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CAPO DI MONTE, LONDON NW3 6RJ

Structural Engineers Report Addendum

Reference 6036

Mar 2015

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Revision	Issue Date	Status	Approved
P1	9 Mar 2015	Planning	X

Executive Summary

Michael Barclay Partnership LLP (MBP) has been invited to submit further information in support of a planning application for the development of Capo di Monte following an Independent Review of the Basement Impact Assessment by LBH Wembley on behalf of Camden.

Specifically, the following additional information has been requested:

- Additional ground investigation to confirm the ground and groundwater conditions around the property.
- Additional information on the structural configuration of the foundations to both the host building and those of the adjacent buildings.
- A more detailed assessment of ground movements and additional structural assessment to assess the sensitivity of the host buildings and neighbouring buildings to accommodate the predicted ground movements
- A more detailed construction sequence and methodology indicating in detail how the host building and neighbouring buildings are to be protected in the temporary and permanent situations
- A detailed monitoring and contingency plan which is sufficiently robust to enable mitigation to be effectively implemented in the event of agreed trigger values for vertical and horizontal movements being exceeded at agreed monitoring positions.

Additionally, MBP have been asked to ensure that the existing and any additional assessments to be clearly signed off by persons holding the correct qualifications.

The following report discusses each point in turn and includes or makes reference to additional supporting information as necessary.

It is concluded that the proposed basement development meets the relevant requirements of DP27 and that it can be approved with respect to CPG 4

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Contents:

1.0 Introduction

1.1 A Planning Application ref 2014/6987/P was submitted by Turley in 2014 for alterations to Capo Di Monte in Hampstead, London. The proposed alterations are illustrated on Charlton Brown Architects Drawings and include an extension of the existing basement.

1.2 MBP were instructed to provide structural engineering support in relation to the planning application and appointed H R Wallingford to prepare a Basement Impact Assessment (BIA). The BIA incorporated both structural engineering advice from MBP and Geotechnical advice from MBP and Ground Engineering.

1.3 The Basement Impact Assessment was subject to a Third Party Review by LBH Wembley on behalf of Camden and the findings of the review published in their report ref LBH4304 dated January 2015.

1.4 The review of the BIA noted that the existing assessments and any additional assessments need to be clearly signed off by persons holding the correct qualifications.

1.5 The review of the BIA concluded that the following additional information should be provided in the form of a further submission:

- Additional ground investigation to confirm the ground and groundwater conditions around the property.
- Additional information on the structural configuration of the foundations to both the host building and those of the adjacent buildings.
- A more detailed assessment of ground movements
- Additional structural assessment to assess the sensitivity of the host buildings and neighbouring buildings to accommodate the predicted ground movements
- A more detailed construction sequence and methodology indicating in detail how the host building and neighbouring buildings are to be protected in the temporary and permanent situations
- A detailed monitoring and contingency plan which is sufficiently robust to enable mitigation to be effectively implemented in the event of agreed trigger values for vertical and horizontal movements being exceeded at agreed monitoring positions.

1.6 The purpose of this report is to address each of the points raised an provide additional information as necessary.

2.0 Qualifications

2.1 The Basement Impact Assessment submitted for planning is a collaborative document ultimately compiled by Mike Briggs CEng MICE of HR Wallingford. Mike is a Chartered Civil Engineer with 26 years of experience carrying out and managing a wide range of drainage studies, flood risk assessments, and other studies. Mike has prepared many FRA reports, contributed to Environmental Statements and contributed to many BIA's and other documents for planning applications.

2.2 Hydrogeology aspects of the BIA were considered by Steve Fleming CGeol of Ground Engineering in conjunction with HR Wallingford. Steve is a chartered Geologist with over 25 years of expertise

2.3 Land Stability aspects of the BIA were considered by Julian Birch CEng MIStrucE of MBP in conjunction with Steve Fleming CGeol of Ground Engineering. Julian is a Chartered Structural Engineer with over 20 years of experience and specialising in basement construction. The land stability issues were reviewed by Keith Jeremiah FICE FGS of Michael Barclay Partnership, a Chartered Civil Engineer with over 30 years of experience specialising in Ground Engineering. Geotechnical Assessments within this report have been made in conjunction with Steve Fleming CGeol of Ground Engineering Limited.

2.4 The information in this report has been prepared by Julian Birch in conjunction with Steve Fleming CGeol and reviewed by Keith Jeremiah FICE FGS.

2.5 HRWallingford have written a separate letter to verify the qualification of the authors. That letter is contained in Appendix A of this report.

2.6 It is considered that the qualifications of the authors meet the requirements of the CGHSS and CPG4.

3.0 Site Investigation

3.1 A site specific ground investigation and groundwater investigation was undertaken in August 2014 By Ground Engineering. The findings of that site investigation is referenced in the current planning submission documents as Ground Engineering Report C13361 but the report was not included in the original planning submission

3.2 The Factual and Interpretive Geotechnical Report by Ground Engineering is appended to this report at Appendix B.

3.3 Also referenced in the planning submission documents (but not included at that time), was the ground and groundwater investigation undertaken at 4 Upper Terrace. This site is the immediate neighbour of Capo Di Monte and the client of that site has given his express permission for the site investigation reports to be referenced in this planning application. The site investigation at 4 Upper Terrace included 3 bore-holes with data loggers (divers) and consequently the information available is invaluable.

3.4 The Site Investigation Report by Southern Testing Ref J11287 dated July 2013 is appended to this report at Appendix C. Also included at Appendix C is the Geotechnical Interpretive Report by GCG dated April 2013.

3.5 Appendix D to this report contains drawings 6036/400-403 illustrating the relative locations of the two sites and positions of bore-holes together with a photograph of the basement construction at 4 Upper Terrace indicating slight water seepage at a level of 126.5m which is consistent with the highest recorded perched water level in the bore-holes.

3.6 It is considered that the site investigation data described above is more than sufficient for the design of the basement at Capo di Monte

4.0 Configuration of Existing Foundations

4.1 Trial pits e were dug on site in 2014 in order to establish the structural configuration of the foundations of the host building. These trial pits are referenced in the current planning submission documents but were not included in that submission.

4.2 The findings of the trial pits are now enclosed within this report at Appendix E as drawings 6036/301,302 & 403

4.3 The configuration of the foundations of the neighbouring buildings has been studied by Charlton Brown Architects using historic records. The findings of this study are presented in Appendix F as drawings 150219-001-005.

4.4 It is considered that the above investigation of existing foundations is sufficient to support this planning application.

5.0 Assessment of Ground Movement

5.1 A detailed assessment of ground movements has been made using CIRIA C580 and is contained in Appendix G. This assessment has been made by both MBP and Ground Engineering.

5.2 The installation of bored piles is known to cause ground movements as a consequence of loss of horizontal support during drilling. CIRIA C580 - Embedded Retaining Walls – Guidance for Economic Design, suggests that based on observation made in the London Area, that the installation of the contiguous piles will cause no more than 3mm of vertical differential settlement between the piling and the boundary wall. Records of data on horizontal movement due to pile installation are known to be very limited and very scattered and in practice horizontal movements due to pile installation can be ignored.

5.3 Consideration has been given in this report to installing a stiff prop at the head of the piled wall ahead of excavation where the piles lie close to the site boundary: This method of construction is recognised as being the most effective in limiting ground movements outside of the site.

5.4 The closest structure to the piled wall is the boundary wall itself and the predicted Category of Damage is 1-2 according to Burland. However, the physical impact of any slight settlement on this wall is considered to be negligible since it has no adjoining structures other than the extension to Capo di Monte which is to be demolished. The boundary wall is to be supported throughout the works in order to protect it as illustrated on the drawings within this report.

5.5 The proposed method of construction described in this report will minimise ground movements and accordingly it has been calculated that any damage to structures outside the boundary wall will be no worse than 'very slight' to 'slight' according to Burland.

5.6 The existing host building has a basement over much of its footprint and consequently the proposed works represent a lateral extension to that existing basement at a very slightly increased depth. Consequently it is considered that the risk of ground movement causing damage to the host building due to piling is negligible.

5.7 The underpinning works to the host building are relatively shallow and will be undertaken by a Member of the Association of Specialist Underpinning Contractors so as to ensure a high standard of workmanship. Accordingly, it is expected that in the site ground conditions encountered, the net settlements due to underpinning will be very small. Horizontal movements will also be very small.

6.0 Construction Sequence and Methodology

6.1 The proposed construction sequence was described broadly in the MBP Structural Report submitted with the Planning Application but is explained in more detail as requested. Additionally, in response to the request for further detail a number of drawings have been prepared to illustrate the assumed construction sequence. These drawings are contained in Appendix H.

6.2 The following paragraphs describe the sequence of works proposed. This sequence has been developed with consideration of measures to protect the host building and neighbouring buildings in the temporary and permanent situations.

6.3 The first stage of the works entails demolition of the roof, side wall and floor slab of the existing conservatory as drawing 6036/306. Temporary props will need to be fixed to the boundary wall in order to protect it ahead of demolition as illustrated on drawing 6036/310 & 311. Note that the existing building itself is not reliant on any part that is to be demolished for its own overall stability.

6.4 Once the roof, side wall and floor slab of the existing conservatory have been demolished, the existing building can be underpinned as drawing 6036/305 & 306 working from both ground and Basement Levels.

6.5 Underpinning is a well-established building technique, which is relatively low tech and is not a complex operation. This work will be carried out by a competent contractor who is experienced with this type of work and associated temporary work.

6.6 Underpinning is to be completed according to the numbered “hit and miss” sequence as drawings 6036/305 & 306 and Specification Appendix H. Each underpin can be formed in one “hit” since the maximum excavation depth is approximately 3.5m. The underpinning does not require temporary propping.

6.7 Temporary underpinning is proposed as a means of supporting the rear elevation of the property prior to installation of the permanent supporting beams illustrated on drawings 6036/320 & 321. This method is considered safer and less disruptive than needling the walls at Ground Level and supporting the needles with props supported by pad foundations in shafts or by temporary piles.

6.8 Following the underpinning then the perimeter wall to the new basement can be formed using bored continuous flight auger contiguous piling as drawing 6036/307. Temporary king-posts will be inserted into the piles to restrain the boundary walls as drawings 6036/310 & 311.

6.9 Experience of recent basement construction at 4 Upper Terrace (Photograph Appendix D) has proven that contiguous piling will be successful and that ground water ingress into the later excavation will be negligible.

6.10 On completion of the piling the capping beam can be formed as drawing 6036/308 and propped as illustrated using a portion of permanent slab and a temporary prop in order to restrain the head of the wall where the piles lie close to the boundary. This propping will facilitate excavation as drawing 36036/310 & 311.

6.11 On completion of the excavation rear elevation can be temporarily supported using needles and props and the temporary underpinning removed. The new RC basement slab and liner walls can then be cast followed by the new Ground floor slab and beams to support the rear elevation as drawing 6036/320 & 321.

7.0 Monitoring

7.1 Drawings indicating proposed movement monitoring points are contained in Appendix J

7.2 The existing buildings are to be monitored during and after completion of the works for displacement in the horizontal and vertical planes by an organisation independent of all parties involved in the design and construction

7.3 Monitoring will be accomplished by using targets fixed to the boundary walls and the property itself and will be read from a fixed stationary point. Additional monitoring points will be located on the capping beam ahead of basement excavation.

7.4 It is recognized that some of the targets will become hidden as the works proceed and consequently their precise location needs to be carefully considered to ensure consistency of readings during the whole monitoring period.

7.5 Results of the movement monitoring shall be presented as graphs showing vertical and horizontal movement with time (as well as a standard tabulated format). The data shall be compiled in a report and issued to the engineer within 24 hours.

7.6 The frequency of readings shall typically be weekly during critical construction phases i.e. during underpinning, excavation and casting of the submerged RC 'box'. Monthly monitoring shall be completed for a time of 6 months following construction of the basement or until such time that any ongoing movement has ceased.

7.7 Trigger values are to be established and a traffic light warning system put into place so that the Contract Administrator, Contractor and Structural Engineer may be alerted, and necessary actions may be undertaken when recorded movement approaches trigger values.

7.8 The following table, based on the Assessment of Ground Movement lists a set of trigger values for existing elements in terms of green, amber and red limits:

Element	Green	Amber	Red
Boundary Walls	Vertical Settlement or heave up to 3mm Lateral Deflection up to 3mm	Vertical Settlement or heave up to 6mm Lateral Deflection up to 6mm	Vertical Settlement or heave up to 10 mm Lateral Deflection up to 10 mm
Capping Beam	Vertical Settlement or heave up to 3mm Lateral Deflection up to 3mm	Vertical Settlement or heave up to 6mm Lateral Deflection up to 6mm	Vertical Settlement or heave up to 10mm Lateral Deflection up to 10mm

7.9 Settlement and / or movement of the boundary structures has been predicted to be in the 'very slight to slight' 1-2 category of damage as defined by the damage category chart from CIRIA C580 (Burland category). The proposed construction sequence described in section 6 of this report has been chosen to maximize restraint of the piled wall where it lies close to boundary structures and consequently limit ground movement.

7.10 Settlement of the existing host building has been predicted to be negligible provided construction workmanship is tightly controlled.

7.11 No remedial action is required if readings are all within the green zone.

7.12 Should recorded movement reach the amber zone then further excavation is to cease until following contingency has been activated:

- The frequency of monitoring is to increase to daily recordings to predict the rate of movement.

- If predicted movement is expected to exceed the upper limit of the amber zone then a strategy to minimise movement, such as jacking the structure using hydraulic struts, and adjusting the temporary works proposals is to be proposed by the Contractor for review by the Structural Engineer.

- Should recorded movement reach the red limit, work on site is to cease until a strategy to proceed is to be agreed between the Contractor and the Structural Engineer and following contingency has been activated. The frequency of monitoring is to remain as daily

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Appendix A – Qualifications

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Appendix B – Site Investigation by Ground Engineering

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Appendix C – Site Investigation & Geotechnical Interpretative Report at 4 Upper Terrace

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Appendix D – Location plans for site Investigations & Photograph 4 Upper Terrace

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Appendix E – Trial Pit Investigations

Appendix F – Configuration of Existing Foundations

Appendix G – Assessment of Ground Movements

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Appendix H – Construction Sequence & Methodology

SPECIFICATION FOR UNDERPINNING WORKS TO BE USED IN LIEU OF NBS D50

To be read with Preliminaries/General conditions.

110 The scope of the work is detailed on drawing 6036/305&306 and all drawings referred to.

115 All materials and workmanship are to be in strict accordance with the Structural Engineer's Specification.

120 The Contractor must submit for the Engineer's approval, a method statement and underpinning sequence plan at least 14 days prior to the commencement of any excavation.

125 Prior to commencing any excavation works the Contractor is advised to carry out a survey to locate the position of all buried services.

130 Openings at basement level may need to be suitably propped to restrict any cracking during the underpinning works.

135 Excavate accurately with vertical faces and to depths shown on drawings. The underpin blocks are to be excavated in lengths not exceeding 1.0 metre at a time and leaving not less than either:

i) 2.0 metres of undisturbed footing on either of the open excavation or
ii) At least one completed section of dry-packed underpinning on either side of the open excavation.

At no time should more than 25% of the length of any wall be left unsupported.

140 Test existing brick-lime footings for soundness by tapping with a hammer over the whole width. Break out and remove any loose or unsound material to a uniform level soffit.

145 Do not excavate beyond the required width of footing at the rear. Do not excavate more working space than necessary at the front.

150 Keep the excavations clean and dry. Remove all soil and loose concrete, etc from adjacent completed pins to form a good key.

155 Obtain approval of the Engineer or Building Control Inspector before concreting each section.

160 Fix plain vertical form-work to the inner face of the underpinning as necessary with joints sealed to prevent loss of grout

165 Concrete to be GEN3 as Specification Clause E10/100.

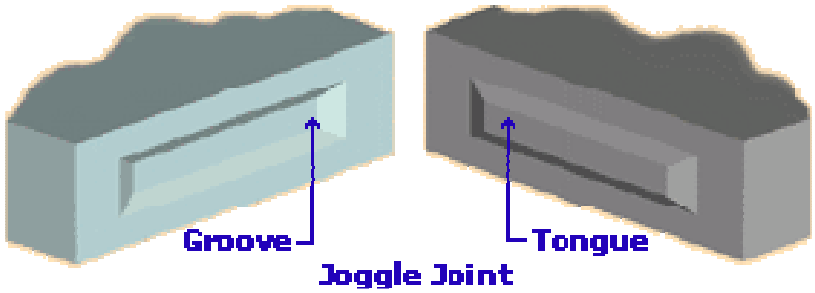
170 Place concrete to full height of excavation and compact fully with a vibrator. Leave nominal 75mm below existing footing / underpinning for dry-pack.

175 Except where indicated on the drawings, not less than 24 hours after completion of concrete pour, dry-pack gap between underpinning concrete and soffit of footing / existing / stage I underpinning. Dry-pack to be 1:3 (cement: coarse sand) mortar gauged with only just sufficient water to moisten thoroughly.

180 Use a wooden ram to hammer mortar hard, in strips not exceeding 75mm deep into gap working symmetrically from the rear toward the face so as to completely fill all space between underpinning concrete and existing footing / underpinning with mortar.

185 Leave dry-pack not less than 72 hours before starting adjacent excavation.

190 Joggle joints to be incorporated between adjacent underpins.



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Appendix J - Monitoring