4th December 2024

Ref: QG1U1287632

Engineers Conclusion Report – Site Investigations
222 Finchley Road London NW3 6DH

Following the occurrence of cracking to the rear of this property, Auger have carried out a site investigation on 8th October 2024 to establish the cause of damage

Two trial pits and boreholes were excavated, and sub-soil samples were tested in-situ with further tests undertaken in their laboratory.

Nature and Extent of Damage

External Damage.

Minor cracks were noted on the front wall above the garage door in the render and brickwork. Further cracks were noted higher up above the brick arch. General cracking was noted to the decorative brick arch and capital above the main front entrance door.

Our further inspection of the right hand flank wall was limited to an acute angle due to the narrow side alley. We were however able to see a long vertical crack to the rear between the lower and upper landing windows.

The crack externally was around 12mm wide below the second floor window but below the first floor window the wall had been repointed and a door opening infilled, so we could not see any crack to correspond with that seen inside.

On the RH flank wall at the junction with the rear kitchen extension there was a large crack from ground to roof level around 12mm wide. This appeared to be of some age. A similar vertical crack was noted at the rear RH corner of the kitchen extension where it abuts the garden wall. This was around 18-20mm high at the top of the wall.

On the rear wall of the main house and extensions we did not observe any significant cracks.

Internal Damage.

Access was gained to the hall, stairs and landing. No cracks were noted on the ground floor hallway.

On the first floor landing to the right hand side there was a long vertical crack extending up to the ceiling around 4mm wide and a further diagonal crack around 1.5mm under the window.

Significant distortion of the window sill was measured at 12mm per metre towards the rear.

On the first floor half landing the cracks were more severe with a crack below the window at 6mm wide but around 12 to 14mm at ceiling level.

Significant distortion of the window sill was again measured at 12mm per metre towards the rear. These cracks coincided with that seen externally. Access through the windows revealed a large vertical crack externally below the upper landing window.

Ground Floor Flat A.

In the front bedroom there were hairline to 1mm wide cracks to either side of the front bay but no cracks higher up, or to the walls, in the rest of this room.

No cracks were noted to the tiled wet room but the owner did report that the shower now drained forwards, out of the enclosure.

In the living room no significant cracks were noted but a photo was supplied that showed some movement and cracking above the shelving on the LH party wall.

No cracks noted in the dining area to the RH side of the living room. In the hallway to the RH side there was a vertical crack on the RH wall but this was only hairline in width and shows signs of ridging suggesting it has closed up since it was filled.

No cracks in the rear study but a photo showed a long vertical crack to the rear wall running up to the small window.

In the front RH bedroom a hairline crack was noted below the window only.

In the kitchen within the rear single storey extension we noted a crack at high level above the cupboards on the RH wall. The corner of the splashback tiles at also been filled and not reopened. This mirrored the old crack seen externally.

Trial Hole 1

Trial hole 1 was excavated on the right hand wall of the rear extension

This established that the foundation was corbelled brickwork with two steps out to spread the load at 500mm deep. The underside of the brickwork was seated upon a moist brown medium gravelly silty clay. At 1.0m deep, this became a very dry brown fine to medium gravelly silty CLAY which continued to a depth of 3.0m, where the borehole was terminated.

In-situ shear vane tests showed bearing strengths from 74kPa to 140kPa. This would be sufficient to support the weight of a typical two storey domestic building above.

Tree roots were found at the underside of the foundations and to a depth of 1.0m within the borehole. These were identified as SALICACEAE (Willows) and Poplars) and some shrub roots.

The sub-soil within the borehole was a very highly plastic CLAY which will be very prone to changes in volume during extended periods of hot dry weather. Atterberg tests were carried out in the laboratory which demonstrates significant desiccation in the sample at 1.0m below ground level.

Soil suction tests showed a value of only 117 to 951kPa which also shows very severe desiccation in the sample at 1.0m deep.

Trial Hole 2

Trial hole 2 was excavated on the rear wall of the rear extension at the left hand side.

This established that the foundation was corbelled brickwork with two steps out to spread the load at 500mm deep. The underside of the brickwork was seated upon a moist brown medium gravelly silty clay. At 1.0m deep, this became a very dry brown fine to medium gravelly silty CLAY which continued to a depth of 1.4m, where the borehole was terminated due to rocky ground.

In-situ shear vane tests showed bearing strengths from 82kPa to 140kPa. This would be sufficient to support the weight of a typical two storey domestic building above.

Tree roots were found at the underside of the foundations and to a depth of 1.0m within the borehole. These were identified as SALICACEAE (Willows) and Poplars) and FRAXINUS (Ash).

The sub-soil within the borehole was a very high and extremely high plastic CLAY which will be extremely prone to changes in volume during extended periods of hot dry weather. Atterberg tests were carried out in the laboratory which demonstrates significant desiccation in the sample at 1.0m below ground level.

Soil suction tests showed a value of only 25 to 861kPa which also shows very severe desiccation in the sample at 1.0m deep.

Trial pit 3

The proposed trial hole at the front of the property was to gain the footing of the main house and the bay window, however upon attending site Auger found a large amount of vegetation preventing access.

Drainage Survey

Auger carried out a CCTV survey of the below ground drainage system, their findings are as follows:

Line 1 - From MH1 upstream to WG1, revealed root ingress and the WG connection bossed into the main line restricting flow and allowing an escape of water, they were therefore unable to survey upstream on the main line.

Line 2 - From MH1 upstream to RWG1, revealed root ingress to the cast iron pipework 5m upstream to the gully. The survey also revealed broken pipework directly upstream of MH1

Line 3 - From MH1 downstream to MH2, revealed no significant defects to the pipework on this line which could be allowing an escape of water. This pipework has previously been lined.

Auger found MH2 was holding water, extensive jetting was successful in clearing the main trap and also revealed the rodding cap stuck in the line prevent flow which we have now removed, there is a connection within the MH that Auger were unable to survey due the MH being 1.7m deep, this line runs to a WC internally.

Conclusion

The site investigation shows corbelled brick foundations at the rear of this building which is very typical for a house of this age.

The subsoil is very highly and extremely highly plastic clay so this is extremely prone to changes in volume due to the influence of the nearby trees in a hot and dry summer.

The Atterberg tests show very significant desiccation using the usual Driscoll formula by comparing the moisture content to 0.4x the liquid limit. The suction tests also demonstrate very severe desiccation in the samples at 1.0m deep.

We can therefore conclude that this damage is due desiccation of the highly plastic clay subsoil cause by the very hot dry weather in recent previous years, due to the nearby trees.

The damage to the front of the main house is relatively minor and due to movement in the brick arches rather than any subsidence of the foundations.

The front boundary wall appears to have failed due to the weight of subsoil it retains and this has most likely been exacerbated by the recent works next door.

There is also some old previously repaired crack to the front right hand steps which will most likely have very shallow foundations. These will be also within the potential influence of the Council's London Plane tree.

Recommendations

It is recommended that the trees, suspected to be affecting the property, are subject to maintenance / removal works to reduce the risk of instability of the house foundations. Expert advice should be sought from an arboriculturist as to the most appropriate course of action for these trees.

To eliminate the drain leakage as a possible contributory factor it is recommended that the drain repairs are carried out to prevent further escape of water from the system as follows.

Line 1 Excavate and replace WG1 and 1m of 100mm pipework including a branch connection at a depth no greater than 1.0m through concrete. Install a 100mm patch directly upstream of MH1 to the branch. We will then need to conduct a further CCTV investigation upstream on this line.

Line 2 Excavate and replace RWG1 and 3m of 100mm pipework at a depth no greater than 1.0m through concrete. Install a 100mm patch liner directly upstream of MH1 to seal the pipework into the cast iron.

The Policyholder should arrange for removal of the vegetation around the front bay so that Auger can return and excavate Trial pit 3 at the front of the house. The damage to the bay is however very minor but this will provide us with some further information.

The property should be level monitored to provide diagnostic evidence as well as being used to determine when the house is stable following mitigation works.

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