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Client

Eminence Development Ltd
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51-53 Richmond Street
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Document Title

Structural Inspection Report

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Revision History

Issue	Date	Status	Prepared By	Signature
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1.0 Introduction

- 1.1 Brennan Consult Ltd was appointed by Kieran Hedges of Eminence Development Ltd to carry out a pre-purchase structural inspection of a Grade II listed 3/4-storey textile warehouse.
- 1.2 The principal aim of the structural inspection report is to advise on the general structural condition of the building and its suitability for a proposed change of use to residential occupancy.

2.0 Survey Information

- 2.1 A representative of Brennan Consult Ltd visited the property on 26th January 2022.
- 2.2 The weather at the time of our inspection was mild and overcast.
- 2.3 The inspection comprised an internal and external visual inspection of all reasonably accessible areas. This report is not a full record of all aspects of the building fabric and relates only to items of structural significance, as set out within our brief. We have not inspected woodwork or other aspects of the structure that are covered or otherwise inaccessible, and are therefore unable to confirm that these elements are free from defect.
- 2.4 Photographs were taken and are included throughout this report.

3.0 Location and setting

- 3.1 The property considered in this report is a three-storey warehouse building located to the south of Richmond Street, Manchester (Photo 1).



Photo 1. Aerial view of survey area

- 3.2 The property is Grade II listed on the National Heritage List for England (NHLE) ref 1270835 as 51 AND 53 RICHMOND STREET. The building is stated to be “probably c.1860” as an “unusual example of very small purpose-built warehouse, little altered and still serving the same function”.
- 3.3 It is proposed to convert the building to residential occupancy as apartments which may include duplex apartments at second-floor level with an additional dormer mezzanine floor within the roof space.
- 3.4 It is also proposed to construct an independent narrow residential property on the adjacent land to the west.

4.0 Observations

4.1 External Observations

- 4.1.1 The property was 3 / 4-storey high and of traditional loadbearing masonry construction with brick arches over windows and stone cills with corbel brick supports (Photo 2). Pattress plates were present at 2nd floor level with tie rods assumed to tie through to the rear elevation.



Photo 2. Front (north) elevation

- 4.1.2 The ground-floor storey was raised 1/2 storey above street level, with access to the basement directly off Richmond Street (Photo 3). A loading bay was also present to the front elevation with wall-mounted lifting crane.

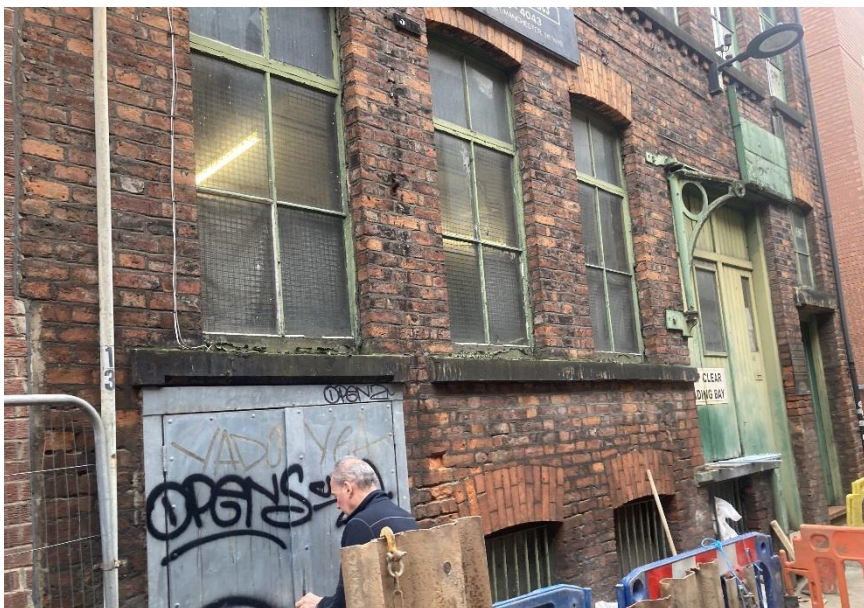


Photo 3. Front (north) elevation showing basement access and loading bay

- 4.1.3 To the left-hand (east) gable wall was a full-height movement joint with the adjacent residential building, suggesting each building has an independent external wall (Photo 4).



Photo 4. Full-height movement joint to left-hand party wall

- 4.1.4 Outward rotation of the second-floor piers between the windows was visible from ground level (Photo 5).



Photo 5. Rotation of brickwork piers at second-floor level to front (north) elevation

- 4.1.5 The right-hand gable wall was full-height masonry with no fenestration and was rendered up to second floor level (Photo 6). The top storey of the gable wall was newer masonry construction and is understood from discussions with the current owner to have been rebuilt due to damage occurring during WWII. There was crazing of the render, though it had remained largely intact.



Photo 6. Right-hand (west) gable elevation

- 4.1.6 At ground-floor level there was vertical cracking to the west gable wall that continued up through first-floor level (Photo 7).



Photo 7. Vertical cracking to right-hand (west) gable wall

- 4.1.7 To the rear (south) elevation there was a narrow alley that restricted viewing access, however it could be seen the brickwork was in a similar condition to the rest of the building and there were patch repairs at higher levels similar to the newer brickwork on the west elevation (Photo 8). Pattress plates were present at second floor level that reflected those on the front elevation.



Photo 8. Rear (south) elevation

- 4.1.8 At ground level to the rear elevation the windows had been bricked up, however there was evidence of water ingress to the basement resulting from an overflow pipe spilling on to the paving and the discharge of a rainwater pipe (Photo 9).



Photo 9. Saturated ground and RWP discharge adjacent basement corner

- 4.1.9 The adjacent building to the west was of newer masonry construction with air bricks facing 51-53 Richmond Street (Photo 10). This faces on to where the proposed adjacent development will take place.



Photo 10. Wall of adjacent building to west showing air bricks

- 4.1.10 At higher level there was a slight overhang of the adjacent building at the eaves position, and a further air brick was present to the side elevation (Photo 11).



Photo 11. Wall of adjacent building showing slight eaves overhang and high-level air brick

4.2 Internal Observations

- 4.2.1 Access was gained in to the basement and showed the construction to consist of timber floors spanning left-to-right and supported on a single row of timber beams and a single internal cast-iron column (Photo 12).



Photo 12. Ground floor construction visible within basement

- 4.2.2 The timber floor joists appeared to be a good depth for their span, however had been propped at mid-span with timber framing to provide additional support (Photo 13). We understand from discussions with the current owner this was due to the weight of materials stored on the ground floor.



Photo 13. Historic timber propping to mid-span of ground-floor joists

- 4.2.3 In the south-west corner of the basement there had been significant water ingress through the rear elevation (Photo 14), at the location noted in 4.1.8 above.



Photo 14. Basement water ingress through rear elevation

- 4.2.4 The ends of timber joists appeared damp where built in to external walls (Photo 15).



Photo 15. Ground floor joists appeared damp where built in to external walls

- 4.2.5 There was no clear evidence of any foundation or structural movement or cracking within the cellar, however there was visible surface corrosion to the single cast-iron column.

- 4.2.6 The ground floor was being used as a store and had the same form of construction seen within the basement i.e. a single internal cast-iron columns supporting timber beams and timber floor joists that spanned left-to-right (Photo 16).



Photo 16. Ground floor store

- 4.2.7 Adjacent the front elevation there was a suggestion of slight outward movement of the façade away from the floor plate, as evidenced by a tapering joint between the ceiling and the masonry piers (Photo 17).

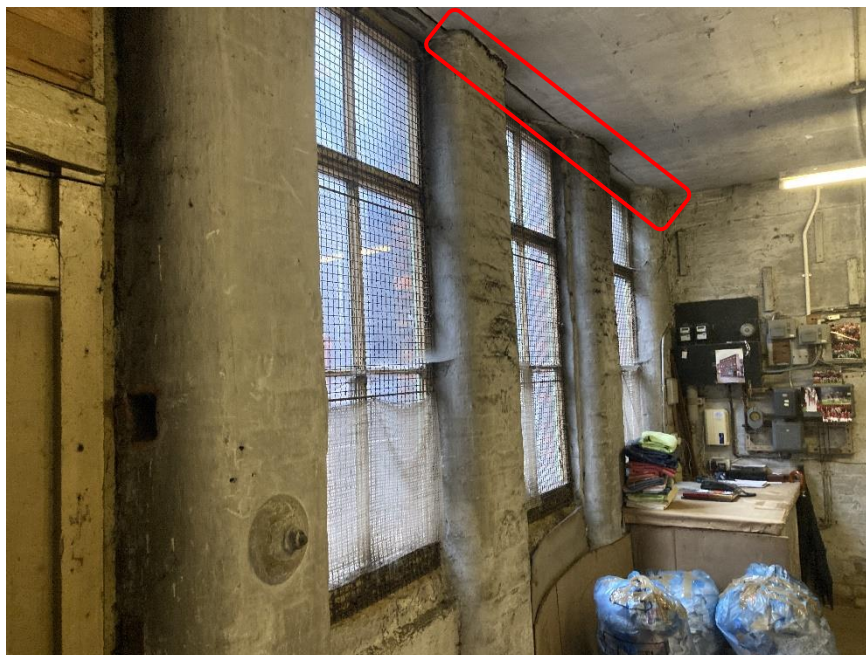


Photo 17. Horizontal joint between ceiling and front elevation at ground-floor level

- 4.2.8 The stair ran parallel to the west elevation and created a void that had been trimmed through the floors at each level (Photo 18).



Photo 18. Stair adjacent west elevation

- 4.2.9 Vertical cracking was evident internally to the west gable wall at north-west and south-west corners of the building and reflected the cracking seen externally to the rendered elevation (Photo 19).



Photo 19. Internal cracking to south-west corner at first-floor level

4.2.10 At first-floor level the structure again repeated what had been seen at basement and ground-floor levels (Photo 20). It was noted that there was no continuity of the columns or any clear evidence of direct fixings through each floor level.



Photo 20. First-floor showing single cast-iron column

4.2.11 At second-floor level there was no internal column, with a single collar-tied roof truss supporting timber purlins and in turn timber rafters and ceiling joists (Photo 21).



Photo 21. Roof structure visible at second-floor level

4.2.12 There was some evidence of the roof structure racking, however this was not considered to be excessive (Photo 22).



Photo 22. Timber roof racking to one side

4.2.13 The second-floor level appeared to be reasonably dry at the time of our inspection, however there was evidence of previous decay and collapse of the ceiling, and the timber again appeared to be damp where built in to the external walls (Photo 23).



Photo 23. Previous damp conditions evident

4.2.14 There was evidence of cracking to the masonry walls at the corners of the second floor and there was visible outward movement of the masonry at the pier positions to the front elevation (Photo 24).



Photo 24. Structural movement to masonry piers at second-floor level

4.2.15 Cracking was also present at the spring point of the roof truss to the front elevation which was also supported off a masonry pier (Photo 25).



Photo 26. Cracking at spring point of roof truss to front elevation

4.2.16 The rear (south) elevation was solid masonry at second-floor level and did not appear to have suffered the same outward movement as seen on the front elevation where windows were present.

5.0 Structural Appraisal

- 5.1 The building is of typical Victorian warehouse construction and has survived in its current form with little or no previous alteration.
- 5.2 The structure consists of two bays, with floors and purlins spanning left-to-right and supported on a single line of internal structure including a roof truss, timber floor beams and a single internal cast-iron column.
- 5.3 There is evidence of previous masonry reconstruction at high-level and we understand from discussions with the current owners that this was the result of damage experienced during WWII and not the result of previous structural movement or collapse.
- 5.4 The building was reasonably dry at the time of our inspection, however there was evidence of timber decay, particularly where timber beams and joists were built into the external walls. A full timber and damp survey would be recommended to determine the extent and severity of any timber decay and the extent of any timber repairs required.
- 5.5 In particular there has been excessive water ingress through the rear elevation and this was due to a leaking overflow pipe and a rainwater pipe discharging in to the rear alley and tracking back in to the building. Works should be carried out as soon as possible to prevent water entering the building to allow the basement to dry out, and the timber and damp survey should include the basement structure, with any recommended repairs carried out.
- 5.6 There were two areas of structural movement that need to be addressed as part of any proposed redevelopment and change-of-use of the building, these are roof spread which has caused outward displacement of the second-floor masonry to the front elevation, and movement and cracking within the west gable wall seen both internally and externally.
- 5.7 The roof spread is due to a lack of restraint at window head level and the lack of continuous masonry on the front elevation compared with the solid masonry on the rear elevation. As the roof has deflected over time, the rafters and truss have spread outwards and have pushed the masonry walls which offer little resistance to this movement.
- 5.8 The worst movement has occurred at the north-east corner and is likely to require locally rebuilding at least one of the masonry piers.
- 5.9 As part of any works to the building it would be suggested that additional plan bracing is installed within the roof to transfer lateral thrust loads and wind loads to the gable walls and prevent horizontal loads being applied to the slender masonry piers. Where cracking is present it will be necessary to carry out crack stitch repairs to reinstate the strength lost as a result of the previous movement.
- 5.10 Adjacent the west elevation there is a lack of restraint of the large masonry gable wall panel due to the presence of the stairs. This is a common defect in older buildings where restraint of external walls was not installed and was exasperated by the lack of flooring where stairs were present. As part of any proposed works it would be recommended to introduce restraint straps between walls and floors

and between walls and roof structure to ensure the building is suitably tied throughout, in accordance with current Building Regulations recommendations. Where cracking is already present, crack stitch repairs should be carried out using helical bar reinforcement to both internal and external wall faces.

- 5.11 Historic buildings often suffer from a lack of robustness as this was not a consideration at the time they were built. Robustness provides additional stiffness to the building to provide alternative load paths, redundancy, and provide resistance against accidental events. The building has been built with no continuity of columns between floors and no apparent direct connection between columns and beams.
- 5.12 As a 3-4 storey residential building, Building Regulations Approved Document A would classify the building as Class 2A and would require effective horizontal ties through the building. This can reasonably be provided by the floor structure being embedded within external walls and the introduction of additional strapping noted above. However, if the building was to be increased to 5-storeys by the addition of a mezzanine floor within the roof space, the building would be reclassified as Class 2B and careful consideration of robustness would be required to satisfy progressive and disproportionate collapse requirements. In any case, it would be prudent to consider this as part of a proposed change of use and carry out strengthening works as necessary. The introduction of these works requires further appraisal and design calculations and is beyond the scope of this report.
- 5.13 The fire performance of the existing structure requires further consideration alongside the input of the Architect and Fire Consultant. The structural floors would normally be expected to provide fire compartmentation between storeys whilst the supporting beams and columns are expected to achieve a minimum period of fire resistance in accordance with Building Regulations Approved Document B.
- 5.14 It is anticipated that the preferred method of achieving the required fire rating of the exposed cast-iron column will be to apply an intumescent coating to allow it to remain exposed, however sufficient space must be provided to allow expansion of the coating material and this could be problematic if the structure is hidden within new partition walls. It is assumed that the fire resistance of floors will be achieved via boarding which may need to be installed above and below the floors to achieve the required period of fire resistance from both sides.
- 5.15 In terms of loading from the proposed building use and the possible addition of a mezzanine floor within the roof space, it is anticipated that the loads imposed by the existing and previous use will exceed those imposed by the proposed residential use, and thus strengthening of floors, beams, columns, walls and foundations is unlikely to be necessary for this purpose. However, a load comparison should be carried out as part of any proposed redevelopment.
- 5.16 Whilst the building is Grade II listed and dispensation against Building Regulations requirements is permitted in some instances, this is not the case with Part A Structure and Part B Fire Performance, on the grounds of these being critical to life safety of the occupants. All necessary requirements will therefore need to be satisfied as part of the proposed change of use and redevelopment, to the satisfaction of the Building Inspector.

6.0 Conclusions and Recommendations

- 6.1 Brennan Consult Ltd was asked to carry out a structural inspection of 51-53 Richmond Street with a view to future redevelopment for residential occupancy.
- 6.2 A visual internal and external inspection was carried out and identified the building to generally be in a sound structural condition, however there is evidence of structural movement at roof level and to the west gable elevation.
- 6.3 Roof spread has pushed out the masonry piers to the second-floor front elevation and at least one of these may require locally rebuilding. As part of any proposed works, plan roof bracing should be installed to the front elevation to resist further roof spread and transfer lateral loads to the east and west gable walls.
- 6.4 Where cracking is evident, particularly due to the roof spread issues and due to a lack of restraint to the west gable wall, crack stitch repairs should be carried out using helical bar reinforcement so to reintroduce strength to the masonry wall panels.
- 6.5 Historic buildings generally suffer from a lack of restraint and it would be prudent to introduce strapping throughout the floors and roof in accordance with current Building Regulations requirements. This ensures all structural elements are suitably tied together and reduces the risk of further movement.
- 6.6 The building was generally dry, however there was evidence of previous water ingress and possible decay of timber elements where they were built into the external walls. It is recommended that a full timber and damp survey be carried out to confirm the extent of any decay. Any recommended repair works should be carried out as part of the proposed redevelopment. Works should also be carried out to prevent water ingress, including renewal of any rainwater goods and particularly diverting water away from the building at the rear alley where an overflow pipe and rainwater pipe discharge.
- 6.7 Consideration should be given to robustness in the design for any future change of use, especially if it is proposed to introduce an additional storey that would trigger a change in building classification from Class 2A to 2B. Historic buildings were not built with robustness in mind and there is a risk of disproportionate collapse due to a lack of continuity to the central cast-iron column through the full height of the building. Further appraisal and design calculations will be required as part of the proposed development and is beyond the scope of this report. In terms of loading, it is expected a load comparison will demonstrate there to be no increase in vertical loading resulting from the development, and thus no strengthening of floors, beams, walls, or foundations for this purpose.
- 6.8 Fire performance should also be taken into account and will require input from the fire consultant with respect to compartmentation and the required fire rating of the timber and cast-iron elements.
- 6.9 With regards the proposed narrow apartment building to be constructed to the west of 51-53 Richmond Street, the design of this should take due account of existing basement structures and the presence of air bricks to the east elevation of the adjoining development that would be closed off by any new building.