46 Avenue Road, London NW8 6HS
Structural Method Statement for Proposed Redevelopment (Incorporating Outline Construction Methodology)

Project No. 1147

Date **25 November 2010**

edge structures ltd
Phoenix Yard
69 Kings Cross Road
London
WC1X 9LL

Tel: 0207 239 4950
Fax: 0207 239 4951

e-mail: info@edgestructures.com

CONTENTS

Revision History

Rev	Date	Purpose/Status	Document Ref.
draft	05/11/2010	For discussion	
Draft inc construction method	24/11/2010	For discussion	
	25/11/2010	Pre-planning	

Prepared by:

_____

Steve Parsons, Chartered civil and structural engineer

Checked / Approved by:

_____

Tony Bailey, Director

1. Terms of Reference

We have been commissioned by Brightwood Ltd to prepare a report setting out the proposed construction methodology for the proposed alterations and extensions this building. The report is intended to be submitted to the London Borough of Camden in support of a planning application and is required to demonstrate that the development can take place safely and while maintaining the structural integrity of the existing property and adjoining buildings. This report also addresses the issues of the access requirements for construction which might be employed in the development, but it is important to note that site investigations and structural designs have not yet been completed and the methodology will be subject to change and refinement.

This report is produced solely for the use of Brightwood Limited in connection with this planning application and not for any other purpose or for any other party. It shall not be used, in whole or in part, by any third parties without the express written permission of Edge Structures Ltd.

2. Description of Existing Building and Boundary Wall Conditions

46 Avenue Road is a four storey house comprising part basement, ground, first and second floors *(see fig 1)*. In front of the building is a hard standing area for vehicles with a basement car lift. The basement comprises staff accommodation, a gym, hydraulic lift room, water tank room, two electrical intake rooms and access to the car lift. There is an array of external air conditioning units and mechanical plant on the roof. In the rear garden of the property is an existing swimming pool with a single storey summer house.

From British History online records: The southern part of Avenue Road existed by 1824 as far as Avenue Close and the northern part of Avenue Road was built by 1829. (*ref 1,2)*
From the London Borough of Camden Planning records: Full planning permission was granted for the following proposals to No 46 Avenue Road (dates of decisions given)

31-12-1934 Erect a garage addition to the premises.

25-11-1964 Erection of dwelling comprising basement, ground floor and two floors over.

16-12-2002 Alterations and extensions to a single family dwelling house comprising: a part single, part two storey rear extension, a wrought iron glazed awning, the infilling of an existing side external terrace, the extension and remodelling of a single storey side extension, including excavation to form a light-well and basement staff accommodation area, entrance portico, domed skylight, roof access hatch, a detached summer house and pool in the rear garden.

From the above we assume that an existing dwelling was demolished and the existing house built circa 1965 with the extensions and alterations including swimming pool and summer house built circa 2003.

A limited site inspection has shown that the basement lift motor room walls and soffit to the basement to ground floor staircase is of in-situ concrete construction. The construction of the ground floor, upper floors and foundations is unknown. A full disclosure of records held by Camden Building control is required, together with a site investigation to provide existing construction details. The height of the building and spacing of vertical supporting elements is such that it may be possible that the building is supported on piled foundations.

On the south side there is a narrow alley way between No 46 and No 44 *(see fig 2).* A cross lattice wooden fence separates the properties.

The north wall to No 46 forms the boundary with No 48. Towards the rear of No 46 there is a light-well to the basement staff accommodation *(see fig 3).*

3. Description of Adjacent Buildings

No 44 Avenue Road to the south of No 46 is arranged over three stories above ground with the upper level of mansard form. It is not known if there is a basement but this is highly probable.

No 48 Avenue Road to the north of No 46 is arranged over three stories above ground with the upper level of mansard form. It is not known if there is a basement but this is highly likely.

4. Description of Proposed Works

The works involve the new accommodation being provided at basement level.

The basement to the house is to be extended over the full footprint of the house with a new basement light-well at the front of the house. To the rear of the house a two storey basement to accommodate a swimming pool, changing room facilities, pool plant equipment with access to the existing house is to be constructed. The existing summer house is to be rebuilt.

The underside of the proposed lower basement floor is approximately 8.7m below ground level. Construction of 6m basements to domestic properties in London is now occurring on a regular basis. This basement is a step up in terms of the technical and construction requirements to build it insofar as domestic projects are concerned and so will require special consideration in the design, logistical planning and construction stages.

A detailed site investigation and desk top study will be required including boreholes and trial pits for soil sampling and testing. The latter will provide the parameters to be used in the geotechnical analyses. In the absence of any site investigation information we assume that the excavations will be through a gravelly layer approximately one to two metres thick and then into the underlying London Clay. There is likely to be a perched water table within the gravel layers.

Due to the depth of construction for the new basement areas, party wall notices etc involving adjoining owners will be required. Monitoring of surrounding ground and building movements will be necessary and the requirements and limits on movement are likely to be incorporated into party wall awards

A full detailed geotechnical finite element analysis of the basement will be required for each stage of construction. This analysis will need to be carried out by a geotechnical specialist with relevant experience. It is anticipated that the wall to the two storey basement is likely to be formed with (approximately) 600mm diameter secant hard/soft bored piles and reinforced concrete floors to create an enclosed box. The walls will need to be propped at ground floor and upper basement level. This could be achieved either with a large scale temporary propping arrangement or top-down construction with the permanent floors acting as props.

The basement will need to be designed to resist water pressures to CP102:1973. The lower basement slab will need to be held down with tension piles to resist water uplift and an under slab system provided to deal with clay heave pressures.

All of the aforementioned will need to be considered as part of a detailed geotechnical analysis to determine predicted ground movements and to provide design loads for the walls and floors.

The architect proposes the basement to be designed as Type C drained protection to BS8102:1990.

The volume of soil material to be excavated to the rear basement alone is of the order of 1500m3 (without bulking): about 2,500 to 3000 tonnes.

The type of underpinning to the existing house foundations will depend on the nature of those existing foundations. Traditional underpinning methods or mini-piling or Pali Radice piling will need to be reviewed by the Chartered Structural Engineer appointed for the project.

The sequencing of work to form the basements under the house, together with any temporary works to the house to provide access and the excavation of the rear basement will need special and detailed consideration. The contractor to be employed for the works will need to have relevant experience for this type of project. The contractor's method statement will need to be agreed with the Chartered Structural Engineer appointed for the project and their geotechnical specialist.

While this project is technically feasible, the safety of the works and the success of the scheme will depend on the considerations of buildability and construction methodology that are considered at design stage.

5. Access Requirements and Outline Construction Methodology

There is very limited existing access to the rear of the property which is via a narrow alley way on the south side of the house. A piling rig and attendant excavators will need to be delivered to the rear of the house. Earth moving equipment will need to get the excavated material out to the front of the house. Construction materials will need to be delivered and got to the rear of the property. Lorries for spoil disposal will to need park and await filling. The logistics and planning for this project are considerable. All deliveries, plant movements and site activities will need to be closely co-ordinated to achieve maximum production.

Possible options are a mobile crane located on the hard standing area in front of the house. Depending on the weight to be lifted the area may require piling or strengthening. A mini-piling rig and possibly a 16 Tonne piling rig could be craned in over the house. However the issue of removing excavated material and delivering concrete and other construction materials remains. We consider that the existing side alley way is not a suitable route to handle the volumes of excavated material or provide suitable access.

The basement to the house is to be extended and a new light-well formed at the front of the house. One option is form a direct route through the house *(see figures 4 and 5, ref 3)*. This would involve extensive temporary works and considerable disruption to the existing house however would provide a more suitable direct access route from the front to rear of the property. Extensive damage to existing finishes at ground level will result and will need to be replaced. Minor damage to existing finishes in the upper stories within the property is very likely given the extent of works that will be taking place below.

The volume of spoil to be removed is considerable. Site access is relatively restricted, with the property located on a busy main road with traffic lights nearby. Only a limited amount of stock piling of excavate spoil to the front of the house will be possible. To reduce traffic congestion it may be necessary to restrict the carting away of spoil to times after the morning rush hour and before the evening rush hour. Due to the limited space restriction the use of grab lorries may be more appropriate rather than providing an attendant excavator with traditional 'muck-away' lorries.

Since we have no information regarding groundwater levels on the site we consider that a secant piled wall is an appropriate solution. 450mm diameter piles could possibly be used on this project but there is likely to be an additional row of props required compared to a 600mm diameter piled wall and this could significantly hamper excavation and construction operations.

A possible construction sequence follows however would need to be developed by the project team and depends on existing ground conditions and existing foundations to the house.

Break out full height openings in the ground floor walls to the rear, middle and front of the property on the south side. Incorporate new framing. These works may require underpinning. Additional horizontal ties beams to the underside of the first floor may be required to provide sufficient lateral restraints to the remaining walls. Break out the existing ground floor slab to front and back rooms on the south side and lower the existing ground level by about one metre to provide 3.5m minimum

headroom. The ramp down at the front of the property will extend approximately 5 m long at a slope of 1:4. This corridor route will be sufficient to provide access for a Klemm KR709 piling rig.

Form mass concrete guide walls required for the secant piling. Construct the 600mm diameter secant (hard /soft) piled walls to the rear deep basement from ground level. Blind bore tension piles and any vertical load bearing piles. Pile arisings and construction materials for the piling will be transported via the corridor route described above. The contractor will need to consider storage locations particularly for the piling reinforcement cages.

On completion of the secant and load bearing piles the rig may then be driven off site.

Construct reinforced concrete capping beam to the tops of the piles. Excavate basement and remove spoil in conjunction with the installation of temporary propping works. Form lower reinforced concrete basement slab. Construct reinforced concrete walls and any internal columns and walls under the pool area. Construct the upper basement slab incorporating the swimming pool. Construct reinforced concrete wall between upper basement slab and ground floor. Construct reinforced concrete ground floor slab.

Basement works to the existing property may then be commenced. The exact nature of this work will depend on the existing foundations. The existing building may be supported on piles.
The new works are likely to be a mixture of adapted traditional underpinning, i.e. reinforced concrete walls constructed in short lengths in a sequence described by the Engineer and /or Pali Radice piles constructed using a mini-piling rig to provide combined vertical capacity and lateral earth retaining capability. The new lightwell to the front of the property would probably be constructed with mini piles.

Construct basement walls to the southern flank and east-west spine wall from within the property. Construct basement wall under the existing front entrance to the house. Depending on the existing foundations to the lobby area the staircase and existing ground floor may require strengthening / underpinning.

The basement areas under the house may then be excavated. Depending on the structural capability of the existing ground floor slab to the lobby area the basement area under may be tunnelled out or the existing ground slab broken out and the basement excavated from ground level. Construct basement slabs and new ground floor slabs.

During all of the above construction period a monitoring system will need to be in place to check surrounding ground, existing house and adjacent building movements.

6. Conclusions and Recommendations

6.1 This a major civil engineering project on a domestic property but it is possible to carry out such works in a safe environment

6.2 Access for construction equipment, delivery of materials and removal of excavated soil is a major challenge and will require considerable logistical planning by the appointed contractor.

6.3 Construction of the basements is technically feasible but in the deep basement category so will require special expertise both in design and construction.

6.4 Existing records held by Camden Building control will need to be obtained in order to verify the most appropriate methods of underpinning.

6.5 A Desktop study of the site will be required at the start of the design stage.

6.6 A detailed site investigation will be required including boreholes and trial pits for soil sampling and testing will be required. The latter will provide the parameters to be used in geotechnical analyses.

6.7 Detailed geotechnical analyses will be required to predict ground movements and settlement of surrounding buildings and to provide loads for designing the piled walls and floors.

6.8 Monitoring of surrounding ground and building movements will be required.

6.9 In excess of 1500m3 of soil will need to be removed from site and site management controls will need to be devised and implemented.

6.10 A direct route created through the existing house to allow construction equipment access, materials to be moved to the required parts of the site and the removal of considerable volume of soil is probably the most appropriate means of access for this site.

6.11 Extensive temporary works will be required to facilitate the access corridor described above, resulting in considerable disruption to the house and likely minor damage to existing finishes at the upper levels.

6.12 With careful consideration the impact on neighbour's buildings can be minimised.

7. References

1) 'Hampstead: St. John's Wood', A History of the County of Middlesex: Volume 9: Hampstead, Paddington (1989), pp. 60-63.
2) Greenwood's Map of London 1827
3) Going Underground Basement Project News, Ischebeck Titan

8. Appendix Photographs

Fig 1 – Number 46 Front elevation

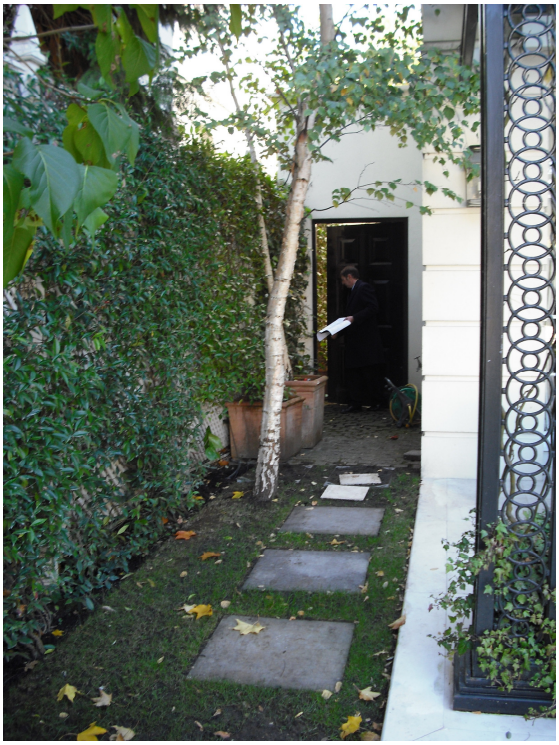

Fig 2 – Rear boundary wall to Number 44

Fig 3 – Rear boundary wall to Number 48

Fig 4 – Example of Temporary works for construction access to build a 6m basement where little access existed before– London (Ref 3 Ischebeck Titan)

Fig 5 – Example of Temporary works for construction access to build a 6m basement where little access existed before– London (Ref 3 Ischebeck Titan)