

DESIGN AND ACCESS STATEMENT FOR THE REPLACEMENT

FOR:



GALLERIES 42-45  
WHITE WING  
BRITISH MUSEUM  
GREAT RUSSELL STREET  
LONDON WC1B 3DG



REVISION	DETAILS	COMPILED BY	CHECKED BY	DATE
A	First Draft	Simon Douch	Lisa Clifton	27 January 2016

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90 WHITFIELD STREET  
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## **Introduction**

This design and access statement has been prepared to support an application for Planning (Listed Building and Conservation Areas) Act 1990 that is to be made on behalf of the Trustees of the British Museum. As directed by the Capital Planning and Programme Management team, within the British Museum, the application will be submitted by HOK International acting as their agents for architecture and historic building conservation.

The works are required to support the creation of new Islamic Galleries, in the existing Galleries 42 – 45 of the White Wing of the British Museum. This application, is part of a phased construction programme, will be one of three / four applications that address different aspects of the programme with the Galleries opening to the public in late 2018. This application deals with works anticipated to be on site in the summer of 2016. Principally these works involve the replacement of the existing copper roof, which is now failing (see attached condition survey) and the high level plaster conservation repairs required following the dismantling of the former exhibition space. This previous exhibition was from the late 1970's and predated the time when the British Museum was required to secure Circular 18/84 and Listed Building Consent. The works were not the most sympathetic to the fabric. See photographs included in the appendices.

## **History of the White Wing**

Built from a legacy in the sum of £71,780 donated originally by William White in 1823 and then finally handed to the Museum upon his wife Mrs White death 56 years later in 1879. In anticipation Sydney Smirke had drawn up plans and had costings prepared in 1848 for a building in open space to the west of Montague Street. After this date further schemes were developed and finally the earlier Smirke plans were handed over to the Surveyor to the Office of Works, Sir John Taylor who kept to Smirke's Greek revival style for the new construction with his proposal that was adopted.

In September 1882 the cornerstone of the White Wing was laid. In 1884-85 the central heating and lifts were installed and electric lighting was provided on a limited basis. Namely in the readers' rooms and staff studies. The wing would eventually cost £48,970. The White Wing today remains largely unaltered although changes have been made in the use of space within.

## **Re-roofing**

As funds have permitted and needs have driven the Museum has been carrying out a rolling programme of roofing repairs. Typically these have involved the replacement of the late 1960's uninsulated copper coverings with traditional lead sheet roofs. During these works the skylights, which are not original framing or glazing, but are in the location of the originals, have been replaced with new roof lights that are fitted with improved thermal performing glass and external louvres for daylight screening. The new roof lights are part of the building services strategy and are able to support natural ventilation of the galleries by providing openable fan lights that can be controlled from within the gallery.

Currently there are a large number of roof hatches that facilitate maintenance and provide limited access to the building services contained within the voids above the plastered ceiling. The number of hatches will be consolidated and safer access platforms will be provided within the voids with building services that need to be readily accessible. These hatches will require new trimmed openings. It is planned that rather than trim original rafters that these will be relocated and new softwood trimming joists will be installed to support the hatches. At the same time as the roofing works all of the containment will be put in place for all of the electrical services.

As part of the Museums sustainability plan the opportunity will be taken to improve the heat loss characteristics of the Gallery 42-45 roofs. The shallow pitch 5 degrees, generous roof void and relative height of the coping stones will allow 160 mm of insulation which can achieve “U” value of 0.18 m<sup>2</sup> °K. This will meet the thermal performance set out in the Building Regulations Approved Document L2B and still conform to safe guarding under Approved Document K.

### **Conservation Plaster repairs**

The creation of Galleries 43-45 in the late 1970’s early 1980’s saw the introduction of a substantial steel framework used to hang the exhibition. Unfortunately these works did not adopt, what would be seen as best conservation practice, by today’s standards. As a consequence of this substantial damage was carried out to the detailed plaster motifs on the undersides of the down-stand beams. These repair works will be carried out by trained conservators. The repair work in Gallery 42 is more superficial and will see the repairs of surface cracking with probably a Toupret filler. Paint analysis will be carried out to help determine the chronology of painting and to establish the original paint scheme. The Conservation Management Plan mentions that the ceiling scheme in Gallery 46 is historically correct although there is some doubt as to the veracity of this statement.

### **Accessibility**

When Galleries 42-45 have been completed the programmed works will be fully accessible for people of all abilities. Those works to support the galleries will be subject to future Listed Building applications once the scope is developed. Due to the nature of this Listed Building application for high level conservation repairs to plaster and roofing there is no accessibility access issues that need to be addressed.

### **Appendices**

A: Existing roof condition survey report

B: Photographic record of Galleries 43 – 45 after steel work is removed

## **APPENDIX A: EXISTING ROOF CONDITION SURVEY REPORT**

## ROOF CONDITION REPORT

FOR:



WHITE WING  
BRITISH MUSEUM  
GREAT RUSSELL STREET  
LONDON WC1B 3DG



SEPTEMBER 2015

REVISION	DETAILS	COMPILED BY	CHECKED BY	DATE
A	First Draft	Helen Molton	Simon Douch	28 September 2015

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## SCOPE

HOK were asked to inspect the copper roofs above the White Wing in order to establish their condition in the light of future works that are programmed to take place in the galleries below. The roofs were inspected on the morning of 12<sup>th</sup> August 2015. The weather was dry at the time of the inspection but there had been rain earlier in the day.

Present at the time of inspection were:

Mike Davis - Client Project Manager, Capital Planning and Programme Management, British Museum

Simon Douch SCA – HOK Project Manager / Conservation Architect

Lisa Clifton – HOK Project Architect

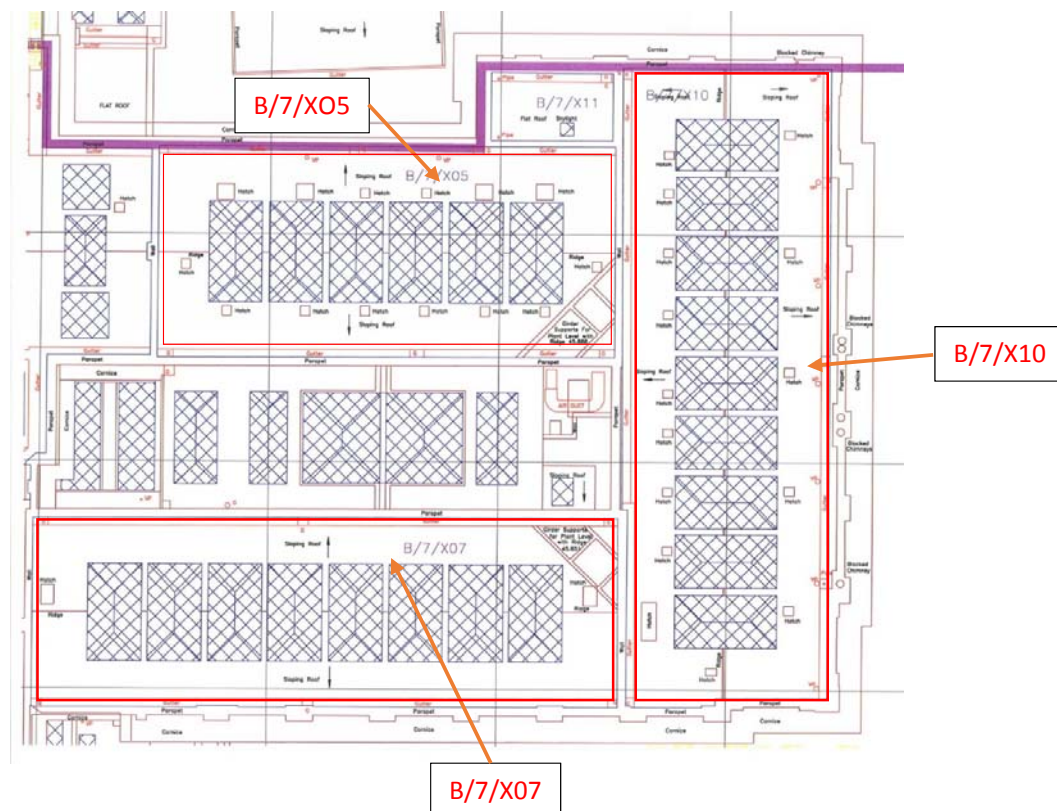
Helen Molton AABC – HOK Conservation Architect

## LIMITATIONS

The inspection was limited to visual observation with no intrusive methods used. Inspections were made externally only although various hatches were opened into the ceiling void from above. Some areas of the roof including gutters were obscured by duck boarding.

## DESCRIPTION

The three sections of roof are identified on the plan as B/7/X05, B7X07 and B7X10. They are double pitched clad with copper sheet arranged in bays with glazed steel roof lanterns straddling the ridge. The copper sheet is jointed with the fall using timber batten rolls and with welted joints across the fall. There is a copper clad vertical upstand to the roof lanterns with copper flashings. There are numerous access hatches of a proprietary type with aluminium flashings located on the roof slopes below the lantern lights. The copper gutters and other areas requiring access are protected with duck boards. The lantern lights have a vertical upstand with opening lights and a pitched roof of patent glazing with aluminium flashings.



## SUMMARY FINDINGS

There were no reports of leaks at the time of the inspection but the roofs were found to be suffering from a number of defects. The roof lanterns in particular are badly corroded and oxidised run off has stained the copper heavily. There is evidence of temporary repairs particularly in the narrow sections between roof lanterns using both lead and bitumen products suggesting that leaks have been a problem in the past. The copper itself is heavily pitted and feels loose against the substrate. It has also taken on the form of the substrate and is no longer therefore smooth. The narrow gaps between lantern lights and between lantern lights and roof hatches have obviously caused problems in the past and are frequently found to be patched using various techniques.

## COPPER ROOFING INSTALLATION AND COMMON DEFECTS

The roofs are reported to have been re-covered in the 1960's. Experimentation in methods of laying copper continued through the 1950s and 1960s, making use of the longer strips of copper then available for greater economy.

Copper roofing is commonly affected by the following:

Mechanical damage

- Wind lift
- Excessive thermal movement
- Restriction of thermal movement
- Accidental damage

Corrosion attack

- Acidic rainwater run-off from other surfaces
- Concentrated flue gasses

Deterioration of the substrate

- Wood-boring insects and rot
- Condensation

## FINDINGS OF THE INSPECTION

The copper roofs over the White Wing were inspected with the above common defects in mind.

### Wind Lift

The bay sizes appear not to be oversized and the joints do not exhibit loose fixings in the welted joints or the timber rolls. The panels do not appear to have lifted or bowed and the seams have not detached. Wind lift is therefore discounted.

### Thermal Movement

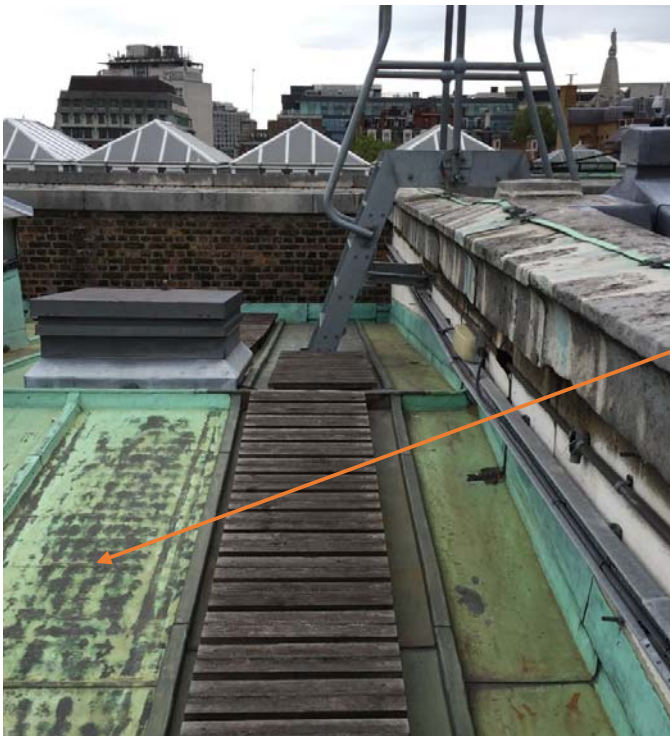
The bay sizes appear not to be oversized and standing seams have not been used as the jointing method in the direction of the fall. These can therefore be discounted in contributing to the defects found.

The difficulty of providing falls, drips, cesspools etc. in long gutters leads to a reduced number being provided. Excess thermal movement can be the result. However on the roof of the White Wing, some ponding is evident caused by insufficient falls, or back falls.



Insufficient falls or back falls causing ponding in the gutters.

Restriction of thermal movement can be caused by the utilisation of incorrect underlay. The use of roofing felt and wood-wool underlay, introduced in the 1960s, has led to the premature failure of some roof coverings. The copper roofs over the White Wing are not tightly fitted to the substrate. The copper exhibits the lines of joints in the substrate boarding. It seems likely therefore that there are problems with the underlay which have in turn caused problems with the roof covering.



Copper sheet has taken on the form of the substrate. The surface is no longer smooth.



### Accidental Damage

The surface of the copper is pitted and the numerous small indents hold the surface water. The exact cause of the pitting is unknown. Damage to vents was also noted.



Ponding in gutter.

Pitting of sheet surface where water can lie.



Damaged vent.

### Corrosion Attack

The patina found on weathered copper roofs produces a protective layer. When acid run-off occurs the patina breaks down and the protection is subsequently reduced. Acid water run-off from glass draining from roof lights and lanterns and caused by acid pollution leads to thinning and perforation of copper roofing. This is a likely explanation for the defects occurring to the bays between the roof lanterns and the junctions between the upstands of the lanterns and the roof hatches. Temporary repairs using sheet lead and bitumastic products are in evidence.



Badly corroded roof lanterns.

Liquid bitumen applied to copper surface.



Loose laid lead sheet over copper.

Staining is also common defect of copper roofs. It does not reduce the weathering capabilities of copper, but can significantly affect the visual appearance of the roof. Run-off from other metals, particularly those subject to oxidation, leaves metal oxide deposits in the patination layer, changing its colour. The roofs over the White Wing exhibit a large amount of brown staining which has run off the corroded steel roof lanterns. This is very severe in some places.



Heavy staining between  
roof lantern upstands.

#### Deterioration of the Substrate

Deterioration of the structure or underlay to the roofing can be caused by condensation if ventilation of the substrate is inadequate. Deterioration may also be due to earlier failure of the roofing as described above. A very limited inspection of the roof space was made possible by opening some of the roof hatches over the White Wing. There was evidence of previous leaks but no damp smell or visible evidence of rot or beetle attack. Whilst it is not possible to completely discount this without proper inspection, it does not appear to be a contributory factor to the roofing defects.



Limited view into roof  
void via access  
hatches.



Other defects noted during the inspection were damage to welthed seam, low points on the roof itself, leading to ponding and some areas of missing pointing above the copper flashings.



Damaged welthed seam.



Low points on roof where ponding occurs.



Loose and missing pointing.

## RECOMMENDATIONS

### REPAIR

Repair could be considered as the roof covering sheets are held together through the use of weltd joints. It is possible to re-open these joints and replace the defective sheets. However, where problems are widespread this method would become uneconomic.

Smaller areas of damage could be patched using soldering, brazing or welding, but all of these require the application of heat in some form. Consideration must be given to the potential hazards and the fire risk to the under-structure. Understandably, current practice does not favour hot-works when working on listed buildings such as the British Museum.

Most small repairs are carried out using some form of adhesive material: gluing copper sheet with black mastic, self-adhesive flashing tape, mastic tape and mastic beads. None of these methods can be recommended due to their short life span.

### REPLACEMENT

Post-war roofs frequently need significant attention after only 50 years. This is commonly due to shortcomings in the supporting structure, original specification or the workmanship. The roofs over the White Wing have been in place for approximately 55 years. It should be borne in mind that these roofing works were carried out at a time when resources were limited and during a period of rapid expansion in the amount of repair and construction being undertaken. This was also a time of technical development and experimentation in the method of laying copper.

As the cause of the defects seem to relate to the laying and possibly specification of the copper roofing and its substrate or underlay, the problems will worsen unless they are addressed and removal and replacement seems to be the only viable option. In view of the significance of the building itself and the programmed works to the galleries below and the fact that defects are already apparent, it would be inappropriate to recommend a short term solution at this point.

In addition, the roof lanterns have reached the end of their serviceable lives and require immediate replacement in order to avoid problems of water penetration.



We therefore recommend that the roof lanterns and all roof coverings are removed and replaced carrying out such remedial work as is required to the substrate and ensuring adequate ventilation of the roof spaces in future.

## **APPENDIX B: Photographic record of Galleries 43 – 45 after steel work is removed**



