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CONSULTING ENGINEERS

Project Title
6 Glenmore Road, London
NW3

Report Title
Basement Impact Assessment
Structural Appraisal

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R10055-RO1

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1 INTRODUCTION

Jampel Davison & Bell have been appointed by Mr Austin Pierson to provide structural engineering services for the proposed works at 6 Glenmore Road.

The proposed works entail the following:-

- Slight lowering of the existing basement level situated at the front of the building.
- Construction of a basement extending beneath the rear part of the existing building into the rear garden.
- Internal alterations to the building.
- A loft conversion.

This structural appraisal has been prepared as part of the planning application. It considers the structural stability of the property and adjoining properties.

2 EXISTING BUILDING

The existing building is a Victorian terraced house, 3 storeys high (excluding the basement over the front part).

It is of traditional construction with loadbearing masonry walls, timber floors, mansards to the front and rear elevations on the top floor and a pitched, slated roof.

The building is performing well without signs of significant movement.

3 ADJOINING BUILDINGS

The adjoining building, no.4 & 8 Glenmore Road, are of similar construction.

No.4 has a cellar beneath the entrance hall.

No.8 has a basement over part of the footprint of the building.

Both buildings appear to be performing well.

4. PROPOSED STRUCTURE

The following drawings, see Appendix A, accompany this report and show the proposed structure and temporary works:-

R10055 / TW1 Temporary works – sheet 1 of 2

R10055 / TW2 Temporary works sheet 2 of 2

R10055 / 1 General Arrangement Basement and Ground Floor

R10055 / 2 General Arrangement First and Second Floor

R10055 / 3 General Arrangement Loft and Roof

4.1 Basement Beneath the Front Part of the Existing Building

The proposal is to lower the existing basement level by approximately 200mm. the existing shallow brick corbel footings will need to be cut back and the walls underpinned. The underpinning here will be shallow. It is to be constructed in traditional hit and miss fashion in accordance with the specification.

4.2 Basement Beneath the Rear Part of the Existing Building

The trial holes have shown deep foundations to this part of the building also. The new basement will involve the construction of a reinforced concrete box designed to safety support the horizontal earth pressures.

The existing party walls will be underpinned in traditional fashion to below the proposed basement level.

The anticipated depth of concrete underpin is of the order 1 metre to the party wall with No.4 and less to the party wall with No.8.

The existing brick party walls below ground are to be propped at all times during the course of the works.

Permanent lateral support is to be provided with reinforced concrete walls that will form part of the reinforced concrete box to the new basement.

4.3 Basement Beneath the Rear Garden

This will be an extension of the construction of the new basement beneath the rear part of the building.

5 ASSESSMENT OF THE EFFECTS OF GROUND MOVEMENT ON THE ADJOINING BUILDING

5.1 Lateral Movements at Construction Stage

Particular care has been taken in specifying a stiff structure to provide temporary lateral restraint to the party structures during the course of underpinning and construction of the new reinforced concrete box.

The earth pressures behind the walls are to be supported by two levels of waling and struts, installed in a sequence so as to maintain lateral support to the party walls at all times.

The design of waling detailed on our temporary works drawings R10055 / TW1 and TW2 has been limited to 2mm thus creating a very stiff support (see calculation page R10055/ST1 in appendix B).

5.2 Lateral Movements due to deflection of permanent structure

Permanent lateral support is to be provided by the reinforced concrete walls and the reinforced concrete box.

The reinforced concrete walls are specified as 225mm thick. They span between the basement raft and the ground floor slab, a clear distance of 2.5m. Fixity of the walls to the raft at the bottom and the ground floor slab at the top will increase further the stiffness of the walls. The calculated lateral deflection (see calculation page R10055/ST3) is of the order of less than 5mm i.e. span/500, well below the normal deflection limits given in the code of practice from reinforced concrete design.

5.3 Vertical Movements due to Relieve of Overburden

The existing ground floor is a suspended ground floor with a void beneath. The depth of excavation measured down to the formation of the proposed raft is anticipated to be of the order of 2.6 metres.

The calculations on page R10055/ST6 are based on the empirical data given in the CIRIA C580 document and demonstrate that a 2.6m deep excavation has the potential of giving rise to a limiting tensile strain of the order of 0.05.

The Burland Damage classification table indicates that such movement could result is slight damage, category 2.

Category of Damage	**Normal degree of severity**	**Typical damage**	**Limiting tensile strain (ε lim)(%)**
0	Negligible	Hairline cracks less than About 0.1 mm	0 – 0.050
1	Very slight	Fine cracks up to 1*mm*	0.050 – 0.075
2	Slight	Cracks easily filled up to 5*mm*	0.075 – 0.150
3	Moderate	Cracks from 5 to 15*mm.*	0.150 – 0.300
4	Severe Extensive repair work	Cracks from 15 to 25*mm*.	> 0.300
5	Very severe	Partial or complete rebuilding. Cracks > 25*mm.*	

The ground movement might extend to around 3 to 4 times the depth of excavation and any influence on properties other than the adjacent no 4 and no 8 would be negligible.

5.4 Vertical Movement Due to Changes of Ground Pressure Beneath the Foundation

The bearing pressures on the clay will be transferred to a lower level by the underpinning.

Traditional underpinning, as specified, is extensively and reliably used on building works where the formation level of foundations needs to be lowered.

The depth of underpinning is shallow and the pressure will be spread by the raft. Such movements should therefore not be significant.

5.5 Effect of Tree Roots

There is a mature pollarded lime tree in the rear garden located at a distance of approximately 2.7m from the rear wall of the basement. Limes are of moderate water demand. The depth of the foundations are of the order of 2.4 metres below the rear garden level and well below the depth recommended by the NHBC guidelines for building near trees. The tree roots should not therefore cause movement to the new foundations.

6 BASEMENT CONSTRUCTION SEQUENCE

6.1 Stage 1 – Remove internal walls on the ground floor above the new basement and the rear elevations

These walls are to be removed and the building above first floor supported on a braced steel frame in order to allow good access to the substructure works

- Excavate and construct temporary pad foundations.
- Install temporary steel frame and brace.
- Form holes through walls to receive every second needle, install needles and drypack
- Wait 72 hours and repeat for other needles
- Wait 72 hours, remove walls below

Details are shown on drawing R10050/TW1

6.2 Stage 2 – Install short sections of reinforced concrete wall at the rear of the existing party wall with no 4 to the single storey rear additions

This involves the construction of an earth retaining wall to support the adjoining garden over a length of approximately 1.6 m between the existing single storey addition and the rear wall of the proposed basement. It is to be constructed in two sections in similar fashion to underpinning.

- Excavate one section and install temporary plank and strutting
- Cast base of retaining wall
- Review need for planking and strutting and adjust using sacrificial props as necessary
- Cast stem of retaining wall
- Wait 48 hours, strike shuttering and prop reinforced concrete wall back to face of excavation
- Repeat for other section

6.3 Stage 3 – Install waling and propping to existing brick party walls below ground floor level + install king post retaining wall to support rear garden

- Remove raised ground floor and excavate ground to a depth of 1.1 metres below ground floor level.
- Install King posts to rear retaining wall and backfill excavations
- Install upper temporary waling and struts.
- Continue excavation to level of second waling
- Install lower temporary waling and struts.
- Construct king post retaining wall at rear down to level of lower waling.
- Construct underpinning in sequence and to the specification. Prop the excavation to each underpin section with timber planking and strutting
- Complete excavation and construction of king post retaining wall.
- Construct new reinforced concrete box and permanent structure.

6.4 Stage 4 – Front excavation for light well

The temporary support is to comprise light steel piles laterally restrained by two steel box frames. The upper box frame would be fixed at high level. The lower frame would be lowered as the excavation proceeds in order to prop the lower end of the steel piles. The steel piles would be pressed down progressively as the excavation proceeds. In this way support to the excavation and the pavement would be maintained at all times.

- Excavate to 400mm below pavement level and place in position the two box frames and the steel piles
- Continue excavation a further 500mm, push down the steel piles as excavation proceeds, drop lower frame and secure in position
- Repeat until excavation is complete
- Secure bottom of steel piles with concrete blinding
- Construct base of retaining wall
- Remove lower box frame and cast wall
- Wait 7 days and remove upper frame

7 CONCLUSIONS

- The proposed works are based on conventional and robust methods of construction and have been designed to limit ground movements to acceptable walls.
- The works will need to be carried out by a suitably experienced contractor in strict accordance with the drawings and specifications and with a high degree of supervision and quality control. This being the case the stability of the property and adjacent properties should not be affected by the basement works.
- The calculations forming part of this appraisal that any damage to the adjoining building should be very slight in accordance with Burland Classification table.
- The works would be subject to the party wall act and any damage would be rectified under the party wall award.

8 APPENDIX A – DRAWINGS

R10055 / TW1 Temporary works – sheet 1 of 2
R10055 / TW2 Temporary works sheet 2 of 2
R10055 / 1 General Arrangement Basement and Ground Floor
R10055 / 2 General Arrangement First and Second Floor
R10055 / 3 General Arrangement Loft and Roof

9 APPENDIX B – CALCULATIONS

R10055/ST1-ST6 Stability Calculations
R10055/1-6 Permanent Structure Calculations

10 APPENDIX C – UNDERPINNING SPECIFICATION

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