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BASEMENT CONSTRUCTION METHOD STATEMENT

PROJECT REF:	15104
ADDRESS:	67 Goldhurst terrace London NW6
CLIENT:	Ian McGowan
DATE:	09.07.2015
REVISION:	A

This document has been prepared and checked by;

Engineer Name
(BCS Project Engineer)

Eur Ing Barry. C. Smith BSc (Eng) CEng MICE FFPWS .....
(BCS Company Director)

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I. PRELIMINARIES

SITE: 67 Goldhurst terrace, London,SW6

CLIENT: Ian McGowan

ARCHITECT:

ENGINEERS: BCS Consulting

DISCLAIMER:

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II. SUMMARY OF PROPOSED WORKS

EXISTING STRUCTURE:

The building is a late 19th or early 20th century London terraced property of traditional construction; the external envelope is constructed from solid masonry, likely supported on brickwork footings.

PROPOSED WORKS:

1. Formation of a single storey basement & front lightwell under the ground floor and rear garden at the above address.
2. Support of superstructure over to allow RC basement wall construction and ground floor slab installation.

III. ASSUMPTIONS MADE AT TIME OF WRITING

- External walls are solid masonry, supported on corbelled footings
- Internal walls at ground floor level are solid masonry or masonry infill.
- Ground & upper floors are of suspended timber construction.
- Property currently remains mainly unchanged structurally from its original form with any changes/repairs being in line with a property of its age.
- Front elevation demolished and re-built off new footing and tied back to existing construction.

IV. FUNDAMENTAL CONSTRUCTION AREAS

- RC BASEMENT WALLS TO BE FORMED IN ONE PHASE ENABLING THE FULL REQUIRED BASEMENT DEPTH TO BE ACHIEVED.
- TWO ROWS OF HORIZONTAL PROPS WILL BE REQUIRED TO ALL FULL HEIGHT UNDERPINS SPANNING ACROSS THE WHOLE SITE. PROPS SHOULD REMAIN IN PLACE UNTIL THE BASEMENT AND ANY GROUND FLOOR SLABS HAVE BEEN FULLY CONSTRUCTED AND HAVE SUFFICIENTLY CURED PROVIDING PERMANENT LATERAL RESTRAINT TO THE NEW RC RETAINING WALLS.
- ALL UNDERPINS AND RETAINED EARTH REQUIRES TEMPORARY WORKS AND SHUTTERING DURING EXCAVATION AND CASTING UNTIL SLABS ARE CAST.

V. SITE LOCATION

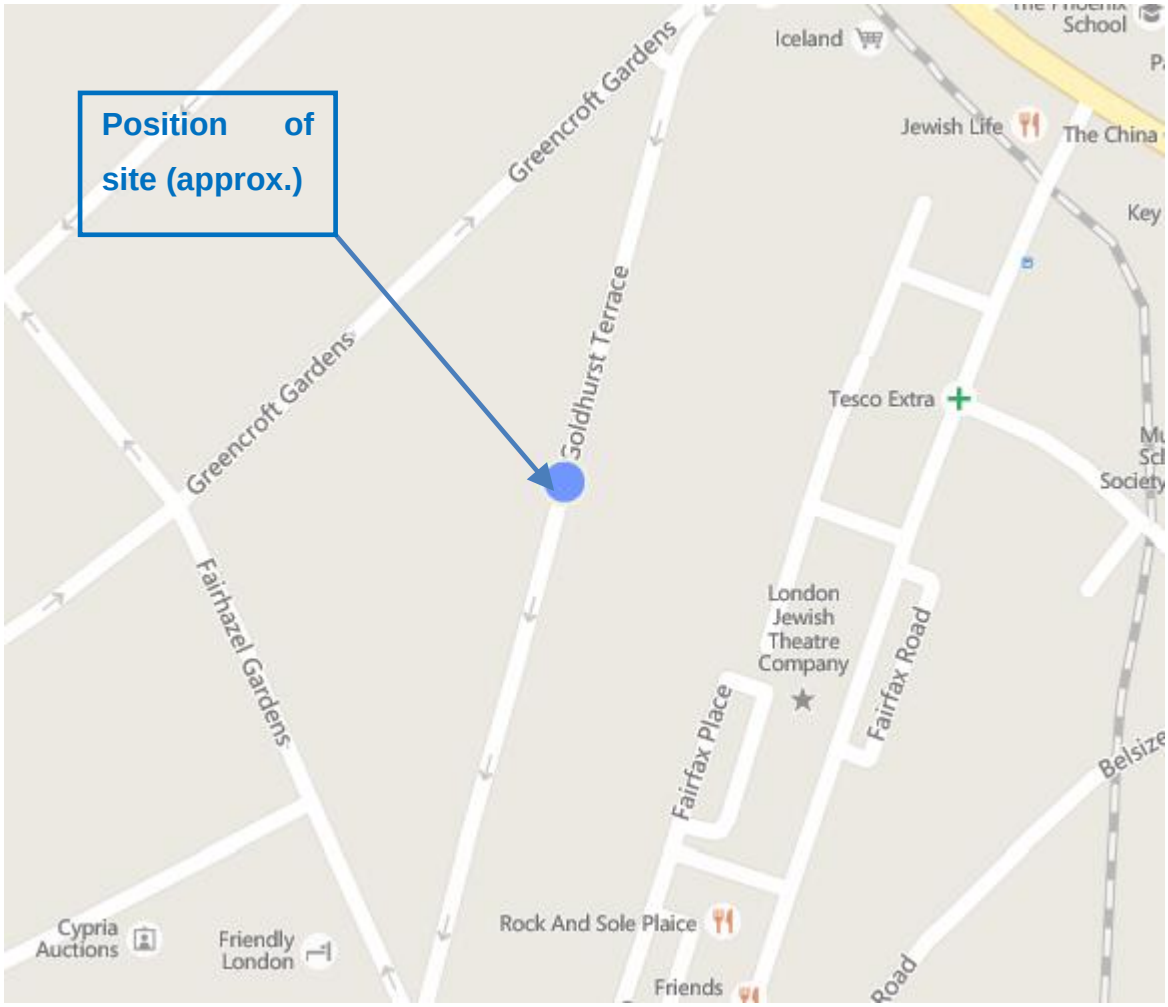

Fig.1 - Site map (Image from Microsoft Bing Maps, Copyright 2014).

VI. SCOPE OF DOCUMENT

The content of this document should be read in conjunction with temporary works drawing set TW1-TW3 and the permanent works structural engineer's package along with any other relevant drawings/ details.

The purpose of this package is to provide a method statement and suggested construction sequence to enable the required elements of temporary works to be installed thus allowing the construction of the permanent works to be carried out.

It should be noted that all temporary works drawings are indicative only and are not intended as detailed construction drawings therefore all specific construction details should be provided by the structural engineer or other relevant parties. Construction sequences are illustrative and should not be relied on to provide specific construction arrangements or any dimensions; these should be specified by others and confirmed on site.

VII. GENERAL COMMENTS

- Buildings of the age of the property in question have often reached equilibrium with their surroundings. The superstructure slowly deforms with time during its life to accommodate any minor settlements and therefore some work is likely to have been carried out in the past and additional repairs may be necessary as a result of the proposed works.
- Any modifications to the existing property should be investigated with local opening up works to assess their potential impact on the proposed scheme.
- The contractor is responsible for the design and correct installation of all temporary works required to safely install the proposed basement and any other affiliated works. The contractor is to ensure that all excavations, any new structure and any neighbouring structures are adequately supported for the full duration of the works.

VIII. BASEMENT CONSTRUCTION

Basement walls

Basement walls are to be formed in reinforced concrete following the underpinning sequence shown (see fig 2). In the permanent case the RC walls will support any load applied from the structure over as well as resisting the retaining soil, surcharging & any water present behind them (see fig 1).

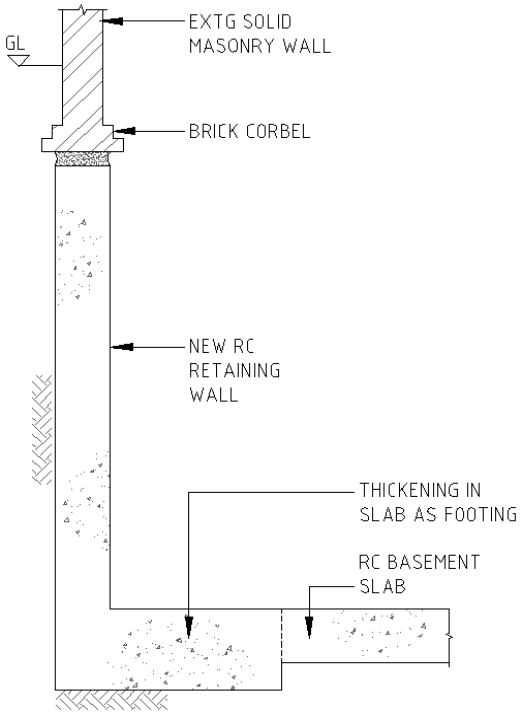

Fig .1 - Typical RC wall section.

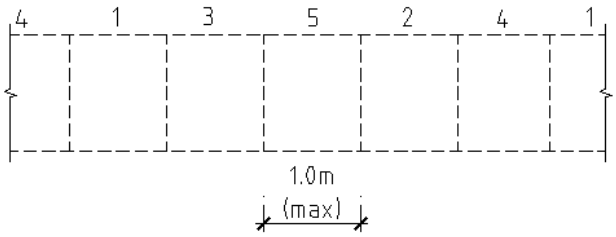

Fig .2 - Typical underpinning sequence.

Heave protection

The removal of excavated soil to form the basement will significantly reduce the loading on the deep clay layer likely present below the property creating the possibility of heave occurring. Therefore heave protection to the slab is recommended to avoid cracking within the basement slab (see fig 3.)

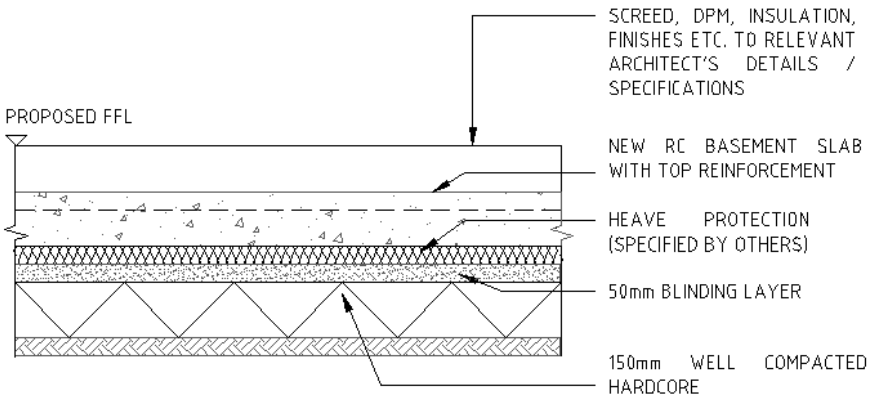

Fig .3 – Typical suggested slab make up with heave protection.

IX. MATERIALS

(Details below to be confirmed by structural engineer)

Concrete used in underpinning/slabs

Mix designation: RC 40 Aggregate size: 20mm Cube strength: 40N/mm^2

Notes:

1. Unless otherwise instructed a 50mm thick blinding layer should be provided beneath all reinforced concrete to provide a clean level surface and avoid pouring directly on to ground/hard core.
2. High Alumina Cement (HAC) should not be used under any circumstances.

Concrete cover

All cover should adhere to minimum values specified by the Eurocodes (BS EN 1992-1-1:2004).

It is recommended that:	Concrete internal cover	= 35mm
	Concrete external cover	= 50mm
	Direct contact with ground	= 75mm

X. GROUND BEARING PRESSURE

Allowable GBP @ ground level = 100kN/m^2 (Clay soil type)

Allowable GBP @ formation level:

Allow for enhancement of 25% to account for excavated soil mass;

$\therefore$ Enhanced GBP @ formation level = (say) 120kN/m^2

XI. PARTY WALLS

The proposed works are subject to the Party Wall etc. Act 1996.

Is therefore advised that the client starts the process/instructs a surveyor as early as possible to ensure that the necessary party wall awards are in place before work commences.

Monitoring points will be installed in advance of the works and monitored throughout the underpinning process and basement excavation.

A consultant have to be appointed to provide monitoring of any movement during the construction as part of the party wall award, and the value obtained by measurement have to be compared with the movements expected within the ground movement analysis.

In case measurement value exceeded expected, all works must be stopped and the excavation / support methodology must to be reviewed.

XII. SUGGESTED METHOD STATEMENT

1 BASEMENT UNDERPINNING

1.1 Remove existing timber floor.

1.2 Highlighted pins and buttress marked ‘A’, ‘B’, C and “D” ” on drawing TW01 to be dug and cast first in accordance with 1.3-1.18 below. Sart with “B” once “A” is completed and C once “B” is completed then D once C is completed.

AREA A

1.3 During excavations ensure vertical faces are shored at all times using 18mm ply, timber wailing pieces and horizontal strutting. The exposed face of the excavation should be lined with ‘Hardie Backer 500’ cement board trench sheeting or similar permanent sacrificial shuttering with de-bonding membrane installed to the inside face of trench sheets prior to concreting.

1.4 Reinforcement should be placed in position in preparation for casting the underpinning base, starter bars should be provided to enable a connection between the base and the vertical stem to be formed.

1.5 Local authority building control officer or appointed inspector to inspect and pass reinforcement prior to concreting base section.

1.6 Pour concrete base and kicker sections to structural engineer’s details. Use vibrating pokers to ensure full compaction of concrete and removal of trapped air pockets within forms.

1.7 Once base has sufficiently cured (min 24 hours) place reinforcement to vertical stem including horizontal dowel link bars to neighbouring pins (horizontal dowels to structural engineers specification) and vertical buttress (as to structural engineering specification)

1.8 Formwork to be secured with heavy timbers and “Leada Acrow” or similar trench props supported off of the central earth mass to retain the concrete during pouring. Leave 75mm clearance between top of concrete pour and underside of existing foundation.

1.9 Pour concrete stem and buttress section to structural engineer’s details, use vibrating pokers to ensure full compaction of concrete within forms.

1.10 Allow 48 hours curing time between concrete pour and installation of dry pack. Clean underside of existing foundation using wire brush or similar in preparation for installation of dry pack.

1.11 Use 1:3 dry pack well rammed into position between head of pin and underside of existing foundation where appropriate (Dry pack is to be installed after each individual pin has been cured see point 2.1 regarding corbel removal.)

1.12 Strike formwork following lapsing of sufficient curing period (normally approximately 7 days)

1.13 Insert temporary work rigid props at maximum 1.2 metres c/c along the length of proposed steel insert as shown on structural drawings.

1.14 Insert temporary works needles to allow insertion of steel beams above existing foundation level as per structural drawing detail TW3

1.15 Carefully chase out the external face of the wall and insert the first beam onto grout bed and fully dry pack above.

1.16 When dray pack properly gone off, carefully chase out the internal face of the wall and insert the second beam onto grout bed and fully dry pack above. Bolt together with the beam at the external face as per S.E.'s details.

1.17 Infill the underpinning between buttress sections in sequence shown until each side of the doubled beams are fully supported on buttresses and R.C. wall is complete.

1.18 the base of each side of the two beams.

1.19 Allow min 48 hours to demount temporary props (at point 1.14) when dry pack properly gone off and wall over fully supported.

Area B (refer to plan drawing)

1.20 When area A is completed start with area B from phases 1.3 to 1.18.

Area C (refer to plan drawing)

1.21 When area B is completed start with area C from phases 1.3 to 1.18.

Area D (refer to plan drawing)

1.22 When area C is completed start with area D from phases 1.3 to 1.18.

1.23 Underpinning is to continue according to sequence specified in temporary works drawing package following previously described method.

1.24 Central earth mass is to be retained to enable local shoring of pins and trenches as underpinning progresses.

1.25 Following completion of all underpinning the central soil mass can be excavated in stages to allow installation of high level lateral “Mabey Mass 50” or similar engineer approved props in accordance with propping plan (Drwg TW1).

1.26 The remaining central soil mass can now be removed and a second row of lateral props can be installed to restrain the lower 3rd of the pins.

1.27 Excavate for reinforced concrete basement slab ensuring lateral propping remains in place at all times.

1.28 Compact base of slab excavation and place reinforcing bars to structural engineer’s specification.

1.29 Cast basement slab to structural engineer’s details using vibrating pokers to ensure full coverage of concrete and removal of trapped air pockets.

1.30 Once basement slab has sufficiently cured (min 14 days) the remaining propping can be removed.

2 REMOVAL OF BRICK CORBELS

Upon completion of underpinning and sufficient curing of dry packing has been allowed, the existing brick corbel foundation projection can be removed using hand tools to leave the wall over flush with the face of the RC underpinning. Care should be taken when removing the corbel to avoid causing undue damage. Where brickwork is in poor condition it should be carefully made good in small increments.

3 STEPPING OF BASEMENT FLOOR LEVELS

The below sequence specifies a suggested method of slab installation where steps in the basement floor level are required. Construction details should be specified in, and installed in accordance with, the structural engineer’s package.

3.1 Once underpinning is complete excavate central dumpling in stages down to formation level of higher level slab installing propping as excavation progresses.

3.2 Place reinforcement for upper slab to structural engineer's specification and drive starter bars for step at slab edge ready for connection with step wall section and lower slab (see fig 4).

3.3 Once slab has had sufficient curing time (min 48 hours), excavate down to lower slab formation level.

3.4 Place reinforcement for lower slab and RC step to structural engineer's specification.

3.5 Cast lower slab and step wall section and allow adequate curing time (48hours) before removing any slab formwork. (Horizontal propping of walls across site to remain in place for min 14 days until slab has had sufficient curing time).

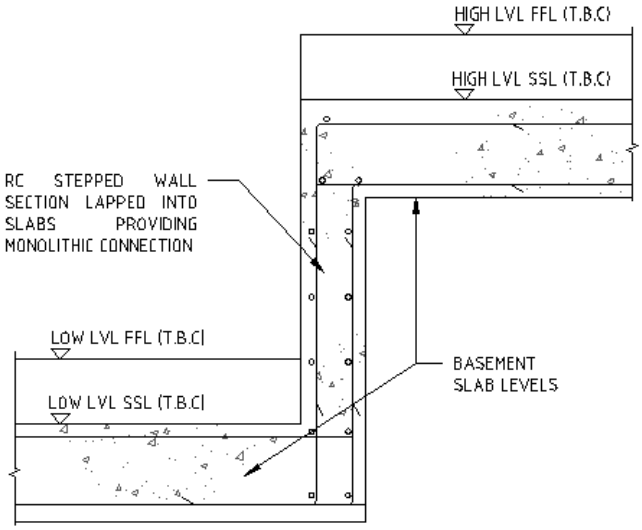

Fig 4 – Typical RC slab step section

4 INSTALLATION OF STEEL BEAMS/ FRAMES

The method described below is a typical generic steel beam/frame installation; full requirements for shoring of superstructure should be assessed on site at the start of the project through opening up and inspection of existing structure

Prior to any underpinning or steel work installation the contractor may also carry out the following suggested works:

- Carry out a verticality survey to check plumb of walls.
- Provide bracing to openings including doors and windows with timber constructed frames.

Where frames are to be installed and supported at basement level, pin sections supporting columns/beams should be excavated and cast first prior to any steel installation being carried out.

All connection details, splices and base plates should be installed in accordance with structural engineer's specification.

Installation Method

4.1 First install securely diagonally braced "Leada Acrow" propping placed either side of the wall requiring support, props should be sited on paving slabs bearing on well consolidated ground throughout.

4.2 Install 152x152x30UC needle beams at high level spanning between the Acrow dead shoring to provide support to the brickwork over and enable removal of masonry panel below.

4.3 Once needling and propping is positioned and tightened the brickwork below can be carefully removed by hand.

4.4.1 Where permanent steel framework is specified members needed to transfer loads in to RC pins should be installed in accordance with structural engineer's details to provide a bearing for the high level beam.

4.4.2 Where bearings are specified cut slots into walls to accept padstone or bearing plates as specified by structural engineer (allowing 48 hours to cure where padstone are cast).

4.5 Insert permanent steel beam either fixed to columns or seated 100mm into walls at each end on bearings.

4.6 Dry packing should be placed between the top flange and the underside of the wall over allowing 48 hours to cure. (Where beam is seated on bearings dry pack should also be placed 75mm above and below the beam well rammed into position and any defective brickwork around beam ends should be removed and made good using class B engineering bricks and 1:3 mortar once dry pack has cured.)

4.7 Following the provision of full support to the wall above, (and bracing has been securely fitted if frame installation is being carried out) any temporary works in relation to its support can be removed.

4.8 Any voids in the brickwork where needles had been positioned should now be repaired by bricking up.

4.9 Once adequate support has been provided by the permanent works structure underpinning can proceed following the sequence specified in point 2.1.

5 DE-WATERING DURING CONSTRUCTION

5.1 If during any excavation work significant ground water ingress is found, a local $1m^3$ sump should be provided formed at a level below the base of the excavation being worked on.

5.2 The vertical faces of the sump chamber should be supported with a pre-made shutter positioned in the area excavated for the sump. The sump shutter should be constructed from 18mm thick plywood sheets with drilled vertical faces to provide a porous surface allowing ground water to flow through.

5.3 Ground water will now flow into the excavated sump to be extracted using a suitable Semi Trash dewatering pump and appropriate diameter discharge hose.

5.4 Discharge from the sump should be directed to the nearest manhole and a drain filter should be fitted to avoid any large debris being deposited into the sewer.

5.5 After completion of the excavation and preparation for the concrete pour has been carried out ensure the sump area is fully dewatered before removing pump and pouring concrete.

5.6 The process above should then be repeated for each excavation where ground water is found.

XIII. REFERENCES

1) Codes / Regulations

I) Eurocode : Basis of structural design (BS EN 1990:2002)

II) UK National Annex for Eurocode : Basis of structural design (NS BS EN 1990:2002)

III) Eurocode 1 : Actions on structures (BS EN 1991:2005)

IV) UK National Annex for Eurocode 1 : Actions on structures (NA BS EN 1991:2005)

V) Eurocode 2 : Design of concrete structures (BS EN 1992-1-1:2004)

VI) UK National Annex for Eurocode 2 : Design of concrete structures (NA BS EN 1991-1-1:2004)

VII) Eurocode 3 : Design of steel structures (BS EN 1993-1-1:2005)

VIII) UK National Annex for Eurocode 3 : Design of steel structures (NA BS EN 1993-1-1:2005)

IX) The Building Regulations 2000 : part A - Structure

2) Books / Manuals

I) Concrete Basements: Guidance on the design and construction of in-situ concrete basement structures – R. S. Narayanan & C. H. Goodchild.

II) How to Design Concrete Structures using Eurocode 2 – A. J. Bond et al.

III) Manual for the design of steelwork building structures to Eurocode 3 (October 2010) – IStructE.

IV) Reynolds's reinforced concrete designer's handbook 11th Edition - C. E. Reynolds et al.

V) Standard Method of Detailing Structural Concrete 3rd Edition (June 2006) – IStructE.

XIV. APPENDICES