



# Roof Survey Report

Warrington Museum  
Bold Street, WARRINGTON  
WA1 1DR, England

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Project Reference: B194051/1

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## 1 Introduction

Further to our site inspection we have prepared the following survey report based on the current condition of the existing roof/s. This survey report is based on our visual inspection of the roof/s together with our exploratory core test samples. It should be noted that core test samples are taken to identify the existing roof construction to deck level and to provide an indication of the roof condition. Due to the limited number of core samples that can be practically taken on a roof, Bauder Ltd cannot be held responsible for any changes in roof build-up in areas where core samples have not been taken.

### 1.1 Description of Building and Weather Conditions

Building use – Public

Height in Storeys: 3 Storeys

The weather conditions at the time of our survey inspection were cloudy with occasional drizzle. The Roof surface at the time of our survey was damp.

### 1.2 Roof Access

Roof access was gained via an access rooflight, using the ladder provided.

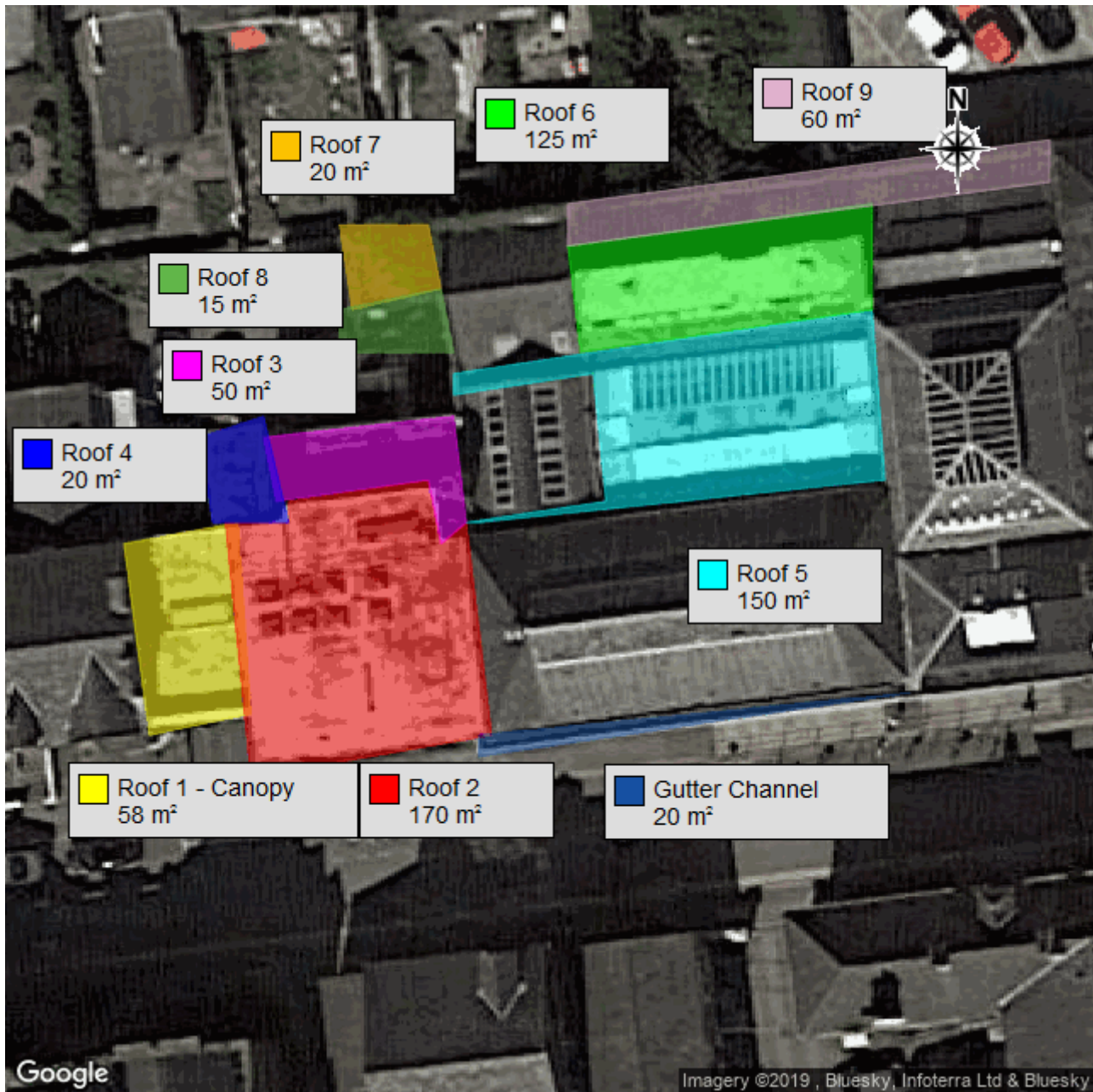
### 1.3 Confirmation of Client brief

To carry out an evaluation and produce a condition report for the flat roof areas concerned, together with specification proposals for upgrading the thermal performance and renewing the waterproofing system.

# Introduction

## 1.4 Roof Plan

### 1.4.1 Warrington Museum



Any measurements displayed on the map above are approximated and are therefore not to be used in tenders.

## 2 Existing Roof Construction

### 2.1 Core Sample Analysis

Core samples are taken as a method of confirming the existing deck and waterproofing system construction and provide indicative feedback regarding general condition. Please note that the findings are representative only of the particular location tested and this is used to give general guidance as to the likely overall condition and deck construction.

#### 2.1.1 Roof 1, Roof 2, Roof 3 and Roof 4

**No. of core samples taken:** 3

**Construction Type:** The existing waterproofing system is constructed as a cold roof, comprising of bitumin installed onto the roof deck.

**Surfacing:** Roof 1 & 2 - Solar reflective paint, Roof 3 - Chippings, Roof 4 - Single Layer Waterproofing membrane.

**Waterproofing:** BS747 bituminous system

**Surfacing:** Stone Chippings

**Waterproofing:** BS747 bituminous system

**Insulation:** None present

**Screed:** Sand/cement screed

**Roof Deck:** Concrete

**Internal inspection:** No internal access available at the time of our inspection

**Condition of core sample:**



Overview of core sample





# Existing Roof Construction

## 2.1.2 Roof 5, Roof 6 and Roof 9

**No. of core samples taken:** 2

**Construction Type:** The existing waterproofing system is constructed as a cold roof, comprising of bitumin installed onto the roof deck.

**Surfacing:** Solar reflective paint

**Waterproofing:** Mastic Asphalt

**Roof Deck:** Concrete

**Internal inspection:** No internal access available at the time of our inspection

**Condition of core sample:**



Overview of core sample.



Confirmation of concrete deck.

## 2.1.3 Roof 7 and Roof 8

**No. of core samples taken:** 1

**Construction Type:** Cold Roof

**Surfacing:** Stone Chippings

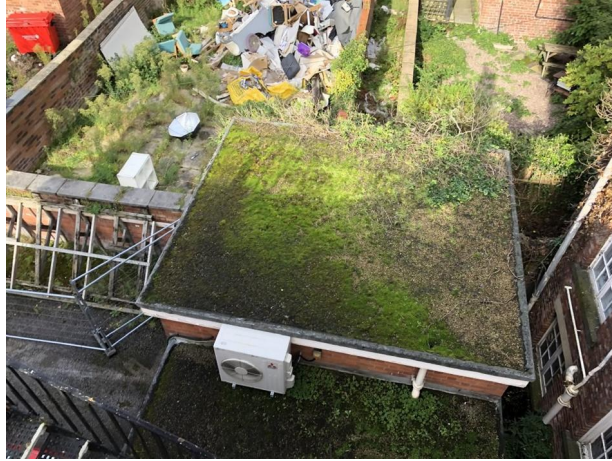
**Waterproofing:** BS747 Built-up bituminous membrane system

**Roof Deck:** Plywood panels

**Internal inspection:** No internal access available at the time of our inspection

**Condition of core sample:** The deck is wet.

# Existing Roof Construction



## 3 Issues and Considerations



# Issues and Considerations

## 3.1 Warrington Museum



Overview of Roof 1.



Overview of Roof 2.



Overview of Roof 3.



Overview of Roof 5.



Overview of Roof 5 Walkways



Overview of Roof 6.



# Issues and Considerations



**Overview of Roof 7.**



**Overview of Roof 8.**

## **3.1.1 Decks**

The decking is believed to be in a good condition and of a suitable construction type to be reused as part of the roof refurbishment.

## **3.1.2 Existing Waterproofing**

The existing waterproofing system on Roofs 1, 2, 3, 4, 7 & 8 are constructed as a cold roof, comprising of bitumin installed onto the roof deck. These have been subsequently been finished in varies way with either chippings, solar reflective paint or an additional layer of bituminous membrane.

From our observations, the existing waterproofing has come to the end of its serviceable life. The system has suffered from leaks, with numerous defects.

This waterproofing system is showing all the typical defects consistent with a covering of this age including; surface oxidation, cracks, splits, blisters, rucks and signs of repair.



# Issues and Considerations



**Cracks have formed in the bitumen allowing moss to develop in the cracks.**



**Cracks have formed in the asphalt particularly at the waterproofing upstands.**



**Liquid repairs to perimeter kerb.**



**Cracks in the upstand resulting in the waterproofing falling away.**



**Further liquid repair.**



# Issues and Considerations



The asphalt is showing all the typical defects consistent with a covering of this age including; surface oxidation, cracks, splits, blows, slumping and signs of repair.

There is evidence of entrapped water between the layers. It firstly highlights that these layers have not been adequately bonded together, but also that water is able to enter and track through the system, either through a defect in the capping sheet lap joints, or via detailing at penetrations or abutment upstands.



**Chippings were found to wet between the layers of bitumen.**

In accordance with BS6229:2018, Building regulations and Energy Conservation Standards for England and Wales roofs should be "designed and constructed so that thermal transmittance does not exceed 0.35W/m<sup>2</sup>K at any point." The thermal performance of the existing roof build-up is poor and falls below the above standards.

One of the risks associated with inadequate levels of insulation is the potential for condensation to form within the structure or waterproofing system during periods of climatic extreme. This roof would therefore benefit from being thermally upgraded in line with current standards.

### 3.1.3 Drainage

Following inspection, we have determined that the existing outlets are unsuitable for reuse with the new waterproofing system and therefore should be replaced.



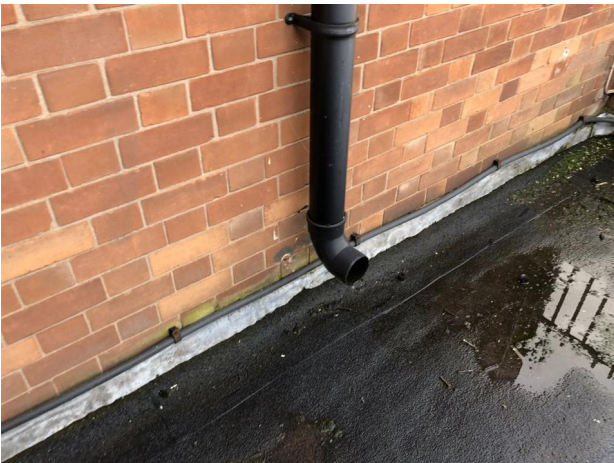
# Issues and Considerations



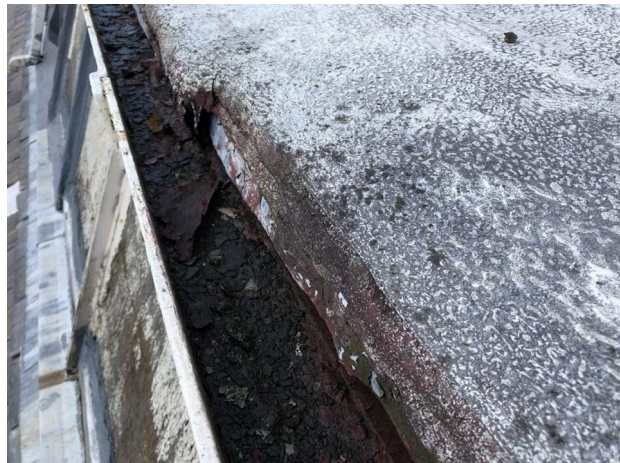
**View of typical internal outlet.**



**These outlets are very narrow and have no debris guards.**



**Downpipes from high level roof areas will need to be modified to accommodate the increased level of insulation included within the proposed specification.**



**External guttering is in poor condition and should also be replaced as part of the refurbishment.**

We noted that the existing lead chutes are aged, defective and generally in poor condition. These are considered unfit for reuse and should be replaced as part of the re-waterproofing works.

The existing external rainwater system is in very poor condition and should be replaced.

## **3.1.4 Upstands and Details**

### **Requirements for waterproofing at upstands and details**

Codes of Practice (BS 8217: 2005) dictate that the minimum height for waterproofing upstand detailing is 150 mm, taken from the finished surface. Perimeter kerbs should be a minimum height of 50 mm above the finished surface and detailed with a welted drip detail or edge trim.

There should be no mechanical penetrations to kerb waterproofing or need for secondary weathering. Kerbs that are weathered with mechanically fixed metal capping or concrete copings are categorised as 'abutment upstands' and must comply with the minimum height requirement of 150 mm.



# Issues and Considerations

This minimum height rule applies equally to upstands to roof lights, pipes, vents and door and window thresholds.

Waterproofed upstand detailing is usually weathered with lead or metal counter-flashings, metal capping and cladding. Termination bars should only be used when fixing to concrete abutments, where no provision exists for other forms of secondary weathering.

## **Waterproofing height to brickwork upstand requires increasing**

To comply with codes of practice the waterproofing should be dressed up the brickwork upstand to a minimum height of 150mm above the new finished roof level. This will impact on the position of any counter-flashings which also need to be raised accordingly.



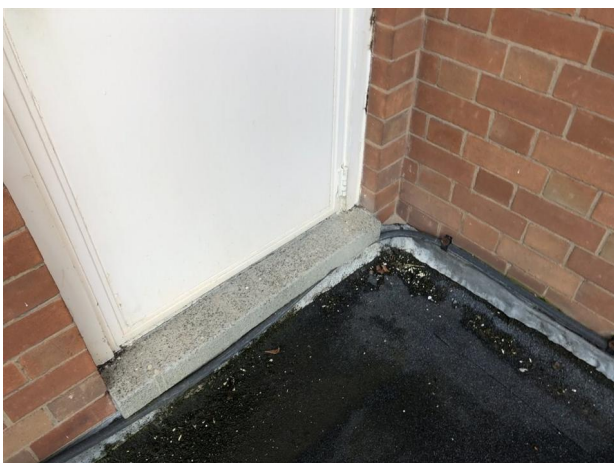
**New details to brickwork are to be formed as part of the waterproofing. New secondary flashings are to be introduced.**



**Parapet walls are to be encapsulated in the proposed waterproofing system, subject to conservation approval.**

## **Low Upstands beneath Door Threshold**

Once the roof has been refurbished there will not be sufficient height beneath the existing door threshold to form a sufficient waterproofing upstand. Due to new surface levels it will be necessary to either remove and replace or modify the door and frame.



**Doors with sills that finish close to the surface of the waterproofing will need to be modified to accommodate the increased insulation within the waterproofing system.**



**In a number of locations the waterproofing abuts pitched tiled roof areas. Tiles will need to be removed to enable the waterproofing to be appropriately detailed.**

# Issues and Considerations

## **Gaining access to re-waterproof the abutment behind tiles/ slates**

The lower courses of tiles/ slates from the adjacent abutment will need to be removed in order to allow access to re-waterproof the upstand behind and if necessary extend the supporting lay-board.

## **Defective coping joints**

The joints in the existing coping on top of the parapet wall are defective. Water staining below the bed course is highlighting that any DPC that may be present is certainly no longer effective in preventing downward movement of water into the wall structure. Long term saturation will lead to gradual degradation of the structure and make the brickwork susceptible to frost damage.



**Coping stones are aged and covered in moss. These are to be encapsulated with the new waterproofing system as part of the proposed refurbishment.**



**External gutters will need to be replaced and raised as part of the refurbishment.**

## **Re positioning of the external guttering**

The external gutter system will need to be re-positioned to suit the new surface level of the roof once the new waterproofing fascia board works are completed.

## **Raise existing rooflight kerbs**

The existing rooflights mounted upon builders kerbs will need removing in order to allow the kerb height to be raised to the required minimum height and then re-waterproofed.



# Issues and Considerations



**Rooflight kerbs are to be modified and raised to accommodate the insulation levels included within the waterproofing system.**



**Soil and vent pipes will also need to be modified and raised.**

## **Extending the existing soil vent pipes**

The change in surface level, once the new waterproofing system is installed, will necessitate extending the existing soil vent pipes. This is to ensure there is sufficient provision for forming the waterproof upstand detailing to the pipes and fitting any secondary weathering collars.

### **3.1.5 Rooflights**

The current rooflights are proprietary plastic glazed units. These fall below current thermal and light transmittance standards and the performance will continue to decrease with age. The service life of these rooflights is not compatible with the service life of the new waterproofing system and for these reasons we propose that they are replaced. Please be aware that these units may contain asbestos in the internal linings.



**Rooflights are aged and are far below current regulations.**



**Monitor glazing is also aged and glazed with georgian wired glazing which is below current standard and should be replaced as part of any refurbishment.**

Natural light is provided by roof mounted monitor lights. These feature a flat waterproofed roof with glazing within the sides of the structure. This glazing is thermally inefficient and should be replaced with modern glazing units to upgrade the thermal performance in line with thermal

# Issues and Considerations

upgrading of the waterproofing system. Please be aware that these units may contain asbestos in the internal linings, rope seals or glazing putty.



**Overview of rooflights**

## **3.1.6 Plant**

The roof mounted AC units appear to be functional, they are positioned on or very close to the roof. We assume they are to be retained on the roof following any refurbishment of the waterproofing. Unfortunately it will not be possible to refurbish the area of waterproofing beneath the AC units due to their proximity to the waterproofing membranes. They will require temporary disconnection and relocation while the roof is refurbished.



**A/C units will need to be temporarily disconnected and raised to accommodate the proposed insulation included within the refurbishment.**

## **3.1.7 Associated works**

The tank house overflow pipe remains functional and must be retained. The overflow pipe should be re-positioned at a higher level to ensure it does not penetrate the new waterproof detailing following re-waterproofing.



# Issues and Considerations



**Further investigation is to be undertaken internally to identify the source of the overflow pipe. This overflow will need to be raised above the new waterproofing upstand.**

## 3.1.8 Safe Access

These roofs currently have some provision access and egress. Safe access provision should be reviewed due to the impact of re-roofing and consideration given to the change in the finished surface level. If the roof is deemed to be a place of work, and if there is any foreseeable reason for access, it is the responsibility of the employer (building owner) to provide a safe place of work.

A specialist company should be consulted to provide a comprehensive access strategy that is compliant with the working at height regulations 2005 and the hierarchy of risk management. This is to say;

- Eliminate the risk – Design out the need to work at height
- Guard the hazard – If working at height is unavoidable a collective/passive means of protection should be used.
- Guard the worker – If collective/passive means of protection are not feasible a PPE based system should be used.
- Fall restraint systems – The system and the associated PPE prevent the worker from reaching all fall hazards
- Fall arrest systems – The systems and associated PPE could result in the worker reaching the fall hazard.

Where appropriate the access strategy should incorporate a suitable rescue plan.

Bauder should be notified of the proposed access strategy system design so it can be incorporated within the proposed specification.



# Issues and Considerations



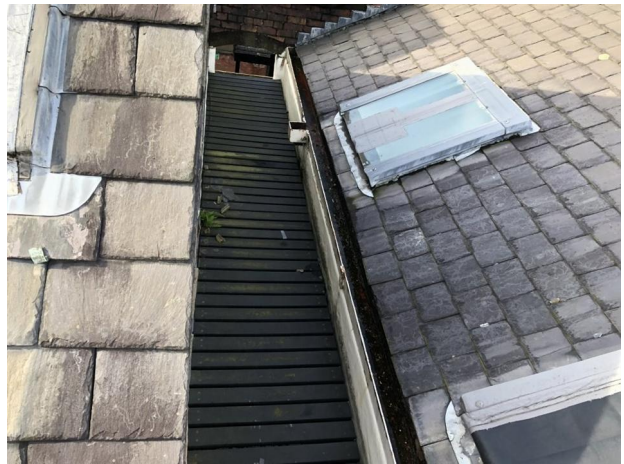
**Handrails are present across the roof areas, these are freestanding which have been fixed to the brickwork at either end.**



**Fixed handrails have also been fixed into the copings. These will need to be modified to ensure a robust detail is achieved as part of the refurbishment.**



**Access ladders will need to be modified to accommodate the raised surface level of the proposed waterproofing.**



**Walkways will need to be recreated as part of the refurbishment.**

## 4 Proposals

### 4.1 Warrington Museum

- The existing deck is to be re-used.
- **Roofs 1, 2, 3, 4, 7, 8 & gutter channels** - Due to its condition, the existing waterproofing system should be completely removed and replaced.

Note - an adequate provisional sum should be set aside to cover for any unforeseen issues related to the removal of the existing waterproof covering that may necessitate localised repairs to the existing deck

- **Roofs 5, 6 & 9** - The condition of the existing waterproofing is considered suitable for receiving an overlay system.
- We propose that the insulation is upgraded to comply with current Energy Conservation Regulations, which will improve the thermal performance of this building and offers longer term payback in respect of reduced heating and/or cooling costs. In areas where a reduced thickness of insulation is required it will be in line with BS6229:2018 and Building regulations Approved Document C where the worst u'value allowed will be 0.35W/m2K equivalent to 60mm FATE board.
- New Bauder Refurbishment Outlets are to be installed that are compatible with the new waterproofing system and suitable for the connection to existing drainage pipework. As refurbishment outlets fit within existing outlets or pipe work, it is important that the flow rates of the new outlets are compared against the current outlets to ensure that drainage performance is not reduced or otherwise confirm if additional drainage provision may be required.
- The external rainwater system is in poor condition and should be completely replaced as part of the roof refurbishment works.
- The existing drainage chutes are to be removed and new site fabricated lead replacement items installed.
- The waterproofing upstand is to be raised to achieve the minimum required height of 150mm. Counter-flashings are to be positioned to suit.
- The existing door and frame are to be removed to allow access to raise the upstand kerb in preparation for re-waterproofing. The door and frame are to be either modified or replaced, these works need to be included within the main client specification/ schedule of works.
- The lower courses of tiles from the adjacent abutments will need to be removed to re-waterproof the upstand. This work should include provision for extending the lay-board to accommodate the change in surface level imposed by the new insulation in order to comply with the required minimum upstand height. As a consequence of these works, the lower course of tiles may need adjusting.

# Proposals

- The existing concrete coping to be left in situ and the upstand suitably prepared so that the new waterproofing system can encapsulate the upstand and top of the parapet wall, terminating with a GRP trim or welted drip detail.
- The height of existing perimeter check kerbs must be increased to provide a minimum 50mm upstand above the finished roof level. The perimeter is to be raised to one consistent level around the full roof area.
- The existing rooflights must be removed to enable the upstand kerb to be raised to comply with the required minimum upstand height. Raising the kerbs will affect the internal linings and provision should be included for any consequential extension and re-decorating work to the linings.
- Provision should be made for extending the existing soil vent pipes in order to accommodate the increase in the finished surface level resulting from the thickness of the new waterproofing system.
- The existing rooflights should be replaced with new modular Bauder Rooflight units that offer improved thermal and light transmittance performance and are classified as being non-fragile. These will complement the performance of the replacement waterproofing system during its serviceable life. Please advise your requirements and we will include these within our separate schedule and specification for replacement Bauder Rooflights.
- The windows to the sides of the existing monitor lights should be replaced with modern replacement glazing, so as to offer improved thermal performance and modern levels of light transmittance.
- The roof mounted AC units are to be disconnected and temporarily relocated while the roof is re-waterproofed. The AC units are then to be repositioned on suitable surface protection and reconnected.
- The existing overflow pipes must be repositioned a minimum of 150mm above the new roof surface level, without impeding or penetrating the waterproof upstand detailing.

## 4.2 Proposed Waterproofing System

### Warrington Museum

#### Bauderflex Roof System

The Bauderflex Roof System offers an exceptional waterproofing solution to the specifier working with a limited budget, whilst still delivering a robust quality system with proven longevity. This product uses high tensile polyester reinforcement with highly modified SBS elastomeric bitumen. This produces a finished product with an elasticity of over 40%.

Where required the system will include Bauder PIR with a choice of either glass tissue or aluminium facing offering versatility in installation methods for both the insulation and the membranes. Bauder insulation provides excellent thermal performance and has outstanding dimensional stability and compressive strength, achieving an "A" rating in the BRE Green Guide. Bauderflex is suited to both new build projects and the refurbishment of existing buildings.

#### Guarantee Information

The Bauderflex system is supplied with a special 20 year guarantee that includes products and workmanship. Full terms and conditions are available by request.

#### Key Features

- Insulation and waterproofing products are all manufactured by Bauder resulting in complete system compatibility and single source responsibility.
- Robust and extremely durable waterproofing that minimises the risk of physical damage and is capable of withstanding maintenance foot traffic.
- Bauderflex has an outstanding track record and has been used in the UK for over 30 years with proven durability in service. This provides complete peace of mind to specifiers past and present.
- 4.2mm cap sheet with high tensile strength and choice of 3 colours.
- Bauder site technicians monitor and sign off each installation and provide up-to-date site inspection reports directly to our clients via email.
- Bauder provides installation training for our approved contractor operatives to ensure the highest quality of the workmanship maintained.
- Reliable application in both high and low ambient temperatures – enables all year around installation.
- Reduced rain noise to gain an extra credit under point 5 of section 6 of BREEAM education 2008 for most projects.

## 5 Health & Safety and Construction Design Management

Bauder believes in promoting a strong safety culture at all times. Our Staff will adhere to the appropriate risk assessments and method statements as required under the Health and Safety at Work Act 1974 and Work at Height Regulations 2005. It is the client's duty of care to advise of any specific health and safety issues pertaining to the project as required under the Work at Height Regulations 2005.

As part of our duty of care we would like to draw attention to the following information:

The HSE Guide H&S in Roof Work (HSG33) states that **all** roofs should be treated as fragile unless declared otherwise by a competent person. Please refer to the Work at Height Regulations 2005 provision 9 for information on working with fragile/suspected fragile roof areas. Under the Health and Safety at Work Act 1974 Sections 3 and 4, it is the responsibility of employers and anyone who controls the work of others to ensure so far as it is reasonably practicable that persons are not exposed to risks that impact on their health and safety. Appropriate control measures must be in place before any work or contact with a fragile/suspected fragile roof area commences.

Safe access and egress to a roof is a major risk and requires careful planning. In particular, the following are likely to be fragile:

- Non reinforced fibre cement sheets e.g. asbestos
- Corroded metal decking
- Woodwool slabs
- Rotten chipboard or similar
- Stramit
- Slates or tiles
- Old roof lights
- Glass (including wired)

Specifying non fragile rooflights will help reduce the risk of falls from height. A non-fragility rating is required by the HSE (Health and Safety Executive) in order to comply with CDM (Construction Design and Management) Regulations 2015.

We draw your attention to your duties under the Construction (Design and Management) Regulations 2015. Regulation 4, Client's duties in relation to managing projects states that the client must make suitable arrangements for managing a project, including the allocation of sufficient time and other resources. Regulation 5, Appointment of the Principal Designer and the Principal Contractor states that where more than one contractor will be working on a project at any time, the client must appoint a Principal Designer and a Principal Contractor.

Please note that although Bauder will assist with the roof waterproofing system design, we will



not undertake the role of Principal Designer.

It is always the responsibility of the contractor to carry out a risk assessment on all aspects of the contract. The 'Safe2Torch' checklist is solely for guidance for the safe installation of torch-on reinforced bitumen membranes and use of gas torches in the workplace.