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Subject
Structural Report

Structural Engineer's statement for alterations to the existing basement at 300 Gray's Inn Road

Document Control

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1.0 Introduction

This document is an appendix to the RIBA Stage 2 report and describes the engineering assumptions made in the design of the new alterations to the existing basement at 300 Gray's Inn Road. It also describes the associated works that take place in the existing rear courtyard area, which involve the installation of a new geocellular attenuation tank and the new external stairs to the existing basement. This report does not address the work above the ground floor in detail.

2.0 Existing Building and Location

The site is situated on the corner of Acton Street and the A5200, to the South East of King's Cross Station. The site is bound by Acton Street to the North, the A5200 to the West and adjoining buildings to the East and South. 300 Gray's Inn Road is located roughly 500m South-east of King's Cross Station.

The building appears to have been built in the 1970's.

The British Geological Survey Maps suggest that the site is underlain by London clay, under a relatively shallow made ground stratum. The existing basement is founded in the London clay formation.

300 Gray's Inn Road, also known as Battle Bridge House, is an eight-storey office, built as a cast in-situ concrete frame building with a single storey basement. The building is connected to a three-storey office building facing Acton Street.

The stability of the eight-storey building is provided by existing reinforced concrete walls surrounding the existing lifts and stair cores. The reinforced concrete walls act as vertical cantilevers and transfer all lateral loads safely to the foundations. Internal columns are approximately 500mm square reinforced concrete columns. The external columns are reinforced concrete blade columns. The external façade appears to be built as cavity masonry walls.

The three-storey building, facing Acton Street, appears to be of similar construction.

The existing basement is built in reinforced concrete structure and lays under the entire footprint of both buildings. The basement currently hosts plant space, Bupa MRI rooms and storage space.

It is assumed that the buildings are founded on ground beams and pile caps over piles.

3.0 Proposed Works in the Existing basement

The existing basement is a single storey and extends below both buildings.

It is assumed that the existing foundations consist of piled foundations, with pile caps and ground beams supporting the cores, columns and the basement slab.

There is already a lift core in the existing building, which extends about 1.2m below the finished basement floor level. The lift core will likely be supported on a recessed pile cap.

The development consists of relocating the lift core to improve the circulation between the residential and office buildings, and excavating a new lift pit in the new lift core position. The proposed lift pit will have the same excavation depth as the existing lift pit and will be within the footprint of the existing basement. The part of the building affected by these works does not directly adjoin any buildings and is set away from any neighbouring structures.

Modest excavation of the new lift pit will not have any adverse effect on the adjoining properties.

4.0 Proposed works in the Existing Courtyard

The existing courtyard at the rear of the building is connected to Acton Street through an undercroft ramp. The level of the existing rear courtyard is lower than the existing street level.

It is proposed to introduce a new set of stairs that will connect the existing courtyard to the existing basement. The proposed stair foundations will not undermine the existing basement foundations. And will be set away from any boundary walls, adjoining buildings, and adjoining structures.

A new geo-cellular attenuation tank will need to be installed in the existing courtyard set away from any neighbouring buildings and structures. The excavation for the tank will not undermine existing building foundations or any adjoining buildings and structures and so these works will not have an adverse effect on the adjoining properties.

5.0 Existing ground conditions

Full ground investigations and testing will be carried out in Stage 3. However, at this stage we have reviewed the British Geological Survey Maps and historic boreholes from the sites nearby. These suggest that London Clay stratum will be present directly below the existing basement foundations.

6.0 Site Hydrogeology

From the knowledge of the site and the local conditions, the following can be concluded:

- The hydrogeology of the site is likely to be characterised by the possible presence of small seasonal areas of perched water table overlying the London Clay, which is impermeable.
- Confined under the London Clay Formation is a deep aquifer well below any impacts from this project.

- The site does not lie within the designated floodplain of the River Thames, nor is it located within a Groundwater Source Protection Zone as defined by the Environment Agency.

As the basement and foundations of the existing buildings are already within the London Clay strata, any movements in perched groundwater on the site are already affected by the existing plan of the building. The new lift pit will be of similar depth as the existing one and won't extend any further into impermeable London Clay and therefore will have no impact on the local hydrogeology.

Similar can be said for the excavations for new attenuation tank and the external stairs will have no effect on the local hydrogeology.

7.0 Slope Stability

The existing courtyard is generally level and the new landscaping will not change the site slopes, as such no issues relating to slope stability need to be addressed.

8.0 Impact on Adjacent Structures and Services

The part of the building affected by these works does not directly adjoin any buildings other than the house itself. If any damage develops in the structure of the adjacent buildings then normal Party Wall procedures provide a mechanism for completing any repairs.

Analysis of any potential for movement of adjacent buildings will be undertaken during later design stages, however we do not envisage that any significant damage will develop as a result of the proposed works to the basement areas.

It is not anticipated that the work will have an impact on buried services passing across the site e.g. sewers, cables etc. Detailed searches into the locations of any mains services has been carried out.

9.0 Lift Pit and Stair Water Tightness

It is expected that the lift pit will need to meet a minimum level of Grade 2 watertightness. The design will incorporate the use of a water resisting concrete admixtures in addition to a sump pump. Final design of the waterproofing will be carried out by the specialist.

10.0 Assessment of Key Safety Issues

The following issues will require further consideration in order to mitigate or eliminate inherent risks:

- Underground Services- A detailed survey of the existing services will have to be undertaken. All existing services will need to be terminated prior to any excavation.
- Intrusive Structural Survey– investigation will be needed to ensure that assumptions about the existing structure can be verified.
- Geotechnical Investigation – to confirm assumptions about the ground conditions.

- Bulk Deliveries- Delivery and handling of large or heavy structural elements (e.g. reinforcement bars) from the main road entrance. Reinforcement can be detailed to provide smaller bars at more regular centres, which will help reduce the weight of hand-lifted elements. However licences maybe required for the delivery trucks.
- Detailed Temporary Works Design with Site Monitoring– the sequence of work needs to be developed in detail by an experienced professional engineer, and regular site visits and reports made to ensure that site operatives understand and follow the designed sequence.

11.0 Conclusions

Our judgment based upon the investigations carried out, the geological records and our experience of basement developments in similar conditions in London is as follows:

1. The development will maintain the structural stability of the existing building and neighbouring properties. The engineering of lift pits, attenuation tanks and external stairs of this kind is well understood and there are no difficult or peculiar issues that arise in this case.
2. The development will have no adverse effects on drainage, run-off or hydrogeology. We do not consider that this site raises any unusual or adverse groundwater or drainage issues.
3. There is no potential for cumulative impacts on structural stability or the water environment in the local area.

Overall, based on the results of the site inspection, background information and our experience, this is a site where development of this type should not give rise to any unusual or adverse stability, groundwater or drainage issues.