CHRIS BROWN STRUCTURAL ENGINEERING LTD

PROJECT: 14117

84 HATTON GARDEN

LONDON

EC1N 8JR

TITLE: BUILDING INVESTIGATION

MARCH 2016

CONTENTS

1. INTRODUCTION

1.1 INSTRUCTION

1.1.1 Chris Brown Structural Engineering Ltd was instructed to carry out a building survey of the existing property at 84 Hatton Garden, London, EC1N 8JR.

1.1.2 The purpose of the inspection was to investigate the nature of the existing construction and establish the live load allowance so advice could be given on redevelopment options. This report is titled 'Building Investigation' in accordance with the definition provided in the Institution of Structural Engineers publication "Guide to Surveys and Inspections of Buildings and Associated Structures", June 2008.

1.1.3 Localised opening-up works were undertaken to identify the composition of the existing foundations and upper floors.

1.2 INSPECTION

1.2.1 The inspection of the foundations took place on 15th August, 2014 and the opening-up of the upper floors were viewed on 26th August, 2014. An earlier visual inspection was made on 11th April, 2014.

1.2.2 The weather was dry at the time of all inspections.

1.2.3 During the interior inspection access was gained into all rooms except the third floor during the opening-up works and the exterior was viewed from ground level at front and rear.

1.3 BACKGROUND INFORMATION

1.3.1 The building forms part of a terrace on the west side of Hatton Garden. It comprises of a seven storey construction occupying the front of site with an adjoining two storey construction at the rear. This includes a basement and ground floor in both regions.

1.3.2 A commercial unit is located at ground floor in the front building whereas all remaining areas were previously used as offices and jewellery workshops.

1.3.3 All areas except the retail unit were vacant, however large safes were observed on the upper floors during the visit in April.

1.3.4 The arrangement of the floors in the seven storey construction was the same from 1st to 4th floor. The only difference on the 5th floor was the presence of a mansard roof at the front. Access was gained by a stair servicing all floors from ground to 5th floor. A separate stair was present leading to the basement.

1.4 PROPOSED DEVELOPMENT

1.4.1 The proposed development will comprise of the demolition of the entire site with the exception of the commercial unit at ground floor and basement below which are to be retained.

1.4.2 A new lift and stair core are to be construction in a similar position to the existing location.

1.4.3 Illustrations of the proposed alterations are shown on drawings prepared by Works Architecture.

1.5 LIMITATIONS

1.5.1 Where defects are not readily visible we cannot be held responsible for missing them. However, experience was applied to a building of this type and age to anticipate likely defects.

2. EXTERNAL OBSERVATIONS

2.1 FRONT ELEVATION

2.1.1 Observations from street level indicated either a render finish or cladding. All structural elements were covered so little could be established regarding the structural framing of the building.

2.1.2 No evidence was apparent of any movement or settlement in the building as no cracks were apparent.

2.2 REAR ELEVATIONS

2.2.1 The roof to the two storey building at the rear was covered with felt roofing so again nothing could be identified regarding the structural framing.

2.2.2 It was apparent that the external walls to the rear building were built inside of the party wall line. Other than a flashing detail it appeared that the walls were separate from the neighbouring buildings on either side.

2.2.3 The rear of the existing seven storey building was seen by accessing the flat roof at the rear through an open window.

2.2.4 The 1st to 4th floors were constructed using masonry with arch lintels above each window. However, the 5th floor was built using concrete lintels above the windows and the masonry was built using a stretcher bond. It is considered that the top floor was constructed at a later date to the rest of the building.

3. INTERNAL OBSERVATIONS

3.1 BASEMENT

3.1.1 A series of piers were seen on the side walls but a suspended ceiling obscured a view of any downstand beams.

3.1.2 No evidence of damp was apparent except for a localised area of staining in the centre of the floor. The cause of which is unknown.

3.2 UPPER FLOORS

3.2.1 A suspended ceiling and raised floors concealed the floor construction but was later investigated during the opening-up works.

3.3 ROOF

3.3.1 Observations on the roof revealed masonry construction with chimney stacks on the side adjacent to No. 85 Hatton Garden.

4. OPENING-UP WORKS

4.1 UPPER FLOORS

4.1.1 Floor finishes were removed in localised areas on every floor except the 3rd floor which was occupied at the time of the works.

4.1.2 Timber floorboards with a 1" thickness were observed at each floor spanning from side-to-side.

4.1.3 The floorboards were removed locally to reveal timber joists spanning from front-to-back with dimensions of 11" x 2" (275 x 50mm) and spaced typically at 13½" (350mm) intervals.

4.1.4 A series of steel beams were seen spanning from side-to-side which corresponded with masonry piers in the party walls. The dimensions of the I-section steel beams were 10 x 6" (250 deep x 160mm wide) at every location where exposed. In every case, the timber joists were built into the web of the beam resulting in a maximum timber joist span of 4.2m.

4.1.5 Each beam was built into masonry piers at each end and supported on a 50mm thick slate padstone.

4.1.6 The same detail was seen on the top floor which was considered to be constructed at a later date and also on the ceiling of the 2nd floor where the underside of the 3rd floor structure was exposed.

4.1.7 It was apparent from the investigation that the safes formerly located on the upper floors had been positioned above the steel beams.

4.2 BASEMENT

4.2.1 Excavations through the basement slab in the front building indicated a mass concrete slab of variable thickness ranging from 100 to 150mm.

4.2.2 On both sides of the building the party walls were constructed on a 300mm thick lean mix strip footing which included stepped corbelling on the side with No. 85. A minimum projection of 640mm was measured from the trial pit excavation.

4.2.3 A similar arrangement was apparent at the location of the chimney.

4.2.4 The strip footing had been broken out in the vicinity of the lift shaft. It seemed apparent the lift had been retrofitted to the building and constructed on its own dedicated slab at the base of the lift pit. The depth and extent of this slab was not exposed during these works.

4.2.5 The basement slab at the rear of the site comprised of a 40mm thick screed topping over a 350mm thick reinforced concrete slab.

4.2.6 The thickness of the slab appeared to remain constant in areas remote from the external walls suggesting that the slab had not been thickened around the perimeter.

4.2.7 Masonry was identified as the composition of the external walls.

4.2.8 In all instances it was apparent that the building was founded onto a sand/gravel material without any ground water present at the time of inspection.

5. LOAD ALLOWANCE ASSESSMENT

5.1 The exact age of construction is unknown but it is apparent that the building was built for office use. From a review of historic codes of practice the following load allowances have been determined.[1]

Dorman Long & Co Handbook	1895	80lb/sqft
Appleby's Handbook of Machinery	1903	70 to 80lb/sqft
London County Council	1909	100lb/sqft
Institution of Structural Engineers	1927	60lb/sqft
Institution of Structural Engineers	1933	50lb/sqft
BS449	1948	50lb/sqft (2.44kN/m^2)
CP3 Chapter V & subsequent codes	1952	2.50kN/m^2

5.2 From the above data a live load allowance of 2.5kN/m^2 has been taken for assessment purposes. A subsequent check of the existing timber joists with a span of 4.2m indicated adequate capacity for this load.

6. APPRAISAL OF PROPOSED WORKS

6.1 The building is to be converted to a hotel. Current codes of practice recommend a minimum live load allowance of 2.0kN/m^2 therefore the live load is reduced by 0.5kN/m^2 at every floor level.

6.2 Over the existing building height of five storeys above the ground floor this produces a spare allowance of 2.5kN/m^2.

6.3 It was assumed that the proposed roof top extension would be constructed using timber with steel beams in order to provide a lightweight construction. For the purpose of the load appraisal an allowance of 1.0kN/m^2 was assumed for the weight of the timbers joists, plywood flooring and plasterboard ceiling. A similar construction is assumed for the walls.

6.4 An assessment of the foundation load applied to the party walls was carried out for both the existing and proposed cases.

6.5 A net load increase of 4% was calculated due to the additional storeys so it is considered it can be accommodated without any remedial works. The majority of the load applied to the foundation is due to the self weight of the masonry of the party walls.

6.6 Existing floors are proposed to be rebuilt at revised levels. It is recommended to maintain the same arrangement of support at each floor level so that steel floor beams will be supported by the existing brick piers to maintain the same load regime. Loads applied by the proposed upper storeys should also be transferred onto the pier locations.

6.7 The existing steel beams are considered to act as props between the party walls. It is recommended that the beams should not be removed until the new floors are constructed.

6.8 It is estimated that 47 x 220dp Grade C24 floor joists will be required at 400c/c to achieve the span of 4.2m between steel beams. Each beam will span between party walls and the section required is either 254 x 102 x 28UB or a shallower, but heavier, 203 x 203 x 46UC.

6.9 It is recommended to construct an additional floor deck immediately above the current 1st floor level. This will be designed to a higher load allowance than hotel use so that it can be used as a crash deck during demolition and protect the commercial unit.

6.10 Blockwork units laid side-on to create a 215mm thick wall can be used to form the new

1. Bates, W. "Historic Structural Steelwork Handbook", BCSA Ltd, 4th Edition, April 1991

lift shaft. This will also provide support the landings at each floor level.

6.11 The capacity of the existing reinforced concrete basement slab at the rear of the site will need to be assessed to determine whether remedial works will be required to withstand two additional storeys.

1. Bates, W. “Historic Structural Steelwork Handbook”, BCSA Ltd, 4th Edition, April 1991

7. CONCLUSION

7.1 The site is currently occupied by a seven storey construction at the front and two storey building at the rear. Both buildings are linked at basement and ground floor level.

7.2 The form of construction of the existing upper floors comprises of timber joists supported by steel beams. The beams span between the party walls and are supported by a series of brick piers spaced along the length of the building. Investigations revealed that the same arrangement is repeated at each floor level.

7.3 The building was previously used as office accommodation and jewellery workshops. An appraisal of the existing joists indicated a capability to withstand a corresponding live load of 2.5kN/m^2.

7.4 Hotel live load allowance is 2.0kN/m^2. With the additional two storeys there is an increase in load applied to the foundation however, this has been estimated to be a 4% increase so it is small and can be accommodated without any remedial works.