STRUCTURE WORKSHOP

Wheatsheaf Yard

Structural Appraisal of Front Façade to 50c Red Lion Street

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Contents

1 Introduction

Through this report we intend to review the structural integrity of 50c Red Lion Street with a focus on the façade facing Wheatsheaf Yard.

50c Red Lion Street is a three-storey building located in the central London area of Holborn. The roof is supported on four king post trusses that span front to back, landing on front and rear walls. The rear wall is solid masonry, assumed to predate the rest of the building. The front wall is formed from a series of timber posts, bressummer beams and masonry spandrel panels. First and second floors are supported on timber joists, which span left to right between down stand timber beams. The down stand beams are supported on timber posts within the front facade, which transfer loads to the ground.

Three site visits have been carried out, all of which show evidence to suggest that the building was an infill to a space between 7a Lambs Conduit Passage and 18 Princeton Street. This is demonstrated by the vertical joint on both ends of the brickwork to the front façade and a vertical joint between chimney and party wall of 7a Lambs Conduit Passage.

The following chapters investigates any defects associated with the front facade as we look to understand whether it could be retained and incorporated into the proposals.

2 Defects

Please refer to Structure Workshop (SW) drawing 1742.SK05.I1 and the photographs included in this report when reading the following section.

A: Protruding Truss
The bottom chord to truss three (T3) punctures through the front façade above the double doors on the second floor (see figure 1), presenting a cold bridging issue. The chord is also vulnerable to decay due to water ingress, both issues combined present a durability issue if left exposed.

B: Reconfigured Trusses
T4 has maintained the most original features of the four timber trusses supporting the roof (see figure 2a). The timber rafters, king post and bottom chord remain largely untouched. The steel plate connection also follows a similar style to the connections found on the timber post inset from the front façade on the ground floor (see figure 2b). T1, T2 and T3 have been altered, this is most clear on T2 where the rafter to the front façade has been removed and a timber purlin added to support the cut rafter and transfer loads to T1 and T3 (see figure 2c). These alterations prevent the truss from working as it was originally designed. Additional timbers have also been added to T1 and T3 to support a large dormer window (see figure 2d). These alterations are evidence that the front façade has been modified significantly at this level.

C: Decaying Timber Lintel
The timber lintel supporting masonry above the entrance from the top of external stair shows signs of water ingress (see figure 3). The lintel looks to have been painted white, which is peeling away from the timber, this could be a sign of decay to the timber.

D: Vertical Joints to Front Facade
David Kohn Architects (DKA) drawing 218-PL02-01 shows a 300mm thick masonry wall to the north side of 50c Red Lion Street (see 'Site Schematic Plan' on 1742.SK05), the 300mm thick wall is likely to resemble the original external wall to 7a Lambs Conduit Passage. The masonry wall to the front façade of 50c Red Lion Street is stack bonded to the south wall of 7a Lambs Conduit Passage with a vertical joint (see figure 4a). Large cracks can be seen in the spandrel panel near the junction of these two walls that would suggest the wall to 50c Red Lion Street has pulled away from 7a Lambs Conduit Passage (see figure 7). Similarly, large cracks can be seen internally where the two walls meet at ground floor level (see figure 4a). The same bonded junction exists between the front wall and 18 Princeton Street (see figure 4b). Based on this information, we believe it reasonable to assume the current rear and front walls to 50c Red Lion Street were constructed after both 7a Lambs Conduit Passage and 18 Princeton Street were complete.

E: Brick Infill
Fresh paintwork and pronounced mortar suggest this section of brickwork is a more recent addition to the brickwork surrounding it (see figure 5). This implies a previous entrance to the building would have been located here. The infill brickwork panel is another indication that the front façade seen presently does not match that of the original façade and further alters the original load paths.

F: Second Floor Bressummer Beam
Three of the four trusses are supported on a shallow bressummer beam at the front of the building (see figure 6), this beam is supported on a series of timber posts also acting as mullions to frame the second-floor windows. The structure of the roof is largely dependent on this beam. The lintel complicates the load paths by directing roof loads through timber posts onto the masonry spandrel panel and down onto the first-floor lintel, resulting in an indirect load path to the ground. Signs of cracking to the spandrel panel above and decay to the timber beam due to exposure to moisture show the beam is in poor condition.

G: Drainpipe
The downpipe on the front façade shows signs of recent renovation. Fixing bracket details for the vertical element appear to be from steel whereas the angled section of pipe and its fixing brackets appear to be from PVC (or a similar plastic) (see figure 7). This suggests the upper part of the pipe has been replaced and may have previously continued vertically instead of being orientated on the angle, resulting in the creation of a new opening in the brickwork parapet. In the drainpipe's latest arrangement, a blockage or failure to the pipe would likely cause water ingress to either the second floor bressummer beam or the large vertical crack between the front façade and the external wall to 7a Lambs Conduit Passage. There is also evidence of water damage to the first floor bressummer beam due to water leaking from the drainpipe (see figure 7). The brickwork is also stained over the first floor lintel due to water from the hopper.

H: Spandrel Brick Panel
The spandrel panel is supported on a deep bressummer beam below and looks to be in reasonable condition (see image 9). The panel transfers point loads from the timber posts above to the timber bressummer beam below. There appear to be no concerning signs of cracking or wear to the brickwork.

I: First Floor Bressummer Beam

This exposed timber element supports brickwork from the spandrel panel above. It's depth and frequent supports show the original design intent to support wall, truss and therefore roof loads from above. The near equidistant timber post supports create rational load paths for loads to reach the ground (see figure 10). Based on visual information, we believe the beam to be original. The 7a Lambs Conduit Passage end of the lintel appears to show signs of warping and general decay due to the leakage from the drainpipe. With the beam also continuously exposed to the elements, it would be prudent to suggest it were to be replaced.

J: Ground Floor Windows

Based on conversations with the client and neighbours on previous site visits, it is understood that the fenestration windows in place on the ground floor are dated back to the 1970s (see figure 11). Whilst the openings to the façade on the ground floor may match that of the original facade, the windows and framing that now remain are not original.

K: Brick Panel

The brickwork is concealed behind decaying fascia board, internally the brickwork shows signs of severe cracking along the vertical joint adjoining the front façade of 50c Red Lion Street to 7a Lambs Conduit Passage (see figure 4a). Due to the bearing of the first floor bressummer beam, a large portion of load is concentrated through this narrow panel. When combined with the poor condition of the brickwork and the decaying first floor bressummer beam which has been exposed to water from the leaking drainpipe, there is a risk that the beam may pull away from the brickwork, or the masonry pier may fail, resulting in a partial failure of the front façade.

Figure 1: Protruding timber truss

Figure 2a: Truss Four

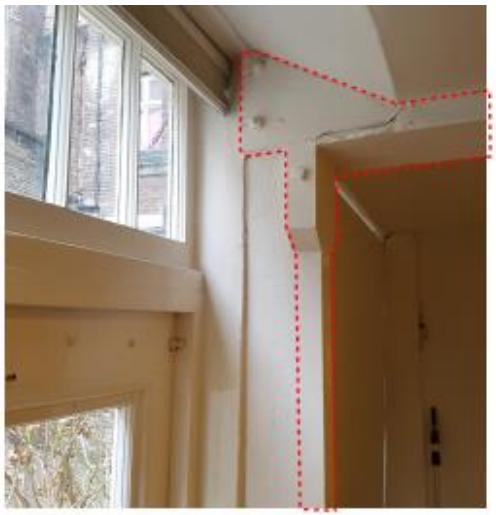


Figure 2b: GF Post to timber beam connection

Figure 2c: Reconfigured Truss Two

Figure 2d: Reconfigured Truss Three

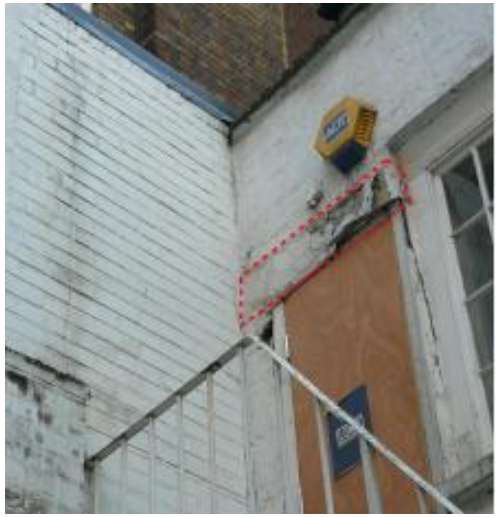


Figure 3: Decaying Timber Lintel

Figure 4a: Bed Joint – 7a Lambs Conduit

Figure 4b: Bed Joint – 18 Princeton Street side

Figure 5: Infill Panel

Figure 6: Second Floor Bressummer beam

Figure 7: Drainpipe

Figure 9: Spandrel Brick Panel

Figure 10: First Floor Lintel

Figure 11: Ground Floor Windows

Figure 12: Brick Panel

3 Conclusion

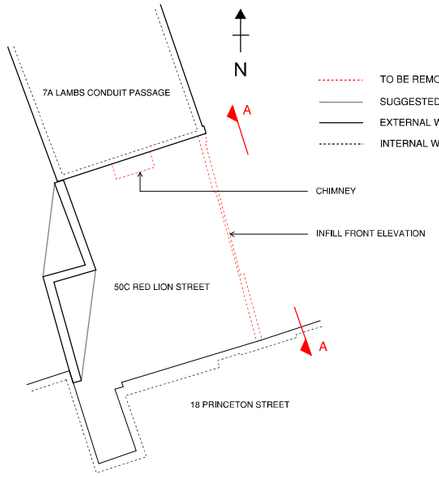
To conclude, the existing timber bressummer beams are in poor condition and we would recommend they are removed and replaced with new timber or galvanised steel beams. These lintels play a crucial structural role to the front facade and to facilitate their replacement would require significant temporary works to support the spandrel panel, parapet and three of the four timber trusses.

We believe the installation of the dormer has significantly compromised two of the timber trusses (T2 and T3) as well as altered the original appearance of the roof and front façade.

Further to this, the complex load paths, a cranked drainpipe and fenestration windows are all signs that the front façade has significantly deviated from its original aesthetic. It follows that the most suitable approach to address the issues presented above is to provide a new structural frame with rationalised load paths. Modern detailing will also help to address the durability issues that are present currently.

The exception is the rear wall, which is in relatively good condition. A suggested temporary propping arrangement has been shown on 'Site Schematic' (see 1742.SK05.I1) for a temporary works engineer to develop.

Appendix A – Structure Workshop drawing 1742.SK05.I1 highlighting all structural defects



SITE SCHEMATIC PLAN
1:200 @ A1, 1:400 @ A3

NOTES:

This drawing is to be read in conjunction with all other Architects and Engineers drawings, details and specifications.

Any discrepancies in the arrangement and details discovered on site, or otherwise, are to be reported to the Architect or Engineer immediately.

All dimensions in mm.

Do not scale from this drawing. Setting out to Architect's details.

All drawings to be printed in colour.

KEY PLAN

ASSUMED LOAD PATHS

ELEVATION A-A
1:50 @ A1, 1:100 @ A3

rev.	description	date
I1	First Issue	10.06.19

INFORMATION

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	appr.: SR
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