Structural Survey

Phoenix House

Union Street, Sunderland, SR1 3BT

September 2014

Prepared By
Billinghurst George & Partners

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1.0 Introduction

Billinghurst George and Partners were appointed to undertake a full Structural Survey of Phoenix House, Sunderland.

Mr Akash Ghai from Greyson Properties requested that Billinghurst George & Partners undertake a Structural Survey of the property to investigate the condition of the structure and to prepare a report, recommending remedial action or other works deemed appropriate. Furthermore, we were requested to comment on the adequacy of the structure for conversion to residential accomodation, the adequacy of existing means of escape and the practicalities of merging the ground floor retail units.

The survey comprised of a visual inspection from ground level. We have not inspected any woodwork or other parts of the structure, which are covered, unexposed or inaccessible. Furthermore, no access was available to the roof or basement. We are therefore unable to report that any such part of the property is free from defect. At this stage, we have not undertaken any structural calculations in reaction to the stability of the existing structure. Our opinions expressed in this report are based on the findings of the visual inspection only.

The ground floor retail units were occupied at the time of our inspection. Floors 1 – 4 were vacant and part-furnished at the time of inspection.

Our comments on any causation of damage are based only on visual inspections that have been carried out at this stage and would be subject to review in the light of further information being made available at a later date.

The report shall be for the benefit of the addressee only. We accept no liability to any other party who may seek to rely upon the whole, or any part of this report.

Mr. J Mason BSc (hons) MRICS, Andy Gibson BEng (Hons), CEng, MIStructE and Neil Dawson BSc (Hons), ACIAT of Billinghurst George & Partners inspected the property on Thursday 04th September 2014. The weather at the time of our inspection was warm and dry.

2.0 Brief Description

The property is a five storey building constructed early 1970 which provides retail units on the ground floor/ basement and office accommodation above.

Fig 1 & 2:- Showing Elevations West (rear) and East (front)

The building appears to be constructed from a reinforced concrete frame. The external walls are constructed from a combination of traditional brick and block construction and curtain walling. The North West and South West corner of the building off-shoot from the main structure to accommodate the escape stairwells, herein known as north wing and south wing. Internally, the walls throughout are generally demountable partitions with the exception of masonry walls local to the north and south wing. The upper floors appear to be of reinforced in-situ concrete underlined with woodwool slab insulation.

The retail outlets are located on the ground floor and accessed via Union Street. Access to the 1st – 4th floors is via the principal entrance on the south wing, there is also a fire escape on north wing.

The property is situated in the heart of Sunderland's retail core fronting on to Union Street, the main link between the adjoining Bridges Shopping Centre and High Street West. The property is also directly opposite Sunderland Metro and rail station and a City Centre car park to the rear.

The topography of the land is generally flat.

3.0 Observations

3.1 Superstructure

3.1.1 Framework

Based on our findings of the visual inspection, it appears that the framing of the existing building comprises a cast in-situ concrete frame. The upper floor concrete slabs are supported from an arrangement of concrete columns which extend through the full height of the building. Typically the upper floor slabs on the elevation that face Union Street cantilever from a row of columns that are set back into the footprint of the building. The upper floor slabs transfer all vertical loading associated with its current use to the columns which in turn transfer the loads down to the foundations.

Located at each end of the structure, there are stair cores which rise through the full height of the building and during the visual inspection it was noted that the wall construction at these locations is solid masonry. It is considered that these have been designed as strong points within the structure and as such any horizontal loads acting on the building (from wind for example) will be transferred down to the substructure by way of the shear wall action of the cores.

Where inspected the frame appears to be in good condition with no evidence of any movement or corrosion to the reinforcement. Concrete is vulnerable to carbonation and although there is no evidence of this, it is not to say this is not occurring within the concrete. Carbonation is the formation of calcium carbonate by a chemical reaction in the concrete. Calcium carbonate neutralises the alkaline, which is currently acting as a protective coating to the reinforcement, therefore permitting corrosion of the reinforcement. The speed of carbonation is dependent on two parameter; porosity and moisture content of the concrete. It is our recommendation that chemical analysis of the concrete is undertaken to test for the presence of carbonation.

3.1.2 External Walls

The external walls are clad with a combination of masonry and uPVC curtain walling, both of which are built off the intermediate concrete floor slabs. In addition, there is also full height aluminium curtain wall local to the south wing stairwell. The masonry walls are approx. 330mm thick and comprise a brick outer leaf, cavity and block inner leaf with a plastered or dry lined finish. The brick work is bonded with a sand/ cement mortar and built off the intermediate concrete floors. Parts of the masonry have an exterior mosaic tile finish which is bonded to a mesh and masonry substrate. Window openings are supported with precast concrete lintels. The uPVC curtain walling is fixed to

the base and underside of the concrete floors. Internally, the curtain walling is lined with an inner leaf of masonry which has a plastered and paint finish.

Figure 3 & 4:- showing thermal movement cracks to masonry

Our survey revealed a hairline diagonal crack local to the left side of the south facing window of the north wing, 3rd floor (see fig. 3). Also, a hair line diagonal crack local to the left side of the door head on the north wing, rear elevation (see fig. 4). We consider the cracks have been caused as a result of thermal movement. This occurs as the brickwork expands and contracts in conjunction with variations in external temperatures. Figure 3 has captured sunlight to one side of the brickwork, this is causing contrasting temperatures in the brickwork which causes the brickwork to expand and contract at different rates.

Thermal movement as described above would not normally be considered a significant structural issue. The cracked brickwork can be cut out and replaced along with re-pointing the affected mortar joints accordingly.

Figure 5 & 6:- showing horizontal cracking to mosaic panels on south wing and south elevation

Horizontal cracks were noted through the mosaic panel's local to the south elevation and south wing (see fig. 5 & 6). The fractures typically run through the intermediate floor junction spanning horizontally across the masonry, approximately 3mm wide. There are also further cracks which run approximately 500mm parallel the immediate floor junctions. The nature of these cracks is consistent on floors 1 – 4.

Figure. 7:- showing typical nature of cracking local to inner leaf on west elevation

Hairline horizontal cracks were also noted on the inner leaf of masonry local to the west elevation (see fig. 7). The size and location of these cracks are consistent on floors 1 – 4.

We consider the horizontal cracking noted both externally and internally are associated with wind load deflection due to a lack of top edge restraint to the masonry. The extent of horizontal cracking, being local to the west and south of the building, is due to high exposure to prevailing winds. The east and north elevations are more sheltered from wind load and hence do not appear to have been affected by wind deflection. It is our recommendation that the provision of adequate head restraint is made during the refurbishment works. This can be achieved by spanning steel members across column locations situated above the masonry. BGP can provide details and calculations for this provision under separate instruction.

3.2 Internal

3.2.1 Internal Walls

Internal walls on floors 1 – 4 typically comprise demountable partitions (see fig. 8), with the exception of masonry walls which are local to the north and south stairwell. The demountable partitions are non-loading bearing and we presume are fixed to the concrete floor/ underside of ceiling.


Figure. 8 & 9:- showing typical internal partition present on floors 1-4

The masonry walls local to the north and south stairwell have a paper finish. The presence of wall finishes limited our inspection of the structure.

A diagonal fracture was identified local to the half landing, second floor of the north stairwell (see fig. 10). The crack is hairline in nature and runs diagonally across the wall from right to left. In addition, a similar crack in size and nature, was identified on the third floor half landing and also on the fourth floor, south wing (see fig. 10). We consider the cracks to be non-structural and caused as a result of failure in the plaster.


Figure 10 & 11:- showing diagonal cracks local to north and south stairwell

3.2.2 Floors

The floors throughout comprise reinforced concrete slab, approximately 225mm thick. The floors are underlined with a woodwool slab insulation and suspended ceiling. The presence of floor/ ceiling finishes limited our inspection of the floor structure.

Our survey revealed a local area of depression on the second floor; a 2-3mm fracture in the floor slab runs between columns at the location where the building cantilevers along the front elevation (see fig. 12 & 13). We are uncertain as to the cause of this and it is our recommendation that further investigation is carried out to confirm a diagnosis. It is possible that the depression has occurred in the screed and not the floor structure. We would recommend core samples are taken of the concrete floor in this location to confirm the floors construction.

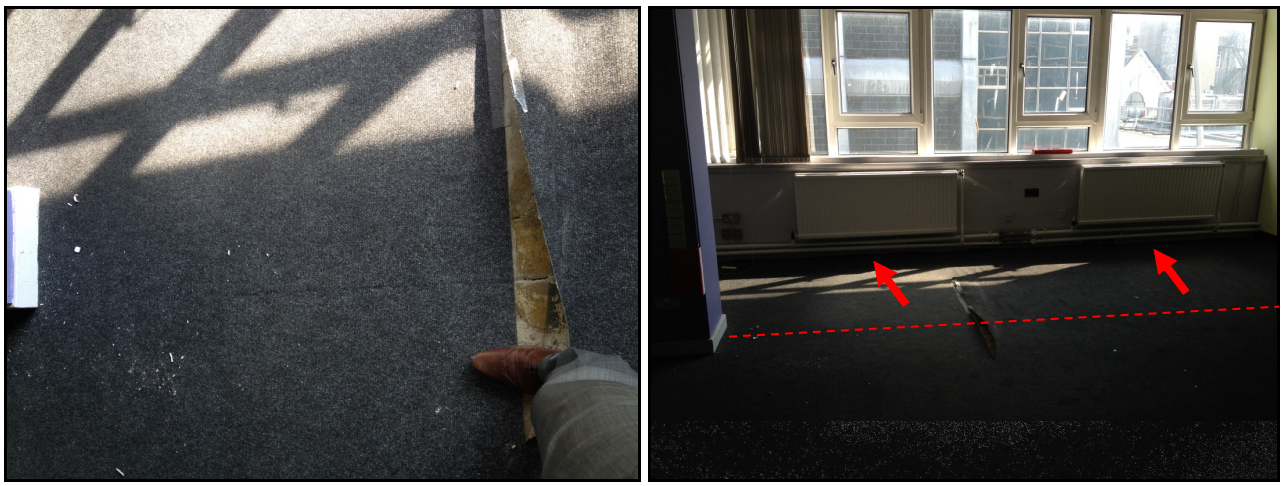

Figure 12 & 13 :- showing fracture and direction of slope to floor slab

4.0 Suitability for Change of Use

It is understood that the proposed redevelopment of the building will involve a change of use from commercial office / retail premises to residential accommodation. It is considered that the lightweight partitions noted on most of the upper floors are not contributing to the stability of the building and as such can be removed to suit the revised layout. Based on accepted design guidance, office loading would subject a floor plate to a typical imposed load of 2.5 kN/m2, whereas typically a load of 1.5kN/m2 is adopted for residential use. On this basis, the change of use would result in a slight reduction to the current occupancy loads and on this basis would be a structurally acceptable change.

5.0 Ground Floor Retail Outlets

A very brief inspection of the ground floor retail outlet was made at the time of our survey to assess the practicalities of merging the ground floor units.

Our survey revealed that the existing dividing walls comprise of stud partitioning and as such are not considered to be a load bearing component. As such, the existing dividing walls between the existing units can be demolished as necessary however, all existing concrete columns must remain in-situ.

6.0 Fire Safety – Means of Escape

Statutory Instrument: The Building Regulations 2010, Schedule 1, Approved Document B (2006 edition, incorporating 2007, 2010 & 2013 amendments).

Requirement referred to: Requirement B1, Means of Warning and Escape.

The existing building comprises 5 storeys of accommodation with the ground floor made up of individual retail units with their own staff and public access and egress provision. These units are not covered by this section of the report.

6.1 Existing Conditions – Layout

The upper storeys comprise previous office accommodation with access and egress located in 2No positions to the rear of the property from Prince Street and South Street. These are located at the northern and southern ends of the building and directly access their own staircases that provide vertical circulation to all floors. The location of the existing staircases and final exits, ensure that alternative means of escape from the upper storeys is provided throughout. Figure 1A illustrates the existing stair enclosures (green) and their final external exits to Prince Street (northern stair) and South Street (southern stair).

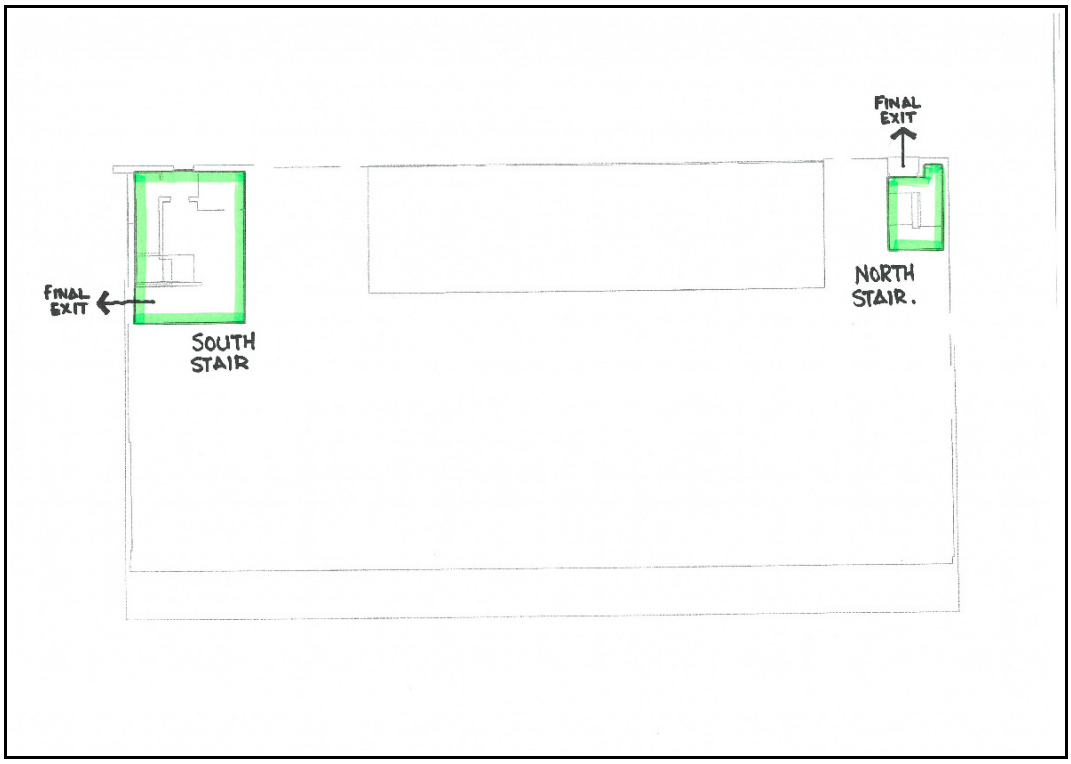

Figure 14 :- Ground Floor Stair Enclosures

6.2 Existing Conditions – Construction

As the intended building use is residential, the existing floors will be classed as compartment floors needing to provide a minimum of 60 minutes fire protection (loadbearing capacity, integrity and insulation). The existing concrete frame and floors will likely satisfy this requirement.

As the existing staircases extend from ground floor up to 4th floor, passing through the individual compartment floors between, the stair enclosure will be classed as a protected shaft and will need the relevant fire protection that this classification brings.

The existing staircases are set within existing masonry wall enclosures which when used with new appropriately specified fire doors, will ensure sufficient separation for them to be considered as satisfactory enclosures to the protected shafts, providing the required minimum 30 minute fire protection.

Note that to ensure the continuity of fire protection to the protected shaft is maintained, consideration should be given to the existing junctions of walls and floors.

Where direct access from the stair enclosure is provided to areas of increased fire risk (e.g. plant rooms, electrical cupboards, etc), then these should be separated from the stair enclosure by means of lockable, appropriately specified fire doors providing the required minimum 60 minutes fire protection.

Figure 15 illustrates a typical proposed upper floor layout, illustrating the existing masonry stair enclosures (blue), required 30 minute rated fire doors (yellow) and 60 minute rated fire doors (pink).

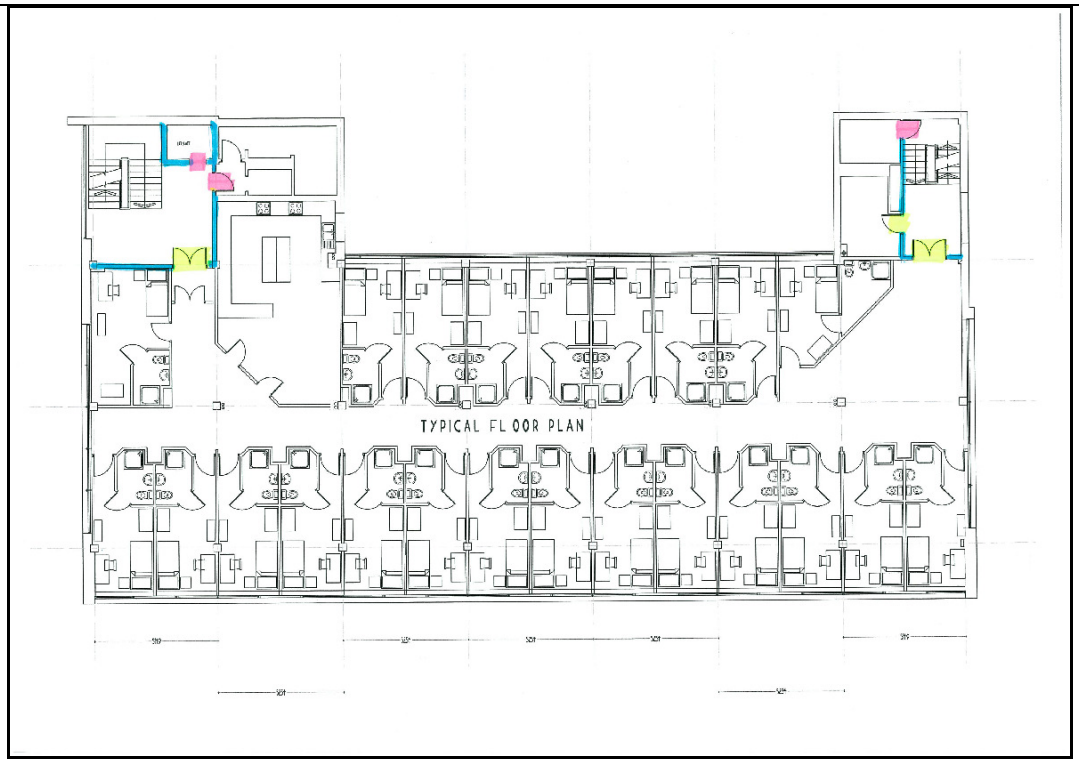

Figure 15:- Stair Enclosures Fire Rating

6.3 Proposed Layout

As the intended building use is residential, the proposed walls separating accommodation from corridors will need to be classed as compartment walls needing to provide a minimum of 60 minutes fire protection (loadbearing capacity, integrity and insulation). In addition, walls separating individual accommodation spaces will also be classed as compartment walls. The construction of these walls and the doors set within them will need to be appropriately specified to achieve this.

To restrict the potential passage of smoke throughout the building, corridors in excess of 12m long to each floor should be sub-divided by appropriately specified fire doors to achieve a minimum of 30 minutes fire protection. These doors should be positioned to avoid compromising the route of escape from the individual accommodation spaces. In addition, all concealed spaces (i.e. suspended ceiling voids) should also be sub-divided to ensure the maximum dimension in any one direction is no greater than 20m.

Figure 16 illustrates a typical proposed upper floor layout, illustrating the locations of proposed compartment walls (purple) and possible corridor sub-division (green).

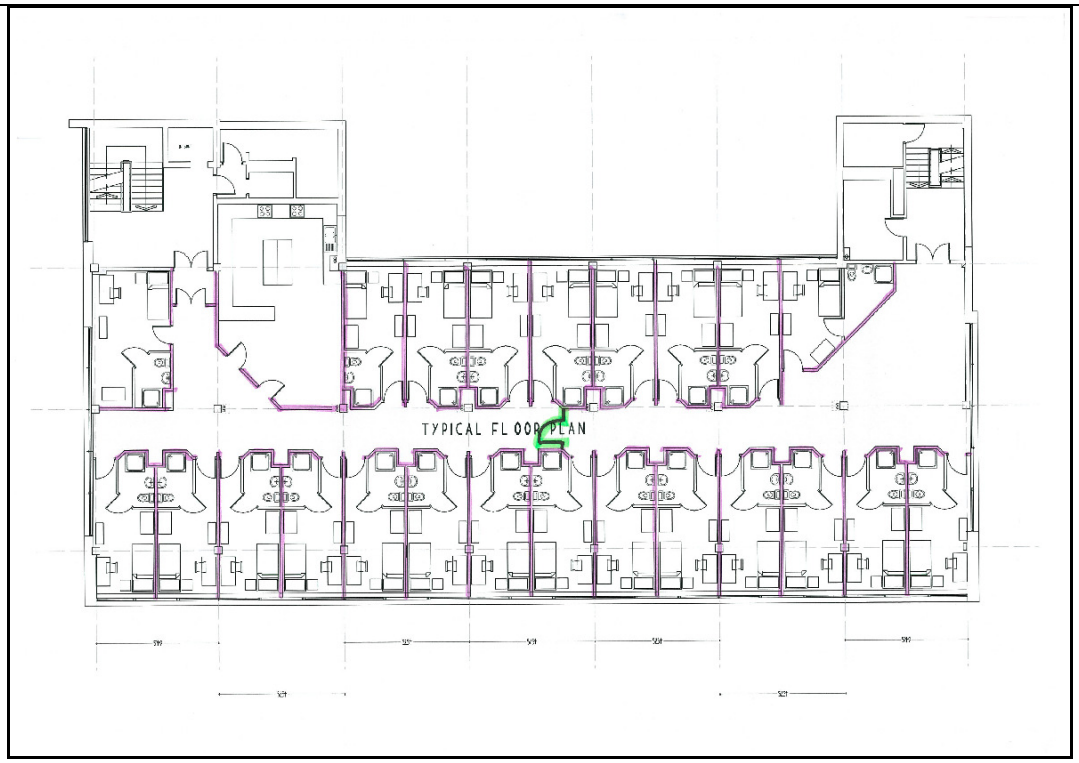

Figure 16:- Proposed Compartment Walls

6.4 Proposed Layout – Fire Alarm and Detection

All individual accommodation and communal areas will need to be provided with appropriately specified mains operated, fire alarm and detection systems in accordance with the recommendations of BS 5839: Fire Detection and Alarm Systems for Buildings..

6.5 General

In addition to the items illustrated on Figures 14 to 16 above, compliance with the Building Regulations 2010, will only be satisfied with recognition of Requirements B2 – B5 of Approved Document B, which this report does not cover.

7.0 Access to and Use of Buildings

Statutory Instrument: The Building Regulations 2010, Schedule 1, Approved Document M (2004 edition, incorporating 2010 & 2013 amendments).

Requirement referred to: Requirement M1, Access and use (section 1-5: Buildings Other Than Dwellings).

The existing building comprises 5 storeys of accommodation with the ground floor made up of individual retail units with their own staff and public access and egress provision. These units are not covered by this section of the report.

7.1 Existing Conditions - Layout

The upper storeys comprise previous office accommodation with access located in 2No positions to the rear of the property from Prince Street and South Street. These are located at the northern and southern ends of the building and directly access their own staircases that provide vertical circulation to all floors.

Both existing access positions comprise a single step up from the public highway of approximately 150mm. Such is the relationship of the entrance locations to the public highway, modification of these areas is regarded as being difficult.

The southern stairwell incorporates an existing lift shaft which continues from ground floor up to 4th floor and incorporates an enclosed motor room to the roof.

Figure 17 illustrates the existing stair enclosures (green), their external entrances to Prince Street (northern stair) and South Street (southern stair) and the position of existing lift shaft (pink).

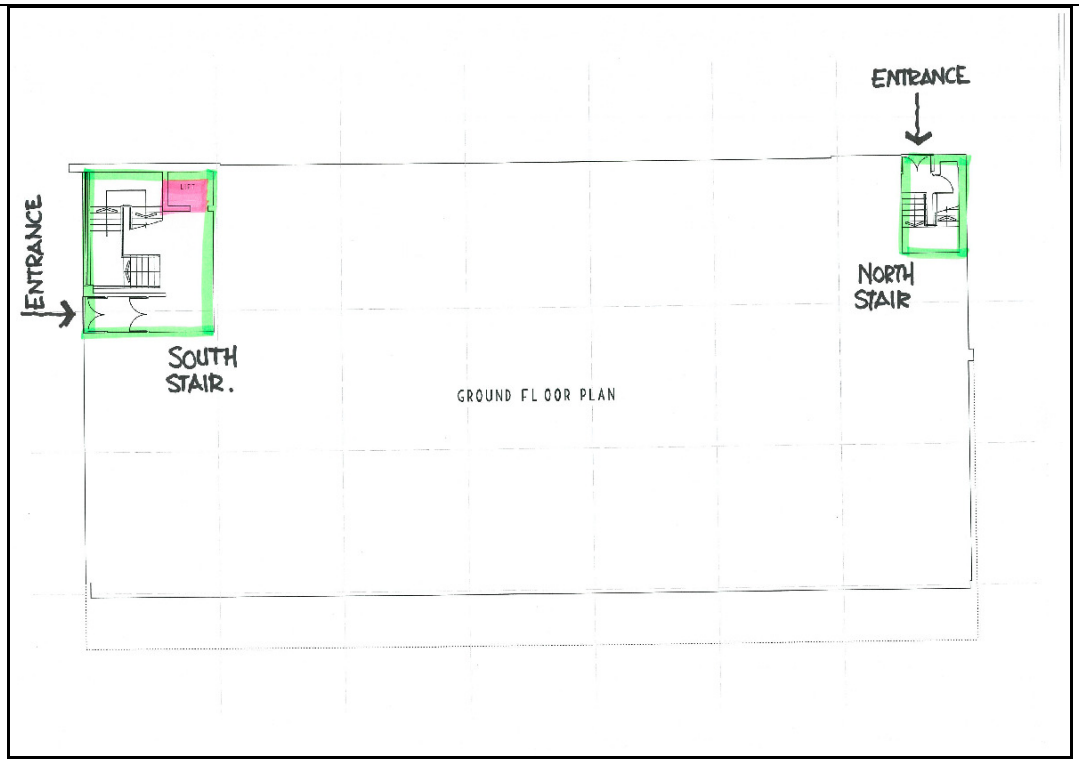

Figure 17 – Existing Entrance Areas

7.2 Proposed Access to Building

The current arrangements for access to the building are not in accordance with the requirements of Approved Document M in that ramped access is not available, weather protection to manual entrance doors is not provided and stepped access comprises a prohibited single step only. Building Control will normally take into consideration the difficulties associated with existing building alterations and so early dialogue with them is recommended to establish their requirements, however consideration to accommodating some form of remedial works (i.e. ramped access and weather protection) to the southern entrance is suggested. Figure 18 illustrates the area most likely for such remedial works to be accommodated (orange hatching).

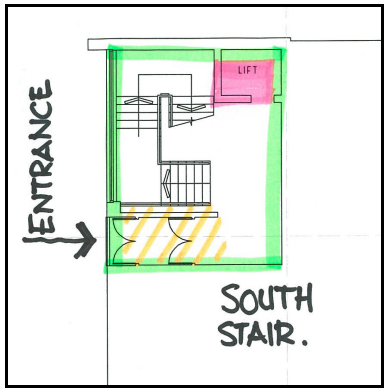

Figure 18 – Position of Entrance Remedial Works

7.3 Vertical Circulation

The existing building contains an existing lift shaft to the southern stairwell approximately 1.5m deep x 2.0m wide. In order to satisfy the requirement of Approved Document B, a lifting device must be accommodated to provide access to all storeys. The preferred solution to this requirement is to provide a passenger lift, however in existing buildings some concession is granted such that a platform lift is deemed acceptable where conditions dictate that a passenger lift cannot be reasonably accommodated.

The existing lift shaft is regarded as being sufficient to accommodate a typical platform type lift, however would likely require significant modification to accommodate the depth required for a typical full passenger lift. Again, early dialogue with Building Control is recommended to establish their requirements.

7.4 General

Note that this section of the report has only considered issues in connection with access to, and vertical circulation of the building. In addition to the items illustrated above in Figures 17 & 18 above, compliance with the Building Regulations 2010, will only be satisfied with recognition of the other requirements of Sections 1 – 5 of Approved Document M, which this report does not cover.

8.0 Conclusions & Recommendations

Where inspected, the structure appears to be in good condition. However, as a detailed inspection of the concrete frame was not possible, it is recommended that a more detailed examination of the frame is undertaken once the internal finishes have been removed. It is possible that some intrusive testing may be required to confirm the current condition of the concrete.

Based on our initial findings it would appear as though the proposed change of use from office to residential is structurally acceptable. Furthermore, it is considered that the lightweight partitions noted on most of the upper floors are not contributing to the stability of the building and as such can be removed to suit the revised layout.

The existing lift shaft is regarded as being sufficient to accommodate a typical platform type lift, however would likely require significant modification to accommodate the depth required for a typical full passenger lift. Early dialogue with Building Control is recommended to establish their requirements.

We have summarised a list of recommendations tabled below which should be address with the more cyclical items noted in the body of this report.

Item Description	**Budget Cost**
Given the age of the property is very likely that asbestos material will have been used during the construction of this property. Prior to undertaking any remedial works we would urge you to carry out a Refurbishment/ Demolition Asbestos Survey. Any asbestos removal works should be carried out by a licensed contractor in compliance with the Control of Asbestos Regulations 2012	
Carry out chemical analysis of concrete to test for presence of Carbonation and also Chloride content	£2,000.00
Core sample of 2nd floor concrete slab to determine thickness of screed and floor construction	1,500.00

We trust that we have correctly interpreted your instructions and have accurately reported on this property; however, should you require any further clarification of any details, please do not hesitate to us.

Report prepared by: -

Jonathan Mason **BSc (Hons) MRICS**
Chartered Building Surveyor
For and on Behalf of Billinghurst George & Partners
September 2014