constructure

Constructure Ltd

1 Norfolk Road

Proposed Construction Methodology, Sequence & Monitoring

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Contents

1.0 Introduction

Constructure Ltd were appointed in July 2015 for structural and below ground drainage design services on the proposed new building at 1 Norfolk Road. Planning was granted in 2013 and is currently subject to an application for amendments to the scheme as granted. This report is based on the amended scheme.

2.0 Site

The site is located on the north west side of Norfolk Road in the London Borough of Camden. Adjacent properties are 1a and 2 Norfolk Road, 37 Queen's Grove to the north west (rear of garden) and 69 Avenue Road shares a boundary wall to the north east. Number 1a Norfolk Road has a single storey extension to the boundary wall between the properties while number 2 is approximately 2 metres from the site boundary and is listed as grade II.

3.0 Site Investigations/Reports

The following investigation works and specialist reports have been carried out:

- Site Investigation Report: Soil Consultants Ltd. February 2012
- Land Stability Report: Soil Consultants Ltd. February 2012
- Hydrology & Hydrogeology Report: ESI February 2012
- Basement Impact Assessment Structural Engineering Report: Hurst Peirce & Malcolm LLP October 2015
- Ground Movement Analysis Report: Soil Consultants Ltd. July 2015
- Arboricultural Implications Report: ACS Trees July 2015

3.1 Groundwater

Standpipes were measured for water levels at 13 and 20 days after the boreholes were constructed. No significant inflows of water were noted during the construction of the boreholes apart from some wetness in the lower levels of made ground and seepage at greater depths associated with claystone nodules. Subsequent monitoring of the standpipes revealed water present at depths between 1.1 and 1.9m BGL which was attributed to seepage/inflow at the interface between the made ground and the clay indicating a perched water table.

Due to the underlying ground conditions, it is expected that there is potential for a perched water table sitting at or near the top of the clay. For the purposes of the design, it has been assumed that groundwater can be present at 1m below ground level, but is variable in nature.

3.2 Results of investigations

The site investigations showed the ground conditions to be as expected from the pre-investigation prognosis. These generally comprised London Clay from around 2.5m depth, proved to the base of the deepest borehole at 25mBGL. The material over the full depth of the proposed basement comprises highly shrinkable clay, when classified against BRE Digest 240 and NHBC standards. Measures will therefore need to be taken to control movement due to change in moisture content at shallow depths, and also due to removal of overburden to the material directly under the lower level slabs.

Preliminary working capacities for piles of varying diameter have been generated from the results of the Site Investigation works. These capacities will be used in the preliminary consideration of suitable pile diameters/ depths, with the final detailed design to be carried out by specialist sub-contractor, to loads as specified by ourselves. Due to the likelihood of perched water within the clay, the lowest level raft slab will be designed for the piles to act in tension, so as to resist any potential uplift forces due to hydrostatic pressure.

Sulphate concentration was measured within samples taken, and the ground was found to fall into Class DS-3 of the BRE Special Digest 1, 2005, 'Concrete in Aggressive Ground'. Table C2 of the Digest indicated an ACEC (Aggressive Chemical Environment for Concrete) site classification of AC-2s. The concrete within the ground is therefore to be designed to take account of these classifications.

The Soil Consultants Ltd report contamination testing results indicated that there was no significant contamination to be taken into consideration. Good practice should be carried out during the construction and if any evidence of contamination is found then caution should be used and further investigations undertaken.

3.3 Recommendations

Most of the research that has been published into the movement of earth retaining structures is based on construction within stiff clays and information is presented in CIRIA report 580 "Embedded retaining walls - guidance for economic design". The CIRIA report 580 states that ground movements to the rear of a bored piled earth retaining structure are at a minimum if a contiguous bored pile wall was to be adopted. We have therefore opted to utilise contiguous piled walls to the perimeter of all excavations, due to the proximity of adjacent buildings/highways, so as to minimise potential ground movements as much as possible.

In the permanent condition, retaining forces will be resisted by RC liner walls, which are to be cast inside the piled wall line.

Due to the highly shrinkable clay present beneath the site, anti-heave measures will need to be taken to prevent failure of slabs/slab pile interfaces due to expansion of the ground following the removal of overburden. At the lowest level, the basement slab is to be designed to resist these forces to crushing of the heave mat, with piles at close centres to reduce the slab stresses.

Excavations in the area around any tree subject to a tree preservation order are to be closely monitored to ensure that any areas of live roots are treated with care, and measures taken to ensure the damage to the root system is minimal. A protection zone is to be set up around the base of the root protection zone, with mini-pile rigs used in the vicinity of this tree in order to minimise surcharging onto the ground.

4.0 General Description of Works

The existing property is to be demolished to allow the construction of a two storey basement with swimming pool and a new house above consisting of ground, first and second floor within the roof space. The perimeter of the basement is to be contiguous bored piles to provide ground retention during the temporary state. This will then be lined with a reinforced concrete liner wall which will resist the retaining pressures in the permanent state. Both below and above ground the main frame is to be reinforced concrete columns, walls and slabs with the exception of the roof which is to be framed in steel.

5.0 Proposed Sequence of Work

All temporary works are to the Contractor's and their Temporary Works Engineer's design. Below is a typical outline sequence for the shell and core works.

- Monitoring points set up and two baseline readings carried out and recorded (see section 6.0).
- Tree protection boundary set up and existing house demolished.
- Underpinning carried out to boundary party walls as indicated on Constructure drawings 1415/80 and 1415/81.
- Site cleared and piling platform laid.

- Pile guide wall (for accuracy of location of piles) set out and constructed around full perimeter.
- Perimeter piling carried out (method statement to be prepared by specialist piling contractor) using rotary bored rig.
- Capping beams formed to perimeter piles.
- At front of property top-down construction is proposed to allow site welfare facilities to be accommodated:
    - Internal piles installed to form basement raft slab (piles designed to temporarily resist tension loads arising from hydrostatic pressure at depth plus clay heave due to removal of overburden).
    - Excavation carried out to form RC wall separating front plant room with appropriate shoring as required.
    - Ground floor slab formed and tied in to capping beams and plant room dividing wall.
    - Excavation carried out to lower-ground floor level out to perimeter piles and dividing wall with temporary props to ground floor slab as required by Temporary Works Engineer.
    - Internal piles cut off below slab formation level.
    - Lower-ground floor slab and RC columns formed beneath ground floor slab.
    - Excavation carried out to basement (lowest) level with temporary propping to lower-ground floor slab as required.
    - Piles cut off and basement raft slab formed with RC columns supporting lower-ground floor slab.
    - Temporary works removed as appropriate.
    - Superstructure construction can be continued in tandem with the basement excavation works if required. This will need to be considered in the Temporary Works Engineer's design for appropriate loading to temporary props etc.
- The remainder of the property is to be constructed using traditional bottom-up construction:
    - Excavation carried out to lower-ground floor level.
    - Temporary propping installed between capping beams (to temporary works Engineers specifications).
    - Excavation progressed to basement level.
    - Temporary propping installed onto waling beams fixed along contiguous piled walls.
    - Excavation continued to lowest formation level for sub-basement area around pool/plant room etc.
    - Pile mat laid at lower level to allow piling rig access.
    - Piling rig lowered into lowest level excavation and piles installed to form basement raft slab (piles designed to temporarily resist tension loads arising from hydrostatic pressure at depth plus clay heave due to removal of overburden).
    - Pile rig lifted out once piling works are complete.
    - Basement raft installed and first lift of RC columns formed.

- Liner walls formed with waling beams removed as required to allow.
- Slabs, columns and walls continued to be formed up the building

- Shell and core complete, follow on works continue including waterproofing, roof steel frame construction, brickwork and services etc.

6.0 Movement Monitoring.

It is proposed that the structural stability of the adjacent properties is safeguarded by a system of movement monitoring. The Contractor shall appoint a specialist survey company to establish monitoring positions (targets) to key elements of the neighbouring buildings as they deem required.

The external facades and Party Walls will be monitored at these positions and the targets shall be firmly attached to allow 3D location measurement for the duration of the work, to a continuous and uninterrupted accuracy of +/- 1mm. Suitable remote reference bases unaffected by the works will be adopted.

Two series of baseline readings shall be taken before the work begins then readings shall be taken shortly after the start of excavation then at weekly intervals during the basement construction until the RC shell is complete and propped after which point the frequency will be reduced to then a final reading 6 months after completion.

All measurements will be plotted graphically, clearly indicating any movements over time. Results shall be submitted and circulated to all relevant parties including the appointed Party Wall Surveyors within 24 hours of being measured.

Trigger levels are to be as set out below. In the event of a 'red' value being reached the Contractor must immediately stop, make safe the works, notify the Party Wall Surveyors and only recommence when agreed by the appointed Surveyors.

Trigger Levels for movement:

Vertical movement of Party Walls (including garden walls):

Amber +/- 5mm	All parties notified
Red +/- 10mm	Work stopped and reviewed

Lateral movement of Party Walls (including garden walls):

Amber +/- 4mm	All parties notified
Red +/- 6mm	Work stopped and reviewed

Lateral or vertical movement of facades:

Amber +/- 5mm	All parties notified
Red +/- 10mm	Work stopped and reviewed

7.0 Potential Impact upon Adjoining Properties and Local Environment

The use of contiguous pile walls, temporary propping and the proposed construction method reduces the amount of potential ground movement and so minimises the effects of settlement and movement of adjacent structures to ensure that it will not be problematic.

Along with this, the appointed Contractor shall undertake the works using good practice in accordance with the structural design, following all the agreed methods of construction and required temporary works, such us horizontal propping of the piles. In practice some minor settlement is possible, but this will not be permitted to be worse than 'Category 2, aesthetic' according to BRE Digest 251 guidelines.

The design of the works will consider the environmental forces as well as the response of the structural elements as their collective whole, and will be carefully designed to have the the required stiffnesses to remain within acceptable deflection constraints. The coordination of sequencing, and the checking of compliance of temporary works will minimise potential for movement. The minimal movement that does occur will be defined by accepted limits, which would be considered as being accommodated within the elasticity of the superstructures.

This overall approach considers all of the potential risks, and ensures that the excavation and construction of the proposed works will not affect the structural integrity of this property, neighbouring structures, roadways and public utilities.

7.1 Trees

ACS Trees (Consulting) prepared an Arboricultural Implications Report dated 10th July 2015. The scheme is to be constructed within the proximity of a number of retained trees, considered to be effective within the landscape. The report concluded that subject to the implementation of the proposed scheme in accordance with the recommendations of the report, the landscape, and the important trees to that landscape, will not be adversely affected either directly or indirectly by or resulting from the construction of the proposed scheme.

Appendix 7 of the Arboricultural Report includes notes from a site meeting between ACS Trees and Tom Little, Tree Specialist from Camden London Borough Council. At this meeting a boundary was agreed as to the extent of the development in conjunction with the neighbouring trees so as to not adversely affect the undisturbed soil, and hence protect the longevity of the trees. This boundary has been used to set out the maximum extent of the development of the basement construction.

7.2 Drainage

The development is a rebuild of a single family dwelling house. Therefore, there will be no significant increased discharge into the existing drainage and sewage systems. Surface water will not be altered as the majority of the proposed works are underground and there will be no additional hard surfaces formed at ground level.

Ground water flows within the clay strata underlying the site are typically very slow moving, towards the deeper aquifer. It is therefore deemed that the development will have little impact upon these.

8.0 Summary

During construction, lateral and vertical stability of the building will be maintained by temporarily propping, such that no significant adverse movement is expected.

Environmental impacts have been assessed, and the response to geotechnical and hydrological aspects have been considered. The proposals are deemed to not have any adverse impact in this respect.

Once complete, the new structure will provide a robust and secure support for the new buildings without detriment to the overall stability of the highways or adjoining properties.