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R9416/PWRB/KMS/34

20 March 2012

## 40 CHESTER TERRACE, NW1

### DESCRIPTION OF PROPOSED BASEMENT EXTENSION STRUCTURE AND

### ASSESSMENT OF ITS EFFECT ON ADJACENT STRUCTURES

### STRUCTURAL STABILITY REPORT

## 1. INTRODUCTION

Jampel Davison & Bell have been appointed by Mr Victor Segal to provide structural engineering services for the proposed alterations and basement extension at 40 Chester Terrace, NW1.

The proposed works are shown on the Architect's (Kerr Parker Associates) drawings and consist of:-

- 1.1 A single storey basement extending 5 metres from 40 Chester Terrace and under the garden to the north. The garden (0.5m thickness) will be reinstated on top of the concrete roof of this structure, which is 3.5m deep overall.
- 1.2 A new basement excavated under the 1960's two-storey extension at the rear, which has a garage and living room at ground floor level (photo 1).
- 1.3 Underpinning of two of the vaults extending under Chester Terrace.
- 1.4 Internal alterations to the main house and the 1960's extension.

## 2. EXISTING BUILDINGS

The main house is the northernmost in Chester Terrace. It has a basement and four storeys (photos 2 and 3). The internal structure was almost entirely rebuilt in the post-war period with a lift serving all floors and new timber floors and roof with timber trusses (photo 4). There is a lift motor room in the loft. The basement extends under the whole house with an area to the front (photo 5) and vaults under the pavement of Chester Terrace (photo 6).

The 1960's extension (photos 7-9) has loadbearing brick walls and an insitu concrete first floor.

### **3. ADJOINING STRUCTURES**

The houses in Chester Place to the east are about 9m from the new basement under the garden and 6m from the new basement under the extension. They have their original basements and are located at beyond the zone of influence of the proposed works.

The adjacent parts of the 1960's extension will be affected by the proposed underpinning. At the rear the walls of this block already go down one storey below the garage floor level.

### **4. CONSTRUCTION OF BASEMENT UNDER GARDEN**

The basement under the garden will be constructed as follows:-

- 4.1 Install piles around extension (either contiguous bored piles or Giken type steel piles) using non-percussive methods and cast capping beam. The piles will be designed as vertical cantilevers.
- 4.2 Simultaneously underpin the north flank wall of 40 Chester Terrace since the new basement is deeper than the existing basement under the house, whose foundations would otherwise be undermined.
- 4.3 Excavate and cast the base slab, tied in to the piled wall and the underpinning.
- 4.4 Cast the insitu concrete roof slab to complete the structure.
- 4.5 The basement will have a cavity drainage system.

### **5. CONSTRUCTION OF BASEMENT UNDER 1960'S EXTENSION**

These buildings were built on the site of the earlier mews. The new basement incorporates a lap pool (1.2m deep and the effective basement storey height in this area will therefore be about 4.5m). They will be underpinned using conventional methods as follows:-

- 5.1 Prop upper parts of the building on beams to allow removal of existing loadbearing wall between garage and garden room and clear access for underpinning.
- 5.2 Cut out existing ground floor slab using non-vibratory methods (diamond sawing or drilling).
- 5.3 Excavate down to existing footing level.
- 5.4 Underpin walls with reinforced retaining wall sections of underpin maintaining lateral support at all times.
- 5.5 Prop across horizontally between basement retaining walls.
- 5.6 Cast basement slab tied into and propping walls.
- 5.7 Cast new suspended ground floor slab, propping top of basement walls.

5.8 Remove temporary horizontal props.

5.9 Re-instate wall between garage and den room to support upper parts.

## **6. UNDERPINNING OF TWO VAULTS TOWARDS CHESTER TERRACE**

6.1 These vaults can be underpinned using traditional methods with a new base slab toothed in to the underpinning. The slab will distribute vertical load as a raft and provide a lateral prop.

## **7. GROUND MOVEMENTS**

The subsoil in this area is London clay, a homogenous material with known parameters.

The proposed development works have the potential to cause ground movements through a number of agencies. Pile installation can cause a degree of movement of the surrounding soil, as can the installation of underpins to the existing structure. The bulk excavation required to create the basement space may generate vertical and horizontal movements of the ground outside the excavation, and it may also lead to a change in the total vertical stress acting at the level of the base of the excavation, leading to settlement or heave.

In some circumstances, the creation of an excavation can cause potential slope instability issues. The site at 40 Chester Terrace is flat and level, with no significant slope. Therefore, while support to the excavation will be required, there is no credible risk of broader slope instability being caused by the proposed works.

### **7.1 MOVEMENT DUE TO PILE INSTALLATION**

Provided that non-percussive methods are used (as will be specified) movements due to the installation of the piles will be insignificant.

### **7.2 LATERAL MOVEMENT DUE TO EXCAVATION**

During excavation the piles will deflect laterally due to horizontal forces from the surrounding ground. The piles will be designed as cantilevers for this temporary effect and the piling sub-contractor will in their design (and during construction) limit the deflection to 15mm. Since only the surrounding garden is affected this amount of deflection will not cause a problem. The basement roof slab will prop the piles in the permanent condition.

### **7.3 MOVEMENTS DUE TO CHANGE IN VERTICAL LOADING**

The removal of the ground will create a slight heave effect at the bottom of the excavation. However the new concrete base tied into the piles and underpinning, the new concrete roof slab and garden above will mitigate the heave effect and the consequent movements should not be insignificant.

### **7.4 MOVEMENT DUE TO UNDERPINNING ETC.**

The underpinning of the 1960's extension will inevitably risk some movement of the adjacent part of this block. This is inherent in any underpinning operation. The Party Wall Act will protect the neighbour if any damage, which should not be great, is caused to his property.

The underpinning will be done by an experienced sub-contractor in accordance with a strict specification using the traditional “hit and miss” method.

The underpinning of the flank wall of 40 Chester Terrace will not be high and any slight movement in this area will be concealed by the subsequent redecoration of the building.

## **8. CONCLUSIONS**

The proposed basement extension under the garden is only single-storey and affects no buildings other than the main house of 40 Chester Terrace, which will be subsequently redecorated hiding any slight signs of movement.

The basement under the 1960's rear extension is deeper due to the lap pool but is still not outside the realm of normal domestic reconstruction. The plan area of this building is only 6M X 8M so it is a very manageable project and the structure above is not of historic importance. There is no reason why this underpinning cannot be successfully accomplished without any significant side-effects.

The structural solutions proposed are robust and conventional and will ensure that ground movements are limited to acceptable levels.

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Photo 1.



Photo 2.



Photo 3.



Photo 4.



Photo 5.



Photo 6.



Photo 7.



Photo 8.



Photo 9.