

CARMODY GROARKE

Power Hall and
Decarbonisation

Science and Industry
Museum

01st June 2021

Design and Access Statement - Package 2

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This document is intended to be read in conjunction with the following documents which form part of the submission: The Vision Document, Heritage Impact Assessment, M&E strategy

1 Introduction

1.1 Project Aims

1.2 Works Packages

1.3 Project Team

1.4 Context

Introduction

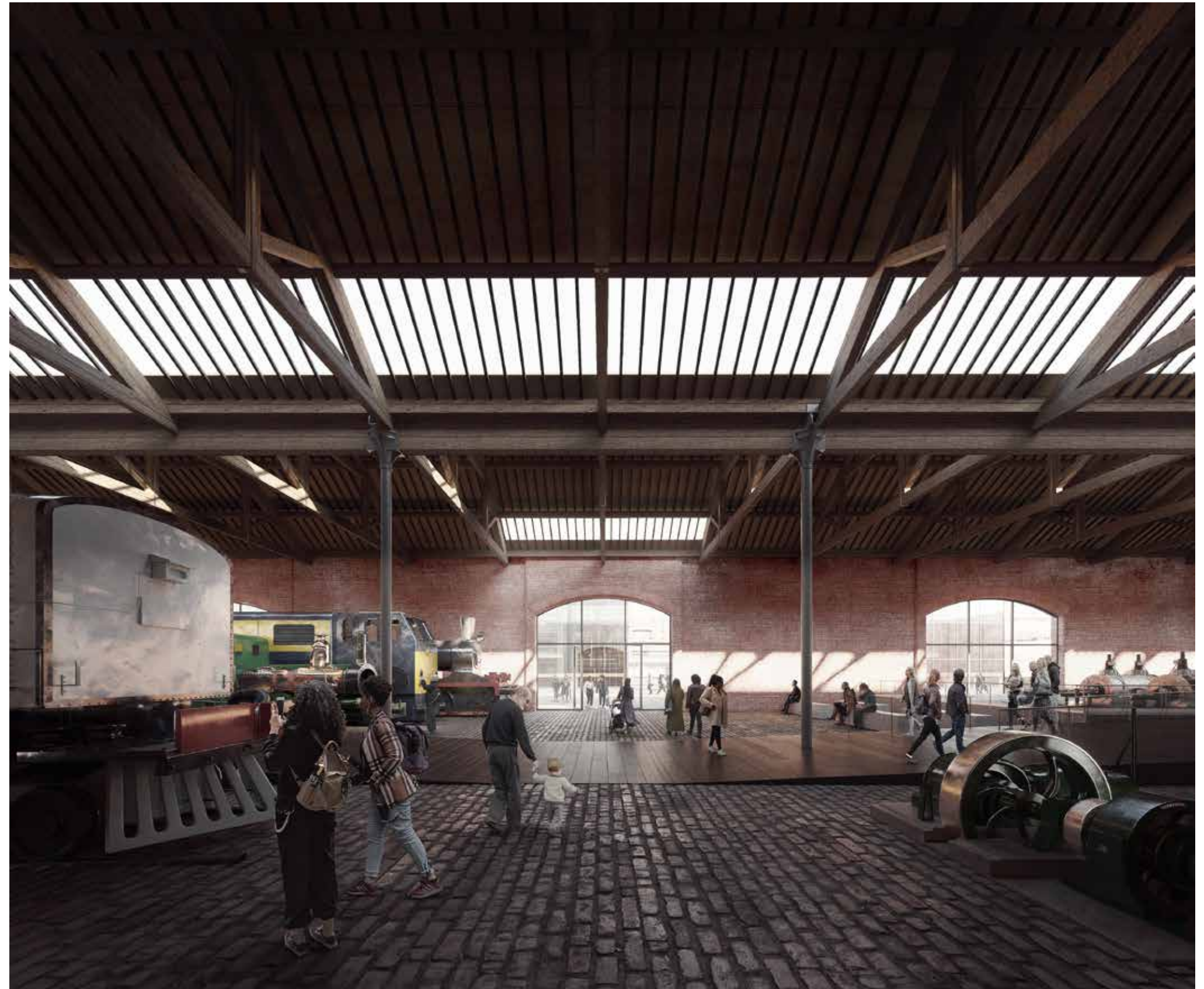
This Design and Access Statement has been prepared to support one of several Listed Building Consent and/or Planning Applications in relation to a new *Power Hall and Decarbonisation* project at the Science and Industry Museum (SIM), Manchester site.

Overall project aims

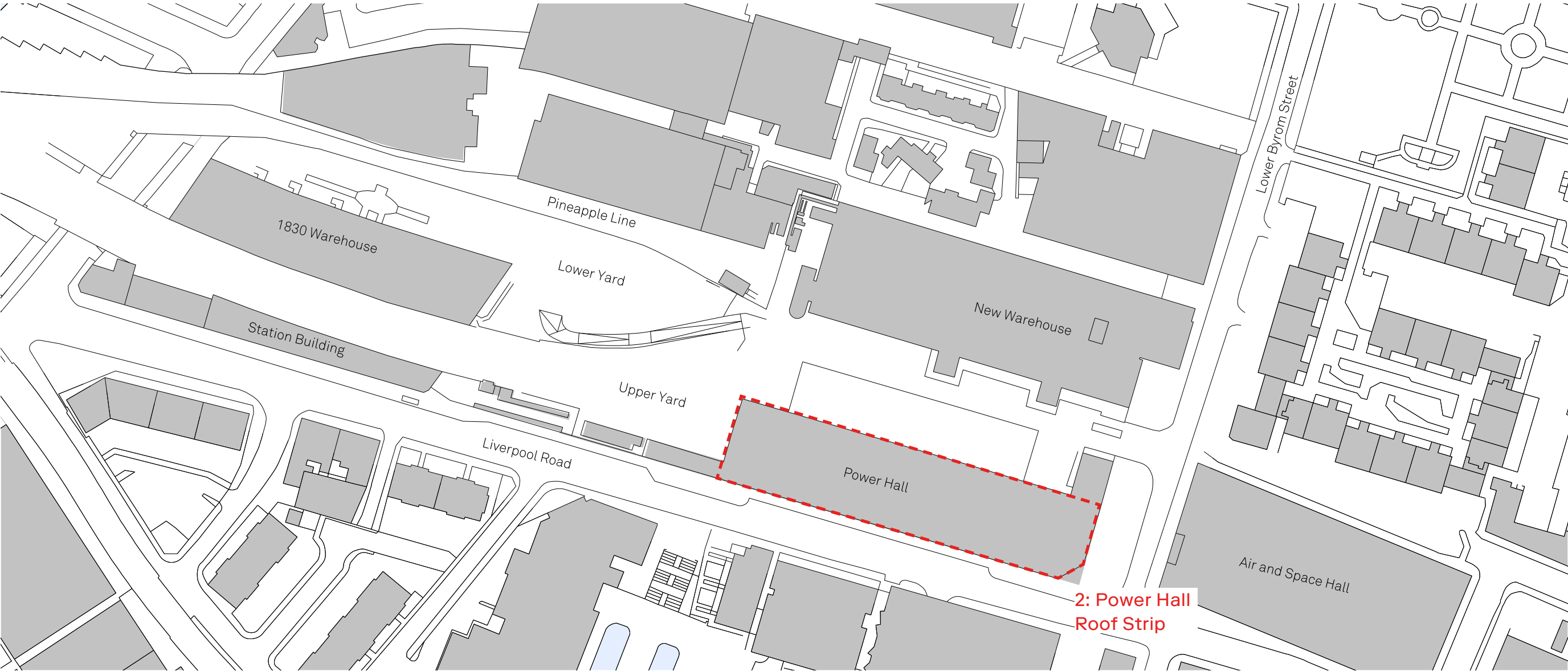
- Re-open the Power Hall, which was closed to the public for repair work in 2018
- Create a new gallery design with a simple and clear circulation route in the Power Hall which is accessible for all
- Reveal the historic structure of the Power Hall and carry out essential repairs to future-proof the building for years to come
- Install new plant to the Power Hall which will allow recommissioning of some of the steam exhibits
- Install site wide plant to reduce the museum's carbon footprint. Part of a journey towards net zero carbon for the Science and Industry Museum

Requirement for a separate Roof Strip Out Package

Due to the extremely tight programme imposed on the project by the government's public sector decarbonisation scheme funding, splitting the roof works into separate roof strip and roof replacement packages would be highly beneficial to the project. It would hold programme and cost benefits, which would ensure the scheme can have the maximum possible public and heritage benefit to the building overall. Further detail and justification of this approach is provided within the covering letter included within this application.



View of the proposed Power Hall concept



The Power Hall and Decarbonisation project is to be delivered as one project. However, the required Planning and Listed Building Consent applications must be split into several separate applications due to the different Listings of the buildings and the deadlines for the government’s public sector decarbonisation scheme funding, requiring work to be completed this year. Splitting the consent packages will also allow construction work to start on site earlier and ensure we meet the government deadlines.

The table across details the timeline for the applications.

Works Package	Package Description	Planning and Listed Building Consent Applications	Submission Date
1A	- Water Source Heat Pump Network (External) - Water Source Heat Pump and associated plant in the Power Hall	Application for Listed Building Consent for alterations to the Grade II Listed Power Hall for the creation of openings and the installation of plant plus the introduction of a services trench within its curtilage.	Submitted April 2021
1B	- Boiler House External Modifications (to facilitate installation of a new sub-station) - Pipework in the 1830 Warehouse (to facilitate installation of a new water source heat pump)	- Application for Listed Building Consent for installation of a services trench within the curtilage of the Grade II Listed New Warehouse. - Application for Planning Permission for external works to the Boiler Room including removal of an external staircase and making good in addition to the installation of a new balustrade and new doors. - Application for Listed Building Consent for alterations to the Grade I Listed 1830 Warehouse for the creation of openings and the installation of pipework plus the introduction of a services trench and borehole cover within its curtilage.	
2	Power Hall Roof Strip	Planning Permission and Listed Building Consent	May 2021
3	Power Hall New Roof, Windows & Doors and 1980s Platform Removal (to allow early investigative work)	Planning Permission and Listed Building Consent	June 2021
4	Power Hall Gallery Refurbishment	Planning Permission and Listed Building Consent	Autumn 2021



Special Exhibitions Gallery at the Science in Industry Museum, Manchester



New Architecture Gallery at the Grade II* RIBA headquarters, London



Windermere Jetty Museum, Lake District National Park

This statement has been prepared by Carmody Groarke on behalf of the Science and Industry Museum, Manchester, in collaboration with the design team:

Services Engineer – Max Fordham

Structural Engineer – Conisbee

Quantity Surveyor – Appleyard & Trew

Project Managers - Gardiner & Theobald LLP

Heritage Consultants - Donald Insall Associates

Planning Consultant - Deloitte Real Estate

Carmody Groarke has extensive experience designing cultural projects within historic settings, these include:

- Special Exhibitions Gallery in the grade II listed New Warehouse at the Science in Industry Museum
- New Architecture Gallery at the Grade II* RIBA headquarters, London
- Windermere Jetty Museum, Lake District National Park
- Grade II listed Dorset County Museum, Dorchester
- Grade I listed Tullie House masterplan, incorporating a contemporary vision for a Public Library, Museum and School of Art, Carlisle
- Refurbishment of a Grade I listed artist's house, Norfolk
- Grade I listed Abbot Hall Gallery masterplan, Cumbria
- Waddesdon Manor Pavilion, National Trust and Rothschild Foundation



Grade II listed Dorset County Museum, Dorchester



Masterplan for Grade I listed Tullie House, Carlisle.

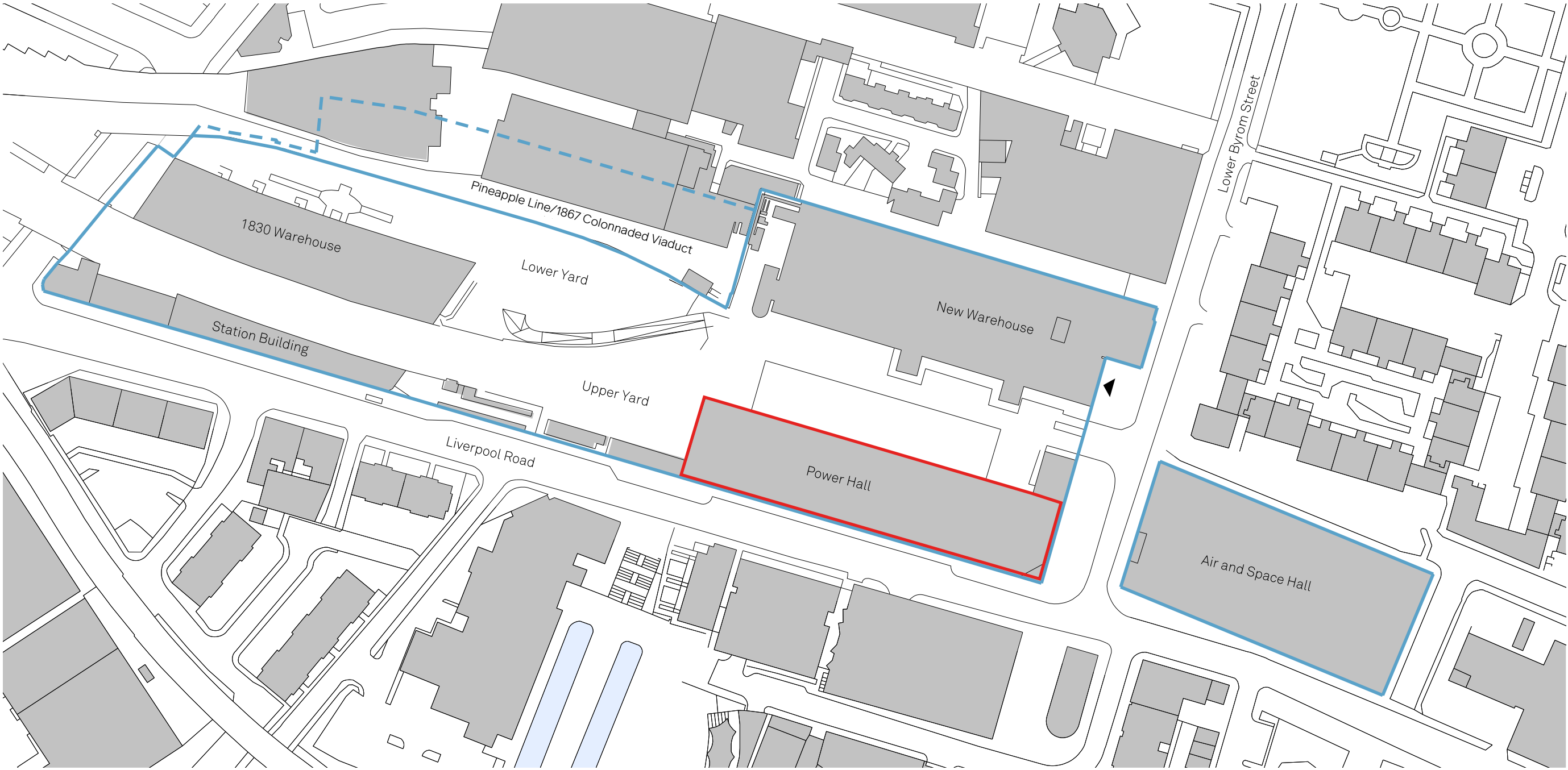


Refurbishment of a Grade I listed artist's house, Norfolk



The Science and Industry Museum is located within the Castlefield Conservation Area, an area with a mixture of visitor attractions, offices and residential uses. A number of new developments are proposed around the Museum boundary, including a new arts complex and mixed use development.

The Science and Industry Museum is situated on the site of a former railway station –Liverpool Road Station – which opened as part of the Liverpool and Manchester Railway in September 1830. The railway yard eventually fell out of use in the 1970s, was purchased by Greater Manchester County Council in 1978 and became the Museum's home in 1983.



The site is formed by a complex of railway structures and buildings and is regarded by Historic England as one ‘of the most significant railway sites in the world’:

- Grade I listed 1830 Warehouse, the first railway warehouse in the world.
- Grade I listed 1830 Station, the oldest surviving purpose-built railway passenger station.

- Grade II listed 1830 Viaduct, brick railway viaduct connecting the two buildings.
- Grade I listed, Station Master’s House,
- Grade II listed New Warehouse (Former Lower Byrom Street Warehouse).
- Grade II listed 1867 Colonnaded Viaduct (known as the Pineapple line), built in 1867

- Grade II listed Shipping Shed (known as the Power Hall), a transit shed added to the station in 1855
- Grade II listed, Goods Office (New Warehouse)
- Grade II listed Air and Space Hall.

Key

SIM boundary

2 Power Hall Roof Strip Off: Work Package 2

2.1 Historic Context

2.2 The Existing Building

2.3 Package 2 Roof Strip and Future Roof Proposals

2.1 Historic Context

2.1.1 History of the Power Hall

2.1.2 1980s Works

2.1.3 Historic Platform

2.1.4 Historic Roof and Modern Alterations



Exterior view of the Power Hall and external gantry, prior to restoration



Exterior view of the Power Hall south-east, prior to restoration

From Shipping Shed to Power Hall

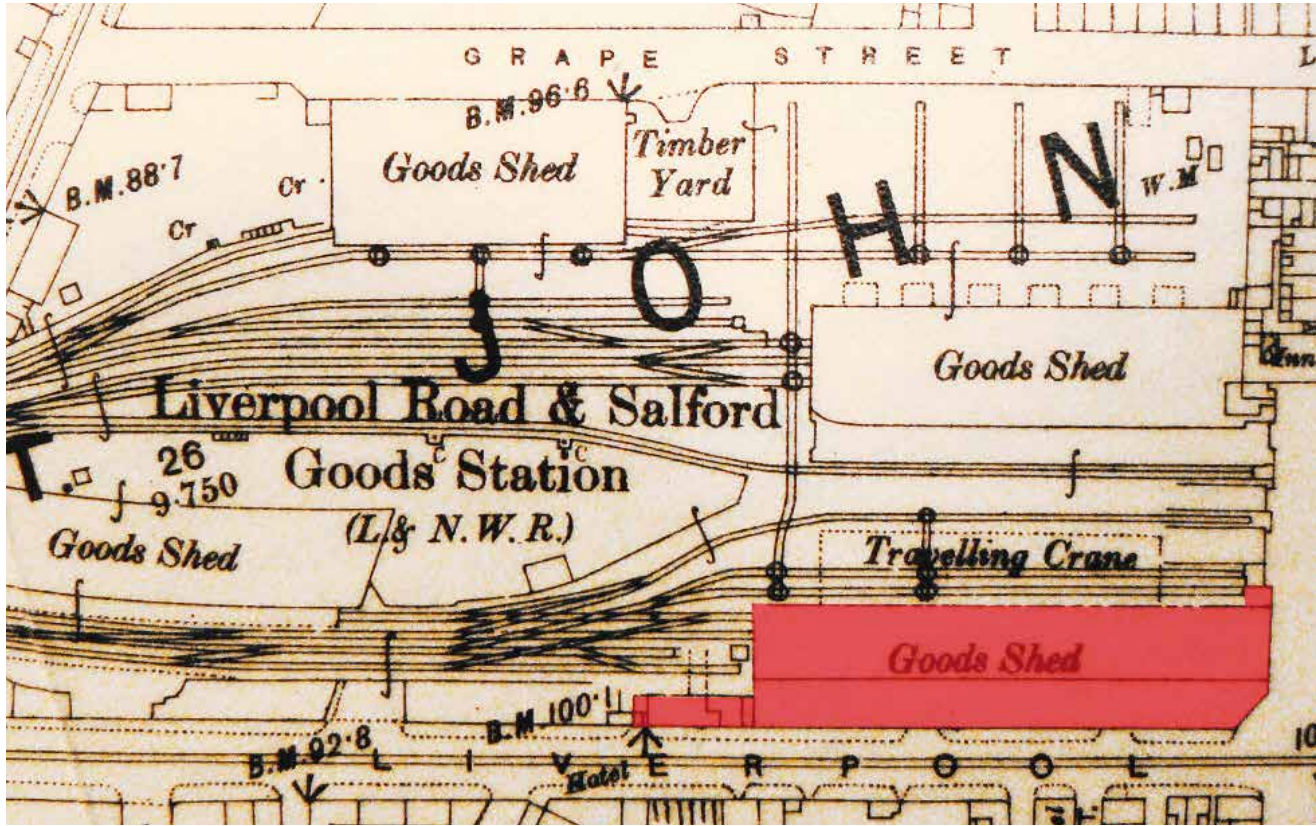
The Liverpool Road Railway Station was the Manchester terminus of the first inter-city passenger railway network in the world. Opened in 1830, the station served passenger trains for just fourteen years, and when Manchester Victoria Station opened in 1844, Liverpool Road became a goods depot.

The Power Hall was built in 1855 to serve as a Shipping Shed for the London and North Western Railway company (LNWR). The building served the purposed of unloading goods from trains, which entered the building to the north of the platform, and immediately loading them in to carts and trucks, which lined up on the south of the platform, for distribution.

In the early 1860s, an office block was added to the south western corner of the Power Hall, and around 1881, the exterior gantry crane was installed in the North Yard, adjoining the northern elevation of the Power Hall. The building was used as a goods transfer shed until 1975.



The Power Hall prior to restoration



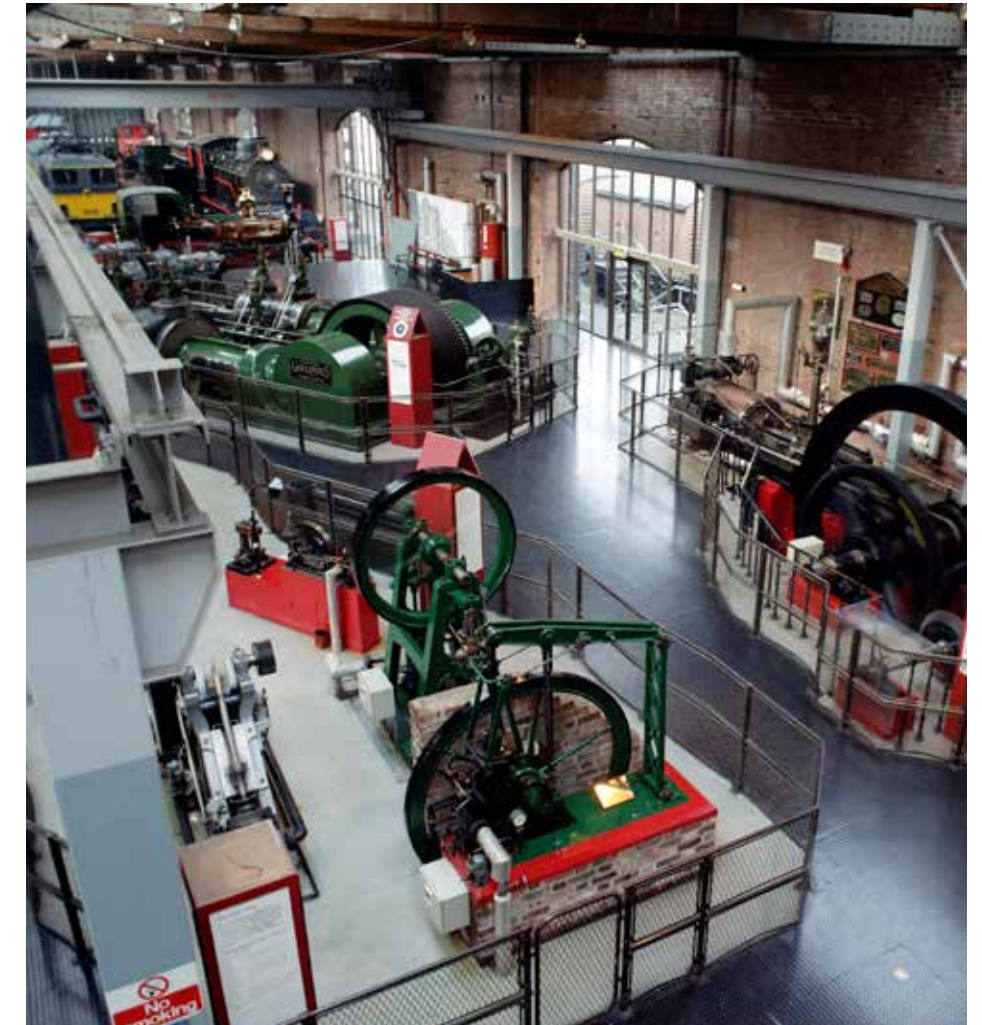
Historic plan showing the historic configuration of the Science and Industry Museum site



The Power Hall during 1980s restoration



The Power Hall during 1980s restoration



Today's Power Hall exhibition layout

From shipping shed to Power Hall

Manchester City Council purchased the entire station site for £30,000 when it became disused as a goods yard. In 1979, the Power Hall underwent a rapid series of structural repairs to enable it to open to the public for a celebration of the 150th anniversary of the Liverpool Road Station in 1980. In the early 1980s, further alterations and extensions were carried out to convert the building into an exhibition space. When it opened to the public in September 1983 the former Shipping Shed was officially renamed the 'Power Hall'.

The works carried out in the 1980s enabled the exhibition of a collection of steam, gas and electric engines as well as locomotives. Many of the machines were in working condition and tell stories of industry in Greater Manchester. A raised platform, which incorporated the existing loading stage, was built. The platform provided an ideal level for visitors to experience the exhibits at eye level. It was also during this period that the brick enclosure to house the beam engine was built.

The two-storey extension to the north east corner of the Power Hall was also added in the 1980s with the intention of housing visitor welcome facilities and orientation.

Refer to the accompanying Heritage Impact Assessment by Donald Insall Associates for further details of the Power Hall's history.



The Power Hall in 1979



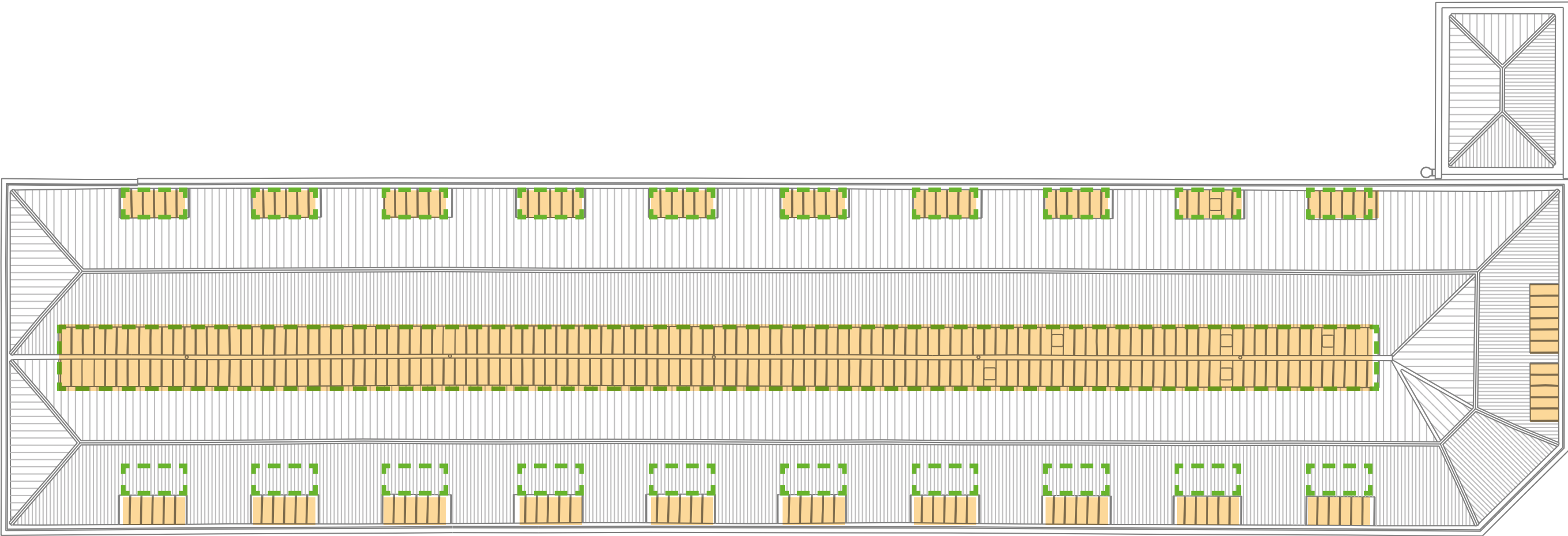
The Power Hall in 1978



The Power Hall in 1978

Historic Rooflight Locations and Modern Changes

The historic images above show the original rooflights in the Power Hall and the original appearance of the roof as seen from below.



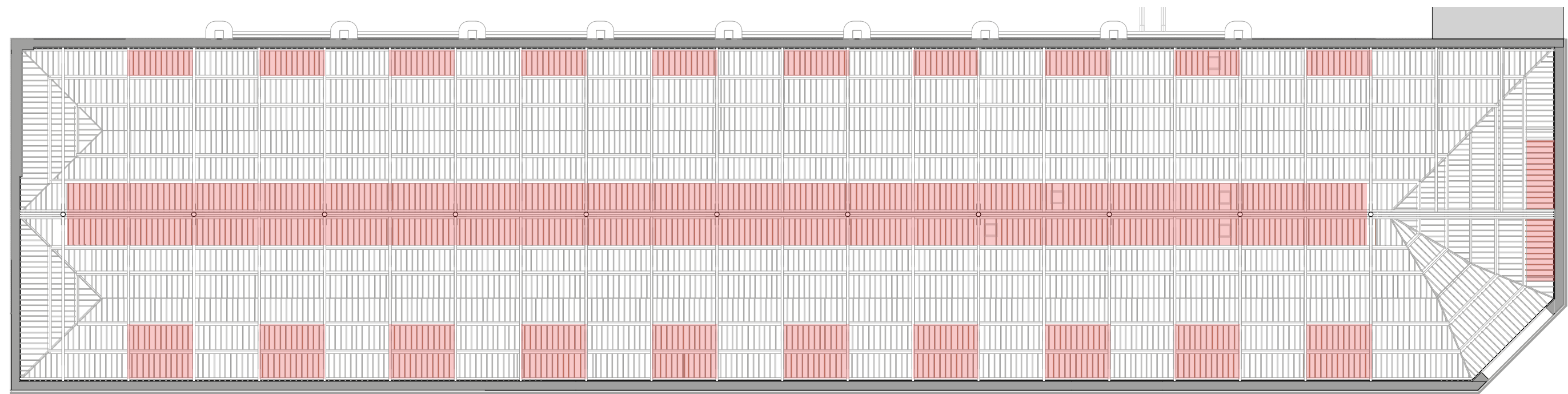
Historic Rooflight Locations and Modern Changes

The located indicated in green on the plan above show the locations of the original rooflights, which have been determined from the historic images.

The orange areas show the current locations of the modern rooflights as they are today.

Key

-  Historic rooflight locations
-  Current rooflight layout



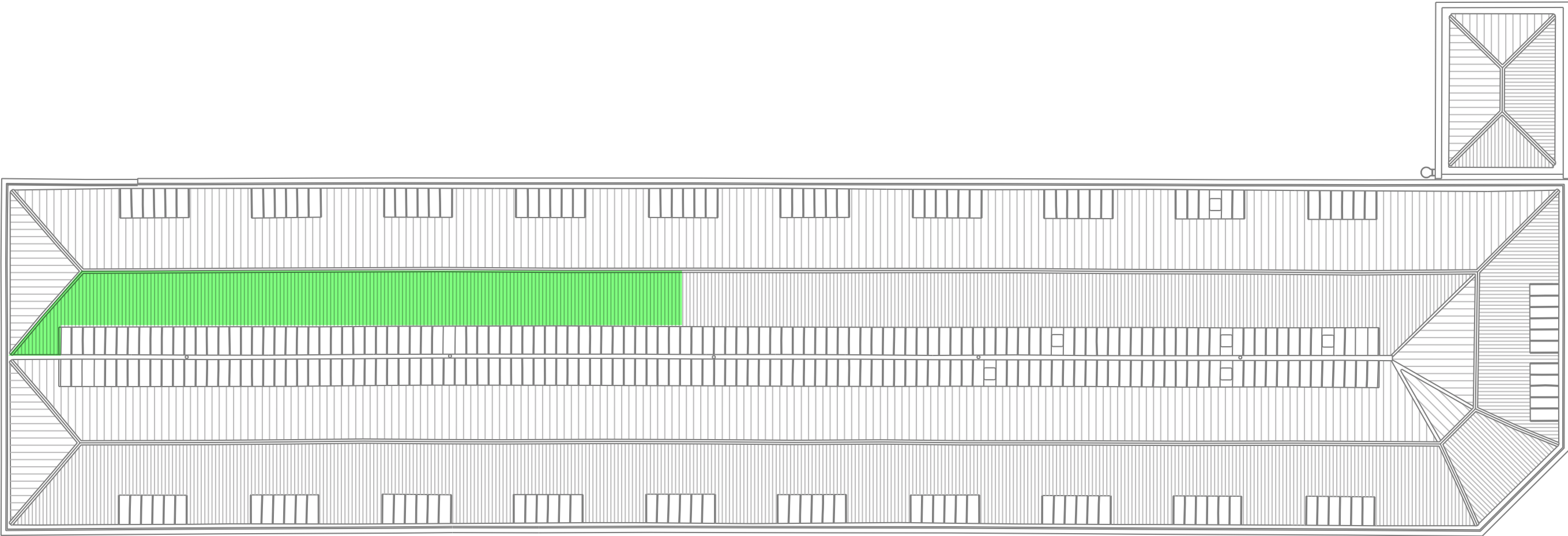
Location of modern rafters
The above drawing shows the areas where modern timber rafters have been installed. Historically there were no rafters directly below the rooflights, as can be seen from the historic images. It is likely that these were installed in the 1980s as part of the modern refurbishment works, as the current rooflights are supported by these rafters. These modern rafters were not installed at the same centres as the historic rafters and visually therefore they are misaligned.



View showing modern rafters below rooflights and historic rafters above

Key

Modern rafters



Roof slates

The roof is finished with Welsh stone slates. Generally these are 12x24" slates, but there is one area finished in diminishing coursed slates, as noted on the drawing above. It is assumed that these are likely to have been the original slates, reinstalled within this location when the the roof was reslated in the 1980's.

The other slated areas are likely to have been sourced to match the finish of the historic slates from salvage.



View along valley showing assumed historic slates on the left hand side

Key

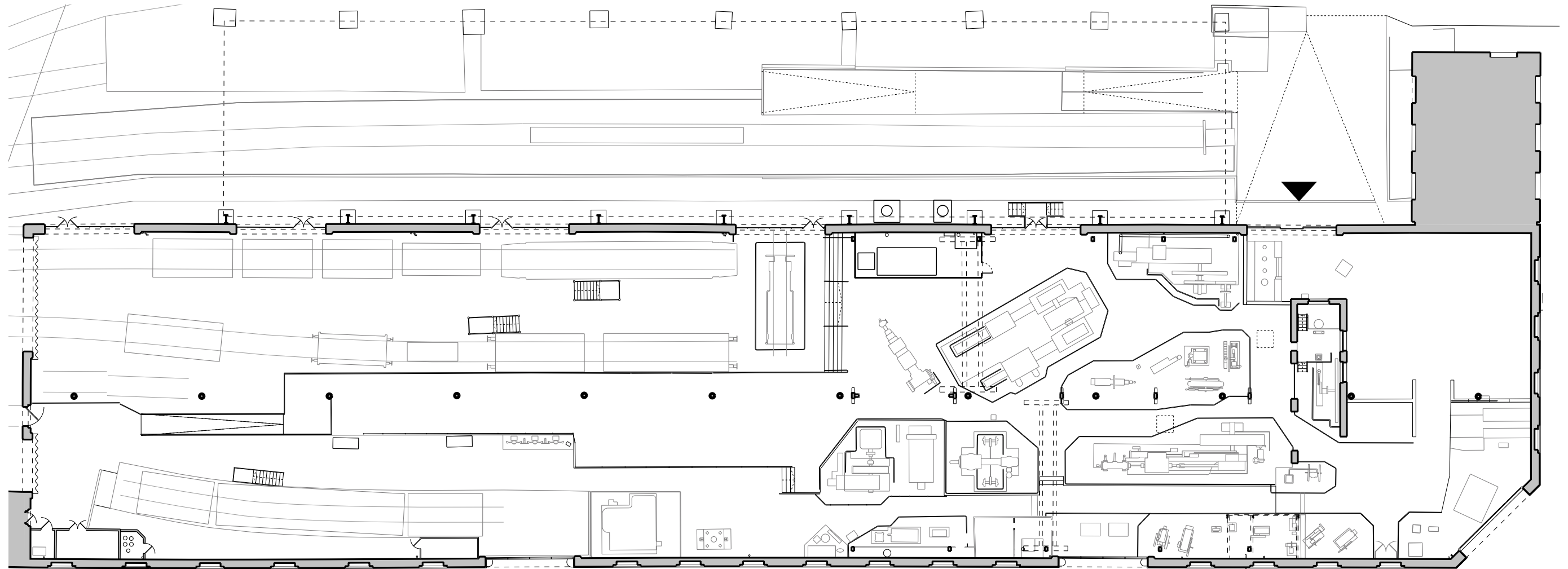
Area of assumed historic slates

2.2 The Existing Building

2.2.1 Configuration

2.2.2 Current Condition

2.2.3 Existing Roof Build Up



Following the urgent restoration of the Power Hall in 1979, carried out so that the building could open to the public to celebrate the 150th anniversary of the Liverpool Road Station, Manchester Council began to develop the site as a museum.

This layout has remained largely unchanged since the building was opened as the museum in the 1980s, with walkways and exhibits remaining in the same positions.



The Power Hall with current 1980s platform



Aerial view on to the 1980s platform



Signage and balustrades currently detract from exhibits



Mismatched floor finishes contribute to unclear visitor route



Current entrance, gantry crane and disused exterior platform



The North Yard with Power Hall (right) wrapped in scaffolding since 2019



View of the central valley roof and defunct ventilation units cutting through the rooflights



Interior view showing the covered exhibits

Current building condition
The Power Hall was closed to the public in 2018 due to roof leakage and risk of associated damage. It has since been covered with a scaffolding 'tent' to protect from rainfall and further deterioration. Further scaffolding was installed internally to provide a roof crash deck. The Historic Working Machines exhibited in the Power Hall, which cannot be moved without great expense due to their size and weight, have been covered with tarpaulin for protection.

Power Hall Access
Site ownership has now been taken by the contractor HH Smith, the contractor undertaking the Package 1 works on the site. Public access is not possible and the building will not be reopened to the public until the wider scheme has been completed.

The proposed Package 2 works will not change the current access arrangements.



View of the Power Hall exterior with scaffold enclosure



Interior view showing the covered exhibits



Roof gutter condition



Roof gutter condition



Efflorescence on exterior south facade



Water damage to existing timber roof structure



Water damage to existing timber roof structure



Rotting timber where trusses meet masonry

Roof Condition

- The existing roof is in poor condition and requires extensive refurbishment work. There are multiple areas of water ingress which will threaten the integrity of the timber structure if not addressed. The structure is understood to be in moderately good condition, with only local repairs required. Removal of the slate tile roof finish will allow inspection of the top side of the timbers to determine whether more extensive repairs are required.
- Some repairs to the truss ends will be necessary. Splits in timbers will need to be addressed and repair and strengthening work are likely to be required in order to stabilise the existing timber structure.
- The rooflights are attributed to leaks within the Power Hall, which is damaging both the brickwork and timbers. Replacement of these rooflights and minor modifications to the roof detailing are therefore required to protect the building structure and historic fabric.

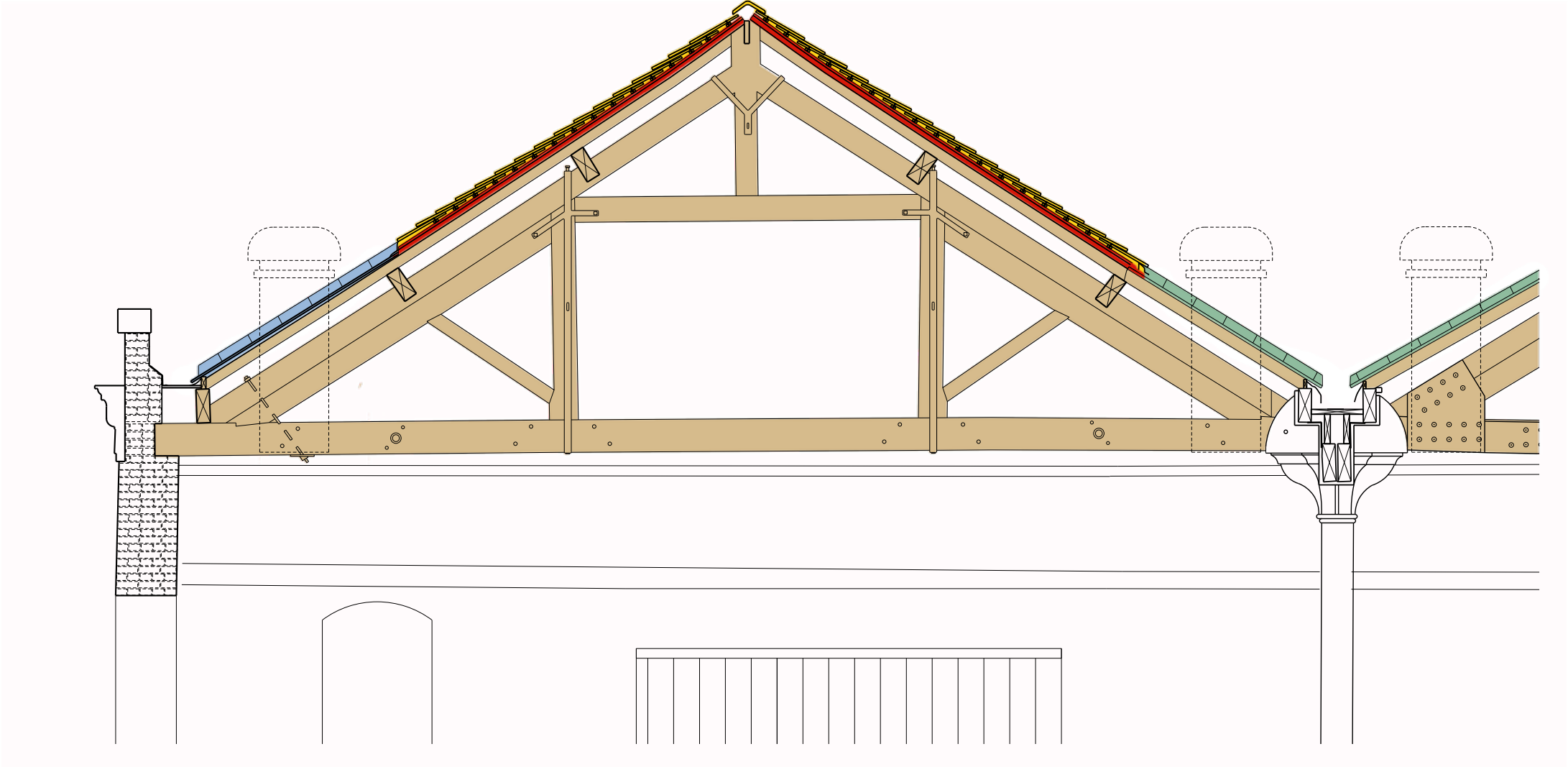
Drainage System

- The building has a continuous perimeter gutter behind the brick parapet and a central valley gutter between the two roof pitches. Both of these gutters are of modern construction; metal lined onto plywood/softwood supports.
- The original building was designed to utilise the central line of columns as internal rainwater down pipes to convey water from the central valley gutter. At the perimeter the rainwater pipes are located internally, against the perimeter wall.
- A CCTV survey is being undertaken to determine the capacity limitations of this system to allow new gutters and drainage design to be implemented.

Walls and Floors

- Due to the water ingress issues, both interior and exterior masonry walls are damaged and require localised repair with replacement and/or repointing required in areas. A full survey is required to determine the scope of these works.
- The existing floors are patchwork of finishes including historic cobbles, concrete slabs and tarmac, alongside the rubberized 1980s platform finish. Local repairs are necessary to make building safe and a holistic approach is required in relation to improving accessibility.

- Existing Roof**
The existing roof build up consist of the following elements:
- The primary roof structure is formed by original timber trusses, which span between the perimeter brick walls and the central timber fitch beams, supported by cast iron columns.
 - Original timber purlins span perpendicular across the trusses
 - Timber rafters run up the height of the roof at approximately 380mm centres. Some of these rafters are not original and were installed as part of the 1980s works.
 - Rooflights run along the perimeter and the central valley of the roof, these were installed as part of the 1980s works.
 - An insulated plasterboard lining sits above the rafters, presumed to have been installed as part of the 1980's works. The paper finish to the plasterboard has been left exposed internally. The U-value of the current roof is assumed to be approximately 2.44W/m2K.
 - The roof is finished with Welsh slates on timber battens.



Key

- Existing timber structure
- Modern insulation backed plasterboard
- Slate tiles
- Perimeter rooflights
- Valley rooflights

Existing Roof
The pictures to the left show the current roof condition and appearance inside and out.



View of the slate roof and rooflights



View of the central valley gutter and rooflights



View of the parapet and outer roof pitch



View of the existing roof structure and exposed plasterboard lining



View of the existing structure and rooflights



View of a typical cast iron column and fitch beam along the central valley (as seen from the temporary scaffold deck)

2.3 Package 2 Roof Strip and Future Roof Proposals

2.3.1 Roof Strip

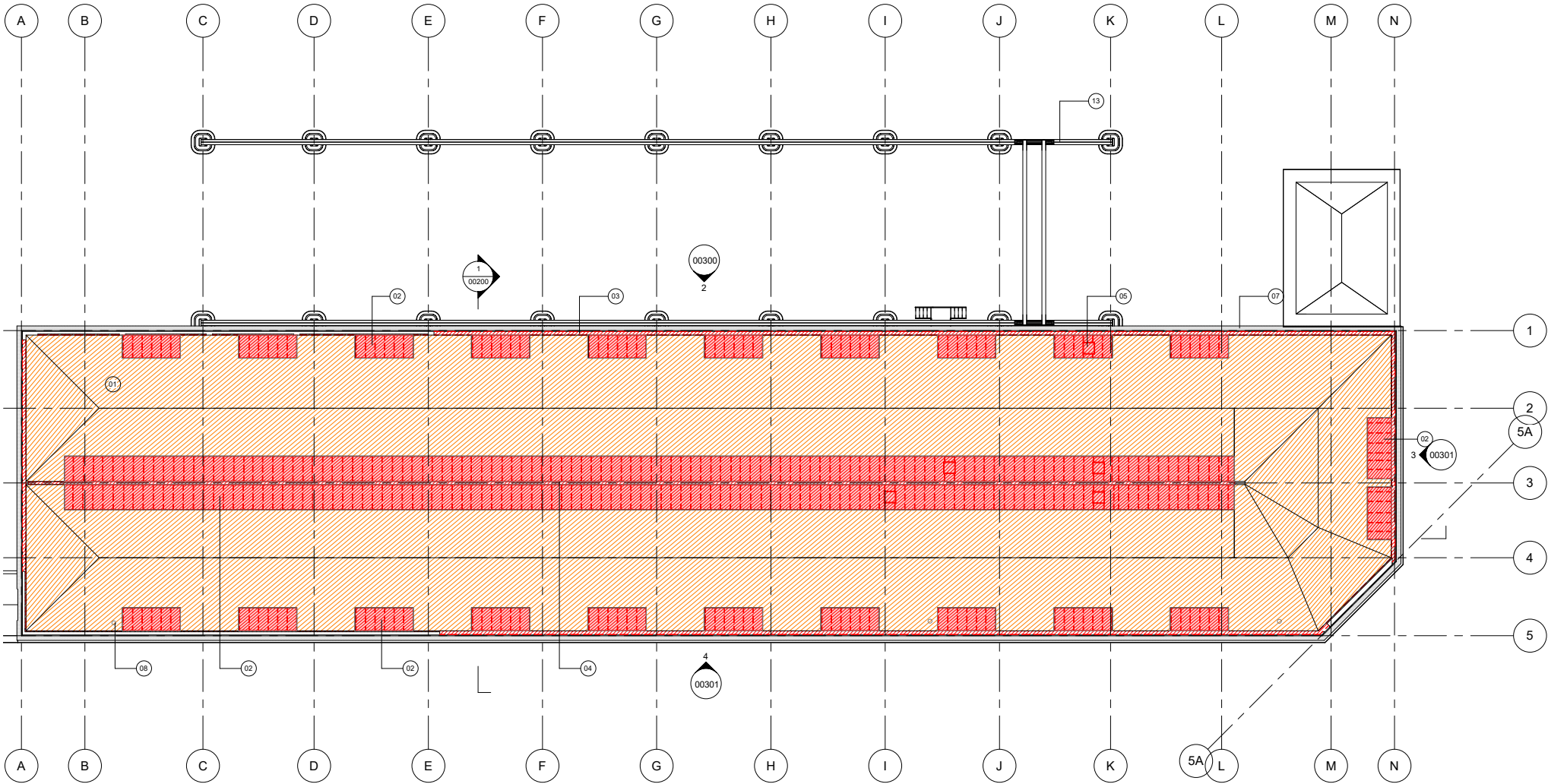
2.3.2 Future Roof Proposals

Proposed Roof Strip Plans
The proposed demolition roof plan to the left shows the proposed elements to be removed as part of the strip out works.

- The existing slate tiles will be removed, sorted and set aside for re-use (where possible)
- The existing modern rooflights will be removed along with the modern rafters installed below them.
- The existing gutter linings will be removed.

A full description of the proposed methodology is provided in the accompanying Method Statement prepared by H.H Smith.

For further detail please refer to the drawings submitted alongside this submission.



Proposed demolition Roof Plan

Key

To be set aside and reinstalled

To be removed

01. Slate roof finish	09. Timber truss
02. Single glazed roof lights	10. Glazed windows
03. Parapet gutter lining	11. Blind windows
04. Valley gutter lining	12. Industrial metal shutter
05. Ventilation Cowles	13. Gantry
06. Timber gutter support	14. Brick and stone cornice
07. Brick Parapet	
08. Building services / pipework	

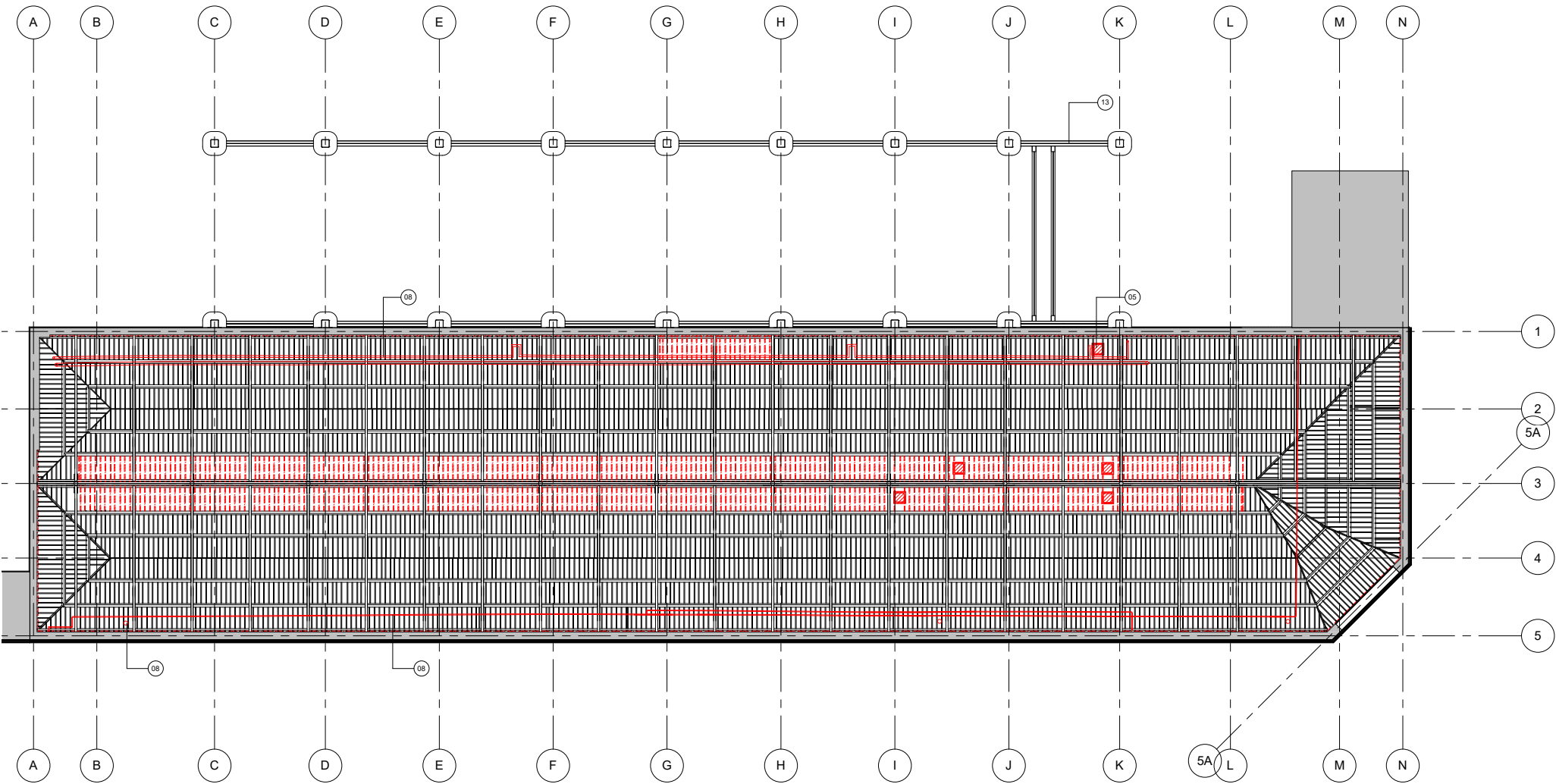
Proposed Roof Strip Plans

The proposed demolition reflected ceiling plan to the left show the proposed elements to be removed as part of the strip out works:

- The existing modern rooflights will be removed along with the modern rafters installed below them.
- The redundant high-level modern pipework running at roof level through the trusses will be removed.

A full description of the proposed methodology is provided in the accompanying Method Statement prepared by H.H Smith.

For further detail please refer to the drawings submitted alongside this submission.



Proposed demolition reflected ceiling plan



View showing modern rafters below rooflights and historic rafters above

Key

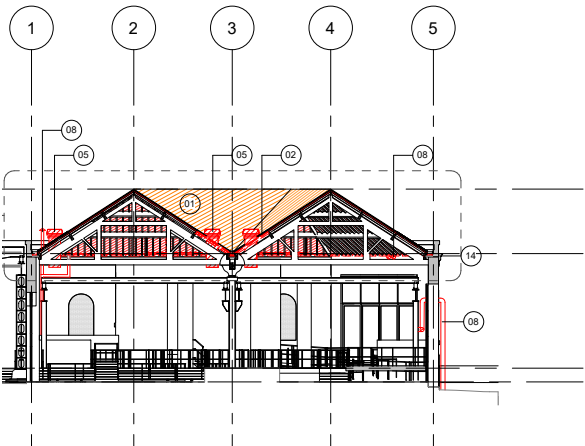
- To be set aside and reinstalled
- To be removed

- | | |
|----------------------------------|------------------------------|
| 01. Slate roof finish | 09. Timber truss |
| 02. Single glazed roof lights | 10. Glazed windows |
| 03. Parapet gutter lining | 11. Blind windows |
| 04. Valley gutter lining | 12. Industrial metal shutter |
| 05. Ventilation Cowles | 13. Gantry |
| 06. Timber gutter support | 14. Brick and stone cornice |
| 07. Brick Parapet | |
| 08. Building services / pipework | |

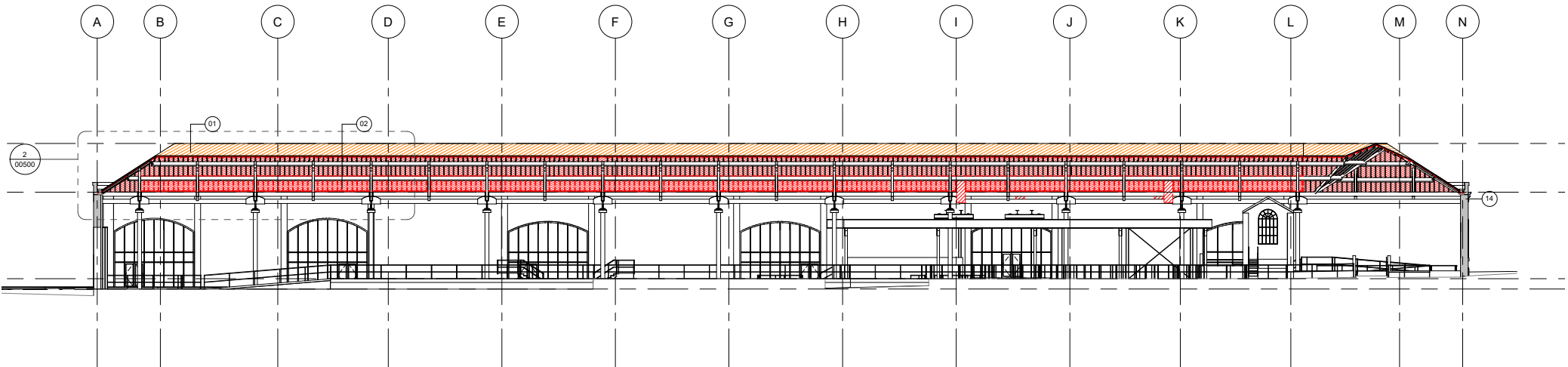
Proposed Roof Strip Plans
The proposed demolition sections to the left show the proposed elements to be removed as part of the strip out works, as described on previous pages.

A full description of the proposed methodology is provided in the accompanying Method Statement prepared by H.H Smith.

For further detail please refer to the drawings submitted alongside this submission.



Proposed demolition short section



Proposed demolition longitudinal section

- Key**
- To be set aside and reinstalled
 - To be removed
- | | |
|----------------------------------|------------------------------|
| 01. Slate roof finish | 09. Timber truss |
| 02. Single glazed roof lights | 10. Glazed windows |
| 03. Parapet gutter lining | 11. Blind windows |
| 04. Valley gutter lining | 12. Industrial metal shutter |
| 05. Ventilation Cowles | 13. Gantry |
| 06. Timber gutter support | 14. Brick and stone cornice |
| 07. Brick Parapet | |
| 08. Building services / pipework | |

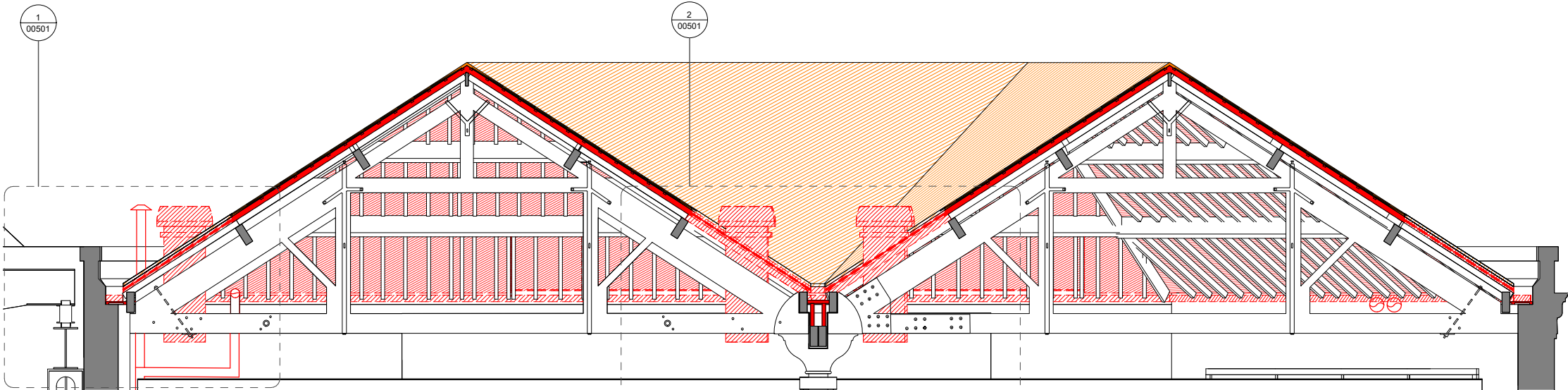
Proposed Roof Strip Section
The section to the left shows the layers of the roof to be removed and set aside for reuse, or stripped off the roof

The existing modern insulation backed plasterboard sitting above the rafters will be removed, along with the battens for the slates above. The slates, which are to be set aside for re-use, will be carefully stripped, sorted and reinstalled. Any slates which can not be salvaged for reuse will be recycled.

The modern ventilation cowls shown in elevation in this drawing will also be removed.

A full description of the proposed methodology is provided in the accompanying Method Statement prepared by H.H Smith.

For further detail please refer to the drawings submitted alongside this submission.



Key

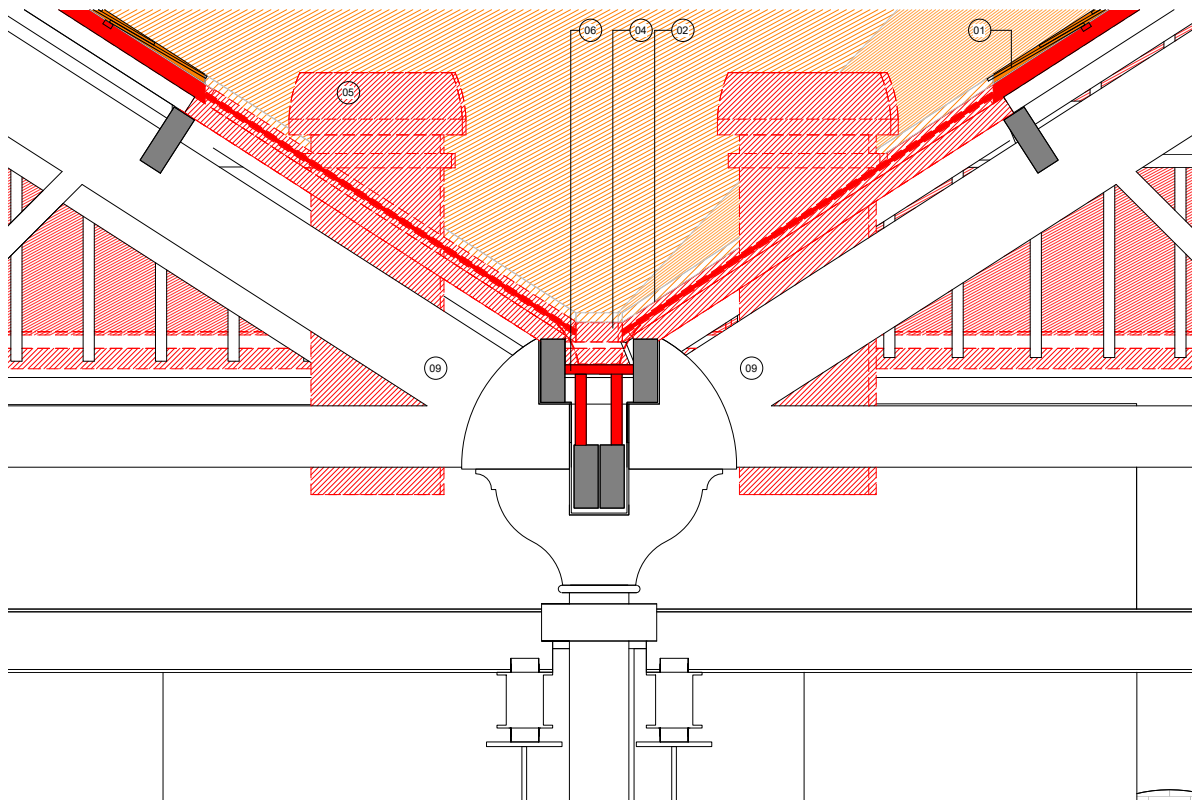
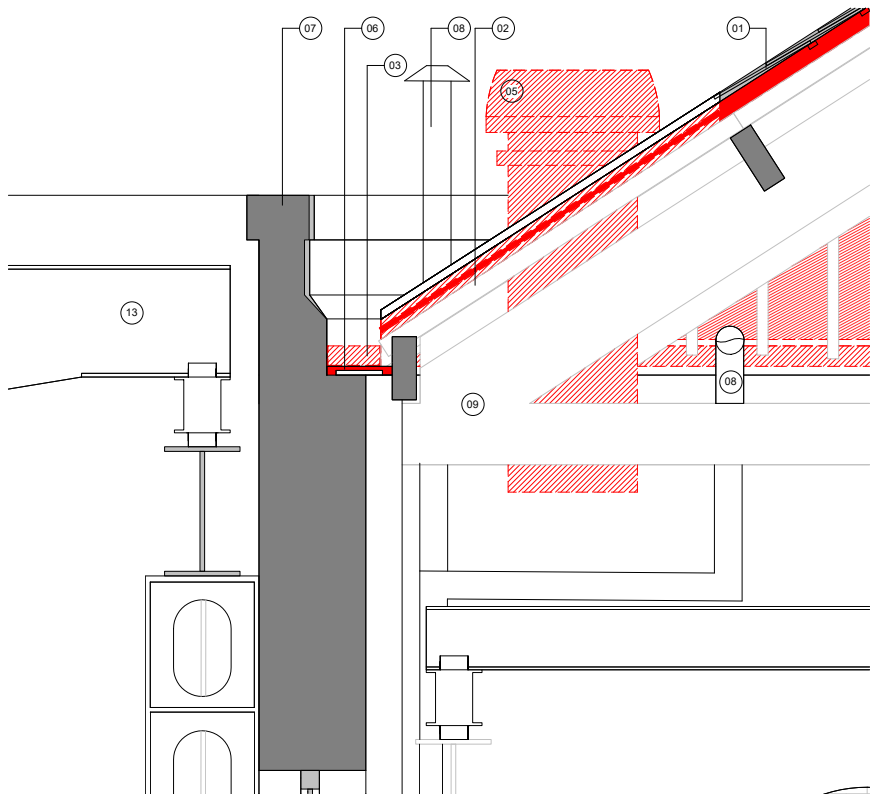
- To be set aside and reinstalled
- To be removed

- | | |
|----------------------------------|------------------------------|
| 01. Slate roof finish | 09. Timber truss |
| 02. Single glazed roof lights | 10. Glazed windows |
| 03. Parapet gutter lining | 11. Blind windows |
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| 05. Ventilation Cowles | 13. Gantry |
| 06. Timber gutter support | 14. Brick and stone cornice |
| 07. Brick Parapet | |
| 08. Building services / pipework | |

Proposed Roof Strip Details
The details on this page show the areas of gutter to be stripped off as part of the package 2 works. The existing modern metal gutters and flashings have been shown to be inadequate with repeated issues of water ingress to the building and will be removed (along with the modern timber gutter supports) to allow for a more robust detail to be installed, which will provide protection to the heritage elements of the building for the future. Proposals for a more robust detail will be submitted as part of the Package 3 submission.

A full description of the proposed methodology is provided in the accompanying Method Statement prepared by H.H Smith.

For further detail please refer to the drawings submitted alongside this submission.



- Key**
- To be set aside and reinstalled
 - To be removed
- | | |
|----------------------------------|------------------------------|
| 01. Slate roof finish | 09. Timber truss |
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| 07. Brick Parapet | |
| 08. Building services / pipework | |

The Power Hall roof, which is currently completely covered and protected by a scaffold enclosure, will remain protected until the new roof proposals have been completed. The future roof proposals are as follows:

Future Roof Proposals

- The new roof build up will provide improved waterproofing details and drainage to prevent further damage to the building from water ingress in perpetuity, this means detailing new gutters to the perimeter and central valley. This is a key requirement forming part of the essential repair work for the museum to be able to re-open the Power Hall safely to the public.
- Structural repairs to the existing timber roof structure will also be carried out as part of the essential repair works.
- The existing welsh slates will be set aside and retained as far as possible to be reused in the new build up. Reclaimed welsh slates will be sourced to match the existing where additional make-up is required. The new build up will provide improved thermal performance, reducing the overall energy output of the Power Hall. This ties in to the wider masterplan for decarbonisation of the Science and Industry Museum site, funded by the government green grant scheme.
- Replacement rooflights will provide better thermal performance with double glazing, and will give better protection to the exhibits with UV protection.
- A new access system will need to be provided as part of the maintenance strategy for the roof

Further details of the proposed roof will be submitted shortly as part of the Package 3 Planning Permission and Listed Building Consent submission.

