A SOILS REPORT

FOR A STUDY OF CONDITIONS

AT A SITE SITUATED AT

207, SUMATRA ROAD, WEST HAMPSTEAD,

LONDON, NW 6 1 PF.

REPORT PREPARED FOR

PROFESSOR KERRY HAMILTON,

Soarbond Limited,

[redacted]

Project No	Revision	Date	Prepared By	Checke	Status
1381	-----A-----	12-12-18	K. Zablocki	Initials: [redacted]	FINAL.

CONTENTS

INTRODUCTION

Soarbond received verbal instructions from Professor Kerry Hamilton in September 2018, to instruct a Soil Testing Laboratory to carry out a site specific soils test of the sub strata at 207 Sumatra Road, London NW6. This information was demanded by Campbell Reith Hill as basement specialist advisors to the London Borough of Camden planning department and this report has been prepared based on Ashdown's Soil Testing Results given hereunder.

The information is, in nearly all respects, that which would have been expected as the sub strata is London Blue Clay, which is so well documented. Our BIA clearly showed the information from six nearby soil testing locations which now can be seen to cross reference the details from the site specific testing.

We are hereby reporting back to the Client, Professor Kerry Hamilton at 207 Sumatra Road and, also, to the Camden planners and Campbell Reith Hill.

This report is part of that package and also includes, in the Appendices A and B, the published results of the soil testing and details of the trial pits carried out on site to show the extent of the existing spread brick footing foundations etc.

OBSERVATIONS

Purpose of Report:

The site under consideration is located under the main footprint of a terraced house at 207 Sumatra Road, NW6..

It is proposed to construct an extension to the existing, Victorian, " under the ground floor hall " basement area.

The site investigation was required to confirm subsoil conditions and hence provide exact information to facilitate the design of foundations / underpin retaining walls for the proposed basement development.

This report describes the work carried out and the encountered ground conditions and discusses their significance in relation to the proposed development. The factual information is contained in the Appendices and includes exploratory hole records, in situ test results, laboratory test results where these were mandated and the site layouts / trial pit cross sections plus photographs.

Graphical representation of the data is also indicated for ease of reference and for the purpose of engineering analysis / engineering interpretation and given in the Appendices.

Available Information:

The property is a large, four storey, terraced house situated on the south side of an east - west running road in West Hampstead. This row of houses was built during the late Victorian or, even, the early Edwardian period; about 120 years ago. The whole area is of a single Class Usage as C3 with West End Lane being mainly retail and a commercial zone with nearby transportation links etc. In the last few years, many neighbouring properties have been extended into their basements as well as converted into flats following the granting of planning permissions. This property is also near to the Network Rail and Thames-link lines in a cutting some 25 metres away to the south. The map given at the beginning of the soils report refers.

This area of West Hampstead is generally undulating ridges and 207 is to be found on one of these ridges with valleys all around.
West Hampstead has a deep band of London Blue Clay overlain with firm to very firm weathered brown London Clay and made ground.
This determines in London the nature of the make-up and the basic details of the sub soil / strata. It is understood that exact details of the soil to the underside of the proposed basement are as expected and very well documented in Geological Maps of the area.

We base our sensible conclusions on these likely soil strata build ups that were met. Further confirmation will always be useful and will be provided when the raft foundation is constructed at up **to 3.2 metres, generally**, below the original soil level. We do not feel that we need to introduce a caveat that there may be significant changes within 20 to 30 metres. It should be noted but, again, we feel that the possibility of changes in the geological profile are very slim.

The reader should also note that, generally, the nearby Victorian and Edwardian houses are nearly all three or four storeys high and bearing on shallow, spread brick footings i.e. from 800 mm to 2300 mm in depth close to the existing basement line. The walling does not appear to be suffering noticeable or extensive settlement problems at the moment, nor differential settlement or the like. This tends to indicate that the bearing strata is sufficient for its needs and **130 kN / m2** appears to be a sensible design criteria at 1.2 metre depth. **However, raft design was based on the A2 page parameter of 110 kN/ m2 nett safe bearing capacity.**

There are no mature trees and only a few bushes to be found on or near the site. This is normal for such a site with small front and rear gardens.

Description of the Site:

As described above and shown on plans, cross sections and the like, this terraced house is a typical late Victorian terraced house.

PROCEDURE

The site was investigated by means of two boreholes situated at the extremes of the site. One 6.0 metre borehole was dug in the rear garden whilst a second borehole was terminated, we understand, by an obstruction etc. A third borehole was started but could not be progressed very far for unknown reasons.
Two trial pits across the site were also dug by a Contractor and the details are given in Appendix B.
The boreholes were designated WS 01 and WS 02 whilst the trial pits were called up as Trial Pit 1 and Trial Pit 2.

The site works were carried out before and on 24th. September 2018.

Boreholes:

Dynamic Sampler Borehole techniques were used together with 150mm diameter temporary steel casing. One hole was drilled to a maximum depth of 6.0 metres below ground level whilst the second hole reached 2.3 metres..

Disturbed samples were taken at regular intervals in the cohesive strata using conventional sampling equipment **such as shear vane and hand penetration tools.**

The results are presented at the end of this report.

Trial Pits:

The trial pits were excavated by hand to the depths as shown on the cross sections and photographs.
They were taken to just below the bearing strata of the spread brick footing.
No representative disturbed samples or any other material testing of the strata was carried out.

The trial pits were logged by the design engineer.

The exploratory hole records as given in Appendix A were compiled using site observations, engineering descriptions of soil samples and the results of in-situ and laboratory testing.

All procedures were carried out in accordance with the up to date British Standards Code of Practice BS 5930 : 1990 and A2 : 2000 " Site Investigations ".

LABORATORY TESTING

Only a few basic laboratory tests were carried out on the materials. The results are given for the materials encountered within the results package.
We did not specifically require Liquid Limit, Plastic Limit, Modified Plastic Limit, Plasticity Index, Density, Particle Size Distribution, Sulphate content determination, pH values or Undrained Triaxial Compressive Testing to be confirmed. As 100 % passed the 425 µmm sieve, we can confirm that the sub-strata material was monolithic clay.

CHEMICAL ANALYSIS

Based on the information given above, it was considered unnecessary to carry out further chemical testing for the whole gamut of chemicals / hazards in the ground.

Consequently, soils from the site were not taken back to a specialist laboratory and subjected to rigorous testing for phenols, toluene, cyanides, toxic metals, other heavy and often found metals, sulphides, sulphates and arsenic on industrial sites as this area was always given over to agricultural and housing needs..

DISCUSSION OF SITE CONDITIONS

The exploratory holes revealed a sequence of made ground, to 1.0 metre depth across the site, overlying a mixture of orange and brown clay and with some traces of gravel, probably known as the Kempton Park formation **but the site was probably** at the very extreme of this band at 4 metre depth. **This formation can be found extensively in the main part of Hampstead and Highgate.** The monolithic orange brown clay may well overlie the deep London Blue Clay some 10 to 15 metres down.

The made ground was generally granular, sandy silty clay consisting primarily of clay and flint gravel with varying amounts of sand and silt. This material was firm and was encountered to a depth of 1.00m.

The Atterberg Limit tests show that the cohesive materials in boreholes WS 01 and WS 02 are generally close to the **medium to high Plasticity Index. This material is found infrequently over most of the London area. The Plasticity Index for the bearing strata here varies from 56 to 58 (PI).**
For most of London we would expect the monolithic Clay to have a PI of between 35 to 45 and, therefore, not critical in the preparation of foundation data etc.
Here the friable clay which could desiccate quickly and also swell if left exposed for long periods would be a greater problem for shallow foundations and not this deep construction. We would propose that the basement raft construction would need to be carried out " piece small " to avoid exposing clay interface for more than a day or, at most, two. Underpinning is an ideal method of working " piece small ".
The deep concrete U shaped box needs to be formed without delays.

We concluded that the N values for the material removed from the boreholes and trial pits would vary with depth and we estimated that safe working N values should be considered as 130 kN / m2 at 1.0 metre depth and 170 kN / m2 at 4.0 metre depth. **However, our design parameters are still acceptable as, generally, we use 110 kN / m2 safe nett bearing pressure at 0.9 /1.0 /1.2 metres below ground level.**

Ground water was checked on subsequent occasions within the one standpipe and found to non-existent in the WS01 borehole.
It should be noted that, within the period September ot October when this report was prepared, it was an exceptionally dry period and this would have a great influence on the standing water levels.
However, we feel confident that the formation of a concrete raft foundations etc (U Shaped Box) down to a depth **of 3.2 metres generally** will not be substantially affected by water in the bottom of the foundation dig.

RECOMMENDATIONS

1/ Extending the existing shallow, " under hall way " basement to a fully demised area, i.e. a deeper basement, should be constructed in a concrete raft foundation and connected up with concreted vertical walls formed as discrete underpins in the classical way of forming such elements.

The construction mentioned above will be formed in the monolithic clay strata with little if any water penetrating into the dig.

It is proposed that the raft foundation and walling will be suitably restrained by ground floor level additional steels so that the box can carry the nett increased, projected **40 to 76 kN/m2** bearing values to the undersides of the **raft**. We do not consider that the substructure should be piled or have strip footing foundations as this would weaken the box action needed at this level.
These higher cost solutions are needed " above existing ", nominal requirements for four storey terraced houses with walls made up of dense 225 to 340 mm brickwork with light timber flooring / insulation and some studwork and skimmed double plasterboards to sides etc.

a/ Assumption of zero skin friction within the top 2.7 metres of ground (made ground and brown London clay max value) whilst the possible effects of negative skin friction have been discounted.

b/ N value can be taken as 130 to 170 as explained above. **Use an angle for phi to be 20 to 22 degrees giving the ka design value of 0.5 instead of a nominal 0.35. Maintain a coefficient of passive earth pressure kp to be 1.5.**

c/ Standing ground water table level to be assumed as below 6.0 metres.

2/ There is no appreciable variable depth of made ground over this site. We would suggest that ground floor slabs needed to be extended only as they are suspended timber joists over the whole demise.

3/ Access to basement is through the existing basement door and front bay basement window.

4/ We would suggest that all sub structure concrete is designed for sulphate resisting requirements and the site-delivered concrete has ground granulated blast furnace slag (ggbfs) or similar cement replacement materials etc. incorporated in lieu of ground cement etc..

207, Sumatra Road, West Hampstead, London NW 6 1 PF Job Number 1381

Prepared by

[redacted]

Konstanty Zablocki B.Sc. (Hons.), C. Eng. MICE
for and on behalf of
SOARBOND LTD.,

Reference: 1381/Soils Report 2
10th. October 2018

A revision noted in red and sent 12th. December 2018.