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Lisa Shell
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Our ref: CRn/gb/151202/GNG0389549

Dear Lisa

4 The Grove, Highgate – Structural Engineering Report

1.0 INTRODUCTION

This report is written in support of the accompanying application for Listed Building Consent for certain structural repairs and alterations to this Grade II* Listed single family home.

This report has been prepared by Mr Clive Richardson B.Sc (Hons) CEng, FICE, FIStructE, IHBC, an Accredited Conservation Engineer and Technical Director of AECOM Consulting Engineers. See attached CV.

2.0 CONSERVATION APPROACH

2.1

The proposed structural repairs and alterations will be conservation-based, in accordance with accepted best practice. See attached ICE/IStructE Paper 2.6.2009.

2.2

In particular, the six tenets of practical conservation will be observed:

2.2.1 Minimum Intervention
2.2.2 Conserving as found
2.2.3 Using like for like materials
2.2.4 Honest intervention
2.2.5 Sympathetic repairs
2.2.6 Reversible alterations

3.0 BUILDING SIGNIFICANCE AND CONDITION

3.1

The significance of the building is described in the "Heritage Assessment" by Stephen Gray Consultancy, and the general condition of the building fabric is described in the "Building Survey" by Private Property Projects. These two documents accompany the application for LBC.

This report takes cognisance of these documents, and builds upon them with regard to the condition of the structural fabric.

3.2

We visited the property on 26.11.15 and made a visual structural reconnaissance of the building, internally and externally from all readily available safe vantage points, including the main roof voids and roof valley. We did not include any external works (eg. retaining walls). The weather was mild, calm, and dry during our visit.

3.3

The following structural symptoms of distress were observed:

Main roof

- sagging rafters, firred to produce planar pitches
- fractured rafters, poorly propped
- sagging purlins, tilting dormer windows backwards, with recent ceiling plaster cracks indicating ongoing movement
- roof spread, thrusting top of rear wall out of plumb
- party-wall stack cracked vertically and leaning towards neighbouring property

Suspended floors

- generally bouncy and out of level

Internal walls

- generally suffering from differential vertical distortion, with lozenged doorways, and cracks through recent decorations indicating ongoing movement.
- Ground floor stair partition buckled sideways

3.4

More defects will probably be found during further site inspections, and when the building is opened-up to perform any necessary repairs and alterations.

3.5

None of the foregoing symptoms are unusual in buildings of this type and age, which rarely acquire true equilibrium, and must be expected to move and crack from time to time. The recommended conservation approach is to control movement as much as possible without draconian intervention, unless structural safety is imminently threatened.

3.6

It is unlikely that every latent structural defect will come to light by the end of the Works and the owner/occupier must be reconciled to dealing with problems as they arise from time to time during his occupation.

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4.0 STRUCTURAL ALTERATIONS

4.1 Restoring the Dormers

The modern double width dormer on the rear elevation will be removed, and replaced by two single dormers to match the extant adjacent dormers. All the carpentry of the timber carcassing will match the existing dormers, but it is expected that member sizes/centres will vary to satisfy current requirements of Part A of The Building Regulations.

The continuity of the roof structure will be checked front to rear, in the vicinity of the dormers, and rafter/joist connections improved if necessary to control the roof spread of the rear wall.

The existing purlins are highly stressed and sagging progressively due to creep. We recommend that they are strengthened to prevent ongoing distortion of the roof planes, tilting back of the dormers, and the risk of ultimate fracturing and local collapse.

Purlin strengthening would involve traditional steel flitch plates, invisible behind the ceiling finishes.

4.2 Relocation of Kitchen Post

The post is not original. It has been inserted to relieve the excessive loads from the upper storeys on the ground floor beam. To optimize space-planning, it is required to move the post position by about 300mm. This is structurally feasible providing there is not a joint or fracture in the beam at the present position of the post. A detailed survey will check this point. A new foundation will be necessary for the post.

4.3 New/Raised Door Openings

The proposed alterations to the single-width doorways are modest, and builder's lintels will probably suffice, subject to what is found and recorded as the opening-up proceeds.

4.4 Replacement of Ground Bearing Floor

4.4.1 It is proposed to remove the existing modern concrete floor, excavate to make room for insulation and damp-proofing and then reinstate the concrete floor to the same finished level.

4.4.2 The British Geological Survey Sheet 256 (drift edition) indicates the bearing stratum to be Bagshot Beds (sands upto 30ft thick) overlying Claygate Beds (sand and loam up to 100ft thick) overlying London Clay (200-350ft thick).

4.4.3 Trial-pits have revealed that there is Clay under the existing floor and wall footings, which is orange/brown and very stiff at the southern end of the house; yellow and moist at the northern end. It is unclear whether the clay is virgin or made ground, and whether there are any leaks from drains which run to the northern end contributing to the moisture in the clay. A CCTV survey of the drains and small boreholes are recommended to check these questions.

4.4.4 The trial-pits have shown that the existing footings are about 200mm deep, whereas the excavations will need to be about 450mm deep. This design issue will need to be resolved to avoid undermining the footings. Options are shallow underpinning, or benching the floor slab at the footings, or raising FFL.

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5.0 CONCLUSIONS

5.1

There are feasible conservation-based options for all the proposed alterations.

5.2

The degree of structural repairs will be governed by the client's expectations of building performance, good conservation practice, and structural safety. In particular, minimum recommended repairs include purlin strengthening, control of roof spread, rafter splints, stack reinforcement and enhanced support for internal loadbearing partitions.

5.3

More defects are likely to come to light as the project proceeds and during occupation. Their resolution should determined using the conservation principles outlined in this report.

Yours sincerely
For **AECOM**

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ICE/IStructE Paper 2.6.09