elm row
structural engineering

report

design method statement

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stage k
stage l

j brown
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client: STEPHEN & JACKIE PALMER

site: 1 ELM ROW
HAMPSTEAD
LONDON
NW3 1AA

date: 16 APRIL 2009

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1.0 Introduction

The following report has been prepared to accompany a listed building consent and planning application for a new basement to the residential property at 1 Elm Row, Hampstead London NW3 1AA. This report should be read in conjunction with all relevant information provided by Formwork Architects.

2.0 Proposed Basement Construction

In considering the viability of constructing a new basement below the existing 4 storey, grade II* property we acknowledge that it is a significantly challenging engineering endeavour and that if poorly planed or executed could cause damage to the existing property. We have therefore commissioned a detailed site investigation in order to fully study the existing foundations, the existing geology and hydrology. In addition we have carried out testing on a sample of existing bricks and mortar.

2.1 Site Investigation

The site investigation comprised the following;

- 2No continuous flight auger Boreholes to a depth of 7.0m below ground level
- gas and groundwater monitoring standpipes to a depth of 5.0m in each borehole
- 1 No trial pit to expose the existing foundations
- sampling & insitu testing of ground conditions
- laboratory testing of soil properties and contamination testing
- removal of a small panel of bricks and mortar for testing

The detailed factual and interpretive report prepared by Site Analytical Services Ltd., reference 09/15403, dated April 2009 is attached, refer to appendix b.

In summary the ground conditions encountered were consistent with geological records and comprised approximately 0.8-0.9m of made ground on deposits typical of the Bagshot Formation resting on materials typical of the Claygate Member. In each case the natural soils were encountered below the made ground and consisted of initially loose becoming medium dense then dense mottled silty fine to medium sand with occasion fine gravel and some pockets of stiff sandy clay towards the base. These materials extended to 3.3m and 5.8m below ground level in boreholes 1 & 2 respectively. The underlying material in each borehole comprised of stiff becoming very still mottled sandy silty clay with partings of silty fine sand. No groundwater was encountered during the excavation and groundwater was subsequently found to have stabilised at a depth below 5.0m in the monitoring standpipes after a period of approximately 4 weeks.

The existing foundations for the property were encountered at approximately 850mm below ground level, in the natural material. There was no foundation or corbelling of the brickwork as such, with the base of the wall terminating in the natural material.

With the exception of an elevated concentration of Total Lead found in the made ground of borehole 1, there are no contamination issues or gas issues on site.

The brick sample confirmed that the quality of the existing bricks and mortar is variable, with compressive strengths ranging from 3.6 N/mm2 to 12.8 N/mm2, with an average of 8.2 N/mm2. The mortar was equally variable, but from site inspection and the laboratory testing is confirmed as a hydraulic lime mortar.

3.0 Design Considerations

The site investigation has confirmed that the existing ground conditions are suited to the construction of the proposed basement with no adverse instability, gas or water ingress issues.

The proposed basement construction would see foundations and retaining structures being constructed approximately 3.5m below ground level. Taking a factor of safety of about 3 against shear failure an allowable net bearing pressure of approximately 150 kN/m2 is recommended. Total and differential settlement is expected to be within acceptable limits and should not exceed 10-15mm under the anticipated design loadings and should generally be substantially complete by the end of the construction period. The new foundations and retaining walls will be designed and constructed in accordance with the recommendations contained within the site investigation report.

The existing foundations will be underpinned to form the new perimeter retaining wall and these works will be carried out in accordance with normal industry practice, with the pin width limited to 1000mm and limited number of pins excavated at any given time. This will ensure that ground stability is maintained and limit the requirement for temporary shoring.

The current building foundations are noted as being inadequate by current standards and it has been noted that there are signs of historic movement within the façade. It is our opinion that the construction of the basement, underpinning the property, will provide greater stability and enhance the foundations. The new foundations would be sized to reduce the bearing pressure and would take the foundations to a depth where they would be unaffected by tree root action.

The lower ground floor walls of the property are constructed in 12" thick brick and despite there being signs of historic movement the walls are suitable robust to allow underpinning to be carried out safely and without affecting the integrity of the wall locally or globally. The sections of existing wall below ground level will be retained as part of the works along with any projecting brick nibs or corbels.

4.0 Construction Methodology

Given the nature of the project the construction works would be carried out by a specialist ground works contractor. A detailed construction methodology will be developed prior to commencing the works on site. The works are not unusual within London and there are now a small number of specialist contractors who are practiced in such works and could undertake this project without affecting the integrity of the property over, adjacent properties and structures.

The exact sequence of construction of the underpinning will be determined by the specialist contractor in conjunction with the District Surveyor, depending on the structural environment and access constraints. We would anticipate the works progressing as outlined below.

- The access trench is first excavated, directly underneath the wall to be underpinned. The length of any base is individually assessed on site with due regard to the type and condition of the foundation, and structural geometry above. The maximum length of any underpinning base will be 1000mm.

- Retain any projecting brick footing to the brick wall.

- Excavate using hand and compressed air tools removing spoil until the design depth is reached, and removed to muck away conveyor.

- Soils, where unstable in the temporary condition, will be shored. For clays or dense sands exhibiting effective cohesion, shoring may not be implemented. Shoring system design will be undertaken by the specialist contractor if required.

- Once the excavation is completed to the design depth and width. The stratum at the proposed founding depth is confirmed as being appropriate by the engineers.

- The design steel reinforcement will be fixed in the toe section of the underpinning base. This will be checked by the engineer and building control inspector prior to concreting.

- Following construction of the toe section, the design steel reinforcement will then be fixed in the stem (or wall) section. This will be checked by the engineer and building control inspector prior to concreting.

- A single sided shutter is then erected, and concrete poured to form the underpinning base up to a maximum of 75mm below the underside of the existing foundation.

- After 24 hours the temporary wall shutters are removed. The void between the top of the underpin base and underside of the existing foundation will then be drypacked with a mixture of sharp sand and cement (Ratio 3:1).

- A further 24 hours is allowed before adjacent sections can be excavated. Construction joints, if required, are formed using a suitable shear key or joggle joint. In exceptional

- circumstances, dowel bars are incorporated. Typically these are post drilled and resin fixed with specification as per structural design.

- A record will be kept of the sequence of construction, which will be in strict accordance with recognised industry procedures. The as-built records will be updated as necessary and issued to involved parties during the works.

A detailed construction methodology will be developed prior to commencing the works on site.

5.0 Conclusions

The site investigation has confirmed that the existing ground conditions are suited to the construction of the proposed basement with no adverse instability, gas or water ingress issues.

The proposed works will not adversely affect the the stability of the property.

The current building foundations are noted as being inadequate by current standards and it has been noted that there are signs of historic movement within the façade. It is our opinion that the construction of the basement, underpinning the property, will provide greater stability and enhance the foundations.

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appendix a

proposed basement section - 493/P/510 a

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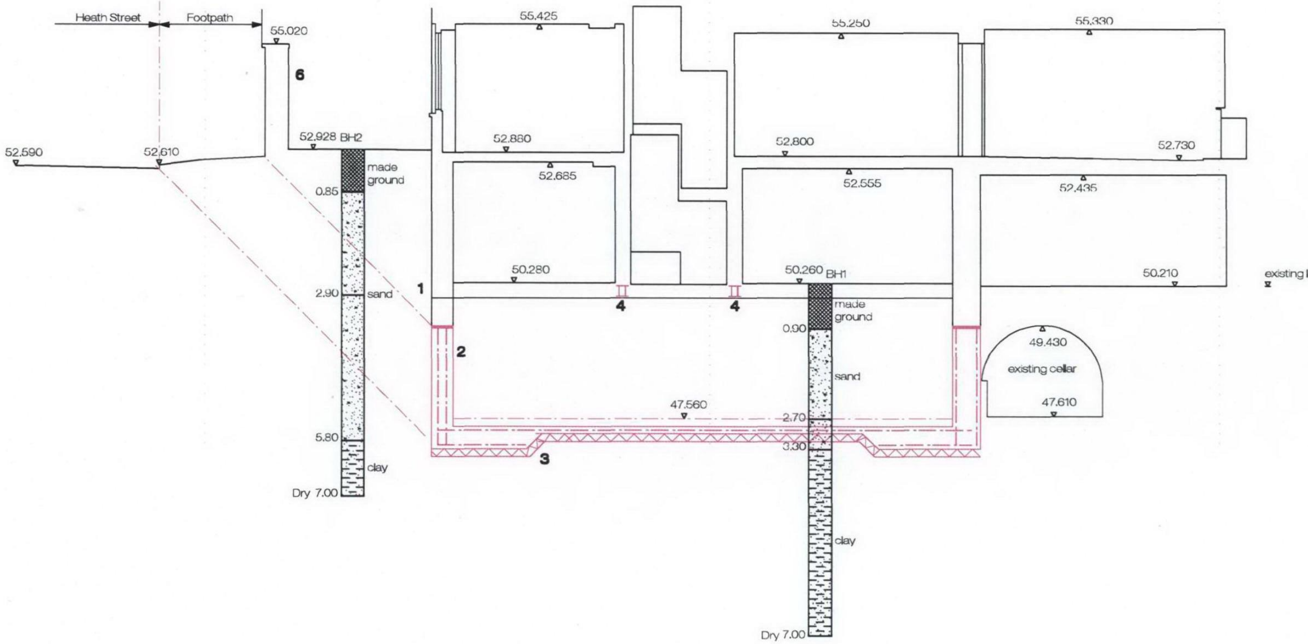


Indicative location of boreholes 1 & 2 refer to SAS report 09/15403, April '09 for full details.

Notes:
This drawing to be read in conjunction with the architects drawings and all other relevant drawings.

For General Engineering Notes refer to drawing 493/P/500.

Temporary works proposals to be submitted for review by the Engineer for all works prior to proceeding.

The following notes outline the works required to form a new basement below the existing residential property at No 1 Elm Row, Hampstead, NW3 1AA.

The proposed construction works will combine reinforced concrete underpinning and a new reinforced concrete floor slab to form a integral retaining wall to the perimeter. The retaining wall to the Heath Street elevation will be designed to take account of the potential surcharge arising from vehicles on the footpath. The permanent works will not affect the stability or compromise the structural integrity of the existing property.

1.
Existing wall terminates approx 850mm below ground level.

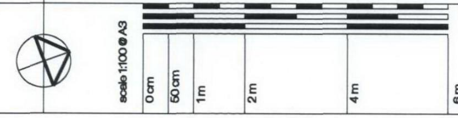
2.
Existing foundations to be underpinned to allow new basement to be excavated. Underpinning to be constructed in Hit & Miss pins, maximum 1.0m wide and with a maximum of 25% of the total length of the wall excavated at any time. Underpinning to be reinforced with adjacent pins doweled together for continuity. Detailed sequence of works to be developed by the specialist contractor for approval of the engineer prior to progressing.

3.
New 150thk reinforced concrete floor slab to be thickened to to 450thk at perimeter and doweled into the base of the underpinned perimeter wall. Slab to be laid on 150thk well compacted type 1 with insulation and waterproofing in accordance with the architects details.

4.
Existing load bearing internal walls to be supported on new steel beams. Beams to be dry packed tight to the underside of the existing masonry. Existing walls to be needled and supported on a system of temporary works during the installation of the supporting beams. Detailed sequence of works to be developed by the contractor for approval of the engineer prior to progressing.

5.
Existing basement vault to be integrated within new scheme.

6.
Existing garden wall to be retained.



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Indicative SI information added

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appendix b

site investigation report 09/15403 april 09

16 APRIL 2009

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