Form

ST PAULS MEWS, LONDON, NW1

STRUCTURAL ENGINEER'S CONSTRUCTION METHOD STATEMENT

Job No: 142176

Date: 5th December 2014

Prepared by Chartered Engineer: Andy Ilsley C.Eng. M.I.Struct.E

Revision: P2

Residential

Commercial

Conservation

Retail

Education

Art

Hotels

Period

FORM Structural Design

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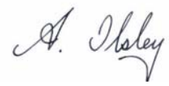
Form

Document Reference::		Construction Method Statement
Prepared By:	Signed:	Date:
Andy Ilsley		01.12.14
Checked By:	Signed:	Date:
Stefan Piasecki		04.12.14

Form

Contents

Preamble

This report has been prepared by Form Structural Design Ltd on the instructions of the project architects, TF Architecture, acting on behalf of the client Mr G.Hedger.

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ABOUT FORM SD

Form has undertaken over 300 projects involving subterranean development, both new build and retrospective, using numerous techniques and sequences of construction. This extensive design, site and local geology/hydrology experience has positioned the practice as one of London's leading subterranean engineering design consultants.

Many of our subterranean projects are in the London Boroughs of, Westminster, Camden, and RBKC, making us familiar with the most recent requirements of subterranean development.

Form has designed multi-level basements using techniques including open dig, underpinning (mass and 'L' shaped R.C. special foundations), temporary and permanent steel sheet piling, temporary and permanent concrete piled retaining walls, top down construction and tunnelling.

TERMS OF REFERENCE

We were appointed in May 2014 by our client, Mr G. Hedger to prepare a supporting Structural Design Statement in support of a Planning Submission for the refurbishment and subterranean development of the existing car park off St Pauls Mews, London, NW1 9TZ.

1.0 Introduction

This report has been prepared as a supporting document to the planning application for the redevelopment of the car park site adjacent to St Pauls Mews. The proposals involve the construction of a new two storey property that includes a subterranean level below the new ground floor. Below ground the proposed new structure will extend to the boundaries of the site, the ground floor above will be set back at the front to form lightwells to the floor below and an off street parking space. This report primarily presents an outline structural scheme for the construction of the new basement.

1.1 The Site

The site is located within the Camden Square conservation area and is accessed through a gate off St Pauls Crescent. The site is situated on the northern side of the cobbled St Pauls Mews approximately half way along as it runs from west to east. At the back the site boundary is formed by the rear garden wall of numbers 128 and 130 Agar Grove. To the sides the site boundary is formed by the side garden wall of numbers 126 and 132 Agar Grove to the west and east respectively.

The site is flat with no significant inclines, but the adjacent garden areas are all at a level approximately 1.0m higher. The boundary walls are therefore all acting as retaining walls and as their construction includes brick piers it is suspected that the site had its levels decreased when the car park was originally constructed. Refer to Figure 1 below.

At the time of writing a site investigation is being undertaken that includes trial pits at each of the boundaries to investigate the existing retaining wall construction and foundation details in order to inform our design as it develops the and party wall process.

The site avoided damage during the war as shown on Figure 4 opposite.

Figure 1: Photograph of the Site Taken from St Pauls Mews

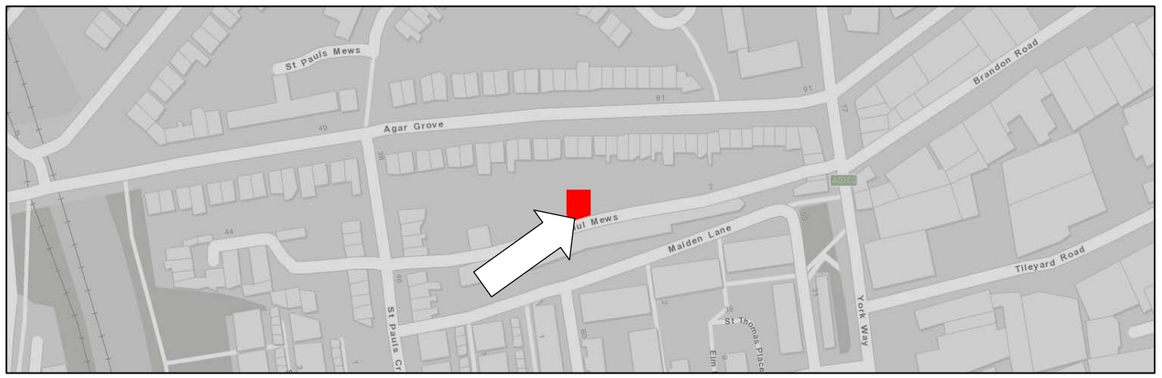

Figure 2: Site Location Map

Figure 3: Aerial View of the Site

Figure 4: WW11 Bomb Map

2.0 Site Information

2.1 Ground Conditions/Geology

The British Geological Survey (BGS) map of the area indicates the site to be underlain by the London Clay Formation. This is in turn underlain by the Lambeth Group, Thanet Sand and Chalk at depth.

The London Clay Formation is an over consolidated firm to very stiff, becoming hard with depth, fissured, blue to grey silty clay of low to very high plasticity. The upper and lower parts may contain silty or fine grained sand partings. It also contains within it, laminated structured, nodular claystone and rare sand partings.

Historical boreholes records freely available on the BGS website indicate that the site is underlain by the London Clay Formation with a limited thickness of Made Ground expected. The thickness of the London Clay in the region has been proven to be approximately 35m from borehole records within 200m of the site.

A selection of the nearby BGS historical borehole records are provided in within the BIA undertaken by Card Geotechnics.

To confirm the site specific conditions a ground investigation including a borehole has recently been undertaken on site by Aviron Associates. The investigations revealed London Clay as expected. This is confirmed within the interim report included within Appendix B of this report. A full Geotechnical Report is currently being prepared by Aviron Associates to ascertain the soil design parameters, and to record the ground water levels for the substructure design. This will be available in early January upon request.

The construction methods proposed within this report and associated structural proposals are appropriate for the geology and are capable for supporting the structural loads of the subterranean development, the techniques that will be used for the construction are well established in the industry.

2.2 Hydrogeology

The Environment Agency (EA) has produced an aquifer designation system consistent with the requirements of the Water Framework Directive. The London Clay Formation is not a productive stratum for groundwater. The site is not within a Groundwater Source Protection Zone.

With reference to historical boreholes on the BGS and the site investigation information on the Camden planning portal for nearby properties groundwater was not encountered in the London Clay but slight groundwater seepage was occasionally present within the Made Ground and often at the interface between the Made Ground and relatively impermeable London Clay. The groundwater encountered in the Made Ground was generally low volume and present within isolated perched pockets.

During construction the contractor will be required to consider suitable remediation measures during excavations and general basement works.

2.3 Hydrology

Figure 11 of the Hampstead Heath Surface Water Catchments and Drainage of the Camden Geological, Hydrogeological and Hydrological Report presents a copy of the 'Lost Rivers of London' map produced by Barton. A number of springs outcrop at the base of the Bagshot Formation to the north, flowing through various drainage channels and in various directions into the watercourses of the district (most of which are now diverted underground) including the River Westbourne, Tyburn and Fleet. The map indicates that two branches/tributaries to the River Fleet are located approximately 800m to the east and west of the site, and flows parallel to the site in a north south direction towards the River Thames.

The Grand Union Canal is located approximately 500m south west of the site.

Flooding

With reference to the EA website, the site is not within a Flood Risk Zone. Further, reference to Figure 15 Flood Map of the Arup report indicates the site does not appear to be have been subjected to flooding during the flooding events of 1975 or 2002 and is not within an area identified as being at risk of potential flooding.

Due to the underlying soil being London Clay, we would not expect the proposals to have an adverse effect on the ground water flow in this area and to be a cause of concern to the neighbouring properties.

2.0 Site Information

2.4 Existing Utilities and Underground Drainage

Water

A Thames Water Asset Location Search has been undertaken and search results have been appended to this report in Appendix D.

The search confirms that a mains supply runs under the St Pauls Mews. It is however beyond the minimum 3.0m construction exclusion zone from the proposed excavation and therefore the proposals will be acceptable to Thames Water without any further liaison necessary.

Gas and Electrical

It is to be established whether any gas or electrical services run under the site. If so they will be diverted.

If required, services will be diverted and replaced to modern day standards where necessary as determined by the Mechanical and Electrical Engineer for the project. All services that are required to pass through new structure will be sleeved and articulated accordingly to allow for future movements and settlements of the surrounding structure.

Below Ground Drainage

Currently there is no drainage to the site which is cobbled stone throughout. The new below ground drainage design will be developed during the following stages of design. Surface water and foul will fall to sumps below the basement level; these will then be pumped to the outfall.

The proposals do not increase the extent of the existing impermeable hardstanding. Furthermore permeable and porous surfaces such as a sedum roof are proposed within the scheme will ensure that overall the storm water flow rates into public sewers will not increase.

2.5 Arboriculture

An arboricultural assessment of the site was undertaken by ACS Consulting in April 2014. The report confirms that there are no trees on the site, however in the adjacent gardens in close proximity to the site there are four trees consisting of two limes, a maple, and a sycamore.

The report confirms that the root protection area for the large lime and the large sycamore tree falls within the site boundary. However as the site as had its level decreased by approximately 1.0m the report concludes that no significant roots are expected within the site and therefore the basement can be constructed without causing damage to the trees.

The report continues to describe details of the protective measures that are recommended for the trees during construction to avoid damage.

2.6 Underground Structures

It can be seen from Figure 5 below that there are no tube tunnels within the vicinity of the site and therefore it not be necessary to advise London Underground asset protection department to check alignments as agreed works will not affect any existing tunnels or access shafts.

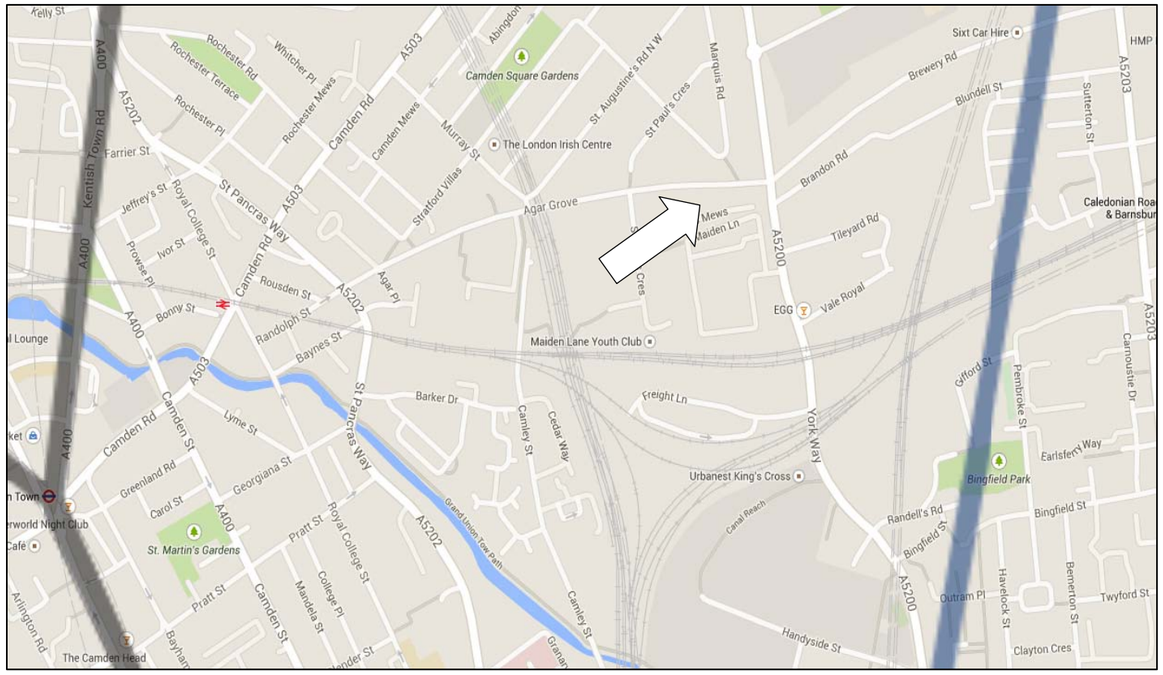

Figure 5: Site Location Plan with LUL Tunnels Indicated

2.0 Site Information

2.7 Boundary Conditions

The site is situated on the northern side of the cobbled St Pauls Mews approximately half way along as it runs from west to east.

The site is flat with no significant inclines, but the adjacent garden areas are all at a level approximately 1.0m higher. The boundary walls are therefore all acting as retaining walls and as their construction includes brick piers it is suspected that the site had its levels decreased when the car park was originally constructed.

South (Front) Boundary

- The southern boundary along the front of the site is with the cobbled St Pauls Mews.

North (Rear) Boundary

- The rear garden wall of numbers 128 and 130 Agar Grove forms the northern boundary.
- Refer to Refer to Figure 6 below for a site photograph of the trial pit undertaken to confirm the footing detail.

West Boundary

- The garden wall of number 126 Agar Grove forms the western boundary.
- Refer to Refer to Figure 7 opposite for a site photograph of the trial pit undertaken to confirm the footing detail.

East Boundary

- The garden wall of number 132 Agar Grove forms the western boundary.
- Refer to Refer to Figure 8 opposite for a site photograph of the trial pit undertaken to confirm the footing detail..

Figure 6: Trial Pit Undertaken to Confirm the Existing Northern Boundary Condition

Figure 7: Trial Pit Undertaken to Confirm the Existing Western Boundary Condition

Figure 8: Trial Pit Undertaken to Confirm the Existing Eastern Boundary Condition

3.0 Development Proposals

3.1 Sub-Structure and Basement Construction

The proposed development of the site includes the construction of a new subterranean level that extends beneath the full footprint of the new property above. The structural proposals are described on the drawings contained within Appendix A of this report. They have been developed by Form SD in conjunction with the architects and the contractor to address the specific site constraints and characteristics including:

- The ground conditions
- The support to the proposed superstructure above
- The stability of the neighbouring boundary retaining walls
- Health and Safety considerations
- The physical site constraints

Due to the close adjacency of the neighbouring properties and the sensitivity of the site location within a residential area the excavation and piling works have been identified as particularly sensitive operations and the following precautions will be taken:

Excavation

The site will be inspected by a Structural Engineer prior to the commencement of any excavation to ensure the following procedures have been implicated:

- All excavation shall be carried out by hand or utilising a micro excavator (maximum operating weight of 1.5 tonnes).

- Any compaction of hardcore shall only be carried out using non-vibrating methods.

Further weekly site inspections will be made by the Structural Engineer to supervise throughout the duration of the excavation

Piling

The site will be inspected by a Structural Engineer prior to the commencement of any piling to ensure the following procedures have been implicated:

- An experienced piling contractor is appointed to undertake the works and pile design. All method statements, drawings and calculations will be submitted to the engineer for review. All precautions taken to ensure that the works are to be carried out in a manner which minimises any noise and vibration must be described.

- It is anticipated that a tracked piling rig will be used similar to the Klemm KR708 shown in Figure 9 below. These can be operated in the confined areas and use Sectional Flight Augers (SFA) up to 450mm diameter to bore from the existing ground level. The SFA process is considered to be virtually vibration free and one of the quietest forms of piling.

- Steel casing is screwed down to approximately 3.0m below ground. This will act to guide the piles, more importantly it will allow the rotation speed to be restricted without pulling in any earth. This precaution will further reduce any risk of vibration and settlement when piling adjacent to existing structures.

Further weekly site inspections will be made by the Structural Engineer to supervise throughout the duration of the piling.

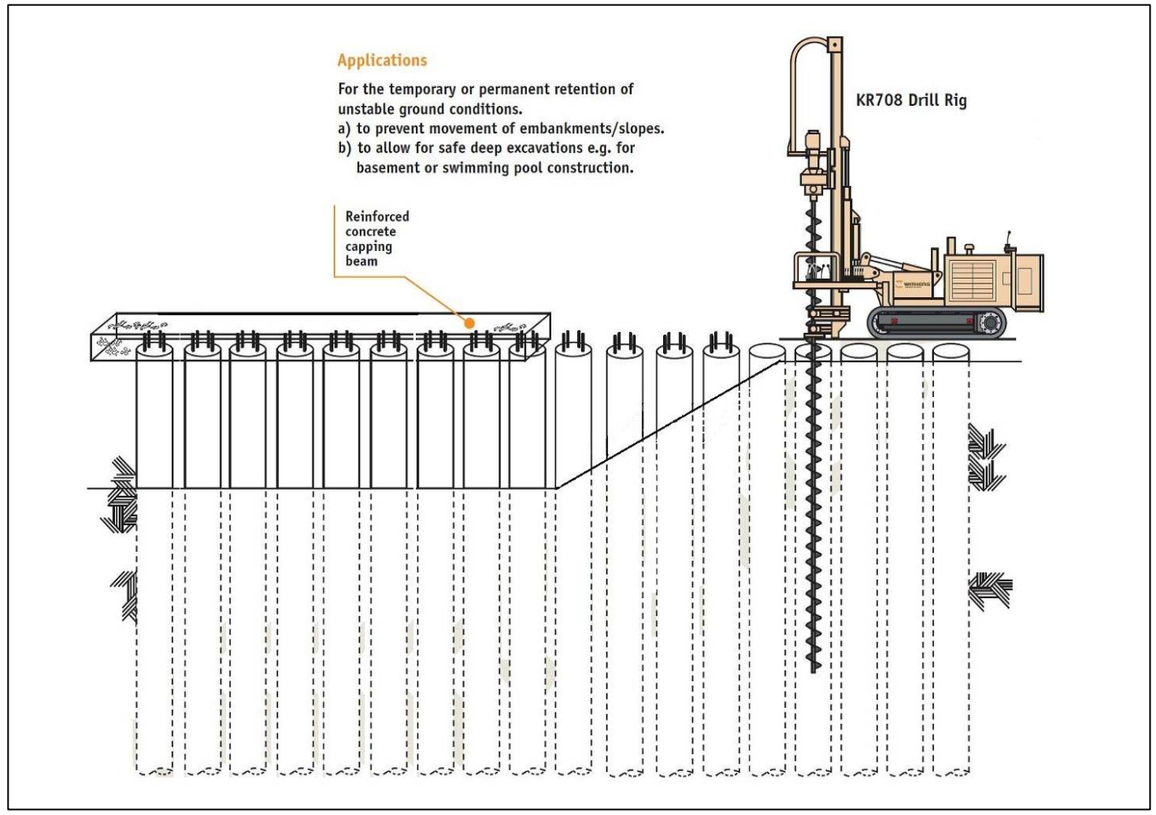

Figure 9: Contiguous Piled Wall Method of Construction

3.0 Development Proposals

3.2 Sub-Structure and Basement Structure

To construct the new basement two different structural solutions have been identified for the design and construction of the basement retaining walls. Both solutions are described below, for detailed sections describing all boundaries refer to the structural drawings contained within Appendix A of this report.

The contractor may put forward alternative solutions to suit his programme and method of working. These will be reviewed by the design team but no proposals will be considered unless they can satisfactorily demonstrate that they satisfactorily minimise any noise and vibrations that may affect the neighbouring properties.

Solution 1: Mass Concrete Underpinning Boundary Wall and Internal RC Liner Wall
Location: The North, East and West Boundaries

To allow excavation of the basement all of the existing foundations to boundary walls will require underpinning. These underpins extend up to the underside of the original masonry throughout and are designed to take all vertical loading from the wall above. They will not however have sufficient strength to act as retaining walls, and therefore internal RC liner walls designed for lateral loading will be constructed to retain the earth in the permanent condition.

All underpins are installed to extend up to the underside of the original footing throughout and are designed to take all lateral earth loading, surcharge loadings, and vertical loading from the wall above without any additional structure. Figure 10 below provides a simplified typical section.

All underpinning will be carried out following a fixed hit and miss sequence agreed beforehand and designed to consider all necessary propping to existing walls and foundations. The new RC basement box will ensure permanent stability when cast but local propping to the underside of the wall and shoring of the excavations will be required in the temporary condition. The works will be carried out by an experienced groundworker to best practice and in accordance with the Form SD drawings. On this basis we would not expect significant movements and the structures above will therefore remain stable and unaffected by the works. A contractor's method statement will be required at this stage for comment by the engineer and party wall surveyors.

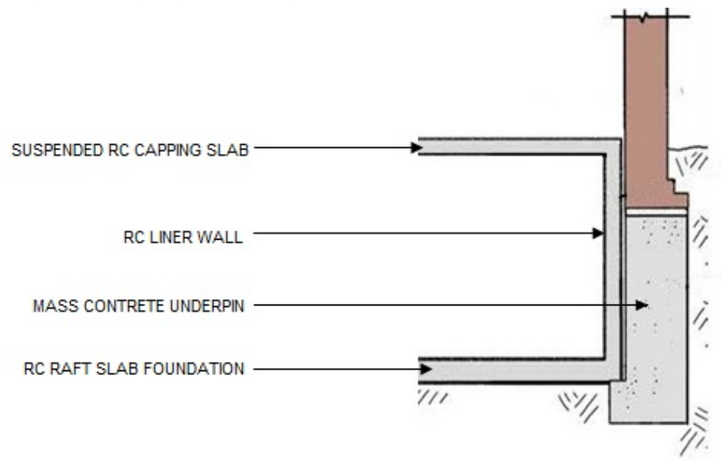

Figure 10: Sketch Section Indicating Typical East/West Section through Basement

Solution 2: Contiguous Piled Wall and Internal RC Liner Wall
Location: The South (Front) Boundary

It is proposed to install a contiguous piled wall along the front of the site to form the temporary retaining structure prior to the construction of the internal RC box structure. Once the piling mat has been provided a contiguous piled retaining wall will be installed along the front of the new basement up to existing external ground level. The piles are designed by the specialist contractor and early consultation with an experienced piling contractor will be critical to ensure ground movement due to pile installation and deflection is controlled and minimised. The head deflection will have to be limited to an agreed value along the boundary.

Once the piles are installed together with a capping beam the internal earth level will be lowered to allow installation of temporary propping beams at high level. These will remain in place until the new ground floor capping slab is cast to provide permanent restraint.

Exactly as the underpinning condition a separate RC liner wall is constructed inboard of the piles that is designed to resist all lateral earth loading. These walls are separated by a vertical slip membrane from the piles to ensure that the entire new RC box structure is structurally independent and founded at the new raft slab level.

Figure 11: Propped Contiguous Pile Construction

3.0 Development Proposals

3.3 Temporary Works

The previous sections describe the methods for the construction of the basement and the associated temporary works required to maintain the stability of the excavation and the adjacent properties.

The temporary works will be designed by a specialist. No works on site requiring the installation of any temporary works will commence on site without all the necessary drawings, calculations, and method statements in place which will require approval from the Structural Engineer. The envisaged construction sequence including the installation and removal of all temporary works is outlined in Section 5.0 of this report.

3.4 Potential Ground Movement to Adjoining Properties

The underpinning and retaining wall installation described in the previous section may cause localised settlements of the boundary walls. Outside of the basement area the change of vertical stresses in the ground may result in limited upward movements. However anticipated movements are expected to be minimal and suppressed by the stiffness of the above walls. It is our experience that the potential for damage will be limited to the boundary walls but this can be mitigated by appointing a suitably experience Contractor familiar with propping techniques and sequential operations and by the Designer giving the necessary consideration to the risk by specifying measures to ensure that significant damage is avoided..

As a result we anticipate that should any damage occur it will be limited to Category 0 (Negligible; hairline cracks of less than 0.1mm) based on the Boscardin and Cording / Burland and Potts Building Damage Classification Table found within Appendix C of this report.

However, there will always be some movement as it can never be completely avoided and there are occasions where unforeseen conditions beneath the site which were not or could not be detected by the pre-construction investigations will result in more extensive damage. From our experience such an occurrence very uncommon and even then the damage would be limited to Category 1 (Very Slight, fine cracks less than 1mm) in the Damage Classification Table.
Monitoring of the adjoining properties will be undertaken throughout the works at regular intervals to ensure that the trigger values agreed under the Party Wall awards are not exceeded.

3.5 Waterproofing and Drainage Systems

BS8102 – Protection of structures against water from the ground identifies three specific methods of water-resisting construction. Each of these options was considered during the preliminary stages of design:

Type A (Tanked Protection)
The tanking may be external or internal. By design it is assumed that the concrete offers no protection against the ingress of water and water vapour. Protection is therefore totally dependent on a continuous barrier system applied to the structure.

Tanked protection has been dismissed for this project due to the complexity of construction, the total dependency on this material providing the water and vapour barrier, plus the difficulties or repairing this system of protection.

Type B (Drained Protection)
The structural concrete box acts to minimise the ingress of water. Any moisture which does find its way into the basement is channelled, collected and discharged within the cavity created through the addition of an inner skin to both walls and floor. Vapour transmission may be prevented by ventilation of the cavity and by providing on effective damp proof membrane over the under drained floor.

A cavity drained system is proposed for this project on the basis that it is the most effective trouble free method of waterproofing. Sump pumps and an outlet drainage system both designed by a specialist drainage engineer will be required to remove any water ingress from the cavity drain.

Type C (Structurally Integral Protection)
The concrete box is designed and constructed in reinforced or prestressed concrete either minimise or prevent water penetration. Transmission of water vapour may not be wholly prevented. In addition an additive such as Caltite can be specified to significantly reduce the penetration of water vapour to negligible levels.

For this project the use of such an additive is not recommended as the guarantees to such products are typically limited to 12 years, their addition also significantly increases the cost of the concrete.

4.0 Site Management

This section of the report has been produced at planning stage and before the main contractor has been fully appointed. It sets out the systems and procedures that the Contractor will utilise in controlling the construction operations on site, to ensure progress of the project in the most safe and efficient manner possible and to minimise impacts on the local environment and surrounding amenity.

Tendering contractors will be made aware of the contents below (alongside any planning conditions). Once planning permission is granted, the appointed contractor will be responsible for the submission of a Construction Traffic Management Plan prior to commencement of development.

4.1 Excavation of Soil

The soil will be excavated and removed using micro excavators up to a skip at ground level within the hoarded confines of the site adjacent to St Pauls Mews.

The street adjacent to the site will remain open to the public throughout. It will be cleaned each evening and the frequency of vehicle movement will be confirmed by the chosen contractor and approved by the council before works commence.

Prior to the commencement of the works the specialist ground works contractor will provide detailed method statements for all aspects of the construction for approval by the engineer. These statements will address:

- All the site specific procedures described in the previous sections to necessary to minimises any noise and vibration that may affect the neighbouring properties.
- Construction requirements for temporary propping, movement monitoring, and waste disposal.

Throughout the duration of the works the engineer will also make site visits at regular intervals to ensure that construction is being progressed safely and in accordance with the agreed methods and design information.

4.2 Rubbish Removal and Recycling

An important part of the site management process involves site cleansing, rubbish removal and recycling.

To reduce and manage site waste:

- We will ensure that all material removed from site is taken to waste recycling stations and separated for recycling where possible. Records of the waste recycling will be provided by the recycling stations.
- Segregate waste types to facilitate recycling activities.
- Ensuring that all Duty of Care and other legal requirements are complied with during the disposal of wastes.
- Consulting with suppliers to determine correct / appropriate disposal routes for waste products and containers.
- It will be the responsibility of each contractor to keep the site area under his control safe from build-up of rubbish.

4.3 Construction Traffic Management

The frequency of vehicle movement will be confirmed by the chosen contractor and approved by the council before works commence. The duration of the excavation works is envisaged to last approximately 3 months.

Direct access to the site is possible from St Pauls Mews. The contractor is to ensure that all vehicles use the main route network and avoid minor roads.

All site operatives, delivery companies, authorities and visitors will be notified of the site access routes.

Contractors and visitors vehicles will use available on street parking within the surrounding area.

Parking is controlled and available spaces are fitted with parking meters. Payment and duration of available parking is displayed at each location.

Deliveries

Site deliveries are to be limited to the off peak hours.

All deliveries are to park in the designated suspended parking bay on St Pauls Mews. For Large deliveries, radio controlled cabs should be used whereby only one large vehicle is in attendance at any one time. This will require a holding area to be established away from the site so that larger vehicles can be called in once the free slot outside the site is available.

All deliveries or loading/unloading must be carried out without delay. Neighbours are to have priority in all circumstances.

It is not currently anticipated that any deliveries will be “abnormal loads” as defined by the Road Traffic Act 1988. If it does become necessary to deliver an “abnormal load” then this will be notified in advance to the Local Authorities/Police in accordance with the requirements of the Road Traffic Act.

Proposed Vehicle Management / Control

Speed limit for any vehicles entering the immediate residential area will be limited to 10 mph, and signage will be erected to minimise risk at the adjacent road junctions.

All vehicles will be recorded on and off site.

The exposure of wheels to soil will be limited. On this basis wheels will be hand cleaned when required. A wheel wash will be will be provided to minimise dirt on the public highway.

Ongoing monitoring of the cleanliness of the road surface on St Pauls Mews will be undertaken to ensure mud is not being generated by vehicles leaving the site and action taken accordingly is any mud is being deposited. The footpath and street adjacent to the site will be cleaned each evening.

All proposed traffic and pedestrian management schemes approved for the works will be monitored daily to ensure the required standards are met.

4.0 Site Management

Proposed Access to Adjacent Occupiers

It is recognised that it will be necessary to maintain access to/from adjacent occupiers throughout the excavation / demolition and construction process.

Prior to works commencing, all neighbouring occupiers will be consulted to ensure that the construction process results in minimal disruption/disturbance. In particular, all reasonable endeavours will be made to organise vehicle arrivals/departures to avoid peak usage for neighbours i.e. early mornings, afternoon school runs and early evenings.

The contractor will join the Considerate Contractors scheme.

Local Environmental Considerations

Construction operations are likely to have impact on residential amenity on a day to day basis, it is our intention to minimise the impact that the construction process could cause to the Local Environment and the neighbouring community. All care will be taken not to cause the primary environmental nuisances, noise and dust pollution. Below are actions that will be carried out to abate these problems.

Reduction in noise disruption will be achieved by:

- Coordinated delivery times to avoid peak traffic times.
- Ensuring all plant has sound reduction measures (mufflers, baffles or silencers)
- Strict adherence to the site working hours.

Reduction in dust pollution and other airborne debris will be achieved by:

- Ensure that all materials transported to and from site are in enclosed containers or fully sheeted.
- During dry periods the works are to be damped down to control the generation of dust.
- Ensuring materials have a minimum of packaging.
- Ensuring all polystyrene and similar lightweight materials are weighted down
- Making sure all dust generating materials are adequately packaged.

In addition to the above provisions the following measures will be taken to reduce any further negative effects on the environment:

- Ensuring all contaminants kept on site are safely stored with the necessary procedures put in place for leaks and spillages etc.
- All temporary lighting, whether for the construction itself or for construction traffic, will be directional to ensure minimal light spillage across the site. The lighting will only be used as necessary during operational working hours.

Environmental issues must be treated seriously and must demonstrate good management practices are implemented to minimise the effects of noise and dust on the environment and local community.

5.0 Outline Construction Sequence

This section describes our envisaged sequence for the construction of the basement based on the construction and temporary works techniques described in the previous section. The contractor may put forward alternative solutions to suit his programme and method of working. Regardless no structural works will commence without a detailed temporary works design, drawing and calculation package in place including all necessary method statements.

STAGE 1 – SITE SET UP

- Mobilise and prepare site with all necessary hoarding and associated health and safety and security requirements.
- Locate all existing services and identify those affected by the new works and take necessary actions as required by M+E engineer, drainage engineer and Thames Water.
- Check all boundary conditions are as to be expected and report any variations to the engineer.

STAGE 2 – PILING

- Reduce the area at the front of the site to the grade level below the new piling mat.
- Confirm details of the existing boundary walls are as expected and report any variations to the engineer.
- Install appropriate piling mat.
- Set out and install contiguous piles to front edge of basement.

STAGE 3 – HIGH LEVEL PROPPING

- Install temporary steel wailing beams and horizontal props across the width of the site to restrain the bottom of the existing boundary walls.

STAGE 4 – UNDERPINNING

- Install all the mass concrete underpins beneath all the existing footings in hit and miss sequence in accordance with specification and prop as required
- Ensure that the underpins are propped against the rear of the new excavations to ensure stability as shown in Figure 12 opposite.

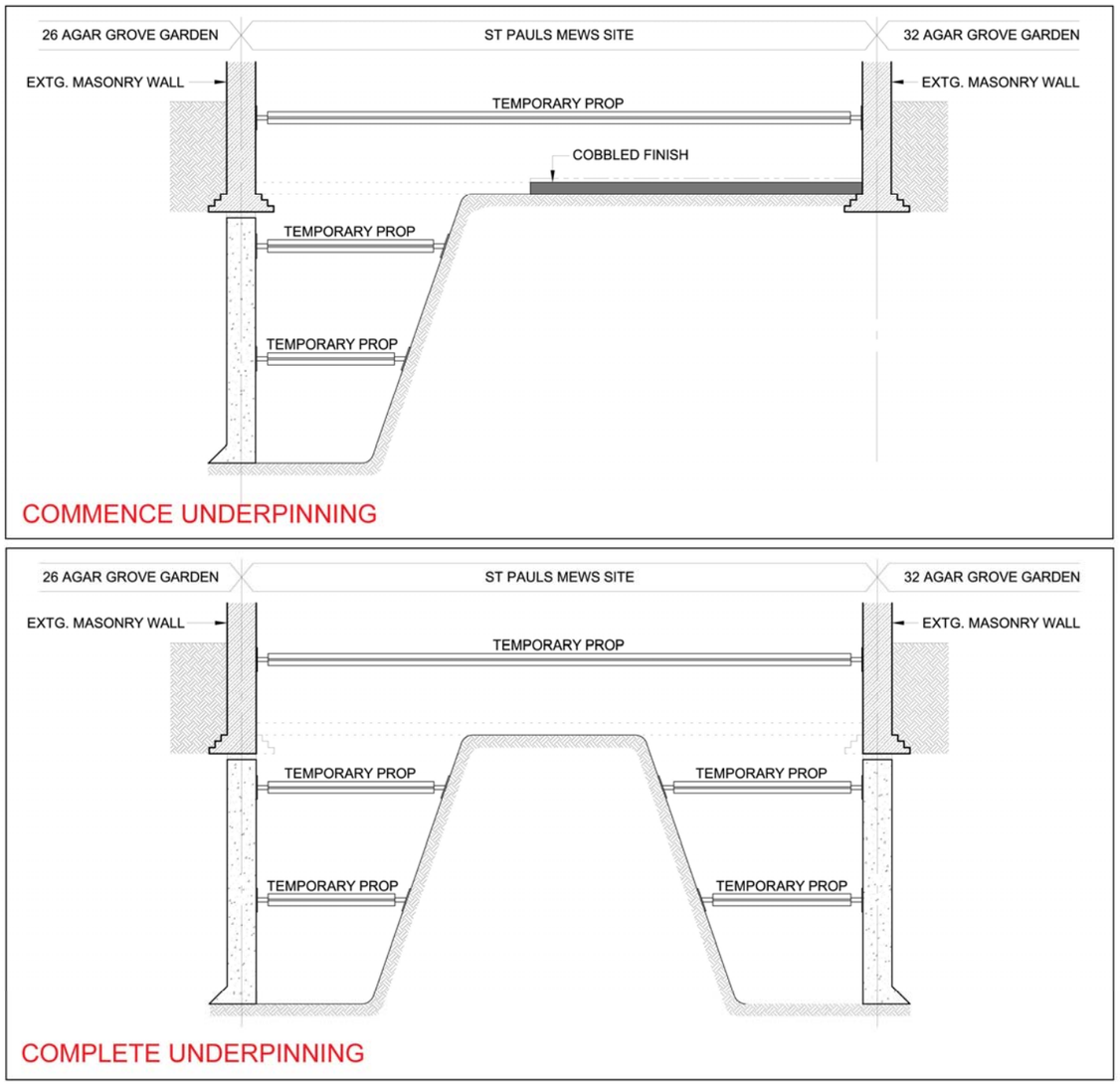

Figure 12: Typical Cross Section Describing Stages 3 and 4.

5.0 Outline Construction Sequence

STAGE 5 – BULK EXCAVATION

- The soil will be excavated and removed using micro excavators up to a skip at ground level within the hoarded confines of the site adjacent to St Pauls Mews.
- Carefully break off and remove the existing unwanted foundations and stepped brick footings

STAGE 6 – LOW LEVEL PROPPING

- When the internal ground level is excavated sufficiently install low level steel wailing beams and propping to the bottom of the new underpinning

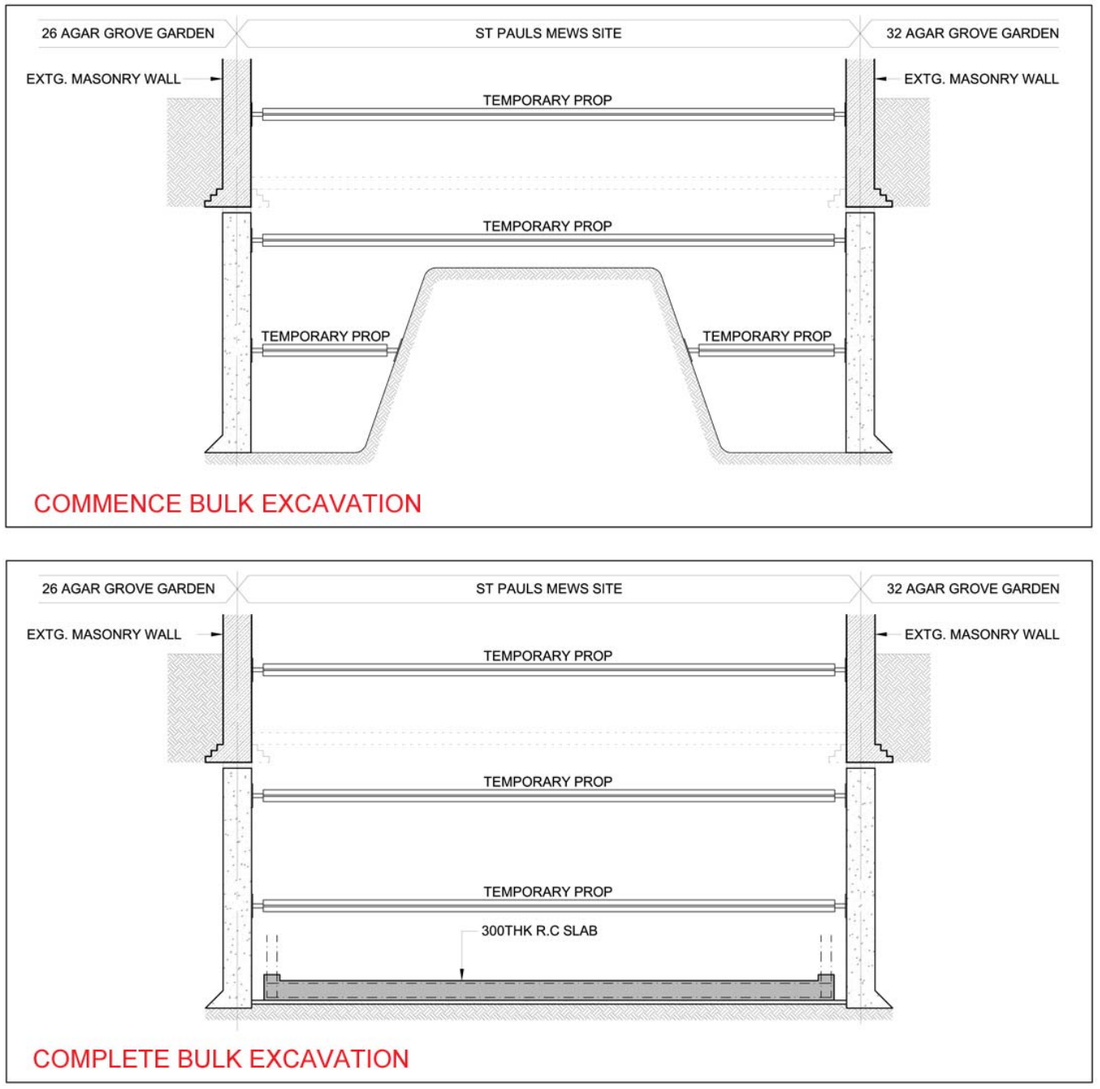

Figure 13: Typical Cross Section Describing Stages 5 and 6.

5.0 Outline Construction Sequence

STAGE 7 – CAST NEW BASEMENT SLABS AND RC LINER WALLS

- Once the excavation reaches the formation level throughout prepare the raft sub-base and reinforcement, pour concrete and allow curing.
- Prepare shuttering and reinforcement for new liner walls to ground floor level, pour concrete and allow curing. The high level props will need repositioning in order to complete the wall.

STAGE 8 – CAST NEW RC GROUND FLOOR CAPPING SLAB

- Prepare reinforcement and cast the new ground floor capping slab including the RC downstand beam.
- The propping can now be removed throughout.

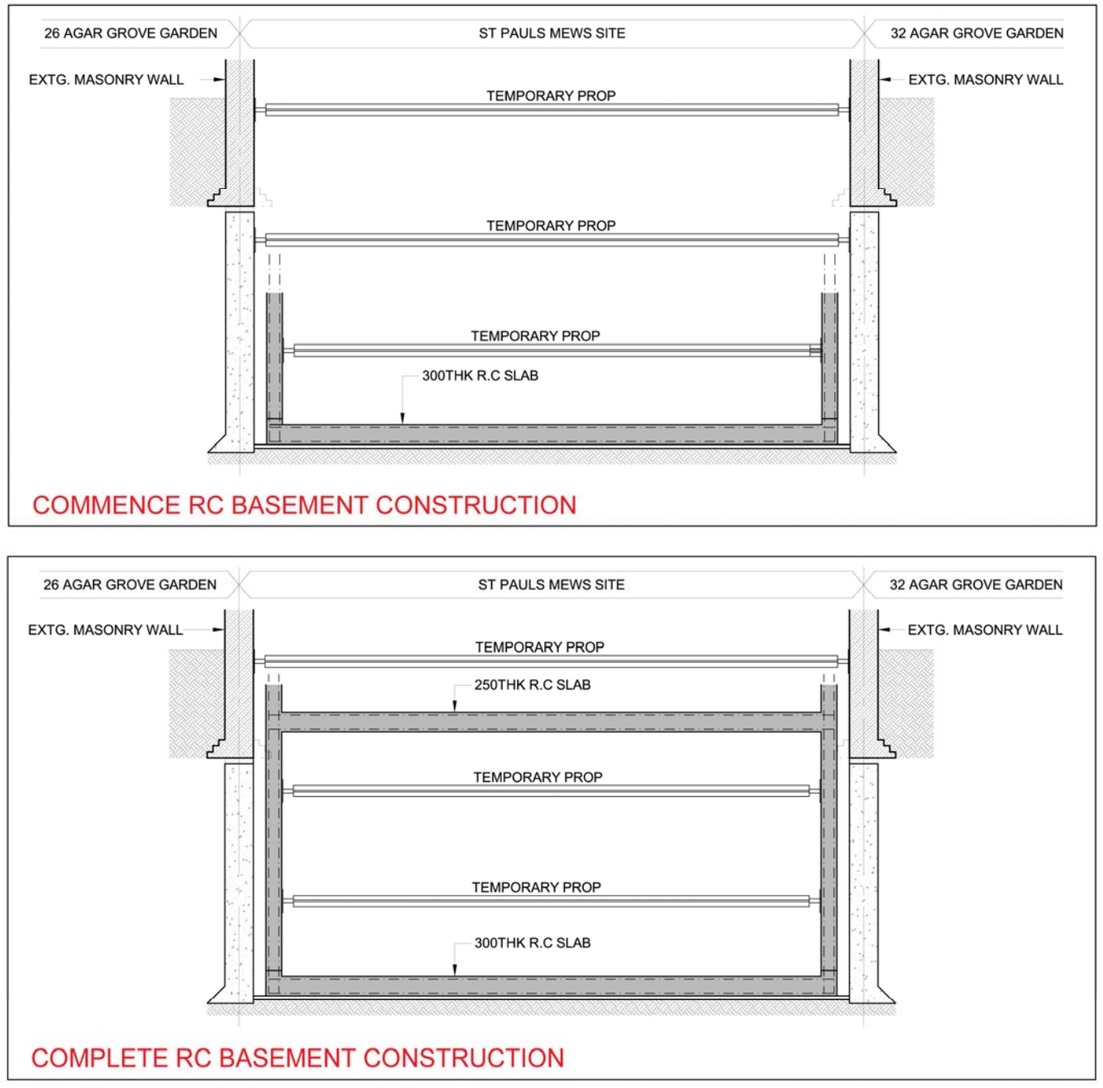

Figure 14: Typical Cross Section Describing Stages 7 and 8.

Appendix A

Preliminary Form Structural Drawings

Document No.	Title	Revision
142176 L(23)01	Proposed Basement Plan	P1
142176 L(23)02	Existing and Proposed Ground Floor Plans	P1
142176 L(23)03	Proposed Roof Plan	P1
142176 A(28)01	Existing and Proposed Cross Section A-A	P1

Notes

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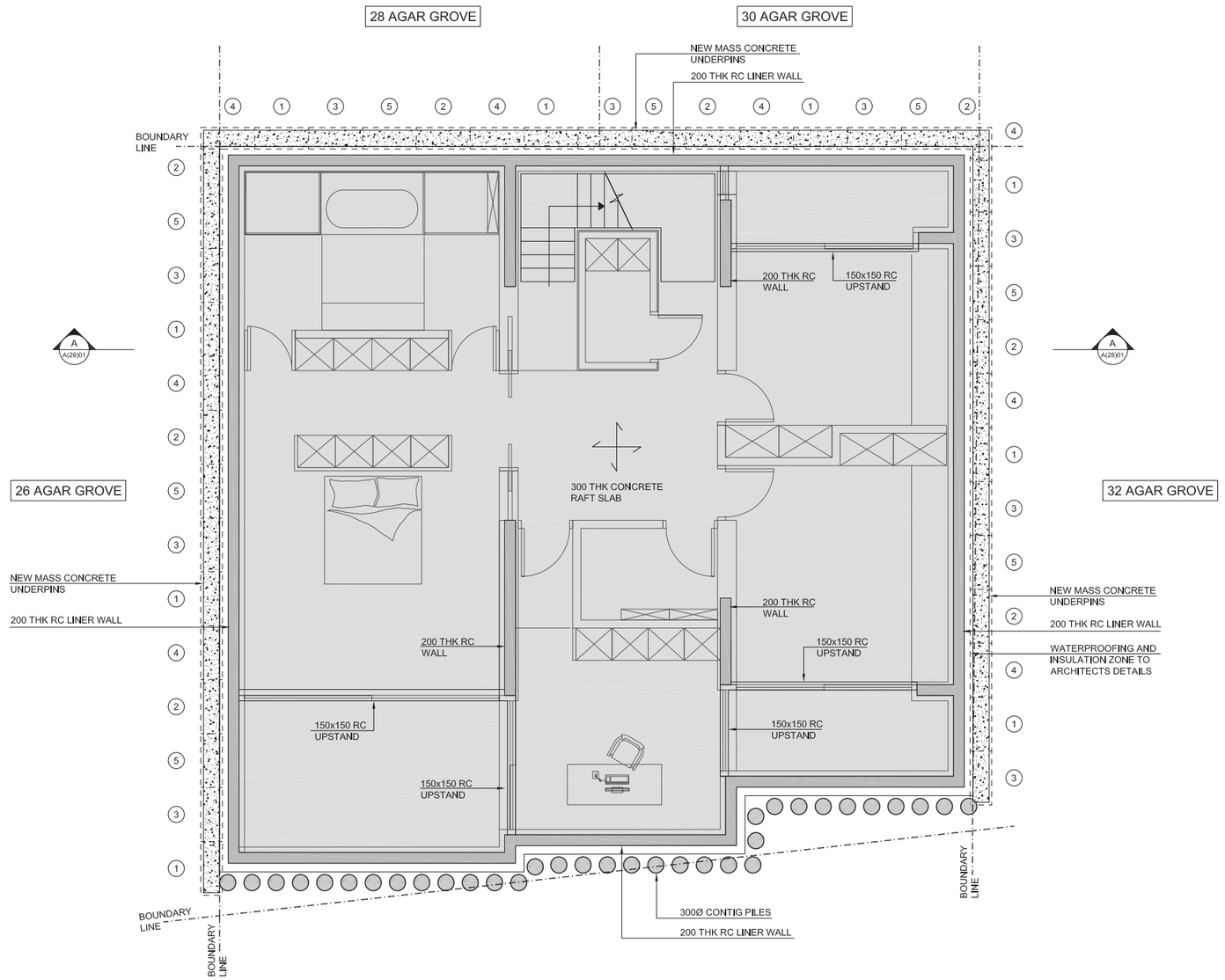
(X) DENOTES SEQUENCE OF MASS CONCRETE UNDERPINS - SEQUENCE TO BE AGREED WITH CONTRACTOR PRIOR TO CONSTRUCTION.



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Rev.	Date	Amendment	Drawn	Chkd
P1	03.12.14	PRELIMINARY ISSUE	GB	SP

Drawing Status: PRELIMINARY

Form

Job Title
ST PAULS MEWS
LONDON NW19TZ

Drawing Title
PROPOSED LOWER GROUND FLOOR PLAN

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142176	L(23)01	P1

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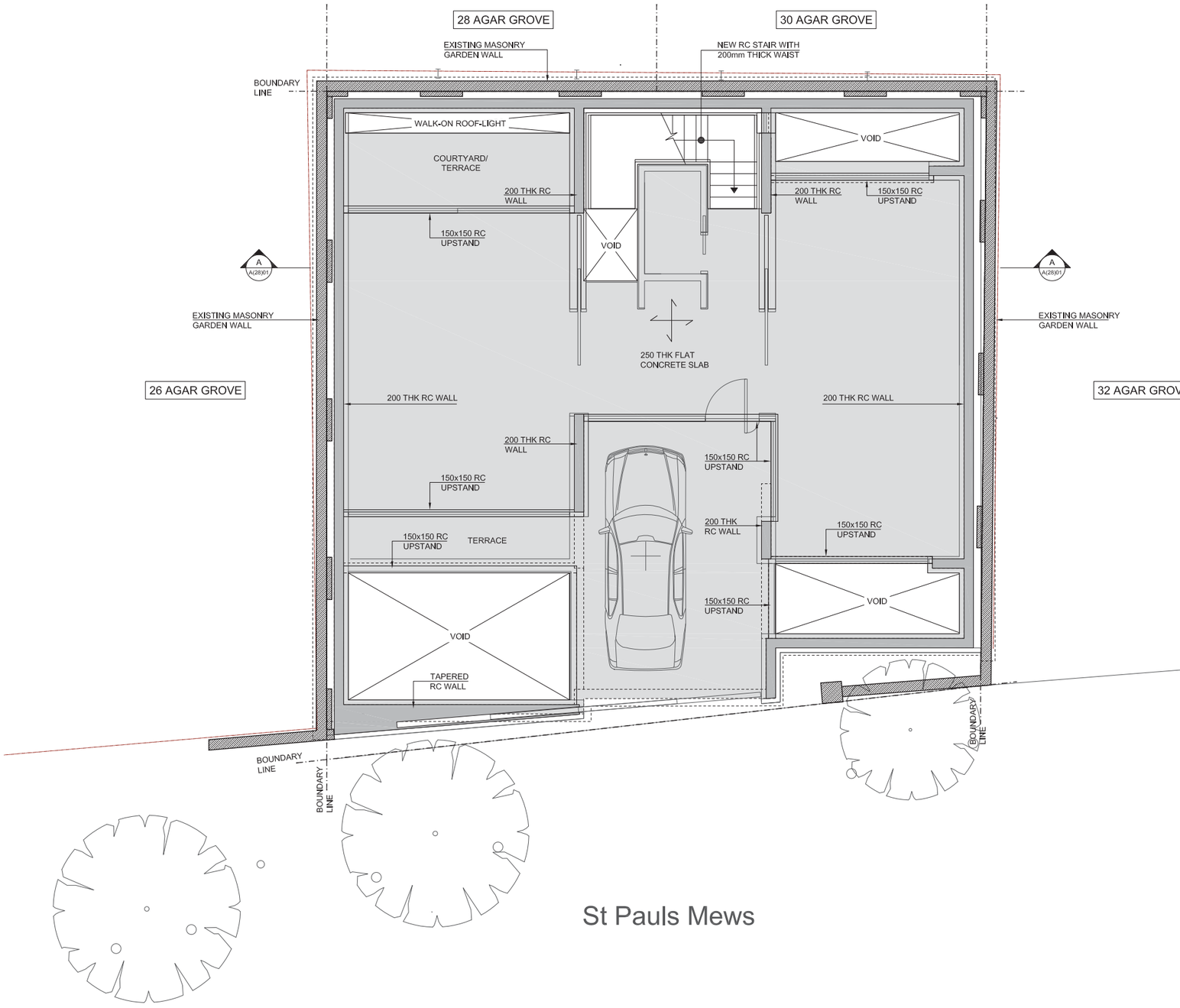

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Rev.	Date	Amendment	Drawn	Chkd
P1	03.12.14	PRELIMINARY ISSUE	GB	SP

Drawing Status: PRELIMINARY

Form

Job Title
ST PAULS MEWS
LONDON NW19TZ

Drawing Title
PROPOSED GROUND FLOOR PLAN

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T:020 7253 2893 E:studio@form-sd.com W:www.form-sd.com

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Job No.	Drawing No.	Revision
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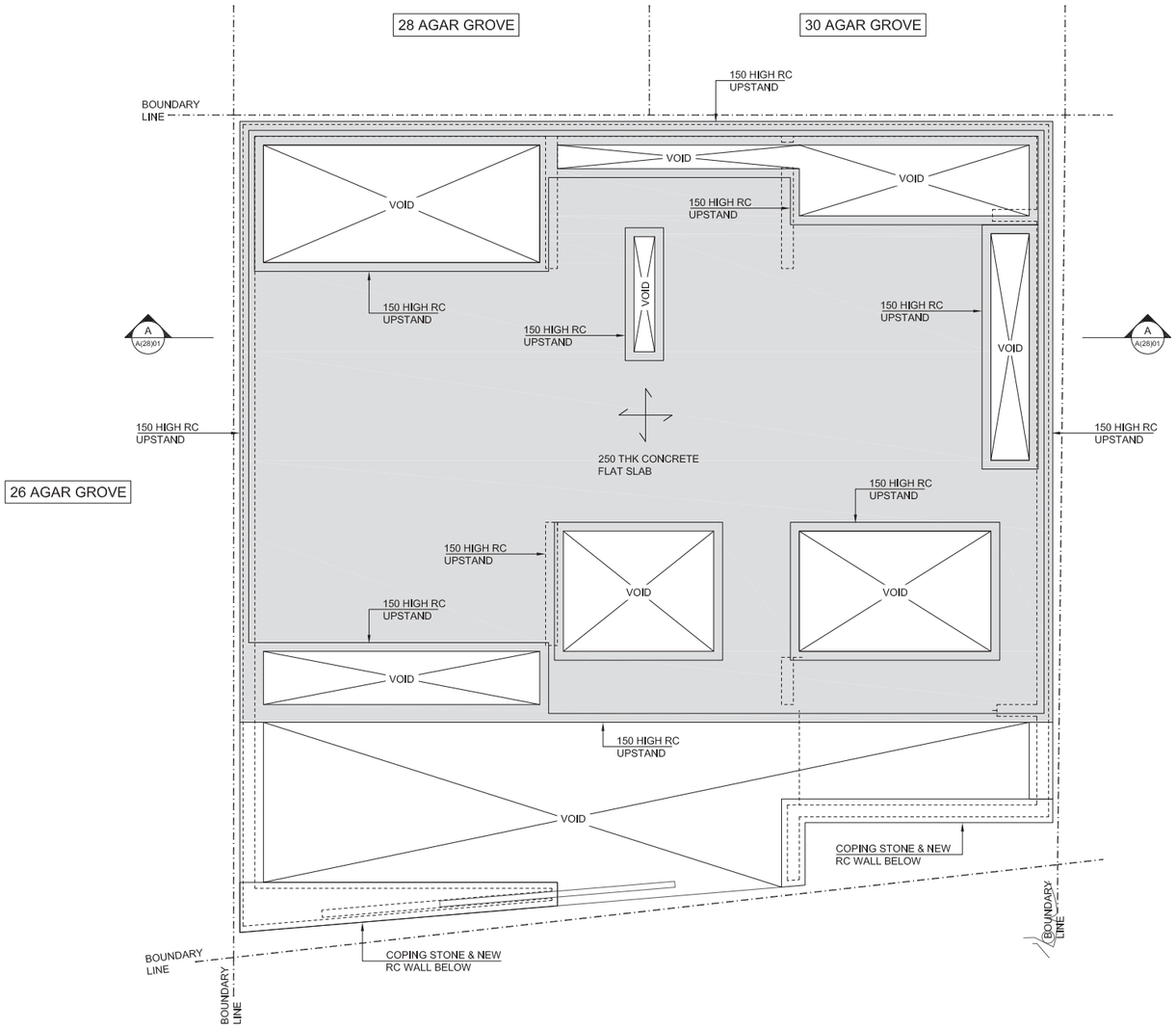

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Rev.	Date	Amendment	Drawn	Chkd
P1	03.12.14	PRELIMINARY ISSUE	GB	SP

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Job Title
ST PAULS MEWS
LONDON NW19TZ

Drawing Title
PROPOSED ROOF PLAN

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Job No.	Drawing No.	Revision
142176	L(23)03	P1

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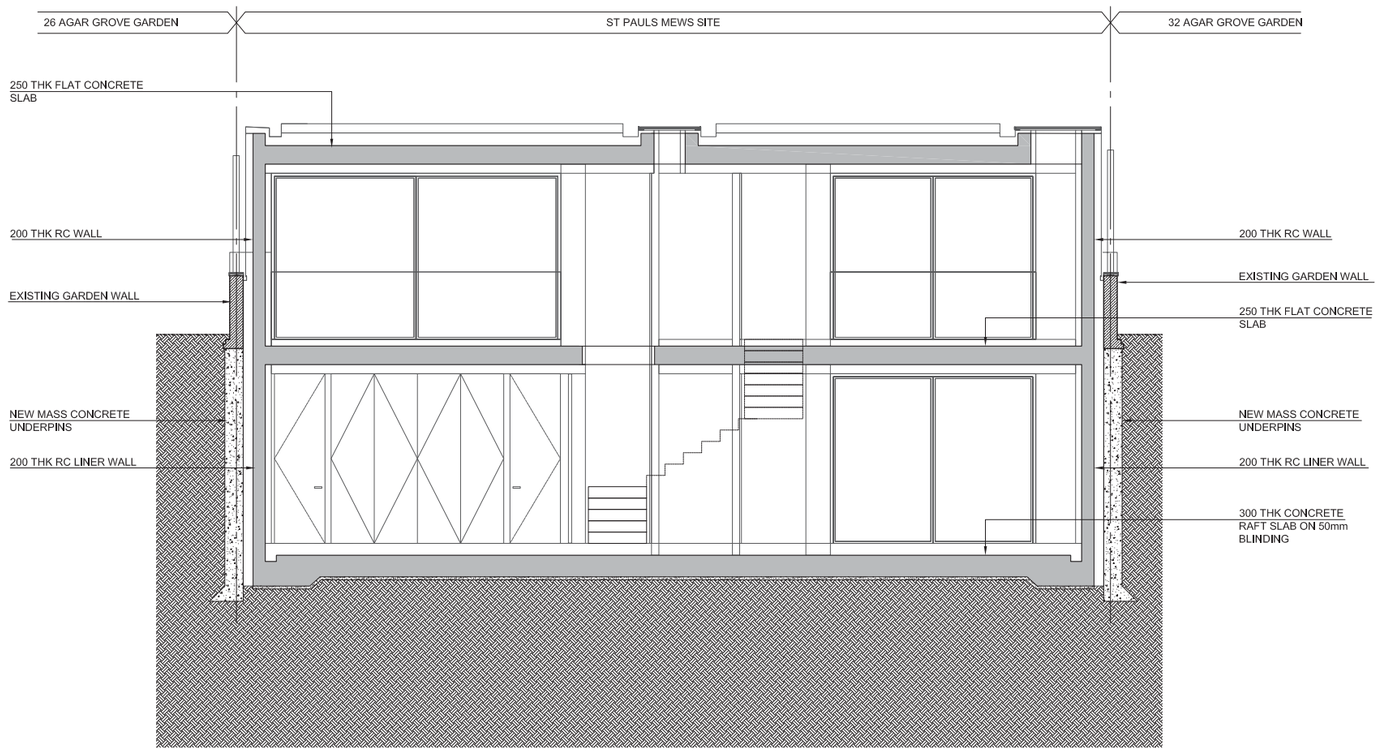

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Rev.	Date	Amendment	Drawn	Chkd
P1	03.12.14	PRELIMINARY ISSUE	GB	SP

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Job Title
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Drawing Title
PROPOSED SECTION A-A

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Job No.	Drawing No.	Revision
142176	A(28)01	P1

Form

Appendix B

Aviron Ground Investigation

Ref: JB/14-318.01/R-1

4 December 2014

Stefan Piasecki
Form Structural Design Ltd

By email only

Dear Stefan

RE: GROUND INVESTIGATION INTERIM FACTUAL REPORT
ST PAULS MEWS, LONDON, NW1 9TZ

Recent ground investigation works completed at the above site comprised;

- 2 December 2014 - Mechanical and hand excavated trial holes to expose boundary wall foundation conditions.
- 3 December 2014 - Cable and Percussion Borehole to 15m.

Please find the following enclosed;

- Figure 1 - Exploratory Hole Location Plan.
- Trial Pit Logs and Photographs.
- Borehole Log.

Trial pits recorded shallow concrete footings.

The borehole recorded a thin mantle of Made Ground (0.8m) overlying soft to firm, becoming stiff and very stiff CLAY of the London Clay Formation. At formation level of approximately 3.0m the CLAY is 'stiff'.

Groundwater was struck within the pits and borehole within the upper metre where we suspect perched water is resting within the Made Ground unit and upon the underlying CLAY. A monitoring well has been installed to enable future monitoring.

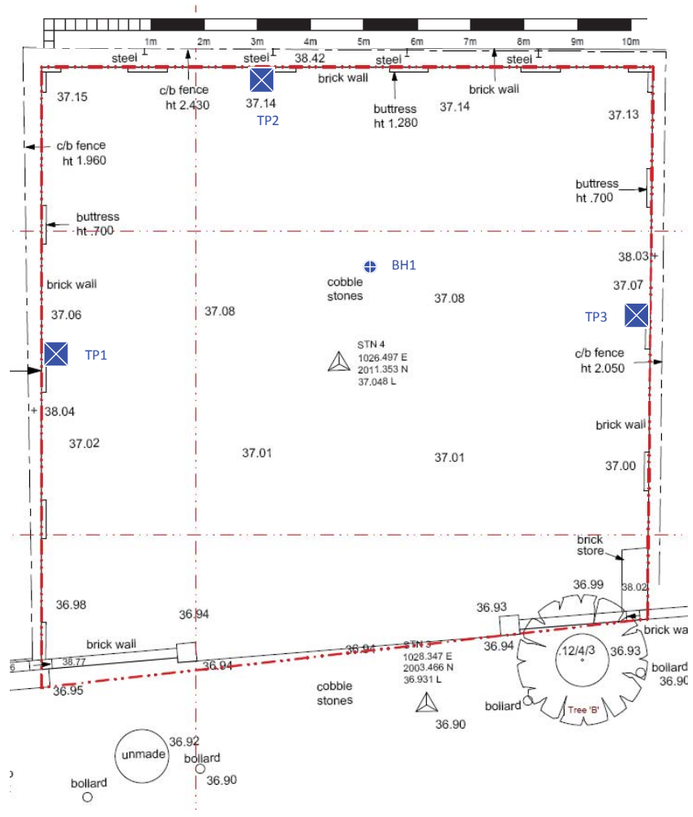
Laboratory testing has been scheduled and we expect the results in 2-3 weeks time. We would expect to issue our report in early January 2015 to account for Christmas closures.

Yours sincerely

James Burkitt BEng (Hons) CEnv MRICS
Managing Director

Encs

Aviron Associates Limited - Head Office
Badgemore House – Badgemore Park – Gravel Hill – Henley on Thames – Oxfordshire – RG9 4NR
Contacts
T; 01491 413 722 - M: 07787 771 686 - F: 01491 413 722 - E: james@aviron.co.uk - W: www.aviron.co.uk
Registered Office
Herschel House, 58 Herschel Street, Slough, Berkshire, SL1 1PG
Company no. 06471259 - VAT no. 929 5083 96



Legend

Borehole Location

Trial Pit to Foundations

Notes

Plan provided to Aviron by Client

Figure 1

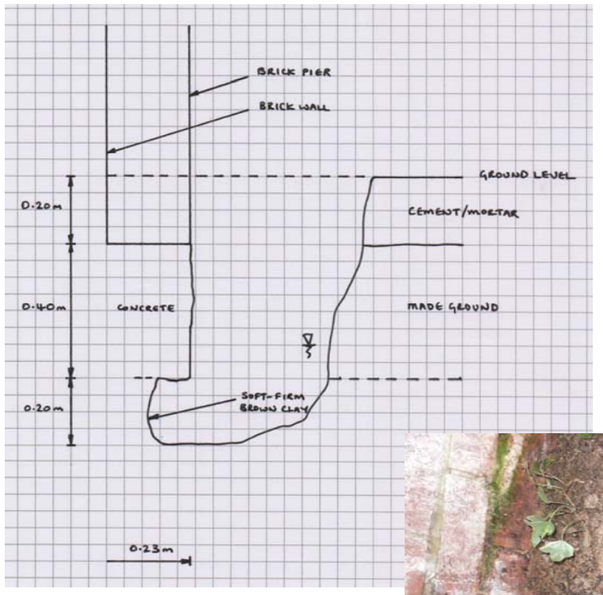
Drawing Title	Exploratory Hole Location Plan
Project Number	14-306.01
Project Title	Parking Area, St Pauls Mews, London, NW1 9TZ
Drawn by	JB
Checked by	OB
Scale	NTS

Aviron Associates Limited - Badgemore House - Gravel Hill - Henley on Thames - RG9 4NR - T: 01491 413 722 - M: 07787 771 686 - E: james@aviron.co.uk

TRIAL PIT LOG

Project:		Project No.	Trial Pit:
Parking Area, St Pauls Mews, London, NW1 9TZ		14-318.01	TP1
Client:	Start:	End:	Sheet:
St Pauls Mews Limited	02.12.2014	02.12.2014	1 of 1
Method/Plant Used:	Co-ordinates:	Ground Level:	
3t mini digger + Hand	NT	NT	

Trial Hole Sketch, Log and Photograph



Water level observations (depths in metres below gl)

Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks
02.12.2014	0.50	0.50	NT	0.50	

Remarks		By	Date	
Backfilled on completion. Completed against brick pier.	Logged	OB	02.12.2014	
	Checked	JB	03.12.2014	Scale NTS

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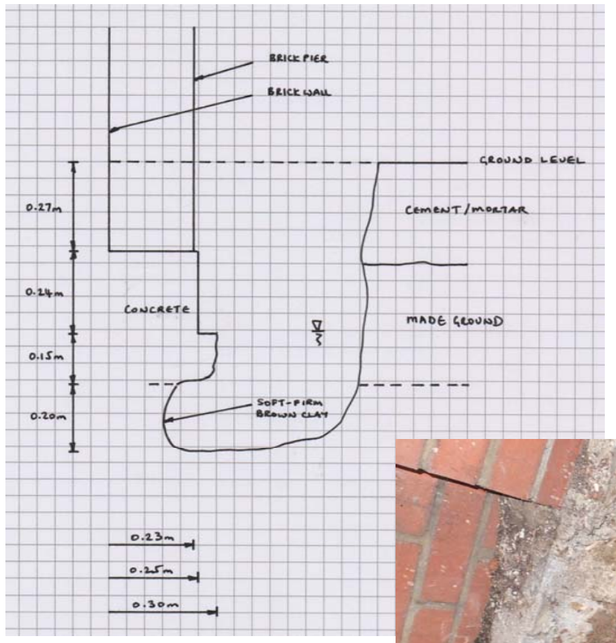
TRIAL PIT LOG

Project:		Project No.	Trial Pit:
Parking Area, St Pauls Mews, London, NW1 9TZ		14-318.01	TP2
Client:	Start:	End:	Sheet:
St Pauls Mews Limited	02.12.2014	02.12.2014	1 of 1
Method/Plant Used:	Co-ordinates:	Ground Level:	
3t mini digger + Hand	NT	NT	

Trial Hole Sketch, Log and Photograph



Water level observations (depths in metres below gl)

Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks
02.12.2014	0.50	0.50	NT	0.50	

Remarks		By	Date	
Backfilled on completion. Completed against brick pier.	Logged	OB	02.12.2014	
	Checked	JB	03.12.2014	Scale NTS

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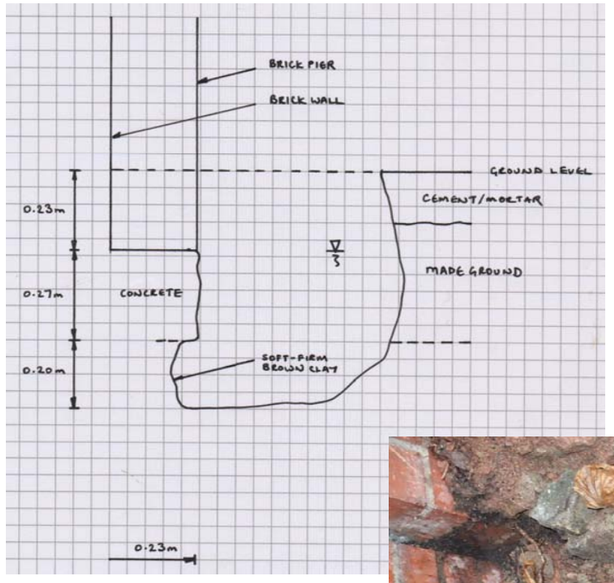
TRIAL PIT LOG

Project:		Project No.	Trial Pit:
Parking Area, St Pauls Mews, London, NW1 9TZ		14-318.01	TP3
Client:	Start:	End:	Sheet:
St Pauls Mews Limited	02.12.2014	02.12.2014	1 of 1
Method/Plant Used:	Co-ordinates:	Ground Level:	
3t mini digger + Hand	NT	NT	

Trial Hole Sketch, Log and Photograph



Water level observations (depths in metres below gl)					
Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks
02.12.2014	0.25	0.25	NT	0.25	

Remarks		By	Date
Backfilled on completion. Completed against brick pier.	Logged	OB	02.12.2014
	Checked	JB	03.12.2014
		Scale	NTS

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BOREHOLE LOG

Project:		Project No.	Borehole:
Parking Area, St Pauls Mews, London, NW1 9TZ		14-318.01	BH1
Client:	Start:	End:	Sheet:
St Pauls Mews Limited	03.12.2014	03.12.2014	1 of 3
Method/Plant Used:	Co-ordinates:	Ground Level:	
Dando 2000	NT	NT	

Description of Strata	Legend	Depth (m bgl) (thickness)	Sheet Depth (m)	Samples/Tests: Depth	No	Type	SPT Results: 75mm	75mm	75mm	75mm	75mm	N' Value	Laboratory Test Details
MADE GROUND; Concrete (0.2m) brown, orange, clayey, sandy Gravel with occasion brick and concrete		(0.80)		0.5	1	CD							
		0.80											
Soft to firm brown, locally mottled grey CLAY (London Clay Formation)		(2.40)		1.2-1.7	2	CD	1	2	2	2	2	8	
				2.2-2.7	3	CD	2	2	1	2	2	8	
		3.20		3.2-3.7	4	CD	4	3	4	4	4	15	
Stiff, rown locally mottled grey CLAY (London Clay Formation)		(1.80)											
				4.2-4.7	5	U							
Continued....		5.00	*5.0*										

Casing record			Chiselling records			Water level observations (depths in metres below gl)					
Date	Diameter (mm)	Depth (m)	Time	From (m)	To (m)	Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks
03.12.2014	150	1.20				03.12.2014	0.80	0.80	Seep	Cut off	

Remarks		By	Date
Standpipe installed to 5.0m with steel cover. Ground level to 2.0m Plain pipe. 2.0m to 5.0m Slotted pipe.	Logged	JB	03.12.2014
	Checked	OB	04.12.2014
		Scale	01:25

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BOREHOLE LOG

Project:		Project No.	Borehole:
Parking Area, St Pauls Mews, London, NW1 9TZ		14-203.01	BH1
Client:	Start:	End:	Sheet:
St Pauls Mews Limited	03.12.2014	03.12.2014	2 of 3
Method/Plant Used:	Co-ordinates:	Ground Level:	
Dando 2000	NT	22.20m ASD	

Description of Strata	Legend	Depth (m bgl) *(thickness)*	Sheet Depth (m)	Samples/Tests: Depth	No	Type	SPT Results: 75mm	75mm	75mm	75mm	75mm	75mm	N' Value	Laboratory Test Details
Stiff to very stiff, brown, locally mottled grey CLAY (London Clay Formation)		(3.20)		5.2-2.7	6	CD	6	7	6	6	7	7	26	
				6.2-6.7	7	CD	6	5	6	6	7	8	27	
				7.2-7.7	8	U								
		8.20		8.2-8.7	9	CD	6	6	7	7	8	8	30	
Very stiff, grey locally dark brown, blue, fissured CLAY (London Clay Formation)		(6.80)		9.2-9.7	10	CD	7	6	9	9	9	9	36	
Continued....			*10.0*											

Casing record			Chiselling records			Water level observations (depths in metres below gl)					
Date	Diameter (mm)	Depth (m)	Time	From (m)	To (m)	Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks
Remarks									By	Date	
								Logged	JB	03.12.2014	
								Checked	OB	04.12.2014	Scale 01:25

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BOREHOLE LOG

Project:		Project No.	Borehole:
Parking Area, St Pauls Mews, London, NW1 9TZ		14-318.01	BH1
Client:	Start:	End:	Sheet:
St Pauls Mews Limited	03.12.2014	03.12.2014	3 of 3
Method/Plant Used:	Co-ordinates:	Ground Level:	
Dando 2000	NT	NT	

Description of Strata	Legend	Depth (m bgl) *(thickness)*	Sheet Depth (m)	Samples/Tests: Depth	No	Type	SPT Results: 75mm	75mm	75mm	75mm	75mm	75mm	N' Value	Laboratory Test Details
...continued														
Very stiff, grey locally dark brown, blue, fissured CLAY (London Clay Formation)				10.2-10.7	12	CD	7	6	8	9	9	10	36	
				12.2-12.7	13	CD	8	8	9	9	10	10	38	
				14.2-14.7	14	CD	8	8	9	9	10	11	39	
EOBH		15.00	*15.0*											

Casing record			Chiselling records			Water level observations (depths in metres below gl)					
Date	Diameter (mm)	Depth (m)	Time	From (m)	To (m)	Date	Water strike	Water level (after 20mins)	Flow	Standing level	Remarks
Remarks									By	Date	
								Logged	JB	03.12.2014	
								Checked	OB	04.12.2014	Scale 01:25

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Appendix C

Building Damage Classification Table

During the later detailed design phases of the project a geotechnical specialist will undertake a ground movement analysis to confirm the foundation widths and limit movement to within the trigger values agreed under the Party Wall awards. Monitoring will be undertaken during the works to ensure these values are not exceeded.

Classification of visible damage to walls (after Burland et al*, 1977, Boscardin and Cording, 1989; and Burland, 2001)*

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

Notes

1. In assessing the degree of damage, account must be taken of its location in the building or structure.
2. Crack width is only one aspect of damage and should not be used on its own as a direct measure of it.

Appendix D

Thames Water Asset Search