

Our Ref: CRn/CRn/MA/90424.D124463/140864
Your Ref:

24 April 2009

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Dear John

57-60 Lincoln's Inn Fields – Leaning Garden Walls

We visited site with you on 23.4.09 and made a visual inspection of the two leaning walls. The weather was warm, calm and dry. The following report is based upon that inspection and our subsequent structural calculations of the stability of the walls. The report is presented to you and the client in accordance with the terms of our letter 21.4.09.

General Description (see attached sketch SK1 and photos 1-6 incl)

The two walls are each approximately 3m high by 13m long by 340mm thick, with 105 thick piers at 3m centres. The walls run between the front elevation of 59-60, and 1m square columns at their free ends.

The walls are constructed with London Stock bricks set in lime mortar, with ribbon repointing in cement mortar. Both walls are leaning to the north. The southernmost wall is dished at its midrun (130mm), and the northernmost wall leans along most of its length (100mm). See photos 3 and 4.

Possible Causes

As both walls lean to the north, cyclical thermal and moisture movement combined with sulphate attack are the likely causes. These causes will continue, so the walls will continue to distort until they get blown over by the wind one day.

Prognosis

If the walls were plumb they would have a 50% safety margin against collapse under design wind loads, to BS. 6399 Part 2. That margin has been reduced to about 7% by the current distortion. Whilst 50% is a normal safety margin, 7% is not, so the distortion of the walls has eroded their safety margin unacceptably close to failure. It will only take another 11mm of lean (half inch) to erode the safety margin completely.

Walls of this stature have killed persons when they have fallen. Remedial action is therefore necessary with the next year.

Remedial Options

1. Rebuild the walls, on new foundations (provisional), and provide dowelled movement joints at the wall ends to accommodate future longitudinal reversible movement.

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2. Butress the existing walls at midrun, and tie the northernmost wall to its terminal column, and the front wall of 59-60 (provisional).

Rebuilding has the benefit of not only eliminating the distortion, but also dealing with the other defects in the walls; poor copings, ribbon pointing, spalling brick faces, fractured plinth bricks, and random hairline fractures.


Buttressing will involve cantilever steel stanchions, with heavy concrete foundations which may have to avoid buried services. Whilst the buttressing will make the walls safe for many years, the aged brickwork will continue to deteriorate, and will have to be rebuilt long before a replacement wall would expire.

Apart from the walls, the leaning column (see photos 5 and 6) needs to be monitored quarterly for a year to check for any progressive displacement.

Upon request we will be pleased to design, specify, and draw the client's choice of remedial option for your submission for statutory approvals and the subsequent use of the Contractor.

Meanwhile, we enclose our account for your kind consideration, certification and onwards transmission for payment by the client.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Clive', with a long horizontal stroke extending to the right.

Clive Richardson

Technical Director - Structural Engineering

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Calculations

Prepared By: 	Date: 24.4.09	Project No: 124463/6	Page: SK1.	Rev:
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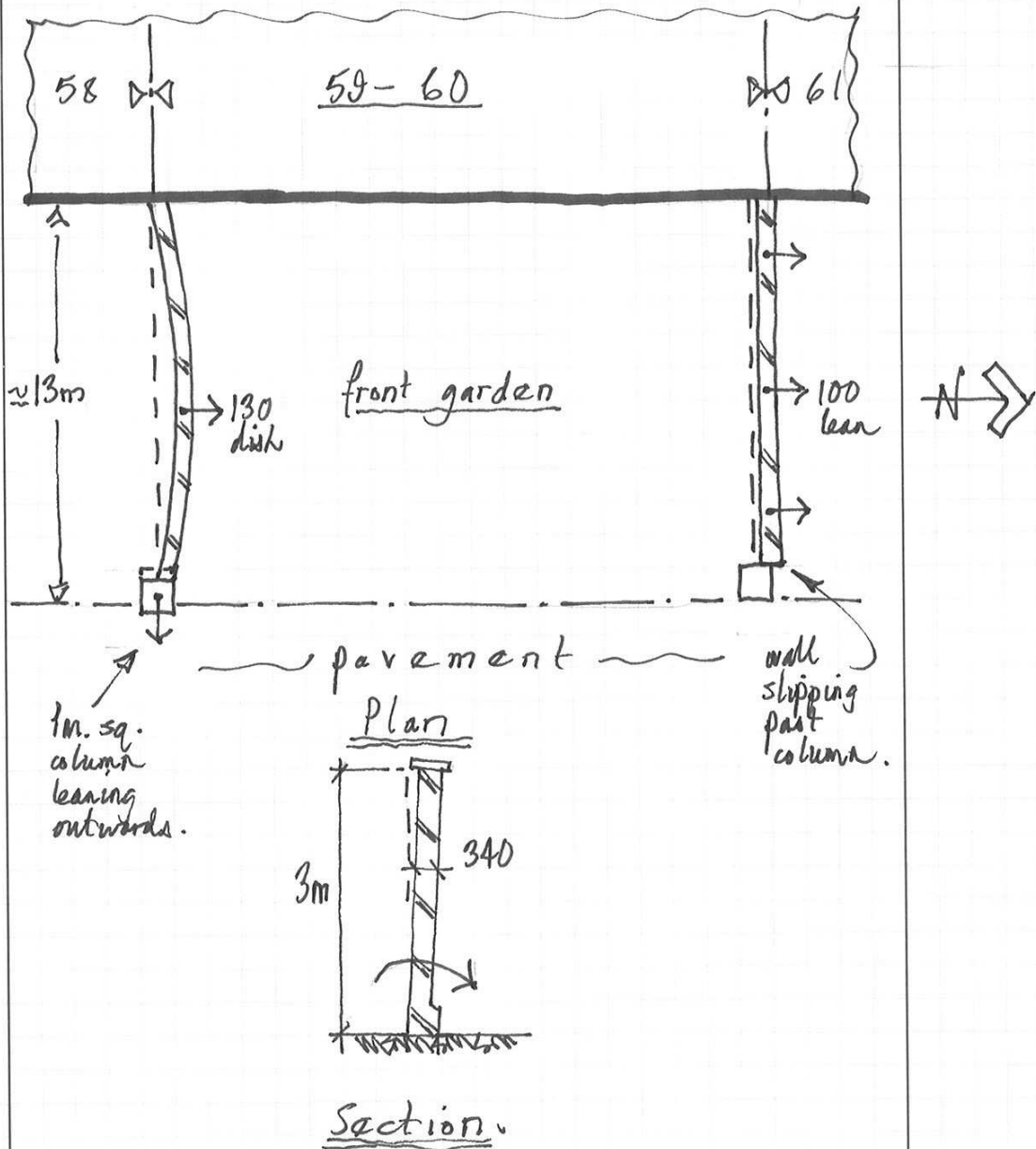




Photo 1



Photo 2



Photo 3





Photo 5

