Barton Engineers

Report

Structural Survey

32 Torrington Square
London, WC1E 7JL

July 2015

Barton Engineers Ltd
75 Newman Street
London
W1T 3EN
T: 0207 631 0348

Contents

Introduction 3
Observations 4
Conclusions 13
Recommendations 17

Introduction

Barton Engineers have been asked by Birkbeck, University of London, to carry out a structural survey of a property at 32 Torrington Square, London, WC1E 7JL. We understand that Birkbeck are the leaseholders of the property, and that the University of London are the freeholders. The property was inspected on 22nd July 2015.

This survey was commissioned after a significant outwards bow of the front facade was identified.

The purpose of this structural survey is to establish the overall condition of the existing structure and to make recommendations for repairs.

This report is for the exclusive use of Birkbeck, and should not be used by any other party without the expressed permission of Barton Engineers Ltd in writing.

Observations

Description

The property is an end of terrace house which is Grade II listed. The description of the terrace in the listing mentions that they were built by a James Sim, in partnership with James Sim Junior and Robert Sim, between 1821 and 1825.

Aerial View of Property

The structure of the house comprises load bearing masonry walls with timber floors and a timber roof. As part of this survey, opening up investigations were carried out on the second and third floor structures. These showed that the floor joists span from front to rear, between the facades and internal load bearing walls. The internal walls are likely to be of masonry or timber studwork, and possibly of timber studwork with masonry infill. The floor joists bear onto a timber wall plate built into the inner face of the external walls.

The houses forming the terrace are of five storeys, with a lower ground floor some 2.5 metres below street pavement level, and an upper ground floor approximately 1.0 metre above street level. Above these are a first, second, and third floor, with a loft space (accessed through a hatch in the ceiling of the third floor) below a duo pitched timber roof. The roof structure spans from front to rear with gutters hidden behind the masonry parapets along front and rear facades.

The front facade contains two windows per storey. The front entrance of the property is reached via an external stair, built of masonry. The lower and upper ground floors are clad in a render over the structural masonry, and there is a plain rendered cill band at third floor level.

At the front of the property is a stone balcony at first floor level across much of the width of the facade. The balcony is supported by brackets, likely to be of cast iron built into the facade, which support stone slabs and metal railings. At the rear, there is also a balcony of similar construction across the width of one of the windows at first floor level.

The lower ground floor is accessed at the front of property through a gate in the front railings, and via an external steel stair in the front light well.

Front View of the Property from Left

Front View of the Property from Right

The level of the rear garden is substantially lower than the level of the pavement at the front of the property, and is about 2 metres below the upper ground floor level. The rear

garden is accessed from the upper ground floor level via a steel staircase with stone finishes.

There is also a three storey brickwork extension at the rear which houses kitchen and toilet facilities.

Rear View of the Property

View of Rear Extension

The flank wall contains masonry buttresses and a large chimney stack above roof level. A similar chimney stack is visible above the party wall with the adjoining property.

The general floor plan of each floor comprises a large cantilevered stone staircase, along the party wall, serving the first and second floor levels, with two rooms at the front of the building, and one room at the rear. A small timber staircase leads to the third floor level which contains four rooms, two at the front and two at the rear.

View of Flank Wall

The Front Facade

The front facade contains a significant outwards bow between the second floor and roof level, centred in the middle of the facade. In addition, it appears that a brick above the head of one of the second floor windows has been displaced.

The window reveals at second and third floor levels are in poor condition, with paint peeling off the reveals. Both second floor window reveals also contain a crack at mid height on either side of the central pier. Above the mid height of the second floor window, the outer part of the facade appears to have moved significantly outwards, leaving a large gap between the brickwork and the outer face of the window frame.

At third floor, there is no gap between the outer face of the window frame and the outer part of the facade. However, there is a significant 30 mm wide vertical crack between the facade and the internal partition between the two front rooms. A large crack was also observed through the middle of both cills of the third floor windows, with part of the cill on the side of the middle pier, displaced outwards. On the inside of the front wall, a significant outward bow is clearly visible between third floor level and the ceiling.

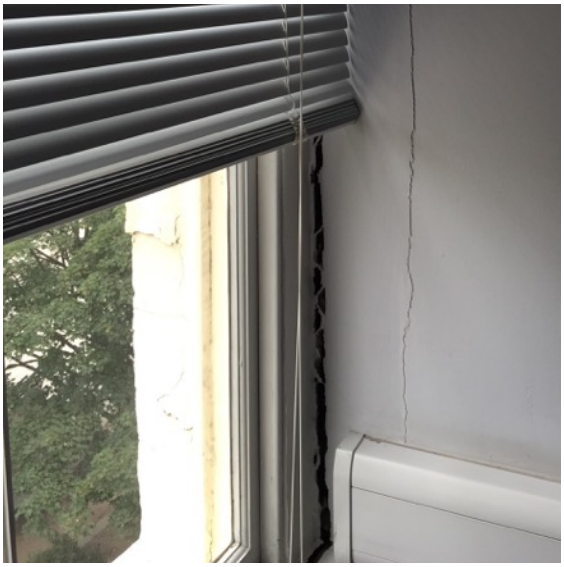
Outwards Bow of Front Facade

Close Up View of Front Facade

Close Up View of Front Facade

Crack Through Third Floor Window Cill

Delamination of Front Facade



Crack Between Front Facade and Partition at Third Floor

The floor opening up investigations uncovered recent remedial works to the facade. These comprised steel ties embedded in the front wall and fixed back to timber blocking pieces installed between the existing floor joists. These ties did not appear to pass through the full thickness of the front wall. At second floor level, these ties were formed using steel rods, whilst steel helical bar ties were used at third floor level.

The floor opening at third floor level also showed that there is a horizontal step in the inner brick course of the front wall, just above the top of the floor joists, and a significant vertical gap could be observed between the inner brick leaf and the remainder of the wall structure below. Clearly a horizontal separation in the masonry wall has occurred at this level.

Second Floor Wall Ties

Third Floor Steel Helical Ties in Wall

The remainder of the front facade below the second floor level appears to be in reasonable condition. There is, however, evidence that original bricks have been replaced in some small areas next to the flank wall of the property,

Vertical cracks were observed in the ground floor render, and in the circular arch above the front entrance door. There is a rainwater down pipe next to the party wall line.

Front Facade Previous Repair Works

Exterior Condition

The front entrance stair contains a crack in the floor finish adjacent to the front door. This crack appears to be historic, and the soffit of the masonry vaulted structure supporting the entrance stair is uncracked and appears to have no significant defects.

The flank wall is rendered between the brickwork buttresses, and there are numerous cracks in this render. The exposed brickwork in the flank wall appears to have no significant defects. There are no windows on this elevation.

Cracks in Flank Wall Render

The rear facade of the building appears to be in reasonable condition, with no significant defects. However, part of the rear facade at lower ground floor level has been repointed recently. A rainwater down pipe is visible along the face of the wall next to the party wall line. A second rainwater down pipe, collecting rainwater from the rear extension roof, is located on the rear facade at the corner with the rear extension wall.

The rear extension walls also appear in reasonable condition. It appears that the top storey is not original and is a later addition. It appears that part of the rear wall of the extension has been rebuilt above the lower ground floor small windows where these were inserted.

Rear Wall Previous Repointing Works

Rear Extension Wall

Rear Wall Balcony

Loft Water Tanks

Roof and Loft Space Condition

The roof could not be accessed, and therefore a close inspection of the roof fabric and chimney stacks was not possible.

Only a limited part of the loft was accessible, adjacent to the loft hatch, and the inspection of the loft was carried out from that location. The roof structure that could be examined appeared to contain no significant defects. There are three water tanks bearing on the loft joist structure, and it is not known if these are still in use or not.

Roof Structure

Upper Floors Interior Condition

Generally, the existing floors are uneven throughout, although there is no sign of significant sag of the floor nor of significant settlement within the floors adjacent to the supporting walls.

At third floor level, there are some pronounced dips in the stair landing which could be an indication that one or two joists have been notched or damaged at these locations.

Generally, there was no evidence of significant cracks in the ceilings, except to the soffit of the third floor landing. In this location, cracks were observed in the ceiling between the light fittings and the edge of the ceiling panel. It also appears that the ceiling in this area has dropped and the edge of the ceiling along the stair void is damaged.

Ceiling Beneath Third Floor Landing

Cracks in Ceiling

Water Ingress at Corner of Rear/Flank Walls

In Room 304 at third floor level (rear room along flank wall), there is evidence of water ingress at the junction between the rear facade and the flank wall, and also above the window.

There are cracks in the plaster finishes of the party wall of the third floor stairwell.

In the stairwell there are also cracks in the plaster finishes of the rear facade at second floor level. In particular, a vertical crack was observed at the junction between the rear wall and the internal wall.

Water Ingress at Head of Window

In the first floor front room, there is a vertical crack in the plaster finish to both side walls.

The cracks in the walls described above, between first and third floor levels, could be due to historic thermal movements of the masonry walls causing cracking of the plaster finishes.

Crack in First Floor Flank Wall

Room 102 (room towards the rear of the property at first floor level) was not accessible and could not be surveyed. As a consequence, the rear balcony which serves the window of Room 102 could only be surveyed from the rear garden.

The front balcony could only be surveyed from the first floor level, as the scaffold erected along the front facade prevented inspection from street level. There was no evidence of corrosion of the metal railings and there was no sign of significant cracks in the waterproofing layer over the stone slab. However, there was evidence of plant growth in the stone slab along its edges, which indicates that the edge of the stone slab might be chipped in these locations.

First Floor Balcony

Close Up View of First Floor Balcony

Upper and Lower Ground Floor Interior condition

There is a vertical crack in the finishes on the arch above the front door, which is in line with the crack observed on the outside.

There is no sign of dampness on the exposed faces of the lower ground floor walls. However, most of the wall finishes are solid sheeting panels, built in front of the walls.

Rear Extension Exterior and Interior Condition

Cracks in the finishes could be observed above a window on the first floor and there was also evidence of dampness on the inner face of the flank wall at lower ground level.

Crack above rear extension window

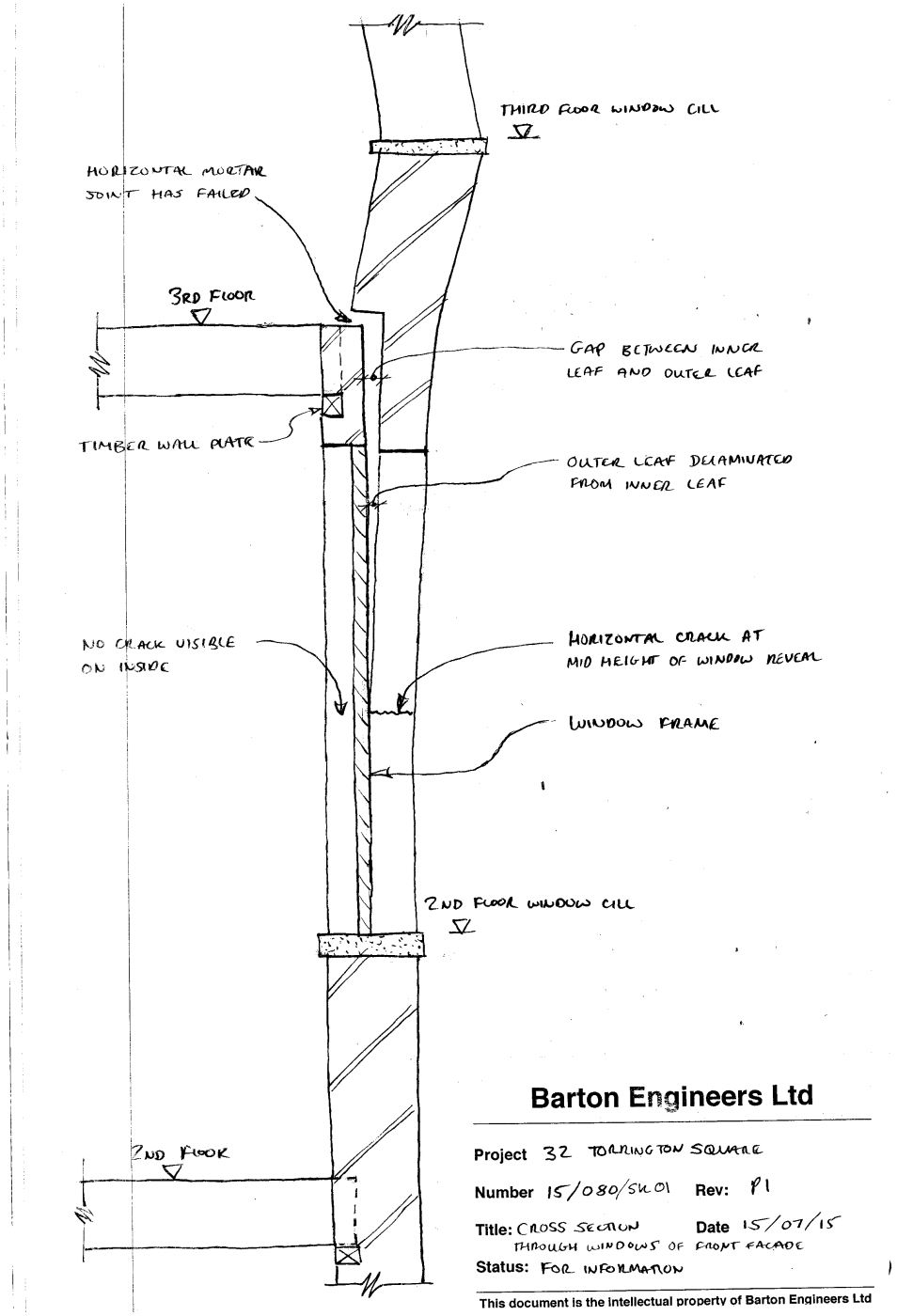
Dampness on rear extension wall

Conclusions

The front facade

The front facade masonry has delaminated above the mid height of the second floor windows. The horizontal mortar joint just above third floor level on the inside face of the facade has failed and the entire thickness of the front wall has bowed outwards. This type of delamination of brickwork walls is not uncommon for this type of construction, but the localised outward movement of the facade is relatively large, and gives serious cause for concern. The remainder of the front wall, below the cill of the second floor window down to ground floor level, appears unaffected, and the sketch below which summarises our conclusions.

The cracks in the render at ground floor level are historic and probably due to weather induced movement in the masonry causing cracking of the render.


THIRD FLOOR WINDOW CILL
HORIZONTAL MORTAR JOINT HAS FAILED
3RD FLOOR
GAP BETWEEN INNER LEAF AND OUTER LEAF
TIMBER WALL PLATE
OUTER LEAF DELAMINATED FROM INNER LEAF
NO CRACK VISIBLE ON INSIDE
HORIZONTAL CRACK AT MID HEIGHT OF WINDOW REVEAL
WINDOW FRAME
2ND FLOOR WINDOW CILL
2ND FLOOR
Barton Engineers Ltd
Project 32 TORRINGTON SQUARE
Number 15/080/SK01 Rev: P1
Title: CROSS SECTION THROUGH WINDOWS OF FRONT FACADE
Date 15/07/15
Status: FOR INFORMATION
This document is the intellectual property of Barton Engineers Ltd

Exterior

Numerous cracks were observed in the render of the flank walls but there was no sign of loose parts of render having fallen off the wall. A close inspection will be necessary to confirm the possible causes for the cracks and the extent of the damage.

Observations of the chimney stacks from the opposite side of the street suggest that they both lean outwards in opposite direction to the roof of the property. The steel ties which have been installed to tie the chimney stacks together seem to have been an attempt to restrain the chimney stacks against one another. However, the ties appear to be loose and therefore it can be concluded that the ties do not seem to currently serve any structural purpose.

View of Chimney Stacks and Tie

The stains observed on the metal brackets supporting the rear balcony are evidence that corrosion of the metal brackets has occurred, but there is no sign of extensive corrosion.

Rear Balcony Brackets

Upper Floors

It is our opinion that the uneven floors could have been caused by the thin layer of chipboard, which was placed over the existing floor boards, being too flexible and becoming damaged overtime. The lack of lateral restraint to the joists, in the form of timber blocking could also have been a contributing factor, as, in this case, a joist could move differently from the adjoining ones.

The localised dips in the floor could be due to previous alterations to one or two joists of the floor, in the form notches or holes for instance, weakening the joists and making them more flexible that those adjoining.

The ceiling on the underside of the third floor stair has dropped and its edges are damaged. The pattern of the cracks in the ceiling indicates that the observed damage may have been caused by the installation of light fittings.

The water ingress observed on the inside of the rear facade at ceiling level of Room 304 could be due to a leak through the flashing of the roof on the face of the masonry parapet, or could have been caused by water ingress through cracks in the masonry parapet. A close inspection of the roof and parapets will be required to confirm this.

The cracks observed at first and second floor levels are probably due to historic weather induced movements of the masonry walls resulting in cracks in the plaster finishes.

Rear Extension

The cracks observed above one of the window could be a sign of the timber lintel being rotten or of damage to the masonry at its end bearing.

The dampness of the lower ground floor wall is evidence of water ingress through the brickwork. The location of the dampness on the inside matches the location of the external steel staircase on the outside. The stone finishes on the treads abut the face of the wall and weeds could be seen at the junction between the wall and the edge of the treads. This seems to confirm that rain water on the treads finds its way through the brickwork, causing the dampness on the inner face of the wall.

Rear External Stair

Recommendations

Prior to the works to the front facade and any internal works taking place, the support of the existing ceilings is to be strengthened to reduce the risk of damage and potential collapse of the ceiling due to the movements of the existing floors both historically and during the works. This could be done by removing the floor finishes and installing additional support brackets to the ceiling, and within the existing plaster thickness, which are fixed to the floor joists.

We would make the following recommendations to address the issues observed;

- We would recommend that urgent works are carried out to restrain the front facade panel bowing outwards from the flank and party walls, to prevent further movements of the brickwork.

At the time of writing this report, Barton Engineers have been appointed by Birbeck to design a temporary scaffolding system to restrain the front facade from the flank and party walls. A full height scaffold along the front facade and the temporary bracing system have been installed.

Based on the magnitude of the delamination and the failure of the horizontal mortar joint above the third floor level, we recommend that the front facade above the second floor is rebuilt up to the roof parapet level. Adequate tying of the brickwork to the floor and roof structures will have to be provided. The roof and floor structures, bearing on the part of the facade to be rebuilt, will need to be temporarily propped during the works.

- Regarding the render of the flank wall, we recommend that a close inspection is carried out to identify the extent of the cracks and if there are any loose parts of render. Samples of the render could be taken for testing to determine its composition. This inspection and testing will be necessary to assess the appropriate remedial works required. It may be that the cracks in the render only need to be infilled and a thin layer of render applied, or the render may need to be removed and replaced.

- A close inspection of the chimney stacks is recommended to measure if any movements have occurred and to identify any damage to the brickwork. This will be required to determine if any repairs are needed.

- We recommend that a close inspection of the roof parapet along the rear facade is carried out to identify any damage to the roof flashing or to the masonry parapet which could have caused the water ingress observed at third floor level. The plaster finish should also be removed at these locations to expose the brickwork and the lintel above the window. This would show any damage of these elements which could explain what was observed.

- The levelling of the existing timber floors could be carried out. As the levelling works are being done, we would recommend that the existing floor boards are removed at the location of dips in the floor, to expose any notches or holes in the existing joists. These joists will need to be strengthened. Additional timber blocking could also be installed between the joists at mid span and supports. This would stiffen the overall floor and limit the differential movement between the joists.

- To reduce the dampness to the rear extension wall, we would recommend that the finishes to the external stair are modified to allow for a sufficient gap between the edge of the stone and the brickwork wall.
- The cracks observed in the walls, except for the cracks to the front facade, are probably due to historic thermal movements of the masonry wall and the cracks only need to be infilled and the plaster made good.
- The stone slabs of the first floor balcony should be cleaned to remove any plant growth, and the stone slab repaired in these locations to avoid further damage.
- The metal brackets supporting the rear balcony should be repainted to prevent further corrosion.

As the building is Grade II listed, any works to the property may require a listed building consent, and under no circumstances are the works to take place without prior consultation of the LB Camden Conservation Officer.

This survey and report has been prepared and written by Matthieu Roure (MEng MSc DIC CEng MIStructE), Project Director of Barton Engineers Ltd

This report has been independently checked and approved by Bob Barton (BSc Hons CEng FIStructE FICE FConsE GradDiplBldgCons AA), Director of Barton Engineers Ltd