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Our ref: 216061/ Rowberry Morris Solicitors - 17 Castle St, Reading – boundary wall / Structural Inspection - Rev O
Your ref:

18th March 2021

Mr Luke Luland
Rowberry Morris Solicitors
17, Castle Street
Reading
RG1 7SB

By email only: luke.luland@rowberrymorris.co.uk

Dear Luke,

Re: Structural Inspection – Boundary wall at 17, Castle Street, Reading

Further to our visit on Wednesday, 10th March, please find our findings below:

1. Introduction

Clive Hudson Associates Ltd were instructed to undertake:

- a structural inspection of the boundary wall between Nos. 17 and 15, Castle Street, and
- to provide a brief letter-report summarising our findings, and outline proposals for possible remedial works and further investigations (if deemed necessary).

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Figure 1. Partial view of wall
(looking south from the carriage entry of
No. 17)

2. Description & background

No. 17 is a Grade-II* listed property (L.E.N. 1113413) and is located on the south side of Castle Street in the centre of Reading (National Grid References SU 7138 73211) (Figs. 2 & 3). The boundary wall inspected separates No. 17 and No. 15, Castle Street (a property to the east of No. 17 that is also Grade-II* listed (L.E.N 1303734)).



Figure 1. Site location.
(extracted from www.streetmap.co.uk
accessed 12th March.)



Figure 2. Site location
(www.google.com/maps
accessed 12th March)

The section of wall runs in an approximate north-south direction and is approximately 21m in length (Fig. 3). The wall varies in height along its length. At its northern end the wall is approx. 2.7m high, in the middle the wall is approx. 1.3m high, and at the southern end the wall is approx. 2m high.

The wall is primarily of brick construction and is generally one brick thick (225mm). There are two integral historic brick piers in the southern section of the wall, and two relatively modern brick piers have been added on the east side. The wall would have originally been built using a traditional lime-based mortar. However, much of the wall is now pointed in a cement-rich mortar, which is generally not compatible with the softer historic brickwork. (Traditional buildings and their materials were built to be 'breathable' – allowing moisture to penetrate the fabric and then evaporate when the conditions were appropriate. The application of non-porous, cement-

rich mortars, and modern masonry-paints to historically 'breathable' surfaces can cause moisture to become trapped, which in turn can cause decay to the underlying material.)

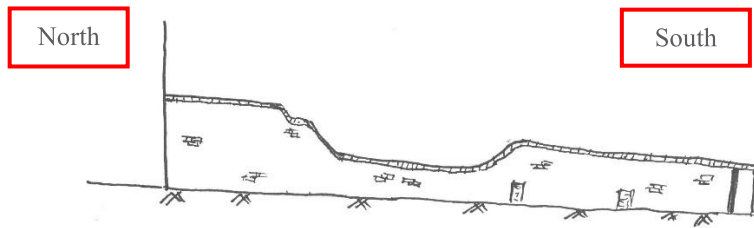


Figure 3. Indicative elevation of the boundary wall (as viewed from No. 17)

The age of the wall is unknown; but parts of the wall are clearly historic and, we assume, are comparable in date to the construction of Nos. 15 and 17 (i.e. it dates back to 16th / 17th century). It is clear the wall has been raised in height over time, the central section appears to have been taken down and re-built with evidence of a concrete 'footing' observed, and localised repairs have been undertaken in the past.

Clive Hudson Associates Ltd were instructed following concerns raised regarding the wall's stability / structural integrity (the wall distorts laterally, and there is a significant crack and lateral displacement at the top of the wall at its southern end).

2.1 Topography & Geology

The natural ground level gently slopes north-south down towards the River Kennet, which lies 100m to the south of Castle Street. The ground in front of the wall on the west side follows the natural slope. The ground on the east side is tiered with steps at the north end of the wall, and a step at the rear of the extension.

At the southern end of the wall, the ground level on the west side (No. 17's side) is approx. 350-400mm lower than the east side (No. 15).

Immediately to the south of both properties, the ground level has been cut to form car parking (Fig. 4).



Figure 4. View of the southern boundaries of Nos. 17 and 15.

Preliminary studies of the British Geological Survey's online 'Geology of Britain viewer' indicates the site geology comprises a Seaford Chalk and Newhaven chalk bedrock. However, intrusive site investigation would be needed to confirm the actual ground conditions.

2.2 Drainage

A drainage gully has been formed in concrete at the foot of the wall on the east side, which runs for approx. two thirds of the wall's length. The water from this gully then discharges onto the paved area to the south of the building.



Figure 5. Drainage gully formed at the foot of the wall on No. 15.'s side.

On the west side, there is a rainwater downpipe and drain at the northern end of the wall and a drainage vent at the southern end of the wall. We are unsure whether the vent is active or redundant or what this vents / vented.



Figure 6. Drainage vent at the southern end of the wall on No. 17.'s side.

There is an inspection chamber immediately half-way along the southern boundary / fence. We would assume the drainage runs observed at the north end of the wall is connected to this inspection chamber in some way.

2.3 Trees

There is a semi-mature, white willow at the southern end of the wall on the east side. The trunk has a diameter of approx. 55-60cm and the tree is located approx. 1m from the face of the wall. The tree leans noticeably to the east.

3. Inspection and Observations

The inspection was carried out by David Evans in wet and blustery conditions. The west face of the wall (No. 17's side) was inspected first before the wall was inspected from No. 15.

No tests were performed on the construction materials used, or to test / analyse the load-bearing capacities of the wall, the foundations and/or to confirm the nature of the underlying geology.

This letter-report is based on the visual inspection undertaken with respect to the brief stated above, engineering experience and judgment. Once all structural elements are exposed and inspected, further remedial works may be required.

Digital photographs were taken to record areas of interest and these are included in the letter-report for reference.

Please note: any references to the "left" and "right" are taken when facing the elevation / structural element being described.

For simplicity, we have divided the wall into three sections: - upper, middle, and lower.

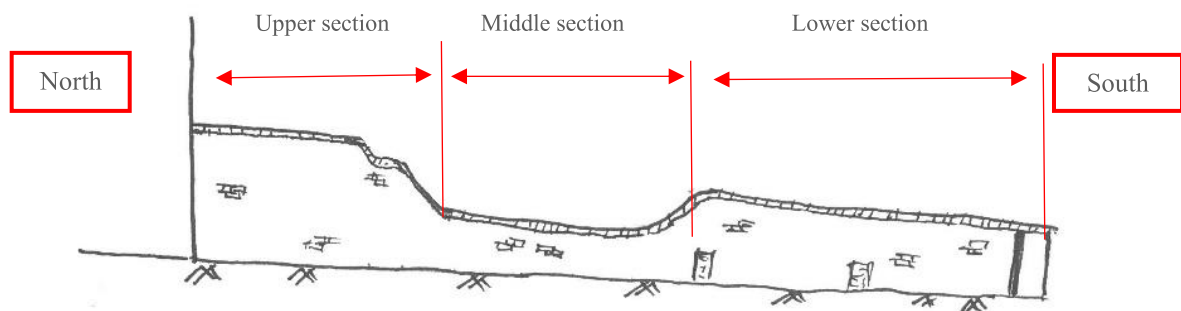


Figure 7. Wall sections

3.1 Observations & Recommendations

Upper Section

- i. The upper section of the wall is in a reasonably good structural condition for its age and generally requires re-pointing with an appropriate lime-mortar mix. There is a small recess on the left hand-side which has been partially infilled with clay tiles laid on edge. As a matter of good practice, we would recommend the clay tiles are removed and the recess is infilled with clay tile creases laid horizontally in an appropriate lime mortar.



Figure 8. General view of the upper section of wall

- ii. The base of the wall on the west side is noticeably damp with algal growths and staining observed. We would assume this has been caused by rainwater splashing off the ground and back onto the wall. Subject to intrusive investigations to confirm the nature of the footings, we would allow for the existing earth / compacted ground to be replaced with a more permeable material, such as pea shingle.
- iii. There were localised areas of brick degradation; but these do not warrant immediate structural concern and could be repaired using a lime mortar 'plastic repair', or the affected bricks could be carefully cut out and replaced with either clay tiles creases, or with new bricks which are similar in size, texture, and colour as the surrounding brickwork.



Figure 9. General view of the southern end of the upper section of wall.

Figure 10. An example of spalling brickwork.



- iv. On the east side, the wall has been painted with a modern masonry paint and the brickwork at the southern end of this section has been re-pointed in a grey cementitious mortar. While it does not warrant immediate structural concern, we would recommend the wall is re-pointed using a more appropriate lime mortar mix and the paint is removed and replaced, if necessary, with a more breathable paint.



Figure 11. A view of the upper section of wall (looking south).

Middle Section

- v. It appears the middle section of the wall has been re-built at some point in time with evidence of a thin concrete footing projecting out of the ground at the northern end of this section (Figs. 12-13)



Figure 12. General view of the middle section of wall.



Figure 13. Evidence of a concrete footing at the north end of the middle section.

- vi. Approximately half-way along this section the wall has been undermined with gaps observed below the apparent bottom course of brickwork and the ground (Fig.14). It appears further undermining has occurred due to rats tunnelling beneath the wall.

Figure 14.
Undermining of wall.



- vii. Structural movement was observed within this section of wall with the wall both bulging on plan and leaning eastwards. On No. 15's side the wall was found to be out-of-plumb by approximately 80mm towards the centre of this section.

A wall is considered theoretically unstable if it leans to such an extent that a plumb line passing through its centre of gravity (CoG) falls outside of the middle third of its base (Fig. 15); in this instance $\frac{1}{3}$ rd of 225mm = 75mm.

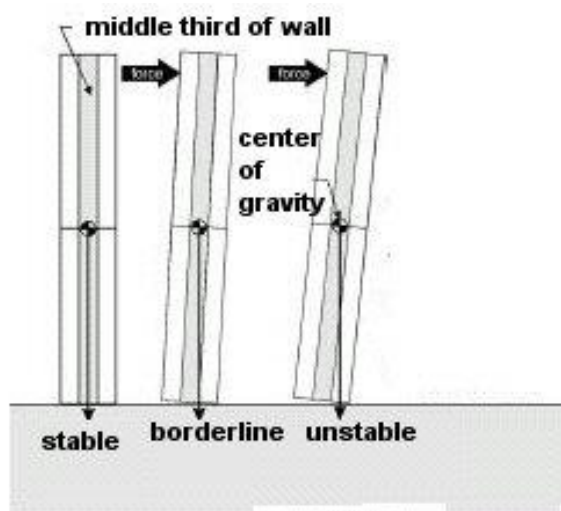


Figure 15.
Middle-third rule

While this section of wall has continuity with the upper and lower sections and has obviously been leaning for a number of years without failing, we would consider the wall to be just above the threshold for it to be classified as theoretically stable, and the movement is likely to deteriorate with time. Consequently, we would recommend this section of wall is propped as soon as possible, and the area is defined as off-limits until temporary works that secure the stability of the wall are in place. Beyond this, we would propose dismantling this section of wall and re-building it off new foundations.



Figure 16.
Cementitious pointing on the
east side of the middle
section of wall.

- viii. While it is not a structural matter per se, it should be noted the foot of the wall on the east side has been re-pointed in a cementitious mortar (Fig. 16).

Lower Section

- ix. The lower section of wall generally consists of a combination of historic, 2" thick brickwork and later, probably 19th-century, brickwork above it. As one would expect the historic brickwork shows signs of brick degradation (loss of surface / spalling) but this does not warrant immediate structural concern and requires re-pointing and localised 'plastic repairs' / brick replacement only.
- x. At the southern end of the wall there is a significant tapered crack with the brickwork either side of the crack displaced laterally (Figs. 17-20). The crack appears to run from the drainage vent up the wall with a crack width of 35mm and a lateral displacement of 50mm recorded in the coping brickwork. Further slight cracks were also observed on the east face of the wall (Fig. 22).

From the inspection it appears the brickwork to the south of the crack has lifted and displaced laterally and is consistent with root penetration into the brickwork, which has grown / expanded over time.

While un-related, the coping bricks and the two courses of bricks below this were noticeably loose for approximately 900mm (Fig. 23).



Figure 17.
Tapered, vertical crack at
the south end of the wall.



Figure 18.
Crack width between
the coping bricks.



Figure 19.
Laterally displaced
brickwork.

Figure 20.
Lateral displacement
between the coping bricks.



Figure 21.
View of the crack at the top of the wall from No. 15.



Figure 22.
Vertical, slight cracks in the
brickwork on the east side.



Figure 23. Loose brickwork to the north of the crack.

At this stage, we would recommend contact is made with the freeholder of No. 15 to discuss the possibility of removing the tree and its root ball before any remedial works commence. As part of the process, we would recommend the health, age, and stability of the tree is confirmed by a competent arboriculturalist as its lean gives us cause for concern (Fig. 24).

While it is not a structural issue, we would also recommend contact is made with the Tree Officer as we understand the tree may have statutory protection being within a conservation area. However, we would assume the wall pre-dates the tree and has its own statutory protection being within the curtilage of two listed properties.



Figure 24.
General view looking south
from No. 15 with the willow
tree at the far end of the wall.

- xi. To the north of the tree, the wall leans noticeably to the east. Unfortunately, due to the quantity of items being stored against the wall and the shrubs growing against it, it was not possible to get a series of accurate out-of-plumb readings. However, to the left of the plastic storage box, an out-of-plumb of approximately 100mm was recorded. At this stage, we would recommend permission is sought from the freeholder of No. 15 to move the items away from the wall so that a more accurate set of readings can be taken.
- xii. A further crack was observed at the head of the wall to the right of the painted pallet (Fig. 25). The cause of the movement is unknown; but it would appear the coping bricks and the two courses of bricks below this may be loose. As part of the next phase, we would recommend the integrity and stability of this brickwork is confirmed.



Figure 25.
Cracking at the head of the
wall to the right of the painted
pallet.

4. Conclusions

From the inspection undertaken, the extend of the structural movement observed to the middle section of the wall does warrant our concern. As a result, we would recommend the area is defined as off-limits until temporary works (propping) are in place.

The cracking and movement in the lower section of the wall is more convoluted with two issues – the cracking due to the assumed root penetration, and the out of plumbness of the wall to the north of the tree. At this stage, we would recommend contact is made with the freeholder of No. 15 to discuss the possibility of removing the tree and its root ball, and a meeting is arranged with both the Conservation Officer and the Tree Officer at Reading Borough Council to discuss the situation and the possible solutions to take this project forward.

If you have any questions, please do not hesitate to contact us.



David Evans BEng (Hons) MSc (Historic Conservation) SPAB Lethaby Scholar 2008 IHBC

Reviewed by



Clive N.W.Hudson B.Sc (Civ. Eng) CEng, MIStructE

On behalf of Clive Hudson Associates Limited.