Britania

High Level & Specialist Access Solutions



Inspection of the Undergraduate Building Roof at

Manchester Royal infirmary

November 2021

For

Hebs

4-6 St. Johns Road, Waterloo

Liverpool

L22 9QG

Prepared by:

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1. Introduction:

1.1 High Access Solutions were requested to attend site on 25th November to carry out a visual structural inspection of the roof with reference to commenting on the following items.

1.1.1 The overall condition of the roof and to identify missing or damaged tiles and document their location.

1.1.2 The overall condition and integrity of the parapet walls and coping stones.

1.1.3 The overall condition of the valley gutters.

To carry out this work, the use of traditional rope access was used to navigate the roof area.

2. Brief description of the roof:

The roof is pitched and of equal proportions on both sides finished with traditional slate tiles. At the ridge of the roof there is a central ornate Cupola constructed from timber and at the far end of the roof extending from the ridge there are rows of roof lights on each side of the pitch. At low level the roof has been retrofitted with PVC ventilation ports.

The accumulation of rain water is dispersed via a lead valley gutter serviced by pre-formed outlets *(3No. each side)* set at the base of the brick-built parapet wall. The parapet wall is then terminated with uniformed sized coping stones which now retains PVC covered lightning protection tapes.



West Side Elevation



East Side Elevation

3. Observations

3.1 Roof tiles

Considering the age of the tiles the overall external condition of the tiles appears satisfactory, however there a several locations where common defects are apparent largely consisting of tiles that are damaged, slipped or have failed. With regards to the fixing of the tiles, as no tiles were removed, we cannot comment on the integrity of the fixings, however the current condition of the roof gives the impression that it is suitably consolidated. In a few locations obvious past repairs are apparent and crude straps have been used instead of aesthetically preferred nail hooks.

Defective tiles -West Elevation.

Distance from front elevation	Row of tiles from the gutter
1m	3rd row
4m	3rd row
21m	1st row
22m	1st row
25.6m	1st row

Defective tiles -East Elevation.

Distance from front elevation	Row of tiles from the gutter
1.1m	5th row
1.7m	9th row
3.7m	2nd row
4.2m	3rd row
4.2m	6th row
5.8m	1st row
15.3m	2nd row
20.4m	1st row
22m	6th row
23m	5th row
23.5m	1st row

A selection of Photographs showing typical defective roof tiles



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3.2 Parapet wall & inner gable ends

The parapet wall is an extension of the facia and the gable ends are similar both capped off with uniformed sized coping stones bedded with mortar on to the associated brick work. In general, both parapets are of a reasonable condition, however there are several issues relating to the coping stones. In a couple of locations there are notable fractures through the width of the stones and on the West side a segment of 1No. stone is splitting off and detaching on the inner face. In most locations, the mortar joints between the stones are perished and some past repairs in the form of silicone sealant have all failed. As a result of mortar failure, several areas exist where vegetation is now present and on the West elevation a tree is firmly rooted in place. On the underside of the coping stones and where the lead gutter is chased into the brick facia the mortar has failed in several locations.

A selection of Photographs showing typical defectives

relating to parapet coping stones

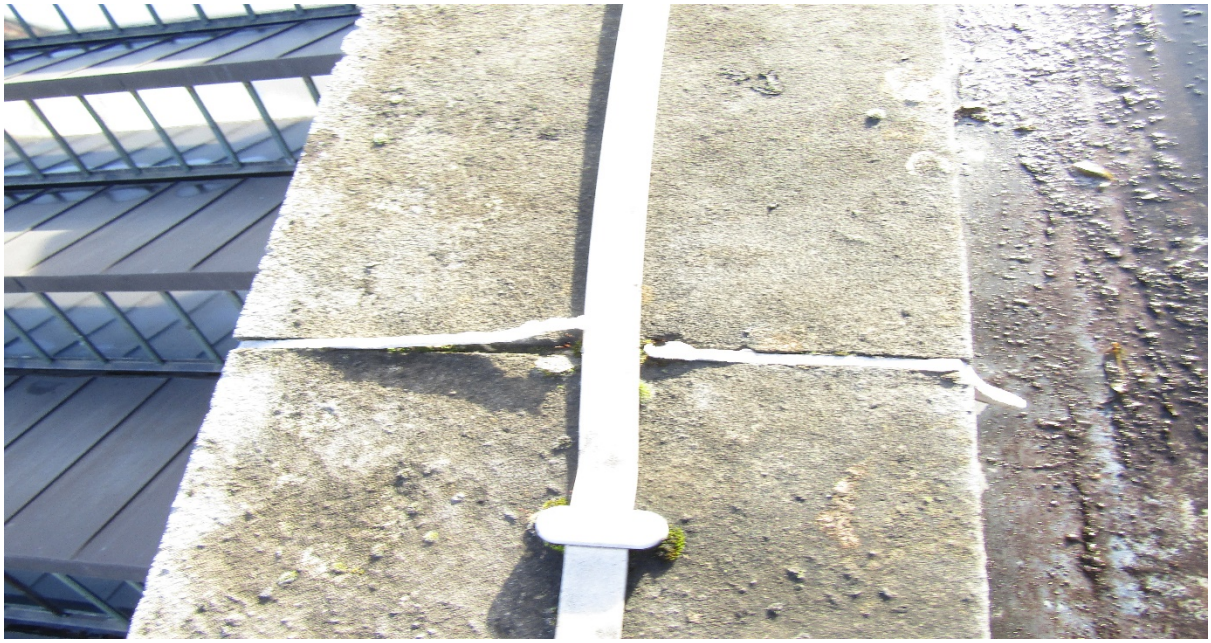


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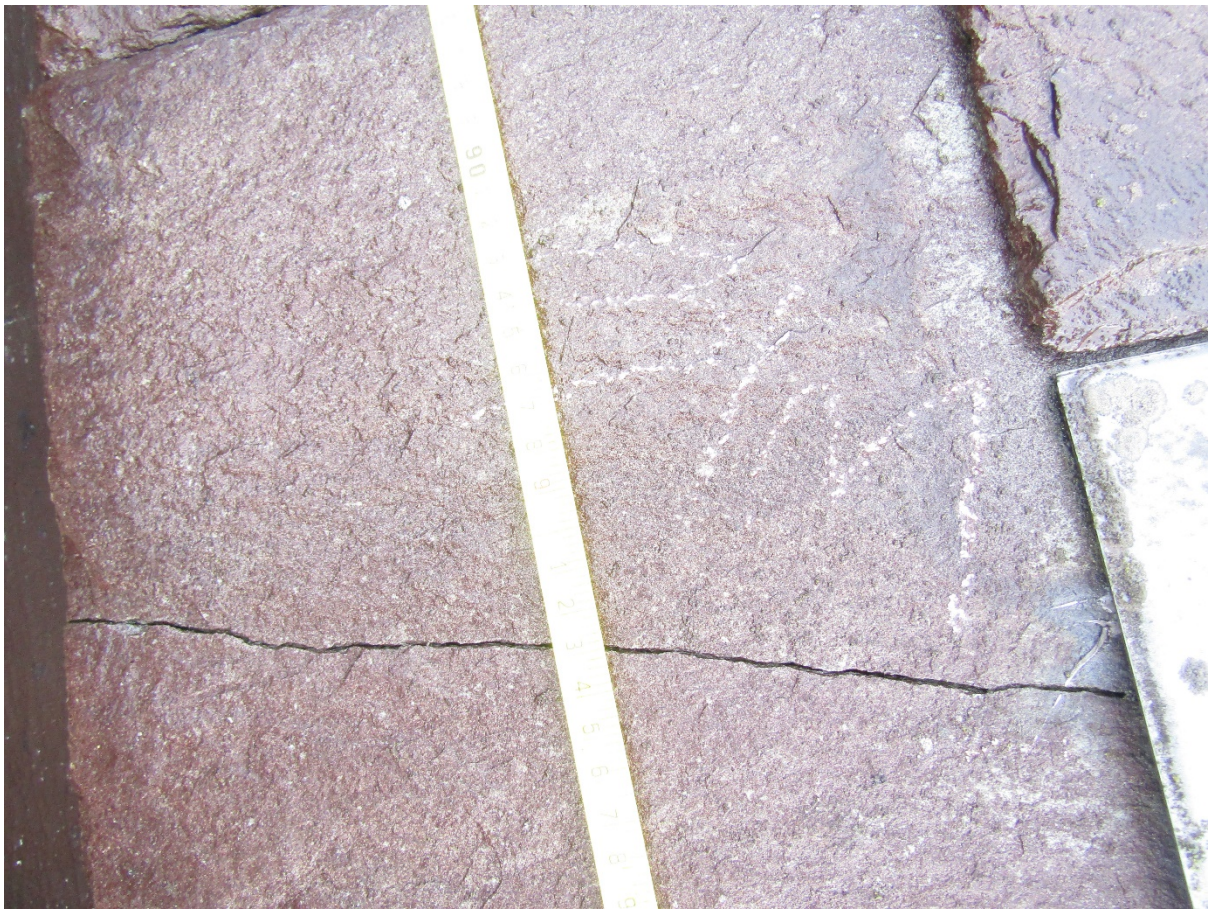
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3.3 Valley gutters

The valley gutter on each side of the roof is constructed from traditional lead sheet and serviced by 3No. outlets also formed from lead. In several locations there are obvious areas of past repairs and on the both sides it would appear that the majority of the gutters have been treated with bitumen type coating which has now largely perished and is totally ineffective with regards to preventing water ingress.

Photograph showing coating in East side gutter



Photograph showing coating in West side gutter



When observing the lead in both gutters appears to be of a comparatively good quality, however on close inspection and in more than a few areas, the lead contains notable splits and has lifted on several seams more so around all the outlets.

Photographs Showing typical gutter defects





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3.4 Roof Lights & Cupola

General observations show the roof lights and Cupola are of a reasonable condition although the Cupola would benefit from re-decoration. The lead aprons are intact and water tight and the glazing in the roof lights appears to be in a reasonable condition. The Cupola is accessed by a fixed steel ladder, currently it is subject to corrosion and is not fitted with any form of fall arrest.

Photograph showing the Cupola



Photograph showing typical lay out of the roof lights



4.Conclusion:

As observed the failure of several slates and the noted defects relating to the coping stones are obvious areas that are inherent with potential water ingress and to a degree are relatively simple fixes, however and more concerning is the condition of the gutters. Obviously in the past there have been issues with water ingress through the gutters hence the evidence of past repairs and the attempt to over coat the lead, regrettably these repairs are a long way off from addressing the current issues.

Lead is commonly used to create gutters between pitched roofs and behind masonry parapets, however defects here often seep quietly for years, providing the ideal conditions for dry rot, wet rot, insect infestations and other forms of decay.

In addition, and only recently been properly identified and understood is decay through condensation on the underside of the lead sheet where, in the absence of weathering, the lead may have not formed a stable patina, leaving it vulnerable to decay. In the absence of a stable patina, the water causes the lead to corrode through flaking *(much the same as rust on steel)* until holes, splits and uplifting takes place in the sheet from below. If underside corrosion is a potential issue, the only solution typically involves replacing the lead over a new ventilated substrate.

To substantiate the potential of internal condensation as a contributing factor, at some stage the retro fitting of PVC vents into the roof would clearly indicate air circulation problems in the past.

With regards to addressing the issue with the gutters, it would be prudent to suggest that replacement is the only practical solution. When considering parapet gutters on an aged building, it is usual to specify “Code 7 or Code 8” however, the existing configuration of the gutter will have bay lengths in excess of the current limits in BS6915. Subsequently, it is essential to engage a professional lead worker with sufficient knowledge and experience to meet the standards.

Other options if agreed and most certainly more commercially viable, would be to over lay the existing lead with either an EPDM rubber membrane or to use galvanised sheet metal, however if internal condensation as indicated above is a contributing factor, internal decay will continue.