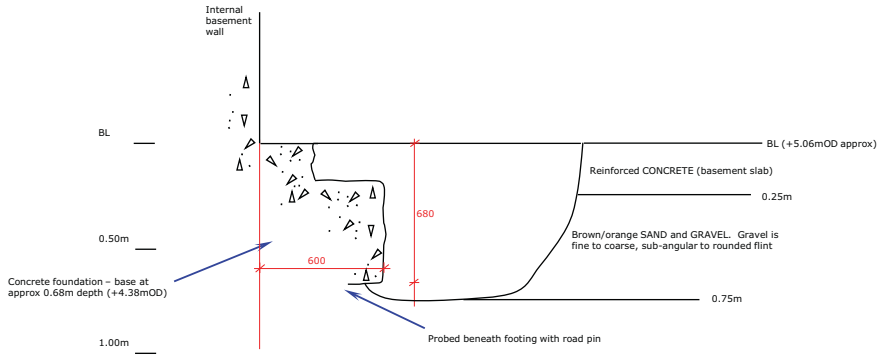
D = small disturbed sample, E = environmental sample (glass jar and tub), HV = hand shear vane test (kPa), pp = pocket penetrometer (kg/cm²)

Date:	23/11/15 (logged)	Groundwater details	Samples
Equipment:	Hand excavation (by others)	• Standing at 1.38m depth	Disturbed samples: 1.50m
Stability:	Stable		
Remarks:			Logged by: JRCB

Soil Consultants

Site & Location	**Westminster House** **Kew Road, Richmond, Surrey TW9 2ND**	Trial Pit No: **TP3** (1 of 1)
Client: Engineer:	**Baden Prop Limited** **Pringuer-James Consulting Engineers Ltd**	Report No: **10213/JRCB**

SECTION (looking SSW)



Note: foundation dimensions in millimetres

PHOTOGRAPHS

D = small disturbed sample, E = environmental sample (glass jar and tub), HV = hand shear vane test (kPa), pp = pocket penetrometer (kg/cm²)

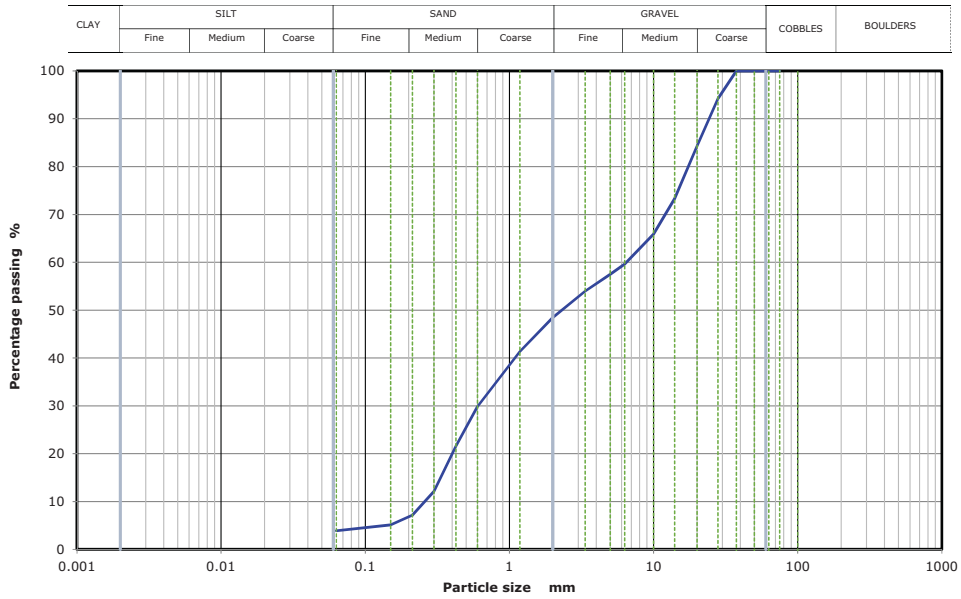
Date:	Excavated: 24/02/18; Logged: 26/02/18	**Groundwater details**	**Samples**
Equipment:	Hand excavation	• None observed	Disturbed samples: 0.50m
Stability:	Stable		
Remarks:			**Logged by**: OT

Soil Consultants

Site & Location	**Westminster House** **Kew Road, Richmond, Surrey TW9 2ND**	Report No: **10213/JRCB**

Particle size distribution

Hole ID: **WS1** Depth (m): **1.25**	Description: **Brown/orange slightly silty SAND and GRAVEL**



Sieving	
Size (mm)	% passing
75	100.0
63	100.0
50	100.0
37.5	100.0
28	94.2
20	84.3
14	73.3
10	65.9
6.3	59.6
5	57.5
3.35	54.0
2	48.4
1.18	41.3
0.6	29.8
0.425	21.6
0.3	12.1
0.212	7.2
0.15	5.1
0.063	3.9

Sedimentation	
Size (μm)	% passing

Sample proportions	%
Cobbles	0
Gravel	52
Sand	45
Fines (<0.063mm)	4

Grading analysis		
D60	mm	6.47
D30	mm	0.606
D10	mm	0.259
Uniformity Coefficient		25.0
Curvature Coefficient		0.2

Test method and date	
Method: BS EN ISO 17892-4:2016	
- Wet sieving method	
Reporting date:	11 Mar 18

Soil Consultants

6. Appendix B - Structural Engineer's Feasibility Report

WESTMINSTER HOUSE, RICHMOND, TW9 2ND

STRUCTURAL ENGINEER'S FEASIBILITY REPORT

Revision	P1 – Preliminary
Issued	05-12-2023
Prepared by	AP= Andrzej Plocieniak MSc CEng MIStructE
Checked by	AB

Axiom Structures Limited
177 Southwark Bridge Road, London
SE1 0ED

Tel: 020 3637 2751
Email: office@axiom-structures.co.uk

AXIOM STRUCTURES

CONTENTS

1.0 EXECUTIVE SUMMARY

1.1 The proposed development involves creation of two additional levels of Class C3 accommodation comprising 7no.units, conversion and excavation of the existing Class E basement and part conversion of existing floorspace at basement, ground, first, second, and third floor levels to provide internal access and ancillary residential floorspace with external alterations and associated development

1.2 The project is not unusual and the underlying soils and groundwater conditions are well recorded in the area. The foundation works should have no adverse effect on the local hydrogeology and the supporting site investigation and assessment by others provides further evidence of this.

1.3 If the works noted above are properly undertaken by suitably qualified contractors, these works should pose no threat to the structural stability of the building or the adjoining properties and public infrastructure. Based on our current knowledge of the buildings and our experience of projects of this type, if the works are carried out in this manner, then the likelihood of damage to the adjacent properties should be limited to Category 0 as set out in CIRIA report C580 & C760.

1.4 All reports have led to the same conclusion: the construction of the proposed vertical extension and groundworks should not have adverse effect on the property, neighbouring properties and public infrastructure.

1.5 The proposed vertical roof extension comprises robust and lightweight braced and rigid primary steel frame structure, lightweight joists floors and lightweight curtain wall cladding. The new structure is to be positioned over the existing roof to minimise impact on the existing building fabric. The new frames will be supported on the existing perimeter columns. The existing columns will be strengthened to withstand additional load and transfer it to the sub-structure.

1.6 The building will increase in height and the overall stability of the building will be provided by introduction of additional reinforced concrete shear and core walls on both ends of the building.

1.7 The lowering of the basement will involve underpinning to the existing perimeter walls, forming new retaining walls and creation of a robust raft structure. The new raft will also assist in supporting additional vertical and lateral loads from the proposed roof extension.

2.0 INTRODUCTION

2.1 Axiom Structures Limited have been asked to consider structural issues surrounding the proposed two-storey vertical extension and lowering of the existing basement at the above property. This report is in support of planning application to be made shortly.

2.2 This report covers the work undertaken during the outline design stage of the project and it gives recommendations on the form of structure to be adopted for each of the main core elements.

2.3 The report summarises findings from various desk studies and surveys, and provides outline structural design for the proposed works.

3.0 THE PROJECT

3.1 The proposed development involves:
- Construction of a two-storey residential vertical extension with associated alterations at intermediate floors to provide access and integration of services,
- Lowering the existing basement for Class E use,
- External refurbishment of facades.

3.2 Architectural proposals are presented on Child Graddon Lewis architectural drawings.

3.3 Summary of proposed structural works are included in Section 5 and in **Appendix A**.

3.4 Outline structural engineering proposals are based on visual investigations, walkover surveys, desk studies of geological and historical maps, site specific structural and ground investigations. Many elements of the existing fabric are exposed and therefore reasonable assessment is possible to confirm existing load-paths and general construction of the building.

3.5 Summary of findings from undertaken investigations such as ground investigation and opening up works are included in **Appendix C**.

3.6 Remaining investigation works to assist the proposed works, such as material testing, further localised opening up works are to be undertaken at the next stage of the project to avoid disruption to current tenants.

3.7 Key structural considerations at this stage of the project included:
- Review of overall stability of the structure due to increased height of the building,
- Appraisal of the existing superstructure to support additional dead and imposed loads,
- Review of the existing structure to meet disproportionate collapse due to increased number of stories above five.
- Increase of load on foundations and replacement of the existing pad foundations with the ground bearing raft structure.

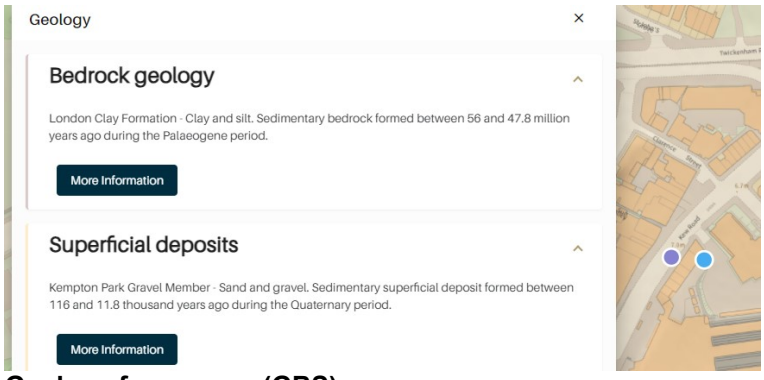
3.8 This feasibility report was prepared for outline purposes for and on behalf of the Client. It is for their use and the use of their professional advisors only and should not be relied upon by others. The scope of work is defined on Architects planning drawings dated 2023.

4.0 EXISTING CONSTRUCTION / GROUND CONDITIONS/ DESK STUDIES

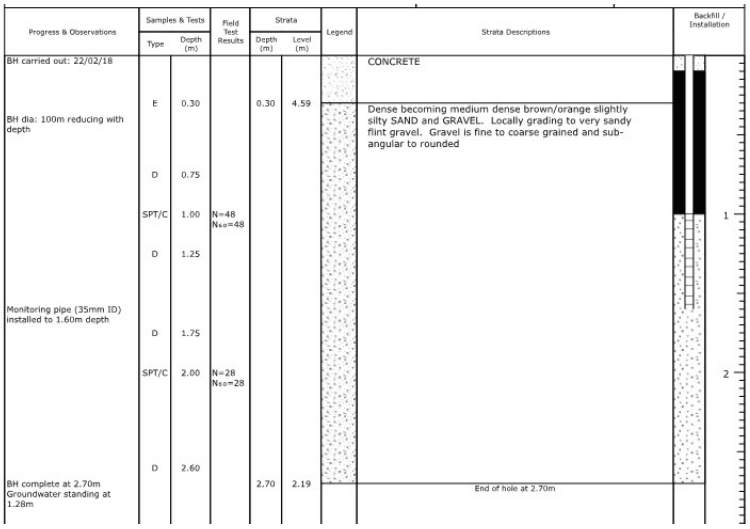
4.1 **Site description:** The site is located adjacent to Richmond train station, with Kew Road running parallel to the main N-W elevation. There is a secondary road along S-E elevation with an access ramp leading to the basement under the building.

4.2 **Geology:** Following desk study of the Geological Maps and site-specific trial pits the anticipated ground conditions are as follows (refer to **Appendix C** for full investigation report with comments):

- Mid dense Kempton Park Gravels to about 2.5m below existing basement level.
- Stiff and becoming very stiff London CLAY under Gravels.



Geology from maps (GBS)

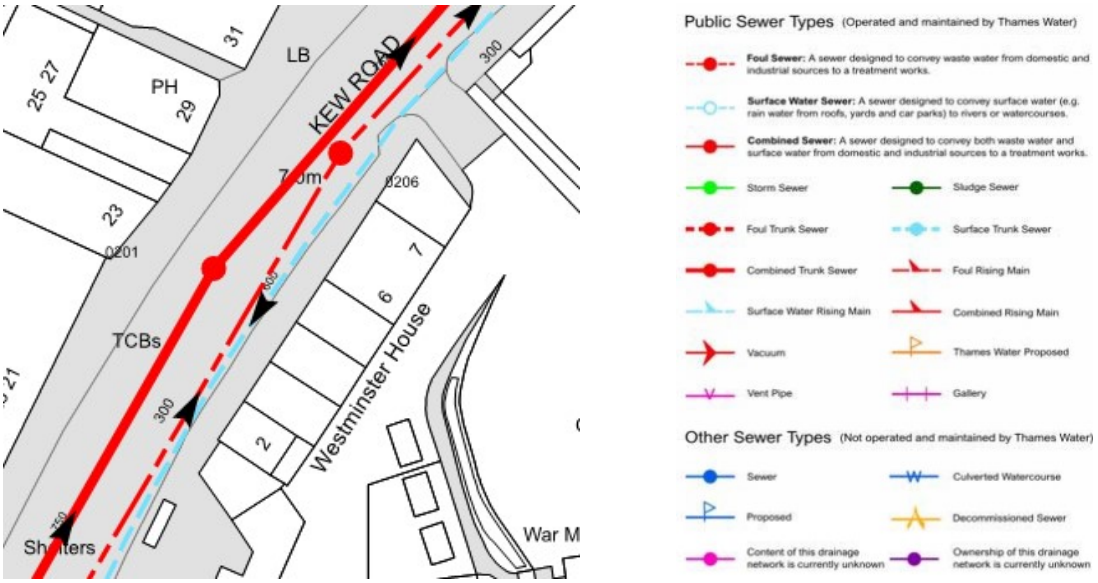


Trial pit information (refer to Appendix C)

4.3 **Ground Water:** The monitoring of groundwater in trial holes indicated that there is unlikely to be any significant ground water flow from upper aquifers within the depth of the proposed excavation. The groundwater was standing at about 1.3m below the basement slab, and hence the excavation is expected to be kept above the groundwater table. Where required, localised dewatering using well-pointing will be feasible and could be adopted to ensure that the excavation is undertaken in dry conditions.

4.4 **Flood Risk:** The site is located in medium risk from surface water flooding, refer to the site-specific Flood Risk Assessment as required and for details and any measures to mitigate future flood risks.

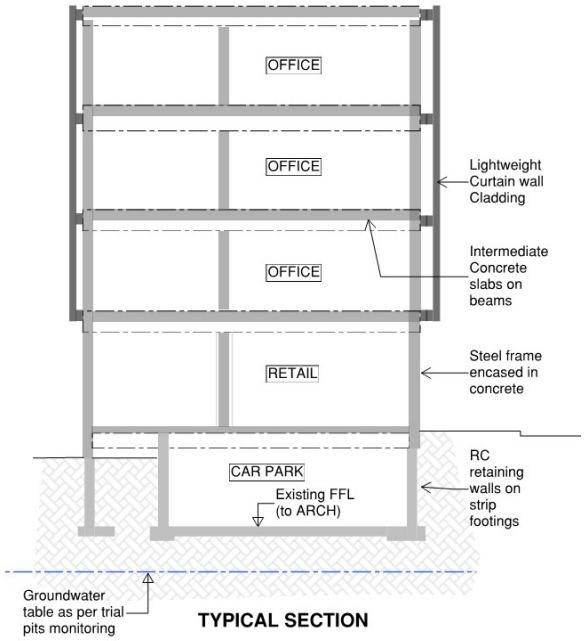
4.5 **Public Utilities:** The trunk combined Thames Water sewers and water mains are noted to run under main streets. There is an existing electrical substation and some other services in the basement that are subject to review at the next stage of the project. In principle, the existing services are to be retained and new structures will be built over them to avoid disruption to occupied units above.



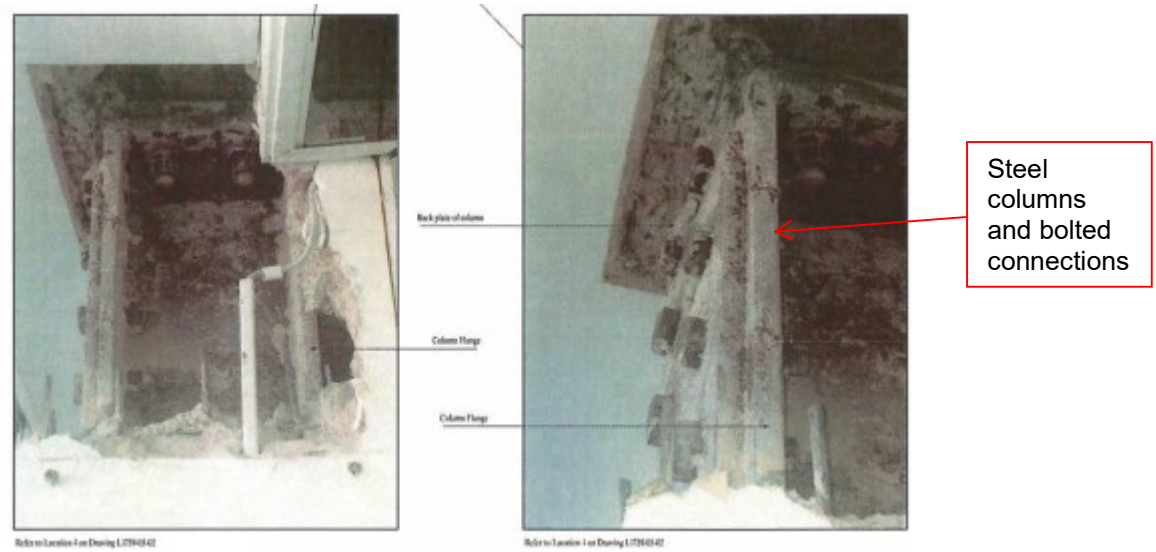
Sewers from Thames Water Asset

4.6 **Existing Underground Structures:** There are no expected underground tunnels or other underground structures (e.g. LUL tunnels, Post Office Tunnel, Trunk Storm Relief Sewers) located directly under the site. The overground rail lines within Richmond train station are located at least 30m from proposed development.

4.7 **Property details:** The property is a four-storey mixed use building with flat roof and one basement level. The building consists of ground floor with retail units accessed from Kew Road, first to third floors occupied by offices and a basement car park with plantroom accessed from the back road.



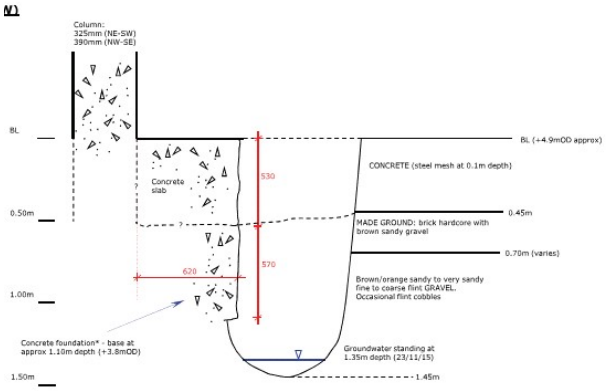
4.8 **Existing Construction:** Exploratory works carried out have revealed that the structure is comprised of steel frames (encased in concrete) with concrete slabs at each level. The frames are distributed throughout the building on a regular grid. A transfer structure above basement supports internal columns to form column free carpark area in the basement.



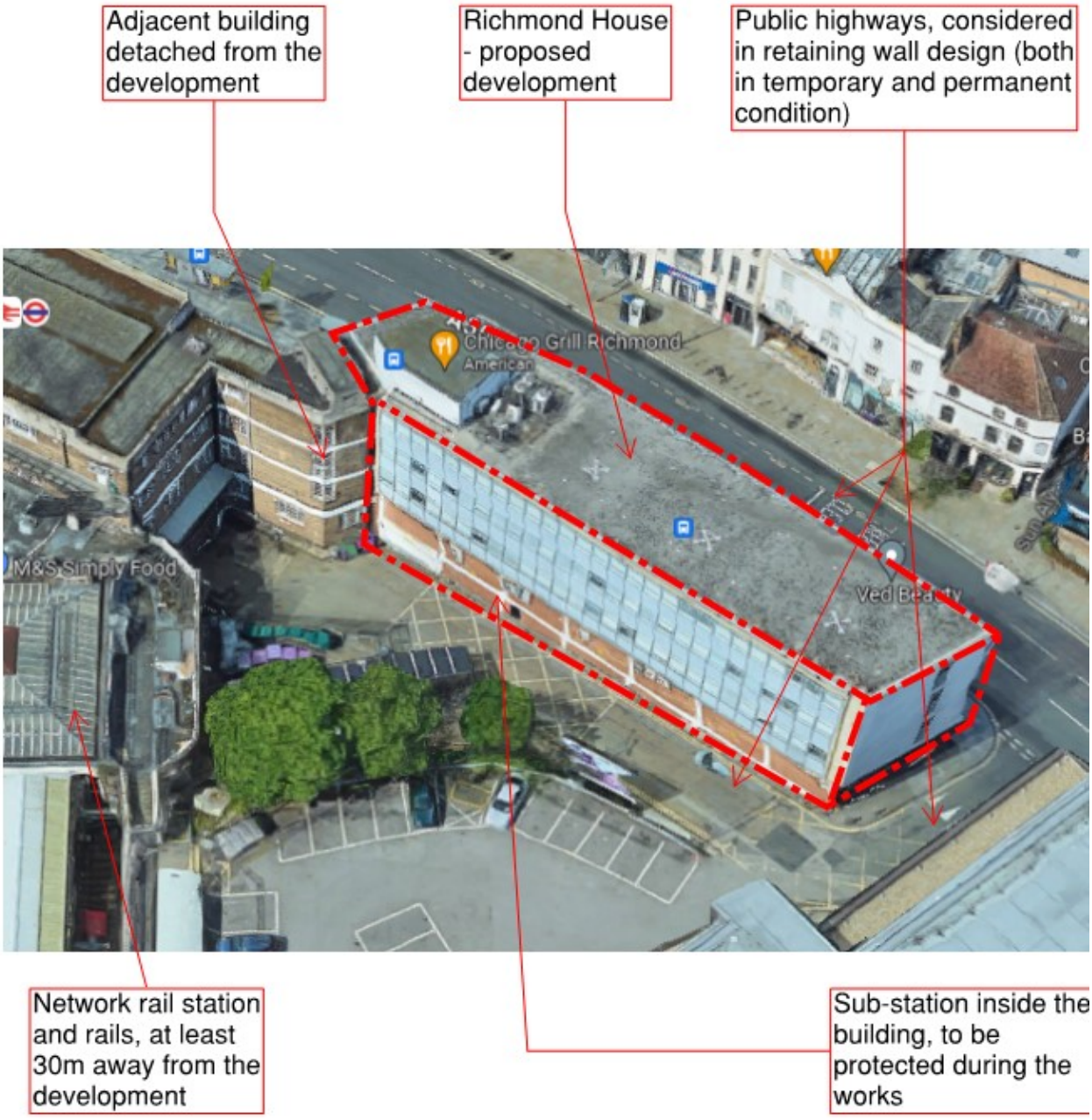
Extract from PJCE investigation (see Appendix C for further details)

4.9 **Existing Stability System:** The overall stability of the building appears to be provided by the diaphragm action of concrete floors and rigidly connected steel beams and columns. It is likely that some shear walls are also present at both ends of the building

4.10 **Existing Foundations:** Trial pits in the basement have indicated that the building is not piled, and the foundations comprise of concrete strip footing to the perimeter and localised pad foundations at the column locations. The basement retaining walls are reinforced concrete and there is



4.11 **Boundaries and Adjoining Structures:** Richmond station building is the only building immediately adjacent to the development. The site is surrounded by public roads and pavements.



Birds Eye view on the development and impact on adjacent building and infrastructure

4.12 **Adjacent Basements and Excavations:** Richmond station appears to have similar depth basement to the proposed development; this is subject to review as part of the party wall process.

5.0 DETAILS OF PROPOSED DEVELOPMENT AND COMMENTS

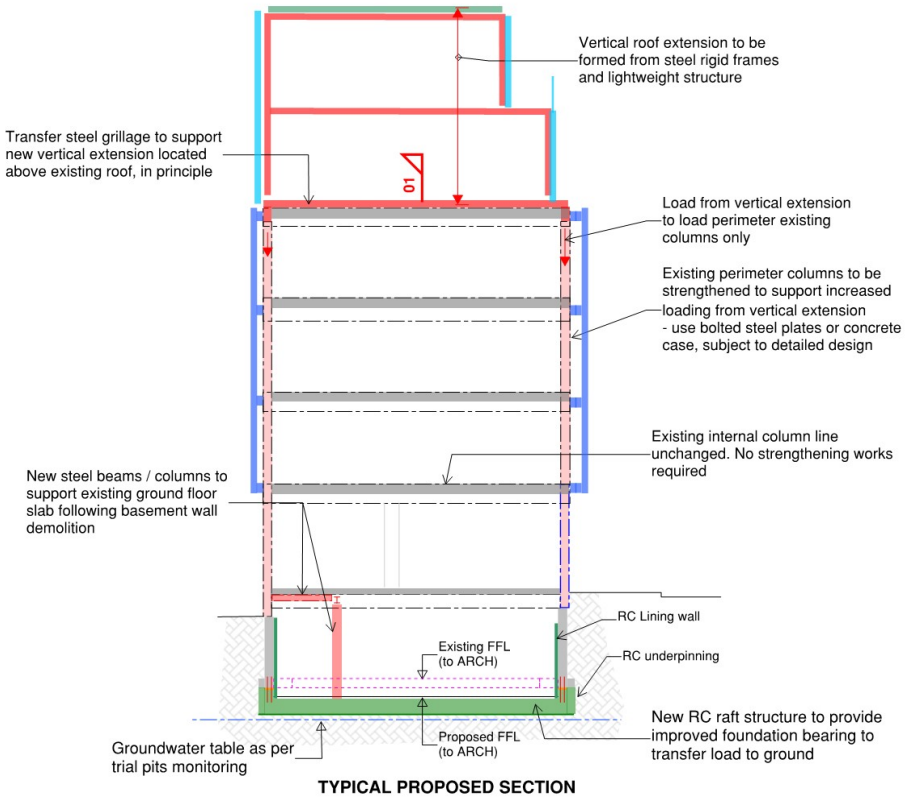
5.1 **Introduction:** The proposed development involves creation of two additional storeys of residential accommodation, refurbishment and partial conversion of the building and lowering of the existing basement.

5.2 Structural engineering proposals including outline sequence of works are presented in **Appendix A**

5.3 The proposed vertical roof extension comprises robust and lightweight braced and rigid primary steel frame structure, lightweight joists floors and lightweight curtain wall cladding.

5.4 The lightweight and framing form of construction was selected to ease lifting up materials, enable dry' assembly over the existing building and to speed up the process.

5.5 The alterations to intermediate floors will involve construction of reinforced concrete shear and core walls. The lowering of the basement will involve underpinning to the existing perimeter walls, forming new retaining walls and creation of a robust raft structure in reinforced concrete. The reinforced concrete structure was a natural choice to match the existing construction and provide durability.



TYPICAL PROPOSED SECTION

5.6 As the building will increase in height and volume, there are following key considerations included:

- Overall stability due to increased height of the building,
- Capacity of the existing superstructure to support additional dead and imposed loads,
- Increase of load on the existing sub-structures (front, side and rear facades) at ground floor levels,
- Disproportionate collapse due to increased number of stories above 5,
- Increase of load on the existing foundations,
- Stability of the sub-structure during basement lowering

5.7 **Overall Stability**: Overall height of the building is to increase from 16m to 23m above rear street level by adding the new vertical extension. There will be an increase in lateral load on the existing structure and therefore additional shear and core walls are introduced to transfer increased lateral loads.

5.8 The new frame is to be a steel rigid and braced frame with cross bracing in both cross directions. The stability bays are envisaged to be tied with the 4th floor transfer grillage structure which in turn is to be securely fixed to the new core walls to prevent uplift and resist shear forces from the new extension.

5.9 **Capacity of Existing Structure:** There will be an increase of load on the existing perimeter columns and they are proposed to be strengthened. The new frames are designed to span over the existing roof and intermediate columns to avoid impact on the inner elements such as columns as well as transfer beams at ground floor.

5.10 **Overall Increase of Load:** Preliminary loading assessment indicates 15-20% increase of load on the existing sub-structure and foundations. The existing foundations will be improved with robust reinforced concrete raft designed to support new loadings.

5.11 **Disproportionate collapse assessment:** The proposed development will increase the Building Class as set up in Building Regulations Approved Document Part A3 from Class 2A to 2B. The regulations are to be satisfied by design of new structure to Class 2B and introduction of robust transfer steel grillage structure over the 4th floor roof. The grillage structure is designed to withstand accidental loadings that may happen in new extension as well as not compromise current capacity of the existing structure to withstand any accident in the original building.

5.12 An intrusive-investigations revealed (refer to **Appendix C**) that the existing building structure is constructed with steel frames consisting of bolted joints as well as reinforced concrete ties with concrete slabs. This system usually satisfies Class 2B buildings subject to detailed checks which may be undertaken at the next stage of the design to optimise the 4th floor grillage. In addition, perimeter existing columns will be strengthened and improve robustness of the building.

Table 11 **Building classes**

Classes	Building type and occupancy
1	Houses not exceeding 4 storeys
	Agricultural buildings
	Buildings into which people rarely go, provided no part of the building is closer t
	do go, than a distance of 1.5 times the building height
2A	5 storey single occupancy houses
	Hotels not exceeding 4 storeys
	Flats, apartments and other residential buildings not exceeding 4 storeys
	Offices not exceeding 4 storeys
	Industrial buildings not exceeding 3 storeys
	Retailing premises not exceeding 3 storeys of less than 2000m² floor area in eac
	Single-storey educational buildings
	All buildings not exceeding 2 storeys to which members of the public are admitt exceeding 2000m² at each storey
2B	Hotels, flats, apartments and other residential buildings greater than 4 storeys b
	Educational buildings greater than 1 storey but not exceeding 15 storeys
	Retailing premises greater than 3 storeys but not exceeding 15 storeys
	Hospitals not exceeding 3 storeys

5.13 **Fire protection to the primary structural elements** is to be designed to meet current Building Regulations. The details are subject to specialist fire engineer design however we envisage that specialist fire lining system or shop applied intumescent coating may work here in addition to appraisal of the existing structure which is currently covered in concrete encasement.

5.14 **Temporary Works - Superstructure:**
The existing fourth floor structure is to be retained and protected during construction until permanent grillage decking is in place. There is limited capacity of this floor and its capacity should be checked by temporary works engineer before the existing floor is loaded. The conventional temporary propping will be required to enable formation of the service holes and installation of shear and core walls.

5.15 Side boundary walls are envisaged to be independent from the building owner's structure and are unlikely affected by the proposed demolition works. This is subject to further review after full strip-out and Party Wall agreements.

5.16 **Basement Construction:** The permanent structural works will involve the construction of reinforced concrete underpinning walls in short sections. New reinforced concrete walls will be monolithically connected to the existing structure and new reinforced concrete basement raft to provide robust and watertight construction. The underpinning to the existing walls will be constructed in a hit and miss sequence to minimise ground movements. The new basement is a naturally rigid structure and will be designed to accommodate the horizontal ground forces imposed via the underpins to the perimeter, potential for upwards and lateral water pressures as well as the vertical loads from above.

5.17 **Soil-structure interaction:** The basement construction and underpinning works to the existing foundations will provide robust and stiffer foundations then original. The stiff reinforced concrete box structure, designed with propped walls, would limit the horizontal movement and consequent impact to the adjacent structures and infrastructure.

5.18 **Grade of Basement - Water Resistance / Proofing:** The proposed basement will be designed to achieve a Grade 3 level of waterproofing protection as outlined in BS EN 8102:2022 Table 2.

Reinforced concrete basement structure with sealed joints would provide barrier against moisture and water ingress. Secondary drain cavity system is proposed as belt and braces measure in case any nominal leak in the concrete joint would happen. I.e. Type B + Type C protection.

5.19 **Impact on Public Utilities:** There are no major public utilities identified within the site except localised electricity cables running from the substation which will be protected during the works. Services within the road (Thames Water sewers) will not be affected by the proposed development. The new basement walls are to be designed to satisfy surcharges that may happen at road or adjacent sites. There should be no impact from the proposed development.

5.20 **Temporary Works - Substructure:** The existing walls are to be underpinned in short sections in fully shored shafts, braced with horizontal cross shores that are to be installed to laterally restrain and retain basement walls during construction, before basement raft and lining walls are constructed. Underpins are to be installed in conventional sequence in short sections and designed to withstand surcharge from building owners and adjacent sides. The installation of the raft will be carried out in sections. Excavations under the existing columns will involve temporary works, most likely raking shores, to unload the excavated area. Refer to **Appendix A** for outline sequence of works and temporary works outline proposal.

5.21 **Groundwater control during construction:** significant ingress of groundwater is not expected during construction. Subject to review on site, any groundwater (perched) would be controlled during underpinning construction with conventional sump pumps with sufficient filters to prevent taking fines from sands and clays. Deep well or other specialist dewatering systems are unlikely to be required due to the groundwater wall below the proposed excavation depth.

6.0 DESIGN AND PERFORMANCE SPECIFICATION NOTES

6.1 Occupancy Loads

The new structure elements will be designed in accordance with current British Standards, Codes of Practice and Building Regulations.

6.2 Wind Loads

The building new internal frame, shear and core walls, and basement structure will be designed to support loads from the wind in combination with the occupancy loads above. The wind net lateral load onto the structure will be determined in all wind directions.

6.3 Surcharge Loads

- The adjoining and building owners lands as well as footpaths imposed load of 5kN/m2 is to be adopted.
- Surcharge from adjacent building foundations is to be considered.
- Pubic Highway surcharge of 20kN/m2 permanent condition would not be applicable to any perimeter walls.

6.4 Permissible Deflections

The design of new constructional steel and reinforced concrete elements will limit deflection and displacement in accordance to the following criteria:

Concrete Elements	Limit – under full load, Dead + Imposed
Beams	Span/ Depth < 20
Simple Slabs	Span/ Depth < 20
Continuous Slabs	Span/ Depth < 26

Steel Elements	Limit – under full load
Simple Beams	Span / 360
Cantilever Beams	Span / 180
Continuous Slabs	Span/ Depth < 26

Lateral sway deflections to be limited to height / 300 unless noted otherwise for curtain walling and overall sway of the building

The above criteria must be read in conjunction with any performance specifications produced by Axiom Structures Ltd for individual works packages.

6.5 Fire Rating

The structure is designed and detailed to achieve the minimum period of fire resistance required by Approved Document B, Table A2. Refer to Architects and specialist fire engineer's performance specification for details.

6.6 Durability

The design life of the new building is taken as a minimum period of 50 years. This falls into Category 4 of BS EN 1990, and corresponds to a 'normal' category of building, which includes new housing and high-quality refurbishment of public and commercial buildings.

6.7 Waterproofing

Extended space of a basement and light-wells are to be designed to achieve performance of Grade 3 Basement in accordance with BS EN 8102:2022 Code of Practice for the Protection of Structures against Water from the Ground. The Grade 3 could be achieved by use of internal membrane such as drain cavity inside the concrete box structure.

Additionally hydrophilic waterstops or slurry are to be considered to all construction joints to prevent moisture penetrating and lime leaching through the concrete joints in walls and at junctions with the slabs subject to specialist advise and design details.

6.8 **Disproportionate Collapse**

There is no change to the disproportionate Collapse Class for the existing elements as there is proposed transfer crash deck grillage at fourth floor to withstand accidental damage in the new extension as set out in Approved Document A of Building Regulations, July 2004. All new and strengthened elements are to be designed and detailed to provide “robust” structure to suit class 2B.

6.9 **Site Constraints**

- The site is located in densely populated urban area often use by public and with limited parking and off load spaces.

- Most likely the commercial units at the ground floor level as well as some offices at upper levels will remain in occupation during the works. Therefore, the construction works will be undertaken close to the public and precautions to ensure that public do not enter the construction site and is protected should be maintained at all times.

- Limited storage of building materials is allowed on the existing floors and this should be reviewed and agreed for particular locations after strip out.

- The works will involve alteration to the existing structure and its lateral stability system. Temporary works sequence should be adhered at all times to ensure that existing building is restrained at all times.

- A contractor to allow for localised dewatering measures during construction and management of surface water that maybe present in the top permeable layers. Permanent works are to adopt watertight reinforced concrete structure as well as perimeter drainage to enable water flow as detailed in section 3.

6.10 **Site Investigation Works**

- Limited intrusive investigations have been carried as highlighted in Appendix C. Further opening up works are required to confirm the existing roof and intermediate floor structures, monitor groundwater level and assist detailed design.

- At the pre-construction stage, further review will be undertaken to confirm assumptions made at the design stage.

7.0 SUSTAINABILITY

Sustainability rating, if required, for the scheme is to be targeted as set up by the Architect. The initial assessment is not yet available, however the following key structural design measures will be considered and incorporated as the design develops:

ITEM	DESCRIPTION
Spoil removal	Will be minimised wherever possible by design measures and/or construction techniques. Re-use of existing material will be encouraged wherever possible for temporary works mats, fill etc.
Recycled aggregate/cement replacement	It is proposed that a proportion of recycled aggregate and cement replacement will be specified for all substructure elements regardless of BREEAM requirements. Opportunities to use similar materials within the superstructure will be dependent on further assessment of design/ programme/ cost implications.
Prefabrication	Possible pre-casting of concrete columns and shear walls or use of modular structural framing systems. Use of prefabricated reinforcement mats as well as modular frame panel construction to be considered.
Service/structure integration	Utilisation of structure as part of the servicing strategy through thermal mass, embedded cooling pipework etc.
Future flexibility	Provide a structural format which can be adapted to suit future changes of use and thus prolong the life of the building. Incorporate specific future allowances where these can be identified (flexibility in layout of flats and communal spaces).
Repetition in construction	Structural elements to be standardised where feasible to encourage reuse and minimise material wastage (column, slab, beam formwork etc).
Finishes	Exposed concrete elements minimise material and associated energy otherwise required for finishing trades. Concrete frame is also detailed to be inherently fire protected thus offsetting the need for further finishes to be applied.

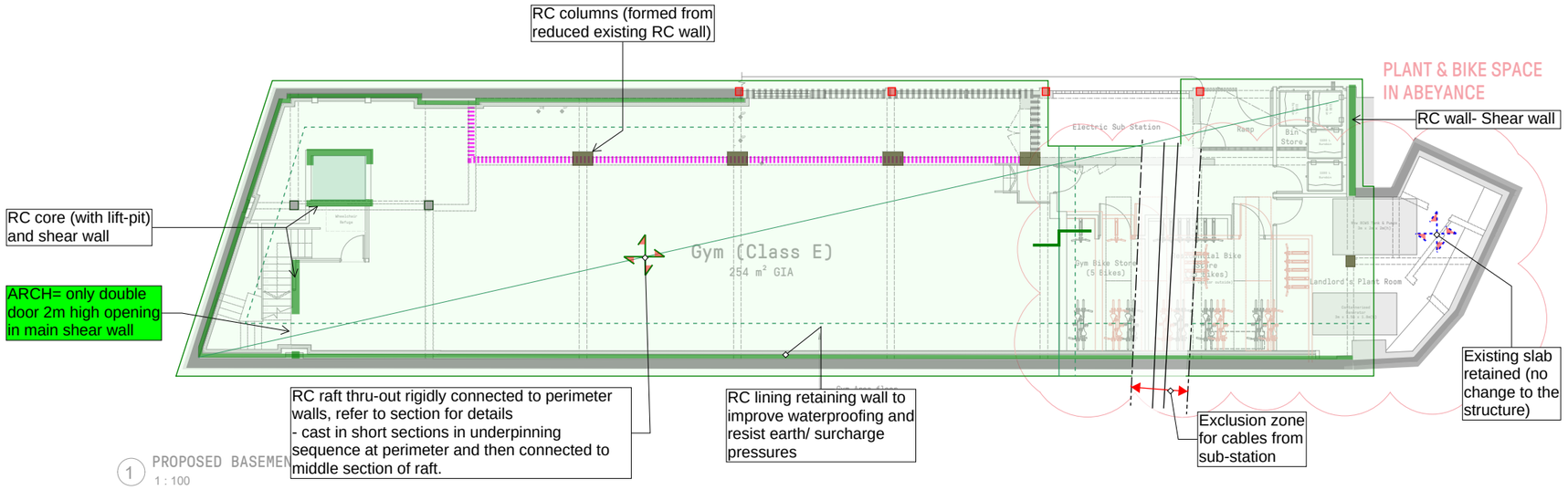
8.0 MATERIALS

8.1 Material Grades

MATERIAL	GRADE
Mass concrete	C20/25; FND2-4
Reinforced Concrete elements including Columns, Floor slabs, beams and all other RC elements	RC32/40
Reinforcement	fy = 500N/mm2 to BS4449
Basement lining walls and rafts	RC32/40; DC-3
Structural steelwork	Grade S355
Structural timber	C24

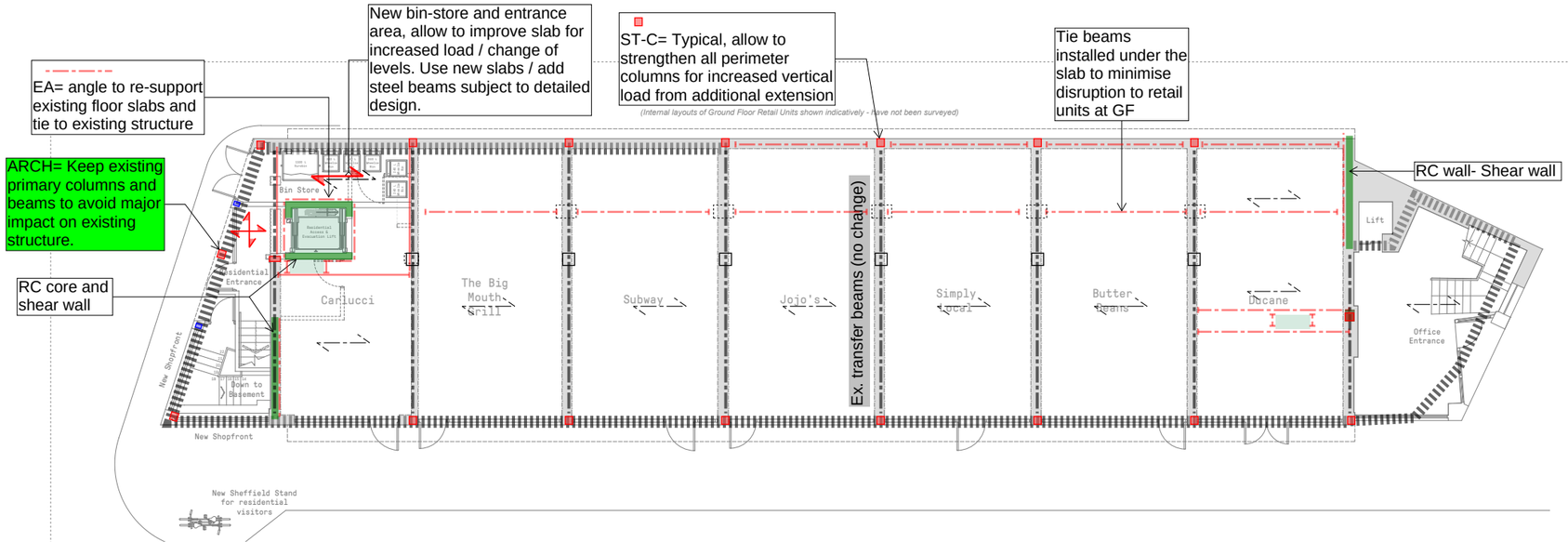
APPENDIX A

SCHEME DRAWINGS



1 PROPOSED BASEMEN
1 : 100

BASEMENT FLOOR PLAN



GROUND FLOOR PLAN

2 PROPOSED GROUND FLOOR PLAN
1 : 100

NOTES:

1. If in doubt please ask.

2. Do not scale this drawing.

3. This drawing is to be read in conjunction with all Engineer's, Architect's or other relevant drawings and specifications.Any discrepancy is to be reported to the engineer immediately.

4. The contractor must ensure and will be held responsible for the overall stability of the building/structure/excavation at all stages of the work.

5. All existing details shown are based on limited opening up. Assumptions have been made regarding existing construction. Framing and spans of existing slab joist and walls to be confirmed on site.

6. To be Read with General Notes DR- S-0001.

Please Note:
Electronic Design Information can be intentionally or unintentionally modified. It is a misconception that Electronic Design Information is by default accurate. Any modification or reuse of the Electronic Design Information issued herewith that results in erroneous setting-out and/or any other design, costing, measuring or construction inaccuracy are the responsibility of the recipient of this Electronic Design Information.

DENOTES:

- Span of existing floor structure
- Existing beams/frames
- Span of new floor/roof structure
- New Steel columns
- Columns under
- New Primary steel frames
- New Secondary steel beams
- New RC concrete structure

THIS IS A PROPOSED WORKS DRAWING TO SUIT PLANNING CONDITIONS AND IS SUBJECT TO FULL DETAIL DESIGN AND STRUCTURAL CALCULATIONS

ALL STEELWORK IN CONTACT WITH EXISTING MASONRY TO BE PROTECTED WITH FOSROC GALVAFROID

FINISHES AND WATERPROOFING BY OTHERS

TEMPORARY WORKS TO CONTRACTORS DESIGN AND DETAILS, OUTLINE SEQUENCE IS NOTED ON SK-S-0400

Rev	Date	Amendments	By	Chk'd
P1	05.12.23	Issued for Feasiblity Reporting	RN	AP

PRELIMINARY

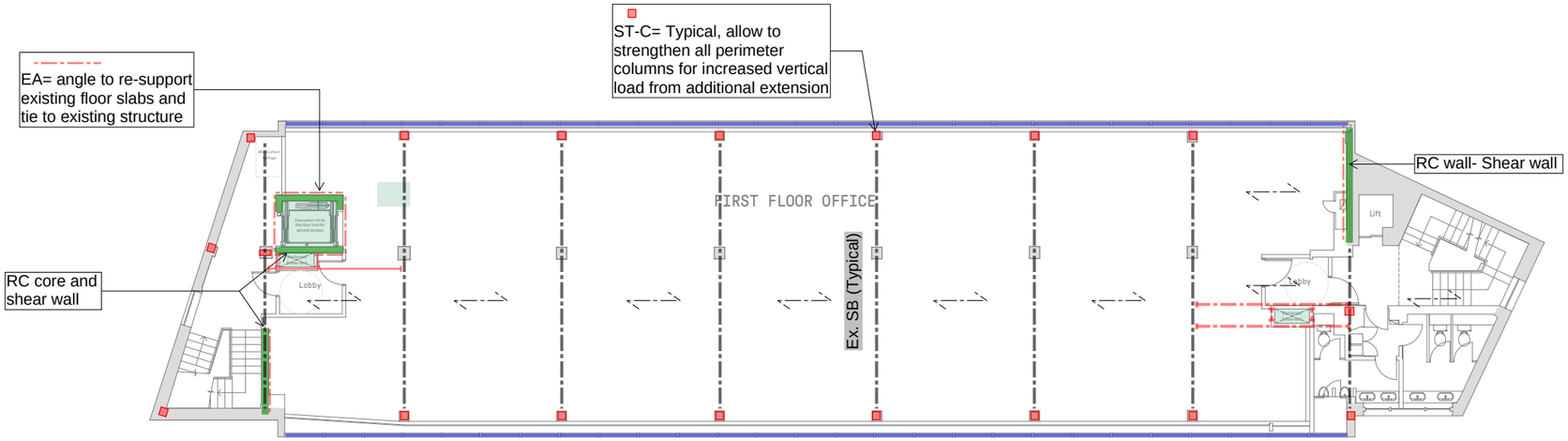
AXIOM STRUCTURES
+44 (0)20 3637 2751
office@axiom-structures.co.uk

Project:
WESTMINSTER HOUSE, RICHMOND, TW9 2ND

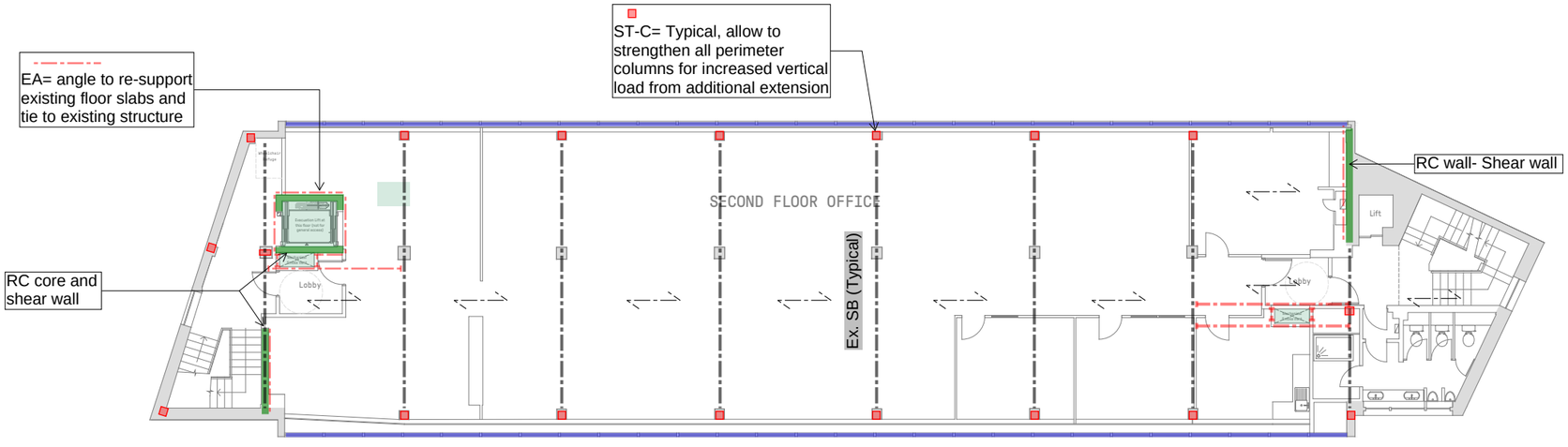
Drawing title:
STRUCTURAL PLANS

Date:	Scale at A1:	Scale at A3:
09/2023	AS SHOWN	/
Drawn by: AS / RN	Designed by: AS/ AP	Chk'd by: AP

Drawing No: **22075-ASL-SK-S-0001** Revision: P1



SECOND FLOOR PLAN



THIRD FLOOR PLAN

NOTES:

1. If in doubt please ask.

2. Do not scale this drawing.

3. This drawing is to be read in conjunction with all Engineer's, Architect's or other relevant drawings and specifications.Any discrepancy is to be reported to the engineer immediately.

4. The contractor must ensure and will be held responsible for the overall stability of the building/structure/excavation at all stages of the work.

5. All existing details shown are based on limited opening up. Assumptions have been made regarding existing construction. Framing and spans of existing slab joist and walls to be confirmed on site.

6. To be Read with General Notes DR- S-0001.

Please Note:
Electronic Design Information can be intentionally or unintentionally modified. It is a misconception that Electronic Design Information is by default accurate. Any modification or reuse of the Electronic Design Information issued herewith that results in erroneous setting-out and/or any other design, costing, measuring or construction inaccuracy are the responsibility of the recipient of this Electronic Design Information.

THIS IS A PROPOSED WORKS DRAWING TO SUIT PLANNING CONDITIONS AND IS SUBJECT TO FULL DETAIL DESIGN AND STRUCTURAL CALCULATIONS

ALL STEELWORK IN CONTACT WITH EXISTING MASONRY TO BE PROTECTED WITH FOSROC GALVAFROID

FINISHES AND WATERPROOFING BY OTHERS

TEMPORARY WORKS TO CONTRACTORS DESIGN AND DETAILS, OUTLINE SEQUENCE IS NOTED ON SK-S-0400

Rev	Date	Amendments	By	Chk'd
P1	05.12.23	Issued for Feasiblity Reporting	RN	AP

PRELIMINARY

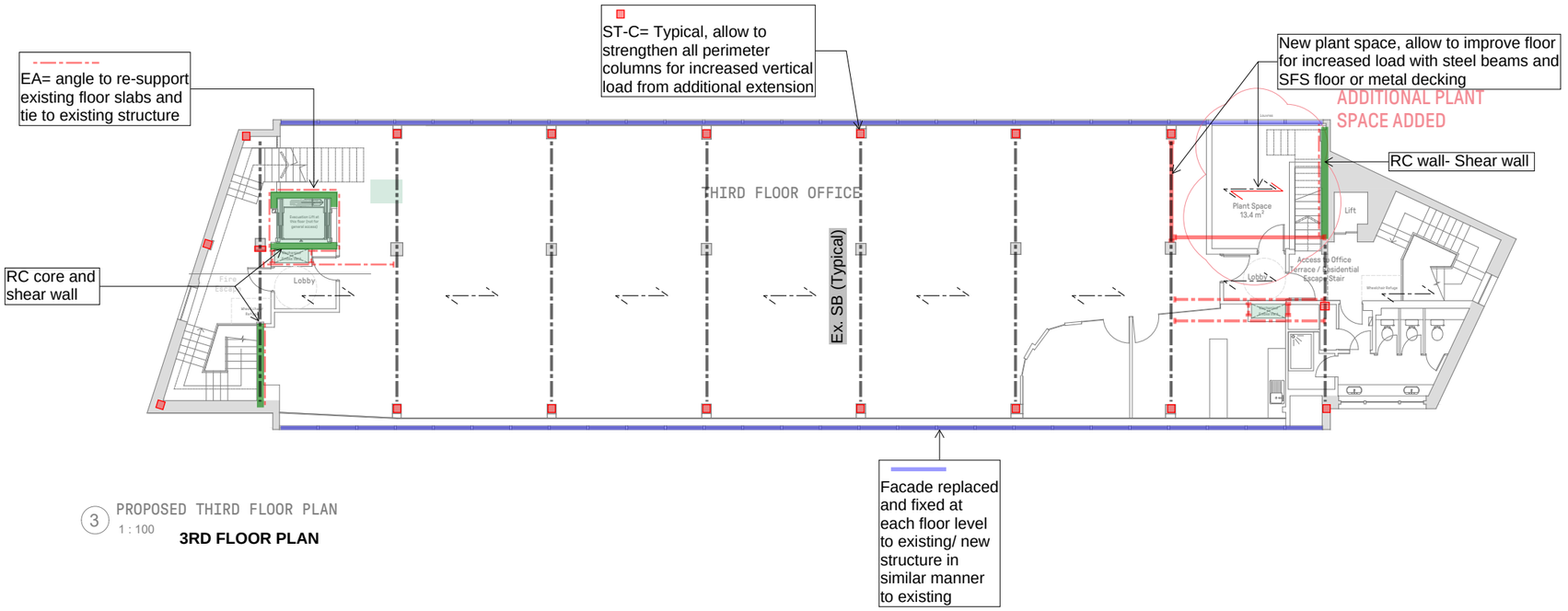
AXIOM STRUCTURES
+44 (0)20 3637 2751
office@axiom-structures.co.uk

Project:
WESTMINSTER HOUSE, RICHMOND, TW9 2ND

Drawing title:
STRUCTURAL PLANS

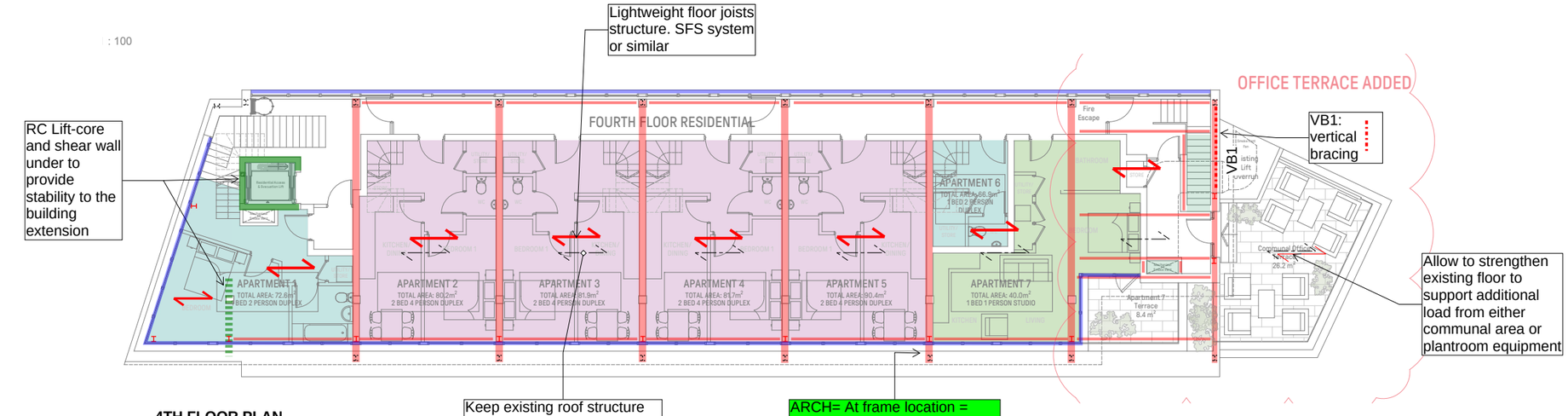
Date:	Scale at A1:	Scale at A3:
09/2023	AS SHOWN	/
Drawn by: AS / RN	Designed by: AS/ AP	Chk'd by: AP

Drawing No: **22075-ASL-SK-S-0002** Revision: P1

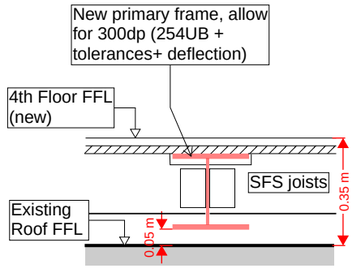


3 PROPOSED THIRD FLOOR PLAN
1 : 100

3RD FLOOR PLAN



4TH FLOOR PLAN



TYPICAL NEW 4TH FLOOR DETAIL

NOTES:

1. If in doubt please ask.

2. Do not scale this drawing.

3. This drawing is to be read in conjunction with all Engineer's, Architect's or other relevant drawings and specifications.Any discrepancy is to be reported to the engineer immediately.

4. The contractor must ensure and will be held responsible for the overall stability of the building/structure/excavation at all stages of the work.

5. All existing details shown are based on limited opening up. Assumptions have been made regarding existing construction. Framing and spans of existing slab joist and walls to be confirmed on site.

6. To be Read with General Notes DR- S-0001.

Please Note:
Electronic Design Information can be intentionally or unintentionally modified. It is a misconception that Electronic Design Information is by default accurate. Any modification or reuse of the Electronic Design Information issued herewith that results in erroneous setting-out and/or any other design, costing, measuring or construction inaccuracy are the responsibility of the recipient of this Electronic Design Information.

THIS IS A PROPOSED WORKS DRAWING TO SUIT PLANNING CONDITIONS AND IS SUBJECT TO FULL DETAIL DESIGN AND STRUCTURAL CALCULATIONS

ALL STEELWORK IN CONTACT WITH EXISTING MASONRY TO BE PROTECTED WITH FOSROC GALVAFROID

FINISHES AND WATERPROOFING BY OTHERS

TEMPORARY WORKS TO CONTRACTORS DESIGN AND DETAILS, OUTLINE SEQUENCE IS NOTED ON SK-S-0400

Rev	Date	Amendments	By	Chk'd
P1	05.12.23	Issued for Feasiblity Reporting	RN	AP

PRELIMINARY

AXIOM STRUCTURES
+44 (0)20 3637 2751
office@axiom-structures.co.uk

Project:
WESTMINSTER HOUSE, RICHMOND, TW9 2ND

Drawing title:
STRUCTURAL PLANS

Date:	Scale at A1:	Scale at A3:
09/2023	AS SHOWN	/
Drawn by: AS / RN	Designed by: AS/ AP	Chk'd by: AP

Drawing No: **22075-ASL-SK-S-0003** Revision: P1

NOTES:

1. If in doubt please ask.

2. Do not scale this drawing.

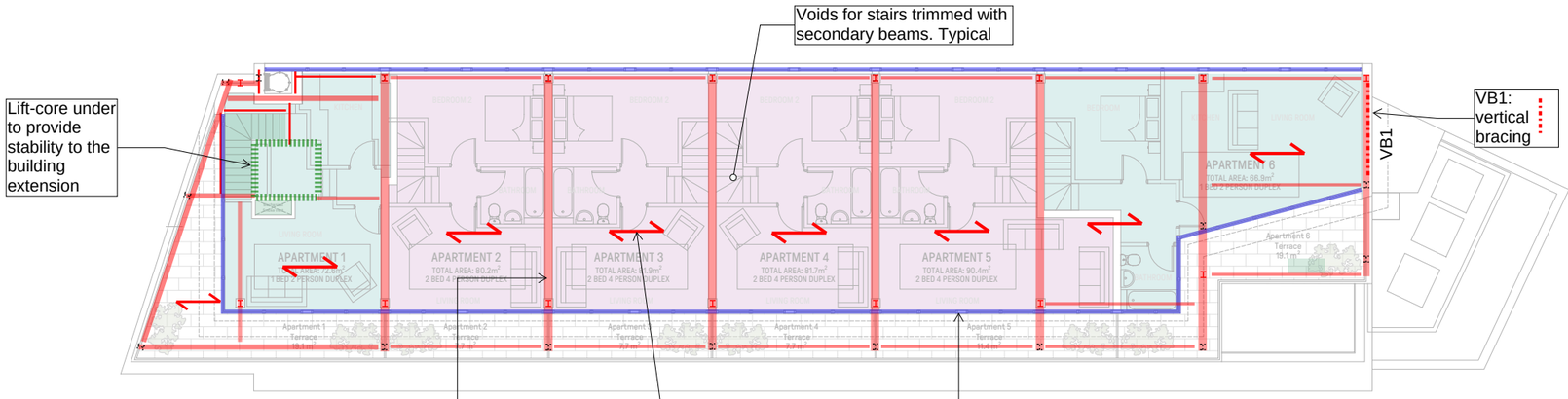
3. This drawing is to be read in conjunction with all Engineer's, Architect's or other relevant drawings and specifications.Any discrepancy is to be reported to the engineer immediately.

4. The contractor must ensure and will be held responsible for the overall stability of the building/structure/excavation at all stages of the work.

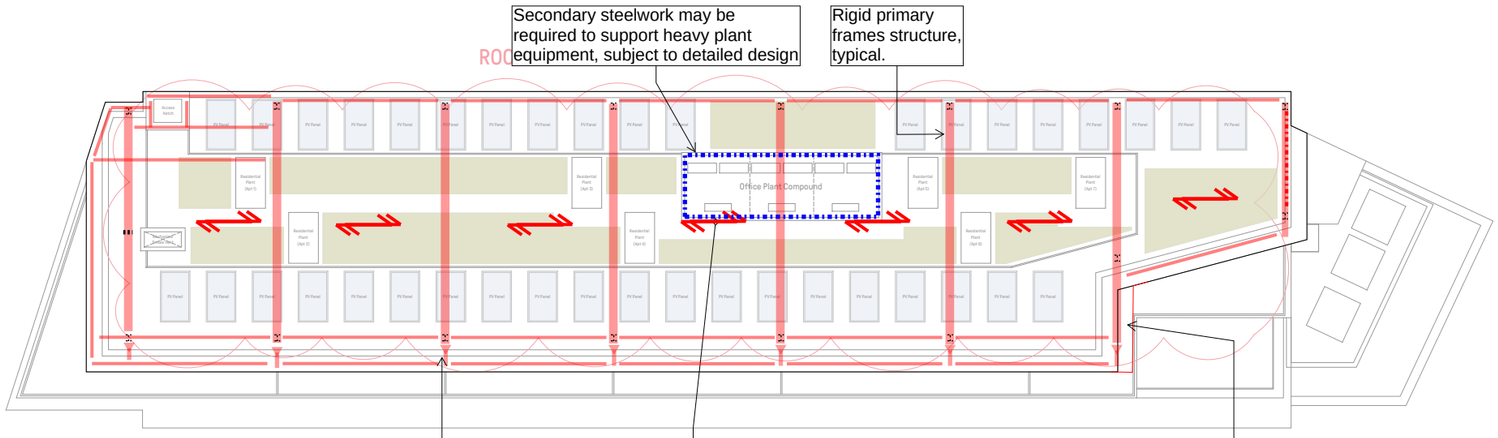
5. All existing details shown are based on limited opening up. Assumptions have been made regarding existing construction. Framing and spans of existing slab joist and walls to be confirmed on site.

6. To be Read with General Notes DR- S-0001.

Please Note:
Electronic Design Information can be intentionally or unintentionally modified. It is a misconception that Electronic Design Information is by default accurate. Any modification or reuse of the Electronic Design Information issued herewith that results in erroneous setting-out and/or any other design, costing, measuring or construction inaccuracy are the responsibility of the recipient of this Electronic Design Information.



FIFTH FLOOR PLAN



ROOF FLOOR PLAN

3 PROPOSED ROOF PLAN

THIS IS A PROPOSED WORKS DRAWING TO SUIT PLANNING CONDITIONS AND IS SUBJECT TO FULL DETAIL DESIGN AND STRUCTURAL CALCULATIONS

ALL STEELWORK IN CONTACT WITH EXISTING MASONRY TO BE PROTECTED WITH FOSROC GALVAFROID

FINISHES AND WATERPROOFING BY OTHERS

TEMPORARY WORKS TO CONTRACTORS DESIGN AND DETAILS, OUTLINE SEQUENCE IS NOTED ON SK-S-0400

Rev	Date	Amendments	By	Chk'd
P1	05.12.23	Issued for Feasibility Reporting	RN	AP

PRELIMINARY

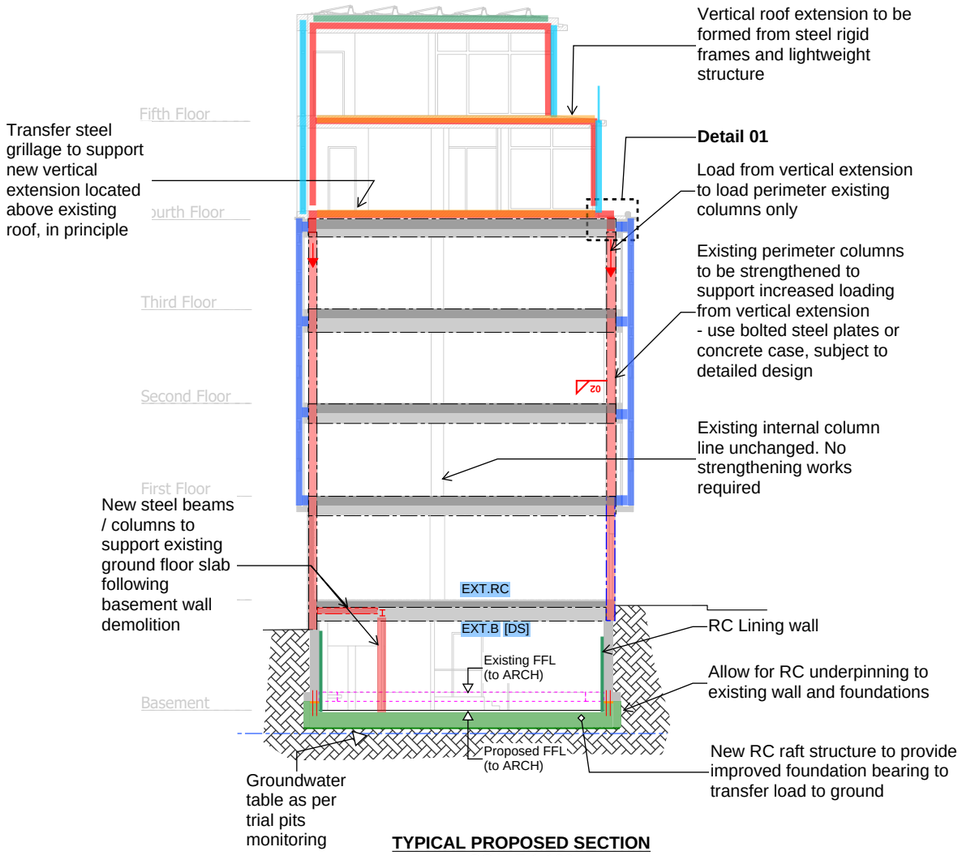
AXIOM STRUCTURES
+44 (0)20 3637 2751
office@axiom-structures.co.uk

Project:
WESTMINSTER HOUSE, RICHMOND, TW9 2ND

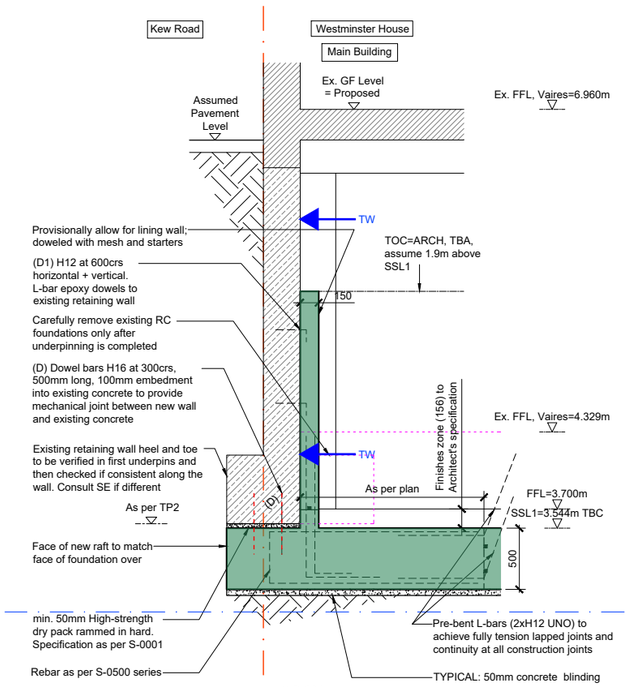
Drawing title:
STRUCTURAL PLANS

Date:	Scale at A1:	Scale at A3:
09/2023	AS SHOWN	/
Drawn by: AS / RN	Designed by: AS/ AP	Chk'd by: AP

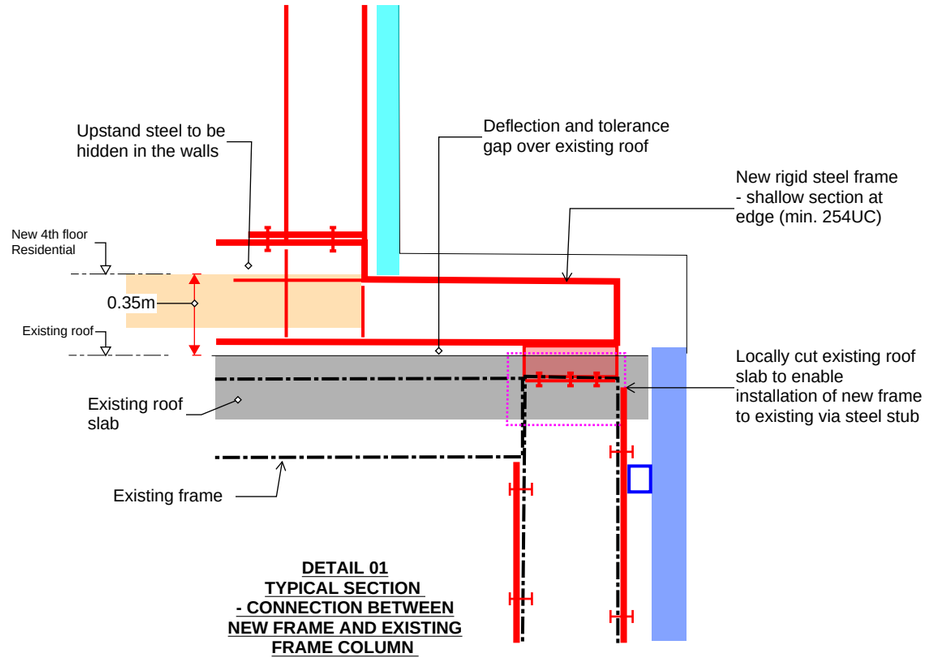
Drawing No: **22075-ASL-SK-S-0004** Revision: P1



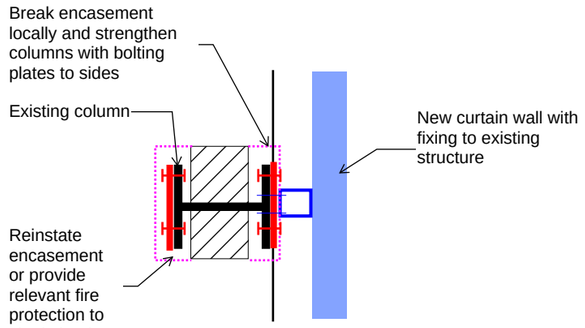
TYPICAL PROPOSED SECTION
SCALE 1:100



TYPICAL PROPOSED SECTION - BASEMENT
SCALE 1:25



DETAIL 01
TYPICAL SECTION
- CONNECTION BETWEEN NEW FRAME AND EXISTING FRAME COLUMN
SCALE 1:10



DETAIL 02
TYPICAL PLAN -
STRENTHENING TO EXISTING INTERMEDIATE COLUMN
SCALE 1:10

NOTES:

1. If in doubt please ask.

2. Do not scale this drawing.

3. This drawing is to be read in conjunction with all Engineer's, Architect's or other relevant drawings and specifications.Any discrepancy is to be reported to the engineer immediately.

4. The contractor must ensure and will be held responsible for the overall stability of the building/structure/excavation at all stages of the work.

5. All existing details shown are based on limited opening up. Assumptions have been made regarding existing construction. Framing and spans of existing slab joist and walls to be confirmed on site.

6. To be Read with General Notes DR- S-0001.

Please Note:
Electronic Design Information can be intentionally or unintentionally modified. It is a misconception that Electronic Design Information is by default accurate. Any modification or reuse of the Electronic Design Information issued herewith that results in erroneous setting-out and/or any other design, costing, measuring or construction inaccuracy are the responsibility of the recipient of this Electronic Design Information.

THIS IS A PROPOSED WORKS DRAWING TO SUIT PLANNING CONDITIONS AND IS SUBJECT TO FULL DETAIL DESIGN AND STRUCTURAL CALCULATIONS

ALL STEELWORK IN CONTACT WITH EXISTING MASONRY TO BE PROTECTED WITH FOSROC GALVAFROID

FINISHES AND WATERPROOFING BY OTHERS

TEMPORARY WORKS TO CONTRACTORS DESIGN AND DETAILS, OUTLINE SEQUENCE IS NOTED ON SK-S-0400

Rev	Date	Amendments	By	Chk'd
P1	05.12.23	Issued for Feasibility Reporting	RN	AP

PRELIMINARY

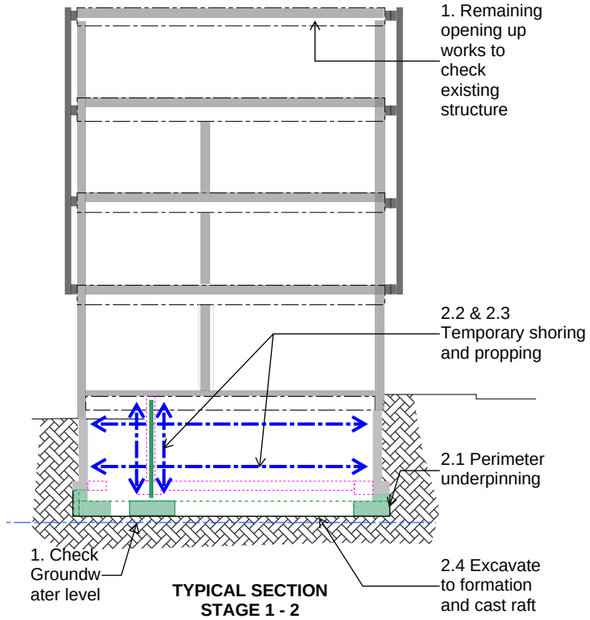
AXIOM STRUCTURES
+44 (0)20 3637 2751
office@axiom-structures.co.uk

Project:
WESTMINSTER HOUSE, RICHMOND, TW9 2ND

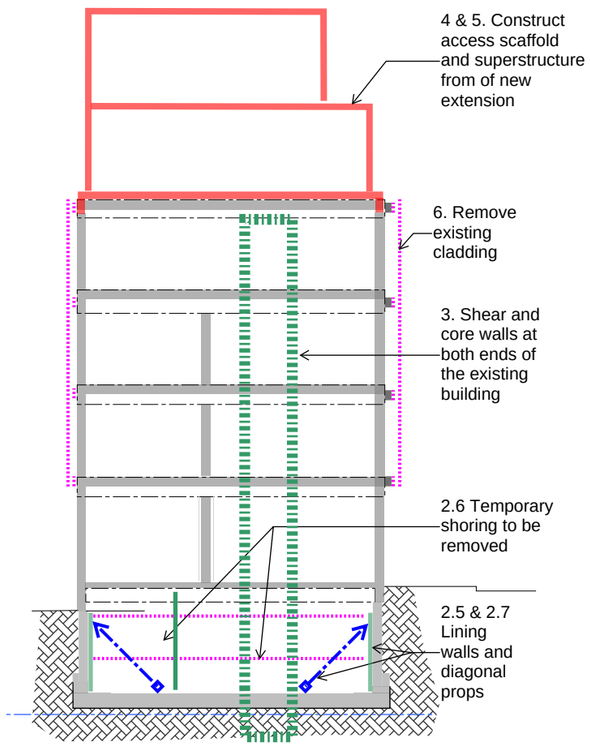
Drawing title:
SECTIONS AND DETAILS

Date:	Scale at A1:	Scale at A3:
09/2023	AS SHOWN	/
Drawn by:	Designed by:	Chk'd by:
AS / RN	AS/ AP	AP

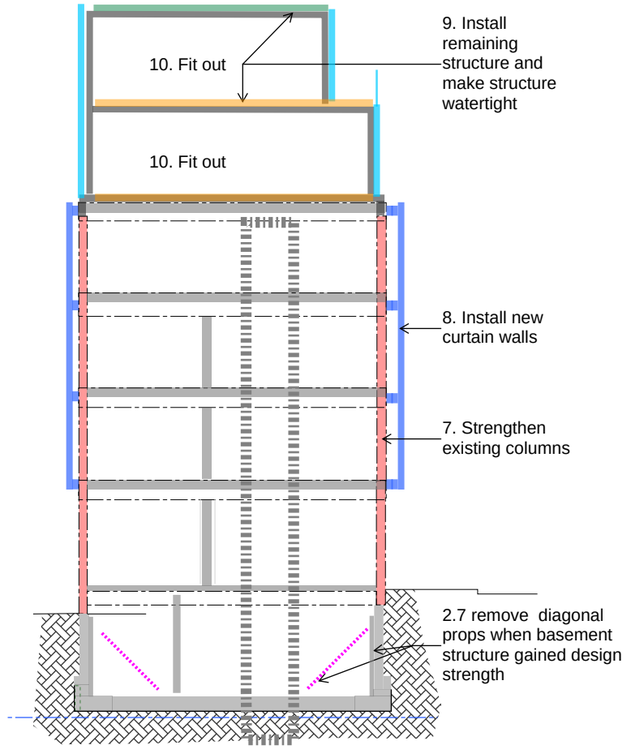
Drawing No: **22075-ASL-SK-S-0020** Revision: P1



TYPICAL SECTION
STAGE 1 - 2



TYPICAL SECTION
STAGE 2.6 - 6



TYPICAL SECTION
STAGE 7 - 10

PROPOSED SEQUENCE OF WORKS

1. Site set up and further investigation works to confirm existing structure.

2. Basement Works - underpin the walls, cast raft and retaining walls

2.1 Carry out perimeter underpinning in localised shafts

2.2 Install temporary works to enable construction of localised bases and cast bases
- consider use of hydraulic jacking to preload the soil before load is applied to TW foundations or permanent foundations. Subject to detailed design.

2.3 Install temporary cross shoring

2.4 Excavate to formation of the basement, install below ground drainage and cast raft

2.5 Install lining walls and back prop with diagonal push pull props

2.6 Release cross shores, temporary works coordinator to issue permit to load.

2.7 Release diagonal props only when permanent structure gained design strength

3. Construct shear and core walls to intermediate floors (up to underside of the 4th floor level).

4. Install access scaffold for construction of vertical extension.

5. Construct shell and core of vertical extension (steel frame, lightweight floors and potentially external cladding- tbc subject to loadings) and tie to as built shear and core walls for lateral stability. Internal finishes and imposed loads will not be applied until existing perimeter columns are strengthened.

6. Remove existing cladding and repair slab edges as required.

7. Strengthen existing columns from the outside where possible

8. Install new curtain walls

9. Install roof structure and remaining floors and make the structure watertight and remove protecting scaffolding.

10. Fit out works to the top floors and completion

THIS IS A PROPOSED WORKS DRAWING TO SUIT PLANNING CONDITIONS AND IS SUBJECT TO FULL DETAIL DESIGN AND STRUCTURAL CALCULATIONS

ALL STEELWORK IN CONTACT WITH EXISTING MASONRY TO BE PROTECTED WITH FOSROC GALVAFROID

FINISHES AND WATERPROOFING BY OTHERS

TEMPORARY WORKS TO CONTRACTORS DESIGN AND DETAILS, OUTLINE SEQUENCE IS NOTED ON SK-S-0400

Rev	Date	Amendments	By	Chk'd
P1	05.12.23	Issued for Feasiblity Reporting	RN	AP

PRELIMINARY

AXIOM STRUCTURES
+44 (0)20 3637 2751
office@axiom-structures.co.uk

Project:
WESTMINSTER HOUSE, RICHMOND, TW9 2ND

Drawing title:
TEMPORARY WORKS

Date:	Scale at A1:	Scale at A3:
09/2023	AS SHOWN	/
Drawn by:	**Designed by:**	**Chk'd by:**
AS / RN	AS/ AP	AP

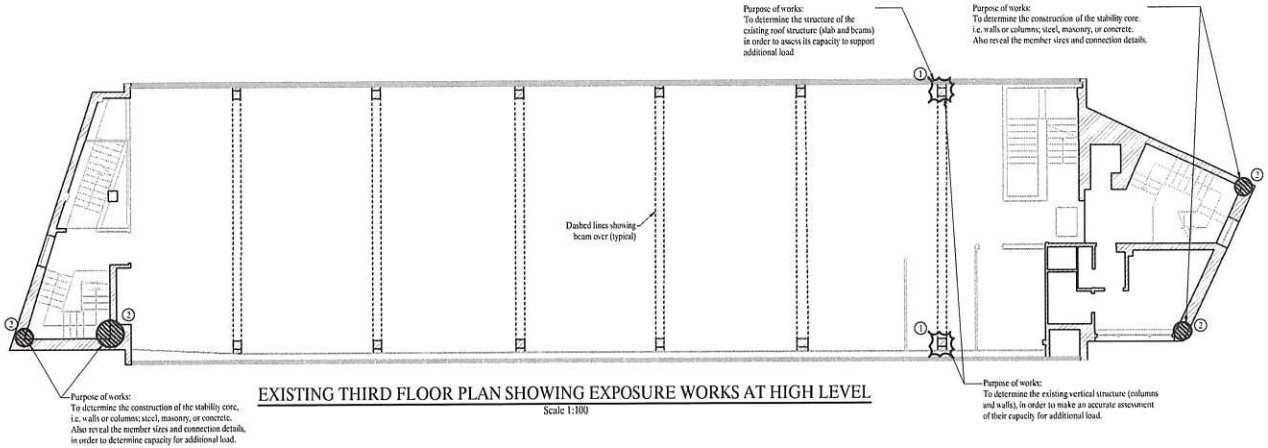
Drawing No: **22075-ASL-SK-S-0400** Revision: P1

APPENDIX B

SCHEME CALCULATIONS

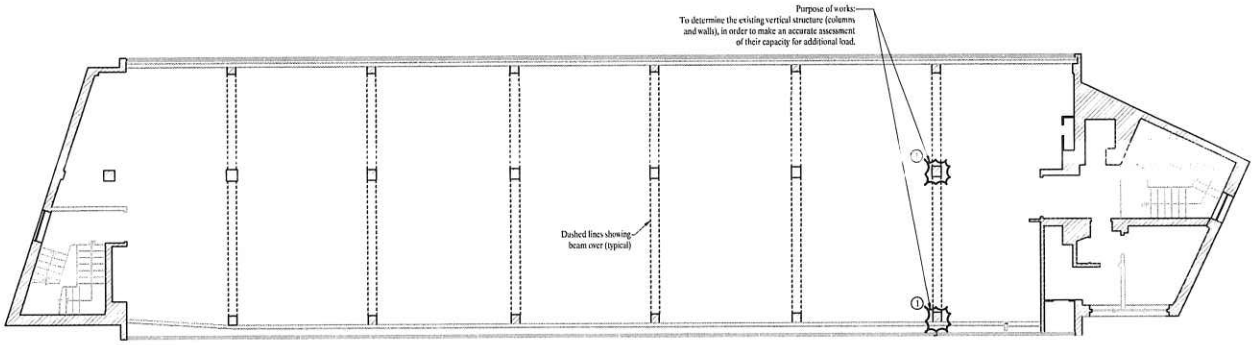
APPENDIX C

EXTRACTS FROM
STRUCTURAL AND GROUND INVESTIGATION SURVEYS



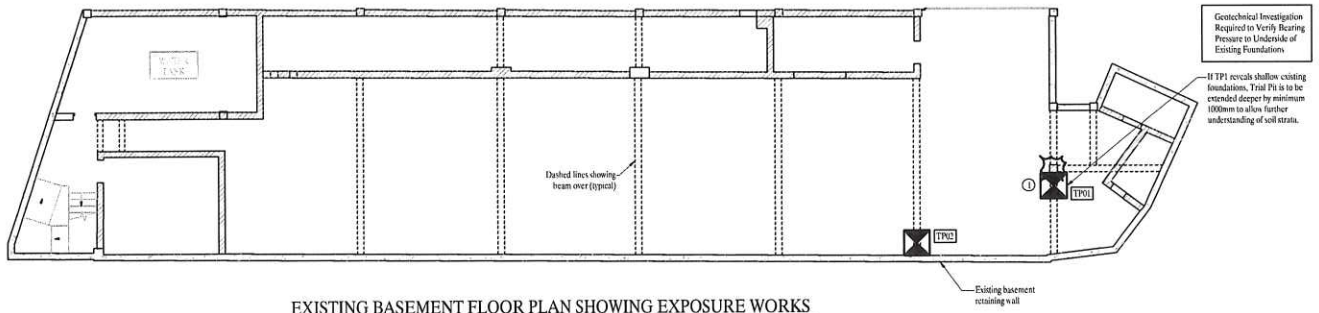
EXISTING THIRD FLOOR PLAN SHOWING EXPOSURE WORKS AT HIGH LEVEL

Scale 1:100



EXISTING FIRST FLOOR PLAN SHOWING EXPOSURE WORKS AT HIGH LEVEL

Scale 1:100



EXISTING BASEMENT FLOOR PLAN SHOWING EXPOSURE WORKS

Scale 1:100

EXPOSURE WORKS NOTES

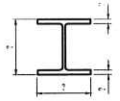
NB: Exact locations of exposure works are subject to site access and client agreement.
Pending results of these investigations, further exposure works may be required.
All exposure works are to comply with contractor's temporary works and method statement.
All exposure works are to made good by contractor at completion of the project.

1. EXISTING COLUMNS - Size and construction of existing columns TBC.
Drill Ø15mm trial hole through column in both directions, to confirm if column is reinforced concrete or steel encased in concrete.
If steel, expose steel size (depth, width, and thickness) and full connection details to beam at high level.
If concrete, expose reinforcement (locally scabble back 200mm long x full width of column on two adjacent sides at high level)

2. EXISTING WALLS - Thickness and construction of existing walls TBC.
Remove finishes and expose both faces of wall.
Core through wall (say Ø100mm hole) to determine thickness and structure.
In addition to above, further remove finishes to expose structure and confirm if there is also a column encased within the wall.
If the exposure works reveal a column, then proceed with works as per Item 1 above.

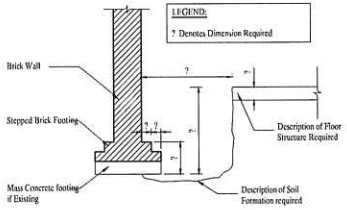
3. EXISTING SLABS - Thickness and construction of existing slab over TBC. Core holes to be set out to avoid beams and ribs.
Remove finishes of floor above & ceiling under to expose structural slab, typical.
3.a. In addition to above, core through carefully from underside (Ø50mm core if precast, Ø100mm core if traditional - confirm with Engineer if unsure) to reveal thickness and structure of slab.
3.b. In addition to all above, scabble back locally (Say 500 x 500 area) to reveal 3 bars of bottom reinforcement in both directions, so that the capacity of the slab can be determined.

4. EXISTING DOWNSTAND BEAMS - Size and construction of existing downstand beams over TBC.
Remove any ceiling/finishes to expose underside of downstand beams over.
Drill Ø15mm trial hole through beam in both directions to confirm if it is reinforced concrete or steel encased in concrete.
If steel, expose steel size (depth, width and thickness) and full connection details to beam at high level.
If concrete, expose bottom reinforcement (locally scabble back 200mm long x full width of beam).



DIMENSIONS REQUIRED FOR STEEL BEAM/COLUMN

Scale 1:10



TYPICAL TRIAL PIT SECTION

Scale 1:20

1 General
All Structural Engineering drawings are to be read with the specification and with all relevant Architects drawings and specifications.

Do not scale from any Structural Engineers drawing. All dimensions are in millimetres and levels in metres.

All waterproofing (DPM & DPC) work to Architects details.

All fire protection works to Architects details unless specifically noted otherwise.

Abbreviations:-
SSL - Structural slab level FFL - Finished floor level
TBC - To be confirmed

The Contractor is responsible for the design, installation and maintenance of all necessary temporary works to ensure the strength and stability of the building throughout the course of the works. Drawings and calculations detailing all temporary works shall be submitted to the Engineer for comment prior to commencement of the works.

The existing structural information shown on these drawings is based on visual inspection of the building and upon limited opening up works. All details of the existing construction are subject to confirmation by the Contractor during the works on site.

2 Steel
All steelwork to be grade S275 to BS EN 10025. (UNO)

The steel structure is execution Class 2 (EXC2). It is highly recommend that the Steel Contractor(s) / Fabricator(s) appointed for the project are members of the BCSA. Otherwise, the Main Contractor or Client should complete the detailed design for those elements shown on the design drawings and produce co-ordinated drawings showing all connection details etc.

The steelwork fabricator shall produce and submit two copies of dimensioned fabrication drawings to the Engineer for comment. The Engineer requires ten working days to return and comment.

All bolted connections are to include a minimum of two M16 bolts per member unless specifically indicated otherwise on details. All connection details to be designed by Contractor.

All bolts are to be grade 8.8 shreadded to
BS 4921, class1. All bolts, nuts and washers are to be to BS 5950: Part 2 clause 2.2. Washers are to be placed beneath rotated item.

All welds to be minimum 6mm leg length continuous fillet welds unless specifically noted otherwise.

All steelwork coatings to be as specification and below. Coatings to be provided by Sherwin Williams Protective & Marine Coatings or similar approved. All coatings to be light grey in colour; red oxide is NOT to be used.

LOCATION	CATEGORY	PAINT SYSTEM
Internal dampin-kiss	C2 - Low	C60O/3 Every Zinc Phosphate coating (125 microns DFT) - Functional
Internal dry	C1 - Very Low	C60O/3 Every Zinc Phosphate coating (75 microns DFT) - Functional
External	[illegible]	[illegible]

3 Concrete
Concrete to be in accordance with BS. 8328 and as follows :
Blinding - C20
Mass concrete - C20
Reinforced concrete - C28/35

4 Masonry
All loadbearing blockwork to have a minimum characteristic strength of 2.5N/mm². All loadbearing brickwork is to have a minimum characteristic strength of 20N/mm².

5 Timber
All timber members to be grade C16 to BS. 5268 unless noted otherwise. Timber to be pressure impregnated with preservative and cut ends brush treated.

6 Padstones
All padstones to be concrete, min grade C16/20 using max 20 mm aggregate. Nominal size to be 440 long x 215 dp x width of wall, unless noted otherwise. All steel beams supported on padstones to bolted to padstones with min 2 No. Hilti M10 HY 200 with HAS rod anchors, (O.S.A.)

Rev.	Date	Drawn	Amendment
B	15.01.16	JC	Exposure works updated
A	06.10.15	IZ	Preliminary Issue
-	02.10.15	IZ	Preliminary Issue

PRINGUER-JAMES
CONSULTING ENGINEERS
10 Beulah Road, Wimbledon, LONDON, SW19 3SB
Phone: 020 8940 4159
Email : mail@pjce.com Website : www.pjce.com

THAMESIS ASSET MANAGEMENT

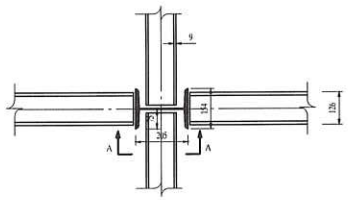
WESTMINSTER HOUSE, KEW ROAD
RICHMOND, LONDON TW9

EXISTING FLOOR PLANS
SHOWING EXPOSURE WORKS

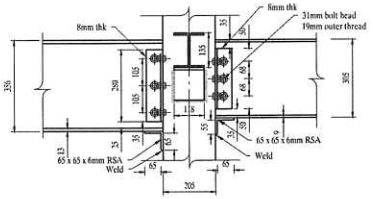
Status : INFORMATION

Scales: AS SHOWN @A1			Date: OCT 2015
Drawn: IZ	Engineer: BB		Checked: SPJ
Drawing No. L1739-01-01			Revision B

LOCATION 1 - LEVEL 1
Scale 1:10

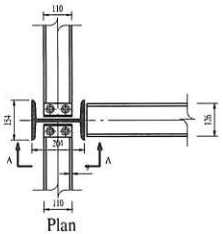


Plan

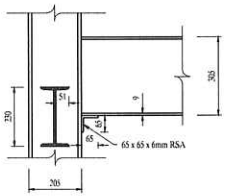


Section A - A

LOCATION 2 - LEVEL 1
Scale 1:10

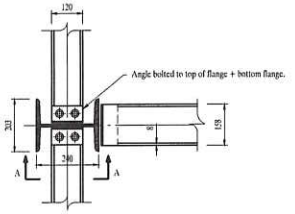


Plan

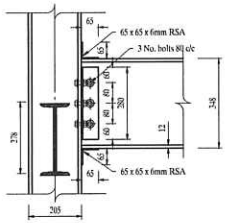


Section A - A

LOCATION 3 - LEVEL 3
Scale 1:10

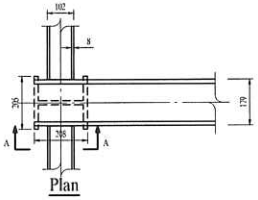


Plan

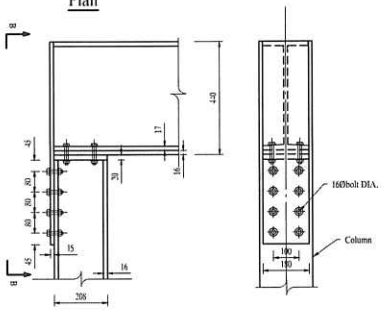


Section A - A

LOCATION 4 - LEVEL 3
Scale 1:10

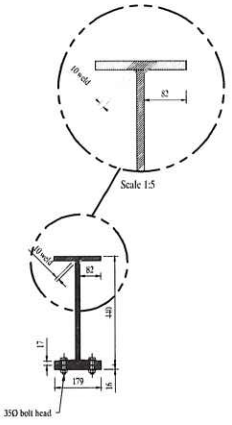


Plan

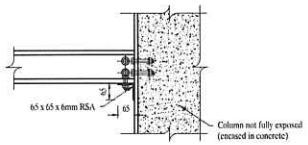


Section A - A

Section B - B

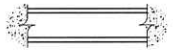


LOCATION 5 - LEVEL 3
Scale 1:10



Section

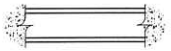
LOCATION 6 - LEVEL 3
Scale 1:10



Section

Note:
Beam / Column connection not fully exposed (encased in concrete)

LOCATION 7 - LEVEL 3
Scale 1:10



Section

Note:
Beam / Column connection not fully exposed (encased in concrete)

1 General
All Structural Engineering drawings are to be read with the specification and with all relevant Architects drawings and specifications.

Do not scale from any Structural Engineers drawing. All dimensions are in millimetres and levels in metres.

All waterproofing (DPM & DPC) works to Architects details.

All fire protection works to Architects details unless specifically noted otherwise.

Abbreviations-
SSL - Structural slab level
FFL - Finished floor level
TBC - To be confirmed

The Contractor is responsible for the design, installation and maintenance of all necessary temporary works to ensure the strength and stability of the building throughout the course of the works. Drawings and calculations detailing all temporary works shall be submitted to the Engineer for comment prior to commencement of the works.

The existing structural information shown on these drawings is based on visual inspection of the building and upon limited opening up works. All details of the existing construction are subject to confirmation by the Contractor during the works on site.

2 Steel
All steelwork to be grade S275 to BS EN 10025. (UNO)

The steel structure is execution Class 2 (EXC2). It is highly recommend that the Steel Contractor(s) / Fabricator(s) appointed for the project are members of the BCSA. Otherwise, the Main Contractor or Client should complete the detailed design for those elements shown on the design drawings and produce co-ordinated drawings showing all connection details etc.

The steelwork fabricator shall produce and submit two copies of dimensioned fabrication drawings to the Engineer for comment. The Engineer requires ten working days to return and comment.

All bolted connections are to include a minimum of two M16 bolts per member unless specifically indicated otherwise on details. All connection details to be designed by Contractor.

All bolts are to be grade 8.8 sheradized to
BS 3921, class1. All bolts, nuts and washers are to be to BS 5950: Part 2 clause 2.2. Washers are to be plated beneath rotated item.

All welds to be minimum 6mm leg length continuous fillet welds unless specifically noted otherwise.

All steelwork coatings to be as specification and below. Coatings to be provided by Sherwin Williams Protective & Marine Coatings or similar approved. All coatings to be light grey in colour; red oxide is NOT to be used.

LOCATION	CATEGORY	PAINT SYSTEM
Internal damp cavities	C2 - Low	Ref(03 Frany Zinc Phosphate coating (125 microns DFT) - Functional
[illegible]	[illegible]	[illegible]
[illegible]	C4 - High	Galvanized in accordance with BS EN ISO 1461 to achieve a minimum mean coating thickness of 140 microns

3 Concrete
Concrete to be in accordance with BS 5328 and as follows :
Blinding - C20
Mass concrete - C20
Reinforced concrete - C28/35

4 Masonry
All loadbearing blockwork to have a minimum characteristic strength of 7.2N/mm². All loadbearing brickwork is to have a minimum characteristic strength of 20N/mm².

5 Timber
All timber members to be grade C16 to BS. 5268 unless noted otherwise. Timber to be pressure impregnated with preservative and cut ends brush treated.

6 Padstones
All padstones to be concrete, min grade C16/20 using max 20 mm aggregate. Nominal size to be 440 long x 215 dp x width of wall, unless noted otherwise. All steel beams supported on padstones to bolted to padstones with min 2 No. M16 HY 350 with HAS rod anchors. (G.S.A.)

Rev.	Date	Drawn	Amendment
-	15.01.16	JC	Preliminary Issue

PRINGUER-JAMES
CONSULTING ENGINEERS
10 Beulah Road, Wimbledon, LONDON, SW19 3SB
Phone: 020 8940 4159
Email : mail@pjce.com Website : www.pjce.com

THAMESIS ASSET MANAGEMENT

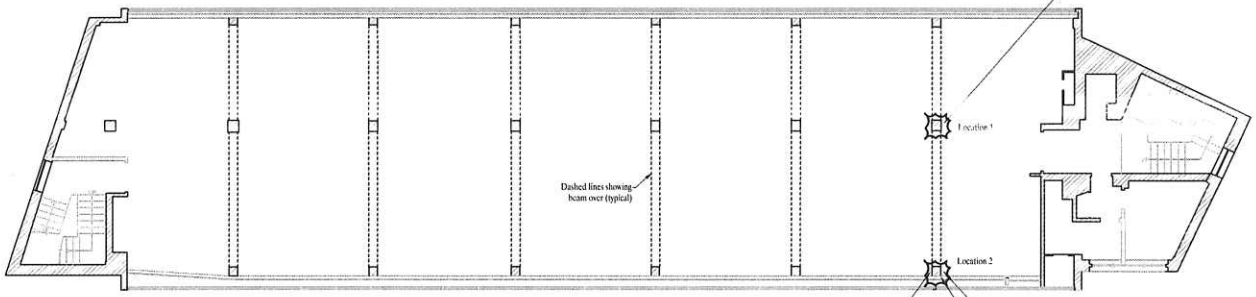
WESTMINSTER HOUSE, KEW ROAD
RICHMOND, LONDON TW9

DETAILS + SECTIONS

Status :	INFORMATION		
Scales:	AS SHOWN @A1	Date:	JAN. 2016
Drawn:	JC	Engineer: CM	Checked: DP
Drawing No.	L1739-01-02	Revision	-

25

Refer to Location 1 on Drawing L1739-05-02



EXISTING FIRST FLOOR PLAN SHOWING EXPOSURE WORKS AT HIGH LEVEL

Scale 1:100

Purpose of works:
To determine the existing vertical structure (columns and walls), in order to make an accurate assessment of their capacity for additional load.

Refer to Location 2 on Drawing L1739-05-02

Refer to Location 2 on Drawing L1739-05-02

1 General
All Structural Engineering drawings are to be read with the specification and with all relevant Architects drawings and specifications.

Do not scale from any Structural Engineers drawing. All dimensions are in millimetres and levels in metres.

All waterproofing (DPM & DPC) works to Architects details.

All fire protection works to Architects details unless specifically noted otherwise.

Abbreviations:-
SSL - Structural slab level
FFL - Finished floor level
TBC - To be confirmed

The Contractor is responsible for the design, installation and maintenance of all necessary temporary works to ensure the strength and stability of the building throughout the course of the works. Drawings and calculations detailing all temporary works shall be submitted to the Engineer for comment prior to commencement of the works.

The existing structural information shown on these drawings is based on visual inspection of the building and upon limited opening up works. All details of the existing construction are subject to confirmation by the Contractor during the works on site.

2 Steel
All steelwork to be grade S275 to BS EN 10025. (UNO)

The steel structure is execution Class 2 (EXC2). It is highly recommend that the Steel Contractor(s) / Fabricator(s) appointed for the project are members of the BCSA. Otherwise, the Main Contractor or Client should complete the detailed design for those elements shown on the design drawings and produce co-ordinated drawings showing all connection details etc.

The steelwork fabricator shall produce and submit two copies of dimensioned fabrication drawings to the Engineer for comment. The Engineer requires ten working days to return and comment.

All bolted connections are to include a minimum of two M16 bolts per member unless specifically indicated otherwise on details. All connection details to be designed by Contractor.

All bolts are to be grade 8.8 sherardized to BS 4921, class1. All bolts, nuts and washers are to be to BS 5950: Part 2 clause 2.2. Washers are to be placed beneath rotated item.

All welds to be minimum 6mm leg length continuous fillet welds unless specifically noted otherwise.

All steelwork coatings to be as specification and below. Coatings to be provided by Sherwin Williams Protective & Marine Coatings or similar approved. All coatings to be light grey in colour; red oxide is NOT to be used.

LOCATION	CATEGORY	PAINT SYSTEM
Internal dampconditios	C2 - Low	CARBO Enviro Zinc Phosphate coating (125 microns DFT) - Functional
Internal [illegible]	[illegible]	CARBO Enviro Zinc Phosphate coating [illegible]
External	C5 - High	Applied in accordance with BS EN ISO 12944 to achieve a minimum total coating thickness of 140 microns

3 Concrete
Concrete to be in accordance with BS. 5328 and as follows :
Blinding - C20
Mass concrete - C20
Reinforced concrete - C28/35

4 Masonry
All loadbearing blockwork to have a minimum characteristic strength of 7.3N/mm². All loadbearing brickwork is to have a minimum characteristic strength of 20N/mm².

5 Timber
All timber members to be grade C16 to BS. 5268 unless noted otherwise. Timber to be pressure impregnated with preservative and cut ends brush treated.

6 Padstones
All padstones to be concrete, min grade C16/20 using max 20 mm aggregate. Nominal size to be 440 long x 215 dp x width of wall, unless noted otherwise. All steel beams supported on padstones to bolted to padstones with min 2 No, Hilti M10 HY 200 with HAS rod anchors. (O.S.A.)

Rev.	Date	Drawn	Amendment
-	15.01.16	JC	Preliminary Issue

PRINGUER-JAMES
CONSULTING ENGINEERS
10 Beulah Road, Wimbledon, LONDON, SW19 3SB
Phone: 020 8940 4159
Email : mail@pjce.com Website : www.pjce.com

THAMESIS ASSET MANAGEMENT

WESTMINSTER HOUSE, KEW ROAD
RICHMOND, LONDON TW9

EXPOSURE WORKS - LEVEL 1
SITE PHOTOGRAPHS

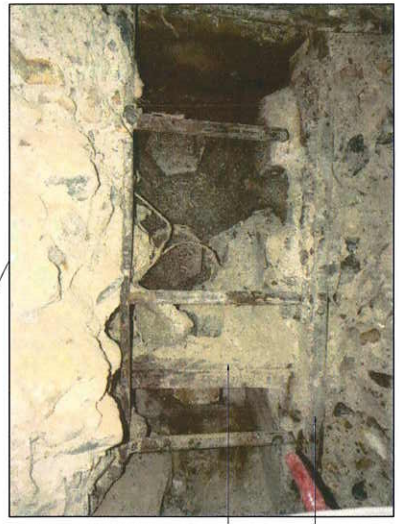
Status :	INFORMATION		
Scales :	AS SHOWN @A1	Date :	JAN. 2016
Drawn :	JC	Engineer : CM	Checked : DP
Drawing No.	L1739-01-03	Revision	-

Refer to Location 3 on Drawing L1739-05-02

Perimeter Beam

Primary Beam with Seating Angle

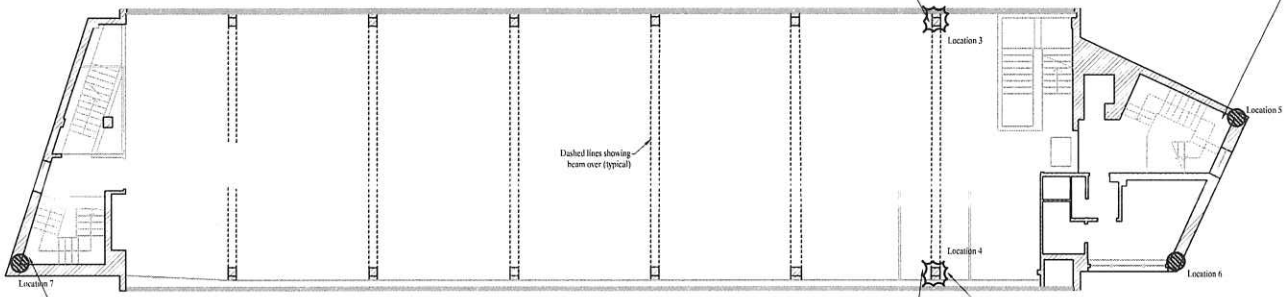
Column



Refer to Location 5 on Drawing L1739-05-02

Flange of Column

Flange of Beam with seating angle



EXISTING THIRD FLOOR PLAN SHOWING EXPOSURE WORKS AT HIGH LEVEL

Scale 1:100

Refer to Location 7 on Drawing L1739-05-02

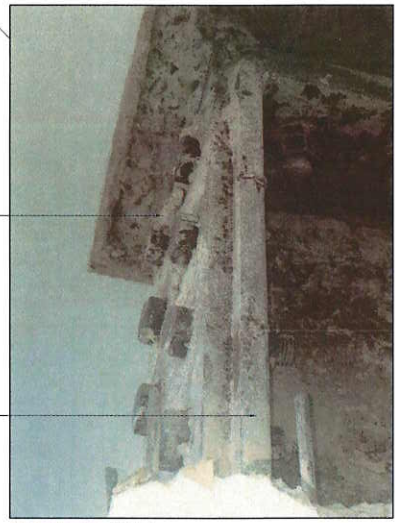
Web of Beam

Flange of Beam

Refer to Location 4 on Drawing L1739-05-02

Back plate of column

Column Flange



Refer to Location 4 on Drawing L1739-05-02

Column Flange

1 General

All Structural Engineering drawings are to be read with the specification and with all relevant Architects drawings and specifications.

Do not scale from any Structural Engineers drawing. All dimensions are in millimetres and levels in metres.

All waterproofing (DPM & DPC) works to Architects details.

All fire protection works to Architects details unless specifically noted otherwise.

Abbreviations:

SSL - Structural slab level FFL - Finished floor level

TBC - To be confirmed

The Contractor is responsible for the design, installation and maintenance of all necessary temporary works to ensure the strength and stability of the building throughout the course of the works. Drawings and calculations detailing all temporary works shall be submitted to the Engineer for comment prior to commencement of the works.

The existing structural information shown on these drawings is based on visual inspection of the building and upon limited opening up works. All details of the existing construction are subject to confirmation by the Contractor during the works on site.

2 Steel

All steelwork to be grade S275 to BS EN 10025. (UNO)

The steel structure is execution Class 2 (EXC2). It is highly recommend that the Steel Contractor(s) / Fabricator(s) appointed for the project are members of the BCSA. Otherwise, the Main Contractor or Client should complete the detailed design for those elements shown on the design drawings and produce co-ordinated drawings showing all connection details etc.

The steelwork fabricator shall produce and submit two copies of dimensioned fabrication drawings to the Engineer for comment. The Engineer requires ten working days to return and comment.

All bolted connections are to include a minimum of two M16 bolts per member unless specifically indicated otherwise on details. All connection details to be designed by Contractor.

All bolts are to be grade 8.8 sheradized to BS 4921, class1. All bolts, nuts and washers are to be to BS 5950: Part 2 clause 2.2. Washers are to be placed beneath rotated item.

All welds to be minimum 6mm leg length continuous fillet welds unless specifically noted otherwise.

All steelwork coatings to be as specification and below. Coatings to be provided by Sherwin Williams Protective & Marine Coatings or similar approved. All coatings to be light grey in colour; red oxide is NOT to be used.

LOCATION	CATEGORY	PAINT SYSTEM
Internal dampproofed	C2 - Low	C40/93 Epoxy Zinc Phosphate coating (125 microns DFT) - Functional
Internal dry	C1 - Very Low	C40/93 Epoxy Zinc Phosphate coating (75 microns DFT) - Cosmetic
Exposed	C4 - High	Galvanized in accordance with BS EN ISO 1461 to provide a minimum zinc coating thickness of 140 microns

3 Concrete

Concrete to be in accordance with BS. 5328 and as follows:

Blinding - C20

Mass concrete - C20

Reinforced concrete - C28/35

4 Masonry

All loadbearing blockwork to have a minimum characteristic strength of 7.3N/mm². All loadbearing brickwork is to have a minimum characteristic strength of 20N/mm².

5 Timber

All timber members to be grade C16 to BS. 5268 unless noted otherwise. Timber to be pressure impregnated with preservative and cut ends brush treated.

6 Padstones

All padstones to be concrete, min grade C16/20 using max 20 mm aggregate. Nominal size to be 440 long x 215 dp x width of wall, unless noted otherwise. All steel beams supported on padstones to bolted to padstones with min 2 No. Hilti M10 HY 200 with HAS rod anchors. (O.S.A.)

Rev.	Date	Drawn	Amendment
-	15.01.16	JC	Preliminary Issue

PRINGUER-JAMES
CONSULTING ENGINEERS
10 Beulah Road, Wimbledon, LONDON, SW19 3SB
Phone: 020 8940 4159
Email : mail@pjce.com Website : www.pjce.com

THAMESIS ASSET MANAGEMENT

WESTMINSTER HOUSE, KEW ROAD
RICHMOND, LONDON TW9

EXPOSURE WORKS - LEVEL 3
SITE PHOTOGRAPHS

Status : INFORMATION

Scales:	AS SHOWN @A1	Date:	JAN. 2016
Drawn:	JC	Engineer:	CM
Checked:	DP		
Drawing No.	L1739-01-04	Revision	-

Ref: 10213/JRCB/OT/Rev 1 11th April 2018

Pringuer-James Consulting Engineers Ltd
10 Beulah Road, Wimbledon
London SW19 3SB
(Attention: John Lange Esq)

Dear Sirs

Supplementary Ground Investigation: Westminster House, Kew Road, Richmond TW9 2ND

We understand that re-structuring of this 4-storey mixed-use building is proposed, involving the addition of two floors together with deepening of the existing basement. On behalf of the Client, Baden Prop Limited, we were requested by Pringuer-James Consulting Engineers Ltd (PJCE) to undertake ground investigation works to establish the ground sequence and groundwater conditions. A previous phase of investigation was undertaken by others in 2015/2016, comprising two hand-excavated trial pits. Soil Consultants Limited (SCL) were requested to examine the trial pits and to provide preliminary advice on foundation performance (Letter report ref: 9897/JRCB/SCW, 14th January 2016). We understand that the Client has legal reliance on this previous investigation and its findings have therefore been taken in to account in this current report.

A summary of the current investigation together with pour observations and foundation advice follows.

1.0 Site description

Westminster House is located on the eastern side of Kew Road (A307), immediately to the north of Richmond railway station. It is a 4-storey building which incorporates a single basement level which is mainly used for car parking. Kew Road at the front of the building lies at about +7mOD, corresponding to ground floor level. At the rear the ground level slopes down to permit vehicular access to the basement car park where the ground level is between about +4.9mOD to +5mOD. The existing site levels have been taken from the McDaniel Woolf 'Existing Basement + Ground Floor Plans' drawing (Ref: 104.05.002, 06/06/05).

2.0 Ground investigation

The ground investigation was specified by PJCE ('Geotechnical Investigation Specification', Ref L1739-SPEC-001, Oct 2017) and comprised the following elements:

Small diameter borehole and dynamic probing

The borehole (WS1) was carried out using dynamic sampling equipment mounted on a small tracked rig. A casing system was used but due to the density of the natural soils and the presence of groundwater, it was not possible to extend the borehole deeper than 2.70m. Dynamic probing (DP1) was continued from the base of the borehole and this extended to 4.50m depth, where refusal occurred with blowcounts of >50/100mm. A 35mm ID water monitoring pipe was installed to 1.60m depth on completion.

Harwich Office
Haven House, Albemarle Street
Harwich, Essex
CO12 3HL
t: 01255 241639
e: harwich@soilconsultants.co.uk

Head Office
Chiltern House, Earl Howe Road, Holmer Green
High Wycombe, Buckinghamshire HP15 6QT
t: 01494 712 494
e: mail@soilconsultants.co.uk
w: www.soilconsultants.co.uk

Cardiff Office
23 Romilly Road
Cardiff
CF5 1FH
t: 02920 403575
e: cardiff@soilconsultants.co.uk

Trial pit

The trial pit (designated TP3) was hand-excavated and was taken to a depth of 0.75m. Its purpose was to expose the existing foundation

Geotechnical and contamination laboratory testing

Geotechnical classification testing comprised particle size distribution analysis on one sample of the natural soils. Contamination testing (including ACEC sulphate/pH testing) was carried out on two soil samples with WAC testing on one sample. Soluble sulphate/pH testing was also carried out on one water sample.

3.0 Ground sequence

The British Geological Survey map indicates that the Kempton Park Gravel is present overlying the London Clay. The following sequence was encountered in the borehole and trial pits:

Basement slab/made ground

The existing concrete basement slab varied in thickness between 450mm (TP1-2016) and 250mm (TP3-2018). A thin layer of brick hardcore with sandy gravel was present beneath the slab in TP1, extending to about 0.70m depth. In WS1, TP2 and TP, the slab rested directly upon natural strata.

Kempton Park Gravel

This natural stratum was met at depths of between 0.25m and 0.70m below basement slab level, comprising brown/orange slightly silty sand and gravel/very sandy gravel. Standard Penetration Test (SPT) N-values of 48 and 28 were measured, indicating a dense becoming medium dense state of compaction. The dynamic probe measured N_{100} values (ie blows/100mm) of between 6 and 10 and this again would suggest medium dense to dense conditions. The gravel extended to the full 2.70m depth of WS1.

London Clay

The London Clay was not encountered in the trial pits or the borehole. The dynamic probe (DP1) which continued from the base of the borehole exhibited a significant drop in N_{100} values at about 3.50m depth (+1.4mOD). Two scenarios which could be inferred from the DP1 profile are as follows:

- The lower blowcounts at about 3.50m depth could represent the level of the gravel/London Clay interface. The picture is, however, confused by the rapid increase in N100 value below about 4.30m, with refusal (N100>50) at 4.50m. The only realistic explanation if this is the London Clay would be the presence of a cemented claystone causing refusal
- The alternative is that the Kempton Park Gravel contains localised loose granular or softer cohesive zones and extended beyond the base of the probing

We have examined published information, and a BGS borehole immediately to west of the site (see appended sheet) identifies the level of the gravel/London Clay interface at approximately +1.2mOD. This would therefore tend to support the first scenario above, with the lower N_{100} values reflecting the presence of London Clay.

Groundwater

In the previous phase of investigation, groundwater was measured at between 1.35m and 1.38m below the basement slab level (23rd November 2015), corresponding to about +3.55mOD to +3.62mOD. In the current 2018 investigation, a standing water level was measured in WS1 at 1.28m depth, corresponding to about +3.61mOD.

4.0 Geotechnical appraisal

The proposed scheme will involve basement deepening and the construction of two or more additional floors on the existing building.

Basement deepening

The proposed basement level has not yet been finalised, although we understand that the intention would be to provide approximately 3m headroom. For any deepening which remains above the groundwater, the construction process is expected to be relatively straightforward. The natural gravel will obviously require support at the periphery of the excavation and this would probably be provided by a new concrete wall cast in a 'hit-and-miss' sequence. The gravel is competent and casting the new slab directly on the exposed formation, subject to proof-rolling/inspection, should be satisfactory.

If the proposed level involves excavation below the groundwater, then this would be a significantly more onerous operation. The natural gravel is highly permeable and localised pumping from within the excavation will almost certainly not be effective in lowering/controlling the groundwater. Loss of fines from beneath existing foundations and increases in effective stress can contribute to foundation settlement. In our opinion, the optimum method of deepening the basement beneath the groundwater would be to install a watertight embedded wall sealed into the London Clay, such as a secant bored pile wall. The alternative of a steel sheet pile wall is not likely to be acceptable due to a) the noise/vibration during installation and b) the difficulty in penetrating through the dense gravel. Both techniques will be affected by the limited access and low-headroom rigs will be necessary. If only limited excavation beneath the groundwater is required then the option of permeation grouting could possibly be considered, although this would need to be confirmed by a specialist contractor.

The groundwater level during the current investigation is consistent with the previous investigation; the overall range of measured water levels was between +3.55mOD and +3.62mOD. It should be noted that groundwater levels vary seasonally and can rise following sustained wet periods. We recommend that a programme of water level monitoring is instigated to establish the potential variation.

Foundations

The trial pits indicate that the existing concrete foundations have a projection of about 600mm from the column/wall faces. Assuming a 300mm column/wall thickness, this would suggest that square pads would measure about 1.5m x 1.5m. Provisional loads have been provided by PJCE and taking this pad size, the existing and proposed applied pressures would be as follows:

Location	Existing load	Existing applied pressure	Anticipated increase	New applied pressure
Central column	1,600kN	710kPa	20%	852kPa
Edge column	1,000kN	444kPa	35%	599kPa

We have carried out preliminary bearing resistance analysis assuming an angle of friction (ϕ') of 37°; this, we consider, to be a reasonable estimate for the dense/medium dense sand and gravel. For the various geometries, the following factors of safety have been calculated using traditional bearing capacity theory for the present condition:

Location	Existing applied pressure	Foundation depth	Ultimate bearing capacity for 1.5m square pad	Current Factor of Safety*
Central column	711kPa	0.70m	860kPa	1.21
Central column	711kPa	1.10m	1,180kPa	1.68
Edge column	444kPa	0.70m	860kPa	1.97
Edge column	444kPa	1.10m	1,180kPa	2.74

(* defined in terms of net ultimate bearing capacity, with groundwater at foundation base level)

These preliminary calculations indicate that the overall factor of safety currently in operation is likely to be <3. This value was traditionally (ie pre-EC7) taken for ULS design and can still be used to provide an indication of the performance and degree of utilisation of a foundation. The proposed works will result in an increase in column loads and this will inevitably lead to 'less safe' foundations, with lower overall factors of safety. When the existing and proposed loads have been accurately determined, we recommend that foundation-specific analysis is undertaken to establish the stability of the foundations in terms of ULS and also the potential settlements which may occur. If the provisional loads provided by PJCE are of the correct magnitude, underpinning of the foundations will almost certainly be required. Indeed, underpinning would be necessary as a matter of course where/if the excavation for the basement lowering extends below the existing foundation level.

Due consideration will need to be given to the potential presence of the less competent London Clay within the zone of influence of the foundation. We have carried out preliminary calculations based upon the London Clay surface being at 3.40m depth. Even accounting for a 35% increase in load on a foundation at 1.1m depth, the stress increase should be well within the capabilities of typical London Clay. A further check should of course be carried out when the structural/foundation loads are finalised. It would be advisable to confirm the level of the London Clay at some point. Dynamic sampling techniques have proven unsuccessful in penetrating the dense Kempton Park Gravel and a cable percussive borehole will probably be required. A low headroom unit would be necessary to work within the building or alternatively an external borehole could possibly be carried out with a full-sized, near to the car park entrance.

5.0 Contamination and chemical testing

Testing for a general suite of contaminants was undertaken on two soil samples, with WAC testing on one sample. The following preliminary observations are made:

- No elevated levels of contamination with respect to human health were measured. Based upon the two samples tested we consider that the risks to potential receptors such as end users, aquifer and construction workers should be low
- With respect to disposal, we anticipate an 'inert' classification for any made ground and the natural soils. This should be confirmed with the relevant regulatory body/disposal site
- Low concentrations of soluble sulphates were measured in soil and groundwater samples, with alkaline pH values. The results results fall into Site Design Class DS-1 of Table C2 given in BRE Special Digest 1 (2005). We assess the site as having 'mobile' ground water and this will result in an ACEC Class AC-1

It should be noted that these results are based on a limited number of samples and there may of course be areas of undetected contamination. A careful watching brief should be kept during construction to ensure that any potentially contaminated soil encountered is handled and disposed of in a safe and controlled manner. Site workers should observe normal hygiene precautions when handling soils and if material suspected of being contaminated is identified during construction, this should be set aside under protective cover and further tests undertaken to verify the nature and levels of contamination present.

We trust that the above comments are of assistance.

Yours faithfully
For Soil Consultants Limited

John Bartley

Encls:

- General information, limitations and exceptions
- Borehole record
- Dynamic probe record
- Trial pit records (2015 and 2018)
- Particle size distribution result
- Contamination and chemical testing results (QTS Environmental)
- BGS borehole information
- Site plan

GENERAL INFORMATION, LIMITATIONS AND EXCEPTIONS

Unless otherwise stated, our Report should be construed as being a Ground Investigation Report (GIR) as defined in BS EN1997-2. Our Report is not intended to be and should not be viewed or treated as a Geotechnical Design Report (GDR) as defined in EN1997-2. Any 'design' recommendations which are provided are for guidance only and are intended to allow the designer to assess the results and implications of our investigation/testing and to permit preliminary design of relevant elements of the proposed scheme.

The methods of investigation used have been chosen taking into account the constraints of the site including but not limited to access and space limitations. Where it has not been possible to reasonably use an EC7 compliant investigation technique we have adopted a practical technique to obtain indicative soil parameters and any interpretation is based upon our engineering experience and relevant published information.

The Report is issued on the condition that Soil Consultants Ltd will under no circumstances be liable for any loss arising directly or indirectly from ground conditions between the exploratory points which differ from those identified during our investigation. In addition, Soil Consultants Ltd will not be liable for any loss arising directly or indirectly from any opinion given on the possible configuration of strata both between the exploratory points and/or below the maximum depth of the investigation; such opinions, where given, are for guidance only and no liability can be accepted as to their accuracy. The results of any measurements taken may vary spatially or with time and further confirmatory measurements should be made after any significant delay in using this Report.

Comments made relating to ground-water or ground-gas are based upon observations made during our investigation unless otherwise stated. Ground-water and ground-gas conditions may vary with time from those reported due to factors such as seasonal effects, atmospheric effects and and/or tidal conditions. We recommend that if monitoring installations have been included as part of our investigation, continued monitoring should be carried out to maximise the information gained.

Specific geotechnical features/hazards such as (but not limited to) areas of root-related desiccation and dissolution features in chalk/soluble rock can exist in discrete localised areas - there can be no certainty that any or all of such features/hazards have been located, sampled or identified. Where a risk is identified the designer should provide appropriate contingencies to mitigate the risk through additional exploratory work and/or an engineered solution.

Where a specific risk of ground dissolution features has been identified in our Report (anything above a 'low' risk rating), reference should be made to the local building control to establish whether there are any specific local requirements for foundation design and appropriate allowances should be incorporated into the design. If such a risk assessment was not within the scope of our investigation and where it is deemed that the ground sequence may give rise to such a risk (for example near-surface chalk strata) it is recommended that an appropriate assessment should be undertaken prior to design of foundations.

Where spread foundations are used, we recommend that all excavations are inspected and approved by suitably experienced personnel; appropriate inspection records should be kept. This should also apply to any structures which are in direct contact with the soil where the soil could have a detrimental effect on performance or integrity of the structure.

Ground contamination often exists in small discrete areas - there can be no certainty that any or all such areas have been located, sampled or identified.

The findings and opinions conveyed in this Report may be based on information from a variety of sources such as previous desk studies, investigations or chemical analyses. Soil Consultants Limited cannot and does not provide any guarantee as to the authenticity, accuracy or reliability of such information from third parties; such information has not been independently verified unless stated in our Report.

Our Report is written in the context of an agreed scope of work between Soil Consultants Ltd and the Client and should not be used in any different context. In light of additional information becoming available, improved practices and changes in legislation, amendment or re-interpretation of the assessment or the Report in part or in whole may be necessary after its original publication.

Unless otherwise stated our investigation does not include an arboricultural survey, asbestos survey, ecological survey or flood risk assessment and these should be deemed to be outside the scope of our investigation.

We will identify tree and plant species if possible, but a suitably qualified arboriculturalist/botanist should be consulted to provide definitive identification.

Site & Location:	**Westminster House** **Kew Road, Richmond, Surrey TW9 2ND**		Borehole No:	**WS1**
Client:	**Baden Prop Limited**	Coordinates:	518071E, 175213N	Sheet 1 of 1
Engineer:	**Pringuer-James Consulting Engineers Ltd**	Ground Level:	+4.89mOD	Report No: 10213/JRCB

Progress & Observations	Samples & Tests: Type	Samples & Tests: Depth (m)	Field Test Results	Strata: Depth (m)	Strata: Level (m)	Legend	Strata Descriptions	Backfill / Installation
BH carried out: 22/02/18							CONCRETE	
	E	0.30		0.30	4.59		Dense becoming medium dense brown/orange slightly silty SAND and GRAVEL. Locally grading to very sandy flint gravel. Gravel is fine to coarse grained and sub-angular to rounded	
BH dia: 100m reducing with depth								
	D	0.75						
	SPT/C	1.00	N=48 N_{60}=48					
	D	1.25						
Monitoring pipe (35mm ID) installed to 1.60m depth								
	D	1.75						
	SPT/C	2.00	N=28 N_{60}=28					
	D	2.60						
BH complete at 2.70m Groundwater standing at 1.28m				2.70	2.19		End of hole at 2.70m	

Key: U = Undisturbed B = Bulk D = Small disturbed W = Water ES = glass jar & plastic tub E = glass jar SPT/S = split spoon SPT/C = solid cone PP = Pocket Penetrometer [kg/cm²] HV = Hand Vane [kPa] PID = Photo Ionisation Detector [ppm - Isobutylene Equivalent, PhoCheck Tiger, 10.6eV lamp] * = full SPT penetration not achieved - see summary sheet

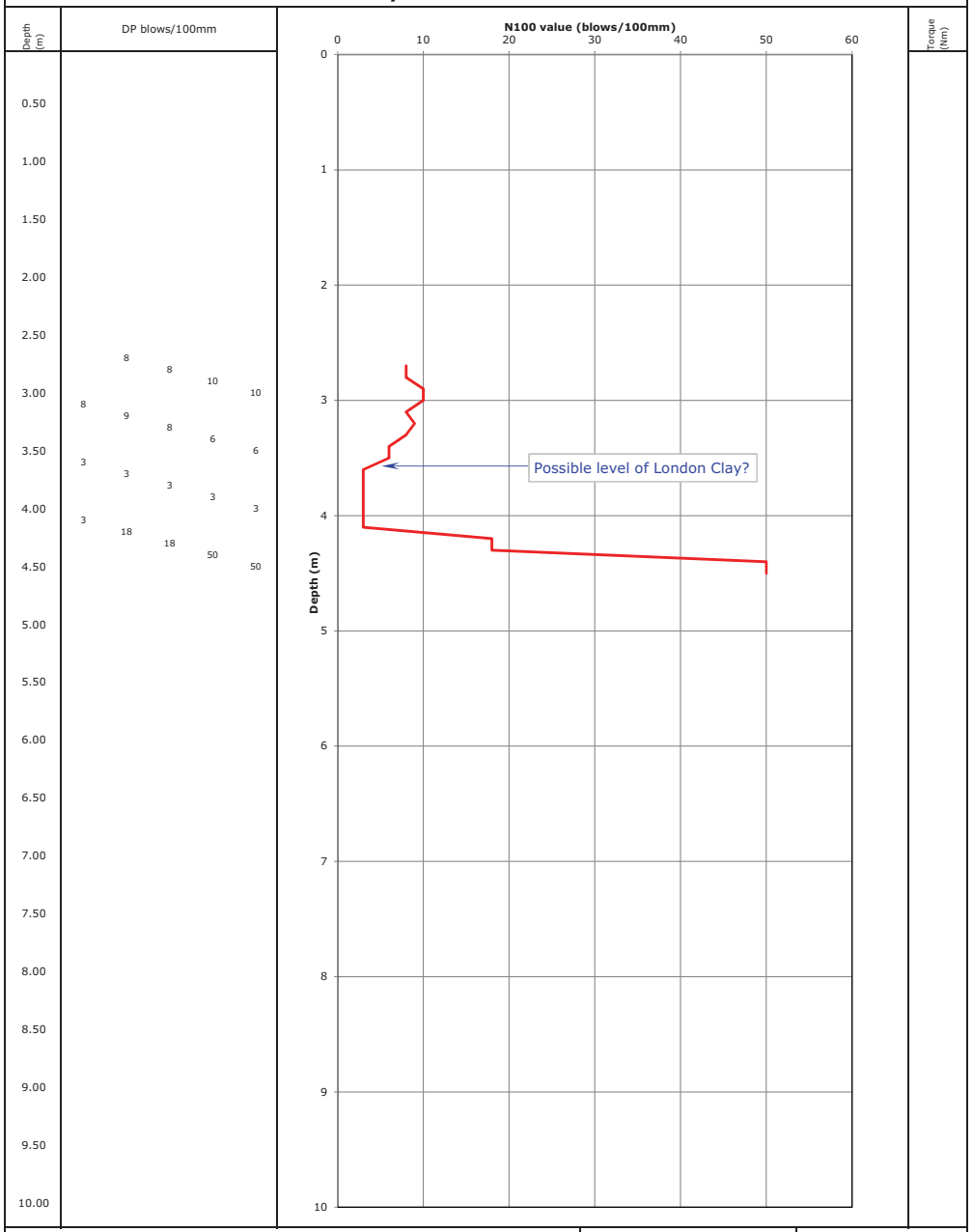
Borehole type: Dynamic Sampler

Remarks:
a) borehole commenced at basement car park level
b) strata too dense to install casing; borehole collapsing below groundwater level
c) DP1 continued from base of borehole

Borehole No: **WS1**

Site & Location	**Westminster House** **Kew Road, Richmond, Surrey TW9 2ND**		DP No:	**DP1**
Client:	Baden Prop Limited	Co-ords (E-N): 518071 175213	Sheet No:	1 of 1
Eng:	Pringuer-James Consulting Engineers Ltd	Ground level (mOD): 4.89	Report No:	10213/JRCB

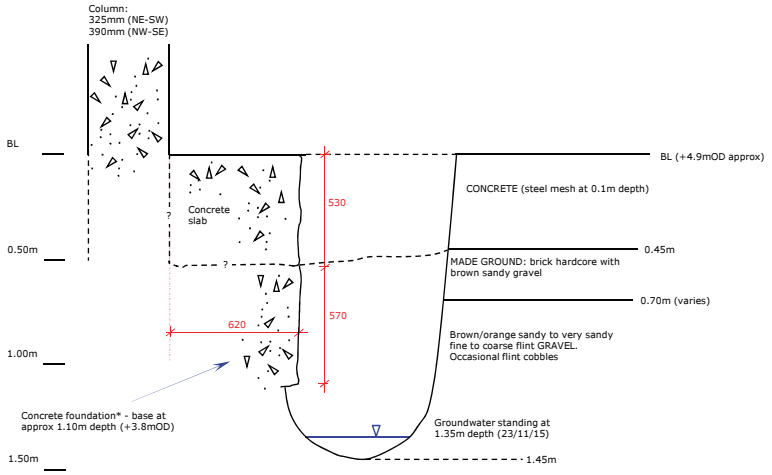
Dynamic Probe Record



Probing by:	GEH Groundworks Specialists Ltd		Remarks:
Equipment: DPSH-B	Hammer weight (kg): 63.5	Date: 22 Feb 18	From base of WS1
Cone area (cm2): 20	Hammer drop (mm): 750	Rod dia (mm) 35	

Site Location	**Westminster House Kew Road, Richmond TW9 2ND**	Trial Pit No: **TP 1 (1 of 1)**
Client:	**Thamesis Asset Management**	Report No: **9897/JRCB**
Engineer:	**Pringuer-James Consulting Engineers Ltd**	

SECTION (looking SW)



*Corner of foundation protrudes approx 750mm from column face, SW to NE

Note: foundation dimensions in millimetres

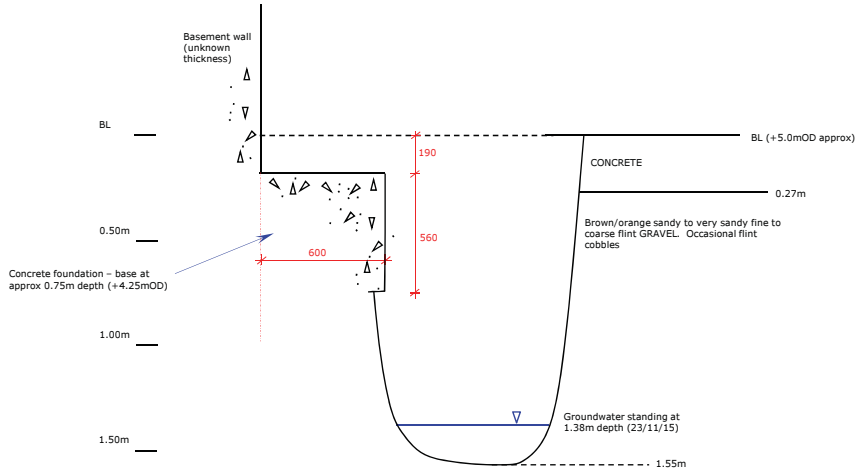
PHOTOGRAPHS

D = small disturbed sample, E = environmental sample (glass jar and tub), HV = hand shear vane test (kPa), pp = pocket penetrometer (kg/cm²)

Date:	23/11/15 (logged)	**Groundwater details**	**Samples**
Equipment:	Hand excavation (by others)	• Standing at 1.35m depth	Disturbed samples: 0.80m
Stability:	Stable		
Remarks:			**Logged by**: JRCB

Site Location	**Westminster House Kew Road, Richmond TW9 2ND**	Trial Pit No: **TP 2 (1 of 1)**
Client:	**Thamesis Asset Management**	Report No: **9897/JRCB**
Engineer:	**Pringuer-James Consulting Engineers Ltd**	

SECTION (looking NE)



Note: foundation dimensions in millimetres

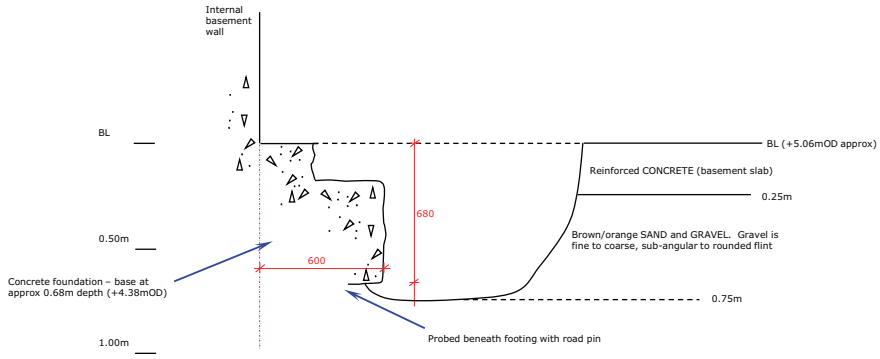
PHOTOGRAPHS

D = small disturbed sample, E = environmental sample (glass jar and tub), HV = hand shear vane test (kPa), pp = pocket penetrometer (kg/cm²)

Date:	23/11/15 (logged)	**Groundwater details**	**Samples**
Equipment:	Hand excavation (by others)	• Standing at 1.38m depth	Disturbed samples: 1.50m
Stability:	Stable		
Remarks:			**Logged by**: JRCB

Site & Location	Westminster House Kew Road, Richmond, Surrey TW9 2ND	Trial Pit No: TP3 (1 of 1)
Client:	Baden Prop Limited	Report No: 10213/JRCB
Engineer:	Pringuer-James Consulting Engineers Ltd	

SECTION (looking SSW)



Note: foundation dimensions in millimetres

PHOTOGRAPHS

D = small disturbed sample, E = environmental sample (glass jar and tub), HV = hand shear vane test (kPa), pp = pocket penetrometer (kg/cm²)

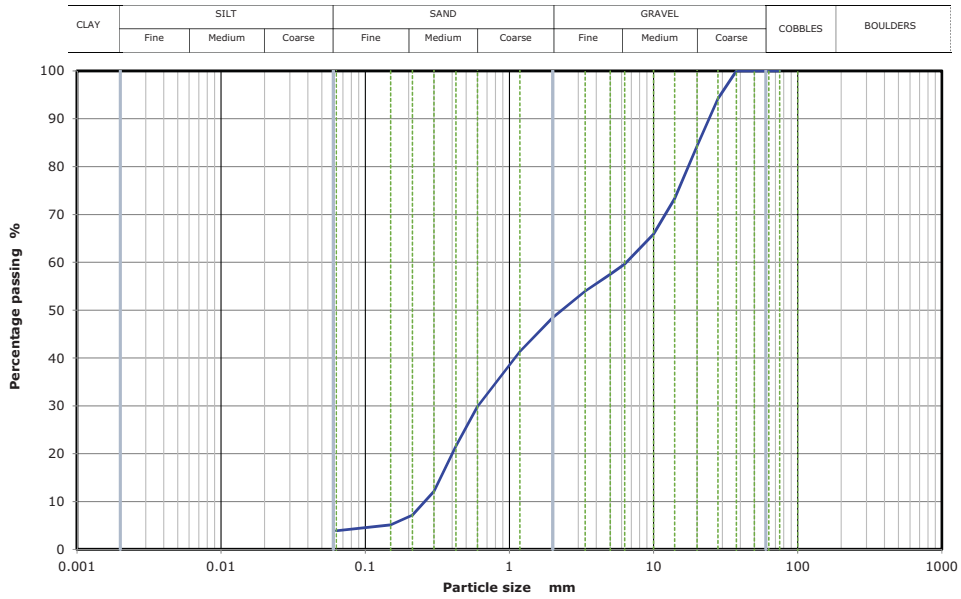
Date:	Excavated: 24/02/18; Logged: 26/02/18	Groundwater details	Samples
Equipment:	Hand excavation	• None observed	Disturbed samples: 0.50m
Stability:	Stable		
Remarks:			Logged by: OT

Soil Consultants

Site & Location	Westminster House Kew Road, Richmond, Surrey TW9 2ND	Report No: 10213/JRCB

Particle size distribution

Hole ID: WS1 Depth (m): 1.25	Description: Brown/orange slightly silty SAND and GRAVEL



Sieving	
Size (mm)	% passing
75	100.0
63	100.0
50	100.0
37.5	100.0
28	94.2
20	84.3
14	73.3
10	65.9
6.3	59.6
5	57.5
3.35	54.0
2	48.4
1.18	41.3
0.6	29.8
0.425	21.6
0.3	12.1
0.212	7.2
0.15	5.1
0.063	3.9

Sedimentation	
Size (μm)	% passing

Sample proportions	%
Cobbles	0
Gravel	52
Sand	45
Fines (<0.063mm)	4

Grading analysis		
D60	mm	6.47
D30	mm	0.606
D10	mm	0.259
Uniformity Coefficient		25.0
Curvature Coefficient		0.2

Test method and date
Method: BS EN ISO 17892-4:2016
- Wet sieving method
Reporting date: 11 Mar 18

Soil Consultants

Construction Method Statement

Westminster House
Kew Road, Richmond, TW9 2ND

Creation of two additional levels of Class C3 accommodation comprising 7no.units, conversion and excavation of the existing Class E basement and part conversion of existing floorspace at basement, ground, first, second, and third floor levels to provide internal access and ancillary residential floorspace with external alterations and associated development