



Structural Methodology Statement

Rev C

Project Title: 6 Fitzroy Park

Job Code: ARC1155

Description: Structural Methodology Statement

Revision: Rev A - 22/11/11 – Additional Information provided with regard to clarification of the requirement DP27 basements and light wells
Rev B - 07/05/12 - Report amended to reflect the revised scheme and the Local Authority Planning department comments
Rev C - 02/04/13 - Report amended to suit revised planning application - amendments are in red.

Client: 800 Group

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Date: 28th July 2011

Drawings

Referenced: BB Partnership Ltd Planning Drawings

Contents

1.00 Introduction

2.00 Structural Proposals

3.00 Conclusions

Appendix A – ARC1155_101 Rev B Preliminary structural foundation Scheme

Appendix B – Validating calculations

1.00 Introduction

Arc Design and Engineering Ltd has been appointed to provide a structural scheme to allow for the proposed alteration works to 6 Fitzroy Park, Highgate N6. The proposals are to be sympathetic to the nearby trees especially where the proposals coincide with root protection areas. Briefly, the proposals are to demolish the existing glass single storey buildings which project towards the west from the main building and provide new buildings which are similar in nature but will provide more space and include a basement which will extend the existing basement which is presently only below the main house. Arbtech Environmental services have produced a performance specification for the foundations in order to avoid any adverse effects on the trees which are close to the proposals. This specification has formed the basis of our proposals.

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This report should be read in conjunction with all relevant Engineering, survey and Architectural drawings

2.00 Structural Proposals

With reference to the Arbtech report we are given to understand that the area of most concern is the new construction adjacent to trees T6, T7 and T8. From the survey data available it would appear that the ground levels are at around 49.500m. The proposed foundation is to be a piled raft supported upon 250mm diameter bored concrete piles. The reinforced concrete raft will sit upon anti heave boards, Cellcore or similar. The maximum thickness of the raft slab will be 200mm. The raft will be at or just above the existing ground level. If we take the finished floor level of 50.000 and work downwards we see that there may be a dig of around 350mm in the worst case. This is better than the 500mm maximum suggested by the Tree officer. We have assumed a 1.0m working area around the perimeter of the proposed work and that this minimal reduction of levels would take place in this area only. Drawing ARC1155_101 Rev B in appendix A refers. The reduction in levels would be carried out with a small to medium tracked excavator (with low ground bearing pressures) but would only need to enter the RPA as far as is required for its excavator arm to reach the tree side of the working zone. This would mean that during this operation there would remain a minimum clear zone of approximately 6m away from the protected trees.

The proposed main basement falls almost entirely outside the root protection area and is to be formed by installing a perimeter contiguous piled retaining wall. The construction methodology will negate the need for intrusive earthworks around the basement perimeter. Once the piled wall is in place the basement can be excavated internally and reinforced concrete slab and walls formed to create the basement space. Systems will be required to remove the spoil immediately from the area.

The piling operations for the individual 250mm dia piles can be carried out with a small tracked piling rig which would exert only a very small pressure on the ground within the root protection areas. Piling rigs are available with so called 'floatation tracks' which would be ideal. The contiguous piled wall, which are larger piles, can be carried out with a larger piling rig, if required, as the rig can be situated outside of the root protection areas.

The steel steps down to the lower level situated within the root protection area are to be fully suspended and fixed back to the reinforced concrete slab. There will be not be a separate foundation set into the root zone.

The small basement store, approximately 3.8m x4.1m on plan is within the RPA but is to be constructed in a similar manner to the main basement and will therefore be as minimally intrusive as possible. Again the piling rig will be working as far as possible outside the RPA with it's orientation such that the encroachment into the RPA is minimised.

Slope Stability

With respect to any possible concerns of stability of the sloping site we would consider that the proposals offer a betterment in that the buildings loads are now taken to a much lower level by virtue of the proposed system of piling. This reduces the surcharge load from the top of the slope which is beneficial.

Policy DP27 – Basements and Light wells

Policy DP27 has been adopted in recognition of the increasing popularity of basements as a means of gaining additional space in homes. Although the policy recognises that such development can help to make efficient use of the borough's limited land it is important that this is done in a way that does not cause harm to the amenity of neighbours, affect the stability of buildings, cause drainage or flooding problems or damage the character of areas or the natural environment.

Guidance has been given suggesting that for this project we must a) maintain the structural stability of the building and neighbouring properties and b) not have a cumulative impact upon structural stability in the local area.

We consider that the structural scheme presented demonstrates that we are protecting the stability of the existing structure by the introduction of a contiguous piled wall. With respect to neighbouring properties there are none that could be in anyway influence by this project.

With regard to cumulative impacts we have considered that the proposed scheme is at the top of an earth embankment which falls down towards the road surface of Fitzroy park. The proposed basement and the manner in which it will be constructed

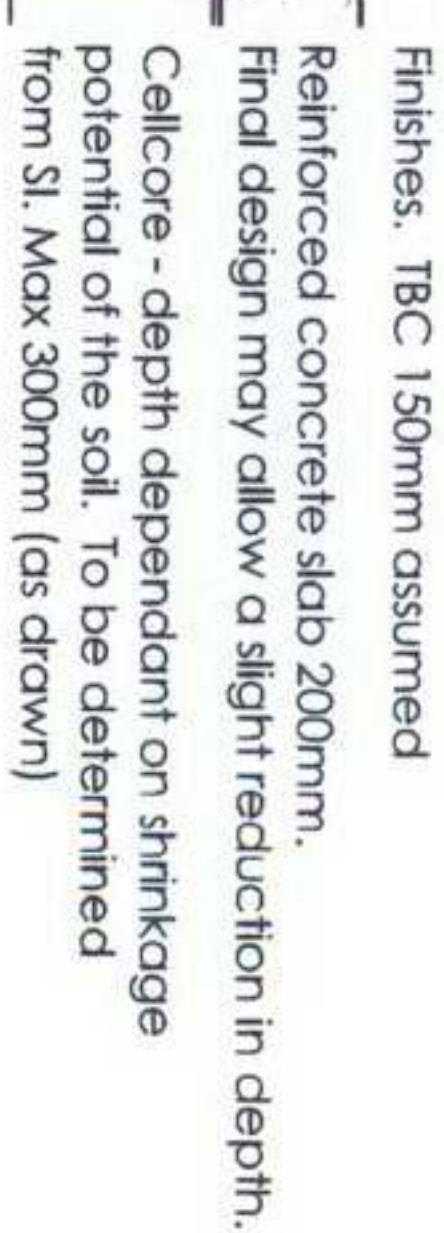
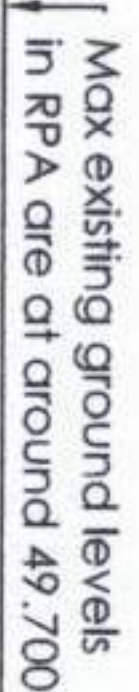
means that the bank will be supporting similar vertical surcharge loads and lateral earth pressures will be lessened. Our opinion is that there will be no detrimental or cumulative impacts upon structural stability in the local area by the proposed construction.

3.00 Conclusion

- Traditional deep foundations have been avoided in favour of a piled raft installed at or just above ground level.
- Excavation into the ground adjacent the protected trees has been minimised and subject to final design should be 350mm or less. This has been achieved by the adoption of a piled raft foundation rather than a more traditional foundation solution. The exception being the small storage basement below the proposed gym area.
- Pile diameters within the root protection areas have been minimised to reduce any impact on the root systems and facilitate the use of a small piling rig, again, to reduce any impact on the root systems below.
- Heave precautions have been allowed for underneath the piled raft to allow for any future ground movements and avoid the build up of pressure.
- The basements are to be formed using a bored piled contiguous wall and so there will be no earthworks external to the basement wall line.
- Precautions and considerations have been applied such that the project complies with Policy DP27 in that there will be no detrimental impact on the structural stability of the building, the neighbouring properties or the local area.

Appendix A

1. ALL DIMENSIONS TO BE CHECKED ON SITE. ALL DETAILS AND DIMENSIONS RELATING TO SUB-CONTRACTORS OF SUPPLIERS WORK MUST BE CHECKED AND AGREED BETWEEN THE SUB-CONTRACTOR OR THE SUPPLIER AND THE GENERAL CONTRACTOR.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND STRUCTURAL ENGINEERS' DRAWINGS AND SPECIFICATIONS.



250mm dia pile



Grey shaded area indicates the reduced level dig within the RPA as allowed by LA Tree officer. Basement Store TBC

arc design
Clear - Concise - Buildable

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6 Fitzroy Park, Highgate N6

Preliminary Structural Foundation

Drawing No.
ARC1155_101

Date: 28/07/11

Appendix B

PRELIMINARY STRUCTURE - GYM.

Area of GYM = 36 m^2

Perimeter = 24 m

LOADS

Green Roof 2.0 kN/m^2

Roof Structure $1.5 \times 24 = 3.6 \text{ kN/m}^2$

Floor Slab $3 \times 24 = 7.2 \text{ kN/m}^2$

Floor Slab Area = 61 m^2

Total Load Walls $3.3 \times 3 \times 24 = 240 \text{ kN}$
(Assume All walls)

$$\therefore \text{Total DL} = (2 + 3.6) \times 36 + 7.2 \times 61 = 640 + 240 = \underline{\underline{880 \text{ kN}}}$$

$$\text{Total LL} = 2.5 \text{ kN/m}^2 + 0.75 \text{ kN/m}^2 = 3.25 \text{ kN/m}^2 \times \frac{40}{80} = \underline{\underline{130 \text{ kN}}}$$

$$\text{Total Load} = 1010 \text{ kN} \div 6 \text{ PILES (say)} = 168 \text{ kN}$$

250 ϕ PILE in REASONABLE CLAY @ 12m GIVES 160 kN.

$\therefore$ ASSUME 250 DIA PILES

$$\text{ULTIMATE UDL} = 1.4 \times 880 + 1.6 \times 130 = 1440 \text{ kN} \div A \approx 24 \text{ kN/m}^2.$$

SLAB - TRY 200mm SLAB

$$\text{SPAN/DEPTH} = \frac{3000}{160} = 18 < 20 \text{ ok}$$

$$\text{BENDING } M = 24 \times 2.3 \times \frac{3^2}{12} = 41.4 \text{ kNm}$$

$$\frac{M}{bd^2 f_{cu}} = \frac{41.4 \times 10^6}{750 \times 160^2 \times 35} = 0.06 \text{ - CURVED STEEL REQ}$$

$$A_s = \frac{41.4 \times 10^6}{0.95 \times 460 \times 140} = 676 \text{ mm}^2 \text{ - } 16 @ 200 \leq 1005$$

PUNCHING SHEAR

250 DIA PILE - Shear Area: $755 \times 160 = 125600 \text{ mm}^2$

$$\therefore v = \frac{168 \times 10^3}{125600} = 1.33 \text{ N/mm}^2$$

$$0.8\sqrt{f_{cu}} = 4.7 > 1.33 \therefore \text{ok}$$

Check @ 1.5d - 1.5d: 240 $\therefore$ Perimeter = $(2 \times 240 + 250) \times 4 = 2920 \text{ mm}$

$$v = \frac{168 \times 10^3}{2920 \times 160} = 0.36 \text{ N/mm}^2$$

$$\frac{100 \times 1025}{750 \times 160} = 0.84 \therefore v_c \approx 0.8 > 0.36 \therefore \text{PUNCHING ok}$$

Provide 200mm GRADE 35 SLAB WITH 250mm ϕ PILES