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Whitestone House, London, NW3

Basement Impact Assessment Structural Proposals & Suggested Construction Sequence

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1.0 INTRODUCTION

1.1 It is proposed to reconstruct the existing property at Whitestone House with the construction of a new basement storey below the existing lower ground floor.

1.2 A site investigation of the subsoil has been carried out by Geotechnical and Environmental Associates (GEA) which complies with and meets the criteria and objectives set out in Camden's development policy for basements PG 4, the stages for the Basement Impact Assessment are;

- Stage 1 – Screening
- Stage 2 – Scoping
- Stage 3 – Site Investigation and study
- Stage 4 – Impact Assessment
- Stage 5 Review and Decision Making

The report prepared by Geotechnical & Environmental Associates (GEA) follows these flow charts and uses the figurative information given in the Camden Geological, Hydro-geological and Hydrological Study to submit data with relevance to the scale of this project to address stages 1 and 2.

1.3 The flowcharts of the Appendix E to the Camden Geological, Hydro-geological and Hydrological Study are completed in table format by GEA and form the screening element of this report, including;

- Surface Flow and Flooding Impact Identification
- Subterranean (groundwater) Flow Impact Identification
- Slope Stability screening flowchart

1.4 The investigation also provides geotechnical design information for new foundations retaining structures and piling, and classification of soil for disposal purposes.

1.5 The original Whitestone House dates from the nineteenth century with later alterations but, was substantially altered and extended in 2005. Information on the existing structure is taken from documentary evidence of those works.

1.6 The works included the construction of a new lower ground floor, together with an underground swimming pool development.

1.7 The site of the house is close to the top of Hampstead on the edge of the slope down to the Vale of Health. The garden has been built up from the hill but still slopes down towards the east. The garden has a number of mature and semi mature trees, principally along the southern boundary with the heath access, several of which are very close to the existing lower ground floor structure.

1.8 The house shares a party wall with two adjoining properties to the west, The Cottage and Gangmoor. The land forming the heath access bordering Bell Moor is also owned by Whitestone House. Bell Moor to the south has a basement car park.

1.9 The subsoil in this part of Hampstead comprises mainly sand of the Bagshot beds. GEA have prepared a full site investigation report that should be consulted in conjunction with this structural report.

1.10 The proposal is to demolish the house, up to the party wall with The Cottage and Gangmoor, and the existing lower ground floor and construct a new enlarged lower ground floor with basement beneath over the larger footprint. Detailed drawings have been prepared by the Architect, Bentheim Associates.

2.0 EXISTING CONSTRUCTION

2.1 The Structural Engineers drawings for the works carried out in 2005 have been obtained. The Engineer for these works was K Harrison Associates LLP. Refer to Appendix A of this report for details.

2.2 The proposed Structural Arrangement drawings for the proposals are in the Appendix B of the report.

2.3 The works in 2005 involved the full underpinning of the original house. The extension beyond the underpinned house was constructed in open dig as a reinforced concrete box with spread foundations onto the underlying soil. A 300mm thick reinforced ground bearing slab forms the lower ground floor construction.

2.4 The swimming pool to the south side of the house was constructed slightly later as a second phase and is formed with a contiguous piled wall construction on three sides. Photographs documenting this construction are in Appendix A of this report.

2.5 The ground floor construction comprises timber joist infill and beam & block infill floors spanning between a primary steel frame which spans the 8.5m (approx.) span between the external load bearing walls. The timber joists are generally to internal spaces while the concrete beam and block floor infill is to the external terraces at this level. There are areas of 200mm thick concrete slab floors supporting chimney breast and hearth structures.

2.6 Similarly, the first floor is of a timber joist and steel frame construction. On the South Elevation there is a 305UC portal frame that supports the new masonry cavity wall construction above first floor level and provides lateral stability to the structure. Lateral stability to the existing structure as a whole is provided by the roof and floor plates transmitting imparted horizontal loads back to transverse masonry walls and steel sway frames, which in turn, transfer these forces to the foundations and underlying ground.

2.7 The second floor is structured in a similar way to the first floor, with new cavity wall construction to three sides of the house at this level. The dual pitched roof structure has been designed and detailed to be horizontally restrained by the arrangement of steelwork at attic floor level. As such the roof is not stable without the framework of steel at attic floor level. Again, lightweight timber joists provide the floor and roof infill between the steel frame at attic and roof levels.

3.0 STRUCTURAL PROPOSALS

BASEMENT & LOWER GROUND FLOOR

3.1 Generally, it is proposed to develop the property on a similar footprint to the existing building above lower ground floor level. Given the scope of work at basement level under the main footprint of the house it is proposed to demolish the superstructure (built in 2005), rather than trying to retain these upper elements during the construction of the new basement as this would bring its own complications and fundamentally make the project a more difficult site to manage during the construction, As designers we have a duty and obligation to design risks out of a project and it is felt that this solution helps to minimises the risks. The original party wall structure to the west boundary will be retained, as was the case with the development in 2005.

3.2 A contiguous piled wall designed as a vertical cantilever is proposed for the construction of the new basement. This wall will follow the perimeter of the new basement space, stepped in from the retained party wall on the western boundary. A series of internal piles to carry purely the vertical load from the structure above are also required.

3.3 On the South elevation it is proposed to retain the existing piled wall construction that forms the retaining wall to the existing pool extension and install a line of piles, to support the basement level excavation, in board of the existing. This will mean that the internal face of the basement wall will be approximately 1m in board of the lower ground floor level wall along this line. Refer to the sketches in Appendix B for further details.

3.4 On the three main elevations of the house, the formation of the basement and piled wall will require the breaking out and removal of the existing concrete pin foundations which appear to range from 0.8m to 2.0m wide. The depths of these foundations appear to range from less than 1m to over 3m deep. Similarly, the 300mm thick lower ground floor slab is to be broken up and removed from site. Any contractor needs to carefully familiarise himself with the existing construction to understand the scope of the work, especially the demolition work, involved.

3.5 An appropriate monitoring regime shall be agreed with the Party Wall surveyors prior to starting the construction works; this will be based on the advice provided by a geological specialist. An action plan will be in place that will be implemented should any trigger levels, ground movement, be reached. It should be noted that the final pile design will be by a piling sub contractor and this will be based on the results obtained from the site investigation and deflection criteria set by specialist geological advice.

3.6 Once the excavation to the final formation level is completed the lower basement slab, with integral pile caps will be cast. The basement slab will also be cast and tied into the piles to act as permanent horizontal prop to the retaining wall. Anti heave material [e.g. Cellcore by Cordek] will be installed under the basement slab to accommodate any heave potential of the soil.

3.7 The slab will be designed to resist potential ground water pressure from hypothetical buoyancy. This is to be resisted by the weight of the wall structures and the mass of the building above.

3.8 The lower ground floor slab will be supported off the capping beam tied to the head of the piles around the perimeter of the basement and a series of internal concrete columns. This slab will generally be 250mm thick with downstand beam elements supporting the line loads from the load-bearing masonry superstructure above.

3.9 A reinforced concrete liner wall is proposed to the face of the piles. As the basement and lower ground floor are to form habitable spaces it will require waterproofing in accordance with BS8102 and Ciria Report 139 to Grade 3. A drained cavity [specified by the architect] will be required in front of the RC liner wall.

3.10 The main contractor shall implement measures in accordance with any Planning Conditions imposed to keep noise from construction activities to within acceptable limits. For instance, continuous flight auger piles rather than driven piles will be recommended for use by the specialist piling contractor as these minimise vibration, noise and ground heave.

3.11 The proposed design will not preclude or inhibit similar, or indeed any works on the adjoining properties.

3.12 The impact of the proposals on nearby trees is thought to be minimal but has been addressed in a separate Agriculturists' report.

UPPER FLOORS

3.13 The upper floors and roof construction is to be traditional in form and comprise of load bearing external wall construction supporting a grillage of steel beams at each floor level that in turn support timber floor infill construction.

3.14 A steel framed roof construction, with timber infill is proposed.

3.15 The internal floor plan arrangement is subtly different from the existing arrangement but the form of construction will be similar to the existing with the internal floor plans being free from columns and load-bearing elements, making the layout of the floor plans independent of the structure.

3.16 Lateral stability of the superstructure will be achieved through the diaphragm action of the steel and timber floors transferring any horizontally imparted loads back to longitudinal masonry walls and to the foundations and underlying ground. Some steel sway stability frame elements will be required where the masonry is not sufficient on its own, for instance at ground floor level on the East elevation.

4.0 PROPOSED CONSTRUCTION METHOD STATEMENT

4.1 The outline construction sequence and temporary works as described below will be superseded by the Contractors' final proposals. The contractor will be required to submit full proposals, method statements and calculations to the Structural Engineer for review prior to the start of any works on site.

4.2 The contractor is responsible for the design and erection of all temporary works in accordance with all relevant British Standards. The contractor is to provide adequate supervision to ensure that the stability of the existing structure, excavations and surrounding structures are maintained at all times.

4.3 The following is a suggested sequence of construction that could be developed in order to provide a safe method of construction for the proposals. The final full sequence of anticipated works is the responsibility of the main contractor.

- Site set up and mobilisation.
- Install monitoring points on existing structure as agreed necessary with Engineer and Party Wall Surveyor.
- Commence the demolition of the superstructure in the reverse order of construction. Careful consideration is to be given to the existing roof & attic frame as the stability of the roof is dependent on the attic floor steel ties. Upon the removal of roof and floor plates, the contractor is to ensure the perimeter walls are laterally stable in the temporary condition prior to demolition.
- Demolish the second and first floor structures to ground floor level. The demolition contractor should carefully cut out the existing steelwork into manageable sized lengths for removal off site. It is to be assumed that none of the existing steel sections are to be re-used in the proposed scheme. Demolish perimeter external walls.
- Remove the existing ground floor construction. It is believed that the steel, timber and beam and block ground floor construction to the main house does not prop the head of the basement walls, however, the 300mm thick ground floor apron slab above the later pool addition on the south side of the building does laterally support the head of the piled retaining wall. The main contractor will need to develop a full temporary works proposal to restrain the head of these piles in the temporary condition, once the existing ground floor slab is removed.
- Commence the cutting out of the below ground concrete works (retaining walls, underpinned foundation sections etc) by non-percussive means. The exact nature of the cutting out and removal of these large elements of concrete is to be agreed with the Party Wall Surveyors to ensure the disruption to adjacent properties is minimised.
- Install perimeter contiguous piled wall, together with internal piles. A degree of backfilling in compacted layers back up to lower ground floor level may be required in order to place these piles to the correct level. Fix reinforcement to capping beam, with starter bars for lower ground floor slab, and cast capping beam. Tie capping beam into existing piled wall construction on South elevation.
- Assume top down construction at this stage to minimise temporary works requirements. Prepare ground to receive fixing for reinforcement to lower ground floor slab level and integral arrangement of downstand beams. Cast lower ground floor slab, tying into capping beam and leaving starter bars below for internal basement columns.
- Commence reduce level dig to basement level. A number of internal temporary piles may be used to support the ground floor slab in the temporary condition prior to the permanent basement columns being cast. Prepare basement drainage, fix basement reinforcement & tie to piled wall construction.
- Cast basement slab and pile caps. Place internal column formwork and cast basement columns. Remove any temporary works requirements, including any temporary pile supports to the ground floor slab.
- Install reinforced concrete liner wall to face of piles, ensuring wall is tied to piles. Install waterproofing.

- Commence traditional superstructure works (load-bearing masonry, isolated steel framing and timber upper floors) off the lower ground floor structure.

5.0 NEXT STEPS & FURTHER INVESTIGATION WORK

5.1 To date, an in depth ground investigation and desk study of the site has been carried out by GEA.

5.2 Existing record drawings of the construction dating from 2004 have been obtained and communication with the original engineer is on-going. A good knowledge of the above and below ground construction has been established.

5.3 The next stages of pre-construction design are:

- Develop the structural scheme in conjunction with the Architect. Develop the structural calculations in support of the proposals to a level of information for submission to Building Control and Party Wall Awards.

- Liaise with a specialist piling contractor to establish the size and form of the piled wall construction to the proposed basement envelope. Acceptable tolerances and deflections of the piles are to be discussed and agreed.

- Develop an agreed strategy, as part of the Party Wall negotiations, to monitor movement to the party wall and neighbouring structures. This specification will be prepared by Conisbee and is to be followed by the main contractor.

- Submit a package of drawings and full structural calculations for Building Control approval. Consider a list of suitable main contractors for the work who are familiar with such projects of a similar scale.