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Interim Report on Investigation

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1.0 INTRODUCTION

We have been appointed by Rusty Ashman to advise on the structural movement and damage to 46 Well Walk that occurred over summer 2013.

Following our initial inspection a claim for subsidence damage was made and accepted by Mr Ashman's insurers Hiscox UK. GAB Robins have been appointed as loss adjusters to manage the claim. Conisbee have been retained as Consulting Engineers principally because of the importance of 46 Well Walk as a Grade 2* listed building.

Since winter 2013 a series of investigations have been undertaken to establish the cause of the movement. These are summarised below.

2.0 INSPECTION OF EXISTING HOUSE

46 Well Walk is a five storey traditional end terrace house built in around 1704. The house is listed Grade 2* and is in an important historical survivor of the development of the Hampstead Well in the early eighteenth century.

The house is now an end terrace, but the entrance to Gainsborough Gardens was originally the assembly rooms and pump room connected with the chalybeate well and fountain situated opposite the house. These were demolished in the late nineteenth century and the flank wall rebuilt in its current form. The houses to the west were originally part of a terrace of similar houses, but were rebuilt following a serious fire in the early twentieth century.

The construction of 46 has not been confirmed but is likely to comprise brick elevations with timber and brick internal walls and beam and joisted timber floors. The top floor forms a mansard at front and rear but is part of an M shaped double ridged roof. A circular bay was added to the rear of the house in the nineteenth century and there is also a rectangular lower ground extension to the rear of that.

Cracking has occurred to the front elevation mainly to the left hand side of the left hand windows, but also to the right hand side in a classic lozenge pattern. Cracks are most noticeable in the brickwork and are up to 5mm wide, but they also occur internally although they are mainly distributed around the window panelling.

The cracking indicates the brick pier to the left hand side of the front door has subsidised relative to the flank wall corner, but also relative to the right hand door pier.

The elevation along with the rest of the house displays a substantial amount of historic settlement; however it is clear that significant new movement occurred in summer 2013.

The rest of the house shows evidence of historic movement but no recent movement. There is cracking to the rear elevation render but it is not new and appears to be the result of thermal movement rather than foundation movement. This elevation was redecorated in April 2014, but the cracks have reopened since then. There is also a slight vertical crack in the centre of the flank wall. This does not taper so does not appear to be an indication of foundation movement.

The front elevation is the most original and certainly the most fragile element of the house. It is not surprising that it is vulnerable to new foundation movement, which appears to have occurred here.

3.0 SOIL INVESTIGATION

A trial pit and shallow borehole were excavated in November 2013 to the front elevation and found that the footing is shallow and founded on shrinkable clay at 450mm depth.

Roots were found below foundation level and appear to be from the poplar tree in the garden of Wellside on the opposite corner of Gainsborough Gardens. The presence of roots and their effect on the clay soil may have acerbated the seasonal movements that have led to the subsidence damage.

At the time of the investigation the subsoil was quite moist but the tests were carried out during a period of wet weather (in November 2013) so it is not known how dry the soil and particularly the upper soil had become during the dry summer we had in 2013.

It is likely the slope and site location below the Hampstead spring line provides a significant ground water flow in normal conditions. This could explain the moist condition of the upper soil strata found in the site investigation.

It is thought that the later flank wall has more substantial foundations than the front but this has not been confirmed by trial pitting.

4.0 DRAIN SURVEY

Drainage collects at the front of the house below the light well and passes out to the street at the front. Because of the proximity of the drains to the movement, a CCTV survey inspection was carried out. This found that the drain is in good condition with no obvious sign of leaks.

5.0 MONITORING

Both level monitoring and crack measurement have been in place since November 2013. Unfortunately the stuck on targets being used for the level monitoring have been removed to the publically accessible parts of the house including the front elevation around the main zone of cracking. New targets have now been installed but to date we have had no useful results from the level monitoring.

Crack monitoring shows a slight recovery over the late spring period but no definitive seasonal movement to date.

Below are shown comparative photographs taken 12 months apart of the worst areas of movement. Studying the large format versions of the photos shows that there has been a small increase in crack size in the last 12 months. This is shown in the crack widths and the slight elongation of some of the cracks, particularly in the second floor window apron. Internally there has been a little more movement to panelling and finishes.

Monitoring will continue until autumn this year. The current dry weather may trigger further movement in the next two months.

06.09.2013

15.09.2014

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6.0 ARBORICULTURAL REPORT

A tree survey was carried out in May 2014 by Marishal Thompson. This identified 3 trees within influencing distance of the house, but concentrated particularly on the poplar tree in the garden of Wellside. They have advised that this tree be removed along with a yew tree in the garden of the adjoining house.

Marishal Thompson has written to the owner of Wellside requesting action on the tree. The owner is sympathetic to the tree being removed as it is a substantial tree close to his house, however there is no record of the tree damaging any part of Wellside, other than the drains. At the present time Marishal Thompson have been unable to advise on the risk of heave to Wellside should the tree be removed.

7.0 CONCLUSIONS

7.1 The front elevation of the house suffered from subsidence damage in late summer 2013

7.2 There has been a small amount of new movement since then but no significant seasonal pattern has been recorded, mainly due to disruption in the level monitoring that was set up.

7.3 Movement is considered to be primarily due to the clay subsoil and shallow foundations, however roots from the nearby poplar tree were found beneath the foundations and it is considered that these have been partly responsible for the movement and damage that has taken place.

7.4 Notwithstanding the presence of the roots there is no evidence that the tree has dried out the soil beneath the house.

7.5 The Arboriculturist has advised that the tree be removed, however it is a prominent tree in a very public location in a conservation area and the Local Authority are likely to apply very strict tests to the evidence that the tree is causing the damage before they will agree to allow it to be removed.

7.6 Against this could be weighed the damage and the potential future damage to an important historic building if movement were to continue.

7.7 It is worth considering the various solutions that could alleviate or remove the cause of the movement. These are discussed below.

8.0 OPTIONS FOR MOVING FORWARD

8.1 Do Nothing

Although the historic evidence is limited it appears that the movement that has caused the cracking is only occasional and possibly only occurs in extreme conditions. The future is less certain. There has been a small increase in damage in the last 12 months, but this may be as much to do with the existing weaknesses in the brickwork as ground movement. Another 2 months monitoring will allow this to be assessed further, but on current evidence I have concluded that a do nothing approach will lead to (at best) a slow gradual deterioration. Similarly a simple cosmetic repair will lead to the same outcome.

8.2 Remove the Tree

I consider this option highly controversial with a very uncertain outcome. The evidence that the tree causes anything more than an occasional movement has not been found. The site conditions and local geology appear to show that the site is naturally moist with a good flow of ground water to prevent drying out of the subsoil.

8.3 Limited Underpinning

The depths of roots suggest that a 1.0m depth of underpinning beneath the front elevation would take the foundations to a zone of subsoil below the root activity. This might be a reasonable option except that I am concerned about the effect of the slope and ground water on any underpinning block. There are also the unknowns of the adjoining foundations, although I assume a 1.0m depth wouldn't create a significant problem of differential movement. If this option were to be progressed trial pits should be excavated on both ends of the elevation. Geotechnical advice should also be sought on the likely ground water regime. Further testing may be required to allow this.

Underpinning would require listed building consent and would need to be justified to English Heritage,

8.4 **Strengthen the Wall to Resist Ongoing Movement**.

If our conclusions about the limited effect of the tree are correct it is very likely that repairing the elevation and strengthening it using brick reinforcement will allow the wall to remain and resist ongoing movement without cracking.

Strengthening would need to include the whole wall and hence we would recommend that Cintec anchors are installed in the elevation between the corner of Gainsborogh Gardens and the pier to the left of the front door. Drilling in from the corner would also avoid opening up to the older and more important front elevation, although cosmetic repairs will be required to the cracked brickwork following installation of the anchors. Attached is a sketch showing the approximate layout of anchors.

Installing anchors would also require listed building consent but in our experience is likely to be an acceptable solution, if it is shown that the damage would otherwise continue.

9.0 RECOMENDED NEXT STEPS

9.1 Complete another 2 month of monitoring and confirm or otherwise the conclusions above

9.2 If option 4 is agreed to be the best way to proceed, we will need to confirm the existing wall thicknesses before proceeding

9.3 Consult and obtain listed building consent for the works

9.4 Obtain quotes from specialist for Cintec Anchors and obtain quotes from specialists for cosmetic repairs to brickwork.

Tim Attwood BSc C Eng MIStructE


Cintec
Anchor
Positions
Note anchor installed just above pavement level angled down will pass beneath lower ground floor window