

Specific Structural Report

carried out on

Flat 4, 1 Bishops Road, Highgate London N6 4HP



Prepared by

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For Client

Mrs Melanie Melrose

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1.0 Scope of Report

In June 2020 Graeme Allen Consultancy Ltd was asked to comment on cracking to the rear extension kitchen area as suspected subsidence.

This is not a “full structural survey” or a “homebuyers report” and our report should not be used in the same way as a pre-purchase survey. It has been prepared specifically in connection with the instruction, noted above, and should not be relied on as a statement of structural adequacy. It does not deal with the general condition of the building, decorations, services, dampness, timber rot or infestation etc.

All directions are given relative to an observer facing the front of the property.

We have not commented on any part of the building that is covered or inaccessible.

The report is based upon a visible inspection which by its very nature is limited. No investigations or monitoring or checking of design of structural design elements has been carried out.

The site inspection took place on 22nd June 2020.

2.0 Description of Property and Site

The property comprises a ground floor flat within a substantial detached block of traditional construction with a pitched roof and clay tiles.

The property also benefits from basement accommodation.

The property is believed to have been constructed circa 1880.

The site slopes down from left to right.

The main external walls comprise of solid masonry and internal walls comprise a combination of brick/block and timber stud.

The geological map shows the underlying soils to be sand close to the clay border.

3.0 Observations

A structural problem will manifest itself as cracking to the structure e.g. load bearing walls, ceilings. Distortions without recent cracking may be an indication of past movement.

The building was inspected both internally and externally to check for cracking. We paid particular attention to the areas above and below window and door openings and at junctions between property elements as structural cracking will usually manifest itself in these areas.

Other factors to consider in the assessment of cracking are distortions to the building and age of the decorations.

The following is a summary of the damage at the property with supporting photographs where appropriate including any limitations of the survey.

Note that the damage recorded below represents the principal structural damage observed of significance to the report in the room/elevation subject to observational limitations and may not include each and every crack such as plaster cracking to ceilings and cornices for example. The damage description describes our observations insofar as they relate to the purposes of the report.

(Note ndss denotes no damage of structural significance)

Where the damage is suffixed by a letter eg (A) this refers to a specific cause within the discussion section.

3.1. Internal Damage Flat 4

Rear right bedroom

No damage of structural significance.

Disruption over door to decorative finish.

Right bedroom

No damage of structural significance.

Rear lounge

No damage of structural significance.

Central bathroom

No damage of structural significance.

Communal entrance

No damage of structural significance.

Kitchen

Hairline crack on the right side wall towards the rear approx. 1m from the rear wall
Associated crack continues across ceiling 2mm wide to left wall and progresses down left wall 2mm becoming hairline behind wall tiles.

3.2. External Damage (single storey extension) (2mx1.5m)

Rear wall

10mm wide crack in rear right corner adjacent to precast lintel.

Low level horizontal cracking 5mm wide in rear left corner of the extension, continues to left wall at low level.

Left wall

Vertical tapering crack at junction with main house (and cellar) 5mm wide at roof level.

4.0 Discussion

4.1. General

It is common practice to categorize the structural significance of damage in accordance with the classification given in Table 1 of Digest 251 produced by the Building Research Establishment.

Category 0	Negligible	<0.1 mm
Category 1	Very Slight	0.1 - 2mm
Category 2	Slight	>2 but < 5mm
Category 3	Moderate	>5 but < 15mm
Category 4	Severe	>15 but < 25mm
Category 5	Very Severe	>25mm

Table 4-1 Extract from Table 1 BRE Digest 251 Classification crack widths

(Building Research Establishment, 1995) In this case the worse damage falls within category 3 moderate.

It is not feasible in practice to achieve a completely crack free house. Minor cracks will always develop between dissimilar materials and due to thermal and differential affects. As materials gain or lose moisture movement occurs which can also lead to cracking. If decorations are very recent then previous larger cracks could have been obscured. Cracks of structural concern are generally above 3mm in width but smaller cracks closely spaced may also be equivalent to a single larger crack.

Most defective old buildings give plenty of warning signs before they become dangerous. In this respect, many buildings which may appear to be unsafe, according to a simplified calculation of the strengths of the individual elements, continue to resist load without apparent distress. This may be because of load redistribution, membrane or arch action, or other factors not normally considered in structural analysis.

Subsidence cracks are generally identified by the following characteristics:-

- diagonal in direction
- wider at one end than the other
- start at and are widest at the free edge (such as an opening)

- tend to travel around openings
- they occur on both wall faces for example internally and externally at the same location
- cracks are generally greater than 5mm wide however smaller cracks may be of concern especially if they are likely to increase in size
- tend to travel down to ground level through the damp proof course
- indicate a pattern consistent with movement of one part of a building relative to another

Subsidence cracks rise from the fulcrum of movement, and often pass through points of weakness in the structure. For example, they may pass diagonally across window frames, or appear at the head of doors.

The geological map for the area indicates the property is underlain by sand or non-cohesive soils.

In sands, gravel and other non-cohesive soils and silts subsidence is usually caused by washing out of fine material which causes reduction in volume and and/or softening causing downward movement of the foundations. Drain leakages or water ingress to the soil adjacent to foundations are a common cause of subsidence on non cohesive soils.

In clay soils subsidence is usually associated with volumetric change caused by changes in moisture content. Normal season variations in moisture content may give rise to subsidence to foundations at a depth of less than 1.0m in the South of England. Below this depth nearby trees will have an effect on the moisture content (and volume) of the soils. During the summer months when trees moisture demand is at its highest (and rainfall at its lowest) the trees extract moisture from the soil causing it to shrink. During the wetter winter months when the trees are more or less dormant, the moisture content increases causing the soil to swell. This is usually referred to as seasonal movement. Maximum cracking due to clay shrinkage usually occurs in early autumn period (September to October).

Most buildings will accommodate normal seasonal movement and this will not lead to structural damage. It is only therefore if during a particularly dry summer or if there are large trees nearby that the moisture content changes can lead to structural damage.

The main factors therefore to consider with clay shrinkage subsidence are tree species, height and distance from the property, foundation type, depth, soil characteristics and weather conditions.

Not all trees are equally likely to cause damage. Broad leaf trees such as Oak and Willow have roots that spread over long distances and they have a high water demand. Conifers and Pines have lesser affect than broad leaf trees as their roots generally do not spread out as far. Various authorities have developed a table of safe distances for various tree types. The NHBC have developed guidelines for new foundation depth based upon tree species, height and distance.

4.2. Subsidence Type Damage

The damage to the kitchen area of the subject flat is considered to have occurred as a result of subsidence.

This is evidenced by the size, location, orientation and the tapering aspect of the cracks, together with the fact that they occur on both wall faces and indicate a clear mechanism of downward movement of the foundations.

As the soils are sandy, non-cohesive, we suspect that water inundation and saturation is the principal cause of the damage. There is a rainwater down pipe RWDP located in the rear left corner of the extension that runs to ground (ie does not have gulley or drainage outfall). The RWDP drains the flat roof to the extension being approximately 2m x1.5m in area. It is our view that inundation of water over time from the pipework directly into the ground is the principal cause of the damage. A water butt is not an effective drainage outlet.

We also noted an outside water tap adjacent to the RWDP and if this tap has been leaking in the past then the same effect can result. Over time water entering suspected predominantly sandy soils close to the foundations of the rear left extension will result in softening and washing out of fine material with consequent loss of strength and downwards movement. This type of movement is usually permanent and once movement has occurred the building will not return to its original position.

We also noted that the main house benefits from deep foundations forming a basement and the foundations to the single storey extension may be shallower than the main house foundations. A firm diagnosis however can only be made following opening of the structure and investigation. We are unable to confirm whether the damage caused is progressive or not without having the opportunity to monitor the cracking further.

There are trees nearby such as large Horse Chestnut 12m distant in the rear garden and smaller trees up to 3m high and 2m distant in the neighbours garden. Whilst not directly implicated at this stage in the damage due to suspected sandy soils these trees can cause problems on clayey elements of the soil that may be present and precautionary works such as regular pruning are advised.

5.0 Recommendations

5.1. Subsidence Damage

Where the damage is suspected to be linked with possible subsidence the first step is usually advising insurers, when there is appropriate cover, so that they can make their own enquiries and investigations into the damage. The following is often carried out as part of a routine subsidence claim. (Institution of Structural Engineers, 2000)

Site investigation to confirm the cause of damage. Investigations include taking soil samples, soil testing, establishing the depth and type of foundations, taking of root samples and drainage investigations.

Monitoring to provide further information regarding the cause of damage and assist in deciding when repairs can be carried out.

If there are trees within influencing distance on clay soils an Arboroculturalist will be able to provide firm recommendations with regard to any tree works that may be required around the building.

Leaking drains or drainpipes discharging to ground may cause damage to either shrinkable or non shrinkable soils and it is important to ensure that all drains and pipes are regularly checked to ensure they are not leaking or draining into the soil especially if they are close to foundations.

Owners should be aware that such problems are usually resolved within 12 to 18 months from initial instruction.

Once the building has stabilised superstructure repairs and decorations are carried out to the building. A decision regarding underpinning should be taken after monitoring has been completed unless an early decision to underpin is required.

As an alternative to the above if there is no insurance cover available or if the damage is relatively localised (as in this case) or the cause is initially apparent or where a quick repair is required then the following option can be considered.

Step 1 Measures to prevent subsidence should be carried out.

- a) re-direct RWDP to fixed drains away from the soil close to foundations or to a soakaway at least 5m from the property and
- b) check outside tap for leaks and
- c) Regular maintenance of vegetation.

Step 2 Carry out structural repairs to affected areas (section 5.2)

Step 3 Repairs will act as a form of monitoring so that if further damage appears then a full site investigation and monitoring can be implemented at that time.

5.2. Repairs Generally

5.2.1. Internal Repair (brick or blockwork)

Typically cracks from hairline to 0.5mm are dealt with during routine decoration.

Structural cracks, usually over 2mm in width, are best repaired by removing plaster a minimum of 75mm both sides of the cracking. Expose cracks in underlying brick or block and repair cracking to the underlying brickwork/blockwork by resin injection techniques.

Either, a) clean the crack by wire brushing to remove all residual dust and debris, drill 6.5mm diameter holes to a depth of 30mm at 150mm centres and starting at the lowest position inject thyratrophic resin into the cracks. When the resin has set the surface is made good.

or b) use epoxy mortar in place of thyratrophic resin to repair the fractures between bricks and within bed joints.

Broken bricks or blocks should ideally be cut out and replaced.

Once repairs to the brickwork are completed, fix 150mm wide galvanised mesh reinforcement to the wall using plugged screws at 150mm centres in pairs with oversize washers prior to re-plastering and redecorating.

Helibar may be used to reinforce cracks over 5mm in width and this involves installing 6mm diameter 1m long stainless steel rods into the brickwork every third or fourth course across the cracking.

Manufacturers guidelines should be followed with regard to the specific method and materials used in the repair.

5.2.2. External Repairs

For cracking to external brickwork use the same procedure as internal crack repair. If the wall is rendered remove render at least 150mm either side of the cracks and proceed as indicated above.

Manufacturers guidelines should be followed with regard to the specific methods and materials used in the repair.

5.3. Future risk

There are steps that can be taken to lower the future risk of subsidence damage and the following should be considered.

Regularly check outside tap connections for possible leakage.

Regular tree maintenance.

5.4. General

No guarantees can be given with regard to the possibility of future damage following repair especially if option 2 is determined.



Signed

Dated June 2020

Graeme Allen CEng MICE

6.0 General Notes concerning the Report

The report is concerned with the main structural components of the property (main house) which confer significant strength, stability, and integrity, such as main walls, beams and floors. Non-structural fabric such as timber partitions, non load bearing walls, plaster, render, windows and doors etc have not been considered. We have not commented on external features separate from the house such as garden sheds/summerhouses, retaining walls, pavings or swimming pools for example.

We have not checked fire resistance, means of escape, insulation, use of high alumina cement or calcium chloride, calcium silicate brickwork, calcium silicate reaction in concrete, cavity wall tie failure, contamination on the site, wood wool slab permanent shuttering, asbestos, radon gas seepage PBCB, alkali silicate reaction, party wall requirements, wall tie failure or concrete, timber or steel deterioration for example.

The report is not a guarantee that structural problems will not develop in the future and is an opinion of the damage at the time of the inspection.

We have not opened up the structure to inspect any beams or supports or inspected any structural drawings or checked calculations for any extensions or alterations and have assumed that they were constructed in accordance with building regulations and that satisfactory certificates/approvals were obtained. No measurements or calculations have been made of the load bearing capacity of the foundations, floors or other elements of the structure unless otherwise stated and they are therefore assumed to be suitable for the present or proposed use. Inspection covers have not been lifted. An additional instruction and separate fee would be charged where such checks are required to be carried out.

Any costing provided are approximate estimates only and the actual cost can only be ascertained once builder's quotes have been obtained.

Our report and damage description should not be used in the same way as a pre-purchase survey and should not be relied on as a statement of structural adequacy or general condition of the property.

Access was limited during the inspection and access to heights will be limited to the use of a 2m ladder. If access to higher areas is required, by prior agreement with the client a cherry picker will be used and the direct cost of the same will be added to the inspection fee. This will not be undertaken without the client's agreement.

The report should not be construed as an implied warranty in relation to the structure. Graeme Allen Consultancy will not be liable to any third parties for any loss, consequential or otherwise, as a result of the information given in the report.

Owners are advised to ensure that the property is fully insured for the normal perils including Subsidence heave and landslip.

The opinions in this report are based upon a visual inspection only to those areas that were freely accessible without opening up the building fabric and for the owners use. No inspection of the foundations or areas buried beneath the structure, behind cladding or obscured by furniture/carpets or fittings has been made. Where further investigations are required this will be noted within the report. However there is always the possibility that there are hidden defects which cannot reasonably be established from a standard structural engineer's inspection.

The report is prepared for the client i.e. the person who pays the invoice and Graeme Allen Consultancy Limited do not accept any liability to any third party. Accordingly, the client should not publish our report in any way (including extracts from it), without our prior written consent, and none of the terms of our engagement are enforceable pursuant to the Contracts (Rights of Third Parties) Act 1999 by anyone other than the parties to it.

Acceptance of the report implies acceptance of these conditions.

7.0 Photographs



Photo 1 Cracking over rhs kitchen door



Photo 2 Low level cracks rear left corner



Photo 3 Cracking to left wall at junction with main house



Photo 4 Kitchen crack across ceiling



Photo 5 Cracking left wall



Photo 6 View from rear



Photo 7 RWDP and outside tap rear left corner



Photo 8 View of neighbours trees