CONSTRUCTION METHOD STATEMENT

FOR

PROPOSED BASEMENT WORKS

AT

FLAT 2, 32 BROMPTON SQUARE
LONDON
SW3 2AE

FOR

OWN LONDON

Project No. P2788

Issue Date: 06 November 2014
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Issued for Planning
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1.00 INTRODUCTION

1.01 Michael Alexander Consulting Engineers has been appointed by Own London to prepare a Construction Method Statement (CMS) for the proposed basement at 32 Brompton Square, London SW3 2AE.

1.02 The proposal is to create a basement extension under the existing courtyard, which will also extend under part of the existing ground floor.

1.03 The site is located within the Royal Borough of Kensington & Chelsea (RBKC) and this report has been prepared to meet the requirements of section 6 of the supplementary planning document ‘Subterranean Development’, adopted May 2009.

1.04 This Report has been prepared by A S Rivett-Carnac BEng CEng MInstEng a Chartered Structural Engineer. It is to be read in conjunction with:

- The Architect’s Drawings
- The Architect’s Design & Access Statement
- The Site Soil Investigation report by Ian Farmer Associates

1.05 This report is the full Construction Method Statement to address the specific requirements set out in clause 6.1.3 of Royal Borough of Kensington and Chelsea’s supplementary planning document ‘Subterranean Development’, adopted May 2009.

1.06 This Report is for the sole use of Own London and their advisors.

2.00 BASEMENT PROPOSALS

2.01 Detailed plans of the existing building are shown on the survey drawings prepared by Groundsurvey Ltd.

2.02 The existing building at 32 Brompton Square is a 5 storey end of terrace property with a single level basement under part of the building. Flat 2 comprises the ground and first floors of the property.

2.03 The existing buildings look to be of traditional construction, with load bearing masonry and timber stud walls with timber floors and roof structures. It is understood that 32 Brompton Square and adjoining buildings date from the early 19th century.

Extract from 1850-1851 map
3.00 DESK STUDY

3.01 The site is bounded by Brompton Square to the South, Ennismore St to the North, 31A Brompton Square to the West and 33 Brompton Square to the East. The adjoining properties look to be of similar age, type and construction.

Geology

3.02 Extracts from the British Geological Survey map indicate that the site is on the boundary of the Kempton Park Gravel strata and the London Clay Formation – refer figure (a).

3.03 We have also reviewed local borehole records to the east of the site which encountered a significant depth of made ground over an approximately 4m deep sand and gravel strata which in turn overlaid London Clay subsoils.

3.04 The ‘Lost Rivers of London’ map indicates that the site lies approximately 500m west of the line of the River Westbourne – refer figure (b).
Groundwater

3.05 With reference to the Environment Agency Aquifer Map, the site is located above a Productive Strata – refer figure (c).

3.06 The closest water well recorded to the site is approximately 300m to the east of the site adjacent to Hans Road – refer figure (d).

3.07 The surface permeability of the site will not be affected by the works as there is no significant change to the impermeable area of the property with the proposed basement being under the existing building and an existing paved courtyard.

3.08 The water table level at the site is not known and so will be subject to site specific investigation as described below. A nearby investigation recorded the ground water level at around 5m below ground level.
Surface Flow and Flooding

3.09 With reference to the Environment Agency’s maps, the site is not at risk of flooding from rivers – refer figure (e).

3.10 With reference to the Environment Agency’s maps, the site is not at risk of flooding from reservoirs – refer figure (f). Specifically it is not in area at risk of flooding from the nearby Serpentine.

3.11 The site is not close to the banks of a river or canal - the River Thames runs approximately 1300m to the south of the site. The site area is less than 1 hectare.

3.12 With reference to the Strategic Flood Risk Assessment for the borough, it is understood that neither Brompton Square nor Ennismore Street were affected by the extreme rainfall event on 20 July 2007, which resulted in ponding of water on roads and flooding of some properties within RBKC.

3.13 Since the proposed basement will be under the existing building and an area currently used as courtyard, the area of collected drainage will not be increased by the works.

3.14 Thames Water records show that there are combined sewer services along Ennismore Street and Brompton Square, with a depth of approximately 4m along Ennismore Street and 3.2m to Brompton Square. Refer to Thames Water Asset Search in Appendix A.

3.15 Thames Water have confirmed that they have no record of any sewer flooding to 10 Priory Walk – refer Appendix A.
Infrastructure

3.16 The site is not above or in close proximity to the London Underground network of tunnels – refer figure (g). The Piccadilly line runs broadly along the line of Brompton Road, 150m to the south of the site. The disused ‘Brompton Road’ underground station was located on the corner of Brompton Road and adjacent Cottage Place, 120m to the south of the site.

3.17 The site is not close to the route of Crossrail which runs across the north east corner of Hyde Park approximately 1200m to the north east of the site. The proposed Chelsea-Hackney line (now known as Crossrail 2) has a safeguarded route through parts of west, central and east London. Through RBKC the proposed route runs along Kings Road to Sloane Square approximately 1200m to the south and is therefore remote from the site.

Trees

3.18 There are no substantial trees within the existing courtyard of 32 Brompton Square, with the majority of trees and bushes containerised. There are substantial trees within the rear gardens of 33 Brompton Square.

Ground Stability

3.19 There is a slight fall across the site of 32 Brompton Square from north to south with the street level to Ennismore Street approximately 1.35m higher than the street level to Brompton Square. However there are no significant slopes in the vicinity of the site and the site is not part of a general hillside setting. Refer figure (h) which show the local contours.

3.20 The proposed basement extension is remote from the Public Highway to Brompton Square, but will be constructed in close proximity to Ennismore Street.
Site History

3.21 From review of the English Heritage listed building map we note that 32-36 Brompton Square is Grade II listed – refer figure (i). From the listing detail we understand the terrace was constructed in 1824-1839.

3.22 We reviewed a number of pre-war and post-war historic maps. These show that the house was present in the maps from the mid part of the 19th Century, and that the area remained substantially unchanged until the end of the century. Early twentieth century maps start to show the current building form including the garages and buildings adjacent to Ennismore St.

1896 map 1916 map showing current building form.

3.23 With reference to the website bombsight.org, the nearest recorded World War 2 bombs fell to the east side of Brompton Square, approximately 50m from the site. Refer figure (j). Due to the relatively high concentration of World War 2 bombs in this part of the London, prior to excavation on site it would be prudent to carry out a specialist unexploded ordnance (UXO) risk assessment.

Utilities

3.24 No information was available at the time of this report in respect of any other utility services running adjacent to or within the site. These will need to be established prior to commencement of construction to allow appropriate protection or diversion measures to be undertaken.

Utilities

Figure (i)
Listed Building Map (Extract from English Heritage)

Figure (j)
Listed Building Map (Extract from English Heritage)
4.00 GROUND CONDITIONS

4.01 The ground conditions have been investigated by:-
- Review of local geological information as described in 3.02-3.03
- A site specific soil investigation carried out by Ian Farmer Construction and Materials Specialists in March 2014.

4.02 The site ground conditions have been found to be a moderate thickness of made ground overlying the Kempton Gravels. Groundwater was not encountered in the borehole during installation or in a following monitoring reading after the investigations.

5.00 PROPOSED CONSTRUCTION

5.01 Outline structural proposals for the basement works are shown on the following Michael Alexander drawings, included in Appendix C: -

- P2788/CMS01 Proposed Basement Plan
- P2788/CMS02 Proposed Ground Floor Plan
- P2788/CMS03 Proposed Ground Floor Plan Showing Structure Over
- P2788/CMS04 Proposed First Floor Plan Showing Structure Over
- P2788/CMS10 Proposed Sections

5.02 The proposal is to construct a two storey infill extension above an existing courtyard at the rear of the property with a single storey basement beneath.

5.03 The basement will be constructed from traditional underpinning on three sides under the existing back addition walls and courtyard adjacent to Ennismore Street and concrete retaining walls formed in sections adjacent to the back wall of the main house.

5.04 The underpinning and retaining walls will be propped in the temporary condition and permanently by the basement roof slab, which will form the ground floor.

5.05 A steel frame and columns will be installed on temporary foundations to support the existing first floor structure. The new basement slab will be formed above the temporary foundations.

5.06 The basement will be Grade 3 to BS8102 to provide watertight construction. This is likely to be achieved by using an internal drained cavity system, which will also extend across the basement floor.

5.07 In the permanent case the lateral loads on the basement from the earth pressures will be resisted by the new slab at ground floor level.

5.08 The design and construction of the building structure will be in accordance with current Building Regulations, British Standards and Codes of Practice, Health and Safety requirements and good building practice.

5.09 Preliminary calculations for the basement works have been carried out, and these are included in Appendix D.

5.10 The various methods of construction proposed are discussed in more detail in section 7.0

6.00 DETAILED ASSESSMENT

6.01 This detailed assessment has been carried out to address the specific requirements set out in clause 6.1.3 of Royal Borough of Kensington and Chelsea’s supplementary planning document ‘Subterranean Development’, adopted May 2009.

6.1 Geology

6.1.01 A site specific Ground Investigation has been carried out by Ian Farmer Construction and Materials Specialists, which comprised the excavation of a borehole and trial pits and included measurement of ground water levels.

6.1.02 A thin layer of made ground was found to a depth of 1.80m below ground, overlying the Kempton Gravels to 5.84 metres, being the full extent of the borehole and approximately two metres deeper than the proposed basement. From borehole records on nearby sites the London Clay lies beneath the Kempton Gravels which have an average depth of 6.0m in this area.

6.1.03 The details of the Ian Farmer Investigations are provided in their report number 15699 dated March 2014.

6.2 Ground Water

6.2.01 Ground water was not encountered during the trial pit and borehole excavations; neither was it recorded in subsequent visits to the borehole that was installed. It is not uncommon however to encounter perched water in the gravel immediately above the impervious London Clay.

6.3 Basement Impact

6.3.01 It has been established that there are no tunnels in close proximity to the site which could be impacted by the works – refer 3.16 to 3.17 of this report.

6.3.02 It is not anticipated that any trunk utilities cross the site or are in close proximity to the site. However the presence of any services on site will also be checked by scanning and marking on site prior to any excavation works.

Any services running in the pavements to Brompton Square and Ennismore St will be safeguarded during the works to the basement by the selection of construction techniques that maintain stability of the highway and adjoining pavements.

6.3.03 The potential for impact on the adjoining properties has been considered in detail in developing the design principles for the proposed basement. The proposed construction methods have been selected to minimise the impact.

6.3.04 The basement proposals have been developed in consultation with a Historic Buildings Consultant after extensive pre-application discussions with officers from the Royal Borough of Kensington and Chelsea. The consultation process has guided the design team in respect of the allowable works to the listed building.

6.3.05 The formation of a basement beneath a listed building has various challenges. Underpinning has not been considered appropriate to the walls of the original house. The basement is therefore confined to the rear of number 32 Brompton Square beneath the existing back addition, which is not deemed to be of the same quality or age as the...
6.3.06 Underpinning is therefore only proposed to the existing rear walls of the back addition adjacent to Ennismore St, forming three sides of the basement. Underpinning will enhance the capacity of the foundations to the walls, and improve their resistance to ground movement going forward. Where the basement adjoins the main house this fourth wall will be formed by constructing a reinforced concrete wall in sections and next to the existing basement that is beneath the listed building. It has been assessed that both of these techniques will not have any significant adverse impact on the listed buildings or adjoining buildings, since:

- There is no evidence of foundation problems to either of the adjoining properties
- The ground conditions do not vary significantly within the basement depth, with the Kempton Gravel found to be of similar stiffness where soil samples were tested during the borehole investigations.
- Contingency plans will be in place should perched water be encountered or excavation faces do not remain stable. These might include sacrificial temporary works or jet grouting of exposed soil faces.

6.3.07 Adopting rigorous construction methods and well designed and installed temporary supports during construction, any foundation movement can be controlled and minimised to avoid damage to adjacent buildings.

6.3.08 To estimate ground movements associated with the excavation works, reference has been made to Table 2.4 of CIRIA C580. This empirical method is normally used for basements formed using piled walls on all sides, but can be a useful estimate for other forms of basement construction, provided the construction methods maintain horizontal propping at all times and that retaining structures are ‘stiff’. The estimates have been based on the maximum depth of basement, which is approximately 3.5m below existing rear courtyard level.

6.3.09 The ground movement estimates immediately adjacent to the proposed basement are therefore as follows:

<table>
<thead>
<tr>
<th>Excavation depth (m)</th>
<th>Predicted movements due to excavation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Horiz (mm)</td>
</tr>
<tr>
<td>3.5</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 6.3.09 - Initial predictions of ground movement calculated using procedure in CIRIA C580

6.3.10 The cumulative predicted ground movements are small, and since the adjoining properties are founded at depth to accommodate existing lower ground floors, the foundation level movements will be significantly less than those predicted using the CIRIA C580 method. It is therefore expected that any damage to the adjacent buildings as a result of the basement works, as classified by Burland, will generally be category 0 ‘Negligible’ for adjoining properties and at worst category 1, ‘Very Slight’.

6.3.11 As part of the process of obtaining party wall awards, schedule of conditions will be carried out to nos. 31 and 33 Brompton Square and the flats above flat 1, which will include the courtyard walls at the rear of the property. If there is any ‘damage’ as a result of the works it will then be recorded and rectified under the provisions of the Party Wall Act.

6.4 Slope Stability

6.4.01 As noted in clause 3.19 and 3.20, the site is on flat land, and with reference to local topography, there are no steep slopes in the vicinity of the site. For this reason no further consideration of slope stability is necessary.

6.5 Surface Water

6.5.01 With reference to clauses 3.09 – 3.11, there is a very low risk of flooding of the site from rivers or reservoirs and hence no formal Flood Risk Assessment is necessary.

6.5.02 There is no change to the surface permeability of the proposed basement as it is entirely beneath the existing building.

6.5.03 With reference to the Thames Water Asset search in Appendix B it is understood that Brompton Square was not affected by flooding as a result of surcharging of the public sewers.

6.5.04 As is good practice however, positively pumped devices (PPDs) will be used for all new connections to the public sewer to protect the property. These comprise a pump and a non-return valve to prevent back-surgeing into the basement during extreme rain events.

6.5.05 With reference to clauses 3.05 to 3.08 of this report, the site is underlain by the Kempton Gravels stratum which is not a productive aquifer, and in addition ground water has not been recorded on the site. Therefore significant water inflows are not anticipated during the construction.

6.6 Impact on Trees

6.6.01 As noted in clause 3.18 of the Desk Study, there are no trees which need to be considered in terms of the impact of the basement.

6.7 Temporary Works

6.7.01 The proposed temporary works and construction sequence are described in section 8 of this report. These proposals will be developed and detailed by the appointed Contractor in due course and subject to the normal reviews by adjoining parties under the Party Wall Act.

6.7.02 The following sections refer to a general discussion of the Construction Methods we have proposed for this development.
CONSTRUCTION METHODS

Engineering Issues

We have considerable experience of constructing basements beneath terrace properties and the construction issues are well understood. With our combined experience, we are confident that the construction at number 32 Brompton Square will be straightforward.

The construction of a basement in an existing five storey terrace has certain technical challenges to overcome. The issues surrounding the potential for differential settlement need to be adequately addressed to prevent excessive movement and cracking of adjacent buildings.

The existing “terrace”, which was built in approximately the 1830’s, has had 180 years to ‘bed in’ and the foundations will have undergone their long term settlement and consolidation. There is no visible evidence of cracking, deformation or movement due to ongoing or recent subsidence. It can be assumed that the terrace is therefore not subject to ongoing movement.

The following methods are discussed in view of the construction processes. The engineering issues are addressed in the context of the challenges presented.

Underpinning

The underpinning for the rear wing building has been carefully considered. It seems that the party wall with the existing basement flat beneath 32 Brompton Square is founded at depth to facilitate the construction of the basement beneath that property. This is the section of the new basement wall which will be constructed in sections. The temporary removal of support to the existing walls which will be underpinned will be limited to 1200mm lengths to enable the walls to safely span or bridge over each excavated section, while the underpins are constructed.

The quality of the existing masonry is likely to be variable and precautions will be adopted to ensure that the walls are temporarily strapped and propped during construction. In cases where the masonry is not well bonded, contains voids or has lost its integrity, additional propping will be introduced, and the masonry will be re-bonded to ensure the integrity is restored.

Underpinning through the sandy gravels is relatively straightforward, but the excavated faces will require temporary shoring. An initial trial excavation will be carried out to establish the soil stability and to what extent shoring will be required.

Ground water was not encountered during the soil investigation and during trial pit excavations the existing ground was dry. It is envisaged that local sump pumping to deal with any water in the excavations, if it is present, will suffice.

The underpinning has been designed to support the buildings vertical loads. Lateral earth pressures and highway surcharges have also been considered. The design of the underpinning has shown that mass concrete underpins, which will also be temporarily propped during excavation and permanently propped by the construction of the reinforced basement box will be appropriate. The temporary propping will be monitored during excavation and construction works.

The underpinning will be constructed to a typical underpinning sequence of 1,4,2,5 and

3. Given the gravel subsoils it will be appropriate to underpin the walls in two stages. The first stage will be to approximately half the depth of the basement, the second stage will not be progressed until all of the first stage pins are cured and fully dry packed. The second stage will be staggered in plan with the first stage.

With reference to the already underpinned party wall, construction of the sectional retaining wall will commence from the level of the existing basement under that property once this is established by trial holes. This is expected to be from a reduced level beneath the existing rear wing, excavated after stage 1 underpinning. This wall may only be locally lowered by a small amount from the existing base level. Elsewhere it will commence from floor level which is approximately the same as the general ground floor level at the rear.

Ground movement and crack mitigation

It appears that the proposed foundations and basement may be no deeper than the existing foundations to the adjoining properties; however the design of the basement and temporary works will be developed to mitigate the potential for damage to the adjoining properties.

Ground movements associated with the construction of the basement can arise from a number of sources. Ground movements have been estimated during construction and are described in the sections below. The stages are as follows:

- Vertical settlement of the walls onto the underpins, as the wall loads are transferred onto the pins.
- Short term movements of the underpinned foundations.
- Excavation of the basement.
- Heave and long term movement

Settling of the walls onto the underpins

As the walls settle onto the underpinning, there is a certain amount of natural ‘bedding in’ of the system. The rigorous construction standards to be applied to the underpinning process will ensure that there will be minimal bedding in following installation.

Short term movements of the underpinned foundations

There will be some short term settlement beneath the new foundations as the load is transferred to the new founding level. Given the depths for the new foundations the estimated total settlement from construction of the underpinned party walls is summarised above.

Heave movements (due to the excavation and relaxation of the loaded ground below the underpinning) may be in the order of 2mm, but from previous experience this will not be fully developed as the load of the existing building is transferred soon after construction.
Excavation of the basement

7.17 All necessary steps will be taken to ensure that there will be no movement resulting from the excavation of the basement level.

7.18 Movements resulting from excavation of the basement between the underpinning re dependent on the depth of excavation. The intended construction sequence will incorporate a rigid temporary support system to the underpinning during excavation. Under such conditions, the CIRIA guide indicates that maximum horizontal movement of the ground surface is likely to be 0.15% of the excavation depth, with horizontal movements extending up to 4 times the excavation depth, while maximum vertical movement is likely to be 0.08% of the excavation depth, extending to 3.5 times the excavation depth from the wall.

7.19 While the CIRIA estimates strictly apply to embedded retaining walls, they have also successfully been used where the retaining walls are underpins.

7.20 Horizontal movements, due to excavation, will generally reduce linearly with distance from the excavation. With well-propped construction, the horizontal movements of the ground surface at the top of the wall will be minimal, with the maximum horizontal displacement occurring towards the bottom of the excavation.

7.21 The predicted ground movements are based on data for regular square basements, and take no account of the effects of buttresses along the wall lengths. Given the relatively small dimensions between internal masonry walls the predicted excavation induced ground movements will be smaller than predicted values.

Heave and long term movements

7.22 When the new basement structure is complete, the building will be supported by the underpinned walls and retaining wall basement structure. Any potential for heave beneath the new basement will be prevented by the self-weight of the new and existing structure.

7.23 Heave movements tend largely to be restricted to the area within the excavated basement, so it is not anticipated that the changes in loading at basement level will have any noticeable effect on surrounding structures, particularly given the stiffness of the underpinning and the relatively small depth of soil being removed to form the new basement.

7.24 It is presumed that the underpinning and excavation works will be executed in a well-controlled manner and that the existing buildings adjacent to the site are currently in good condition, the potential movements and associated strains fall into the “negligible” to “very slight” damage category by Burland et al. Reference should be made to Table 2.5 of CIRIA C580.

Monitoring of temporary works and existing structures

7.25 Measurement monitoring of the temporary works, Party Wall and adjoining structures will be carried out during the construction period. The precise scope of monitoring will be prepared in conjunction with the advisors to the Adjoining Owners.
8.00 PROPOSED SEQUENCE OF CONSTRUCTION.

8.01 The following provides an outline sequence of construction for the construction of the house and basement. This should be read in conjunction with the proposed structural drawings for the works directly affecting the neighbouring buildings. The methods will be developed and finalised by the appointed Contractor, once the detailed design is complete.

8.02 During construction noise, vibration and dust will be maintained with levels agreed with RBKC, and the measures put in place to achieve this in accordance with the relevant acts and regulations including Control of Pollution Act (COPA) 1974, Environmental Protection Act 1990 and Noise Emission in the Environment by Equipment for use Outdoors Regulations 2001. Due reference will also be made to British Standard 5228 – 1: 2009: Code of practice for noise and vibration control on construction and open sites.

8.03 Prior to works commencing, schedules of condition will be carried out to the adjoining properties as part of the Party Wall process.

8.04 As is customary with projects of this nature and sensitivity, a Specification for Monitoring the adjacent building structures will be put in place and the monitoring will commence to ensure that movement does not occur.

8.05 The works will commence with the setting up of a safe working area with particular regard to the protection of the public and the adjoining owner’s properties.

8.06 The condition of the existing walls will be reviewed as the stripping out work proceeds at ground floor level, with strapping and props installed at ground floor level to stabilise the brickwork as necessary.

8.07 The first construction process will be to install the permanent steelwork frames supporting the first floor structures overhead followed by the underpinning of the perimeter walls beneath the rear wing.

8.08 Temporary ground support would also be installed at this time to support the ground to facilitate excavation and underpinning. This would be achieved with temporary trench sheets and props. Temporary props at the tops of the underpinning/base of the existing walls will be installed in both directions to resist the lateral ground and surcharge loads. Permanent beams at the ground floor to support the steelwork frame supporting the first floor will also be installed.

8.09 Once all of the stage 1 underpinning is completed, cured and dry-packed then excavation to the base of the first stage will be undertaken.

8.10 Temporary horizontal props would be installed at this reduced level to prop between the top of the stage 1 underpins. It is envisaged that the props at both levels will be formed from a proprietary propping system subject to the Contractors choice.

8.11 From the reduced level the second stage underpinning will commence along with the construction of the sectional retaining wall adjacent to the existing basement beneath the house.

8.12 Michael Alexander’s Structural Specification will include clauses for monitoring movement of the underpinning during the temporary propping and excavation processes. Through selective choices of the Contractors proposed Temporary Works subcontract and robust supervision our experience is that these operations can be well controlled during construction.

8.13 Excavation between the second stage underpinning then proceed in the normal way, with dowels and shear keys used to link the adjacent pins and enable the construction to span between the temporary and permanent horizontal props.

8.14 Excavation can proceed down to the underside of the second level of underpinning. A second level of temporary horizontal props may also be installed at the lowest level prior to construction of the basement slab.

8.15 The basement raft slab will then be constructed. The internal columns, internal walls and the waterproofing and lining walls will follow.

8.16 The ground floor slab will then be constructed. When the ground floor concrete has reached full strength, the temporary horizontal props can be removed.

8.17 On completion of the ground floor structure, the internal and upper floor works will be progressed.
APPENDIX A

THAMES WATER RECORDS
Figure A1 - Extract from Thames Water Asset Search showing a combined sewer

Figure A2 - Key to Thames Water Asset Search

Figure A3 - Manhole Invert and Cover Levels
Sewer Flooding

History Enquiry

Thames Water Property Searches

Vastern Road

Search address supplied 32 Brompton Square
London SW3 2AE

Your reference P2788 32 Brompton Square SW3

Our reference SF/H/SFH Standard/2014_2705469

Received date 6 March 2014

Search date 6 March 2014

Sewer Flooding

History Enquiry

Is the requested address or area at risk of flooding due to overloaded public sewers?

The flooding records held by Thames Water indicate that there have been no incidents of flooding in the requested area as a result of surcharging public sewers.

For your guidance:

- A sewer is “overloaded” when the flow from a storm is unable to pass through it due to a permanent problem (e.g., flat gradient, small diameter). Flooding as a result of temporary problems such as blockages, siltation, collapse and equipment or operational failures are excluded.
- “Internal flooding” from public sewers is defined as flooding, which enters a building or passes below a suspended floor. For reporting purposes, buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes.
- “At Risk” properties are those that the water company is required to include in the Regulatory Register that is presented annually to the Director General of Water Services. These are defined as properties that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overflowing of the sewerage system more frequently than the relevant reference period (either once or twice in ten years) as determined by the Company’s reporting procedures.
- Flooding as a result of storm events proves to be exceptional and beyond the reference period of one in ten years are not included on the At Risk Register.
- Properties may be at risk of flooding but not included on the Register where flooding incidents have not been reported to the Company.
- Public Sewers are defined as those for which the Company holds statutory responsibility under the Water Industry Act 1991.
- It should be noted that flooding can occur from private sewers and drains which are not the responsibility of the Company. This report excludes flooding from private sewers and drains and the Company makes no comment upon this matter.
- For further information please contact Thames Water on Tel: 0845 9000 800 or webpage www.thameswater.co.uk

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Michael Alexander Consulting Engineers
APPENDIX B

PHOTOGRAPHS
APPENDIX C

OUTLINE STRUCTURAL DRAWINGS
APPENDIX D

OUTLINE STRUCTURAL CALCULATIONS
1. INTRODUCTION

The proposed works to Flat 2 32 Brompton Square, is to construct a two storey infill extension with a basement under the rear of the existing house and rear courtyard.

The new basement will generally be constructed by underpinning the existing rear walls. The basement adjacent to the existing neighbouring basement will be constructed with reinforced insitu concrete retaining walls internally. The walls will be propped in the temporary condition and permanently by the basement roof slab, which is the new ground floor.

The proposed structural modifications are shown on Michael Alexander drawings

P2788/CMS01  Proposed Basement Plan
P2788/CMS02  Proposed Ground Floor Plan
P2788/CMS03  Proposed Ground Floor Plan Showing Structure Over
P2788/CMS04  Proposed First Floor Plan Showing Structure Over
P2788/CMS10  Proposed Sections

The new floor constructions will be in timber joists, spanning front to back between beams/internal dividing walls on the upper floors. The walls will be in masonry construction internally with cavity walls externally.

The following calculations take the spans into account and have resulted in the structural sizes indicated on the drawings.

These preliminary calculations are for planning purposes only. Detailed calculations will be developed in due course in respect of Part A of The Building Regulations.
2. BRITISH STANDARDS

The following Standards will be applied in the detailed design:

- BS648: Weights of Building Materials
- BS5268: Part 2: Structural use of Timber: Permissible Stress design, materials and workmanship
- BS5950: Part 1: Structural Steelwork-Simple & continuous construction
- BS5977: Part 1: Lintels: Method for Assessment of Load
- BS6399: Part 1: Code of Practice for Dead and Imposed Load
- BS6399: Part 3: Code of Practice for Imposed Roof Load
- BS8007: Code of practice for design of concrete structures for retaining aqueous liquids
- BS8110: Part 1: Structural use of concrete
## 3. LOADING

### Flat roof Construction

<table>
<thead>
<tr>
<th>Material</th>
<th>Loading (kN/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Membrane</td>
<td>0.40</td>
</tr>
<tr>
<td>Timber joists</td>
<td>0.20</td>
</tr>
<tr>
<td>Insulation</td>
<td>0.01</td>
</tr>
<tr>
<td>Plywood</td>
<td>0.30</td>
</tr>
<tr>
<td>Plaster x2</td>
<td>0.40</td>
</tr>
<tr>
<td><strong>Total Dead Load on elevation</strong></td>
<td><strong>1.31</strong></td>
</tr>
<tr>
<td><strong>Total Live Load</strong></td>
<td><strong>0.60</strong></td>
</tr>
<tr>
<td><strong>Ultimate</strong></td>
<td><strong>2.78</strong></td>
</tr>
</tbody>
</table>

### First Floor

<table>
<thead>
<tr>
<th>Material</th>
<th>Loading (kN/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floor boards/ finishes</td>
<td>0.22</td>
</tr>
<tr>
<td>Timber joists</td>
<td>0.24</td>
</tr>
<tr>
<td>Ceiling/services.Insulation</td>
<td>0.50</td>
</tr>
<tr>
<td><strong>Total Dead Load</strong></td>
<td><strong>0.96</strong></td>
</tr>
<tr>
<td><strong>Total Live Load</strong></td>
<td><strong>1.50</strong></td>
</tr>
<tr>
<td><strong>Ultimate</strong></td>
<td><strong>3.74</strong></td>
</tr>
</tbody>
</table>

### New External wall (Cavity masonry wall)

<table>
<thead>
<tr>
<th>Material</th>
<th>Loading (kN/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2x 100thk blockwork wall rendered</td>
<td>4.50</td>
</tr>
<tr>
<td>Plaster</td>
<td>0.50</td>
</tr>
<tr>
<td><strong>Total Dead Load on elevation</strong></td>
<td><strong>5.00</strong></td>
</tr>
</tbody>
</table>
350mm Concrete Slab over new basement

Dead Load
- Concrete slab: 8.40 kN/m²
- Insulation: 0.01"
- Ceiling and services: 0.50

Total Dead Load: 8.90 kN/m²

Imposed (+1.0 kN/m²): 2.50 kN/m²

Ultimate: 16.46 kN/m²

400mm Raft Slab

Dead Load
- Concrete Raft: 9.60 kN/m²
- Insulation: 0.01"
- Screed: 2.40 "

Total Dead Load: 12.01 kN/m²

Imposed (+1.0 kN/m²): 2.50 kN/m²

Ultimate: 20.81 kN/m²
4. **LOAD DIAGRAMS**

![Diagram showing load diagrams with various load values and levels: ground level, basement level, first floor level, and surface level.](image)

**FIGURE 1**

**DEAD & IMPOSED LOADS**

- **DL 0.96kN/m²**
- **IL 1.50kN/m²**
- **DL 0.96kN/m²**
- **IL 1.50kN/m²**
- **Surcharge vehicles 10kN/m²**
- **GL 7.5**
- **DL 9.60kN/m²**
- **IL 2.50kN/m²**
- **Basement level**
- **First Floor level**
Boundary walls to be removed & reconstructed

24.5 kN/m

24.5 kN/m

Sky Light

First Floor level

70.5 kN

70.5 kN

0L 1.30 kN/m²

IL 0.60 kN/m²

DL 8.90 kN/m²

IL 2.50 kN/m²

Ground level

Stair Void

Basement level

DEAD & IMPOSED LOADS

FIGURE 2

P2788 Construction Method Statement

Michael Alexander Consulting Engineers
5. PRELIMINARY CALCULATIONS

5.1 Check of Slab over Basement Below Infill Columns

Column Load from Extension = 70.5kN
Dead Load = 8.9 kN/m²
Live Load = 2.5 kN/m²
Span = 5.5m

Moment = 141.48 kNm/m

b = 1000, d = 350 – 35 – 12 – 20/2 = 293 mm
f_{cu} = 40 N/mm²

\[ M/bd^2 = 141,48 \times 10^6 / 1000 \times 293^2 = 1.7 \]

% As = 0.45, hence As = 1319 mm²/m

Adopt H20 @ 200mm c/c = 1570 mm²/m

Span/depth = 5500/293 = 19 < 20 hence OK
5.2 Underpinning Design (Simplified)

As summarised in load diagram, design vertical loads within soils are as follows:

\[
\begin{align*}
Ps &= (54/2) \times 3.5 \times 0.38 = 36 \text{kN/m} \\
Pu &= 10 \times 3.5 \times 0.38 = 13.3 \text{kN/m} \\
Pw &= (25/2) \times 2.0 = 25 \text{kN/m} \\
Ps + Pu + Pw &= 36 + 13.3 + 25 = 75 \text{kN/m} \\
\text{Prop Load} \times 2.8 &= (36 \times 1.00) + (25 \times 0.8) + (13.3 \times 1.75) \\
\text{Hence} &\quad \text{Prop Load} = 28 \text{kN/m}
\end{align*}
\]

This load will be used in design of temporary and permanent props.

Ground Floor slab to be designed to act as a prop.