ADDENDUM TECHNICAL REPORT No.2

[redacted]

28 Park Village East
London
NW1 7PZ

prepared for

Chubb Insurance Company of Europe SA

[redacted]

[redacted]

DATE 29 August 2024

Crawford®

Crawford and Company

[redacted]

Chartered Loss Adjusters

[redacted]

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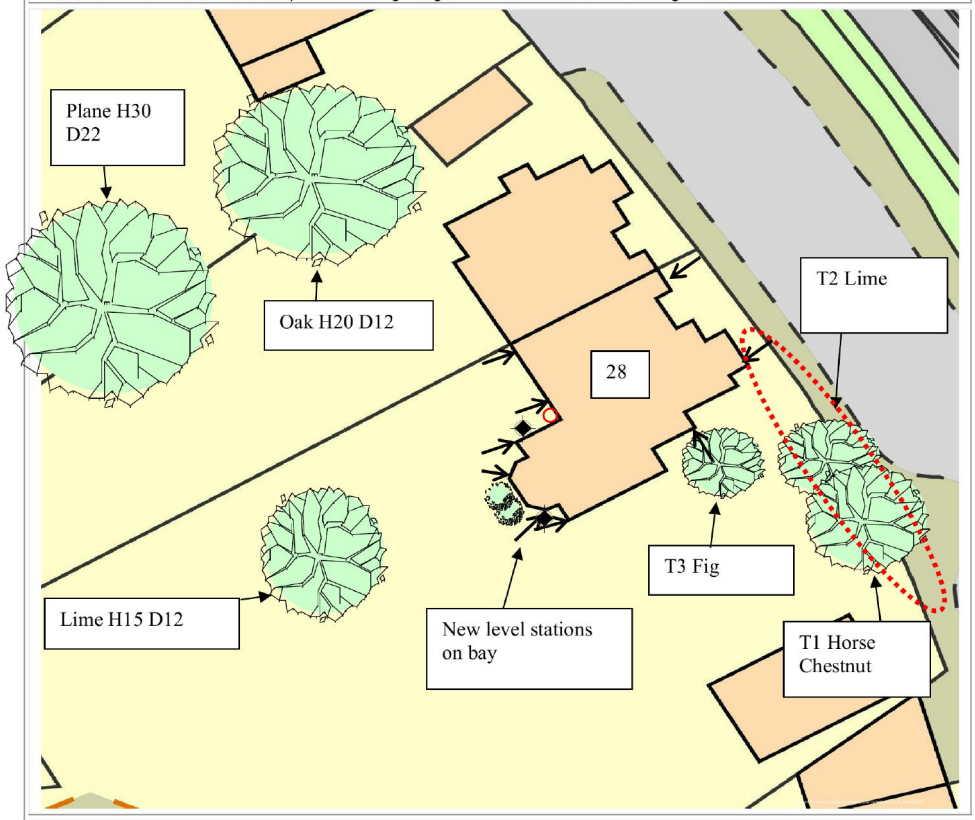
Site Plan	This plan is Not to Scale

This plan is diagrammatic only and has been prepared to illustrate the general position of the property and its relationship to nearby trees etc. The boundaries are not accurate, and do not infer or confer any rights of ownership or right of way. Position of utilities is only indicative and contractors must satisfy themselves regarding actual location before commencing works.



Key:

	Tree: Deciduous		Tree: Conifer		Shrub
	Hedge		Area of Damage		Bore Hole
	Trial Hole		Trial & Bore Hole		Level Monitoring
	Rain Water Manhole		Rain Water Gulley		Rain Water Pipe
	Waste Water Manhole		Waste Water Gulley		Toilet Pipe
	Rain Water Drain		Waste Water Drain		Electricity Cable
	Water Supply Pipe		Gas Supply Pipe		Incoming Gas Pipe
	Incoming Water		Incoming Electrics		

[redacted]

INTRODUCTION

We have been instructed by insurers to investigate a claim for subsidence at the above property. The area of damage, timescale and circumstances are outlined in our initial Technical Report. This report should be read in conjunction with that report.

The original concern was to both the house and the front boundary wall extending from the house to the garage. The house was level monitored and seasonal cyclical movement was observed, but to an extent that could be routinely repaired and re-decorated. As such, no tree works have been undertaken.

The boundary wall, however, continues to have structural issues which are worsening and the homeowner is concerned about the safety of pedestrians on the pavement. This Report re-visits these issues in more detail and provides recommendations to provide a long term structural solution.

DAMAGE TO BOUNDARY WALL

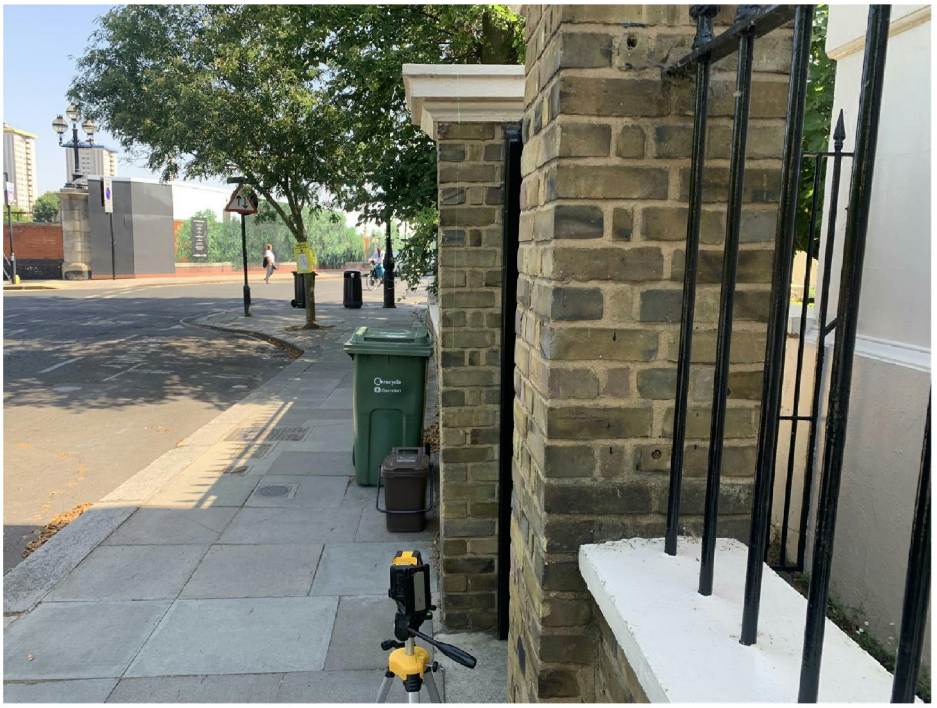
The section of wall of concern forms the front boundary between the left front entrance pillar and the right pillar of the drive in front of the garage.

Boundary wall section of interest

[redacted]

Pillars

The left front entrance pillar is formed of 450mm square brickwork, extending a height of 2.06m from the pavement and with a stone capping. The pillar leans outwards towards the pavement, measured at 73mm over the pillar height, which equates to **1 in 28** out of vertical.



Left front entrance pillar lean

The right driveway pillar is similar 450mm square brickwork, 2.3m high with a pyramid concrete cap. This pillar also leans out towards the pavement, measured at 140mm over the full height, which equates to **1 in 16** out of vertical.

Right drive pillar – green laser line is vertical

Wall

The wall is 225mm solid brickwork, c.960mm above pavement level, and built in 9 sections about 1.9m long with movement joints in-between. The wall acts as a retaining structure for the garden, but to a low height of c.400mm.

For the purposes of this report, each section is labelled A-I from the Entrance Pillar to the Garage Pillar with damage noted and tabulated overleaf. Left and Right are looking at the wall from the road.

Panel	Length	Verticality	Tilt	Comments
A	1.9m	Same as Entrance pillar but lessening towards left.	1 in 56 down towards left	Attached to Entrance pillar Stepped crack from pillar to underside of cill. Previously re-pointed but re-opened.
B	1.9m	Leans out but to a lesser degree than A	1 in 63 down to left	Repointed horizontal crack 1 brick below cill, slightly re-opened. Stepped crack at mid-point.
C	1.9m	Leans out but less than B.	1 in 190 down to left side	No crack damage or past repairs
D	1.9m	Lean out not measured but visually more than adjacent panels	Approximately level bed joints	Horizontal crack 1 brick below cill. Panel is adjacent to T1 Lime tree.
E	1.9m	Slight lean out	Approximately level bed joints	Slight stepped cracks but minor.
F	2.25m	Mainly vertical	1 in 119 down to left side	
G	2.1m	Mainly vertical	1 in 119 down to left side	Adjacent to T1 Horse Chestnut Rebuilt panel to accommodate tree trunk with lintel on inner face and brick slips on outer face.
H	2.0m	Bulge out adjacent to T2 trunk and leans out.	1 in 34 down to right side	Stepped horizontal crack at high level, previously re-pointed but has re-opened.
I	1.9m	Severe lean out as per Drive pillar	1 in 95 down to left side	Previously re-pointed cracks have re-opened Attached to Drive pillar.

In addition, the following related damage was noted:

- Right gate on drive has been adjusted on several occasions due to movement
- Paving has dropped in front of drive. Paving slab cannot easily be re-set due to hard spot provided by roof slab of flat which extends under driveway.
- Road and pavement has dropped in front of drive. Rain gathers rather than flow into road drains which are visibly higher.
- Paving slab loose just inside front entrance pillar.
- Stepped crack on internal perpendicular garden wall near drive end, open 12mm after previous filling and repointing.

[redacted]

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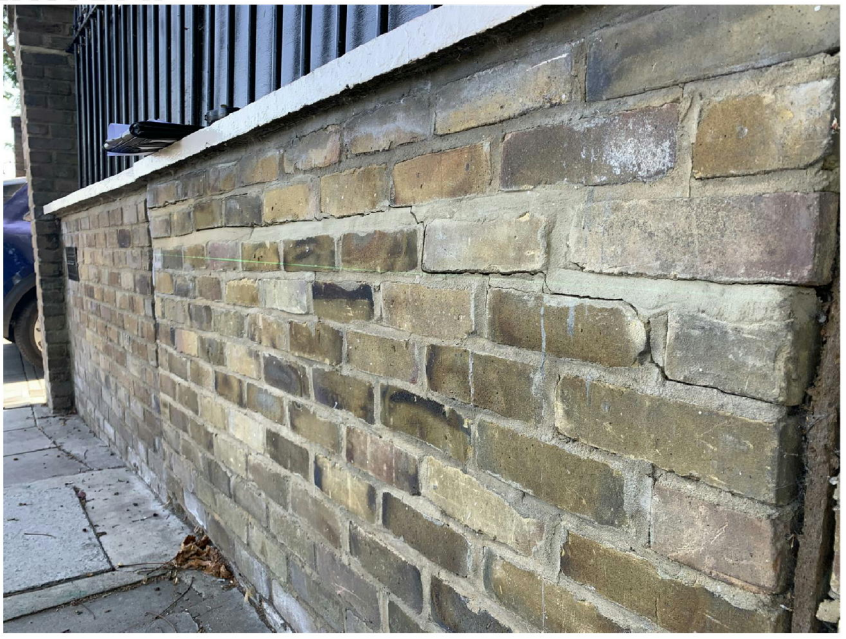


Panel H – Cracking, bulging out and tilt down to left (as shown by laser line)

Cracking to perpendicular wall near Drive end

[redacted]

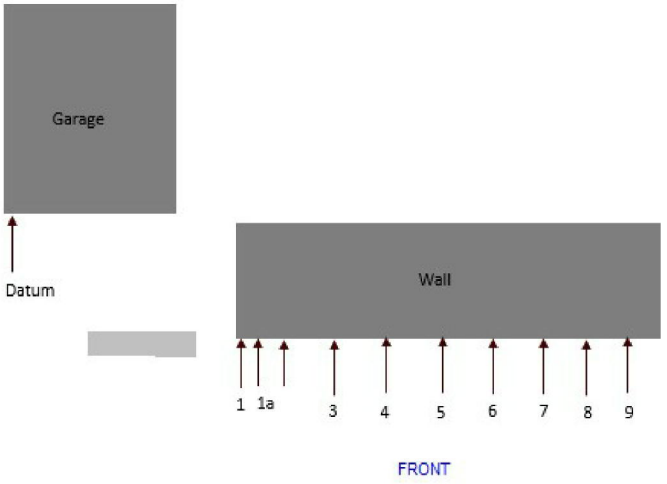
SITE INVESTIGATIONS (ref Site Investigation Report by Optera dated 25/6/19)

Trial pits and hand augered boreholes adjacent to the house showed the subsoil to be a firm to stiff, sandy CLAY of very high plasticity. No trial pits have been carried out immediately adjacent to the wall but the angle of tilt indicates that footings will be shallow (less than 1m). Whilst no roots have been recovered, the two trees are situated immediately adjacent to the wall, so there must be root ingress below the wall.

LEVEL MONITORING

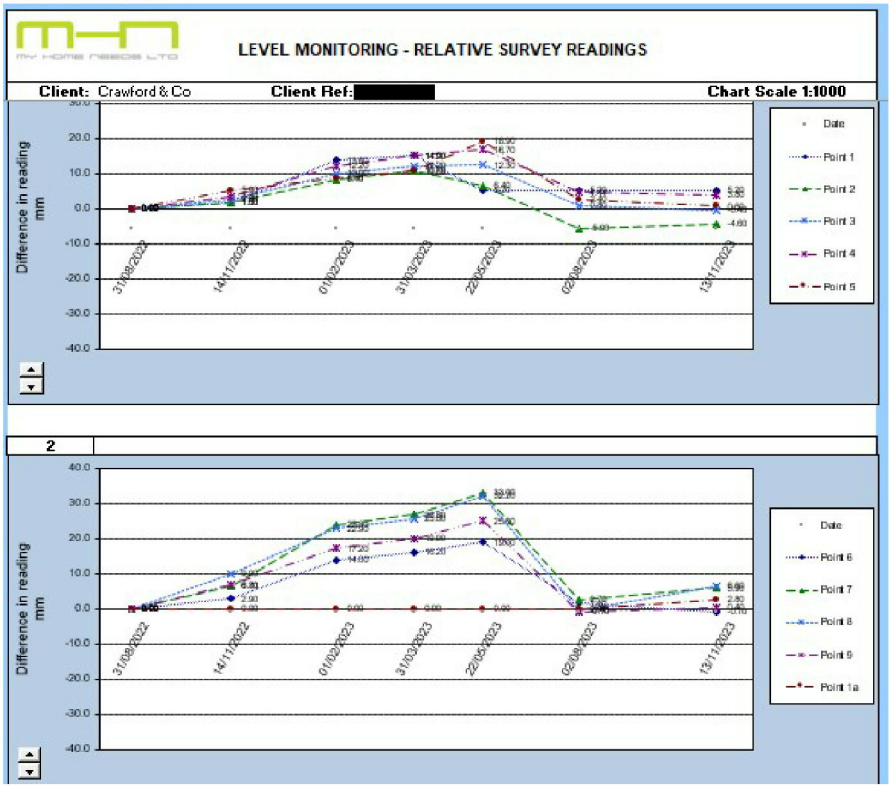
Level monitoring along the wall at 1 panel intervals has been carried out over the period August 2022 to November 2023, following which the monitoring points were either destroyed or removed by other parties (the wall faces the public footpath).

Monitoring positions are shown below:



Readings are shown in graphical form overleaf. The datum was placed on the garage which has a deep foundation, so is considered to be relatively stable and unaffected by clay shrinkage movement.

The readings show upward ground movement ranging from 10mm to 32mm over the period August 2022 to May 2023, correlating with rehydration (sweliing) of the clay. From May 2023 to August 2023, the movement is downwards ranging from 4mm to 30mm. This correlates with shrinkage of the clay during the drier summer months. From August 2023 to November 2023, there is some slight upward movement at some points, indicating that the winter rehydration (swelling) is re-starting. Overall, the pattern of cyclical movement is consistent with clay shrinkage and swelling beneath the footings of the wall and piers.



DISCUSSION

The wall and pillars have been damaged by a combination of physical root damage caused by the trees and subsidence caused by root-induced clay shrinkage, which is also linked to the trees.

It is notable that the lean-out of the wall tends to decrease between the trees, with the exception of Panel F which has been re-built in the past, accommodating the physical impact of the trunk by installing a lintel and using facing bricks externally to 'hide' this.

Subsidence is shown by both the lean outwards of the wall/pillars and the horizontal tilt of the bed joints. Site investigations for the house showed the subsoil is London Clay of very high plasticity to at least 3m depth. This equates to a high volume change potential in accordance with NHBC Guidelines. The roots have extracted moisture from the clay, causing it to shrink and lose volume. This has caused the foundations for the wall and the pillars to subside and tilt.

Whilst no trial pits or boreholes have been carried out immediately adjacent to the wall, the proximity of the trees indicates that roots will be present beyond reasonable doubt.

The driveway provides an indication of the movement. Beneath most of the driveway is an underground Flat, so foundations are deep and unaffected by the movement. However, in front there is significant clay shrinkage which has caused the pillar to lean significantly.

[redacted]

BRE Digest 475 provides some advice on tilt for low-rise buildings. Whilst this is a boundary wall, there is still some merit in the advice. At tilts <1 in 100, remedial action is recommended, such as re-levelling of the building, jacking or underpinning. At tilts <1 in 50, the building is regarded as in a dangerous condition, with urgent action required to re-level or demolish the building.

In this instance, the tilts on both pillars and Panel H are less than 1 in 50 and those of Panels A, B & I are less than 1 in 100. Whilst we do not consider there is immediate danger of collapse, the physical damage is in excess of normal serviceability requirements and the tilt increases the risk of collapse.

It is also noted that the wall is above the HS2 tunnel. When excavated, there is potential for surface settlement which HS2 are monitoring in this area. At this stage, we understand that soil anchors have been installed below the wall but these should not cause any surface settlement or tilting.

RECOMMENDATION

The subsidence issue can be addressed by removing the cause ie the trees of influence. This will allow the ground to gradually stabilise so that remedial works can be implemented. Arboricultural recommendations obtained from MWA Arboriculture recommend removal of T1 Horse Chestnut and T2 Lime. By addressing the subsidence issue, the tilt will also reduce thus significantly reducing the risk of the wall toppling/collapsing onto the public pavement.

If tree works are implemented, remedial works would involve partial rebuilding and repairs for which an estimate has been obtained from Lawnscape at [redacted] (December 2023 prices).

If the trees remain, we see no alternative but to rebuild the whole section of wall and pillars on a piled foundation taken below the depth of influence of the tree roots. As per Panel G, the brickwork can incorporate lintels to span the trunk growth in Panels D & G but the new piled foundations will inevitably cut some roots. An estimate has been obtained from Optera Structural Solutions in the sum of [redacted] (August 2023 prices)

Neil Crawford CEng MICE
Crawford Claims Solutions – Subsidence
[redacted]

29 August 2024

[redacted]