Structural Engineering Report

J1219 One Radlett Place

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GENERAL NOTES

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This document has been reviewed and approved for issue by a chartered structural engineer (CEng).

REVISION HISTORY

Revisions indicated with line in margin.

Revision status: P = Preliminary, T = Tender, C = Construction, X = For Information

Revision	Date	Author	Reviewer	Description
X1	10/10/12	AL	AY	For Information
X2	26/10/12	AL	AY	For Information

1 INTRODUCTION

The purpose of this report is to describe the structural scheme for One Radlett Place, a new residential development in Primrose Hill. It describes the current site conditions as well as the proposed basement and superstructure scheme as well as detailing the proposed construction sequence and principles of design.

This report is to give an overview of the scheme for planning and, as such, does not go into detailed calculations or specifications for materials.

2 GENERAL PROJECT INFORMATION

2.1 THE PROJECT

The proposed development is a private residential house in Primrose Hill, London. The house consists of a double height basement housing a swimming pool, leisure facilities and a plant room. The above ground structure has 2 storeys of habitable space with a pitched roof and covers around half of the basement footprint.

2.2 THE SITE

The site is located on the West side of Primrose Hill in North London. It is generally level and is bounded by existing boundary walls to all sides. An existing property currently occupies the site. It is assumed that there is no basement to this building and that is it supported on shallow foundations. It is to be demolished as part of the enabling works.

There are three London Plane trees in close proximity to the proposed building which have root protection zones. The proposed extent of basement construction respects these zones however some drainage runs and manholes are required to run through these zones and so the contractor will need to be made aware of this with respect to digging and backfilling.

Initial investigation has shown up the possibility of an underground hidden river, a tributary of the Tyburn, running close to or underneath the site. Enquiries have been made with the environmental agency to clarify this.

2.3 GROUND CONDITIONS

A site investigation was undertaken between 30th April and 2nd May 2008 by Chelmer Site Investigation with an interpretive report by G. L Martin produced 19th June 2008. A summary of the findings is as follows:

The general ground build up consists of made ground to a depth of up to 1.3m, below which is a strata of stiff to very stiff brown silty clay (Upper weathered London clay) to 10.6-15.7m depth. This overlies a layer of very stiff grey silty clay to 14.2-20m bgl (London Clay).

Ground water inflows occurred in 2 of 3 boreholes at level of 1.3m and 2.4m bgl with final levels being measured at 1.7 and 1.2m bgl. Water seepage was noticed in 2 of the window sampler boreholes at 6.5m and 3.8m with final levels measured at 6.5m bgl. Standpipes installed on site measured the ground water level at between 3.4 and 3.7m bgl.

Claystone was encountered in two of the boreholes at 14.2m and 15.5m bgl and this should be taken into account when choosing the pile solution.

The results of soil sulphate tests indicate the natural subsoil/ made ground vary between Classes DS-1 and DS-3 and it is therefore recommended that the latter category be assumed for the purpose of the concrete mix design.

2.4 OTHER PARTIES

The site is enclosed by boundary walls on 3 sides with a road to the North West, Radlett Place, and Primrose Hill to the North East. Generally the boundary walls are double thickness masonry with masonry piers founded on shallow concrete strip footings to a depth of 0.45 to 1.6m bgl. Party wall agreements are in place or being sought where required.

There are no buildings directly adjacent to the site boundary walls but there are 3 residential properties; at 30 and 34 Avenue Road and Radlett House, which shares the adjacent road, Radlett Place. The nearest structure is around 15m from the boundary wall.

The main risks to these properties are ground settlements due to installation of the basement retaining wall and further settlement caused by lateral deflection of this wall during excavation. The wall will be designed to limit these movements to within acceptable limits and so there will be an extremely low risk of any adverse impact to the neighbouring properties. Two levels of temporary propping will be introduced and the wall will be designed to have adequate stiffness.

3 THE STRUCTURAL SCHEME

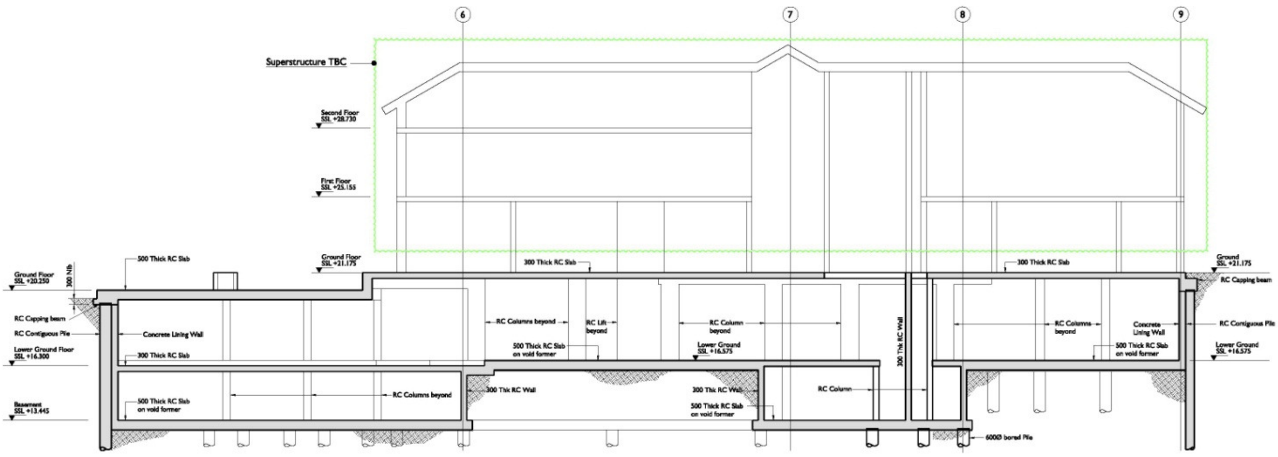
3.1 SCHEME DESIGN

The planning and design programme have led to a basement scheme that allows flexibility for the design of the superstructure. This is to enable further design development of the new superstructure scheme, within specified structural limits, after completion of the basement construction.

As the superstructure design will be finalised in tandem with the construction of the substructure, flexibility has been designed into the basement so that changes to loads applied to it can be catered for with minimal modification.

3.2 DESCRIPTION OF STRUCTURE

The structure has been split into two packages consistent with the procurement route. The first package is the basement box up to ground floor slab. The second package is the superstructure and lift shafts.



Section A-A

3.2.1 BASEMENT STRUCTURE

The basement box consists of a contiguous piled wall built using 450 or 600 diameter reinforced concrete piles which extend down into the London clay 10-13m from ground level. Within this retaining wall a two story reinforced concrete basement box will be constructed. The RC slabs will be used to prop the retaining walls in the permanent case but additional works will be required in the temporary case as the basement will be constructed using bottom-up construction sequencing.

The basement slabs have a series of openings for light wells and services and so the RC slab has been designed to span around these both vertically and horizontally for propping of the retaining wall.

The bottom of the basement box is supported on bearing piles and the contiguous piles that also make up the retaining wall. Void former will be used under the bottom slab to reduce uplift forces from clay heave. By using void former, the only uplift on the slab will be from water pressure, which the slab must be designed to withstand. The primary method of support for the other basement slabs is on RC columns, however, where aesthetic considerations govern; some steel blade columns have also been used.

The RC slabs also act as the permanent props for the retaining wall and are designed to be stiff enough to limit lateral deflections of the retaining wall. Due to the size of the basement, the deflections of the retaining walls must be kept to a minimum. These walls will be designed by a specialist piling contractor to adhere to specified limits.

The substructure extents are larger than the superstructure and so must also act as the foundations for the superstructure. This means that there has been some flexibility incorporated into the design of the basement box, in the form of knock out panels, in the eventuality that the desired superstructure cannot be constructed. Areas of the basement box that are not covered by superstructure will be concealed beneath garden "green roof" areas.

3.2.2 SUPERSTRUCTURE

The superstructure is made up of a 2-story building with additional, accessible loft space and is entirely supported by the basement box. The building is composed of a rectangular main area with two extra "wings" extending out the front. One of these will connected via a single story glazed section and the other connected directly. There is also a single story double garage that includes housing for a substation.

The majority of the roof is pitched timber construction but there are also extensive green and brown roofs, some of which are accessible.

The main construction is hollowcore or solid precast planks spanning onto load-bearing blockwork. Due to the complexity of the house, steelwork is needed to support the external walls and precast planks in certain areas. The first floor is exclusively precast planks, whereas the second floor is a mixture of hollowcore planks and lightweight timber joist construction, depending on the loading conditions. The roof is required to span over a large area and so a steel frame running along the ridges and hips will be used to support the timber rafters. Several dormers are also incorporated into the pitched roof.

The superstructure is entirely supported by the inner skin of blockwork, with the external facade, composed of either a double layer of brickwork or stone cladding, vertically self supporting and tied back into the inner blockwork for stability.

In order to ensure the global stability of the structure, the precast planks will have a structural screed on top that is continuous across supports and joints. By doing this, the precast floor will act as a diaphragm; transferring lateral loads to multiple masonry and concrete shear walls distributed throughout the building. Robustness criteria are satisfied by providing effective horizontal ties throughout by using rebar grouted into pockets.

3.2.3 TEMPORARY WORKS

Temporary works will be provided to ensure all aspects of the construction are secure before they reach their final state. One of the key aspects will be the temporary propping of the retaining walls before the basement slabs have been cast, these props will be designed to not only keep the structure stable, but also to limit the horizontal and vertical deflections of the structure.

By keeping these deflections within specified limits, the impact of the basement excavation on the surrounding area will be kept to a minimum. If these deflections are suitably limited, the surrounding ground will also remain largely unaltered so the stability of nearby properties will be unaffected.

4 DESIGN STANDARDS AND SOURCES OF REFERENCE

The structure is to be designed in accordance with the following design standards and technical reports:

- BS EN 1990: Eurocode 0: Basis of structural design
- BS EN 1991-1-1: Eurocode 1: Actions on structures – Part 1-1: General actions – Densities, self weight and imposed loads
- BS EN 1991-1-3: Eurocode 1: Actions on structures – Part 1-3: General actions – Snow loads
- BS EN 1991-1-4: Eurocode 1: Actions on structures – Part 1-4: General actions – Wind actions
- BS EN 1991-1-6: Eurocode 1: Actions on structures – Part 1-6: General actions – Actions during execution
- BS EN 1991-1-7: Eurocode 1: Actions on structures – Part 1-7: General actions – Accidental actions
- BS EN 1992-1-1: Eurocode 2: Design of concrete structures – Part 1-1: General rules and rules for buildings.
- BS EN 1993-1-1: Eurocode 3: Design of steel structures – Part 1-1: General rules and rules for buildings
- BS EN 1993-1-3: Eurocode 3: Design of steel structures – Part 1-3: General rules. Supplementary rules for cold formed members and sheeting
- BS EN 1993-1-8: Eurocode 3: Design of steel structures – Part 1-8: Design of joints
- BS EN 1995-1-1: Eurocode 5: Design of timber structures – Part 1-1: General. Common rules and rules for buildings
- BS 6180: Barriers in and around buildings. Code of practice
- BS EN 752: Drain and sewer systems outside buildings.

Where Eurocodes are provided above, this is deemed to include the relevant National Annex together with main Eurocode document.