



Ian Drummond
Consulting Engineers
Suite 291, 56 Gloucester Road
Kensington, London SW7 4UB
+44(0)20 7050 0702
www.idce.co.uk

STRUCTURAL ENGINEER'S REPORT

8 HOLLY TERRACE N6

PROJECT REF 5869
REV –
ISSUED 29/11/23

Introduction

This report was commissioned by Mr R Ormond being the owner of the property. The report was instigated as a result of concerns regarding the following aspects:-

- The condition of the front light well and proximity of the adjacent Magnolia tree.
- The condition of the balcony support structure.
- The condition of the roof structure and valley beams.
- The loading and capacity of the upper floors.

The building is a semi-detached house comprising basement, ground, first and second floors with an extended wing to the left of the property.

Access was available to most parts of the building. No exposure work or testing was carried out as part of the survey and the opinions expressed and conclusions drawn are based on the visible evidence available at the time of the survey. References to left and right are made viewing the property from the front.

This report is for the benefit of Mr Ormond and no other party is entitled to gain benefit from this report which remains the copyright of the author.

Visible Evidence

- 1) The light well wall is leaning and bowing inwards severely. See Photograph 1.
- 2) The head of the light well wall is restrained by two steel props against the main house. Both of these have resulted in a punching shear failure in the lightwell brickwork. See Photograph 2.
- 3) A clear gap can be seen between the front light well wall and the right side brick vaulted structure beneath the garden. See Photograph 3. The extent of movement reaches a maximum of approximately 100mm.
- 4) Parts of the inner half of the light well wall enclosing the right side vault have collapsed, leaving only the brick arch on the outer half. See Photograph 4.
- 5) A similar gap can be seen between the left side vault and the light well wall. See Photograph 5.
- 6) The light well wall itself exhibits tension cracks near the centre due to the extended length as a result of bowing. See Photograph 6 and 7.
- 7) Areas of the wall have completely lost all pointing and much of the mortar has fallen out. See Photograph 8.
- 8) Deterioration in the masonry to the entrance porch was also noted, see Photograph 9 and inside the vaults there are various cracks through the vault brickwork, see Photograph 10.
- 9) A mature Magnolia tree is growing in the front garden, 500mm from the light well wall.
- 10) The balcony is supported on a timber edge beam approximately 225 x 100mm and supported in a total of four locations by means of cast-iron columns.
- 11) To the right of the entrance door, the timber edge beam is severely rotted with a screwdriver easily penetrating the underside by 75mm. See Photograph 11.
- 12) In the roof space to the right of the valley gutter there is evidence of damp penetration which has caused rot to the base of the rafters and supporting timber plate. See Photograph 12. A total of four affected rafters could be seen from the left side of the roof, close to the centre of the building.
- 13) There is evidence of water damage staining to the main valley beam and potential onset of rot. It was noted that some ceiling joists have been replaced in the past and a timber beam planted on the side of the valley beam, potentially strengthening it towards the front. See Photograph 13.
- 14) The general condition of the main external walls of the building appeared relatively sound. See Photograph 14, 15 and 16.

Discussion

Front Light Well.

The front light well wall is in very poor structural condition. Movement of up to 100mm inwards towards the house has occurred, with the wall bowing severely and leaning inwards. Large areas of pointing and mortar are missing and there are numerous structural cracks. The wall has moved bodily away from the vaulted structures which act as the main retaining structures to the ground of the front garden. However, the close proximity of the Magnolia tree has undoubtedly had an adverse effect on the wall and its growth over the years will have been a primary contributing factor to the movement of the wall.

Fortunately, the brick vaulted structures are in relatively good condition with relatively manageable cracking, all of which could be repaired by means of resin injection. The light well wall however is considered to be entirely beyond repair and should be taken down and rebuilt.

Front Balcony Structure.

The main supporting edge beam to the front balcony has been badly affected by rot at the interior support close to the entrance door. Anecdotal evidence was given that this coincides with the position of a leaking gutter above. Being at the support, repair of the edge beam will not be a straightforward matter. The rot cannot be cut out and replaced as it will destroy the integrity of the beam. Repair may be possible, subject to identifying the full extent of rot, by means of reconstituting the beam and splicing with steel plates. The method of repair is described in principle in the next section but would be subject to more detailed investigation once full access to the edge beam is available on site.

Roof Structure and Valley Beam.

The internal loadbearing spine wall of the building is constructed in timber over the top storeys, and this will shrink and compress over time due to the permanent loading. The result of this is that the centre of the building will drop slightly relative to the brick perimeter, and this is likely to have resulted in a back-fall on the valley gutter and ponding of the rainwater near the centre of the gutter. Leaking of the gutter near the centre is evident by staining on the ceiling, together with the areas of rot in the roof timbers as illustrated. Fortunately, the rot does not appear to have badly affected the valley beams themselves and it is likely that these could be treated and if necessary, strengthened rather than replaced. However, several of the rafters are undoubtedly affected with rot as well as the supporting plate on top of the valley beam. Only the left side of the roof was accessible, and it is probable that a similar situation exists on the right side of the roof.

Repair of these roof timbers should be possible, as described in the following section.

Floor Loading.

While the live load on all the floors is high, a rough estimate of the average floor loading does not appear to exceed the typical or the regulation design live loading for residential floors. The design live loading at the time this building was constructed around the mid-1800s was 30 pounds per square foot which roughly equates to the current regulation live loading of 1.5 kN/m². (approximately 150 kg/m²). No excessive sagging was noted in any of the floor structures and the current live loading is not considered to be of particular concern. It was noted that particularly heavy storage has been accommodated in the basement on a solid ground bearing floor.

Conclusion and Recommendations

Front Light Well.

It is recommended that the front light well wall is largely rebuilt, the only exception to this being the corner near the party wall which carries a cast-iron column supporting the balcony and the support to the entrance portico, the arch of which is housed into the light well wall. The majority of the wall should be carefully taken down leaving toothed out sections each end. The supporting braces against the main house would need to be removed and set aside. Prior to commencing work the Magnolia tree should be propped to avoid destabilising more soil than necessary when the wall is dismantled. Localised areas of soil may be lost between the two brick vaults, but the vaults should be sufficient to adequately retain the garden during the works. Once the light well wall has been taken down, the foundation should be examined and if necessary, a new strip foundation cast. The wall should then be reconstructed in 215mm solid bond brickwork, and it is recommended that stainless steel ties be drilled and resin anchored into the end of the vaulted brickwork and built into the main front wall. Before completion all the cracks in the vaulted brickwork should be resin injected.

Balcony Structure.

Remedial works in principle would involve propping of the balcony edge beam remote from the supporting column where the timber is sound. The area should then be accessed and thoroughly examined, and the area affected by rot completely cut out. This section should be replaced with a hardwood block of equal size to the existing edge beam. Some jacking back up of the balcony structure may be required to accommodate the full size of the new timber. Once in place, the old and new sections of timber should be spliced using two long galvanised steel plates, one inside, one outside, and bolted right through to reintroduce the continuity of the beam.

Roof Structure.

It is assumed from evidence of leakage of the valley gutter that the lining of this will need to be replaced. In doing so it is assumed that the lower courses of slates will need to be lifted and, if indeed the roof covering is in poor condition, the entire roof may need to be re-clad. Once exposed by such works the areas of rotten timber should be cut out and the remaining timbers thoroughly treated. Areas of defective wall plate could simply be replaced and screwed down onto the tops of the valley beam. Rafter ends affected by rot should be cut back and the rafters, re-extended, by bolting on similar timber sections, possibly one each side of the rafter to avoid imbalance and bolting through the sound timber to form a splice connection.

If, once full access is available, it is discovered that sections of the valley beams have become affected by rot, these areas should be neutralised with a timber preservative. If the extent of rot is so much that it has impaired the structural adequacy of the valley beams, the valley beams could be augmented by bolting on of new timbers in the way that has already been done in the past towards the front.



I.G. DRUMMOND BSc(Eng) CEng FStructE

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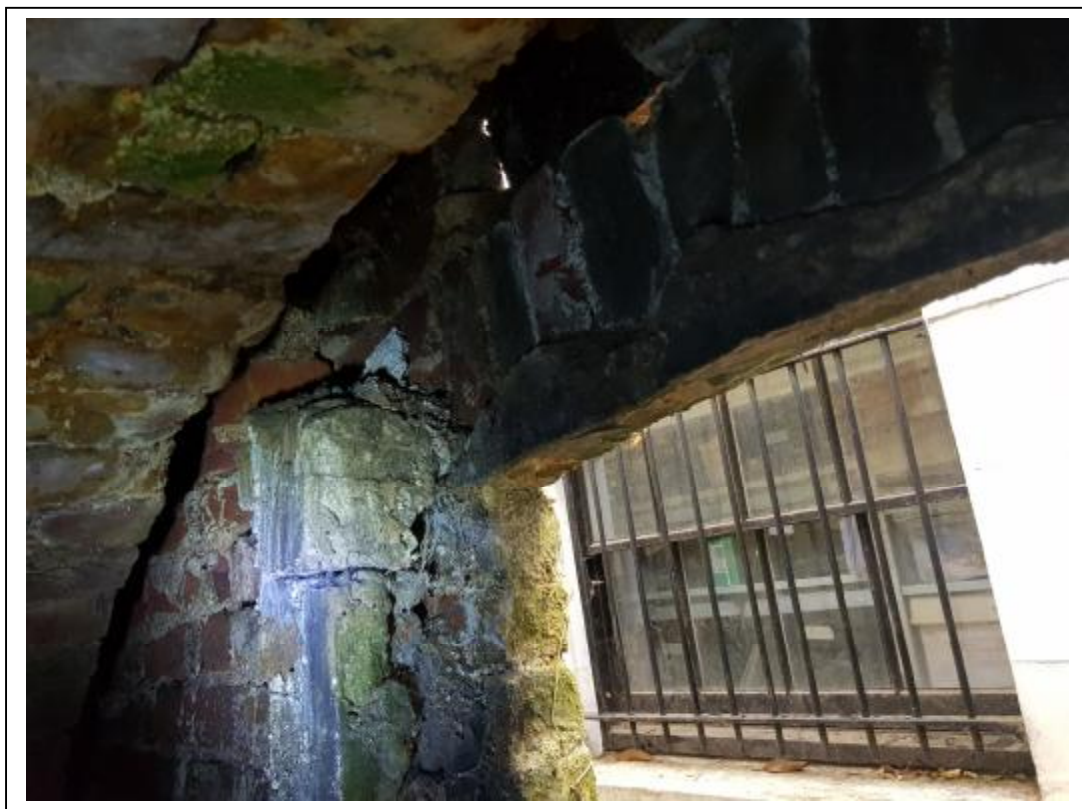
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Photograph 1.



Photograph 2.



Photograph 3.



Photograph 4.



Photograph 5.



Photograph 6.



Photograph 7.



Photograph 8.



Photograph 9.



Photograph 10.



Photograph 11.



Photograph 12.



Photograph 13.



Photograph 14.



Photograph 15.



Photograph 16.