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STRUCTURAL ENGINEERING SURVEY	Date:	8 Dec 2017
	Our Reference:	A1759(D)

SURVEY AT:	21 Newton St (Cheetwood House), Manchester M1 1FY
CLIENT:	Beech Construction Partnership Ltd
IN RESPECT OF:	Further Stair Structure Survey



Graham Jones Associates Ltd
Company No. 4661158 VAT Reg No: 787 2314 07

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of Structural
Engineers*

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Survey at:	21 Newton St (Cheetwood House), Manchester M1 1FY
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Date of Survey:	5 th December 2017
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Statement:	Following identifying potential issues with the two main stair structures at Cheetwood House during an original survey carried out by Graham Jones Associates in March 2016, a further inspection was carried out by Matt Pimbley of Graham Jones Associates to re-inspect the stairs structures. <i>A follow-on inspection was carried out in December 2017, once existing structure had been exposed, following comments by the Local Authority in regards to the previously recommended remedial solutions. Results and suggested solutions have been added as an addendum to this report in the section titled, Suggested Remedial Works.</i>
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Inspection:

Rear Stairs

Photos 1 to 5 in Appendix A show the rear stairs.

The majority of the steps throughout the rear staircase were found to be out of level and to have dipped inwards, in line with the central spiral of the stair structure. The stairs are of timber construction and to the mid-level the steps wind around completely, from the first flight up to the second flight (see Photos 1 to 3).

The construction of the stairs is likely to have been carried out by a carpenter or joiner at site with little thought to the continuity of loading paths and support. The steps are likely sat on a series of individual timbers that are in some way connected to each other. As the stair case is of an age prior to the use of steel in such structural elements, the shape of the stairs and the movement noted, suggests the timber construction has likely only lasted by all the elements and connections working together. The movement noted suggests the structure is coming towards the end of its safe working lifespan.

Central Stairs

Some cracking was noted to the soffit of the stairs structure around mid-landing level.

The stairs were also felt to have dropped in level to the internal corner at this area.

Due to the age of the property, again the construction is likely to be timber. It is likely there will be cantilevering timber members at the mid-landing level. Which will support the main structural timbers of the stairs.

It is likely the cantilever timbers have deflected over time and caused the dipping seen. Inspection in to the connection of all members should be carried out to determine.

It is possible the lift structure that has been installed at a later date, is in some way providing a small element of support to the stairs, although this should not be relied upon (Photo 7).

Conclusions:

Rear Stairs

In its current state, the rear stairs pose an unsafe environment to users, partly due to their unevenness and out of level, but also due to the cracking noted towards the central winder areas. It is unknown how the structure has been affected and it is unlikely the stairs will be capable of the 3.0 kN/m² required of a communal residential stair.

It is likely the construction is still standing because the individual elements are working together (steps, handrail, stringers, etc.) to hold the stairs together.

Central Stairs

There has been some movement to the main stairs, which have dipped towards the mid-landing internal corner. This has likely occurred due to the timber cantilever support in this area deflecting over time. The supports should be exposed for inspection.

Recommendations:

Rear Stairs

The stairs require some form of remedial supports or complete replacement.

It will be difficult to provide remedial support to the existing stairs without compromising its existing look. The only structural elements in the stairwell, to provide any kind of support, are the masonry wall to the back and the structural beams to the landing level. Therefore, the support would likely have to be in the form of cranked steel members, which due to the shape of the stairs will likely be on view under (although these could be boxed in) but these may also have an effect on head height.

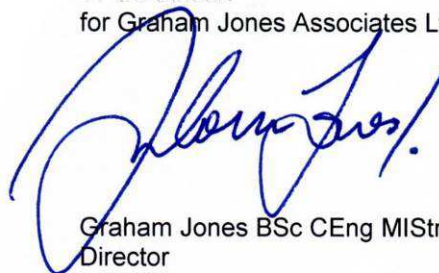
Another possibility would to add central columns through the full height of the stairs with members spanning off these to support the winders. Again, these supports may be on show under the existing.

It may be more appropriate to replicate the stairs with a more suitable and safer structure. These could be created in cranked or shaped steel encased in timber with similar finishes to the existing.

Central Stairs

It is recommended some additional steel support is introduced to the half landings, in the form of cantilevered members extending from the large internal masonry walls. These could be positioned in a way to be concealed within the half landing structure, some temporary support would be required to achieve this.

for Graham Jones Associates Ltd



Graham Jones BSc CEng MStructE MICE
Director

ADDENDUM - Suggested Remedial Works:

Proposals

Both the rear and central stairs require some form of remedial support to enable the retention of the existing stair structures. The following are suggestions to improve the structural safety for each:

Rear Stairs

Exposure of the existing structure has revealed the original stairs have poor positive support under. No continual supporting elements were found, only a series of cut individual members. Given this it is obviously why there has been so much structural displacement.

It is recommended the rear stairs are supported directly under the two main supporting beams that sit under the pitched steps, see notes below.

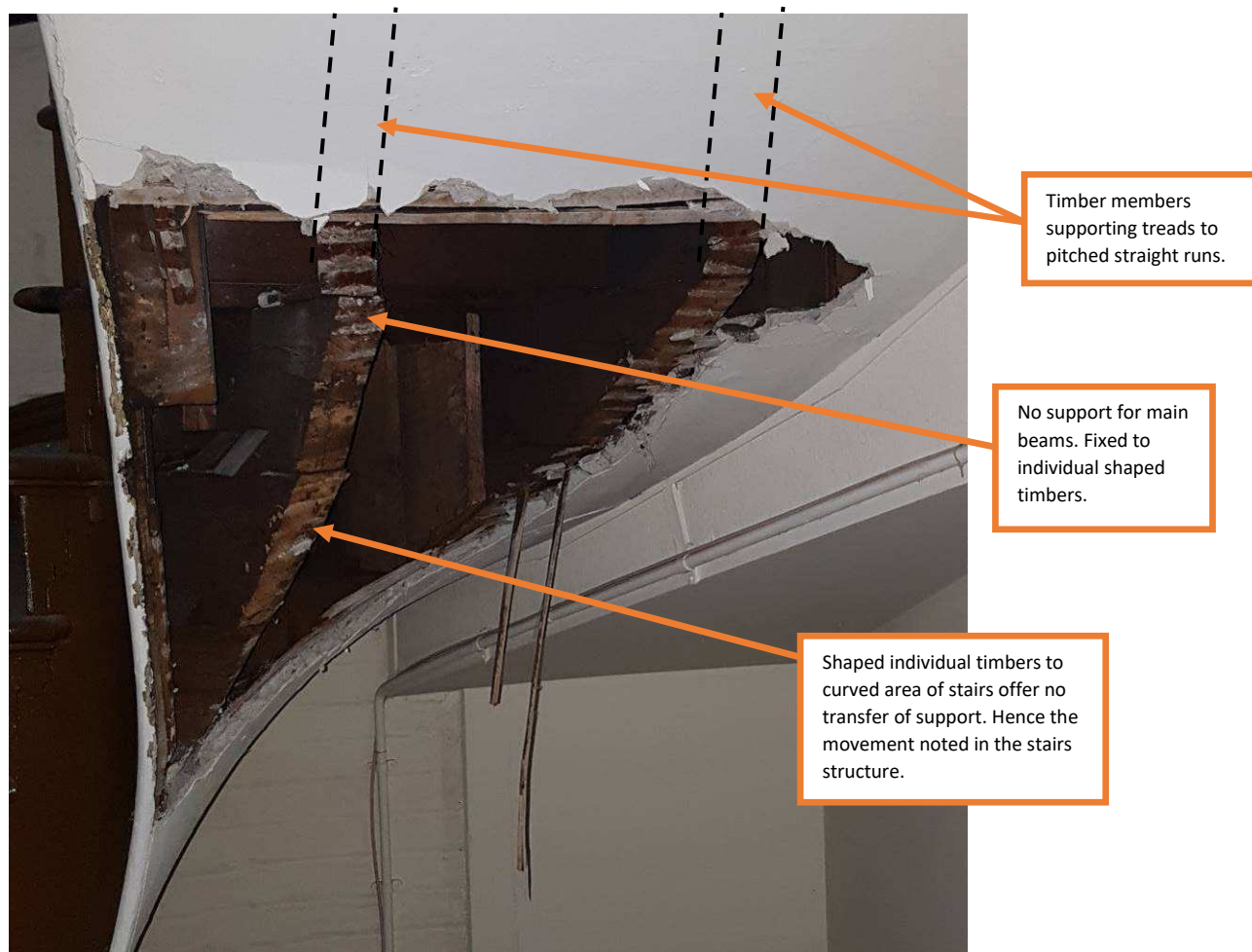


Image 1 – Existing Structure.

It is understood from consultation with the Local Planning Authority that introducing a central post to add support to the existing stair construction is to be avoided.

It will also not be possible to achieve a concealed cantilever support, as suggested for the main stairs (see Central Stairs proposal below). The shape and construction of the individual supporting members does not allow for concealed supports to be introduced under the plastered finish, there is also limited structure to

extend supports from. As shown below, the only supporting elements are the rear wall (side walls are non-load bearing partitions) and the floor beams to the landing areas.

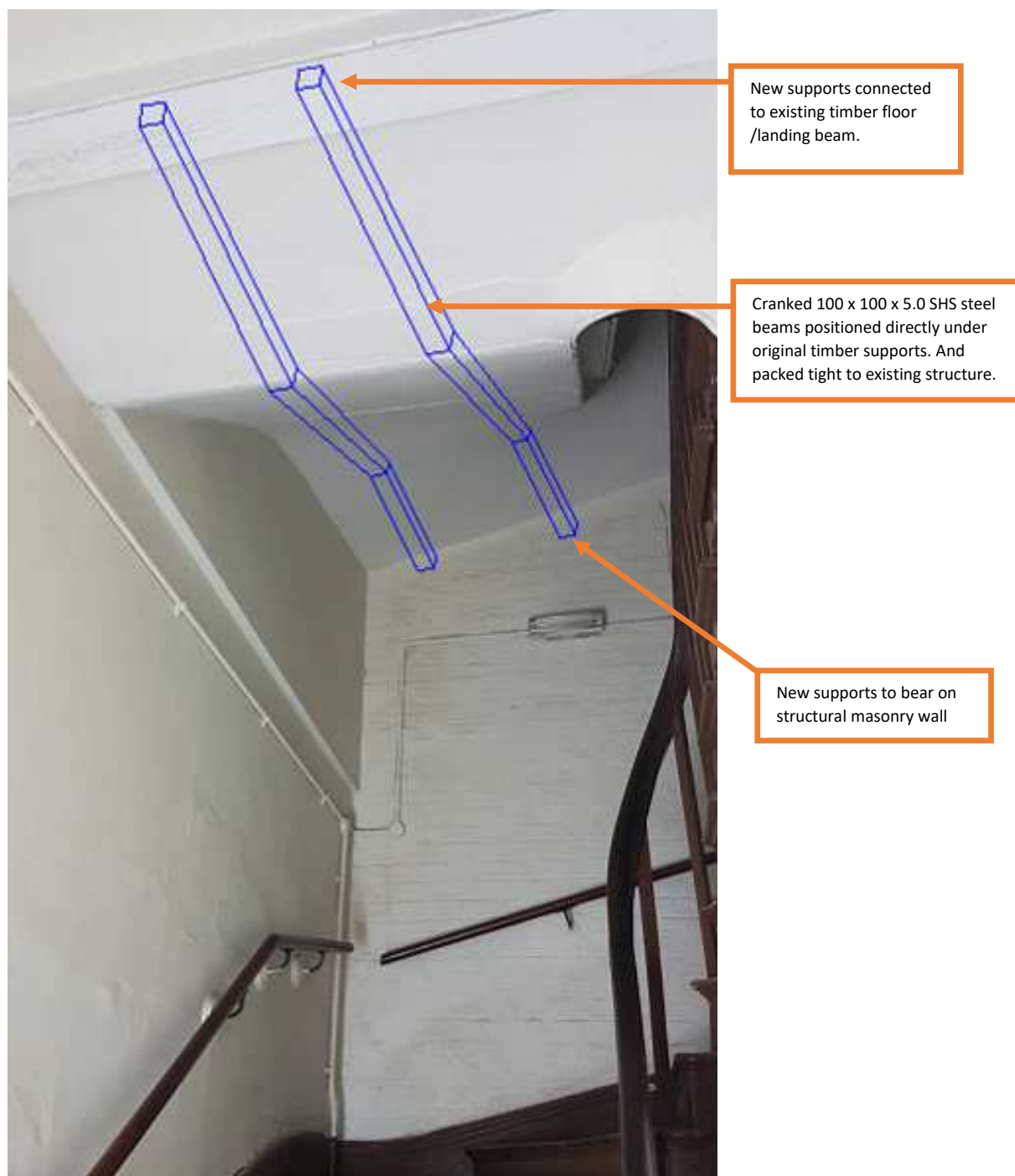


Image 2 – Remedial works to first rise of each flight.



Cranked 100 x 100 x 5.0 SHS steel beams positioned directly under original timber supports. And packed tight to existing structure.

Wall will require building to infill existing partition throughout full height of stairwell

Image 3 – Remedial works to second rise of each flight.

Central Stairs

The central stairs are generally set over two flights between each floor, with a central half landing. Under each flight there are two main supporting timbers, which at floor level appear to be supported by the main floor structure. The half landing locations have been formed by original cantilever timber beams extending from internal load bearing masonry walls, see below. It appears these members have rotated and deflected over time. The bearings have likely also shrunk or crushed to add to the movement. It would be difficult to replace these existing cantilever timbers and it would not be advisable to replace with new timber members, as the issues that have occurred to date will be difficult to prevent from occurring again in the future. The bearing pressure induced at the supports due to the cantilever of the timbers would be significant and would not be suited to an interaction between timber and masonry.

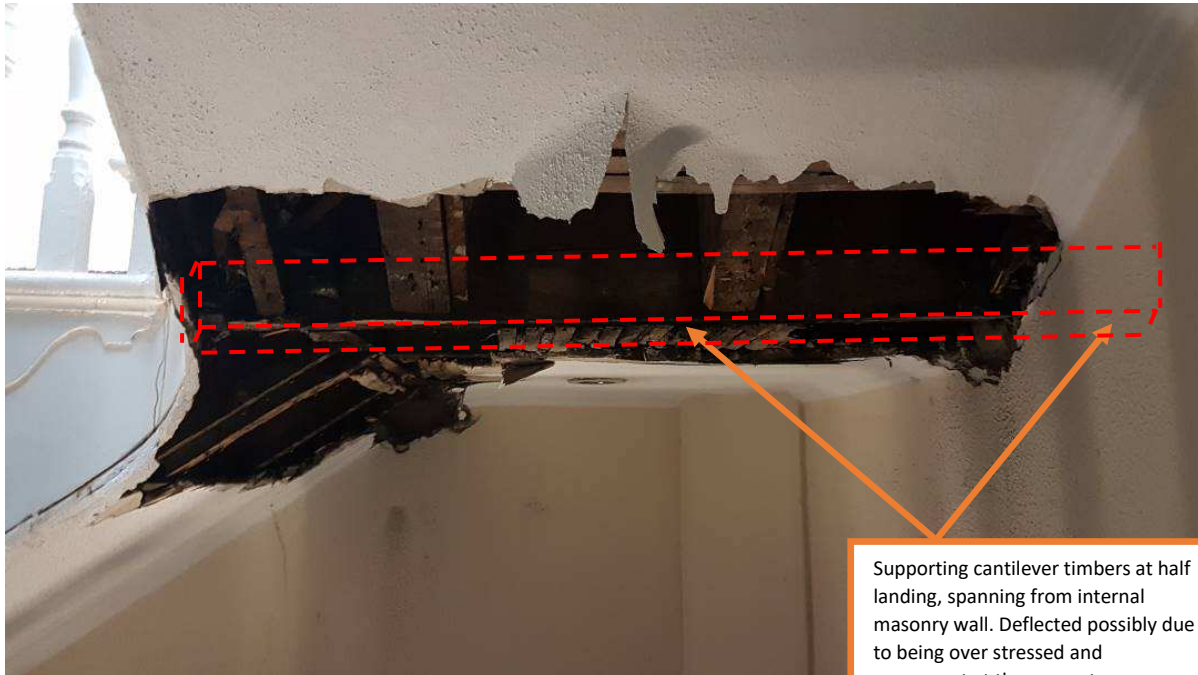


Image 4 – Existing Supporting cantilevered half landing.



Image 5 – Existing Supporting cantilevered half landing.

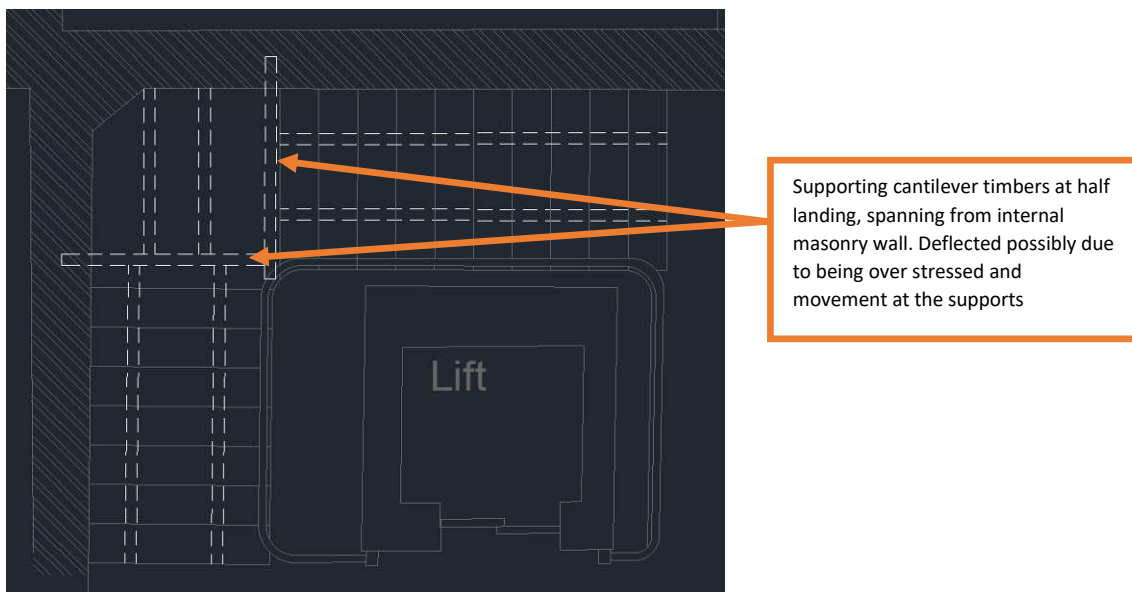


Image 6 – Existing Supporting members.

Steels installed completely through existing masonry walls and fully fixed to prevent any rotation of cantilever.



Image 7 – Proposed concealed remedial steel members.

The lower flights between ground floor and 1st floor appears to be reasonably sound but may require some additional support to the edge of the low landing and under the return. Further exposure and investigation may be required whilst works are carried out.



Image 8 – Ground to first floor stairs.

Terms and Conditions:

1. Our inspections are visual inspections only of those areas specifically identified within this report.
2. No opening up of any decoration or finishes was carried out to uncover structural elements.
3. No trial holes were excavated to determine ground conditions, foundation details or the condition of underground drainage etc.
4. No checks for dampness were carried out nor did we check any part of the building for decay or infestation.
5. No checks were made on any parts of the building which were covered or otherwise not readily accessible.
6. This report only carries responsibility for those aspects of the building specifically reported upon and no liability is accepted for any other matters.
7. This report is for the benefit of the Client only and may not be re-assigned to any third party without agreement.

APPENDIX A – PHOTOS

PHOTO 1:

Rear stairs with mid-winders



PHOTO 2:

Rear stairs with mid-winders

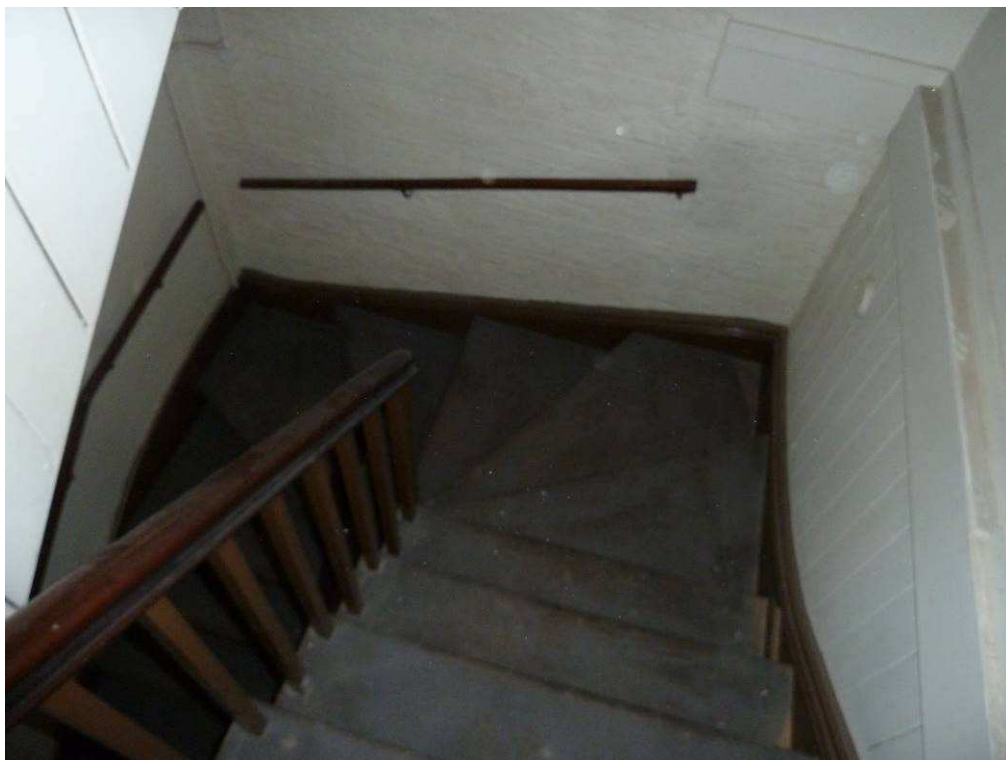


PHOTO 3:

Rear stairs with mid-winders



PHOTO 4:

Cracking to a number of areas, particularly to winder areas.

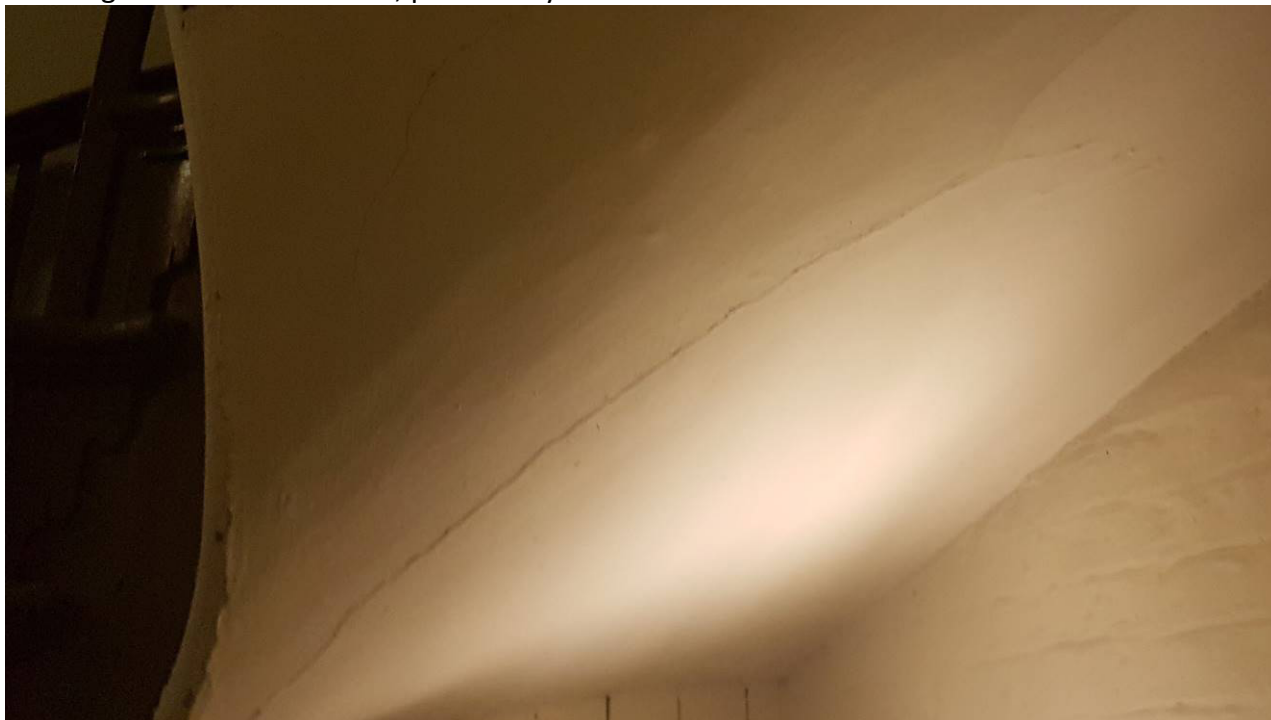


PHOTO 5:

Beam to landing areas

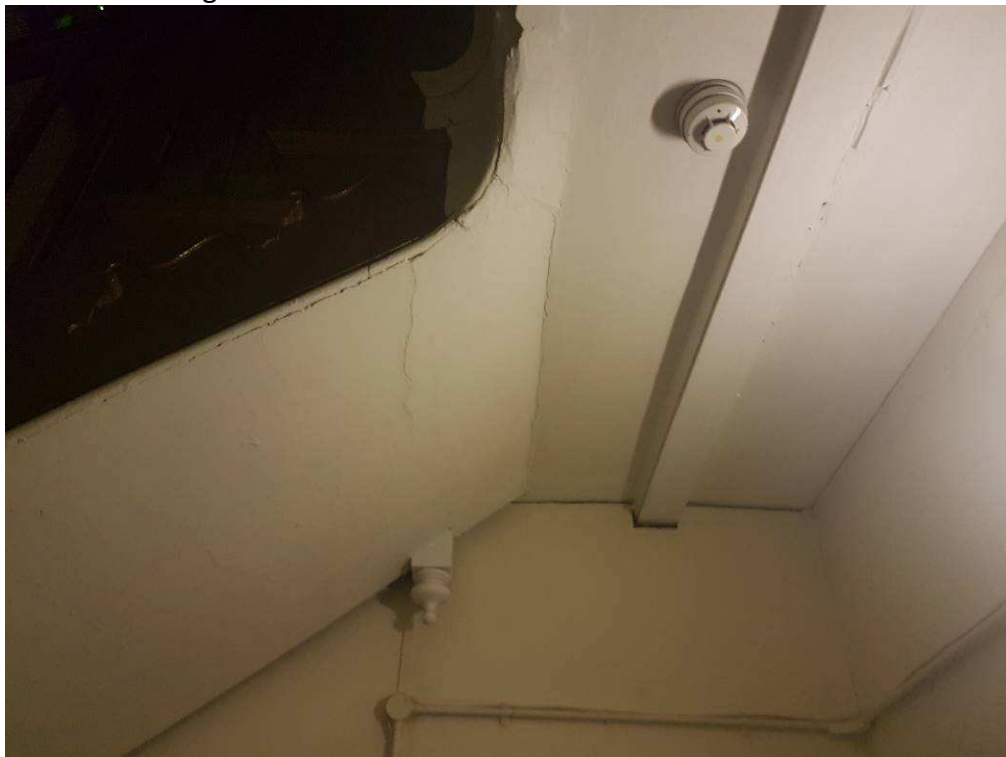


PHOTO 6:

Main internal stairs, with lift structure to central area

