
SPECIFIC STRUCTURAL REPORT

For 223 Archway Road, London, N6 5BN



prepared for

Cholmeley Park House

DATE: 17/10/2023



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1.0 The Brief

Allan Goldstein Engineers Ltd have been appointed by Cholmeley Park House to carry out an inspection of 223 Archway Road, London, N6 5BN. This report documents the findings of the non-invasive visual inspection of the structure conducted on the property. Our instruction was to attend site and carry out an inspection to comment on the front elevation external staircase which has been subject to cracking. Our report is limited in its scope to this task.

2.0 About the Inspection

Date of Inspection

17th October 2023 at 10:00am.

Related Party Disclosure

I confirm that I personally do not have any material involvement in the property or conflicting interest in accepting this appointment.

Full Address of the Property

223 Archway Road
London
N6 5BN

Weather Conditions

The weather at the time of the inspection was dry.

Status of the Property

At the time of inspection, the property was occupied.

3.0 Limitations & Exclusions

This report has been prepared for the sole use of Cholmeley Park House and may not be used or relied upon by any third party without the specific written permission of Allan Goldstein Engineers Ltd. However, the insurance company can use this report.

Unless expressly provided, no term in the agreement between Allan Goldstein Engineers Ltd and the client is enforceable under the Contracts (Rights of Third Parties) Act 1999 by any person other than Allan Goldstein Engineers Ltd or the Client.

We have reported on obvious health and safety hazards only to the extent that they were apparent from elements of the property considered as part of the inspection.

We have not commented or advised on any matter the significance of which in relation to the property was not apparent at the time of inspection from the inspection itself.

We have not undertaken any structural or other calculations.

We have inspected as much of the internal and external surface area of the building as was practical and relevant to the survey but have not inspect those areas which are covered, unexposed or not reasonably accessible from within the site or adjacent public areas.

External inspections were carried out from ground level. Flat roofs under or over 3m in height from ground level have been inspected where it is safe to do so.

We are unable to confirm unexposed parts are free from defective concrete, corrosion, condensation, wet rot, dry rot woodworm or any other defect.

We have not lifted any floorboards, nor have we lifted any ply, hardboard, fitted carpets or other fixed floor coverings.

We will have not moved any obstruction to inspection including, but not limited to, furniture, fixtures, fittings, or equipment. We carefully and thoroughly inspect the property using our best endeavours to see as much of it as is physically accessible. Where this is not possible an explanation will be provided.

If we are concerned about parts of the property that the inspection cannot cover, the report will tell you about any further investigations that are needed.

The report that we provide is not a warranty.

Services

We have not carried out any specialist tests of gas, electric, water or drainage installations. The report is based upon a visual inspection only. However, we will advise upon the need for any specialist tests if deemed necessary within the body of the report.

Environmental Issues

Particular noise and disturbance affecting the property will only be noted if it was significant at the time of the inspection and specific investigations will not be undertaken. Our report will not consider the energy performance of the property.

Hazardous Materials

This report cannot be relied upon to confirm the presence or otherwise of asbestos or asbestos containing materials. If the client is unaware of the presence of such materials, a suitably qualified specialist should carry out a specific asbestos survey.

Unless otherwise expressly stated in the report, we have assumed that no deleterious or hazardous materials or techniques have been used in the construction of the property. However, we have advised in the body of the report if, in our view, there is a likelihood that a deleterious material has been used in the construction and specific enquiries should then be made or tests carried out by a specialist.

Ground Conditions

We will not comment upon the possible existence of radon, noxious substances, landfill or mineral extraction implications, or any other forms of contamination.

Consents, Approvals and Searches

We will assume the building and site is not subject to any unusual or onerous restrictions, or obligations or covenants, which may affect the reasonable enjoyment of the property.

We will assume the property is unaffected by any matters which would be revealed by a Local Search and replies to the usual enquiries, or by a Statutory Notice, and that neither the property, nor its condition, its use or untended use, is or will be unlawful.

We will assume all planning, building regulations and other consents required in relation to the property have been obtained and such consents have not been verified by us.

4.0 About the Property

Technical Circumstances

The external front elevation staircase is subject to natural and induced movement. The trees at the very front and side of the staircase must be removed or seasonally pruned. The grounds are swollen causing differential movement in the staircase.

Property

The property is a 3/4-storey detached property of traditional construction with solid brick walls, built circa. 1890. The floors structure is constructed from timber framed elements. The floor joists, span from the front masonry wall to the supporting spine structure, which runs from side to side in the centre of the main building. The external walls are found to be load bearing elements. The roof is made up of timber framed elements with interlocking tiles.

The foundations for the main building are assumed to be shallow brick corbelled footings. A lower ground basement level is present in the building.

Topography

The property occupies a reasonably sloping site with no unusual or adverse topographic features.

Geology of the site

The London Geological Map suggests the sites underlying bedrock geology is known as London Clay Formation which consists of a mixture of clay, sand, and silt. This is highly relevant because clays are marine deposits characterised by their silty composition.

They are typically stiff, dark, or bluish grey, weathered dark to mid-brown superficially with fine particle size (less than 0.002mm). Tomlinson describes it as 'fat' clay with high loadbearing characteristics due to pre-consolidation pressures in its geological history.

The upper horizon is often encountered at shallow depth, sometimes just below ground level. They have high shrink/swell potentials and can be troublesome in the presence of vegetation also. The solid geology appears to outcrop in this location, although we cannot rule out the presence of superficial deposits at shallow depth. The expected foundations for a site such as this one with its current scale and magnitude considered in parallel with the sub strata present would most likely be shallow masonry foundations.

¹ Tomlinson M.J. (1991) "*Foundations Design & Construction*" Longman Scientific Publishing.

¹ B.S. 5930 (1981) "*Site Investigations*"

5.0 Methodology

We carried out a visual inspection of the affected areas and the property as a whole to establish the extent of the issue and to gain a better understanding of the layout and general condition of the building. No specialist equipment was used to carry the inspection out. We could not inspect the top of the main roof due to no access.

6.0 Systems of Construction

Structures built particularly in London post 1890s 'allowed' for a certain degree of ground movement despite the Engineers at the time not having access to methods abundant today for accommodating anticipated and natural movement. One such design method employed historically was the inclusion of lime mortar-based joints between the individual masonry units forming wall panels, such as the front, flank, and rear facades.

These mortar joints would act as a minute system of 'movement joints' and collectively distribute forces due to movement by way of miniature fractures forming in the interconnected accommodating mortar joints. In this way large cracks were minimised by way of dispersion of micro-cracks through the interconnected system of joints. This historic system could disperse a certain degree of ground movement but was not 'immune' as such to having large cracks appear where movement is due to concentrated loads or movement induced in specific locations.

Bay structures are built on independent foundations from the main building, therefore, are subject to differential movement when induced with factors that affect their foundations.

¹ Tomlinson M.J. (1991) "*Foundations Design & Construction*" Longman Scientific Publishing.

¹ B.S. 5930 (1981) "*Site Investigations*"

7.0 Observation

The cracking that was observed generally under structural thesis was categorised as negligible to moderate in correspondence with the BRE digest table. Please see the images below that display the areas we found to be mentioned. At the time of the inspection the cracks had been infilled for a patch-up job. We do not recommend a simple patch-up encasement for such cracks. The images below have been provided by the building owner and also carried out from our inspection.

Location: External Elevations Front.



Image of front staircase cracking.

The diagonal nature of the crack shows that movement is present between the base of the staircase and where the staircase is fixed back into the supporting masonry wall in the flat below. We recommend heli-bar stitching the crack to stop the differential separation re-occurring. The remedial section shall elaborate further.



Image of front trees to the side entrance.

The trees were established to be local to the entrance, approximately 15m high and of high-water demand. We also observed cracking and swelling in the grounds. This leads us to believe that the tree roots are causing unnatural drainage paths and disturbing the grounds. The trees must be pollarded to a height of 8-10m high maximum. If possible we recommend for the entire removal of the trees with their roots poisoned.



Image of front trees to the very front local to the main road.

The trees were established to be local to the front, approximately 12-15m high and of high to medium-water demand. We also observed cracking and swelling in the grounds. This leads us to believe that the tree roots are causing unnatural drainage paths and disturbing the grounds. The trees must be pollarded to a height of 8-10m high maximum. Alternatively, the trees should be removed, and all roots poisoned. This is to control the pressure from the roots and soil.



Image of cracked and swollen grounds.

The images above show swelling and cracking in the grounds. These are primary signs that the roots are present in the grounds, causing unnatural drainage paths. Taking into consideration the clay ground conditions, this further adds to the roots absorbing more moisture than recommended, thus causing ground movement.

Cracking Categories from BRE Digest 251

In structural terms the damage visible upon visual inspection only (i.e., that which is not covered by finishes/covered) would typically fall into varying categories of Table 1 below, Building Research Establishment¹ Digest 251, which describes the severity of cracks. **We believe the cracks at the present time represent categories ranging from 0 – 3.**

Category 0	"negligible"	< 0.1mm
Category 1	"Very slight"	0.1 - 1mm
Category 2	"slight"	>1 but < 5mm
Category 3	"moderate"	>5 but < 15mm
Category 4	"severe"	>15 but < 25mm
Category 5	"Very severe"	>25 mm

In general, categories 0, 1, and 2 with crack widths up to 5mm can be regarded as 'aesthetic' issues that require only redecoration. Categories 3 and 4 can generally be regarded as 'serviceability' issues, that is, they affect the weather-tightness of the building and the operation of doors and windows. Category 5 presents 'stability' issues and is likely to require structural intervention.

BRE Digest 251, and in particular the categorisation above, is now used widely in the industry as a way of classifying cracks and determining whether any intervention is necessary.

Extract from Table 1, B.R.E. Digest 251

Classification of damage based on crack widths.

8.0 Possible Causes of Defects

Natural Ground Movement due to consolidation over time:

Ground movement on site can cause indirect damage to a property if there is potential for volumetric change. It must be established that the structure bears upon a shrinkable substrate such as clay/s, which can suffer significant changes in its volume with variations in its moisture content. This often contributes to structural movement in buildings.

Ground movement caused by tree action:

Tree roots can be troublesome in cohesive (clay) soils because they can induce volumetric change. They are rarely troublesome in non-cohesive soils (sands and gravels etc.) other than when they enter drains, in which case blockages can ensue. Investigations have been carried out in accordance with the requirements of The Institution of Structural Engineers². All the trees can be classified as being either, "high", "moderate" or "low" depending on their level of water demand. Trees that are of "high" water demand, are generally said to extend their influence on soil moisture levels over a distance of 125% the height of the tree. Trees of moderate water demand extend their influence on soil moisture levels over 75% of their height. Trees of low water demand extend their influence over 50% of their height.

Differential movement due to faulty drainage issues:

There are also other factors that must be considered that would impact profoundly on the stability of a building as well as the rise of defects therein. Faulty drainage pipes running directly beneath the building have the potential to cause ground movement. Any possible existing damage to the underground pipe network could potentially lead to the influx of large volumes of water into the sub soil causing the sub soil to be effectively eroded and this would weaken and reduce the geotechnical properties of the sub soil that could cause the building to be subjected to cracking.

² Institution of Structural Engineers (1994) "*Subsidence of Low-Rise Buildings*"

9.0 Recommendations

In carrying out our inspection we have had to report on signs of defects which will involve current expenditure or future liability. We must point out that when dealing with properties of the age of this one, such signs of cracking are not uncommon.

Recommendations for remedial works

In this section we will comment on the proposed remedial action and highlight key points that may be above and beyond normal statutory consents.

1. Location front and side foliage/tress: We recommend for the trees to be completely removed with their roots poisoned. This is to control and reduce any induced movement created by the roots onto the front staircase. If this cannot be carried out due to tree protection orders, then we recommend for the trees to be seasonally pruned to maintain a height from 8 – 10m high maximum. This will reduce and control the moisture levels absorbed by the trees roots.
2. We recommend for the staircase crack to be heli-bar stitched together. Where the vertical/diagonal crack is present heli-bars must be fixed at 300mm centres along the full height of the side of the staircase. One bar must be fixed at the top and bottom.

Please see below a method statement on stitching the cracks:

- a) Rake out or cut slots in horizontal mortar joints to specified depth & at vertical spacings. Use power / hand chisel to continue slots 500mm past crack where applicable.
- b) Vacuum out slots & thoroughly flush with water.
- c) Cut a piece of 16mm thick helical bar to the required length (1m minimum) & inject a bead of Helibond to the back of the slot.
- d) Insert the Helibar & push into the grout to obtain good coverage.
- e) Insert a further bead of Helibond over the exposed Helibar finishing 10-15mm from the face of the wall & iron in using a finger trowel.
- f) Make good the vertical crack with Epoxy Resin filler (crack bond tie).

Evidence of natural movement was noted in the building. Within the limitations of this report, we cannot confirm that the building will not move further. We believe that the structural integrity of the building will not be compromised by the cracking currently present.

Allan Goldstein Engineers Ltd disclaims any responsibility to the Client and others in respect of any matters outside the scope of this report. This report has been prepared with reasonable skill, care, and diligence within the terms of the Agreement with the Client. This report is confidential to the Client and Allan Goldstein Engineers Ltd accepts no responsibility of whatsoever nature to third parties to whom this report or any part thereof is made known. Any such party relies upon the report at their own risk.

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Appendix C

14 CEILING JOIST PINNING

RetroTie fixings are driven at an angle through the joist and into the masonry, via a small pilot hole, and the projecting end is hammered over.

REFERENCE RetroTie – Page 17

13 REPLACING CAVITY WALL TIES

DryFix wall ties are power driven directly into both leaves, via a small pilot hole of around 6mm diameter.

OR

RetroTies are driven into a 4.5mm pilot hole in the far leaf, via a clearance hole in the near leaf into which they are bonded with PolyPlus.

OR

ResiTies are resin bonded into a 10mm hole in both leaves.

REFERENCE DryFix – Page 14; RetroTie – Page 17; ResiTie – Page 17; Technical Data – Page 12

12 REPAIRING OR CREATING FLAT ARCH LINTELS

Parallel lengths of HeliBar, are bonded into the specified cut slots above the existing lintel.

REFERENCE HeliBeam System – Page 57

11 CREATING MOVEMENT JOINTS

A 400mm HeliBar is installed across the joint, as with cracks, but is only bonded at one end. The other end is allowed to move freely by inserting it into a sleeve which is then bonded into the masonry.

REFERENCE Movement Joints – Pages 7 & 60

10 CRACK STITCHING

Lengths of HeliBar extending 500mm either side of the crack are bonded into cut slots, normally the mortar beds, with HeliBond or PolyPlus resin.

REFERENCE Crack Stitching – Pages 21 & 51

9 CREATING MASONRY BEAMS

The HeliBeam System uses parallel lengths of HeliBar reinforcing bonded into predetermined cut slots (normally the mortar beds) with HeliBond grout to form deep masonry beams which distribute the building loads.

a) shows a beam resisting the horizontal displacement of a bowing wall. Due to the internal stairwell BowTies cannot be used as there are no joists at this point.

b) shows a beam resisting vertical loads to prevent building subsidence.

REFERENCE HeliBeam System – Pages 6 & 56; HeliBond Grout – Page 24

8 STABILISING BOWED WALLS INTO JOIST SIDES

BowTie HDs are inserted through clearance holes in the masonry and are power-driven through the first and second joist (and third, if required) before the outer end is bonded into the masonry with PolyPlus resin.

REFERENCE BowTie HD – Pages 20 & 63

7 REPAIRING CRACKS NEAR CORNERS AND OPENINGS

Where cracks are less than 500mm from an external corner or an opening, at least 100mm should be bent round the corner and bonded into the return wall or bent and fixed into the reveal, avoiding any DPC membrane.

REFERENCE: Crack Stitching – Pages 21 & 50