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6 TEMPLEWOOD AVENUE, LONDON NW3
BELOW GROUND RECREATION ROOM

Structural Engineer's Planning Statement

MBP

Preamble

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Terms of Reference

MBP are appointed by Templewood Avenue Property Partnership, the Client, to prepare a report to outline appropriate methods for the construction of a basement room within the rear garden of No 6 Templewood Avenue. The principal purpose of this report is to address the concerns of the Planning Authority with respect to the practicality of executing the works and to the effect of the development on adjoining properties.

The report is based upon preliminary scheme drawings prepared by Darling Associates, Architects.

Introduction

No 6 Templewood Avenue is a substantial detached property comprising ground floor and two upper storeys. It is proposed to construct a basement beneath the rear garden to accommodate a swimming pool and other leisure facilities and to subsequently restore the garden to its pre-existing layout and condition.

This report outlines the structural form proposed for this installation; the constraints on methodology; the anticipated impact on adjoining properties; and recommended solutions to address the various constraints.

The proposed approach is based on MBP's experience of designing and overseeing construction of a number of similar basement installations beneath and adjacent to existing buildings in confined situations. Certain aspects of the design proposals may be refined or modified during development of the scheme, whilst ensuring that the principal requirements for stability of the surrounding ground and avoidance of unacceptable movements or other distress to existing structures are adhered to.

Description of Proposed Building

The proposed structure consists of a single storey, fully buried basement beneath the existing garden level. The top of the roof slab is proposed to be 350 to 450mm below the existing ground level and the general floor level to be approximately 3.6m below ground level. The depth is increased by one metre over part of the plan area to accommodate a shallow spa pool, jaccuzzi and associated plant.

The basement is to be covered with an intensive green roof to provide a similar garden layout to that existing, the proposed depth being sufficient to allow provision of grassed areas and low growing shrubs, using proprietary artificial growing media, water retention and drainage systems.

Access is to be provided by a covered stair from the existing building and a secondary escape stair in an open lightwell.

Desk Study and Site History

The existing house is believed to have been built on previously undeveloped land and is a substantial detached masonry building typical of the area. It is understood to be connected to all normal mains services, none of which are located within the plan area of the proposed development.

Ground Conditions

The site lies to the south of Hampstead Heath on the south facing slope. The Geological Survey map of the area shows the site to lie on the Claygate Beds overlying London Clay. It also indicates that the upper reaches of the Westbourne Brook, one of the lost rivers of London, or one of its tributaries, runs close to the garden of the property. However, preliminary discussions with Camden Building Control Department and inspection of a reference map provided by that department show the stream to pass some distance to the east, at the further end of Templewood Gardens.

Although no site investigation has yet been undertaken on the site, from our knowledge of other sites in the area, it is anticipated that the subsoils will be predominantly cohesive with potential water bearing lenses and pockets. The probability of water is increased by the location downslope from the Heath.

Boundaries and Adjoining Structures

The proposed basement is set back from the property boundaries. It is located approximately 6 metres from the existing house. To the north, it is approximately 2 metres from the boundary garden wall and at least 10 metres from the building of the neighbouring property, No 8 Templewood Avenue. To the east, it is 3.5m from the boundary adjacent to which there is a single storey wing to the neighbouring house.

Factors Affecting Design and Construction

Unlike many new basements to existing buildings, which are constructed beneath or immediately adjacent to shallow founded properties, the proposed basement will be located at a distance from the existing houses equal to between 1 and 2 times the difference in founding level. Although some ground movement may be experienced at this distance, the magnitude of horizontal or vertical movement at existing foundation level is unlikely to exceed 0.1% of the excavation depth if normal good practice is followed in controlling lateral displacement of the retaining structure during excavation. This would equate to between 3 and 5 mm. There is, therefore, considered to be no risk to adjoining properties from the excavation process.

Provision will need to be made to collect and dispose of any water that enters the excavation and to provide adequate water-proofing to the completed basement.

As the ground is to be restored to its existing levels and there is to be no above ground building, the effect of the development is to reduce the load imposed on the underlying clay strata and there is likely to be some heave as a result. The relatively permeable near-surface materials and the flow of water in these layers is likely to result in the majority of this movement taking place during construction. However, it is to be expected that long-term uplift could occur to some extent. Owing to the relationship between the basement and the existing buildings, this is, again, not anticipated to have any effect on those structures.

A principal consideration in the selection of construction methods and the associated permanent works is the availability of access to the site for plant and materials. In this case, the southern side of the site is bounded by Templewood Gardens providing reasonable access for most normal construction equipment.

General Construction Process.

There is insufficient space on the site to allow excavation without temporary support and the need to control lateral deflection of the temporary walls requires a reasonably stiff support structure. These factors dictate a basic approach which would apply to each detailed method under consideration:

1. Prepare site – remove existing garden features; protect retained trees and structures; level and prepare a suitable working surface for plant.
2. Install temporary retaining wall from ground level – an array of concrete or steel piling on the external line of the permanent basement wall.
3. Excavation within temporary walls introducing propping as required to maintain stability and control movement of the surrounding ground.
4. Construction of base slab, incorporating drainage pipes and sumps as required.
5. Construction of permanent walls to perimeter and interior as required structurally.
6. Construction/completion of roof structure.
7. Removal of temporary props.
8. Cutting down of surplus temporary wall and placement of "green roof" system including waterproofing, insulation, drainage and cultivation medium.

Principal options to be considered are:

- the method of forming the temporary piled wall;
- the extent of propping to be provided, which depends on the form and size of the piling;
- whether to integrate propping during excavation into the permanent works;
- sequence of excavation and construction;
- methods of achieving watertightness;
- resistance to/accommodation of heave and settlement;
- structural roof system to provide support and desired clear spans.

These are considered individually below.

Piled Retaining Wall

Steel sheet piled walls have the advantages of providing a substantially water-proof perimeter to the excavation and of creating no spoil to be removed during installation. For a given width of construction, they are also capable of retaining a greater unsupported height of ground. Modern installation equipment using vibration or direct hydraulic pushing techniques are relatively quiet.

The equipment needed to install steel sheet piles is generally heavier than that for concrete bored piles of equivalent capability and the individual steel elements are too heavy to be manhandled, necessitating the provision of additional plant to lift and move the elements to the driving location. Given the ease of access to the site, these factors do not preclude the use of steel piling in this case.

Concrete bored piles of moderate diameter in predominantly clay soils can be installed using relatively lightweight equipment using continuous flight auger or open-bored techniques. It is necessary to remove spoil as work proceeds, necessitating provision of an excavator and spoil removal systems at an early stage (although they may already have been required for site preparation works). Provision also has to be made for the delivery and distribution of concrete and reinforcement to the piles as they are formed. Concrete can be pumped from the street and reinforcement cages can be assembled close to the working location and manhandled on completion.

Contiguous piles (at close centres but not touching) can be used where water is not a problem. If ground water is expected to occur in significant quantities, overlapping (secant) piles are used, alternate unreinforced "soft" piles being cut into by the reinforced "hard" structural piles. The latter solution would be applicable to the Templewood Avenue site. The formation of the "hard" piles through the "soft" piles is quite a noisy operation.

Although cantilever walls can be designed using concrete bored piles, the diameter and length of pile required is appreciably greater than that for a propped wall.

On balance, it is considered that a steel sheet piled wall is the preferable method for the present proposals. It would be possible to carry out most of the excavation without temporary propping at high level if a suitably deep steel section was adopted and driven sufficiently below the base of the excavation. Alternatively steel props could be installed close to existing ground level with shallower section piles and a shorter toe in at the base. The selection of the appropriate pile and the detailed design of the wall would be carried out by a specialist contractor, subject to strict specification criteria for the permitted deflection of the wall and the surrounding ground.

Propping

Conventionally, where required, large section steel temporary props are employed acting on a steel waling beam. Alternatively, the contractor may opt to construct part of the roof slab itself prior to excavation and use a top-down construction sequence. This minimises the materials needed for temporary support and provides a high level platform for storage of materials and accommodation. Although this is likely to result in a longer excavation period, there may be compensating savings in either cost or in other stages of the project.

Sequence of Excavation and Construction

The sequence of excavation is largely a matter for the contractor to propose and relates to the decisions made about the amount and nature of propping.

As with the roof slab, it may be appropriate for the major part of the general basement slab to be cast before the final excavation of the lowered Jacuzzi/spa pool and plant space in order to reduce the magnitude of propping required to the temporary retaining structure at this stage.

On completion of the excavation to accommodate the pool base slab, any below slab sumps and drainage runs will be installed before the slab is cast. Reinforced concrete vertical structure will then be constructed sequentially to general basement level and then to the roof slab level.

Watertight Construction

As indicated above, the use of steel sheet piling will reduce the risk of significant inflow of free water into the excavation. Minor inflows during excavation will be managed by directing them to sumps and pumping the water away or by locally sealing the piled wall by welding or other means. The ground conditions and the distance from other structures mean that there is no risk of damage to those buildings from any slight variations in the ground water conditions.

It will be necessary to prevent seepages and water vapour transmission into the completed structure. It is possible to utilise a sheet piled wall as the principal permanent barrier to water by welding all the joints between segments. However, it is considered that this may not be acceptable in the domestic market as a relatively new technology. It is, therefore, proposed to use a proprietary waterproofing additive to the floor slabs and to a reinforced concrete lining wall in conjunction with compatible hydrophilic water bars in construction joints to achieve the required internal environment. The final design and detailing of such systems is carried out by specialist suppliers who also provide a construction monitoring service to ensure the proper application of the materials.

Heave and Settlement

The removal of load from the Clay strata will result in both immediate and longer term swelling of the ground. The duration of the construction process will mean that the magnitude of this movement after completion of the project will be relatively small. The remoteness from existing buildings and the constraining influence of the piled wall will prevent any appreciable consequential movement being experienced by adjoining properties.

Provision will be made to accommodate differential vertical movement between the new basement and the existing structure of No 6 Templewood Avenue, in such a way as to prevent water penetration at the junction.

As indicated above, the specified deflection criteria for design of the piled wall will preclude damaging settlement of nearby existing buildings.

Structural Roof

The roof to the basement will be of reinforced concrete. It will act as a permanent prop to the top of the basement retaining walls as well as supporting the "green roof" build up above. Construction may be entirely of in-situ concrete or a composite of pre-cast and in-situ material where speed of construction and cost make this more attractive. In either case, the construction will be linked into that of the walls to provide a homogeneous and essentially waterproof box.

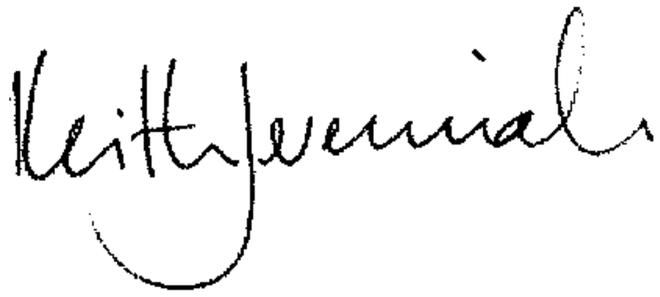
Water ingress from the "green roof" landscaping above will be prevented by a combination of effective drainage; sheet or liquid applied membrane; and/or waterproof concrete additives. An integrated proprietary system will be specified to ensure compatibility between components and application only by suitably experienced and approved specialist contractors.

Summary and Conclusions

The proposed development has been sited away from close proximity with site boundaries and existing buildings. As a result, its construction, using current good practice for properly supported excavations, will have no deleterious effect on such properties.

Detailed specifications will be prepared and method statements procured to ensure that good practice is followed and that adequate supervision and monitoring is provided throughout the works.

Report Prepared by:



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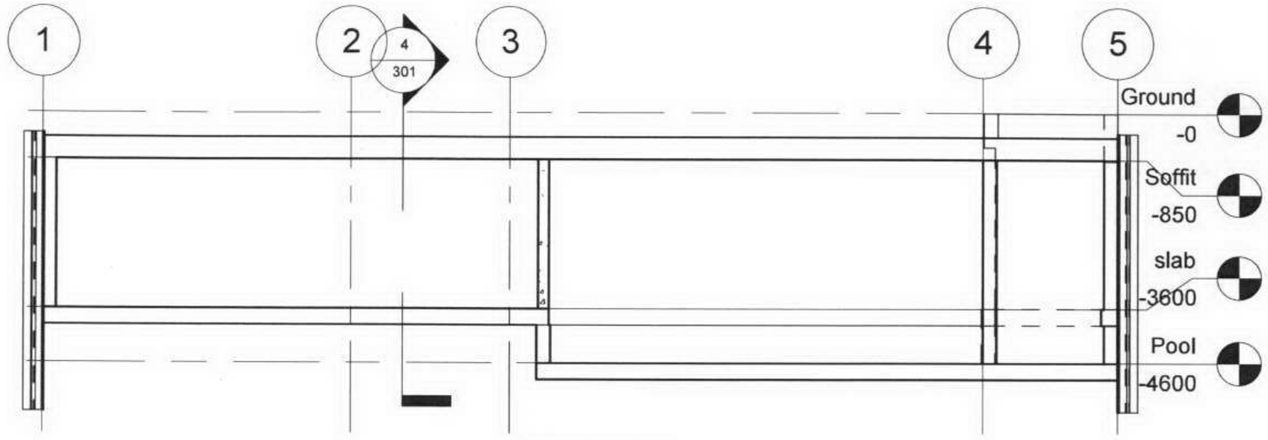

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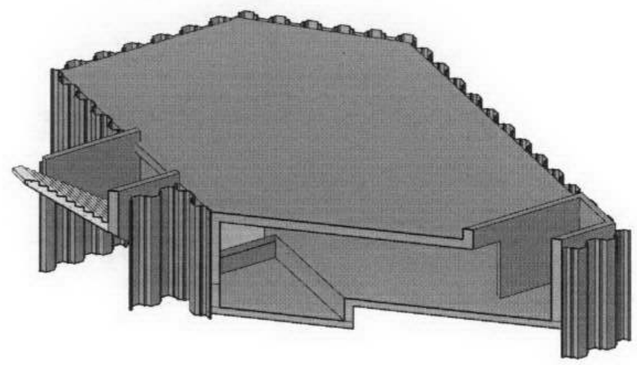

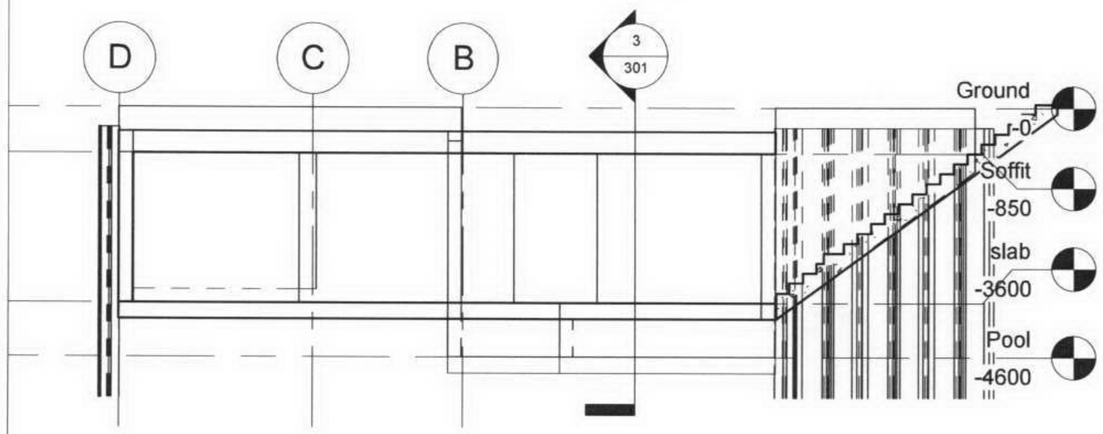

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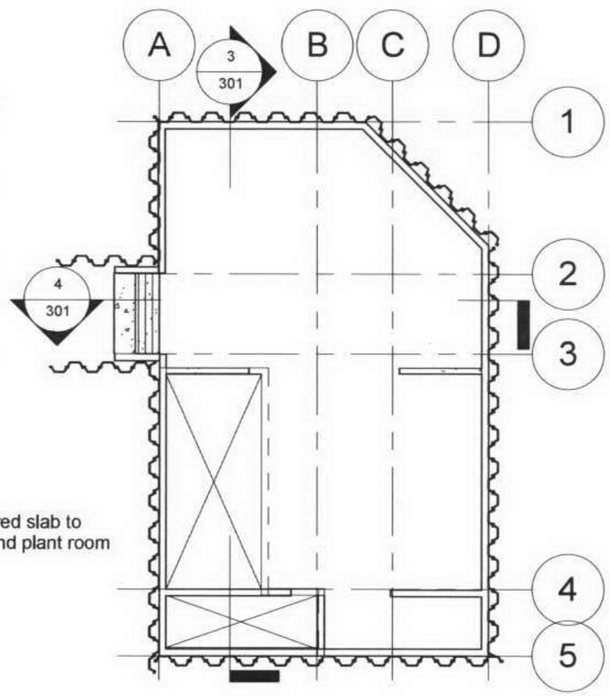

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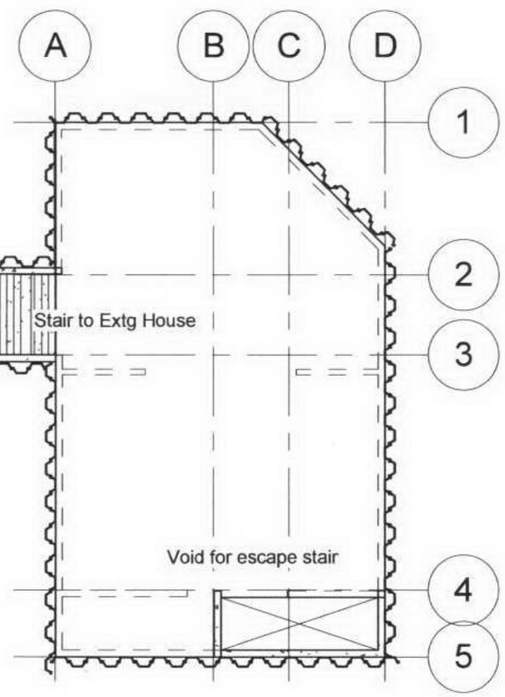

ROOF SLAB
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Rev	Date	Description	By

JobTitle: 6 Templewood Avenue

Drawing Title: INDICATIVE PLAN AND SECTIONS

Scale	Date	By	Checked
As indicated	15/10/07	KJ	

Drawing Number: 3657 – 301

Revision:

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