HUDDERSFIELD STATION AND VIADUCT DESIGN GUIDE

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P04

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Document History

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P01	13.10.2023	JEC	First Issue
P02	14.12.2023	JEC	Minor updates following Kirklees Comments on 07.12.2023
P03	11.04.2025	JEC	Footbridge information added in Section 4.5
P04	07.11.2025	JEC	Access walkway, Footbridge, Subway added

Huddersfield Station Design Guide

The purpose of this is to provide design information on the scheme at Huddersfield Station. This will be used to supplement Listed Building Consent (LBC) Condition 5

LBC Condition 5 is as follows and is concerned with the production of a Conservation Implementation Management Plan (CIMP):

No works including any works of demolition shall commence until a Conservation Implementation Management Plan (CIMP) for Huddersfield Station has been submitted to and approved in writing by the local planning authority. The approved CIMP will include as a minimum requirement contents based on the model template CIMP structure attached to this list of conditions.

The CIMP will specifically include methodologies for:

i) fabric removal, masonry repairs, vegetation removal, repointing, metalwork repairs and application of protective paint systems as appropriate;

ii) repairs and strengthening to the existing fabric of the train-shed roof at Huddersfield Station;

iii) the deconstruction, storage and reconstruction of the Tea Rooms at Huddersfield Station;

iv) the identification of historic elements of the fabric which once removed may be reused or preserved, and a strategy for their storage or reuse;

v) any improvements to the setting to sustain, enhance and better reveal the heritage asset affected;

vi) details of the maintenance access regime with particular reference to the roofs;

vii) dissemination of "toolbox talks" to personnel involved in demolition and construction works;

viii) provision of heritage interpretation boards during construction works;

ix) the exact affixing details of overhead line electrification; and

x) an overarching design guide covering both Huddersfield Station and Huddersfield Viaduct.

The works must be carried out in accordance with the approved CIMP unless otherwise agreed in writing with the local planning authority.

Information Release

Due to the nature of the detailed design process, the information in the design guide will be updated in stages in order to coincide with the various CIMP phases. Below is the list of Phases:

Phase of CIMP	Construction Work (To be undertaken after Phase of CIMP submitted / discharged)
Phase 1	Enabling works to ensure conservation of Tea Room prior to Roof works: - Deconstruction of the Tea Rooms - Commencement of storage of Tea Rooms
Phase 2	Works prior to first blockade, including: - Erection of scaffolding under Roof A - Refurbishment and strengthening of Roof A - Removal of Manchester End bays of Roof A - Works to Penistone Line Canopy
Phase 3	Works during and immediately after first blockade, including: - Demolition of signal box / relay room - Demolition of cable gantry - Demolition of Roofs B and C - Piling and foundations for new canopies - Commencement of construction of footbridge - Commencement of works to platforms - Commencement of works to subways

Phase of CIMP	Construction Work (To be undertaken after Phase of CIMP submitted / discharged)
Phase 4	Works following commissioning of first span of the footbridge, up to the start of the second blockade, including: - Completion of footbridge - Works to new Platforms 5 / 6 - Construction of new canopies - Completion of works to subways - Preparation work for Roof A Leeds End extension
Phase 5	Works to ensure the conservation, repair and to realise the reconstruction of the Tea Rooms: - Storage, repair and reconditioning of the Tea Rooms - Commencement of reconstruction of Tea Rooms
Phase 6	Works during second blockade and thereafter, including: - Completion of Roof A Leeds End extension - Construction of OLE - Completion of works to platforms - Completion of reconstruction of Tea Rooms

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Section 1
Introduction

01

1.1 TransPennine Route Upgrade

Network Rail submitted a Transport and Works Act Order (TWAO) to authorise changes proposed to Huddersfield station and viaduct as part of the wider TransPennine Route Upgrade (TRU) project. The station is Grade I Listed and as such Listed Building Consent and the work as a whole Planning Consent has been applied for and granted.

The TransPennine Route Upgrade Programme has been established to increase capacity and improve reliability and journey times on the route between Manchester Victoria and York, via Huddersfield and Leeds.

The Programme will be delivered via a series of discrete interventions, of which Huddersfield Station is one. Route-wide signalling and electrification enhancements will also be implemented to support these interventions.

Work was undertaken in 2017 to identify, sift and select options within the Huddersfield to Ravensthorpe section of the route. It was agreed that these interventions should deliver an electrified four-track railway with a grade separated junction in the Ravensthorpe area. They should also provide a railway compliant to modern standards, and the major works should be constructed with proportionate disruption to the current operational railway and other third parties.

The primary focus of the Huddersfield to Ravensthorpe section of the route is to provide sufficient capacity and operational robustness to meet the remitted timetable. Additionally, they must also provide significant journey time improvements through line speed increases and by de-confliction of train services.

All train services on the line will stop at Huddersfield. Stopping services from Manchester will terminate and reverse here; similarly, stopping services from Leeds will do the same. Fast and semi-fast services will continue through to their respective destinations.

Huddersfield Station is the western fringe of the proposed four-track section of railway which extends to Westtown just outside Dewsbury. Beyond Huddersfield the railway reverts to two tracks towards Manchester, with the single track of the Penistone Line diverging from the route at Springwood Junction.

1.2 Aims for the Huddersfield Area

At Huddersfield Station, the approach for the development of the new platform and roof design was to ensure that the design takes account of the high level requirements of the TRU and stakeholder ambitions for both the short and long term. Whilst this begins with the permanent way design, it also responds to the requirements of the stakeholder consultation with Historic England and Kirklees Metropolitan Borough Council with respect to the heritage significance and exceptional interest of the station.

The approach to the design was to ensure the following core design principles.

- A facility that provides safety, security and comfort to passengers
- A platform arrangement to accommodate forecast numbers
- Platform facilities that provide operational train planning capacity
- Platform arrangement that can be safely and efficiently managed
- Best practice sustainability design principles applied to the design
- Step free access for all in accordance with the Equality Act 2010
- Arrangements to ensure wayfinding routes are easily identifiable
- A design across all levels which complement the existing station, the adjacent context and the character of the area
- Respect for the qualities of the heritage assets and local urban grain

1.2.1 Station interventions

The key interventions proposed for Huddersfield station are as follows:

1. Altered platforms and new track layout in order to achieve the high-level objectives of the TRU Programme.
2. A new footbridge providing alternative access to all island platforms.
3. A new through platform at the rear of the station. This will be accessed via an extension to the existing subway and the footbridge. The existing bay platforms of the existing island platform will be infilled and reduced in width.
4. Platforms extended over the first span of Huddersfield Viaduct to achieve a minimum of 150m and 200m usable platform length for bay and through platforms respectively (excluding the Penistone Line).
5. Modifications to, and partial removal of, the existing roof structures.
6. A new roof to replace removed structures, and new small-scale canopies over extended platforms.
7. Relocation of the Tea Rooms.

Key constraints at Huddersfield include aspects of the station's heritage significance, along with various limitations imposed by surrounding buildings and structures. Please refer to the Heritage Assessment and Section 3 of the CIMP for further details. There are also a number of constraints from Network Rail requirements that need to be factored into the design. In particular, but not limited to, the Stations Design Principles for Network Rail and Design Standards for Accessible Railway Stations.

Section 2
Existing Station

02

2.0 Existing Station

2.1 Physical Context

2.1.1 Surroundings

Huddersfield Station forms the west side of St George's Square in the centre of the town. The principal pedestrian approach is through the square, with the strict symmetry of the station façade recently reinforced by public realm improvements in the square itself (Fig.3.1a). Many of the buildings around the square are also listed. These are mostly commercial, with the exception of the George Hotel, and generally reflect the scale and classical architecture of the station building.

The rear of the station is overlooked by two large Victorian railway warehouses which previously formed part of a large railway goods yard, along with a surviving accumulator tower – all listed at Grade II (Fig.3.1b). The goods lift of the larger warehouse, which features an arcade of large Doric columns, is aligned approximately with the central axis of the Principal Building. Although several railway sidings survive, the majority of the goods yard is now a public car park.

The station is overlooked from the south by the Westgate Bridge, which forms the northern portal to Huddersfield Tunnel (Fig.3.1c). To the north, the railway runs over the John William Street bridge and along the elevated Huddersfield Viaduct (both listed at Grade II) with commanding views over the surrounding landscape (Fig.3.1d).

The station is a Grade I listed building, the details of which are further outlined in the Statement of Significance. The station and surrounding buildings form part of the Huddersfield Town Centre Conservation Area.

The site is also part of the Huddersfield Town Centre Blueprint initiative.

Figure 2.1a: Overlooking St George's Square

Figure 2.1b: Overlooking the former goods yard

Figure 2.1c: Looking south-west

Figure 2.1d: Looking north over Huddersfield viaduct

2.1.2 Heritage assets nearby

The station lies within the Huddersfield Town Centre Conservation Area, the boundary of which is indicated on Fig.xxx with a blue dashed line. The list below identifies the listed buildings adjacent to the train station, with the level of designation indicated by the colour key.

Image showing Conservation Area and listed buildings to be included in a later CIMP Phase.

2.1.3 Key views

The views to the right indicate the pedestrian approaches to the site from Railway Street (image 1), St. George's Square (image 2), Brunswick Street (image 3) and Trinity Street (images 4 & 5).

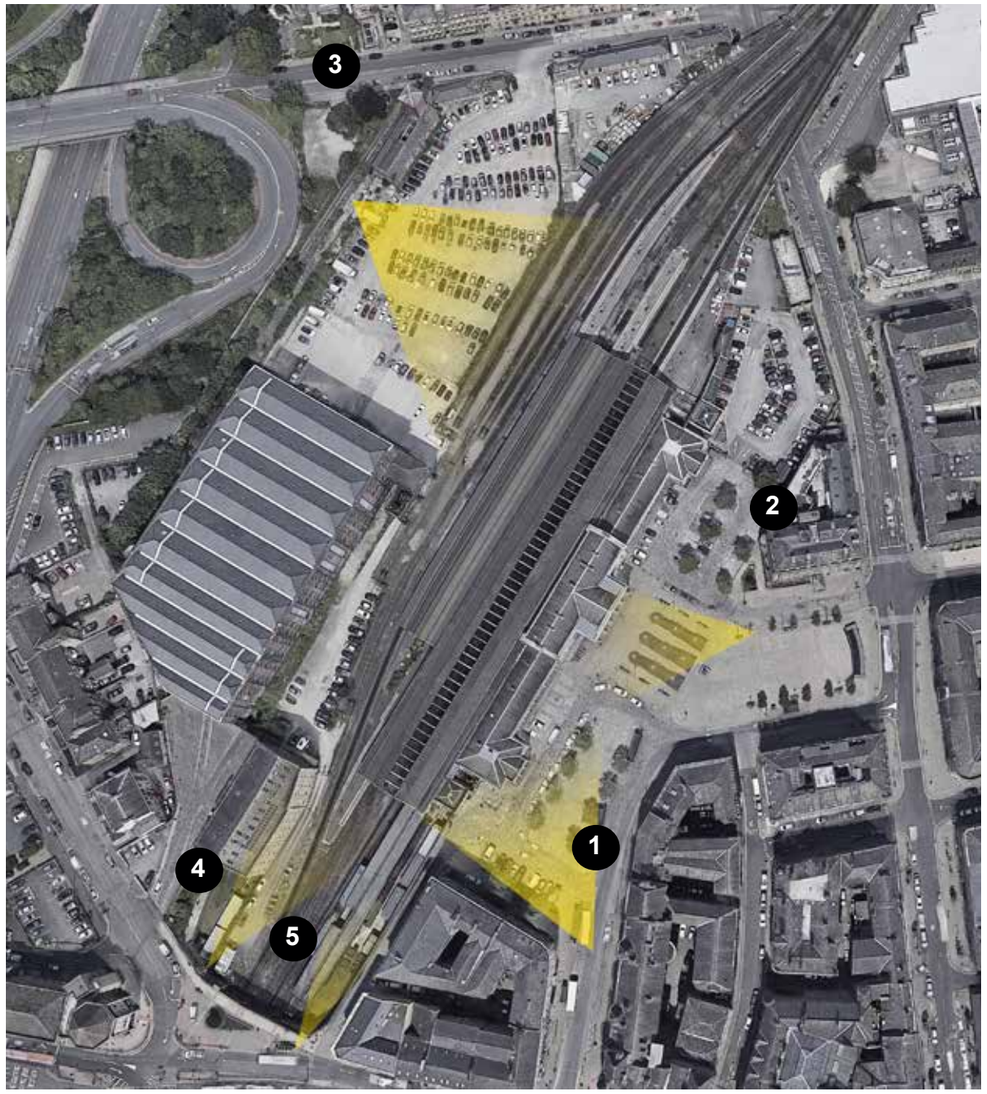


Figure 2.1.3a: Approaches to station

2.2 Station

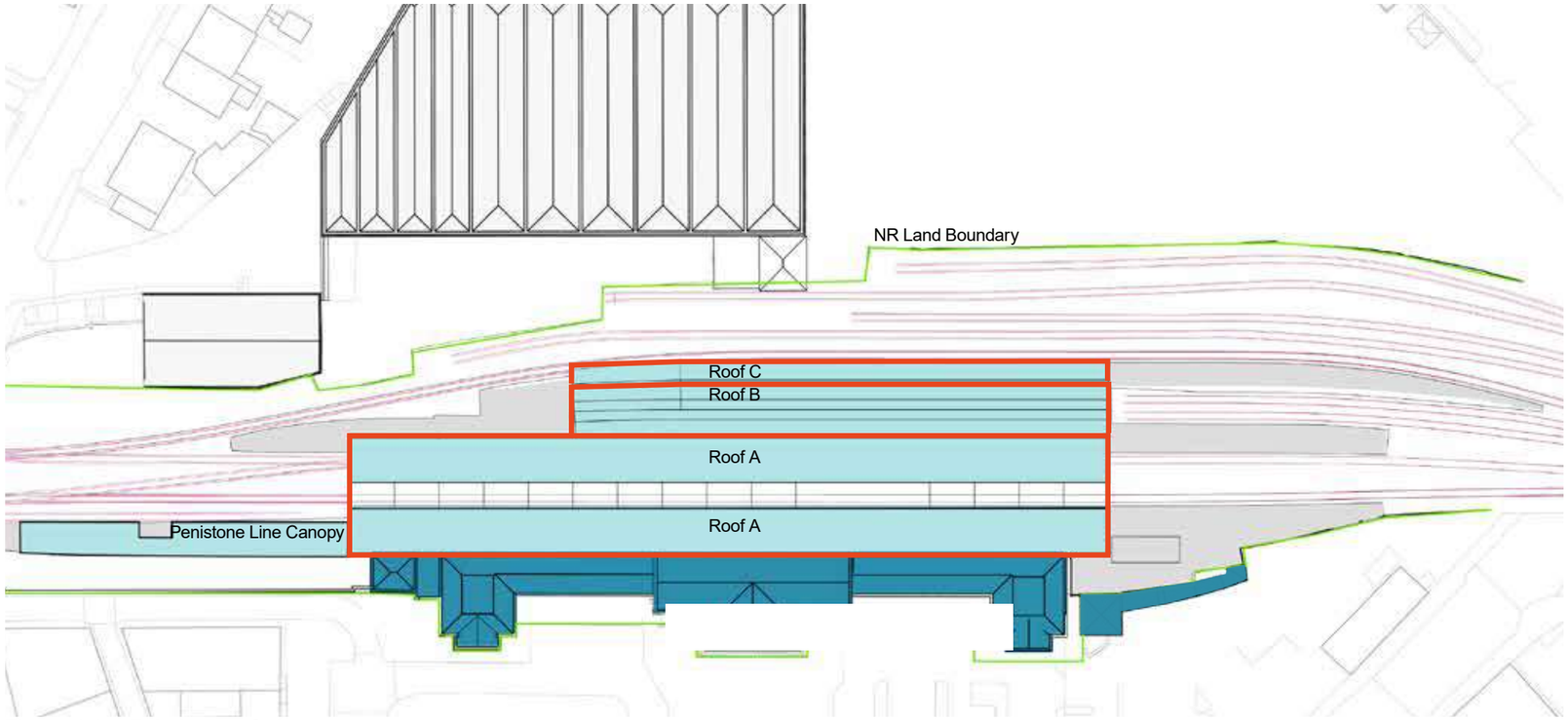


Figure 2.2a: Existing roof plan

1. Relay Room
2. Coffee Stand
3. Acc. WC / Baby
4. Customer Assistance
5. Male/Female WC
6. Waiting Room
7. Cafe
8. Cycle Storage
9. WC's
10. Newsagents
11. Principal Existing Building & Main Entrance
12. Ticket Office
13. Existing Lift & Stair
14. Existing Tea Rooms location

Existing
Platform
Circulation

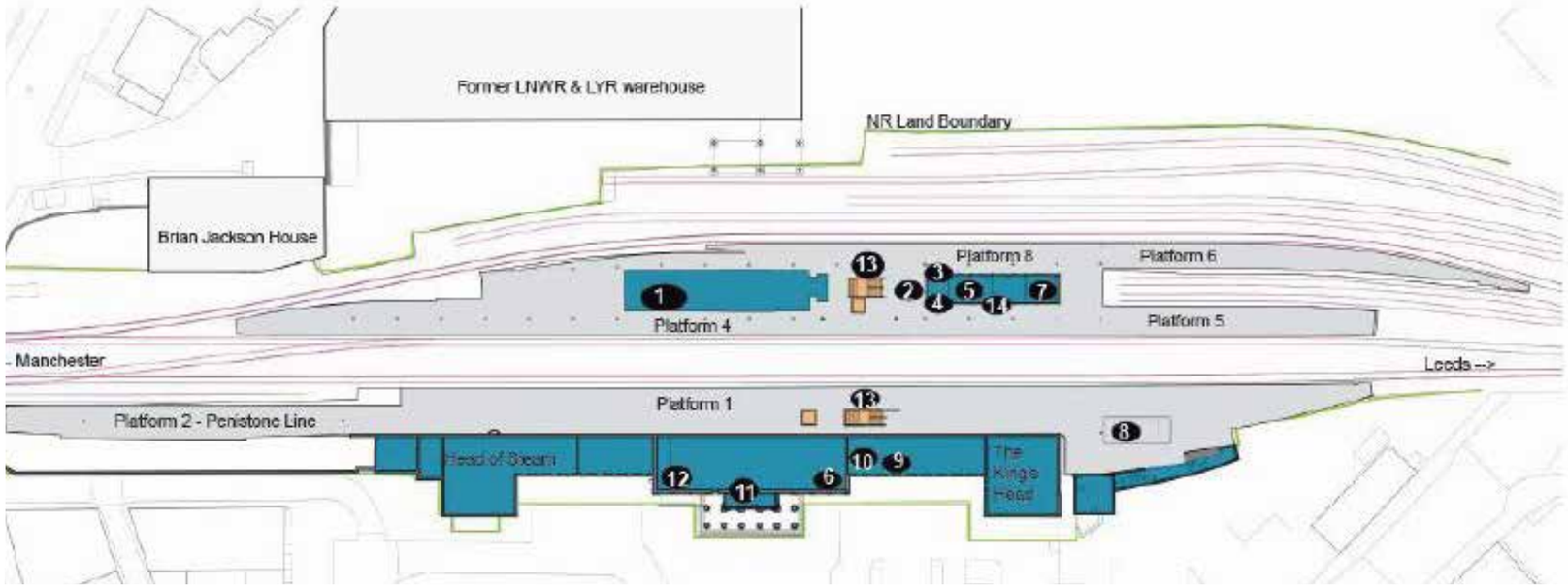
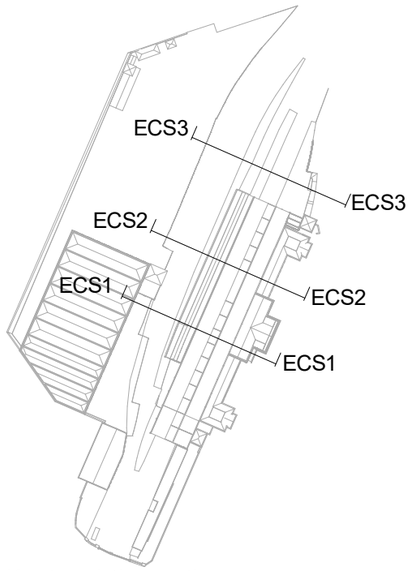
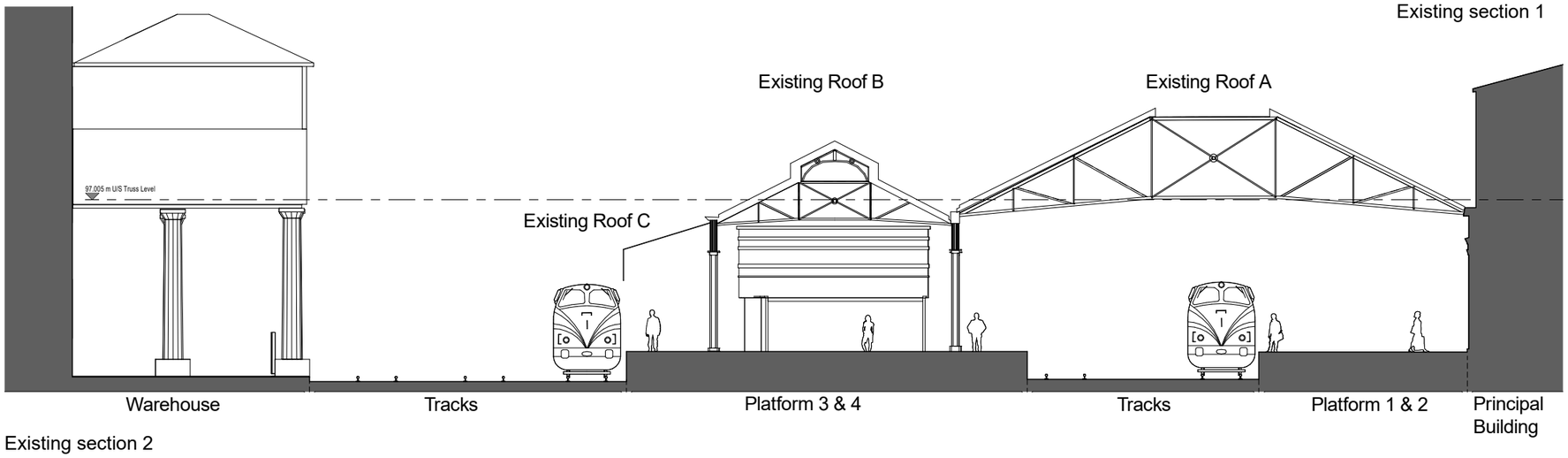


Figure 2.2b: Existing station platform plan

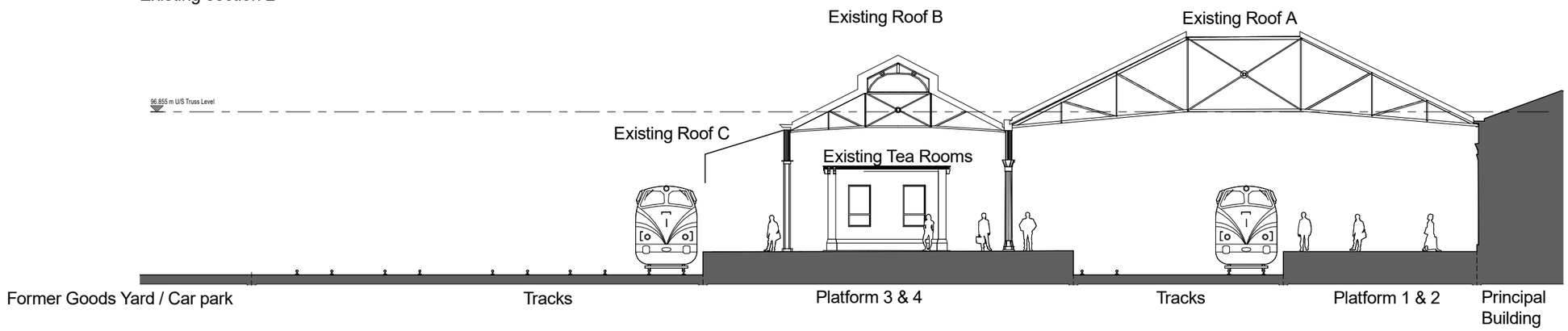


Key to existing sections

Existing section 1



Existing section 2



Existing section 3

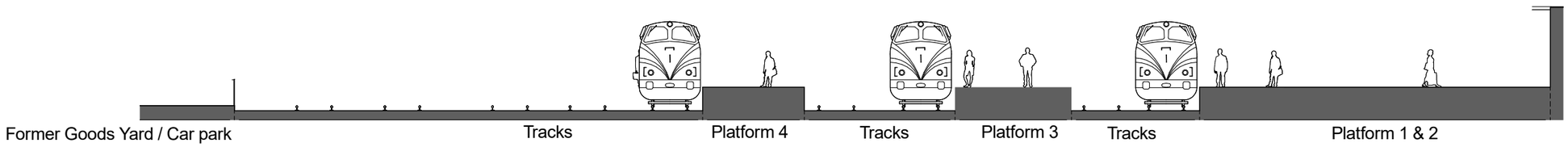


Figure 2.2c: Existing sections

2.2.1 History in brief

Huddersfield Station is a significant piece of architecture and engineering, reflecting the historic importance of the TransPennine rail line, the pioneering railway companies which constructed it and the high civic aspirations of the town of Huddersfield in the nineteenth century.

Huddersfield Station was originally constructed in the 1840s, with two railway companies – the London & North Western Railway (LNWR) and Lancashire & Yorkshire Railway (LYR) – both contributing to a joint development. The trainsheds were enlarged and an island platform added in the 1880s.

2.2.2 Principal Building

The main station building, referred to as the Principal Building, faces St. George's Square. It consists of a central range, faced in stone and dominated by a pedimented Corinthian portico, and two symmetrical arcaded wings with smaller end pavilions.

The main public entrance to the station ticket hall is through the central doors under the portico. On entry, the booking office is to the left; to the right are the train timetables and a newsagent. Passengers pass through ticket gates and leave the Principal Building, again on the central axis, onto Platform 1.

The two end pavilions are now public houses: the Head of Steam and the King's Head. Both pubs are also accessible from Platform 1, the latter for emergency egress only.

The Principal Building, with its magnificent façade, makes a very large contribution to the station's significance. It also derives significance from its relationship with St. George's Square and its role as a focal point for the town. The square was developed in response to the monumental Classicism of the station and remains a public space of memorable grandeur. Its continued civic importance is reflected in its contemporary use as a location for public events, celebrations and civic life.

Figure 2.2.2a: St George's Square 1948 (The Examiner)

Figure 2.2.2b: St George's Square 1980 (The Examiner)

2.2.3 Station roofs

The existing roof plan of the station (Fig.3.2) features a large roof consisting of two main spans. Roof A is the largest of the two, spanning between the rear of the Principal Building and a row of iron and steel columns on the main island platform. Roof B spans across the island platform. Roof C is a non-original additional cantilevering canopy which extends the side of Roof B to the edge of Platform 8.

Roofs A and B date back to the 1880s and are relatively rare surviving examples of large-span 'Euston Roofs'. Truss roofs of this type were a common choice of engineering for station roofs during the 19th century and were notably used by both the LNWR and LYR at various stations.

The existing roof at Huddersfield therefore evidences the engineering which characterised the period of station expansion during the 1880s. It also reflects the historic development of the station and the railway line during this period

Figure 2.2.3a: Trainsheds under construction 1886

Figure 2.2.3b: Inside trainshed, 1954 with Tea Rooms in distance (The Examiner)

KEY

1. Inside trainshed (towards Leeds), 2018
2. Inside trainshed (towards Manchester), 2018
3. Penistone Line canopy, 2018
4. Trainshed gables from Leeds end, 2018
5. Rear of Principal Building from inside trainshed including view of cable gantry, 2019
6. Tea Rooms, 2018
7. Tea Rooms, 2018
8. Tea Rooms, 2018
9. Smaller roof span with former LNWR & LYR warehouse to rear of station, 2018
10. Former LNWR & LYR warehouse to rear of station, 2018
11. View towards former goods yard with Accumulator Tower, 2018
12. View over viaduct at Leeds end, 2018

Figure 2.2.3c: Existing images

2.2.4 Tea Rooms

The Tea Rooms are a small rectangular timber building situated between Platforms 4 and 8 on the island platform. The building represents a common feature of expanding and improving station facilities during the 1880s, offering refreshments and waiting areas to passengers.

The building's position between the two platforms, with entrances on both sides, is of significance – as is its timber construction and some surviving elements.

Today the Tea Rooms contain passenger WC facilities, a waiting room, and a café area with significant surviving joinery around the servery and doorways.

The full draft methodology statement for the Tea rooms will follow shortly in a separate document.

Figure 2.2.4a: Refurbished Tea Rooms

2.2.5 Platforms

Platforms 1, 4 and 8 are the station's only through-platforms. Platform 2 is a bay platform serving the local line to Sheffield via Penistone and Barnsley. Platforms 5 and 6 are bay platforms located on the island.

Automated train announcements, customer help points and digital display screens provide train running information on all platforms.

2.2.6 Relay Room and cable gantry

The Relay Room, a single-storey brick building housing signalling equipment and other services, is situated opposite the exit from the ticket hall. A large steel cable gantry bridge spans across the tracks between the Relay Room and the Principal Building.

2.2.7 Passenger subway

The passenger subway was constructed in circa. 1885 and has undergone several modifications over the decades to meet the requirements for the station. The subway currently provides the only means for passenger access to Platforms 4-8. Access is provided through steps, with step free access via lifts.

2.2.8 Parcel subway

The Parcel subway was constructed in the 1890s and traverses under the two main through lines, from the Principal Building basement to the underside of the Tea Rooms on Platform 3 & 4 where it terminates. The subway was originally used to transfer postal mail and goods to the island platform. The subway is not accessible to the public.

The subway roof is a concrete slab cast on permanent troughed steel formwork. There is a large catchpit in the roof structure positioned between the two lines. The slab originally spanned between the brick subway walls, but steel strengthening works have been installed to reduce the span and increase its capacity.

Section 3
Design Philosophy & Design Drivers

03

3.1 Conservation Approach

The overarching heritage aims for the design have been:

1. to offer a minimal intervention to the listed buildings;
2. to repair and celebrate the historic buildings as far as possible;
3. to design new interventions sensitively, expressing new elements as new.

3.2 Design approach

3.2.1 Summary

The principal architectural aims for the design have been:

- to create a holistic, site-specific scheme which celebrates the best of the existing station, its role on the rail network and its unique situation in terms of townscape and landscape;

- to confidently add an authentic 'next chapter' to the story of the station, delivering the large-scale performance objectives of the TransPennine Route Upgrade scheme with an architectural finish to match.

3.2.2 Taking inspiration from the existing station

The Principal Building is clearly the element of highest significance in the station, although the main train shed (Roof A), with its distinctive Euston truss, is another important component.

The scheme draws on the design of both, in the following ways.

a. Reinforcing the key axis of symmetry

The portico and wings of the Principal Building exemplify the grand civic ambition of early Victorian railway development. They gave equal prominence to the two original railway companies which jointly built the station. Each of the companies used one of the two end pavilions as a booking office. A corridor originally ran directly through the central block, from portico to platform, along a central axis of symmetry.

The design of the large brick warehouse (separated listed as entry 1228533) to the rear of the station, likely built at the same time as the current train sheds, also acknowledges that symmetry: its loading bay, with three pairs of giant Doric columns, is positioned to lie on the same central axis.

The sense of symmetry has been compromised over time. The central block is now occupied by the booking hall and ticket gates, confusing the clarity of the plan arrangement. Views from the booking hall to the warehouse loading bay have been blocked by the Relay Room on the island platform.

The proposals aim to reinstate the clarity of the central axis by:

- positioning the new roofs and the 'heart' of the redeveloped station as close as possible to the axis of symmetry, with a central large-scale enclosed space and slender 'finger' canopies extending equally on either side;

- bringing the loading bay back into the composition overall by re-establishing clear views through to it from the rear of the Principal Building;

- removing the Relay Room (see 1.2.2).

b. Echoing the Victorian roofs

The Euston trusses give Roof A a distinctive, dynamic geometry when viewed from below. Different lines and planes appear more prominently from different angles. Several of these have been used to define the form of the new roofs, so the new blade-like shapes appear to spring naturally from the Victorian structure.

The two blades are designed to descend in scale and angle of inclination, establishing a clear hierarchy of importance in the roof line with the retained Victorian roof as the most dominant element.

Columns supporting the new roofs are aligned with the columns of Roof A.

3.2.3 Upgrading the railway

The station's role on the network is also distinctive, serving as a mid-point between the principal hubs of Leeds and Manchester. It is the most important station for a large catchment area. The original design captured the ambition, scale and adventurous spirit of the Victorian railway, dignifying travel and transportation with a building of real grandeur.

The scheme seeks to elevate the much-degraded environment of the platform area today, to better complement the quality of the Principal Building. It also integrates various features which allow the railway to develop significantly from its Victorian origins.

a. Improving the experience of passengers

The station will be enhanced for users by:

- installing a new lantern at the top of Roof A (following a similar design to the original version, no longer in place), which is currently open to the elements and contributes to a dismal passenger experience on wet and windy days;

- the full reconfiguration of information systems and signage – including bespoke, fully-integrated floor-standing totems on Platform 2;

- installing inclusive, accessible design features throughout the platform environment;

- new furniture, designed and selected to compliment the architecture on all platforms – including benches integrated with weather-screens for the most exposed areas;

- giving greater prominence to the historic Tea Rooms, which will be relocated slightly to occupy a more central position in the station – and be rotated so that the café is closer to the main flow of passengers to and from the subway;

- increasing the cycle storage provision.

b. Enhancing public transport

As part of TRU, the station will facilitate increases in passenger capacity and line speed, while making the TransPennine line greener and less vulnerable to delays and cancellations. Key features factored into the design include:

- longer platforms for more carriages;

- more space between the Westgate portal and the platform structures to allow the flexibility of more switches and crossings between platforms;

- platform structures designed to allow good signal sighting, despite the necessary curvature of the tracks;

- allowance for overhead line equipment, with supports fully integrated into the architectural design, to power trains by electricity rather than diesel.

c. Improving safe access for maintenance and conservation

The efficient operation of a mainline railway station (and the ongoing conservation of a Grade I listed building) demands simple and effective tools for cleaning and maintenance. This will be achieved by a range of new items, including:

- more robust systems for safely accessing the roofs;

- detachable cladding panels to allow inspection of hidden steel elements and connections;

- dedicated housing on site for motorised access equipment.

3.2.4 Respecting the town

The station's civic face – the Principal Building façade – is its most famous and significant feature. It forms an important historic setting with many large-scale Victorian buildings around St. George's Square to the east, and throughout the town centre conservation area.
To the west, physical and visual connections to a former railway goods yard (including two large listed warehouses and various smaller railway buildings of some historic interest) have been severed over time.

The scheme is designed to harmonise with the very different historic context on both sides, in the following ways.

a. Minimising impact to St. George's Square

Maintaining the existing appearance of the station from the east has been an important design principle. Key views from St. George's Square will remain virtually unaffected, with the new platform roofs well below the height of the retained Roof A. The new lantern will be expressed as modern but with a finish designed to harmonise with the reinstated slate roof covering the retained Victorian parts.

Consideration of these views has also been important to designs for handrails and access equipment affecting visible parts of the eastern pitch of Roof A.

b. Establishing new views to the goods yard

The blade-like roof forms will be inclined in order to maximise views through from Platform 2, so that passengers entering the platform area have a relatively unobstructed visual connection with the historic goods yard to the west.

The existing Relay Room, a low-quality brick building currently blocking the axial view from the ticket hall doors, will be removed.

Waiting shelters on the new island platform will be positioned behind the Tea Rooms, with respect to the ticket hall doors, to further limit the visual disturbance to this key view.

3.2.5 Connecting to the landscape

Huddersfield is a town nestling in the foothills of the Pennines. Long landscape views are a key characteristic of the town more generally, and the relatively unobstructed view north-east over the Huddersfield Viaduct is a particularly distinctive feature of the platforms.

Extending the platforms to the north, and installing a new footbridge to connect them, will undoubtedly impact the landscape views from the station. The scheme seeks to mitigate this impact by keeping the new 'finger' canopies as low as possible, and by glazing the sides of the footbridge to permit views through and from the raised structure.

3.2.6 Responding to the environment

The station's topographic location, and the north-south orientation of the platforms, generates a range of site-specific constraints concerning sunlight, wind and rain. The scheme responds to these in a holistic manner, including the following features:

- sawtooth glazed elevations to footbridge, while echoing the angles of the new roofs, are angled to deflect glare from drivers on platforms;

- weather screens on the new island platform provide shelter from the prevailing westerly wind;

- a glazed clerestory connecting the two new roofs, reducing through-winds and protecting the painted timber Tea Rooms building from excess weathering.

3.3 Tracks & Platforms

3.3.2 Existing arrangement

The existing Huddersfield Station layout comprises three through platforms and two north-facing bay platforms. There is a dedicated south-facing bay platform for the Penistone Line services.

The existing layout is shown on Figs.4.1.2a & 4.1.2b.

Fig.4.1.2c illustrates the following key 'pinch points' which dictate the site boundary and limit the expansion of rail facilities on the site.

- The width of the tunnel portal opening to the south
- The proximity of the goods lift serving the former warehouse to the rear
- The width of the viaduct, and specifically the John William Street bridge

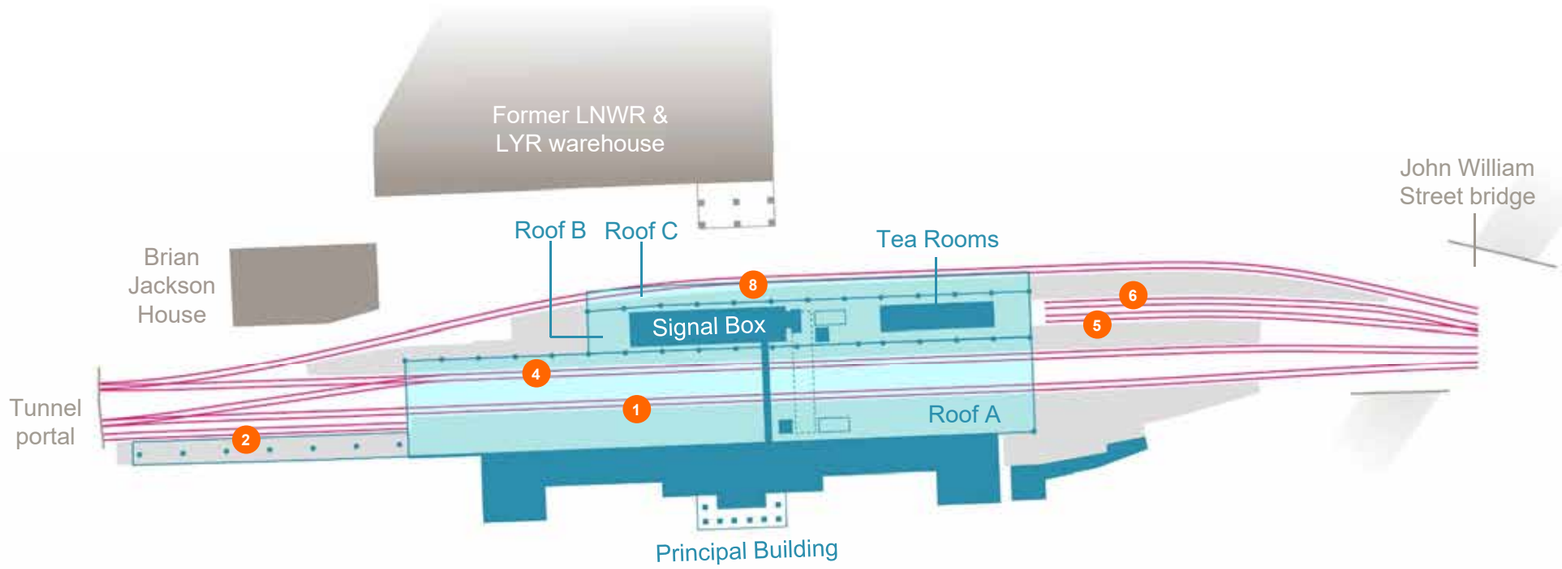


Figure 3.1.2a: Existing station layout

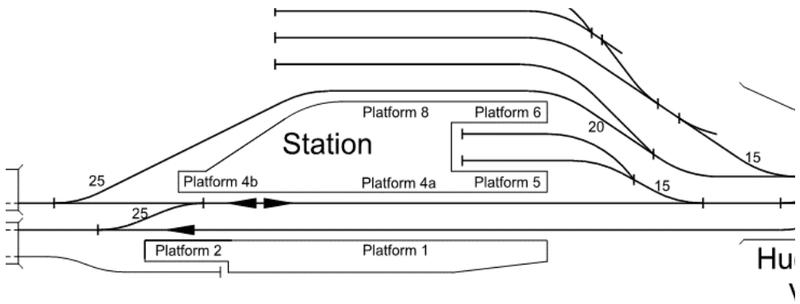


Figure 3.1.2b: Existing track schematic

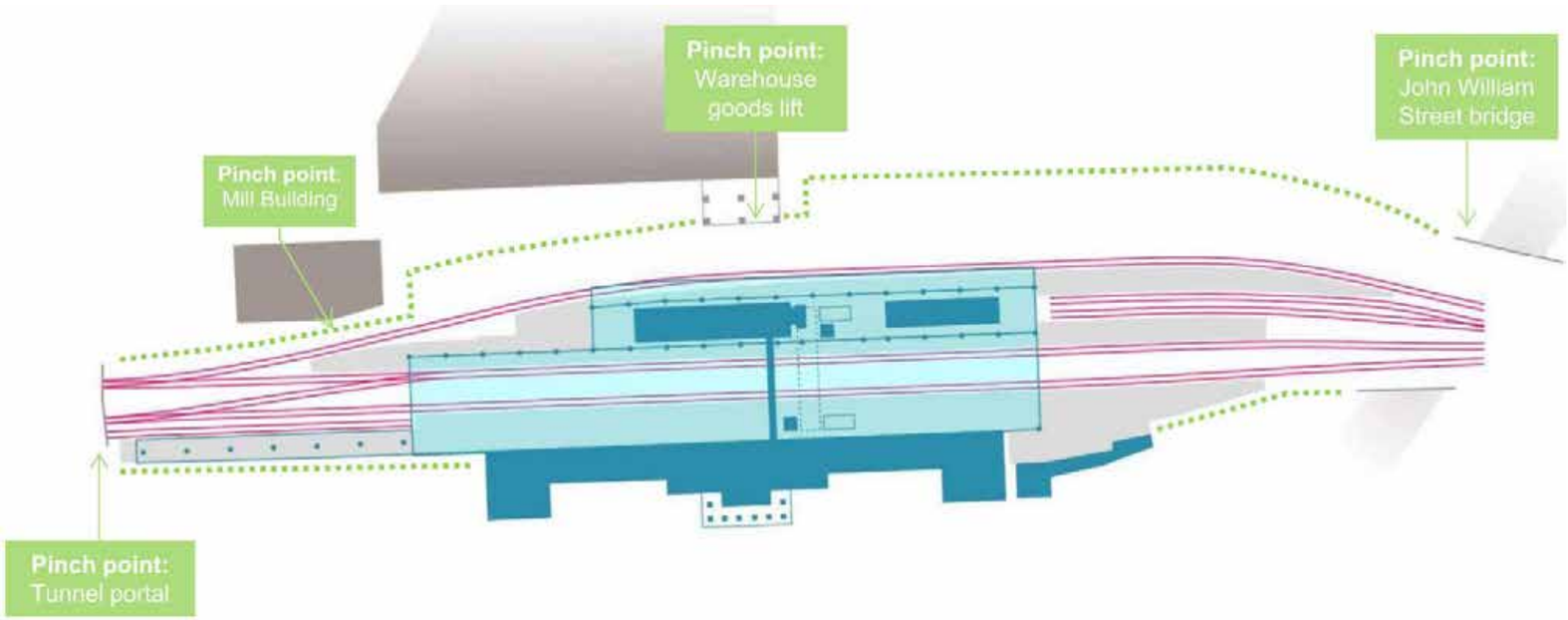


Figure 3.1.2c: Site boundary with 'pinch points'

3.3.3 Changes required for TRU

Operational modelling has shown that the proposed timetable can be supported with the greatest level of reliability with the following changes:

- four through-platforms of 200m length
- one west-facing bay platform of 200m length
- comprehensive junctions to allow train services to be sorted onto the correct platform and line at both ends of the station
- overhead line equipment (OLE) introduced above all tracks

Achieving these interventions between the 'pinch points' noted above will involve the following key changes, as indicated in Fig.4.1.3a.

- The current Platforms 4, 5, 6 and 8 will need to be replaced by two longer islands.
- The number and complexity of switches and crossings required to service the platforms (allowing trains to access multiple lines) cannot fit within the tunnel portal, so they must be located at the Manchester end of the station – effectively pushing the southern end of the platforms towards Leeds.
- The additional width of the new track layout will involve replacing the existing sidings close to the car park occupying the former goods yard, and running closer to the warehouse goods lift.
- The additional length of the platforms will involve extending the station further still towards the Leeds end, meaning that the bridge over John William Street will need to be widened.

Three principal options were explored to achieve this arrangement. Each had different implications for the structures within the station.

The Penistone Line platform is to be extended to accommodate longer trains.

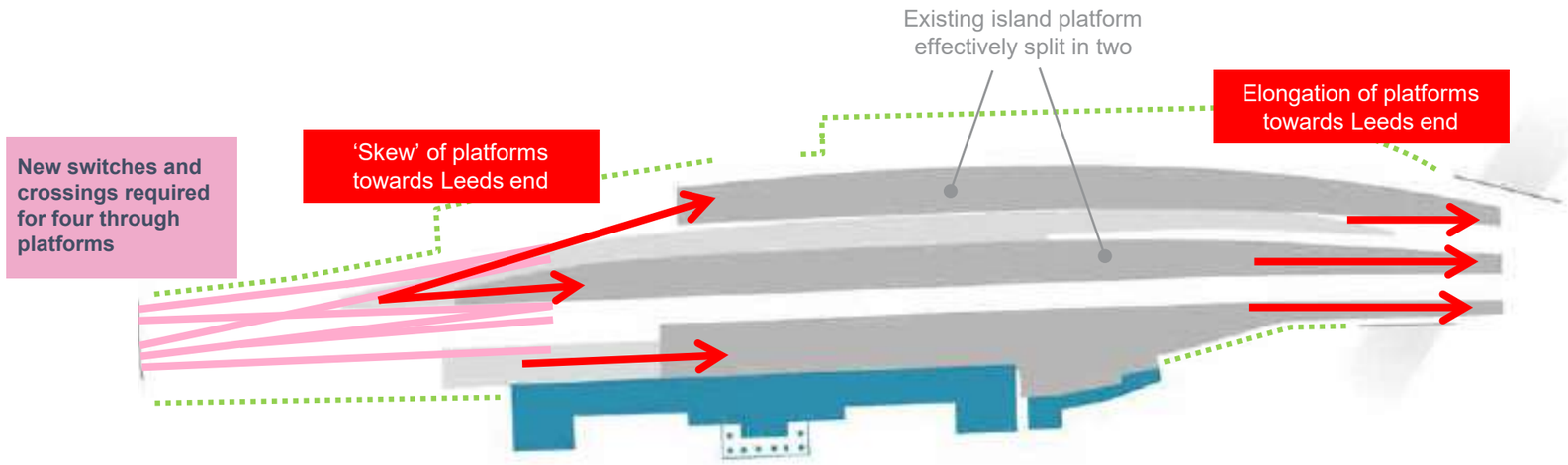


Figure 3.1.3a: Basic implications of track and platform alterations

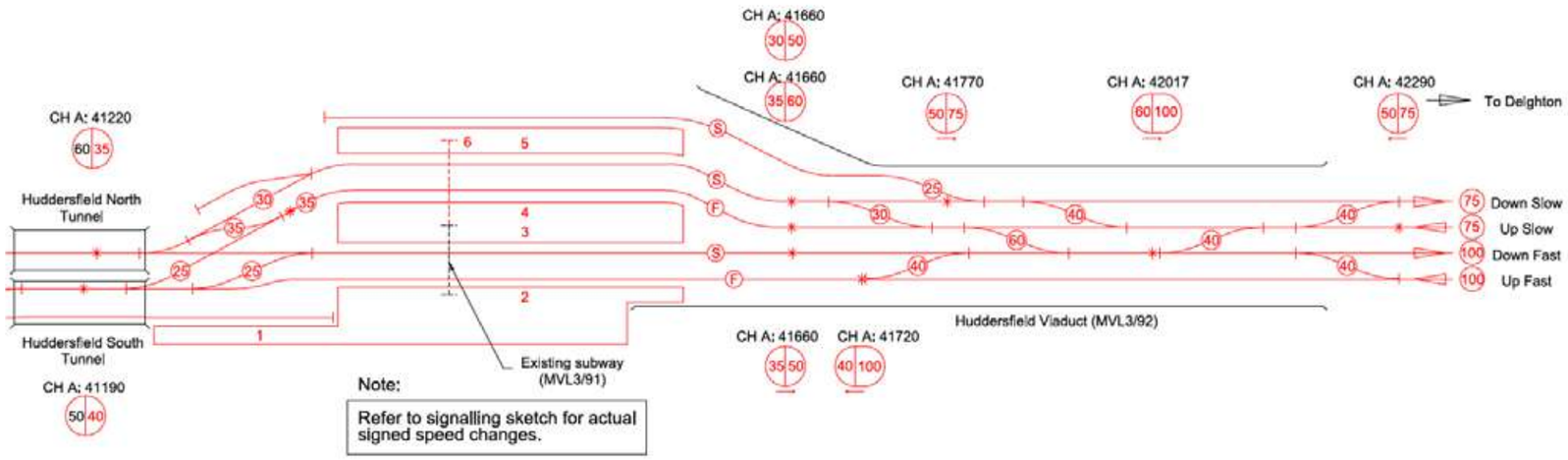


Figure 3.1.3b: Proposed schematic layout

3.3.4 Selected option

This option achieves a radius of >800m to the proposed Platform 4 edge, which improves signal sighting distance for drivers and reduces platform edge distance to train doors in comparison with the existing platform 8. This is a significant safety improvement on the existing station.

Stopping up the existing bay platforms 5 & 6, removing the existing rail sidings, and increasing the radius of existing Platform 8 reduces the width of the existing island platform. This provides space to the west, allowing the new 200m long island platforms 5 & 6 to be positioned to avoid the pinch point with the existing warehouse Goods Lift structure. It also opens land to the north of the Goods Lift for a future bay platform if required.

With this arrangement it will be possible to further expand the station by providing an additional bay platform in the future.

This option requires modification of the existing trainshed, removing two bays of Roof A from the Manchester end of the platform, and the removal of the smaller shed (Roof B) along with its cantilever span (Roof C). New coverage will be required to some of the extended platform areas.

The Tea Rooms may be retained on the central platform but must be relocated slightly to the north-east. The existing stair and lift on the central island platform will also require relocation. The Relay Room will need to be removed, along with the existing gable gantry.

Key design drivers this selection imposes on the design include the following:

- New roof or canopy structures to effectively replace the coverage provided by the existing Roofs B and C.
- A solution to relocating the Tea Rooms a short distance on the island platform.
- A new footbridge providing safe passenger egress from platforms extended toward the Leeds end.

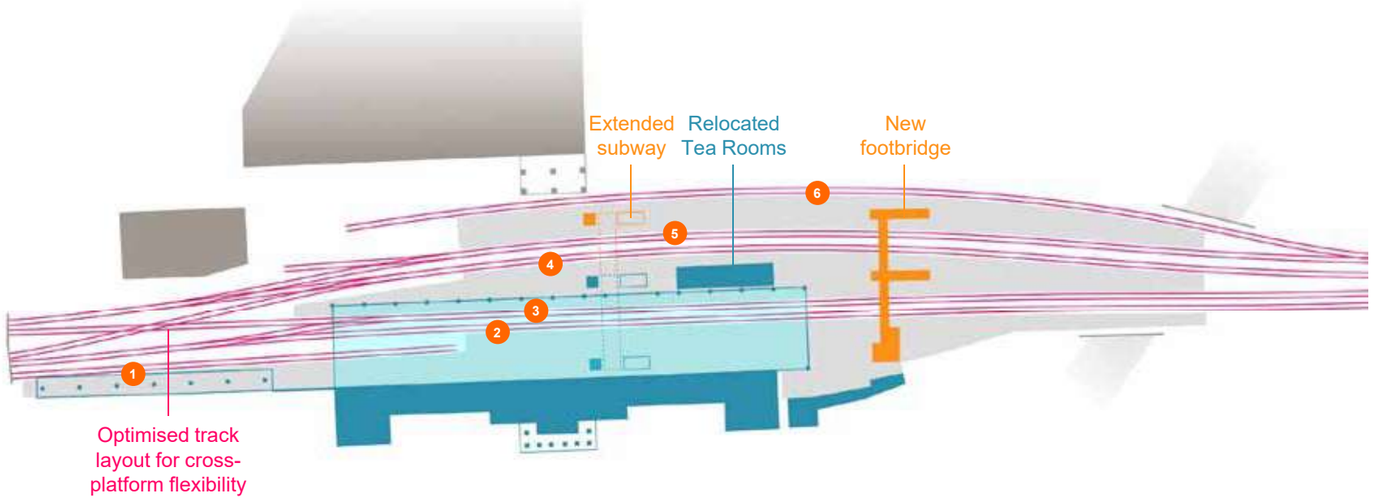


Figure 3.1.4a: Option 0 - basic layout

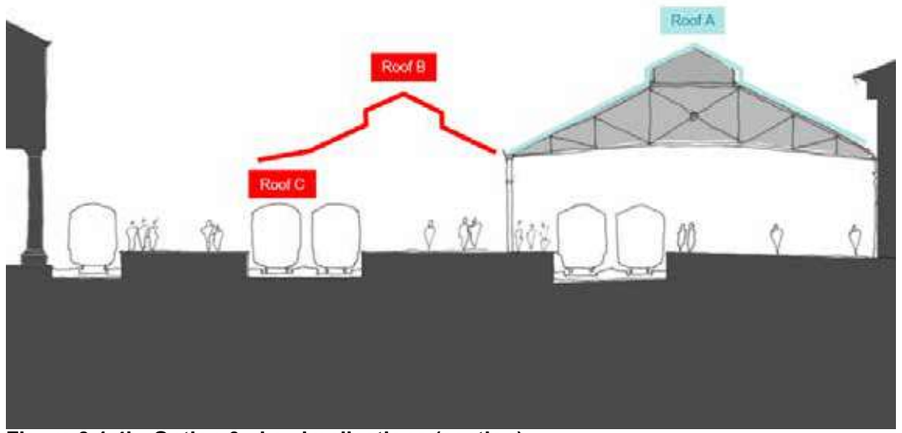


Figure 3.1.4b: Option 0 - key implications (section)

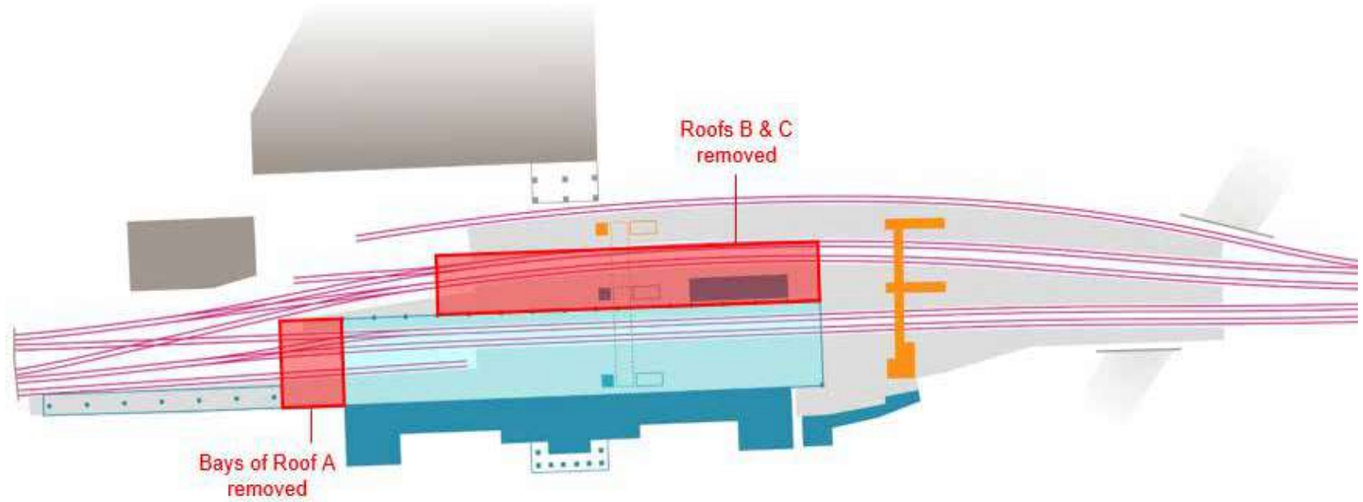


Figure 3.1.4c: Option 0 - key implications (plan)

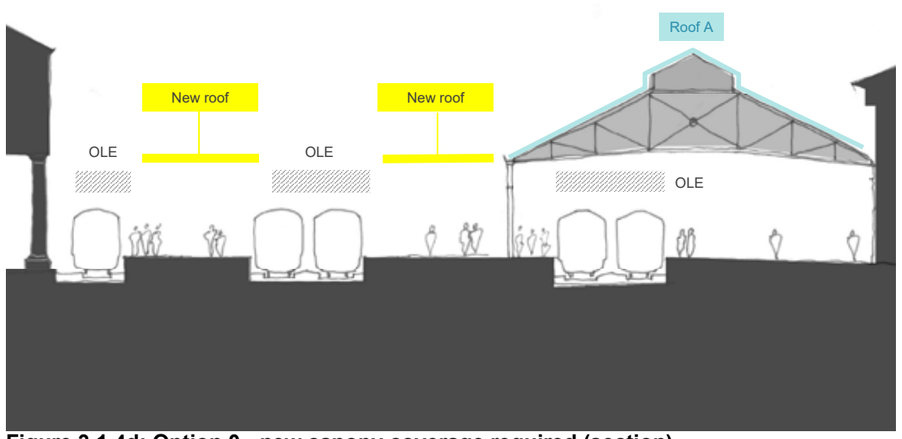


Figure 3.1.4d: Option 0 - new canopy coverage required (section)

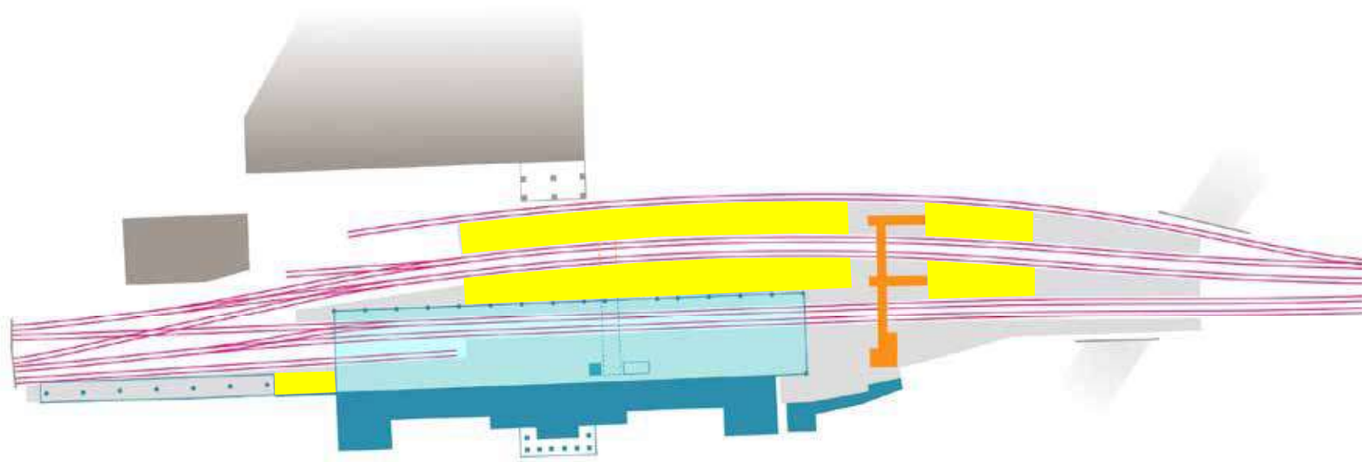


Figure 3.1.4e: Option 0 - new canopy coverage required (plan)

3.4 Platform Coverage

Basic coverage must be provided to the platform areas as indicated in the previous section. This must conform to Network Rail specification in terms of overall coverage.

Passenger coverage is based on providing a minimum of 0.65m2 per passenger for forecast numbers through to 2043. Ideally this coverage should be distributed as evenly as possible along the length of the trains in order to avoid passenger bunching.

Minimum coverage based on the above provision should not be less than the existing station.

3.5 Historic significance

The Grade I listing of the station places exacting requirements on the design to avoid harming the historic buildings and their setting. To this end the design team has adopted the following set of general conservation principles, several of which are described in more detail in subsequent sections.

- Preserve/conserve as much original station fabric as possible.
- Where new canopy/roof structures are required, design them in harmony with the rhythm and geometry of the retained trainshed roofs. The emphasis of additional buildings should therefore be on clean lines and angular elements (as opposed to curving/organic shapes, for example).
- Where new canopy/roof structures are required, design them to be sympathetic but expressed clearly as modern. Minimal forms and simple detailing to help accentuate the distinctive characteristics of the existing shed roofs.
- 'Open up' the station to engage visually with its wider historic setting particularly the warehouses to the rear and surrounding landscape.
- Incorporate OLE elements neatly within the structure, reducing the number of extra OLE specific elements such as stanchions and portals which will detract from the historic station buildings.

3.6 Scale

Given the significance of both the Principal Building and the retained Roof A, the scale of any new intervention should be such that the dominance of the historic station is celebrated and reinforced.

This will involve creating an architectural extension which emphasises the original core grouping of buildings and spaces. In effect it means replacing Roofs B and C with a structure of commensurate size, in an equivalent location.

This also means that coverage provided to the platforms extending away from the central axis of the station will be smaller in scale and more subservient in character.

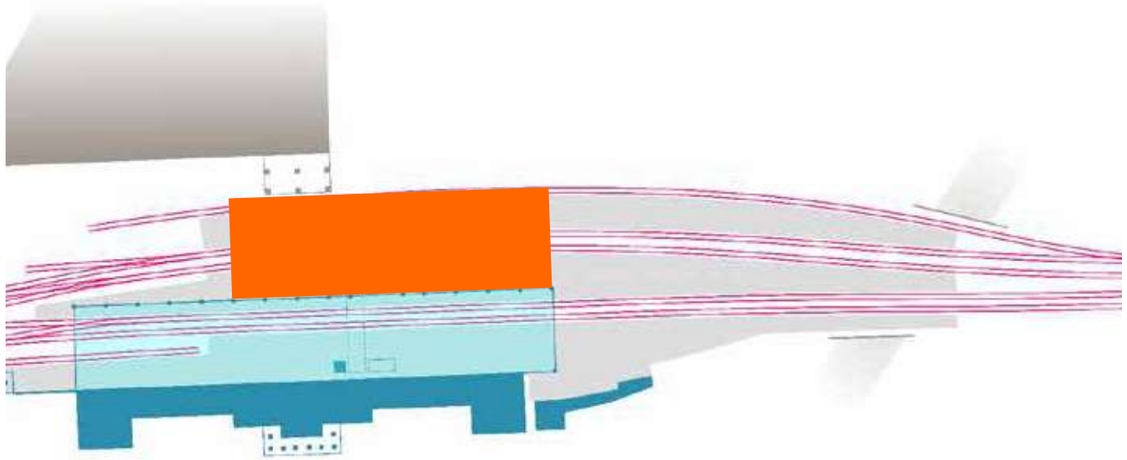


Figure 3.4a: Celebrating and reinforcing the central area of the station

3.7 Balance on Plan

New extensions added to the station should respect the significance of the Principal Building's strict central axis, along which passengers enter and leave the ticket hall. As noted, this axis also aligns with the monumental columns of the warehouse goods lift to the rear.

The consolidating effect of locating a large-scale extension on (or close to) this axis should be reinforced by emphasising each of the extended platform canopies as a smaller architectural 'finger' spreading away from the principal roof space. This will create a balance on plan, with passengers having the option to stay in the central space or move outwards on either side: left towards Platform 1 and the Penistone Line, or right towards the three newly-extended fingers at the Leeds end.

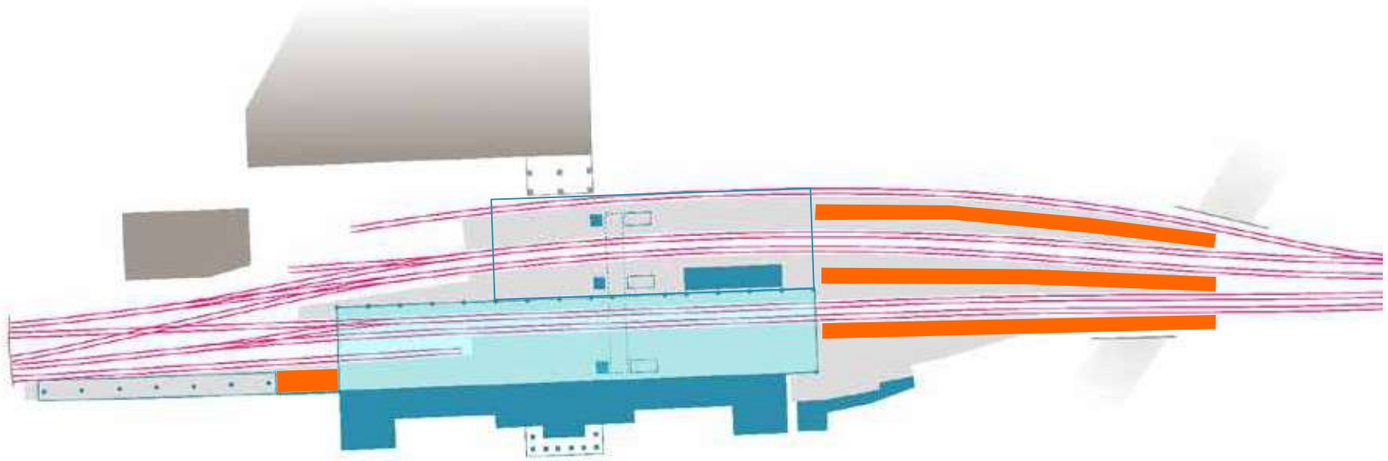


Figure 3.5a: Balance on plan with consistent 'fingers' of canopies

3.8 Views

Although there is a loss of heritage fabric as a result of the removal of Roofs B & C, the scheme offers improvements through the removal of the Relay Room and the Cable Gantry. These changes present an opportunity to reconnect the station visually with the surrounding historic environment and the dramatic landscape it sits within.

Views towards the warehouses and goods yard at the rear of the station should be kept as clear of new structure as possible. There is also an opportunity to create enhanced views into Roof A, celebrating the appearance of the existing roof structure and the rear elevation of the Principal Building. For this reason views through from the new island platforms should also be as unobstructed as possible.

These two requirements create a set of view lines from which the form of new roofs or canopies may be defined – as indicated on Fig. 4.6a.

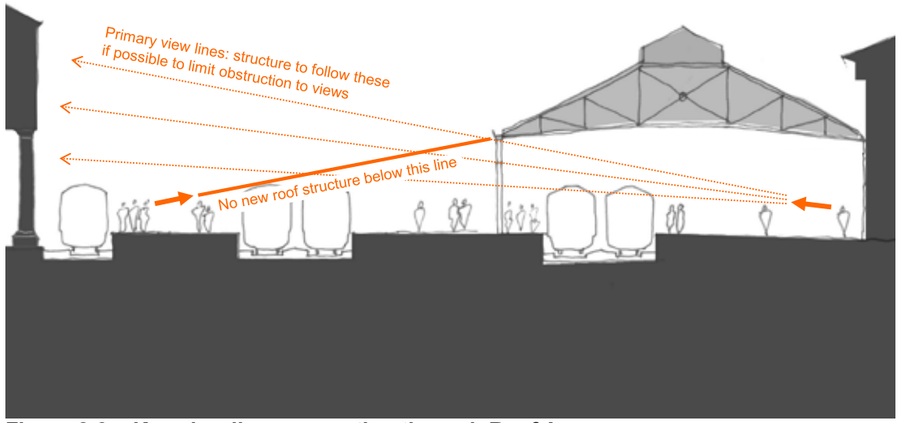


Figure 3.6a: Key view lines on section through Roof A

3.9 Form and structure

New roof/canopy structures replacing Roofs B and C should draw geometrical cues from the strong lines of the retained Euston trusses. This includes using the setting-out indicated on Fig.4.7b, including the eaves line springing point of the Victorian roof, the inclined angle of the bottom Euston truss boom and the pitch of the roof finishes.

Repeating elements such as columns and transverse beams visible within a new structure should align with those of the retained Roof A. Where possible they should be oriented to be as slim as possible, when viewed from the Principal Building, in order to minimise their visual impact from that perspective.

The gables of Roof A, with the roof trusses so clearly visible, should be kept free of any obstructing structures (with the exception of a footbridge, from which the public should be able to enjoy views of the structure at relatively close quarters).

Columns supporting roofs and platform canopies should be aligned longitudinally on plan to limit visual clutter.

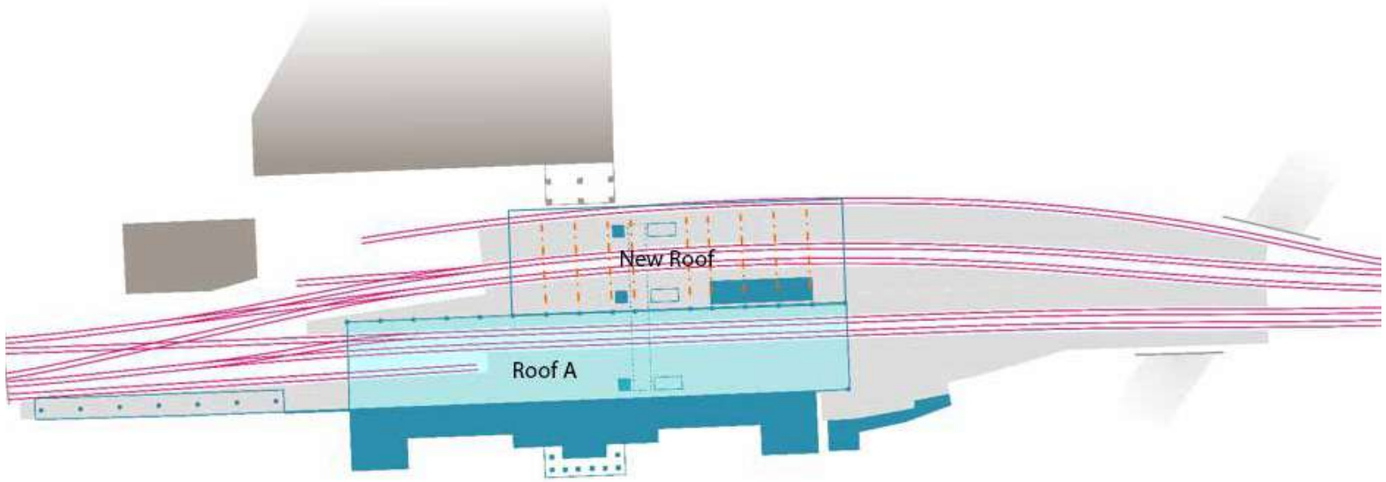


Figure 3.7a: New roof / canopy columns aligned with those of Roof A

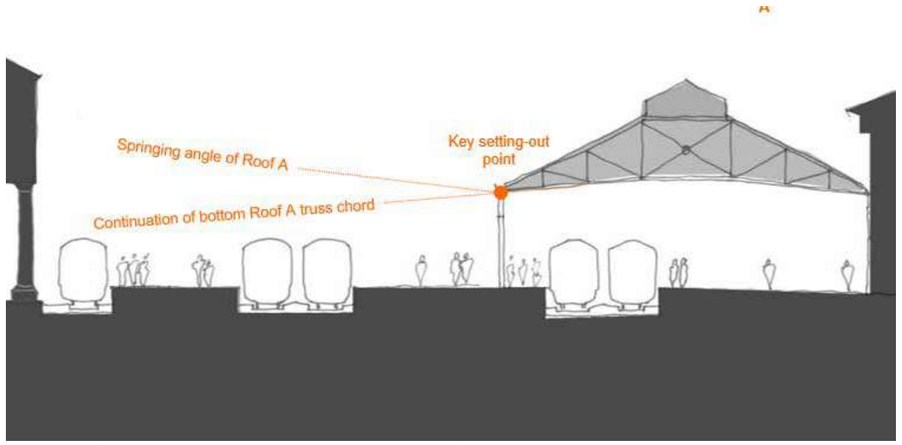


Figure 3.7b: Setting out lines derived from Roof A

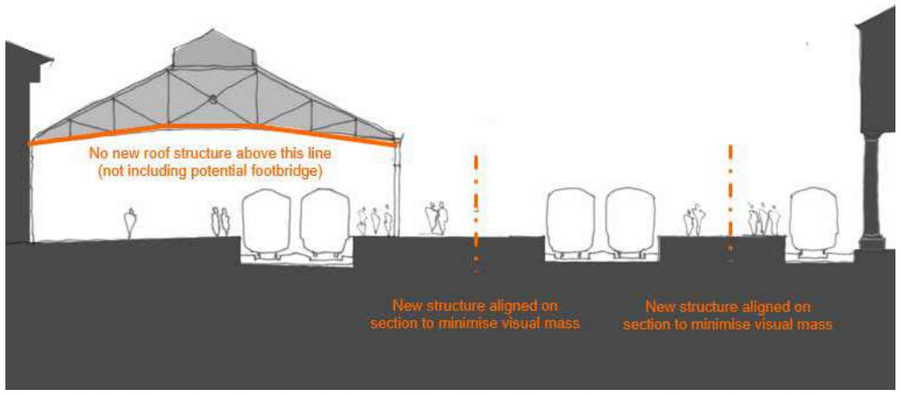


Figure 3.7c: New structure kept clear of Roof A gable; columns aligned on platform

3.10 Station experience

The previous design drivers combine to create a requirement for a coherent environment within the central part of the station, with a scale and quality derived principally from the Principal Building and Roof A. Smaller modern canopies will lead away from this area on all sides, with a diminishing sense of scale and an increasingly open and transient character.

Passengers arriving onto Platform 2 through the ticket hall should feel like they have entered the 'heart' of the station. Views through to the former goods yard connect them visually to the wider historic setting. Clutter-free platforms, sensitive lighting, the careful use of colours and other elements all enhance the consistency of the architecture.

Fig.4.8a indicates several key components of the upgraded station experience.

1. Entrance on axis from St George's Square
2. Enhanced views through the station setting
3. 'Heart of the station' with an integrated and high-quality architectural environment
4. Sense of connection to wider heritage setting
5. Platform canopies balancing the design of the station.

3.11 OLE

Structures supporting OLE elements should fit neatly within the structure, with the number of obtrusive OLE-specific elements such as stanchions and portals kept to a minimum. The design of bespoke components may be required to avoid components which clash with the architecture of the station.

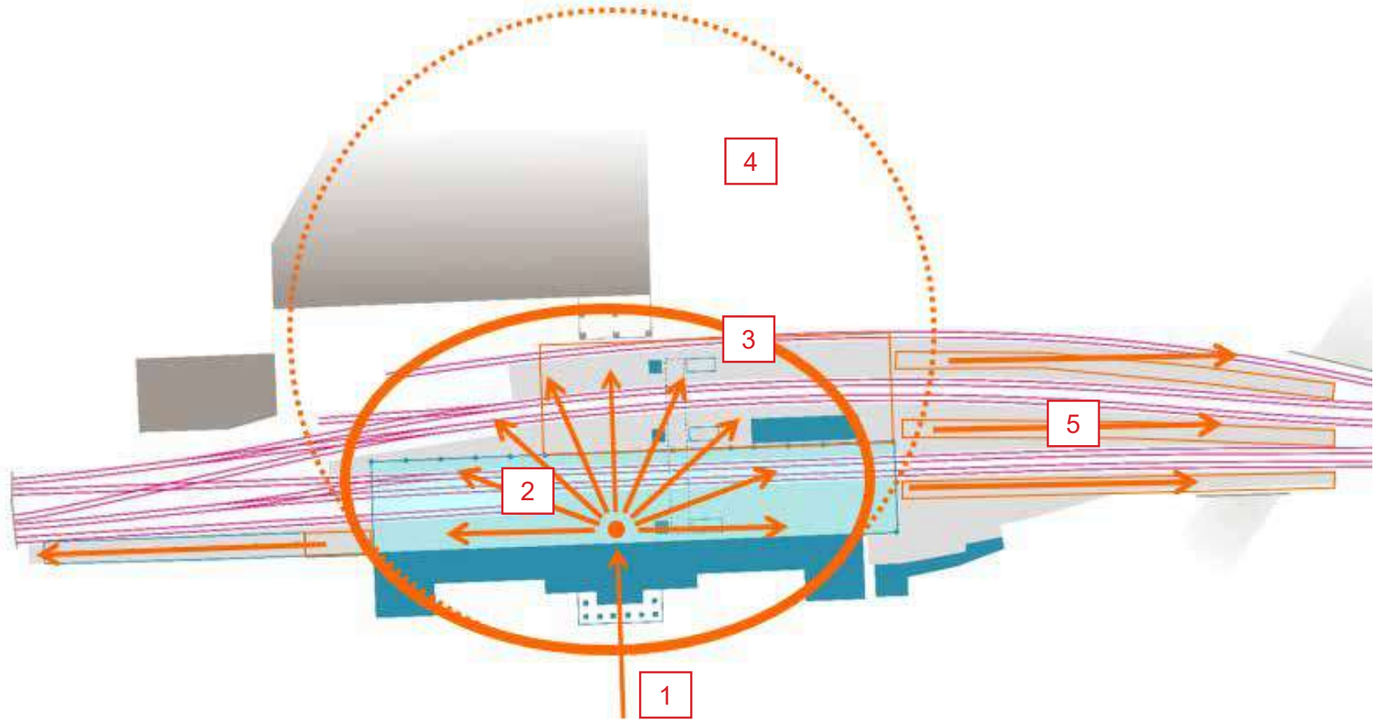


Figure 3.8a: Key components of upgraded station experience

3.12 Signal sighting

The design of new roof/canopy structures must allow clear signal sighting along the new curved platforms. This will require a sufficient set-back from the platform edge, defined by a driver's-eye-view analysis (see Fig.4.10a).

3.13 Passenger Circulation

The existing passenger subway is the sole means of passenger access to the existing and proposed island platforms.

In order to accommodate the forecast increase in passenger flows through the station to the target date of 2043, and to comply with emergency access/egress requirements, a second means of access is required to the proposed island platforms (Platforms 3-6).

To accommodate passenger flow from the longer 6-8 carriage trains, this alternative means of access is in the form of a footbridge located to the north of the proposed Roof A.

Emergency egress routes for passengers are also to be provided at ground level from the southern end of island Platforms 5-6, exiting on to the adjacent Mill land, and from Platforms 1 and 2 around the southern end of the "Platform 1" charity train, exiting into St George's Square.

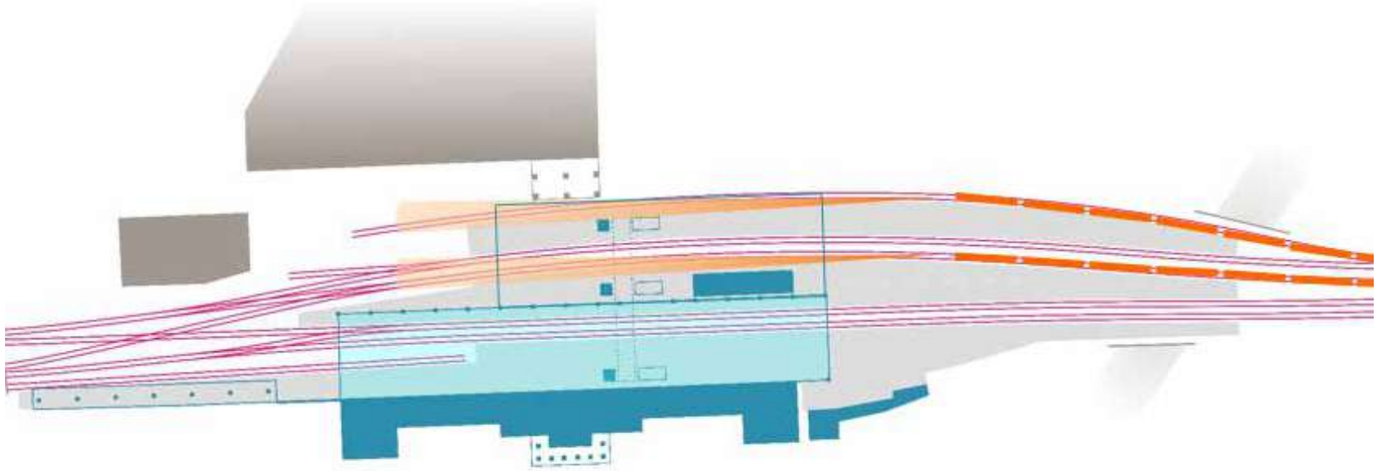


Figure 3.10a: Indication of viewing corridors for adequate signal sighting

3.14 Lighting

A new lighting scheme is proposed to achieve the following design objectives:

- Facilitate safe movement and orientation for a large number of users by defining entrances/exits.
- Identify hazards with local accent lighting such as level changes and platform edges for public and staff.
- Highlight public safety especially when near the platform edge.
- Navigate passengers efficiently around the station by using light as a wayfinding tool to highlight transitions and destination points.
- Achieve the safety and security requirements by providing sufficient illumination for facial recognition and CCTV camera detection.
- Provide a visually comfortable space and accessible environment.
- Incorporate a reliable, user-friendly lighting control system to maximise flexibility, daylight use and energy efficiency.
- Specify high quality LED light sources that will ensure consistent colour and a reduced maintenance cycle.

The lighting scheme within Retained Roof A has been designed in accordance with the following guides and standards:

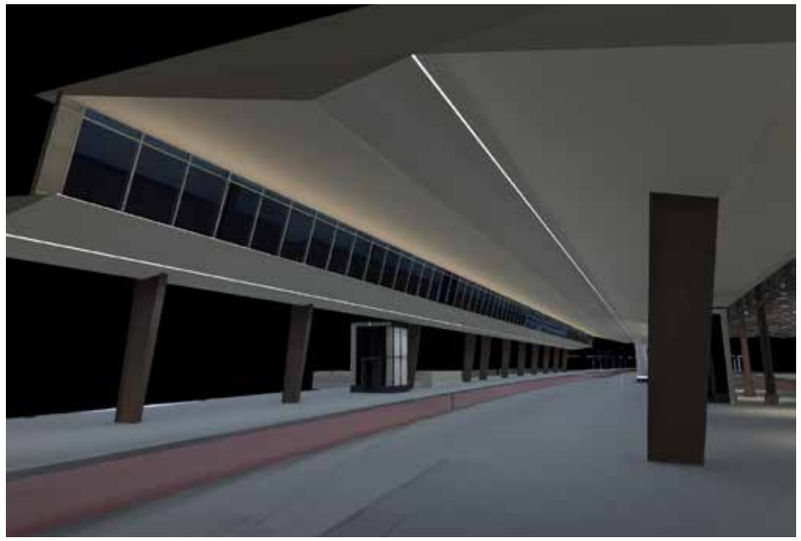


Figure 3.12a: Proposed lighting scheme

- RIS-7702-INS Lighting at Stations
- RIS-7016-INS Interface between Station Platforms, Track, Trains and Buffer Stops
- BS EN 12464 Part 2: Outdoor Lighting
- BS EN 5489-1:2011 Road and Public Amenity Lighting
- BS EN 5266-1: Emergency Lighting
- BS EN 1838: Lighting Applications - Emergency Lighting
- CIBSE SLL LG15 Transport Buildings (2017)
- ILP GN01 Guidance Note for Reduction of Obtrusive Light

3.15 Accessibility & inclusivity

The new elements of design have been developed in accordance with Part M of the building regulations, BS 8300: 2009- Design of buildings and their approaches to meet the needs of disabled people, the Department for Transport (DfT) Design Standards / Code of Practice (COP) for Accessible Railway Stations (2015) and the Technical Specifications for Interoperability (TSI) for PRM's (Person's of Reduced Mobility).

Circulation around the station and platforms
The new lifts are sized to Network Rail's standard 16 person lifts for wheelchair access, and designed as through lifts for ease of accessibility as explained in the footbridge section of the design statement. Lifts are provided to all platforms via the footbridge or the subway. The new stairs to the subway and the footbridge are designed for ambulant disabled use following the guidance stated within the above documentation.

Horizontal circulation
All obstacle-free routes, footbridges and subways will have a free width of a minimum of 160cm between handrails such as the stairs and width of the footbridge.

The first and last steps shall be indicated by a contrasting band and, as a minimum, tactile warning surface indicator shall be installed before the first descending step. The wider access and maintenance strategy for the station will be covered in Section 5 of the CIMP.

3.16 Access and Maintenance

An Access & Maintenance Strategy is required for Huddersfield Station that not only provides safe access to areas above Overhead Line Equipment but also does not impact on the heritage value of the Grade I listed station elements.

3.17 Sustainability

The Architectural design approach is to design upon an overarching sustainable strategy. We will provide creative and viable solutions that will introduce innovative and flexible ways for the station to operate in the future, driven by delivering value for operational and maintenance aspects of the station.

References have been made to current and emerging design standards and environmental assessment methods, ranging from familiar practices such as BREEAM, the Well Building Standard and biophilic design which focus on the impact of buildings on the human body and promotes high quality, healthy and inspiring internal environments for building users.

Network Rail has embraced a need to ensure it provides for a safer, more reliable railway, with greater capacity that contributes towards a low-carbon economy with better connections between people and jobs. Network Rail is one of the largest purchasers of energy in Great Britain and, as they continue their programme of electrification of the network, the requirement for more electricity will grow.

Network Rail recognises it has a responsibility to make a contribution to achieving government carbon reduction targets through a combination of energy efficiency and low carbon procurement strategies and this is set out in detail in the Network Rail Sustainable Development Strategy. This applies to both design of the track, associated infrastructure and stations.

The design seeks to maximise passive and active measures to achieve a sustainable design, for example, the availability of natural daylight in order to lower life cycle costs for the retained roof and the new roofs and canopies. Less energy consumption costs and maintenance costs for lighting result from intelligent passive design.

Reduce energy demand
As a starting point, the design aims to reduce demand and the design team will also continue to input into the design of the new station elements to ensure passive and active design principles are incorporated including:

Passive sustainable methods include:

- Platform canopies with open side façades facilitating natural cross ventilation.
- Façade optimisation including the provision of appropriate solar shading and solar control glass to limit the amount of solar thermal gain on the footbridge, reducing the need for mechanical cooling as well as controlling disability and discomfort glare to occupants.
- Rainwater recycling of the roof and canopies. There will be high usage for the station toilets, rain water can be used to flush the WC's in the station.

Active technologies in the design include:

- Use of low energy consumption light fittings including LEDS and efficient light distribution to minimise overall lighting energy.
- Integrated intelligent controls strategy relating to the ventilation of the Tea Rooms.
- Low water consumption design for new toilets and wash hand basins through the use of low flow fittings and intelligent control systems.
- Embodied energy addresses how sustainability should encompass the construction methodology, including the processes on site.
- Use of local materials, minimising embodied energy (including transportation)
- Demolitions should facilitate a strategy for recycling materials on site or other sites.
- Construction waste minimisation strategy – adopting core procedures that will reduce the amount of construction waste and waste to landfill including; prefabrication, modularisation, off site storage / delivery and waste take back schemes when looking at the procurement of the new roof, footbridge and canopy design.
- Any new paving to be permeable paving to aid the SuD's design.
- Inclusion of bicycle stores for sustainable travel.

3.18 Sustainability assessment and assurance
The sustainability performance of TRU is being assured and assessed using the CEEQUAL v6 infrastructure assessment methodology. CEEQUAL v6 offers the opportunity to innovate and challenge beyond what is considered 'business as usual' in terms of sustainability performance. The scheme gives the consistency, structure and built in assurance process required to drive sustainability objectives throughout the life-cycle of the programme, ultimately delivering a more sustainable railway. Implementing CEEQUAL v6 offers third party, globally recognised, certified assurance that provides lasting industry-wide improvement in the rail sector and beyond.

3.19 Carbon reduction
The Government has set a target to reduce carbon emission by 80% by 2050, compared to 1990 levels. Network Rail is committed to reducing energy consumption and carbon emissions across the rail network, as outlined in the Network Rail Energy and Carbon Policy. (https://safety.networkrail.co.uk/home-2/environment-and-sustainable-development/energy-and-carbon-management/energy-and-carbon-policy-and-strategy/)

In order to achieve these objectives, the carbon reduction hierarchy (Build Nothing, Build, Less, Build Clever, Build Efficiently) outlined in the Publicly Available Specification PAS 2080:2016 (https://shop.bsigroup.com/ProductDetail?pid=000000000030323493) has been applied at key decision points throughout the option selection and development process.

3.16 Remove Existing Structures

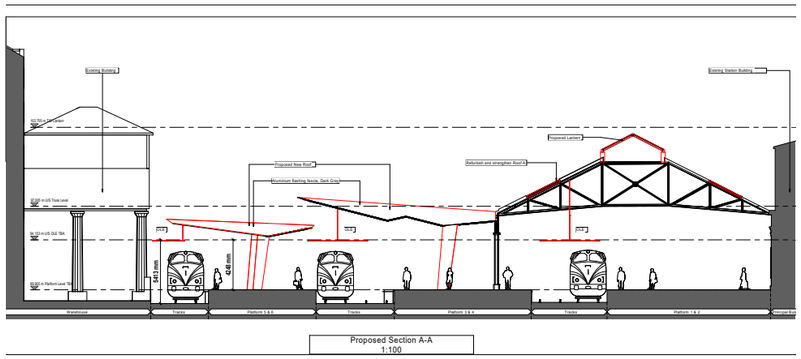
3.16.1 Removal of the services gantry
The proposal includes the removal of the services gantry. This currently provides access to services between the main station platform and entrance and the opposite platforms. This is not part of the original scheme and will have been added to provide services intervening with the tracks.
The gantry is of detriment to the visual expanse of the station and will benefit being removed. Services will be connected underground.

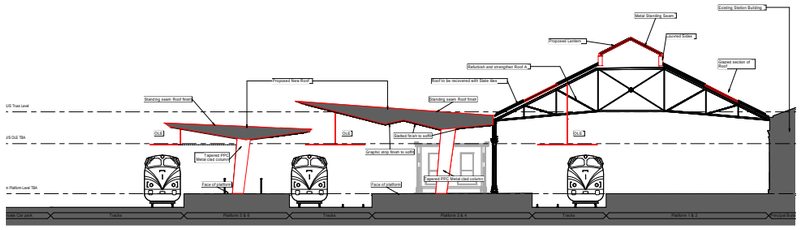
3.16.2 Removal of the signalling box building
The signalling box building is not original to the railway station and was a later addition to provide more advanced and better access to the signals. Unfortunately this structure has blocked off a large portion of the visibility to the main station. The architecture is not in-keeping with the design intent and aesthetic and is proposed to be removed as part of the major works. The removal of the signalling box will provide clear views from the main station building through to the opposite warehouse, which is reflective of the original design intent.

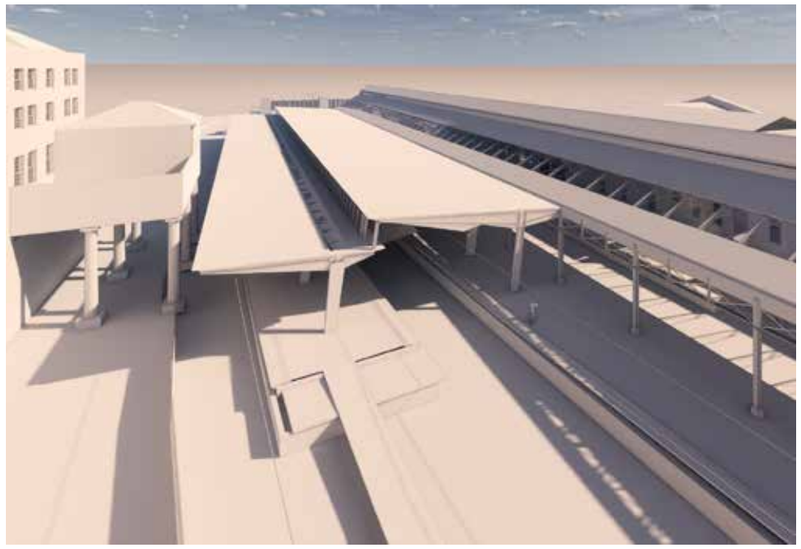
Section 4
The Scheme

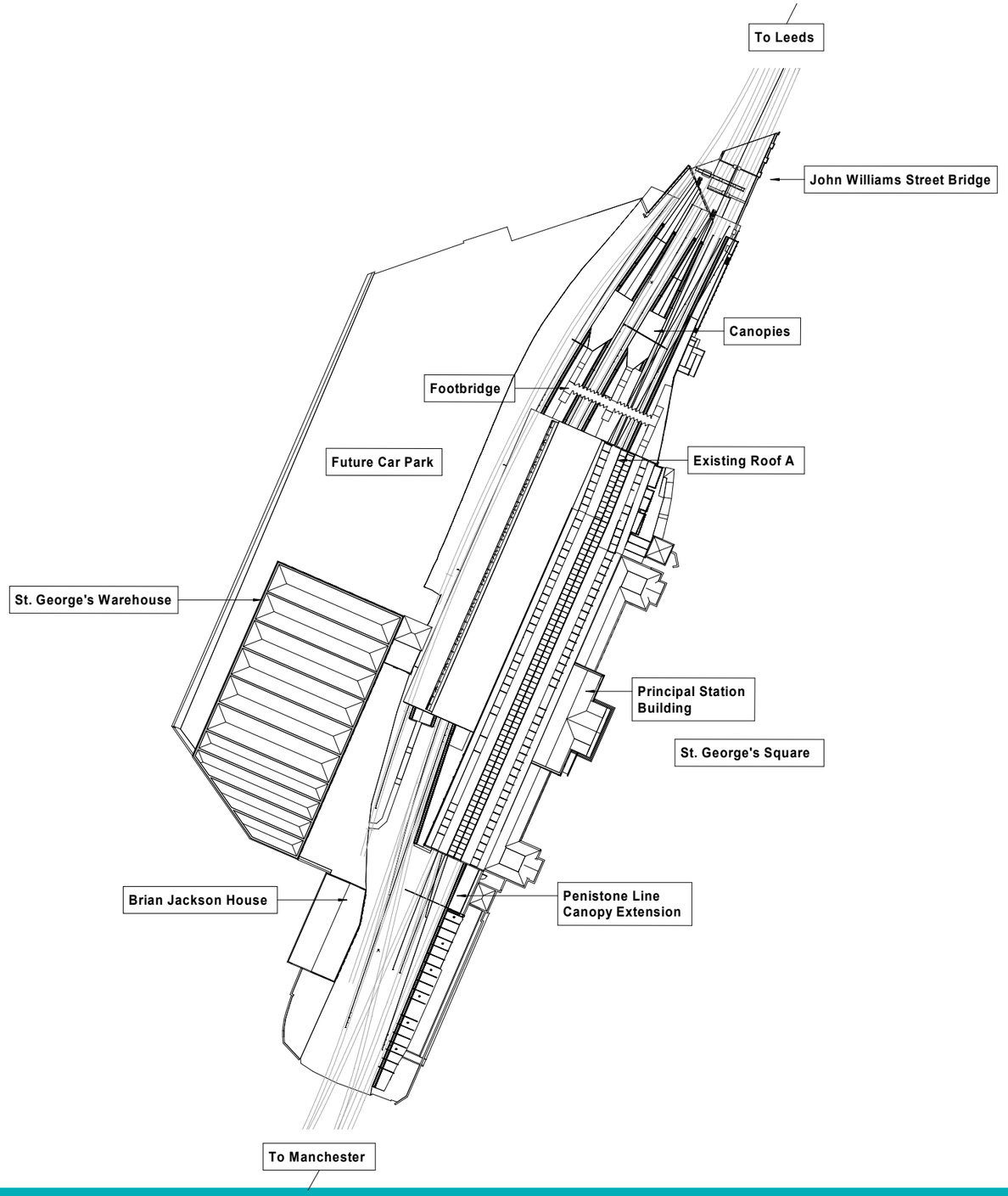
04

4.0 Proposals









4.1 Retained Roof A

4.1.1 Specific drivers

Roof A is part of the Grade I Listed Huddersfield Station and substantially contributes to its historic significance. It is one of the last surviving examples of a Euston truss roof on the railway network today. Through recognition in the Statement of Significance this has led to the retention of the structure, which will be strengthened and refurbished to meet modern standards with new roof covering and as much of the existing structure maintained.

4.1.2 Relocated bays

Due to the new track and platform alignment/extension, 2 bays (18m approx.) of Roof A will need to be removed at the Manchester end of the station. To rebalance the symmetry of the roof and to continue to provide adequate coverage for the new train stopping locations, 3 bays (27m approx.) are to be reintroduced at the Leeds end of the station.

The two bays of structure removed from the Manchester end cannot be reused at the Leeds end, as the span differs.

The Leeds end extension will be tapered in line with the last retained bay and will follow the path of the original 2 roof bays which were removed in the 1980s.

4.1.3 Lantern

The original design of Roof A included a lantern that sat atop the roof which would have acted as an exhaust to encourage the ventilation of the space below. It also would have provided continuous shelter from inclement weather. This was removed leaving a large opening along the length of the trainshed for much of its recent history. It is believed to have been removed sometime between the 1940s and 1950s and, as such, has remained in its present state for at least 70 years. There was a proposal put forward in the 1980s to reinstate a lantern but covered in corrugated polyester, but this was never completed.

As part of the refurbishment, it has been agreed there is an opportunity to reinstate this which will provide increased platform coverage from the elements, therefore improving passenger comfort and maintaining historic fabric.

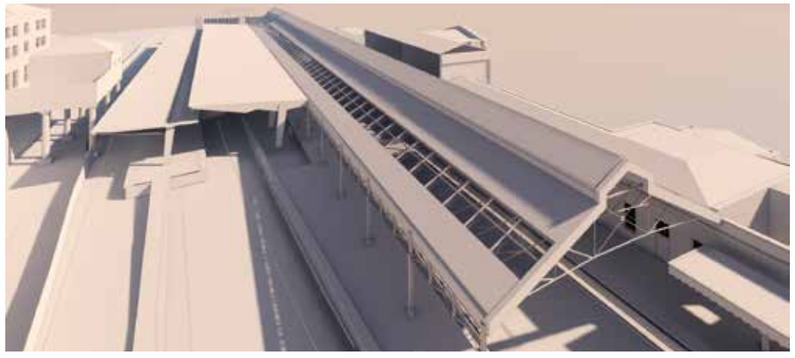


Figure 4.1.3a: Roof A aerial view

Different roof coverage approaches were explored from fully glazed to solid. These were reviewed with the following in mind:

- Historic narrative
- Daylight requirements
- Visual aesthetic
- Management and maintenance

A study was completed on the history of the roof with further research completed on the original design intentions of Roof A. It is still unknown as to why the lantern was removed but we reflected on the fact that the roof has been missing for longer than it was a part of Roof A and therefore it was important to find a way to celebrate all of the building's history.

Following an historic assessment which confirmed there was originally a lantern and it was glazed, a daylight study was completed to determine whether, for operational purposes, a replacement structure would also need to be glazed. An assessment was completed for lighting at different times of the day. It was determined there would be little advantage to the overall daylighting within the space if the lantern was glazed instead of solid.

Visually the key design criterion was to ensure the lantern was reinstated and pitched. The ethos of the design process is to conserve the historic fabric and, where new intervention is required, that it is sensitive and in-keeping to the historic fabric, but also find a balance of honesty and complementary design. This led to considering something that created a balance of both.

The lantern will be situated above live OLE wires. This means that the OLE would need to be shut down if glass panels were to break and require replacement: a highly onerous condition for the operation of the railway.

For these reasons it is proposed that the new lantern roof would be finished in modern standing seam sheeting. The seams of the roof finish would mimic the glazing bars of the earlier patent glazing, and would match the finish of the other new roof elements proposed for the station (see subsequent sections). Maintenance for an opaque roof would require significantly less frequent maintenance than a glazed version.

Train diesel fumes will need to be ventilated from the roof space. This will be achieved by providing a sufficient area of fixed louvres in the short side walls of the lantern.

4.1.4 Materials

The roof will be re-clad with a mix of traditional and modern materials. The main roof covering will be slate as the original. There is a structural reason for this in that the additional load applied to the structure by the slates will combat any wind uplift.

The soffit of Roof A will be timber boarding running in parallel to the tracks in reference to the original cladding, drawing your eye along the roof helping to appreciate its expanse.

The covering for the lantern will be standing seam with metal louvres in a colour to match the slate.

4.1.5 Colours

Extensive colour options have been researched and assessed to determine how the shades of colours proposed for the underside of the timber soffit and Euston Truss would work together. The conclusion was that a dark colour should be used for the Euston Truss and a lighter shade should be used for the underside of the soffit. This will emphasise and celebrate the structural elements of the roof.

The soffit for the lantern will likely be a metal slatted material with closed joints which will be a modern interpretation of the original boarding.

The transverse & longitudinal trusses, and the columns supporting them, will be painted in a mid tone that will make them stand out and be celebrated against the soffit.

4.1.6 Lighting

Retained Roof A provides the mounting framework for the luminaires required to illuminate the platforms below.

The existing lighting scheme shown in Fig.5.1.6a comprises a combination of suspended and wall-mounted luminaires to illuminate the platform. The luminaires distribute light onto the platform in a downward direction only without any upward illumination. By only having a downward distribution of light, the lit effect results in an oppressive, flat environment that also provides minimal enhancement to the highly decorative architectural elements of the roof. The downward illumination exaggerates the contrast between the light source and the dark roof and increases the perception of glare.

The existing lighting scheme and luminaire positions were modelled in lighting software alongside the proposed platform rearrangement. It was concluded that the existing luminaire positions are inadequate for safe illumination of the platform edge.

The lighting scheme was installed circa 1990s (Fig.5.1.6b), therefore the luminaires are at the end of their lifetime and hold no heritage significance.

Lighting options were explored to achieve the design objectives whilst considering the key viewpoints and user journeys around the platform. These options are listed below:

1. Suspended, decorative luminaires
2. Continuous linear luminaires positioned below the trusses
3. Discrete luminaires with strategically-placed light

The preferred solution was a combination of option 1 and 3 as shown in Fig.5.1.6c. The discrete solution minimises the visual clutter within the space whilst illuminating key elements and surfaces.

Figure 4.1.6a: Retained Roof A existing lighting scheme

Figure 4.1.6b: Retained Roof A lighting scheme in 1990s

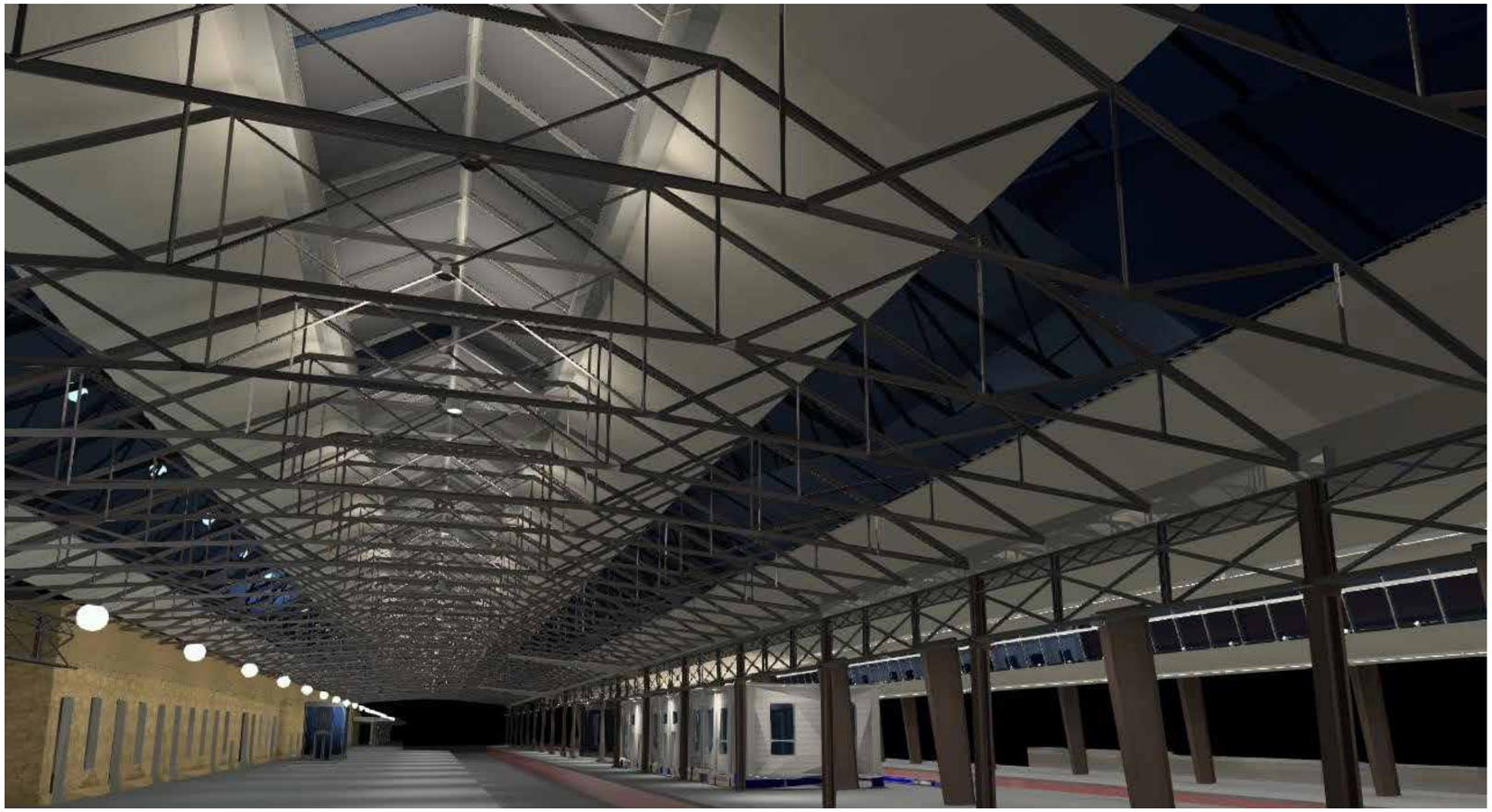


Figure 4.1.6c: Proposed lighting scheme

The lighting scheme will comprise the following elements:

- Discrete downlights surface-mounted to the underside of the trusses to provide safe illumination at platform level. The downlights will be positioned in two rows; one row on the widest section of the platform closest to the station building and one row on the Tea Room platform.
- A row of suspended, decorative pendants will be mounted on the platform closest to the station building. These luminaires will provide safe illumination at platform level and will also distribute light into the roof void to create a welcoming, low contrast environment.
- A discrete, linear luminaire will be positioned on the topside of the trusses to illuminate the architecture and structure of Retained Roof A. The uplight element will provide a visually comfortable environment by minimising the contrast between light and dark in the evening.

4.1.8 Structural considerations

The existing trainshed roof trusses are formed from a series of tees, flats, bars compound I-section connected with rivets, bolts and wedge details. The roof has undergone a number of structural interventions throughout its history including the removal of the original lantern and strengthening works in the 1980's and again in 2013.

A number of further interventions are required as part of this scheme. This section summarises the structural design for each of these.

4.1.8.1 Design approach

The principles followed in the development of the structural design are as follows:

- Conservation to be the first assumption
- If conservation is not possible in place, then repairs and strengthening works will be applied
- Repairs are not to replicate the effects of ageing
- Modern elements are to be expressed as modern

Following the conclusion of GRIP3, a number of surveys have been undertaken to develop a detailed understanding of the geometry, condition and material properties of the structure.

The results of tests on the material composition concluded that the original roof is formed from early poor-quality mild steel. The only exception to this are the two cast-iron columns adjacent to the subway on the existing island platform.

The dimensional survey results were incorporated into structural design models of the roof. The behaviour of the roof has been considered under a range of load conditions including roof finishes, access, wind, snow, and the reinstatement of the lantern.

Adjusting the load allowance for roof finishes gave scope to influence the behaviour of the roof. By increasing the roof finishes, design issues associated with wind uplift has been minimised.

4.1.8.2 Strengthening works

The results of the design models showed that a number of elements across the length of Roof A require strengthening for the roof to be safely retained.

The proposed strengthening details typically involve bolting additional mild steel plates to the existing sections to increase capacity. This approach minimises the visual impact of the works and follows similar approaches taken for previous interventions.

The diagonal elements on Fig.5.1.9.2a are to be strengthened across the entire length of the roof. Flat plates will be bolted to either side of the web and to the top of the flange of the tee section in order to achieve the required capacity.

The first 6No. retained trusses at the Manchester end of the roof are subject to wind uplift. The effects of the wind uplift have been minimised through the use of roof finishes, however, given the slender nature of the bottom boom, this causes a buckling issue in the current condition. As well as strengthening the central section by bolting flat plates to either side, plan bracing will be provided between the first two trusses with ties provided to the subsequent four. This is required to limit the effective length of the bottom boom. Where the Principal Building projects above the eaves of the roof, snow drifting causes the top boom adjacent to the building to become over-utilised. In this location it is not possible to attach flat plates to the existing elements to achieve the required strength due to roof coverings. In this instance angle sections will be bolted to the section to create an I-section.

4.1.8.3 Lantern reinstatement

The lantern structure will be formed as a portal frame from mild steel sections following the proposed profile. The frames, spanning the existing opening to the centre of Roof A, will be located on each truss line.

Eaves and ridge beams will span between each frame to tie them together.
The structure will be stabilised in the longitudinal direction by bracing to the end bays at either end. The bracing will be formed from steel bars.

4.1.8.4 OLE support structure

OLE is to be supported at up to four locations within the existing roof. The support structure will be formed of vertical drop tubes with restraining cables splayed to limit movements to within satisfactory limits for the operation of the OLE. The structure will be supported from beams spanning between the top booms of the existing trainshed roof.

4.1.8.5 Removal of Roofs B & C

To facilitate the proposed P-way to the west of the station, the existing Roofs B & C are to be removed. A full historic recording of Roofs B & C will be carried out prior to demolition. The design of Roof A considered the impact of this loss of structure. It was concluded that Roofs B & C provide no lateral stability to the retained Roof A and, as such, it is structurally acceptable for them to be removed.

The Contractor will be required to approach the demolition of Roof B & C with caution to ensure that no damage is caused to the retained roof, particularly when working on the shared column line between Roof A and Roof B.

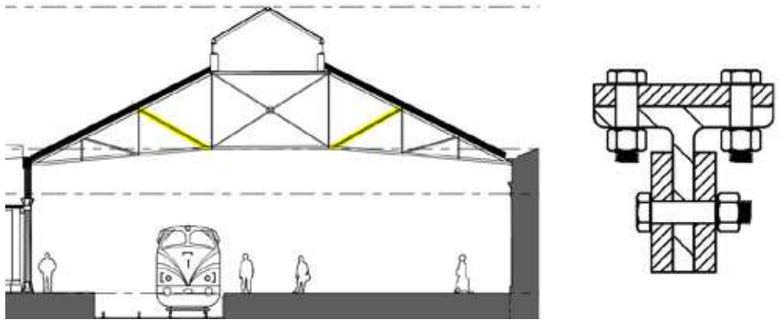


Figure 4.1.9.2a: Strengthening detail to diagonal elements

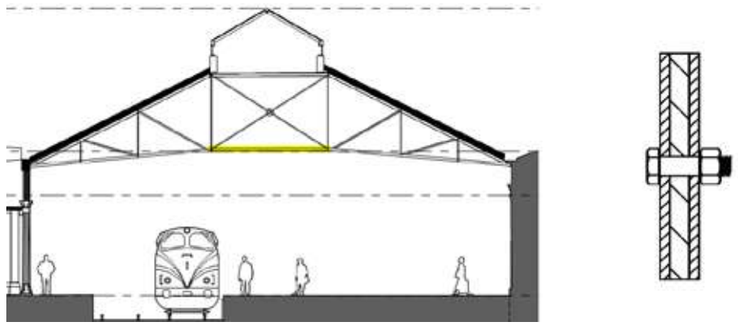


Figure 4.1.9.2b: Strengthening detail to bottom boom of 6No. trusses at Manchester end of Roof A

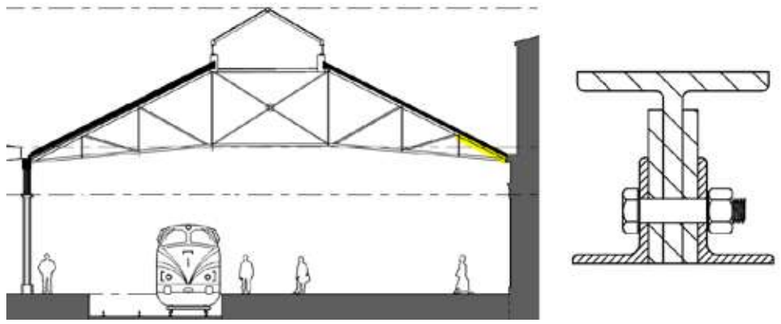


Figure 4.1.9.2c: Strengthening detail to top boom

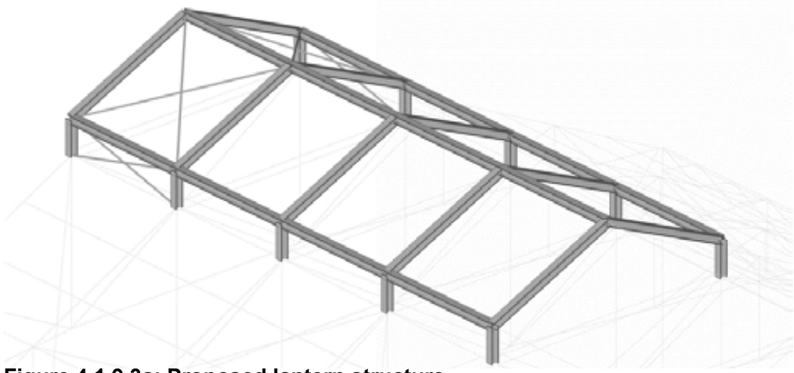


Figure 4.1.9.3a: Proposed lantern structure

4.2 Detail Development Roof A

4.2.1 Roof A Build up

The new build up for Roof A will be from the outside, new slate roof tiles sitting on 25 x 50mm timber slate battens on a sarking layer which will sit on 25 x 50mm timber counter battens which will prevent water from being trapped in the build up.

This will then be sat on a metal liner tray deck that will proved a substrate that can be installed more safely and faster than traditional timber joists but will remain concealed. This will then be underdrawn with 150 x 25mm square edge timber boarding, coloured off white on 25 x 50mm battens.

The underside of roof A will respect the heritage of the building while also employing modern construction techniques to provide a safe and efficient solution.

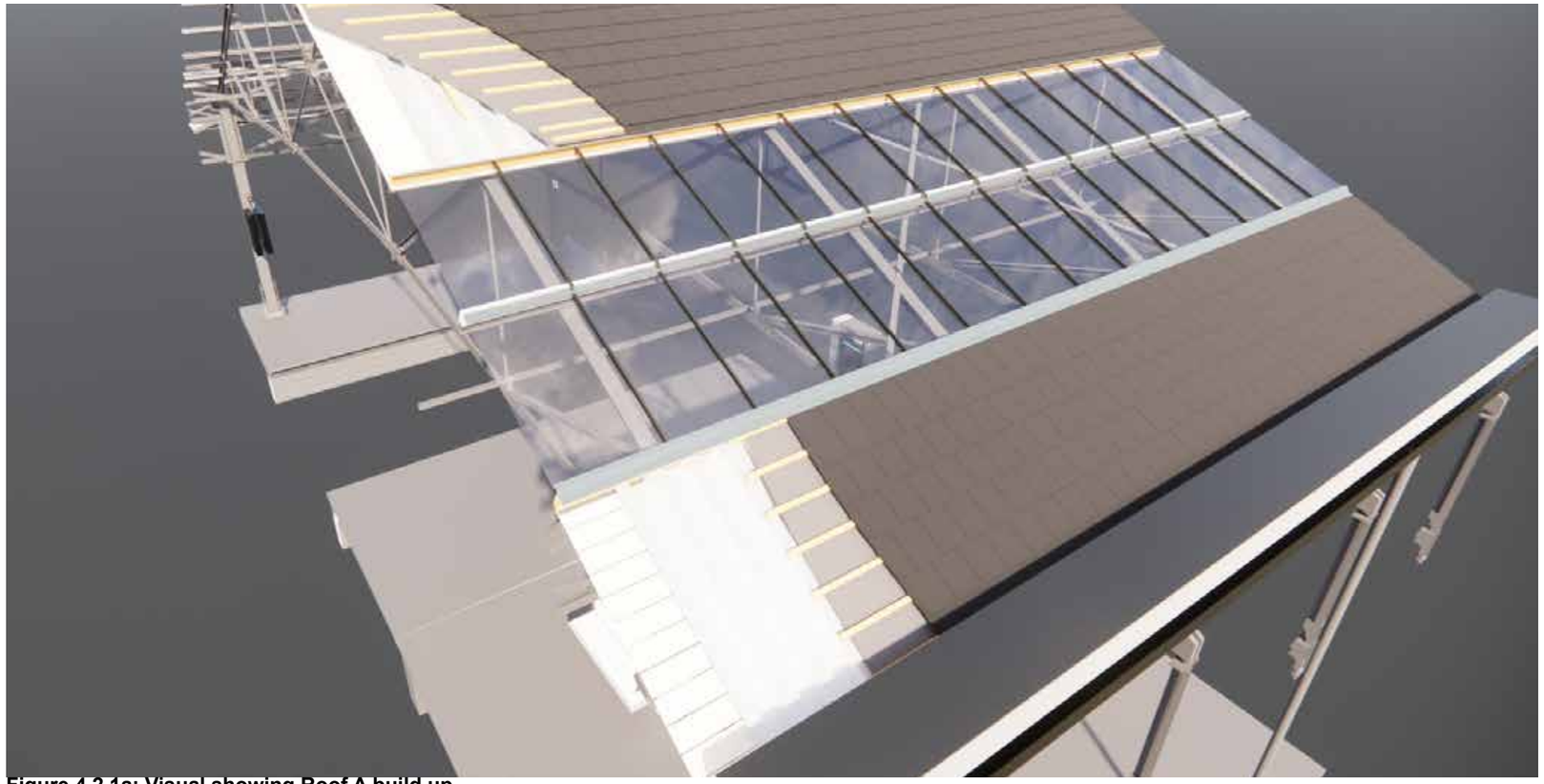
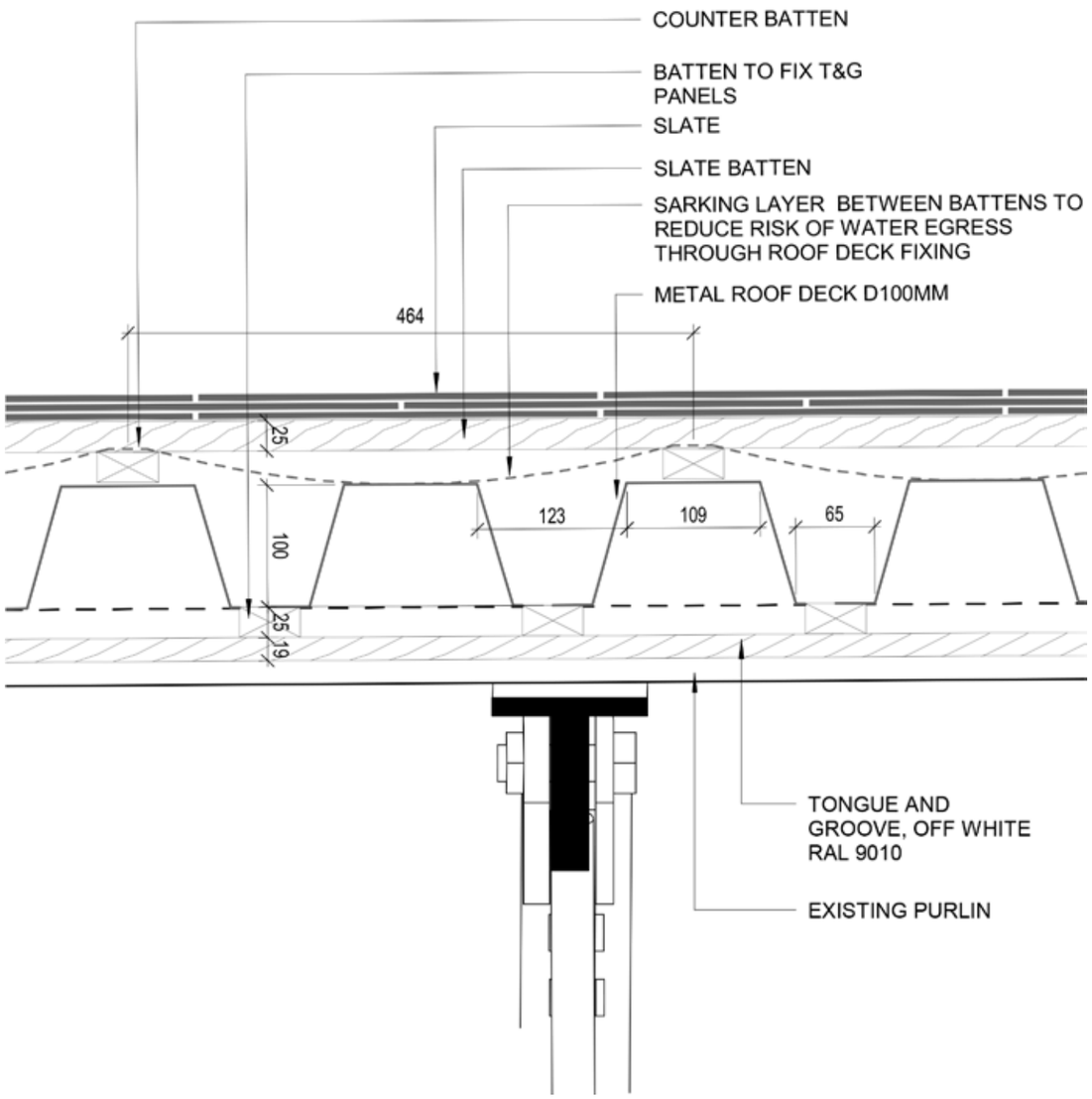


Figure 4.2.1a: Visual showing Roof A build up

Figure 4.2.1b: Visual showing underside of Roof A



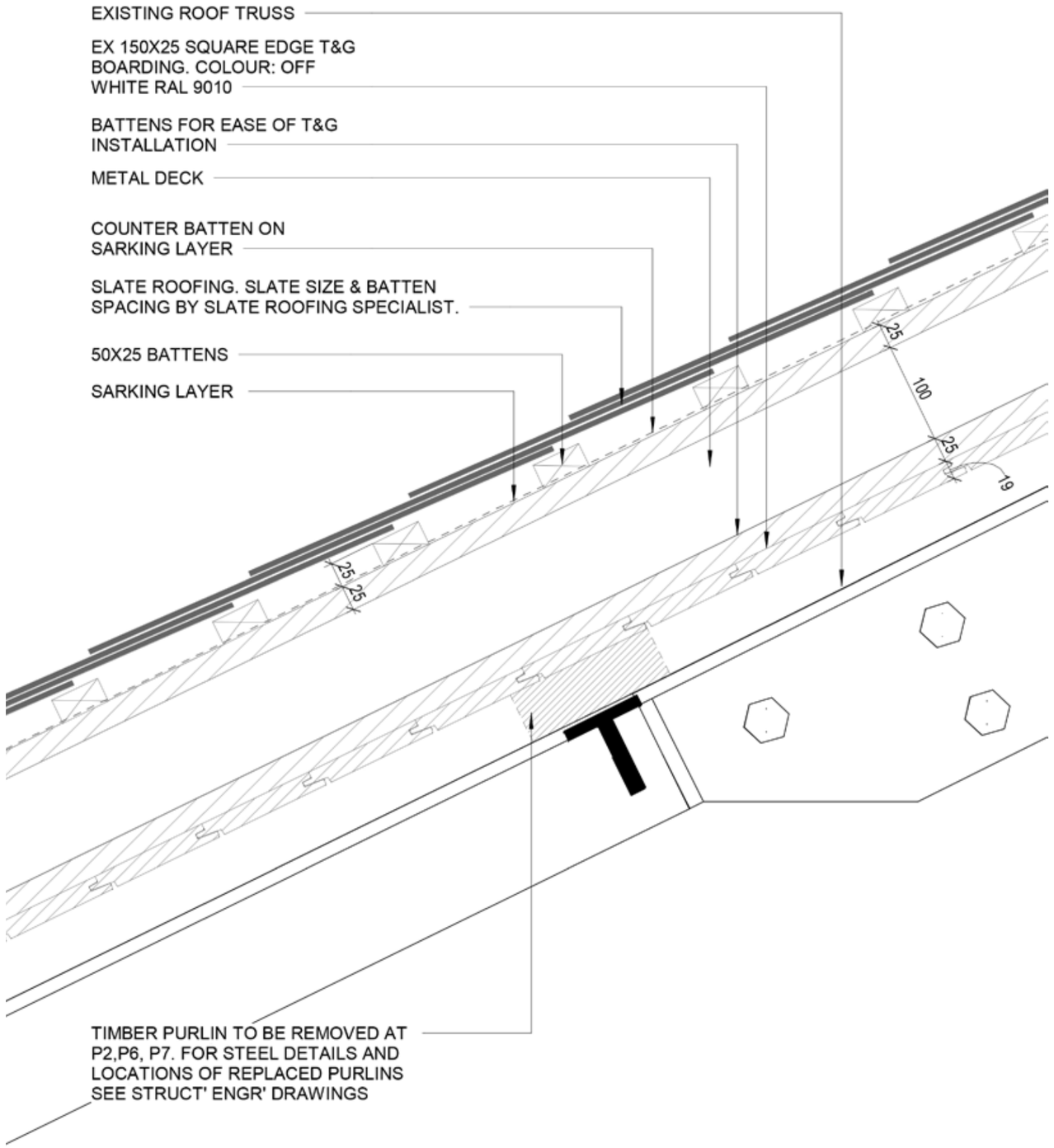


Figure 4.2.1c: Section details showing build up of Roof A

4.2.2 Polycarbonate Roof lights

Instead of traditional glazing, polycarbonate is being used as the material for the rooflights that are being reinstated in Roof A, these have been chosen due to their light weight properties that will improve the safety and speed of installation as well as replacement. This has been reviewed by the Station Security Group.

We have chosen a glazing rhythm that would have been similar to that of the original roof, respecting the heritage even though this is a modern material, again providing a safe and efficient solution.

Figure 4.2.2a: Visual showing polycarbonate rooflights

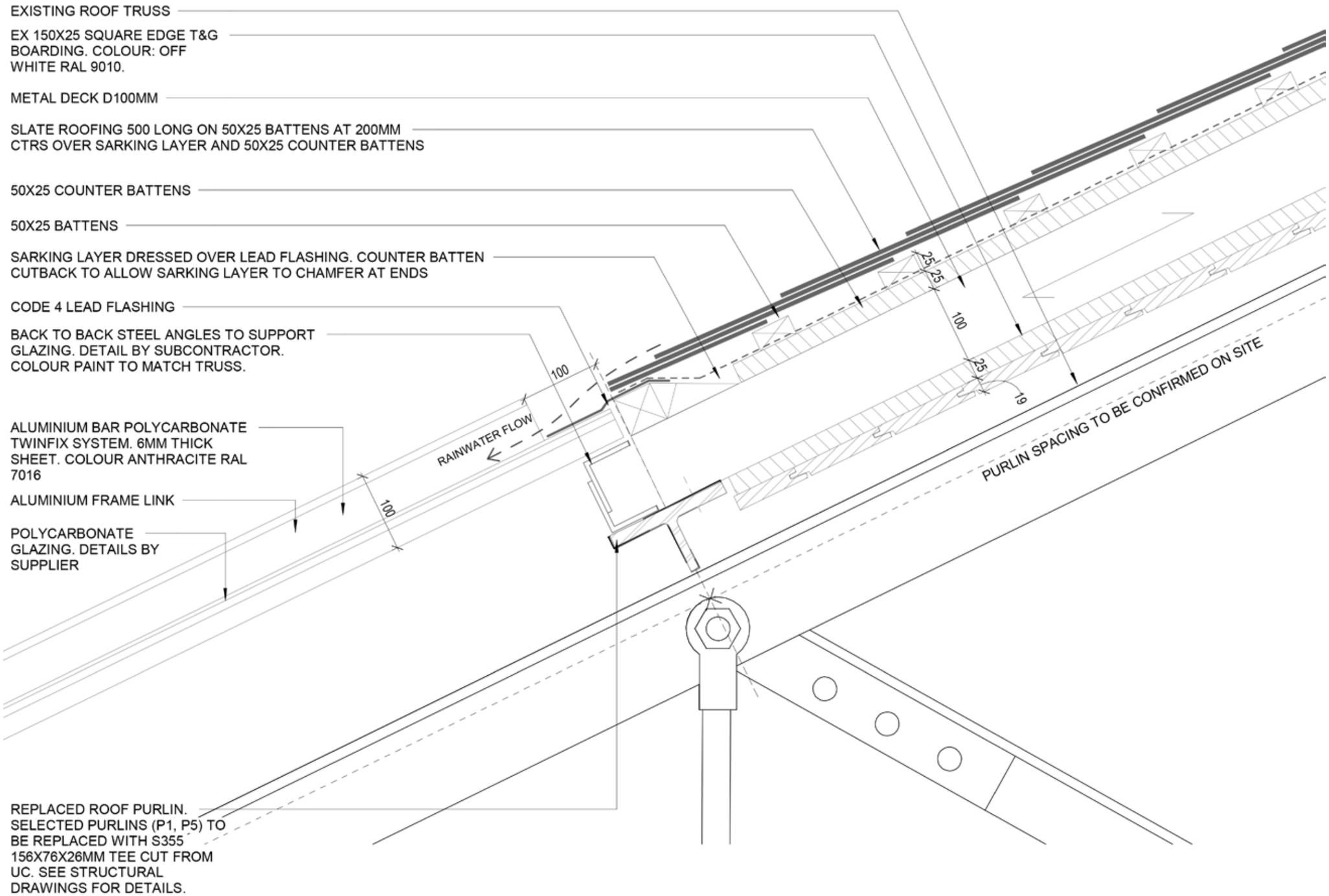


Figure 4.2.2b: Section detail showing roof light and slate roof interface

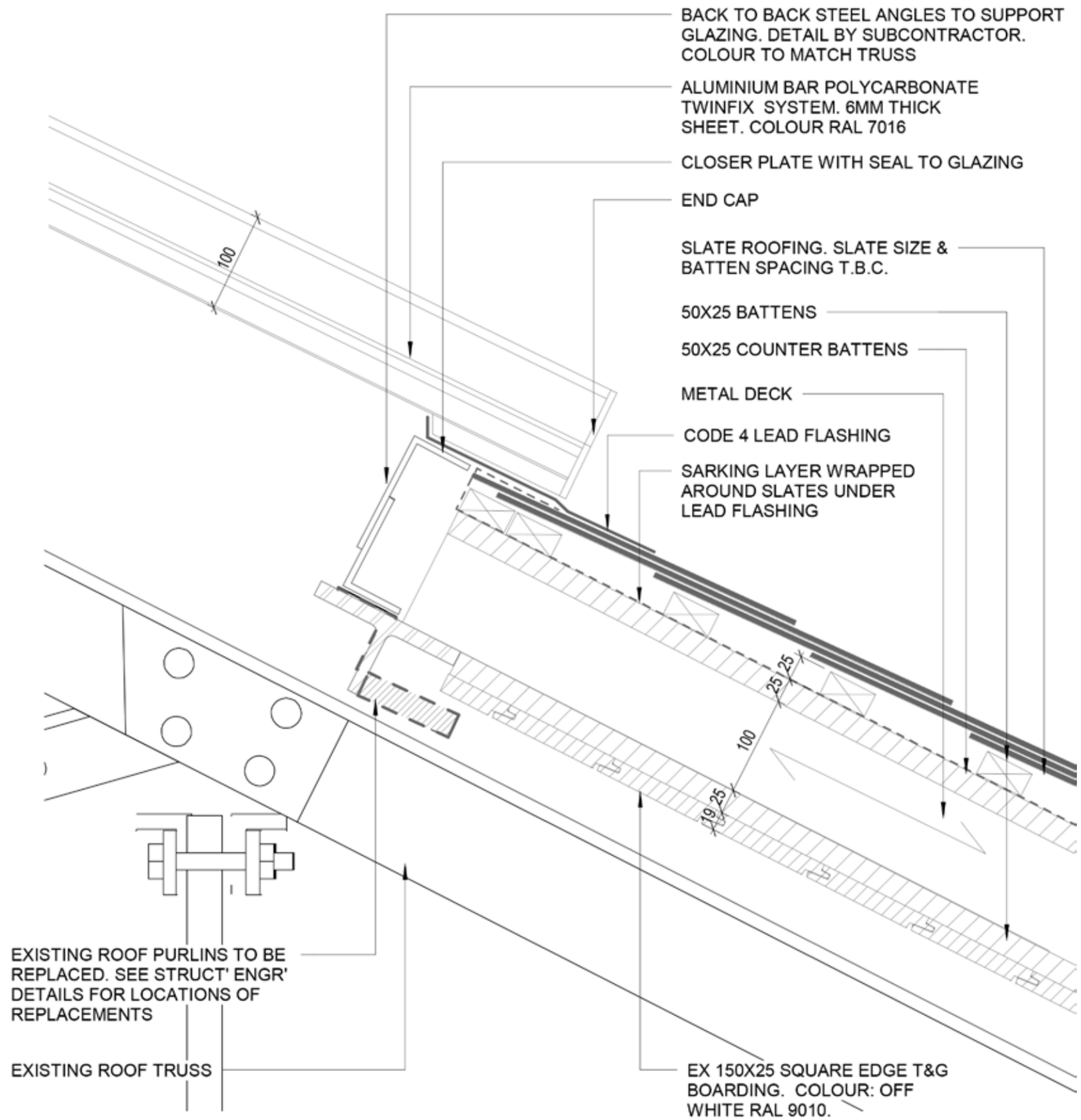


Figure 4.2.2c: Section detail showing roof light and slate roof interface

4.2.3 Lantern

The lantern will be reinstated using modern materials as opposed to providing a heritage aesthetic. This is so that we are honest about the new interventions at the station and also making it easy to understand the ongoing evolution at the station through its detailing.

This new section will have a standing seam roof which is part of an insulated cladding panel, chosen so that it can span between trusses without additional purlins. The underside of the panel will be coloured the same as the Roof A soffit with the grooves of the cladding panel running in the same line as the Roof A soffit.

To the sides of the lantern we are proposing static louvres coloured grey.

Figure 4.2.3a: Visual showing new lantern

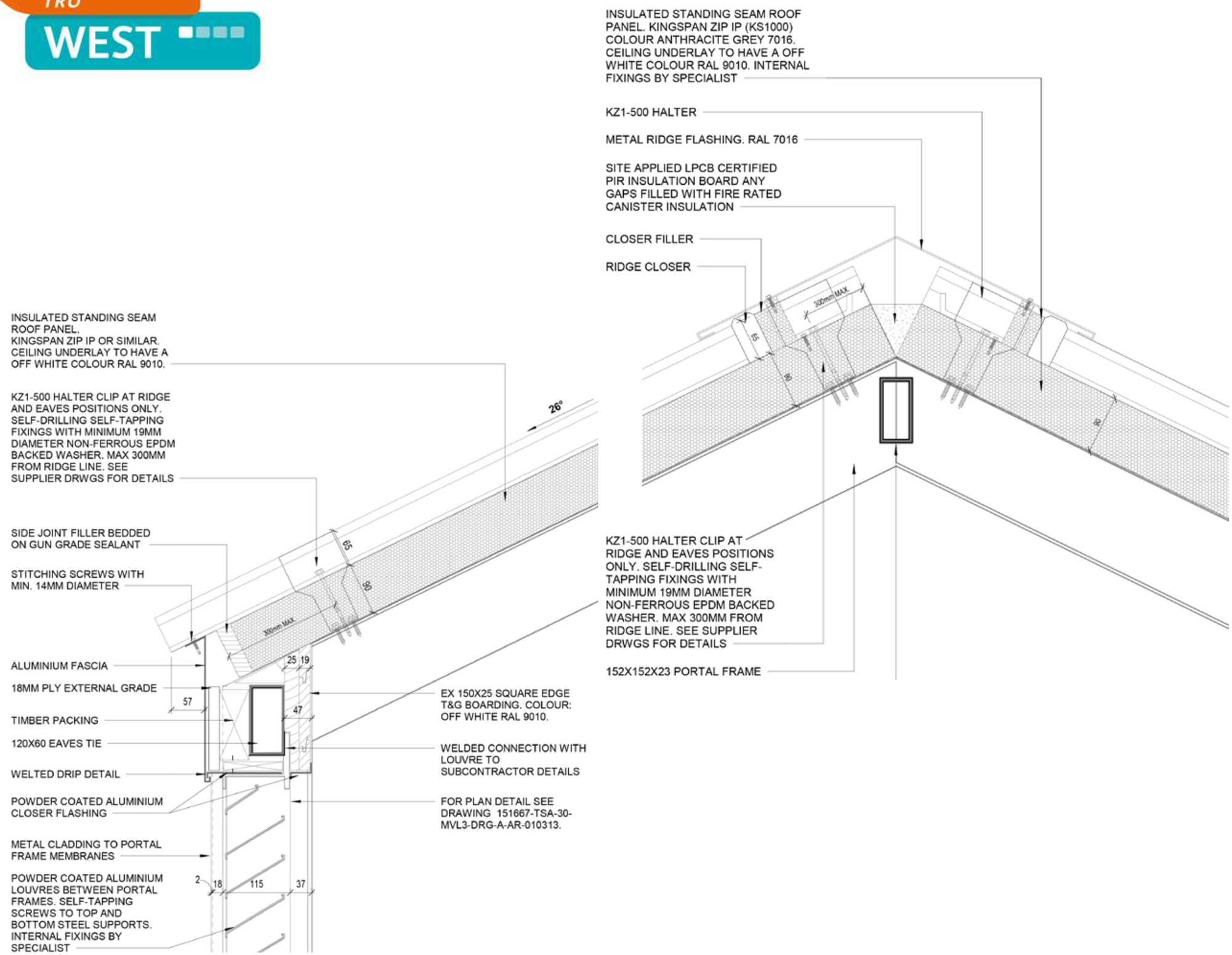


Figure 4.2.3b: Lantern section details

4.2.4 Lantern gable

The majority of the gable end will be open, apart from the lantern section which will be glazed. This will protect the soffit to a degree and the top chord of the Euston Truss at the Manchester end of the station. The flashings will be metal and coloured blue to match the footbridge and the new gable end of Roof B.

Figure 4.2.4a: Visual showing Roof A gable end

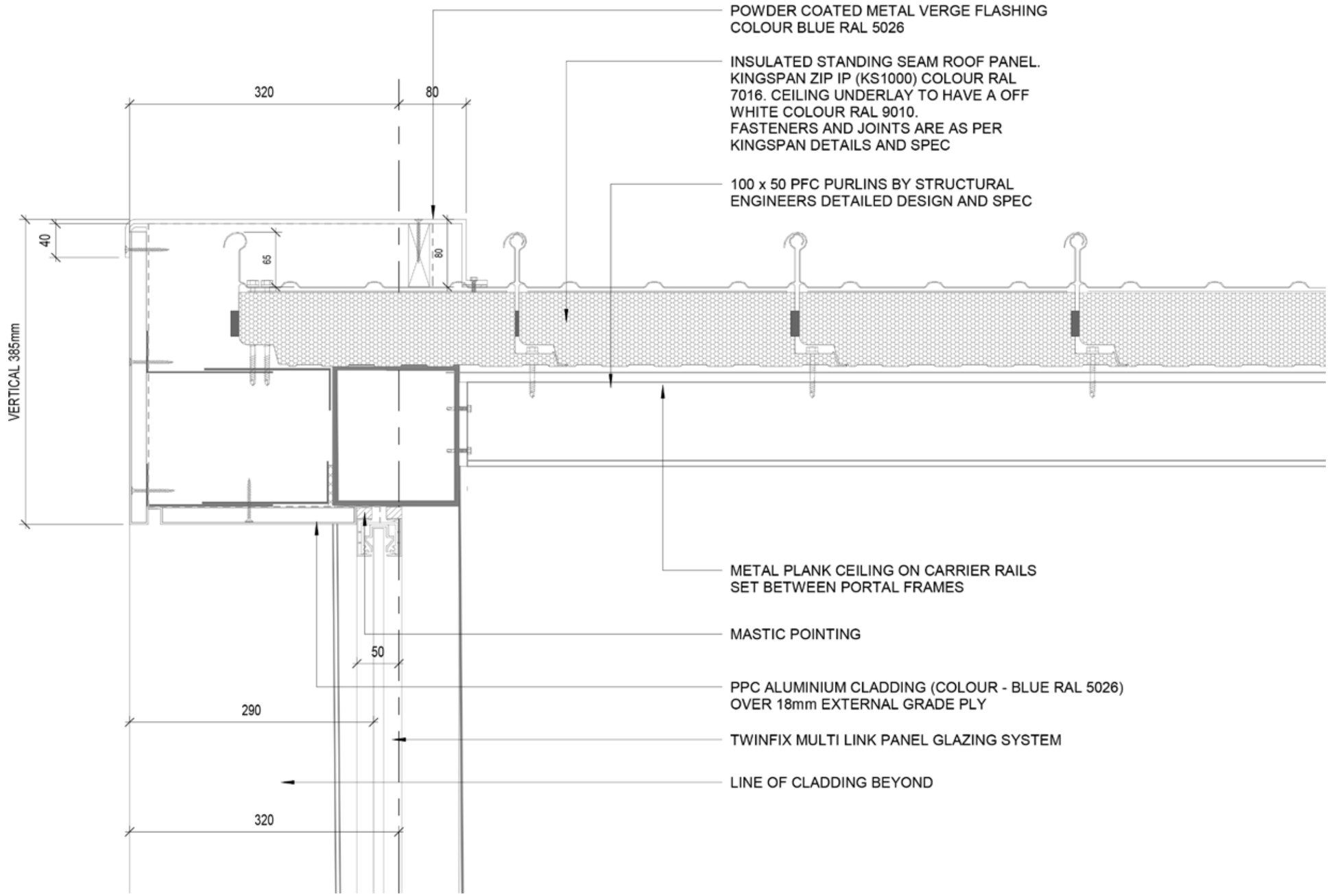


Figure 4.2.4b: Section detail through top of roof A gable end

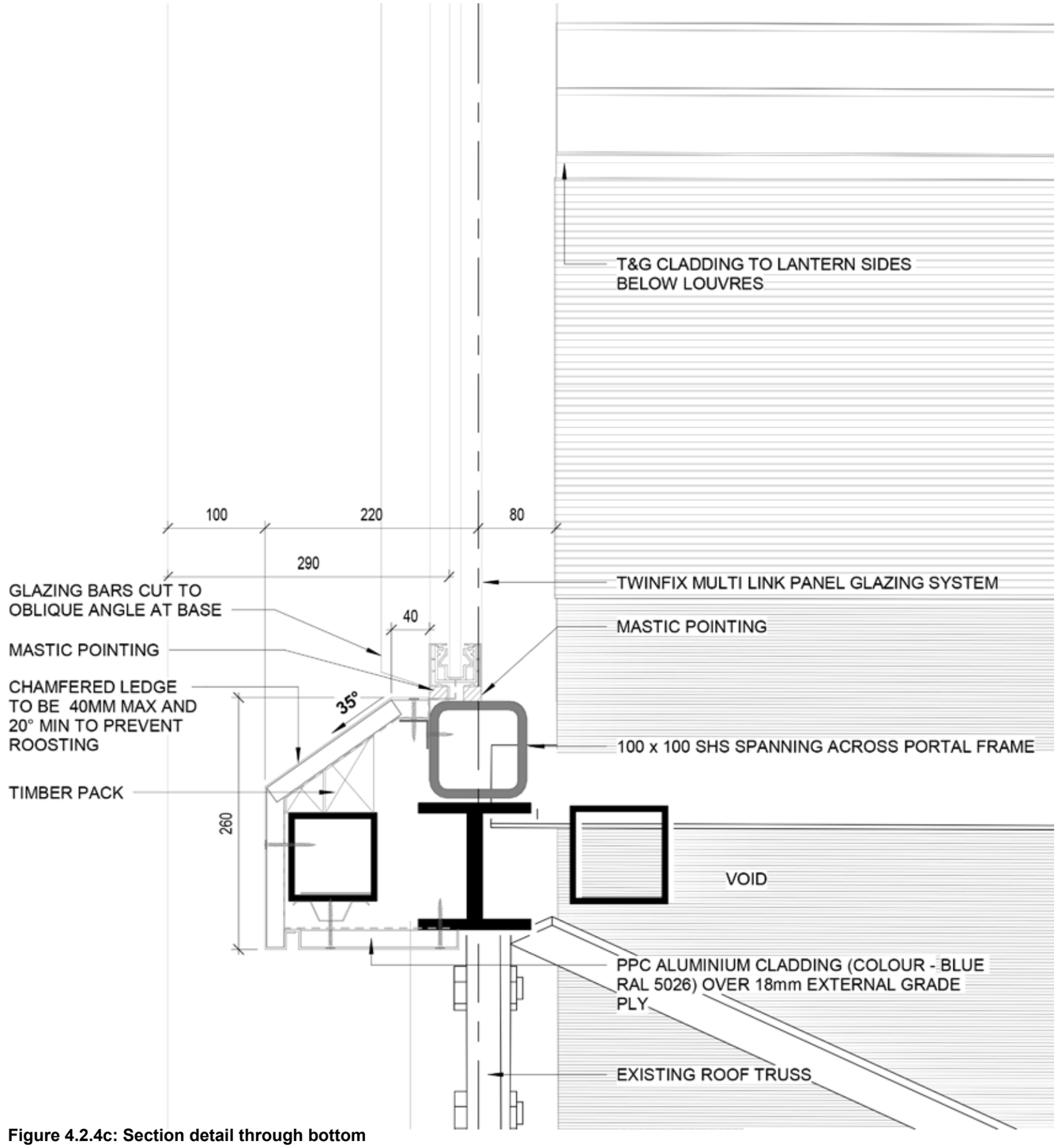


Figure 4.2.4c: Section detail through bottom

4.2.5 Access walkway

The eastern section of Roof A will be accessed in the same manner as it is now. Access is provided through the Principal Building onto a walkway at the interface between Roof A and the Principal Building façade or parapet. This access and walkway will be replaced and upgraded. There will be a provision of a fall arrest system alongside the walkway. The extent of the system will be indicated in the Access and Maintenance drawings in chapter 5.

The walkway will continue to the new extension of the Leeds end of roof A with a guard rail. This section is only visible from the car park. The walkway will stop 3000mm from the both ends of Roof A to prevent operatives from falling over the roof edge.

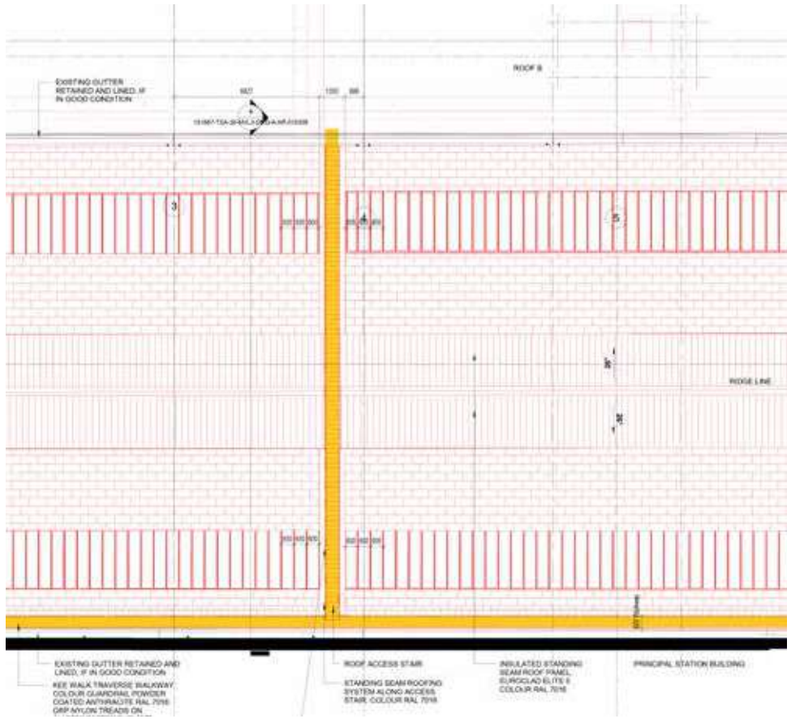


Figure 4.2.5a: Roof A plan, showing access walkway highlighted

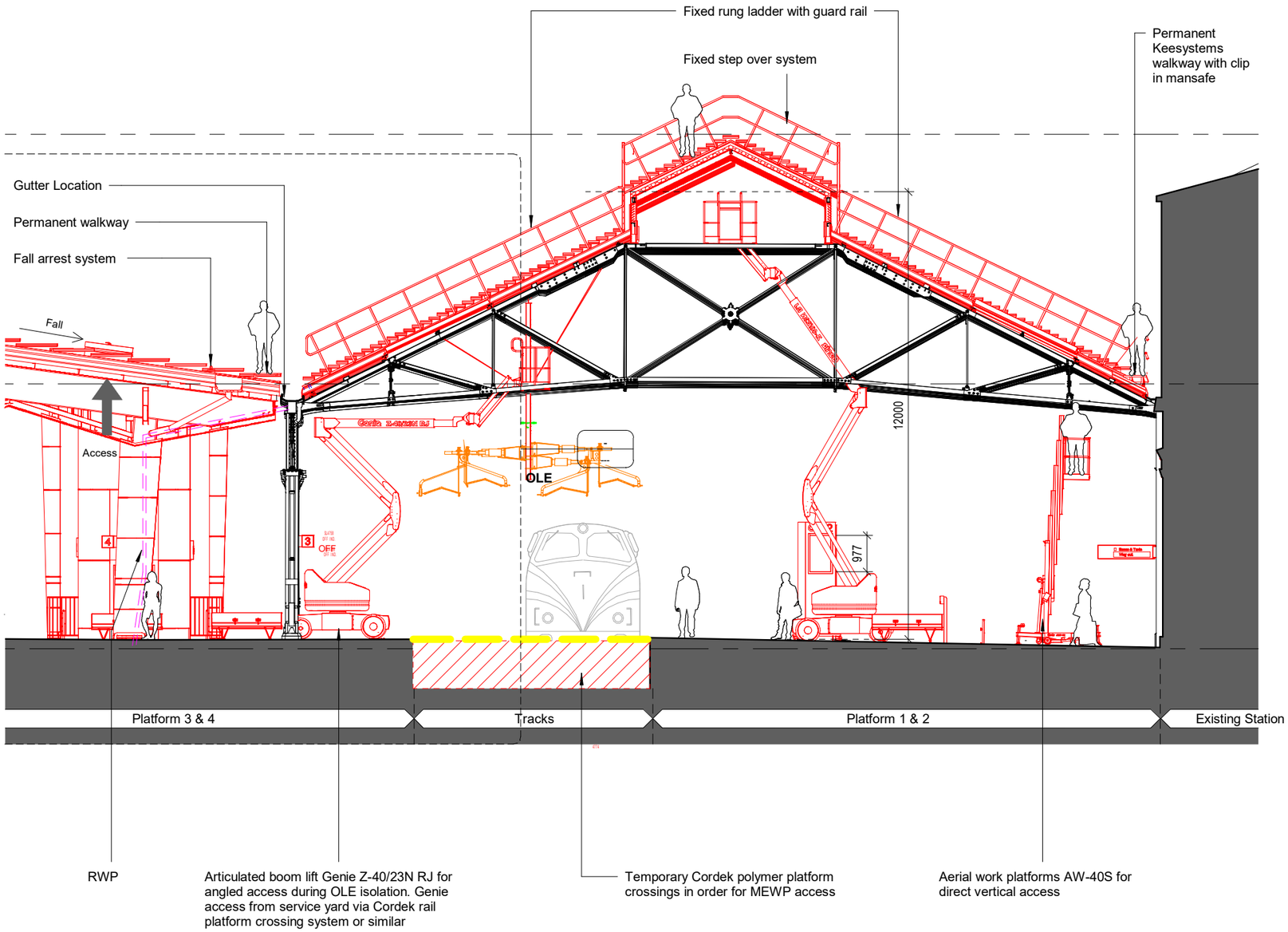


Figure 4.2.5b: Access walkway section over roof A lantern

To access between the both sides of roof A, a permanent stepped access will be centred behind the principal station building in order to reduce the visual impact from St George's square. All of the elements of the access walkway, for the exception of the new extension guard rail, are hidden behind the station principal building.

Temporary walkways can be added such as the BroadWalk, or equivalent other, by a single operative to access areas further away from the walkway located at the eaves. This is to carry out tactile inspection of the lantern.

There is an emergency ladder access to the walkway onto the new roof A extension that sits between the two cycle park units to allow alternative means of escape.

All the guard rails and stepped access equipment are to be coloured according to the Project's colour specification for the station, as reflected in the Materials Schedule submitted to discharge Condition 2 attached to the granted LBC.

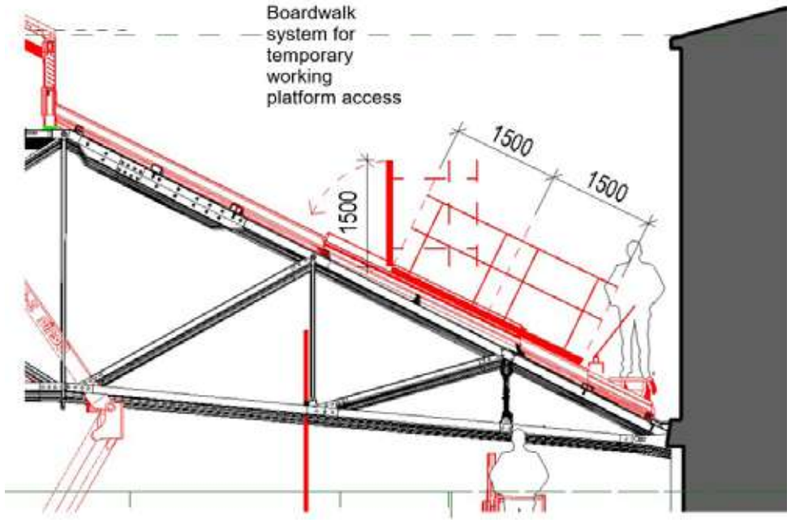


Figure 4.2.5c: Broadwalk temporary access system

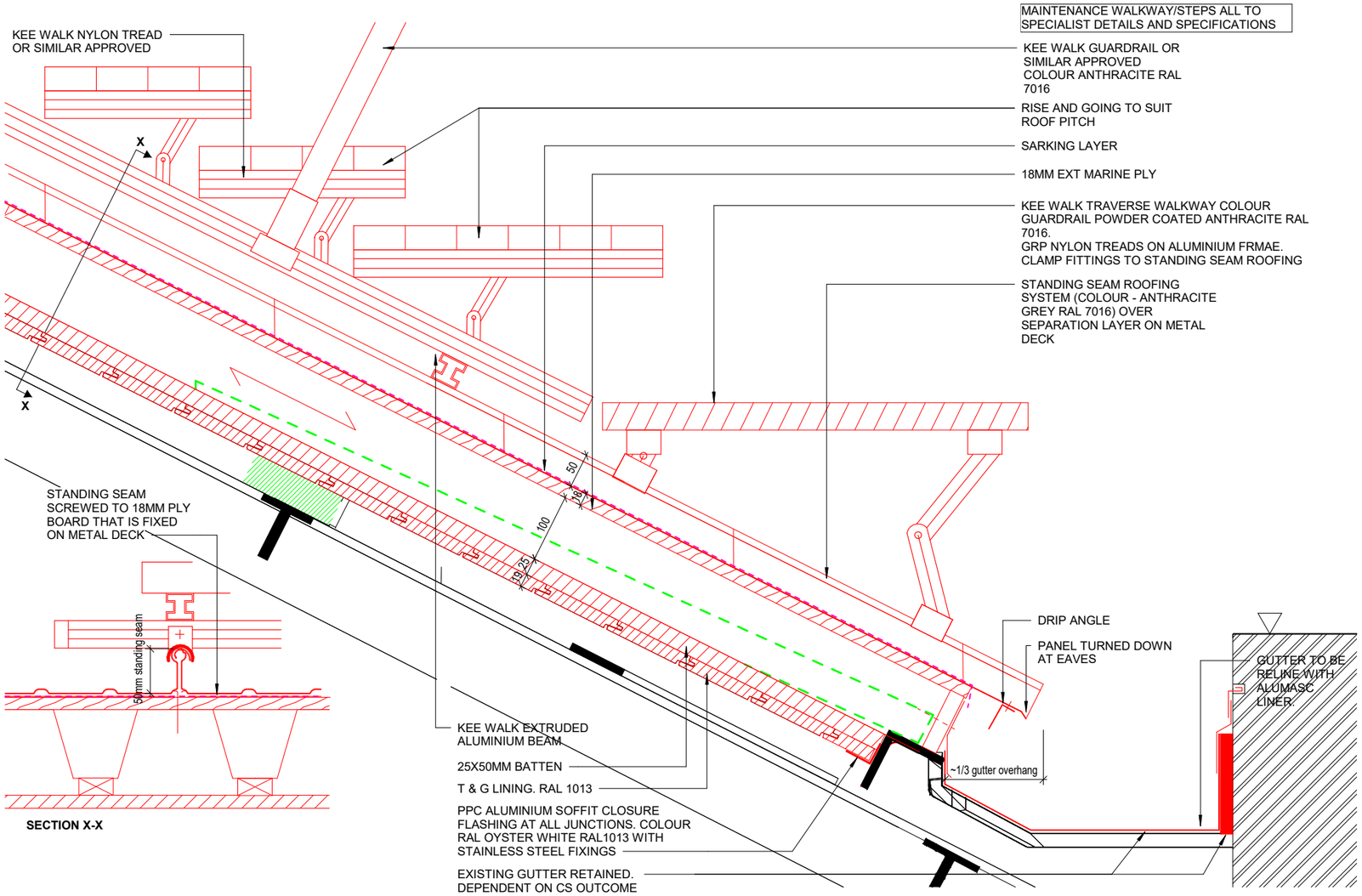


Figure 4.2.5d: Access walkway section at eaves with station building

Access to the western side of the roof will be via permanent access ladders which will pop up from the rooms at the back of lift shafts up on the island platforms onto Roofs B and C.

There will be a walkway on the standing seam with a fall arrest system that will allow access to the valley gutter between roof A and B and the glazing on Roof A. Where Roof B finishes, access will be from a mobile platform along Platform 3/4 at the Manchester end.

Figure 4.2.5e: Roof A extension walkway view from car park

Figure 4.2.5f: View from St George square

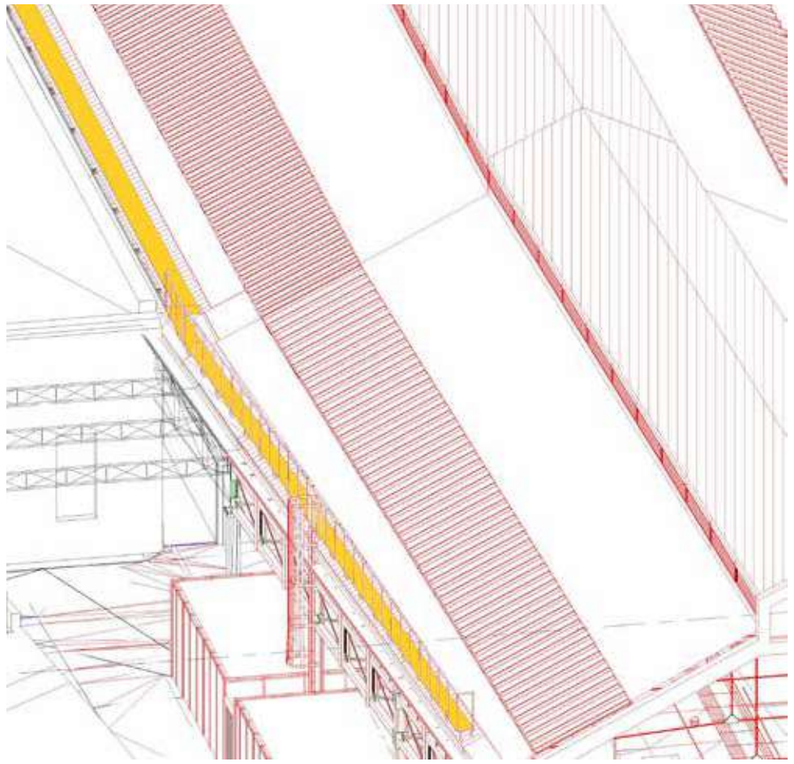


Figure 4.2.5g: highlighted access walkway on roof A extension with emergency ladder

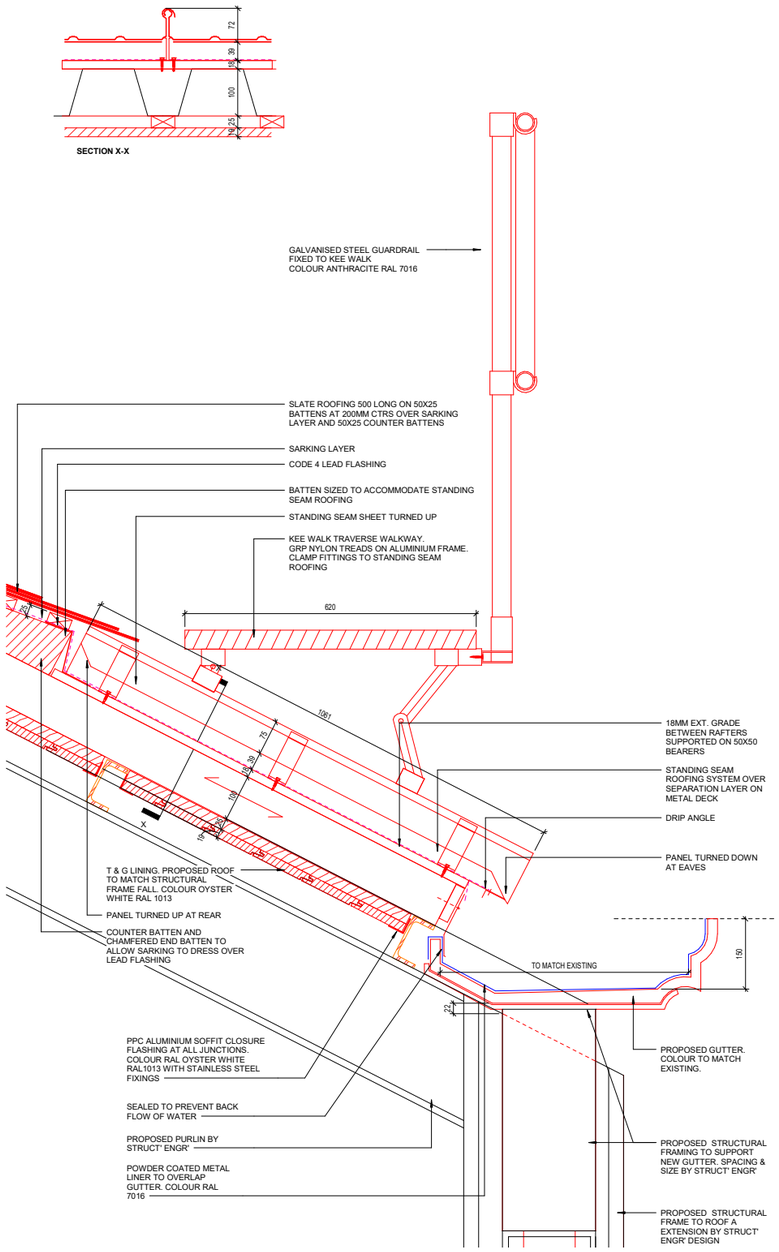


Figure 4.2.5h: Access walkway section on roof A extension eaves

4.3 Detail Development Penistone Line

An extension to the Penistone line canopy is required where the existing Roof A is cut back. It was decided that this extension should retain a similar envelope to the existing canopy while using a new structure to show the honesty of the new interventions.

This will also include new timber dagger boarding that will also feature on the existing canopy where the front is needed to be cut back to allow for the new track alignment

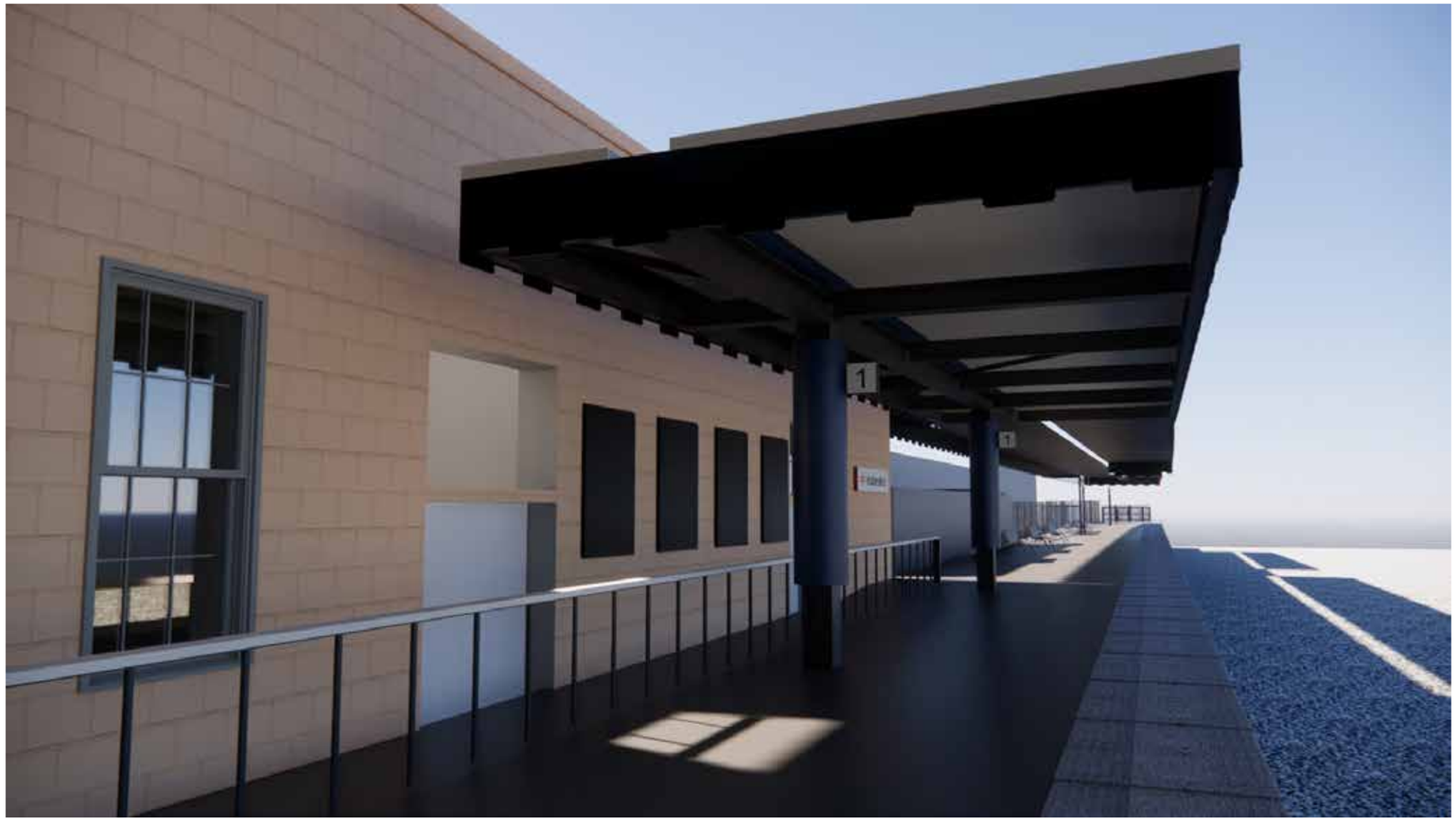


Figure 4.3a: Visual showing Penistone LIne canopy

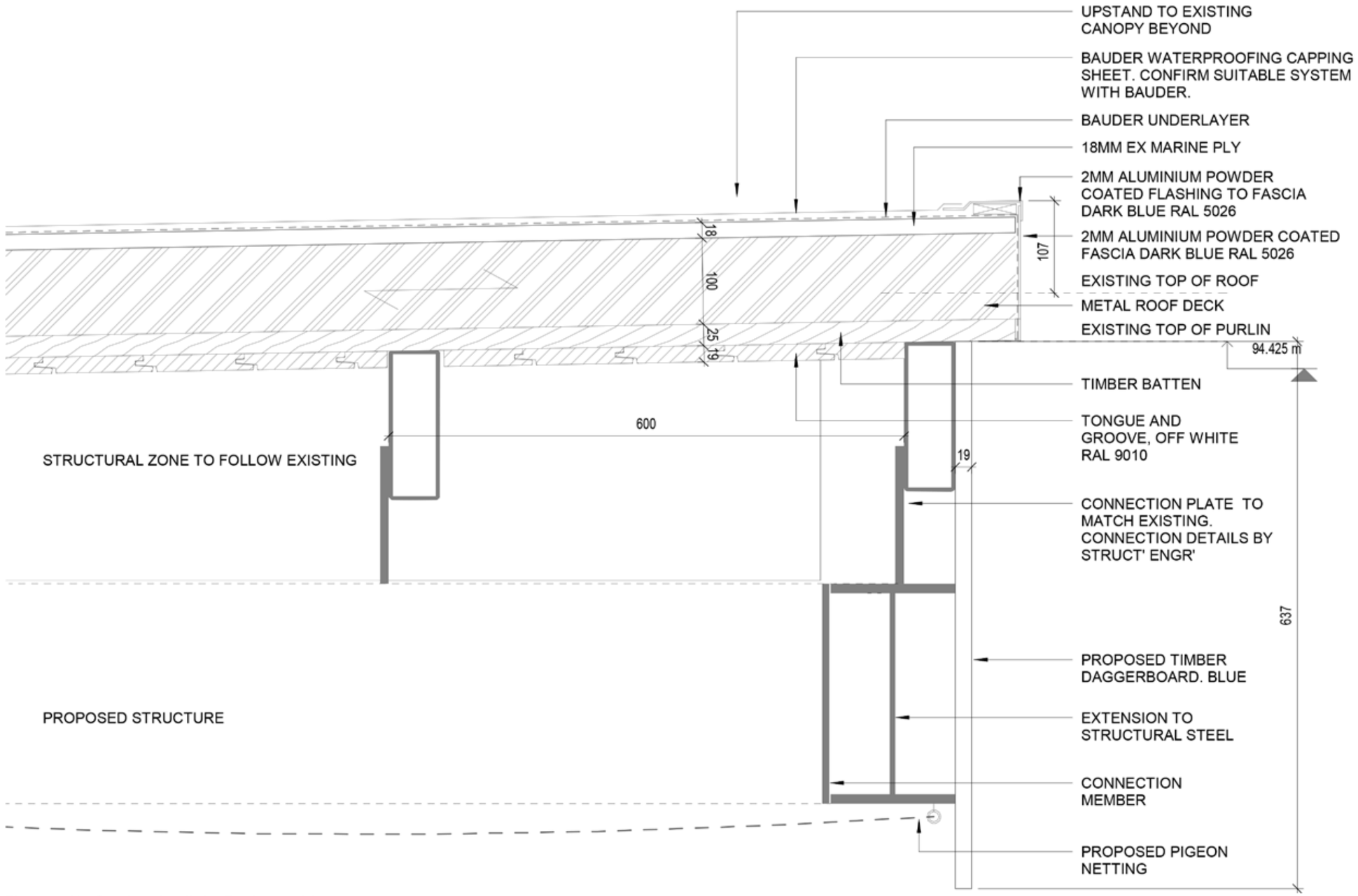


Figure 4.3b: Section detail the Penistone Line canopy

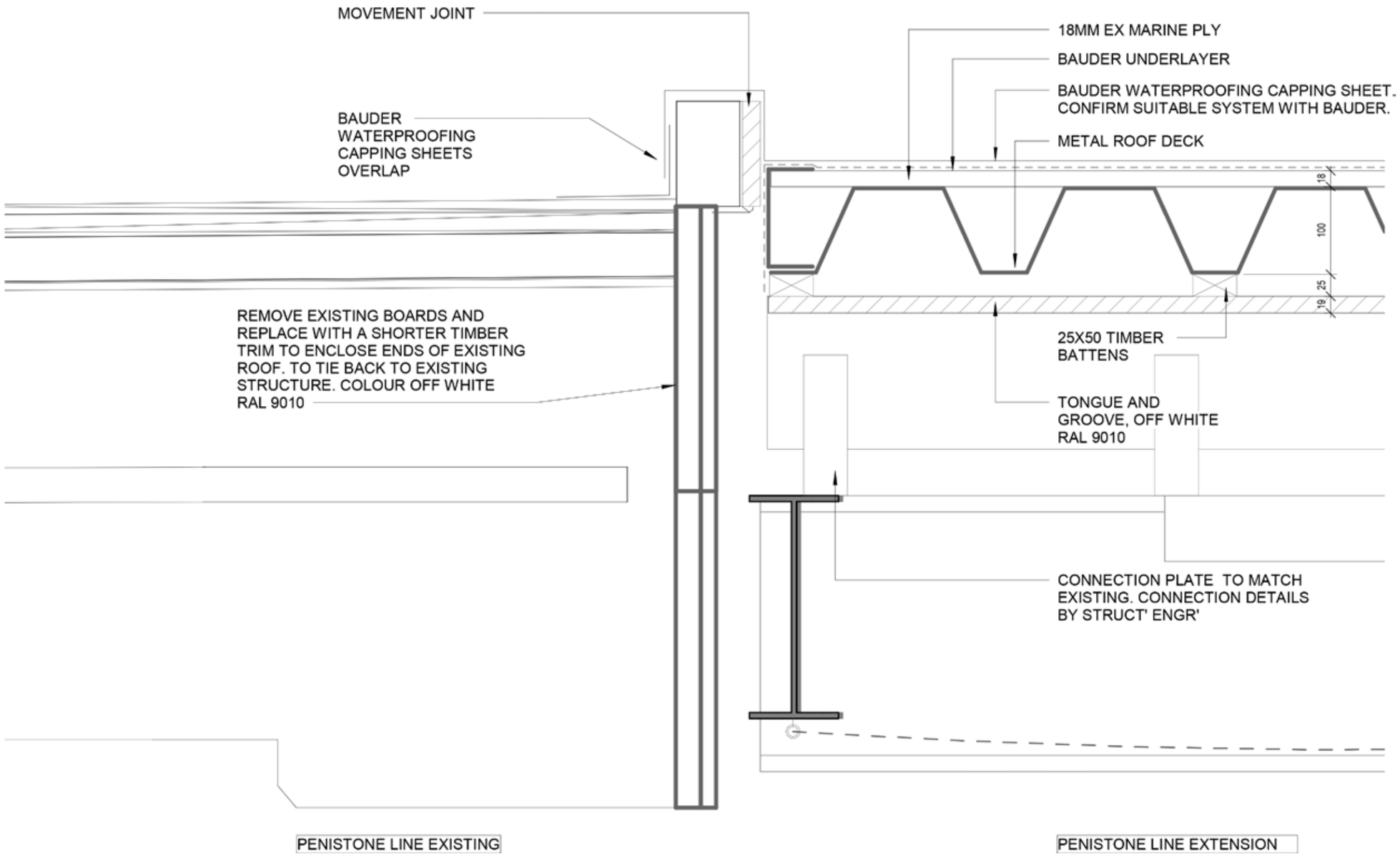


Figure 4.3c: Section detail the Penistone Line proposed and existing interface

4.4 Detail Development Roof B & C

4.4.1 Roof B & C Design

The main drivers for the location, scale and form of the new roof are outlined in section 3.0. More specific design drivers include the following:

- to respect and celebrate the geometry of the adjacent Victorian structure;
- to provide a high-quality, bespoke architectural environment befitting the Grade I station;
- to provide suitable shelter from adverse weather, given that the prevailing wind will blow into the open western side of the station.

In order to better understand the last of these drivers, a microclimate study has been carried out to establish the effects of wind and wind-blown rain on a range of proposed roof forms. The results of this study pushed the design towards a closed roof form spanning between the new platforms 4 and 5.

4.4.2 Proposed form

The proposed roof form consists of two large 'blades', both straight and parallel on plan. The form of the blades has been drawn from the geometrical cues from the strong lines of the retained Euston trusses. They are designed to be complementary to, and respectful, of the Victorian structure: for this reason they decrease in span, height and angle of inclination as they move away from it.

The blades were linked with a continuous glazed clerestory, that have now been removed to satisfy ventilation requirements in case of a fire. This has been designed to allow the structure to span over the tracks while allowing clear views through to the large warehouse behind the station. Linking the two blades in this way will mitigate the effects of adverse weather as far as possible.

The soffit of the larger blade has been facetted to break up a large clear expanse of ceiling cladding. This will provide visual interest and an additional geometrical link back to the adjacent Roof A. Recessed shadow-gap joints in the cladding align with the Roof A trusses.

The columns supporting the new roof on platform 4 are arranged in a straight line, aligned with those of Roof A. The columns on the new island platform (platforms 5 and 6) are arranged on a curve, matching the curve of the platform itself. The interplay between straight and curved lines generates a second sophisticated soffit form above the island platform.

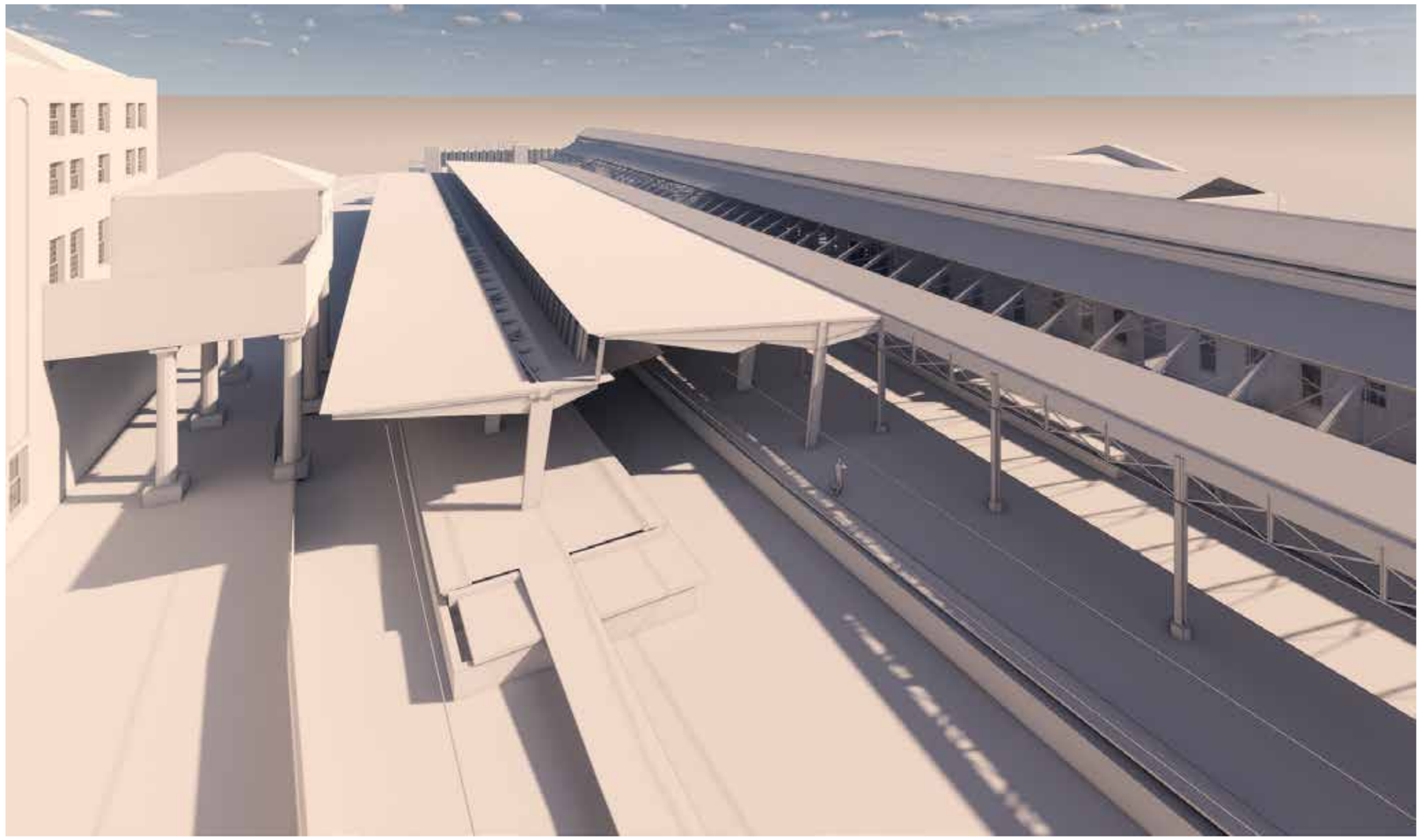


Figure 4.4a: Aerial view showing descending hierarchy of roof forms from Roof A to the proposed new roof

4.4.3 Materials

Through our study of Roof A we have determined a colour and tonal scheme that will best complement and express the Euston Truss and trainshed volume. The columns will be encased in a coloured grey metal cladding so they tie in with the roof A structure.

The soffit will be clad in a white metal slatted panel with open joints which will make a visual reference to the Roof A soffit but will also help with acoustic reverberation in the space. These will run in parallel with the tracks but a larger joint adjacent to this will be expressed to emphasise the structural grid that relates back to Roof A. The roof covering for the new roof will be a standing seam, coloured to match the existing.

4.4.4 Colours

To make the New Roof relate further to the original, we have kept the essence of the Roof A colour scheme and evolved it, thus further representing another progression in the ongoing story at Huddersfield Station.

All colours are to specified in the project's colour specification for the station, as reflected in the Materials Schedule submitted to discharge Condition 2 attached to the granted LBC.

4.4.5 Graphic strip

It is proposed that one of the faceted soffit planes above platform 4 is filled with a large-scale site-specific artwork running the length of the platform. This would be printed onto metal cladding panels.

This colourful plane is intended to break up the large blank expanse of the roof soffit. It would accentuate the cranked form of the roof, and add visual interest and a high-quality bespoke element to the platform environment. The final approach to the graphic strip will be defined at a later CIMP phase.

4.4.6 Lighting

Lighting options were explored to achieve the design objectives whilst considering the key viewpoints and journeys around the platform and coordination with the lighting scheme in Retained Roof A.

These options are listed below:
1. Discrete lighting solution with surface-mounted downlights
2. Suspended, decorative luminaires
3. Continuous linear luminaires
4. Illumination of the structural columns
5. Uplight of the roof soffit

The preferred solution is shown in Fig.4.4.2c. The continuous linear luminaires will accentuate the architectural form and the angular nature of the roof. The uplighting element will highlight the roof and harmonise with the lighting treatment in Retained Roof A.

The lighting scheme will comprise the following elements:

- Continuous linear luminaires running parallel to the platform lengths to provide safe illumination levels at platform level. The linear luminaires assist with providing a uniform distribution of light and are an effective method for assisting with navigation around the station.
- Concealed luminaires will be positioned along a channel at high level and provide a gentle wash of light across the roof. Illumination of the roof surface will ensure a visually comfortable environment by minimising the contrast.

Figure 4.4b: Image of clerestory cladding. *Graphic strip to be included in later phase of CIMP

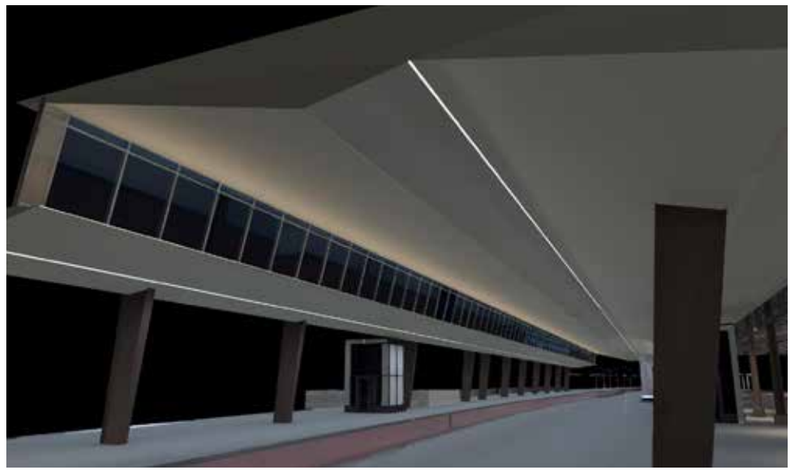


Figure 4.4c:View of clerestory cladding from platforms

Figure 4.4d:View of clerestory cladding from the LYR warehouse

4.4.7 OLE

The OLE will be situated at several locations along the span of the new Roof B. This will be fixed back to the roof structure and the drop rods will be coordinated so that they fit seamlessly into the new soffit cladding.

4.4.8 Structural considerations

The structural framing of the new roof has been designed to follow the envelope of the architectural design set out above. The new roof will support the loads applied including snow, wind and OLE. The design adopts a repetitive structure as far as reasonably possible in order to provide a cost-effective design for fabrication and speed of installation. The roof has been designed so that the majority of the structure can be fabricated off-site, minimising the on-site construction time.

Columns are standard sizes but are inclined and clad to create a tapered profile to the architectural intent. They are typically spaced at c.9m to match the existing structural column grid of the retained trainshed roof. The spacing changes to c.12m centres local to the subway and lifts shafts. This is to ensure that clear access is maintained to the stairs and lifts and the subway is not overloaded. To enable this column spacing, the new roof above the stairs is supported by a pair of columns, rather than a single column, supported off the walls on either side of the stairs. The roof is typically formed with fabricated sections to suit the architectural envelope.

At column lines, they form a portal frame which steps in section at the clerestory line (shown in Fig.4.4g) between platforms. The vertical element of the frame through the clerestory is minimised to limit the visual impact of the structure whilst maintaining stability.

At intermediate locations, the sections cantilever from trusses spanning along the platforms between columns. The sections taper in profile away from their supports to meet the architectural intent. The tip of the cantilevers from Platform 3/4 are propped off the back-span cantilevers on Platform 5/6. The props, along with horizontal beams between the cantilevers, form Vierendeel trusses on the clerestory line. This provides additional stiffness to the structure whilst avoiding bracing which would obstruct views.

Figure 4.4e: Sectional view of the new roof at a column line

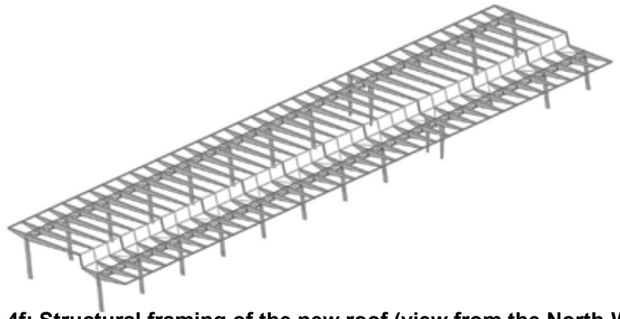


Figure 4.4f: Structural framing of the new roof (view from the North-West)

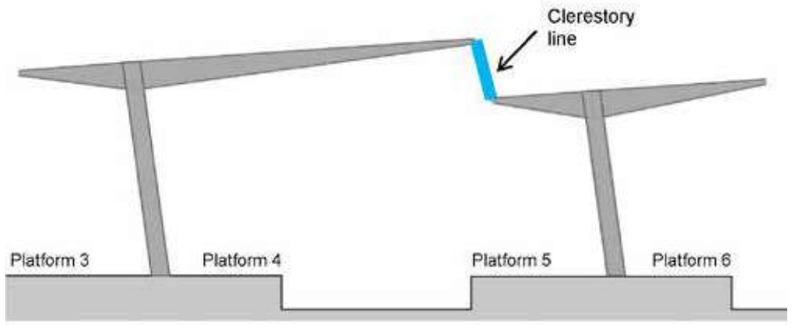


Figure 4.4g: Sectional view of the new roof at a column line

Secondary framing will be placed within the depth of the structure to support the roof finishes and cladding. The final profile of the roof will be expressed through the finishes and cladding. Based on the initial ground desk study and an assessment of the loads, it is envisaged that the roof will be founded on piles.

4.4.9 Soffit Details

In terms of design integration, the curvature of Roof C is particularly well-suited to the SAS 760 system from Valcan, or equivalent other. The panels are segmented into 100mm wide sections—narrower than those in the SAS 330 system—allowing each panel to flex and accommodate subtle shifts in the roof geometry. This segmentation enables a smooth and consistent soffit finish across the entire span of the curved roof while maintaining structural and visual integrity.

Importantly, the updated GRIP 5 design retains the same soffit outline as established in GRIP 4. The soffit panels will continue to align with the Roof A trusses, maintaining the design rhythm and intent using a recessed shadow-gap joint between panels (seen in figure 4.4e). This detail ensures a clean visual break while enhancing depth and definition across the soffit plane.

4.4.10 Clerestory Details

The clerestory glazing curtain wall connecting Roofs B and C above the proposed Platform 5 was initially introduced to link the two structures and provide weather protection for the Tea Rooms.

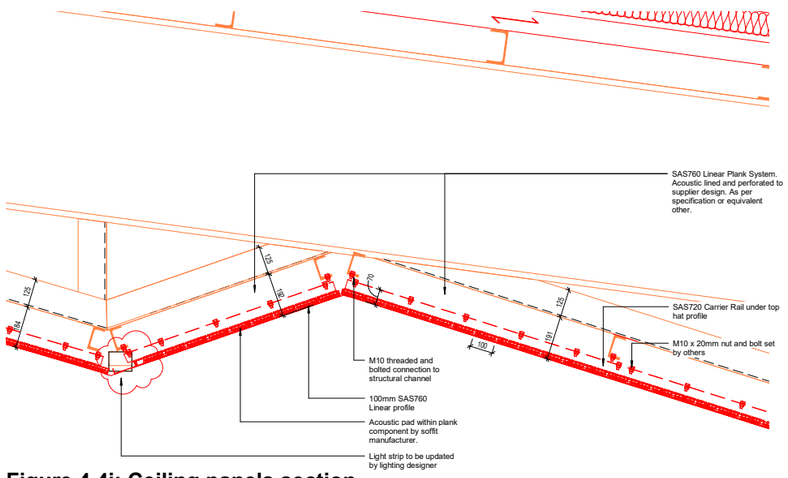


Figure 4.4j: Ceiling panels section

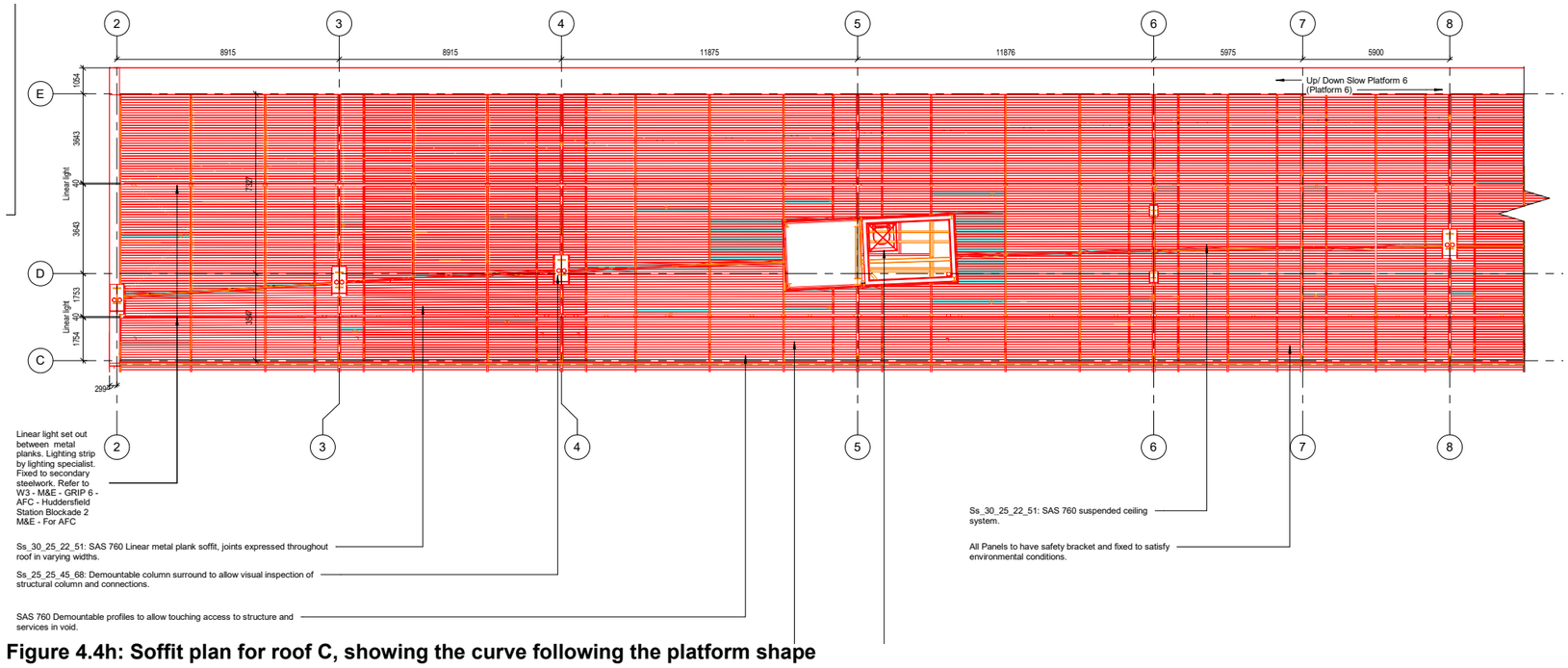


Figure 4.4h: Soffit plan for roof C, showing the curve following the platform shape

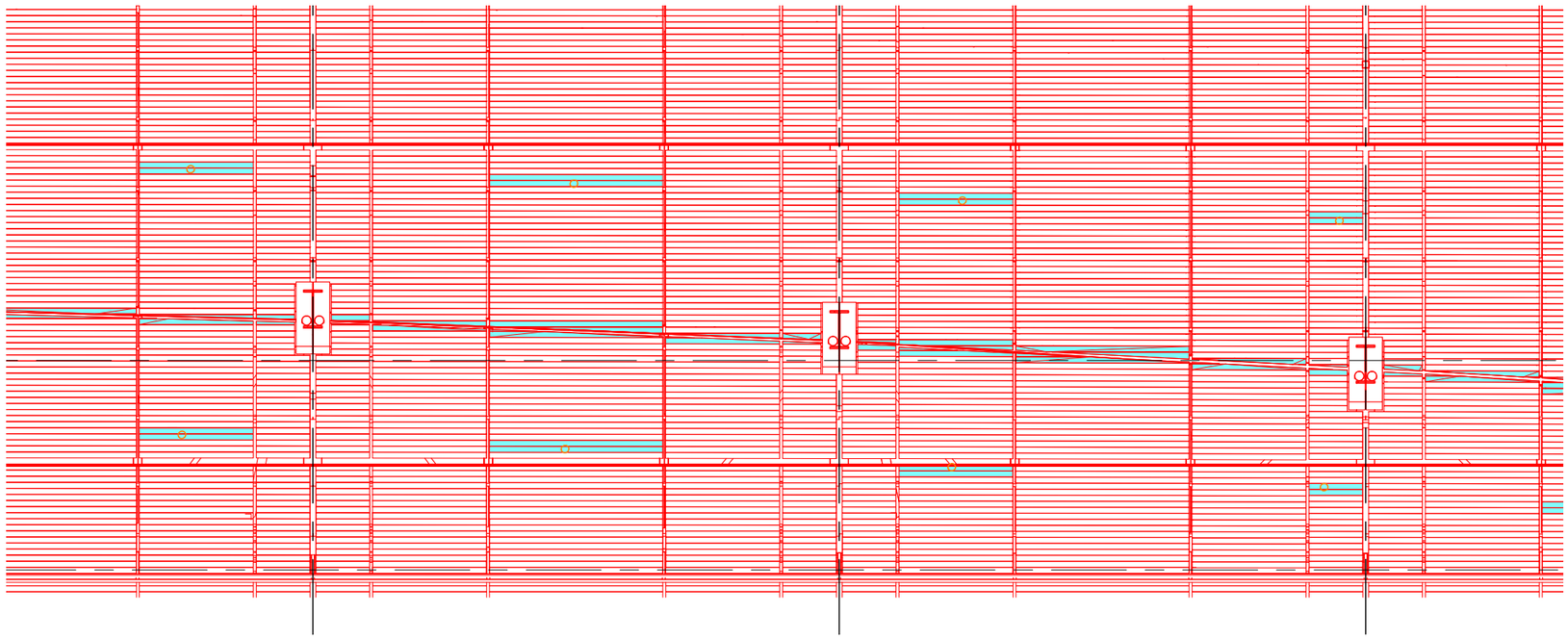


Figure 4.4i: Soffit close up plan for roof C, showing the custom cut panels to suit, the curve, speakers and vertical cladding locations

However, in the event of a fire, this design created the potential for smoke buildup, requiring 50% of the glazed area to be openable.

This requirement led to a bulkier, more complex façade, reduced daylight into the station, and necessitated additional structural supports for the operable system. Furthermore, the inclusion of automated mechanisms introduced spatial and technical challenges, such as accommodating electrical drivers and mechanical equipment on the roof.

These deviations significantly departed from the original design intent established during the earlier GRIP 4 stage, which emphasized visual transparency and simplicity.

Microclimate studies have since shown that the overlapping roof design alone effectively minimises the impact of adverse weather on the Tea Rooms. As a result, the decision was made to remove the glazing and return to the early pre-GRIP 4 concept.
This change left the structural columns that connect the two roofs exposed. In the proposed GRIP 5 design, these columns will be clad in steel to match the existing.

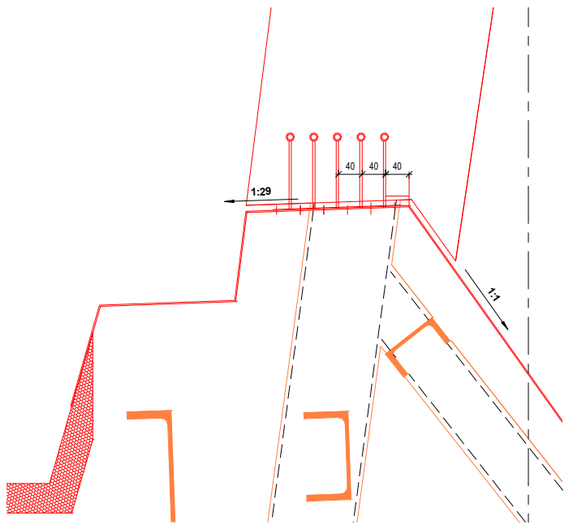


Figure 4.4k:Bird wire detail

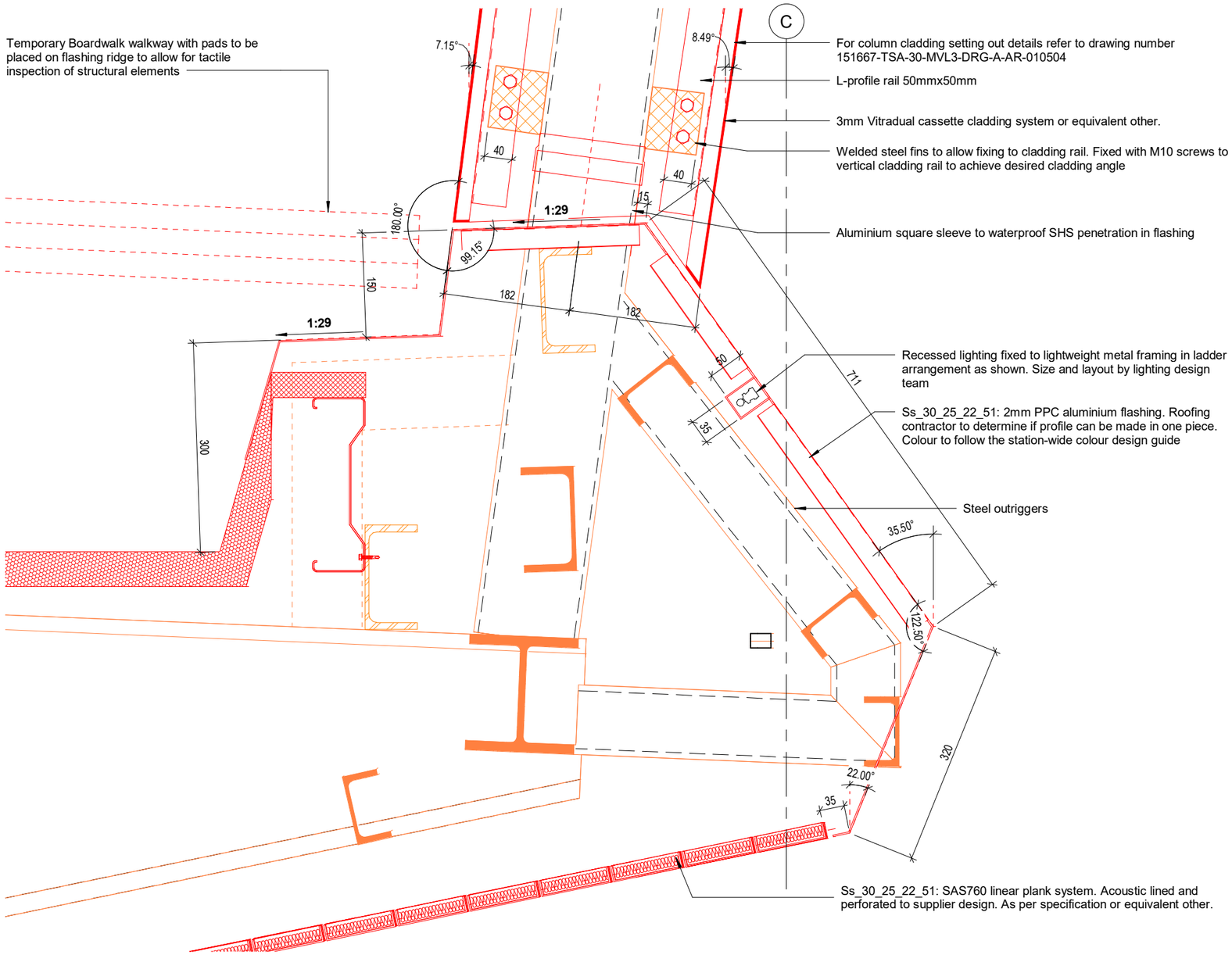


Figure 4.4l: Clerestory bottom detail

Platform column finishes, visually tying the two roofs together and maintaining consistency with the station's overall material and colour palette.

The removal of the glazing also meant an increased risk of falls from the maintenance walkway into the station. To mitigate this risk the gutter and the walkway swap positions, away from the edge of the roof. Paired with a fall restraint system that runs along the length of the walkway the risk is reduced.

The open area may also provide area for pigeon roasting and perching and bird wires will be proposed on the ridge line of the clerestory sections, as seen in figure 4.4k. The angle on the internal side of the ridge is to be 35° minimum.

4.4.11 Roof B & C Column Detail

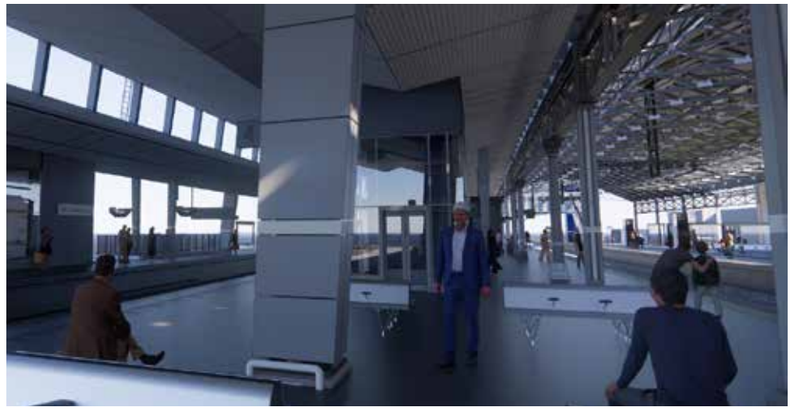
The column casements size and angles have been amended to accommodate several updates from structure's column and base plate sizes, rainwater pipe clearances, larger plinth sizes and most importantly steering clear of the 3.3m minimum clearance zone for the unobstructed route from the platform edge.

The intention of the column casing is to follow the same size of the base plate and taper on a splayed angle to the soffit. The casing has increased in size from GRIP 4, albeit a minimal change. This includes the casing widths increased to allow for a larger 160mm external diameter rainwater pipe to fit in the between the flanges of the column.

The angle of the columns for platforms 3 and 4 have been updated to a shallower angle. This is to avoid the end column plinths clashing with the 3.3m zone, mentioned above.

The column casings are steel cassette panels with the vitreous finish, Vitranamel from Vulcan or equivalent other. The exterior coating is very durable and is highly resistant to graffiti, abrasion and impact damage and is low maintenance.
The panels are used in high traffic areas such as the London underground.

The Vitranamel cladding has a C-shaped panel that is fixed vertically on the narrow end of the column only with no horizontal fixings required. Each panel is sized up so that they achieve the allowable size tolerances from the manufacturer.



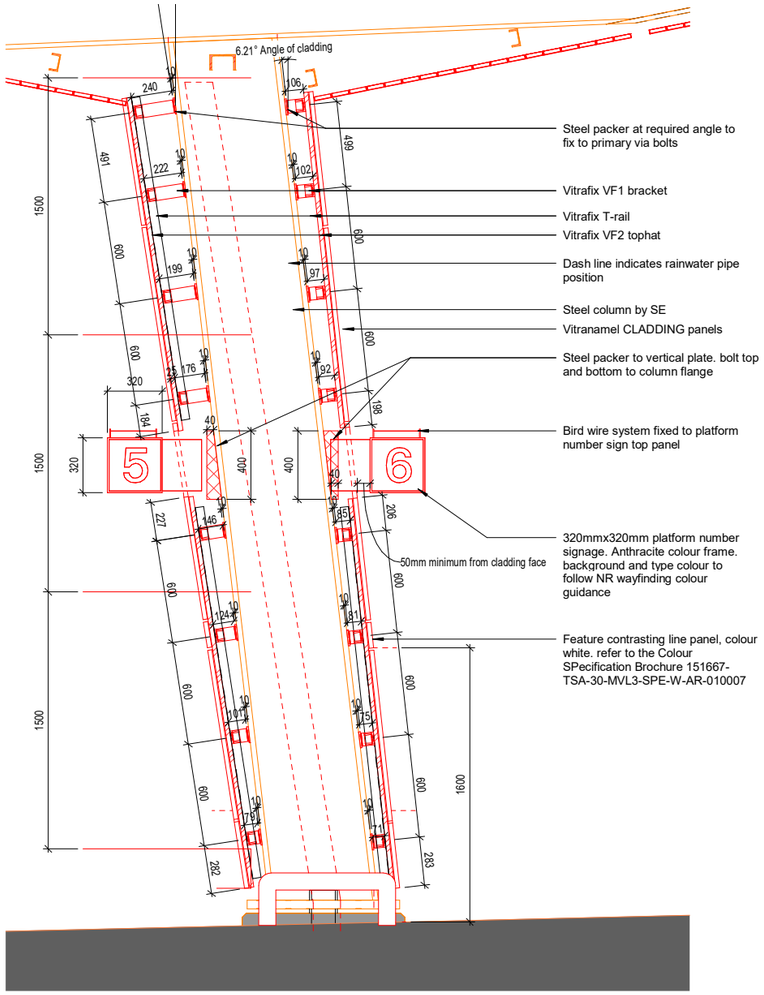


Figure 4.4m: Column cladding section & visual

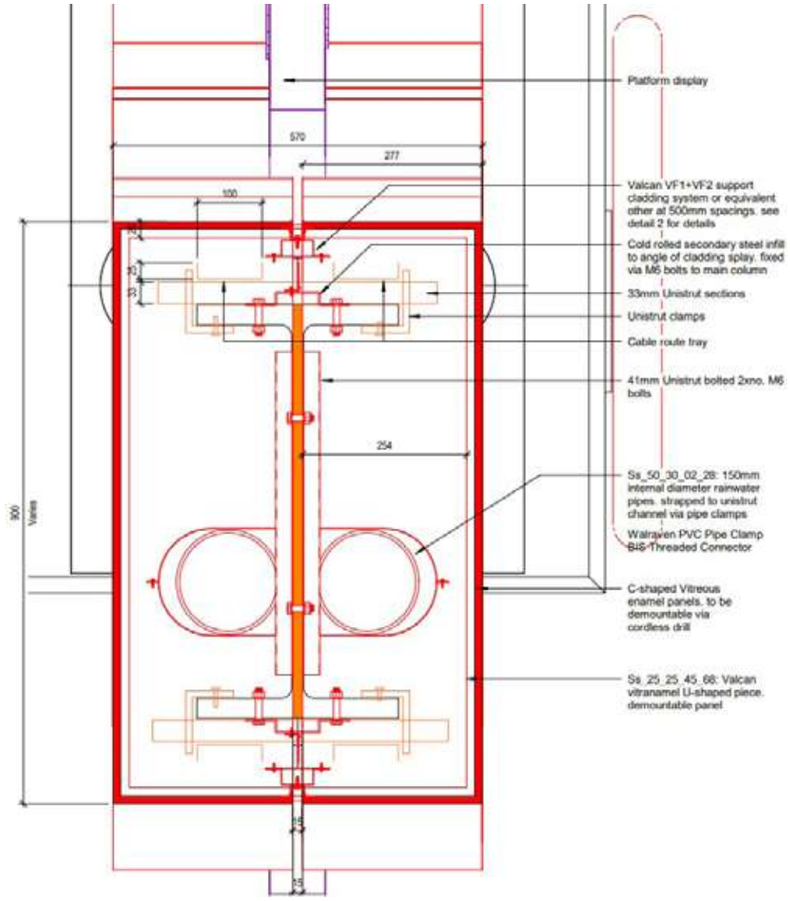


Figure 4.4n: Column cladding plan detail

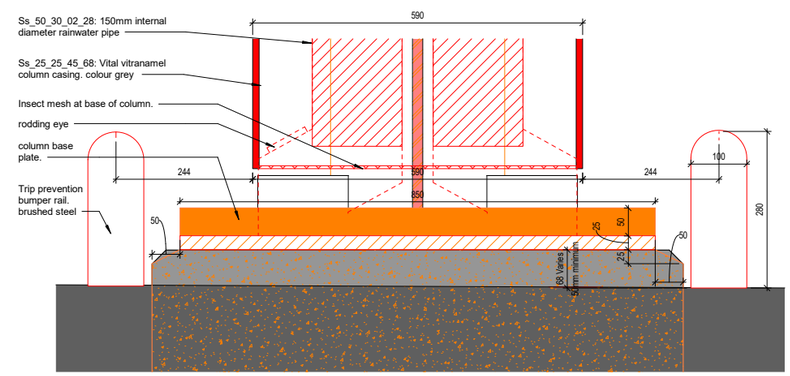


Figure 4.4o: Column plinth section detail

The casing houses rainwater pipes and cable route trays that are not necessarily at each column. The cladding can be notched to allow signage and CIS screens to penetrate through.
The Integrated Risk and Readiness Development (IRRD) states in item RR-W3-TRU-3357 that 'All building assets minimum design life of 40 years. 25 years design life for finishes'
The access ladders shown in GRIP 4 is also removed from within the column casing to avoid increasing the casing size further. The latter is now relocated into a separate room within the lift motor room.

4.4.12 Roof Access

Roof B will also be access through the permanent ladder through the Tea Room. As mentioned previously there is a permanent walkway clipped to the standing seam that will provide access to the valley gutter.

The top section of Roof B is only 4° so most this roof can be accessed using a clip in fall arrest system and we only use walkways to traverse the standing seam to avoid any trip hazard.

There will be a man-safe wire that leads to a permanent set of steps that will provide access to the lower section of Roof B that is 3° in pitch so again access is only by fall arrest system.
There will be a secondary point of access from Platform 5/6 up into the lower section to Roof B through a platform store.

Figure 4.4p: Lift motor room view within platform

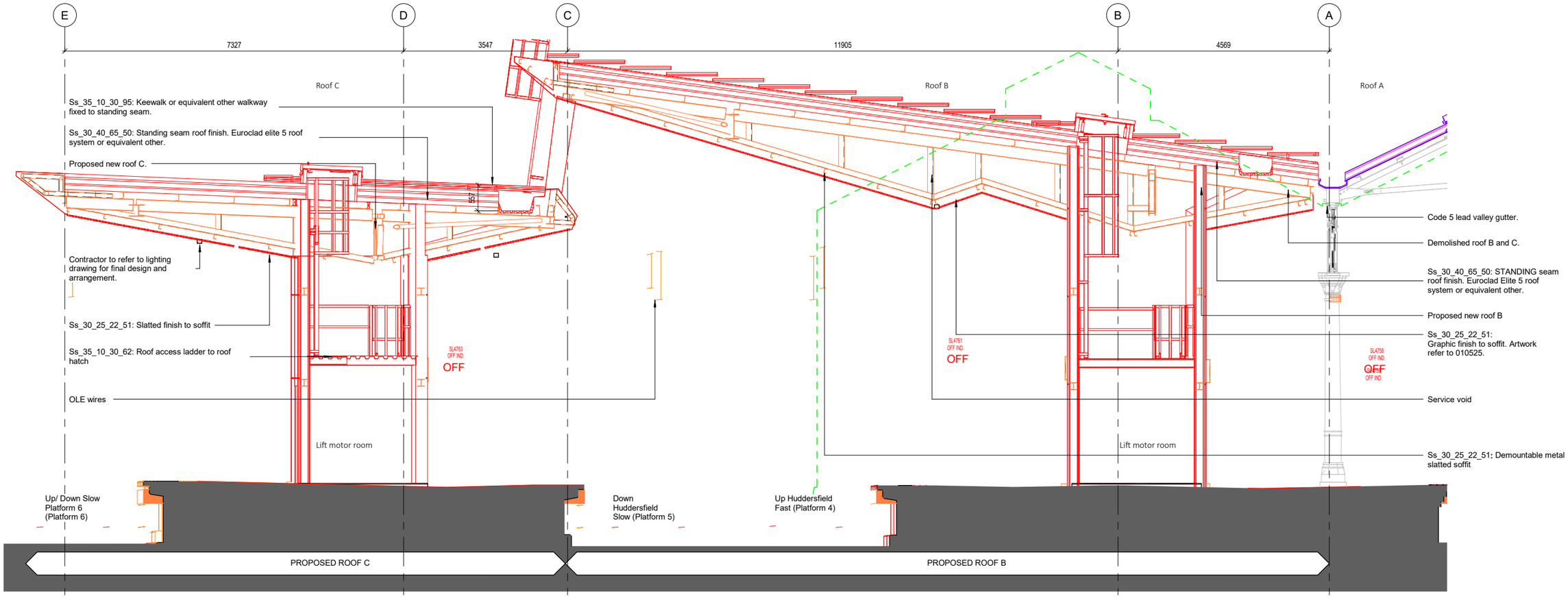


Figure 4.4q: Roof B & C section showing access ladder locations

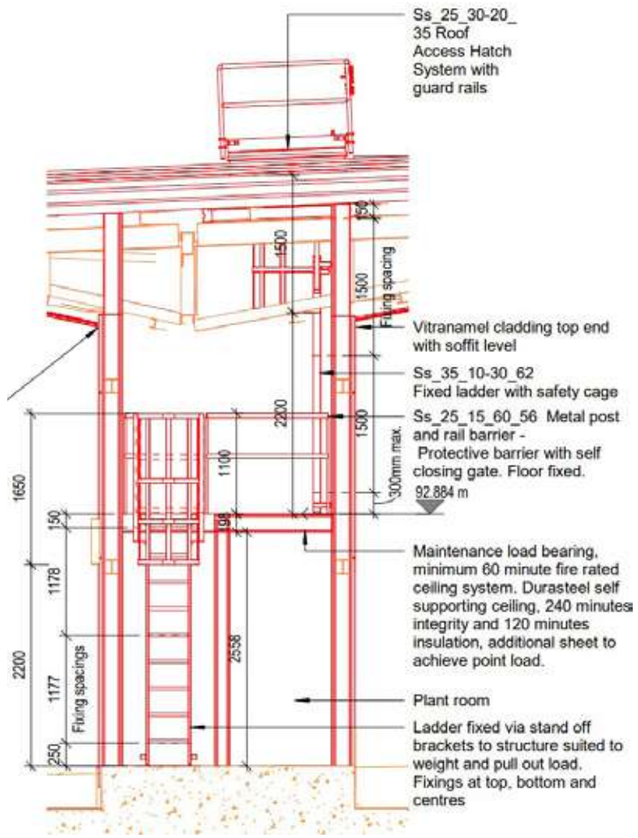


Figure 4.4r: Roof B & C access room section detail

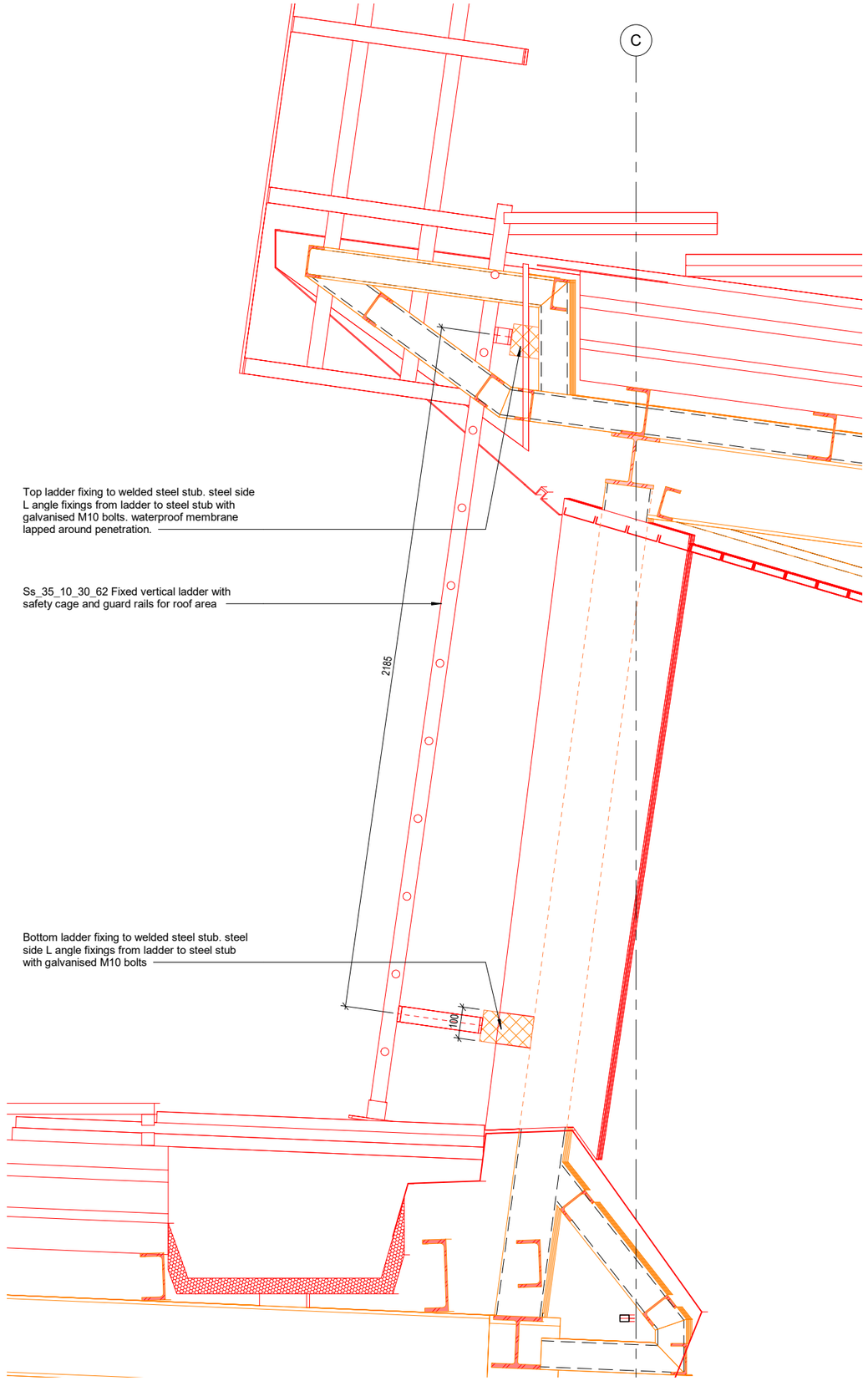


Figure 4.4s: Roof B & C section showing access ladder at clerestory zone

4.4.13 Lift and Motor Room Detail

As mentioned previously the access ladders are located in a separate compartment within the lift motor room. The update was to create a direct line of access from platform level to the roof and reducing the amount of hatches and demountable panels needed to be removed to gain access. Hence, the design decision to have the lift motor room extend into the roof void, as seen in figure 4.4t.

The access ladder has more secure points of support up the wall to the roof. Visually the lift motor room forms a similar unit in height with the lift shaft and no longer acts as bolt-on unit to the lift shaft. The lift motor room will remain fire rated and isolated from the access room.

Another benefit of extending the lift motor room vertically is to allow for much needed distribution of services to and from the roof, such as rainwater pipes, M&E and telecoms cabling, water supply, etc. that otherwise could not be provided. These services can only be allocated within the column casings. Therefore, the lift motor room's location is critical to allocate the mentioned services, bridging a large gap of 33m between the closest usable columns, as seen in figure 4.4u.

The two access hatch locations within the lift motor room are sufficient to provide access to both roofs B and C. Their locations satisfy fire regulations with maximum distances for several means of escape from the roof.

Figure 4.4t: Lift and motor room view

Figure 4.4u: Lift motor room and access room visual

Figure 4.4v: Shadow gap view of the wall and ceiling

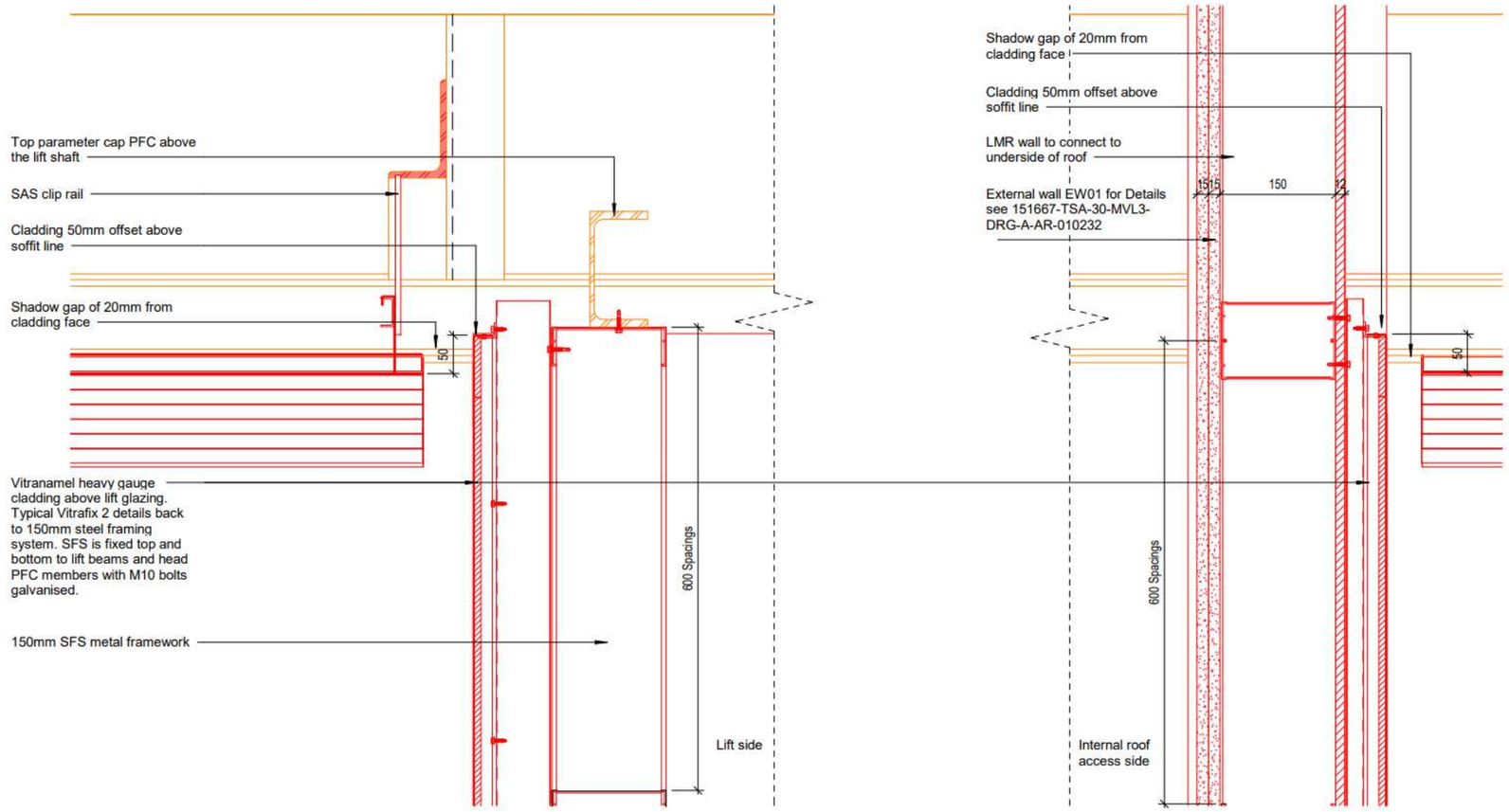


Figure 4.4w: cladding and ceiling connection detail

4.5 Detail Development Footbridge

4.5.1 Footbridge Design

Network Rail standards dictate the geometry of the footbridge to a large degree. These include minimum distances from platform edges, minimum heights above OLE wires, minimum balustrade dimensions above OLE wires, etc.

The materials of the footbridge must all be easily maintainable without disabling the OLE system. This has important implications for glazing, for example, which cannot easily be cleaned unless it is accessed from the floor deck of the bridge itself without having reach beyond it.

To enable a safe and comfortable passenger experience throughout the station, continuous shelter should be provided from Roof A to the new platform canopies. This means that the footbridge will require a roof.

Given its large size and prominent location close to Roof A, the bridge should be as transparent as possible: both to limit its visual mass and to allow impressive views towards the retained roof structure at close quarters.

Balustrades on open-sided bridges are required to be opaque to a height of 1800mm above OLE wires.

A glass-sided bridge must be designed to minimise reflected glare.

This is particularly important on the south facing side of the bridge, where the bridge may reflect the sun into the eyes of train drivers in the station below.

As a fully-accessible route through the station, the footbridge must include elevator access for people with reduced mobility, preferably using through-lifts to avoid having to rotate within the elevator cars. Lifts should also be given equal visual prominence to the stepped access.

4.5.2 Proposed form

The proposed bridge features full-height glass panels on both sides, minimising its visual impact. A unique sawtooth form has been developed in order to complement the faceted forms of the new roof structures.

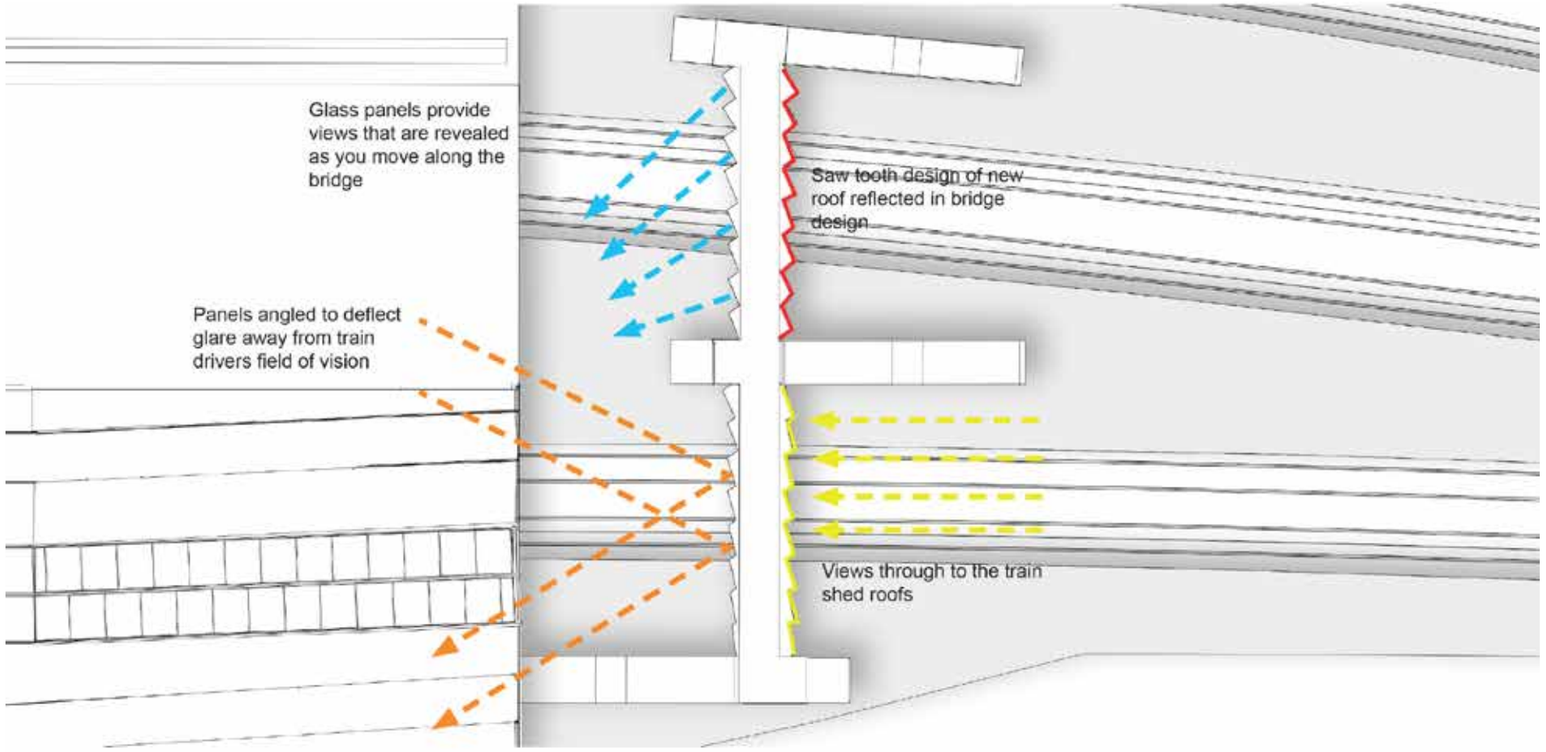


Figure 4.5.1a: Proposed footbridge design drivers

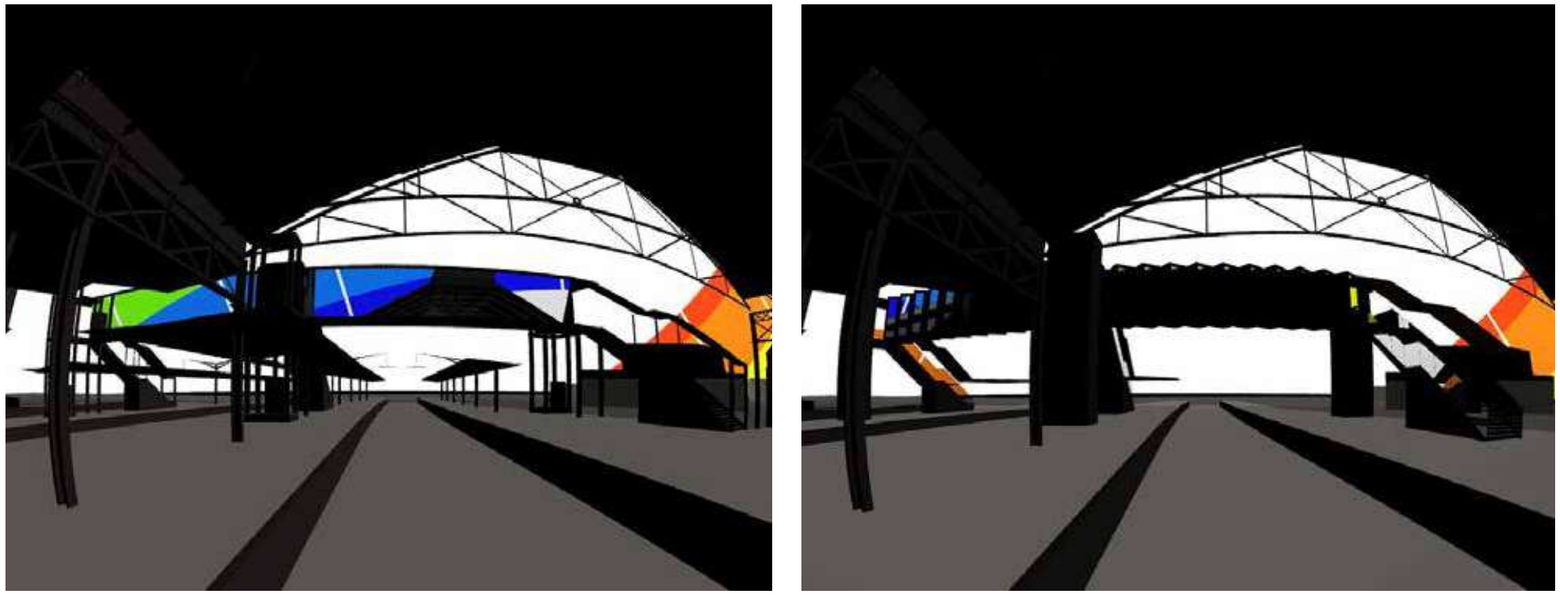


Figure 4.5.2a: Glare study - flat glass (left) -v- sawtooth design (right)

This arrangement has been optimised to the site's geometry, using sun-path analysis to minimise the extent of glare reflected towards the tracks.

Fig.4.5.2a shows the glare study of the footbridge from the driver's perspective. The rainbow colours indicate when sunlight is shining into the driver's eye; black indicates no glare.

Fig.4.5.2b shows the glare study of the footbridge with reflected sun-paths (in red) at different times of the day, superimposed for multiple times in a year. Each image shows a plan view of the platforms and tracks beneath Roof A at the Leeds end. The five top images show the analysis for a bridge with flat glass walls; the bottom set illustrates the same situation with a sawtooth design.

4.5.3 Accessibility and inclusivity

The proposed footbridge features staircases and through-lifts on each platform. The staircase on Platform 2 has been positioned to run below the gable of Roof A. All routes are covered to allow a continuous sheltered walkway. Restrictions due to narrow platforms mean that it is not possible to position lifts and staircases side-by-side with equal visual prominence from both angles of approach.

4.5.4 Materials

The roof of the bridge will be a standing seam on the stair that will tie in to the new elements of the lantern and the new replacement Roof B. The bridge span will be a mix of laminated glass and metal cladding that will need to be matte in texture and colour so as not to create any new glare issues. The lift cores and undercroft areas will be clad in a hard-wearing vitreous enamel.

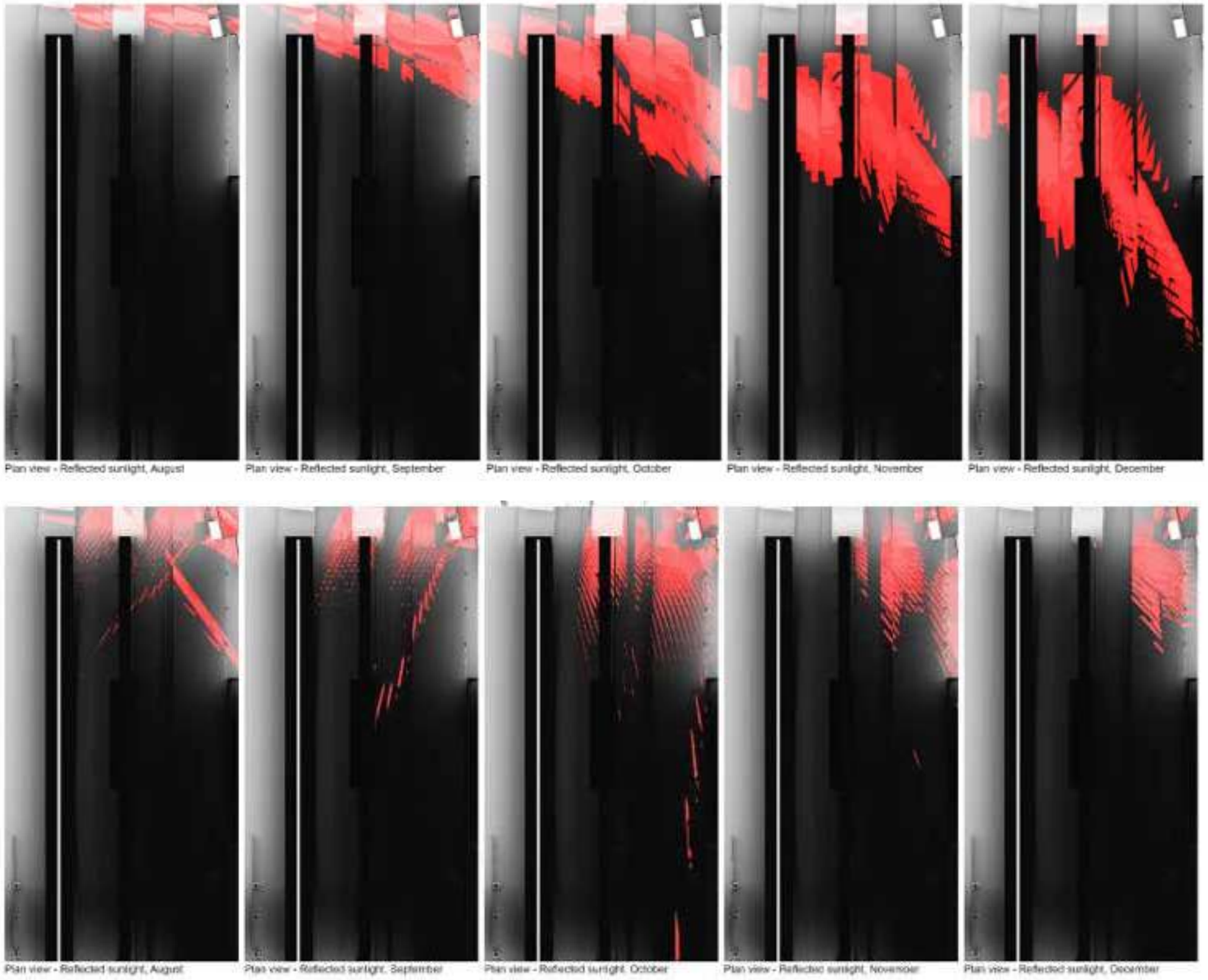


Figure 4.5.2b: Sun path study - flat glass (top) -v- sawtooth design (bottom)

4.5.5 Colours

For the colour scheme, we will be relating back to the colour schemes determined for Roof A, B, the Penistone Line and Platform Canopies. We will be using the same grey as the Roof A and new replacement Roof B structure to articulate the bridge structure, the bridge span will be a similar grey which will emphasise the horizontal element while the lift shafts will be a subtle shade of blue which will include feature banding that will break up the façade. The blue will relate back to the blue elements of the Penistone Line and Platform Canopies.

4.5.6 Graphic Strip

It is proposed that the underside of the bridge features a large-scale site-specific artwork to accompany the similar strip under the new shed roof. As with that strip it would be printed onto metal panels and add colour, detail and a bespoke contemporary edge to views through the station. This is will be presented at a later CIMP stage.

4.5.7 Lighting

Lighting options were explored to achieve the design objectives required for the footbridge and adjoining stairways. These options are listed below:

1. Circular downlights
2. Linear luminaire variations
3. Wall-grazing in the vertical and horizontal orientation for the footbridge only
4. Handrail lighting for the stairways only

Option 4 was preferred for the stairways and option 2 within the footbridge and these are shown in Figs.4.5.7a and 4.5.7b.

The lighting scheme will comprise the following elements:

- Linear lighting integrated within the handrails to provide uniform illumination of the stair risers and treads to ensure safe transitions. Handrail lighting will be a discrete, robust way of achieving the lighting requirements whilst ensuring a comfortable, low glare solution.
- The angular architectural arrangement of the window reveals will be accentuated when travelling within the footbridge and from platform level by using linear luminaires connecting each window joint. Coordination of the luminaires with the architecture will provide the lighting requirements whilst also creating a unique experience for users. The option to incorporate carefully selected coloured light within the luminaires will be explored.

Figure 4.5.5a: Footbridge perspective view showing colours

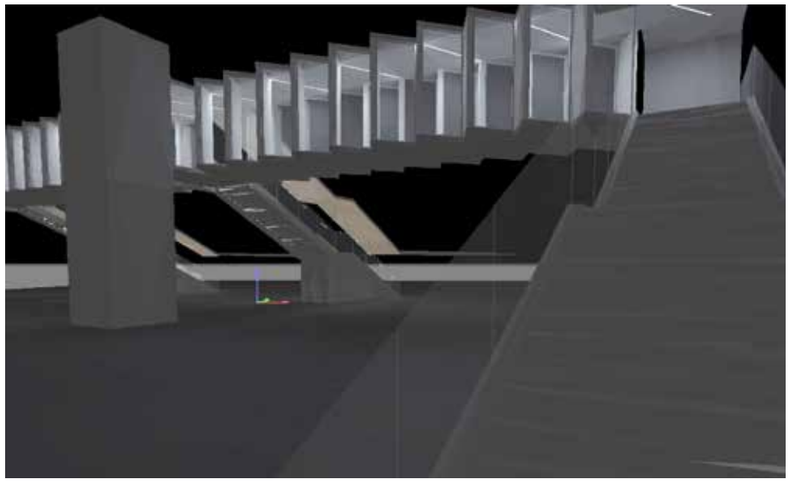


Figure 4.5.7a: Lighting scheme from stairways

4.5.8 OLE

It is not anticipated that the OLE will require attaching to the footbridge, it will be free-running.

Figure 4.5.7b: Proposed lighting scheme within footbridge

4.5.9 Maintenance access

The footbridge roof will have access from a temporary ladder and access hatch at the top of the Platform 2 stair. Once on the roof there will be 2 fall arrest systems to clip in to simultaneously to prevent falling from the sides of the footbridge. The glazing will have a self cleaning coating on the outside to reduce the cleaning requirement.

The access and maintenance is indicative at this stage and will be further defined and confirmed at a later CIMP phase

4.5.10 Structural considerations

The new footbridge consists of a steel frame supported off concrete foundations. The structural members are closed steel sections and provides an unrestricted walkway for passengers to access the platforms. To allow unobstructed views through the windows, the structural elements are all within the façade of the footbridge. The steel column supports are aligned with the staircase and lift shafts to maintain the clear platforms. The footbridge is accessed through via staircases with lift providing step free access.

The steel frame construction of the footbridge permits off site fabrication, with assembly and installation undertaken on site to reduce disruptions to the station operations.

Figure 4.5a: View of footbridge stairs and main span

4.5.11 Footbridge Lifts

The lift shafts and the undercrofts will be clad in a vitreous enamel cladding that will be coloured blue to tie it back into the colour scheme on existing Roof A and new replacement Roof B. They will have flat roofs and concealed downpipes keeping the surfaces free of clutter.

Each lift shaft will have a waiting canopy.

Figure 4.5.11a: View of footbridge lift shafts

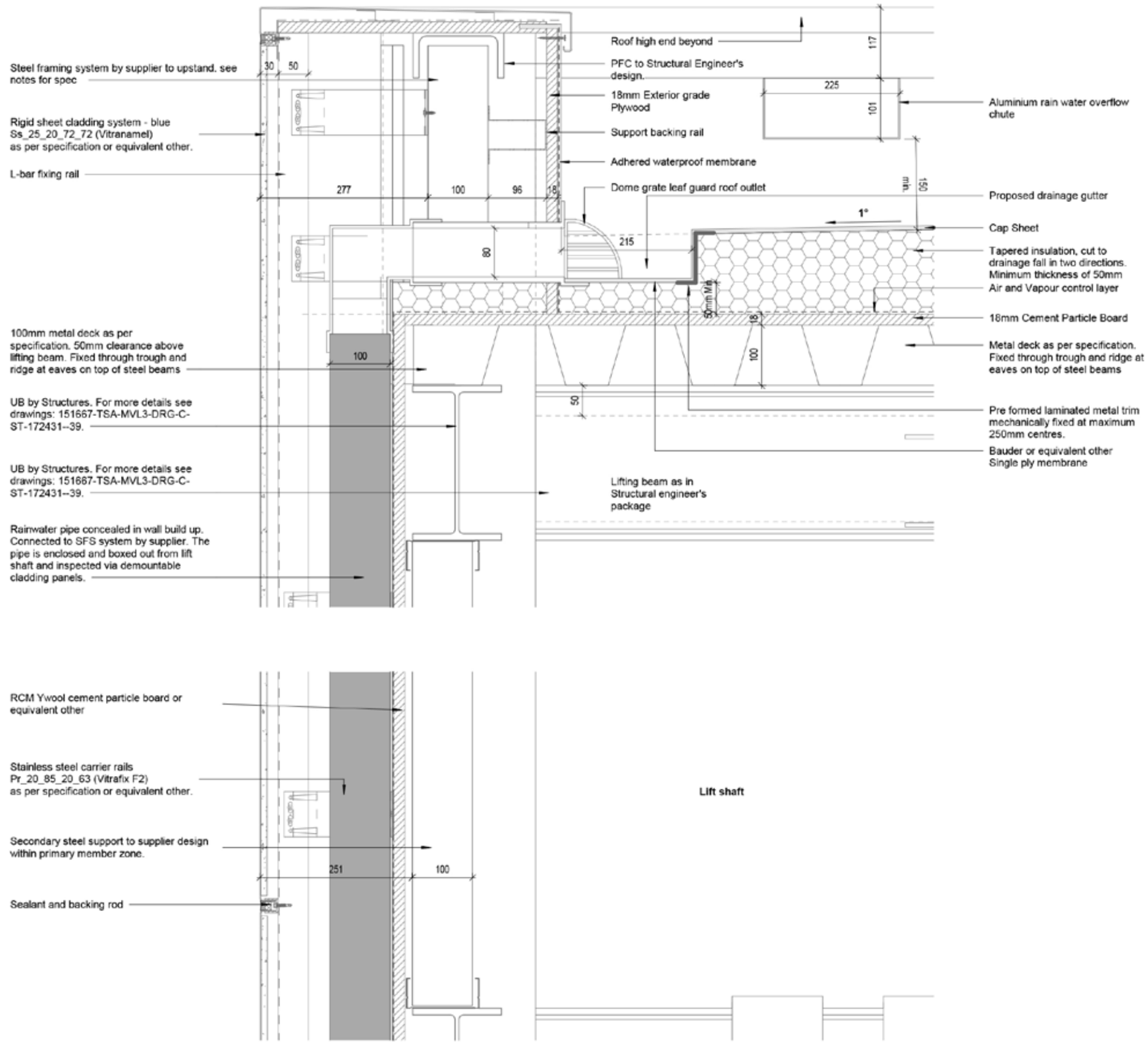


Figure 4.5.11b: Proposed lift shaft detail

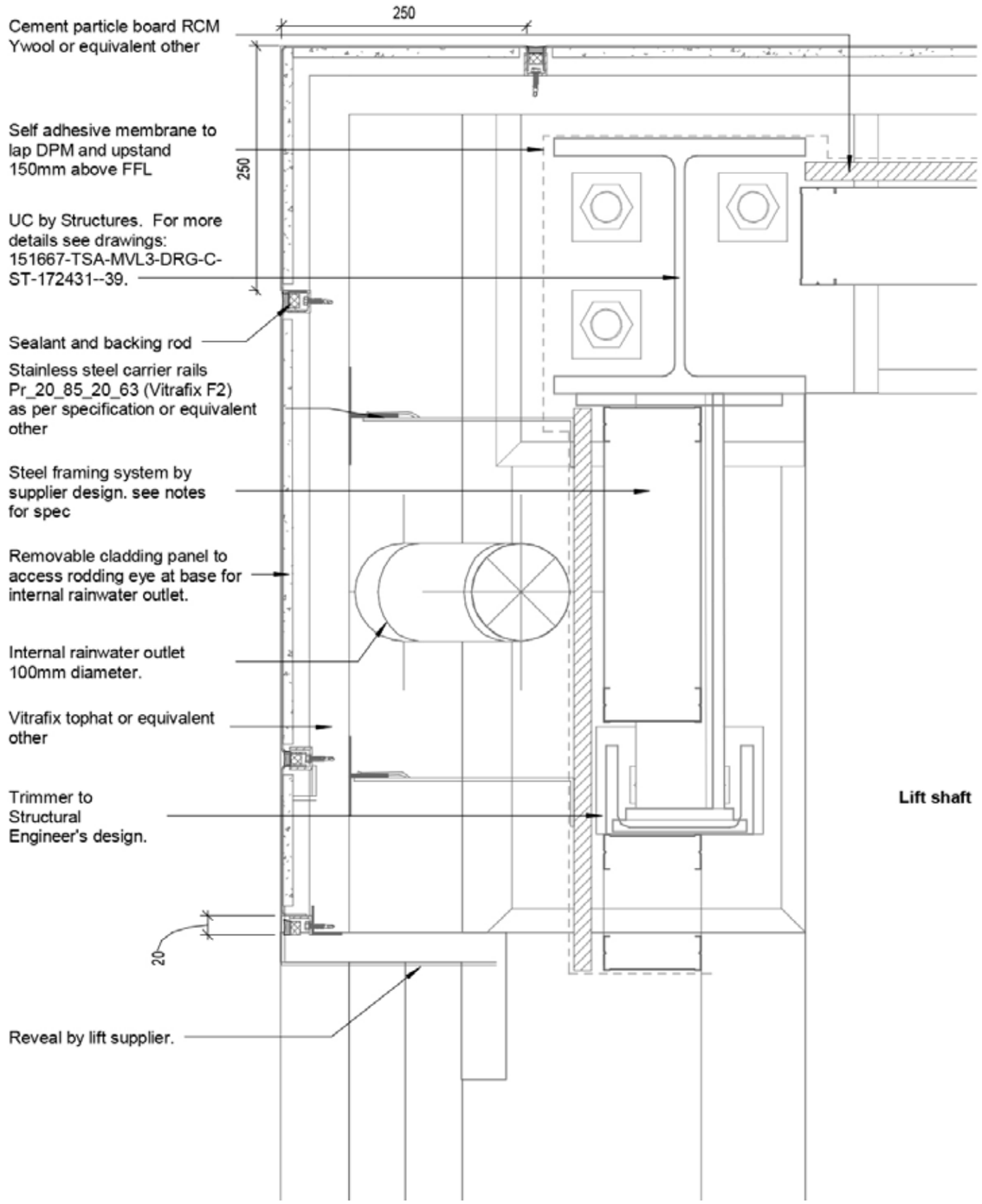


Figure 4.5.11c: Proposed lift shaft detail with concealed downpipes

4.5.12 Footbridge Undercrofts

The stair undercrofts will house lift motor rooms and small plant rooms that will serve the station. This will reduce the requirement for additional structures elsewhere on the platforms. These have been kept as small as possible so that they do not increase the visual mass of the footbridge.

These will be clad in vitreous enamel cladding that will be coloured blue.

The main columns that support the bridge span will be exposed steel but painted grey to match the structural elements on Roof A and the new replacement Roof B canopies. These will also be tapered in design so that they tie in with the design intent of the other new structural elements.

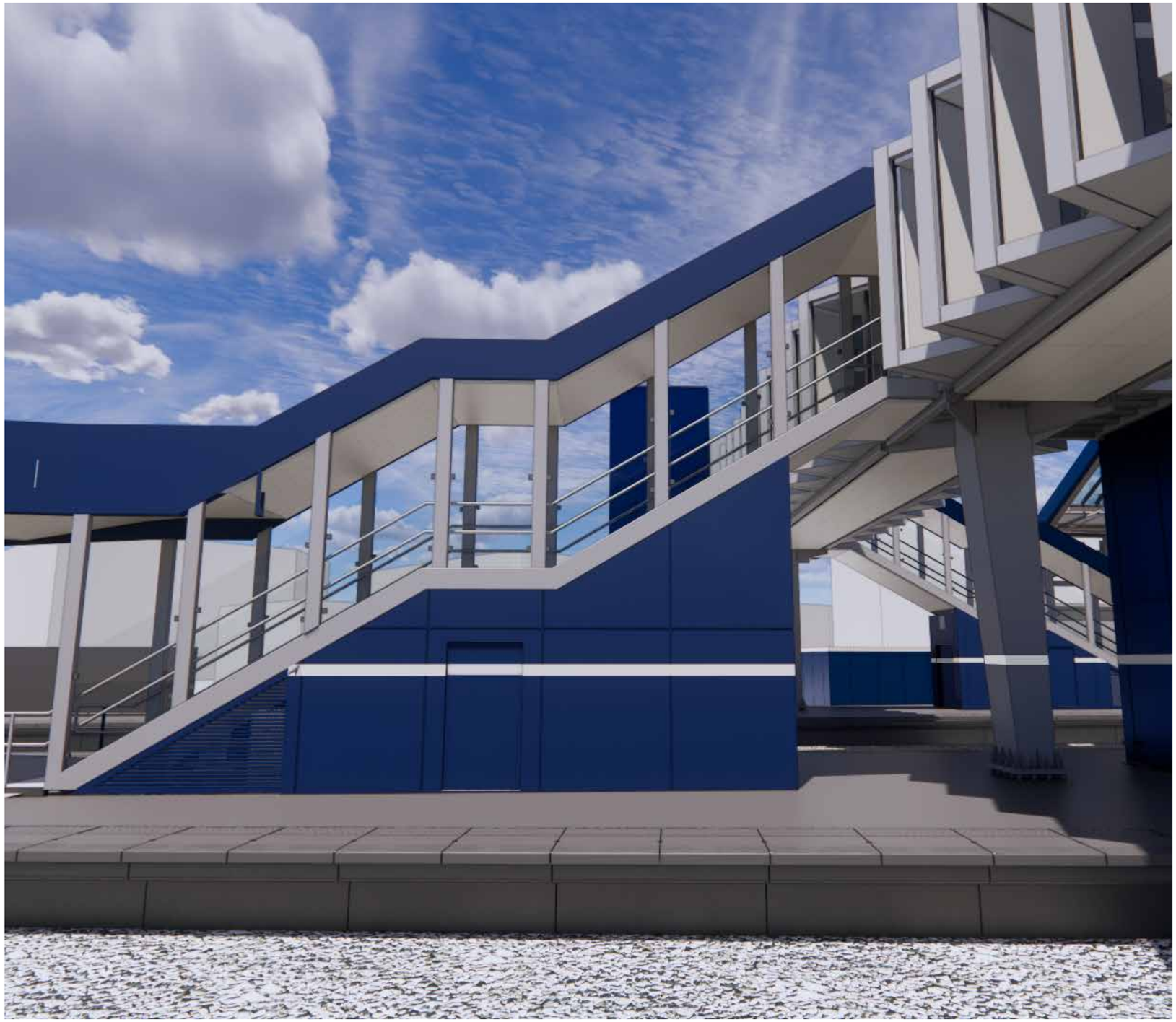


Figure 4.5.12a: View of footbridge undercroft areas

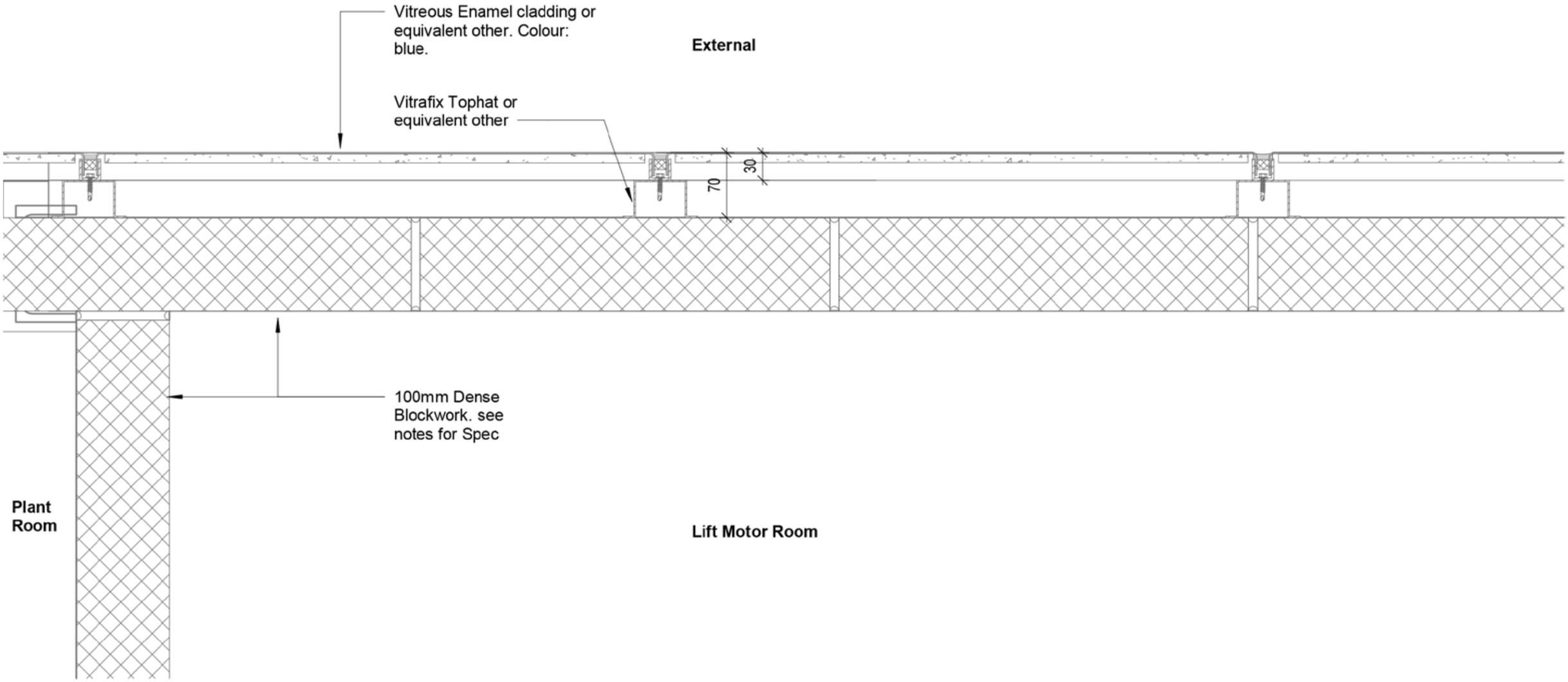


Figure 4.5.12b: Typical undercroft wall build up

4.5.13 Footbridge Bridge Span

The bridge span will be clad in secure glazing that is positioned to reduce glare for train drivers waiting to depart from the station but also to provide views to back across to the inside of the original Euston Truss in Roof A. They are also clad in vitreous enamel cladding that will be coloured grey.

Inside the bridge span the floor will be a grey resin with a colour contrasting guidance strip, the walls will be a grey enamel cladding and the ceilings will be an off white metal panel system similar to the system used in the new replacement Roof B that will reference the geometry of the bridge from the inside.

Figure 4.5.13a: View inside bridge span

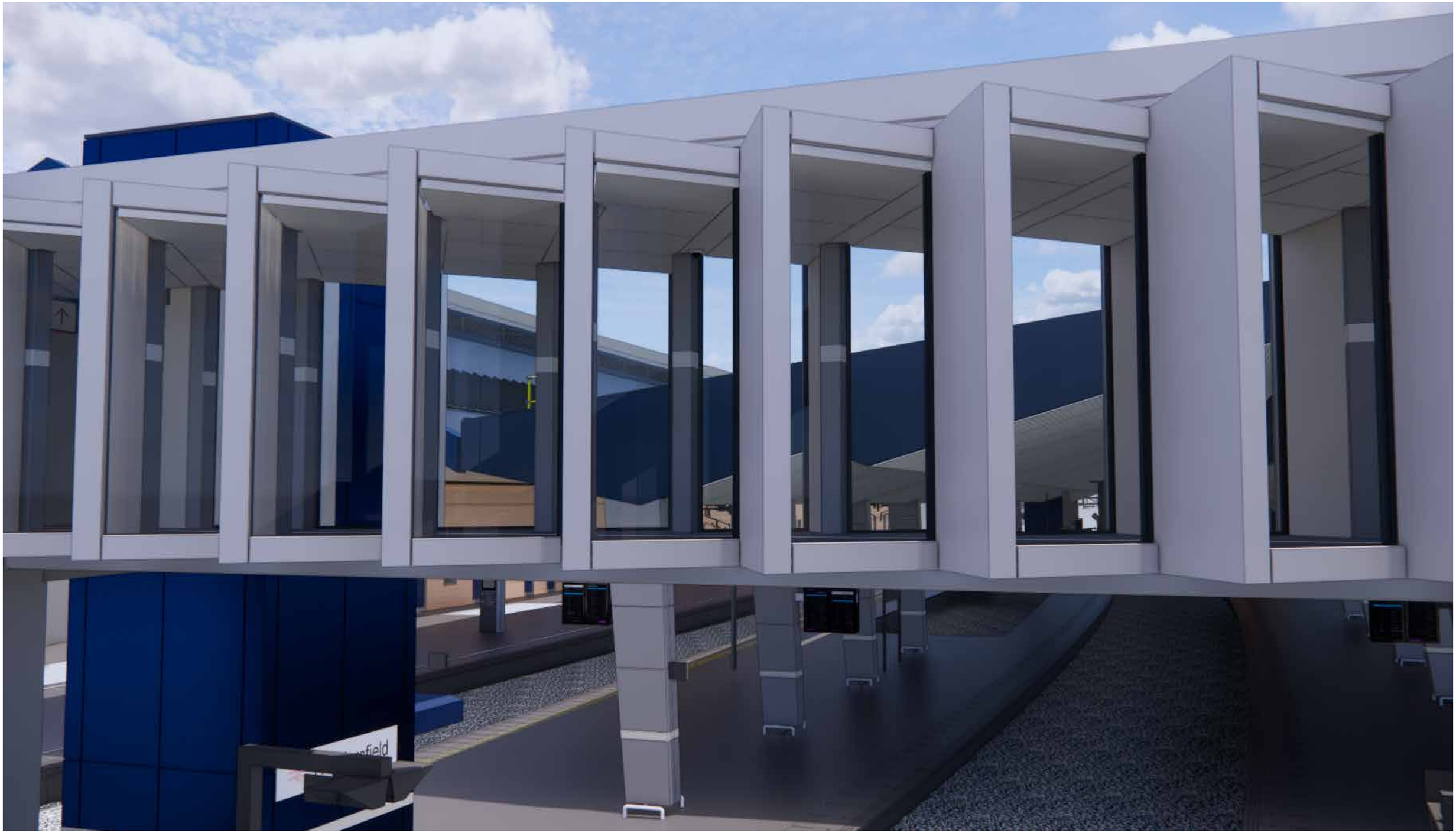


Figure 4.5.13b: View of footbridge span

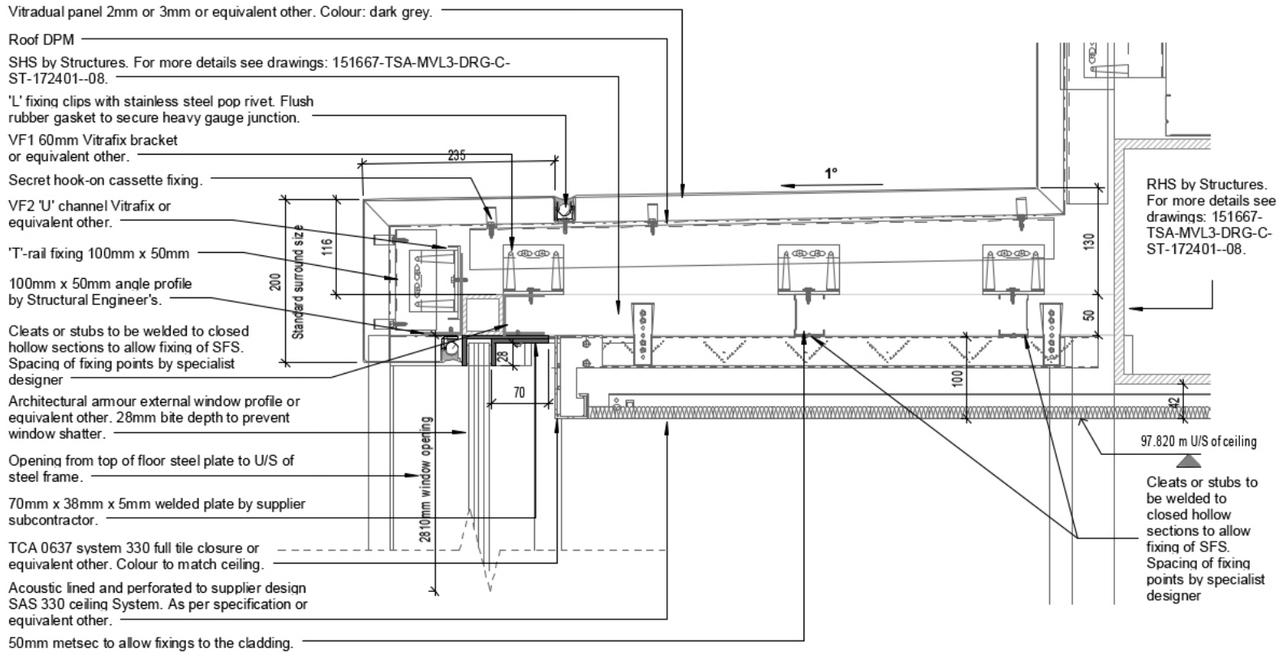


Figure 4.5.13c: Typical glazing head detail

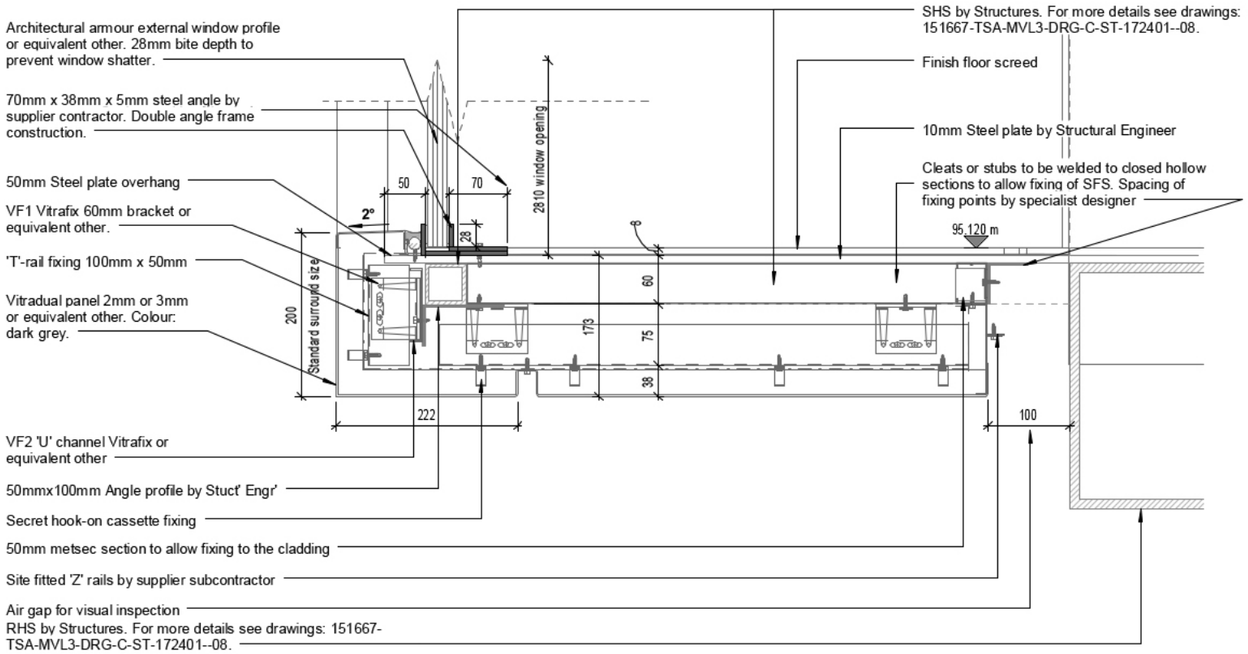


Figure 4.5.13d: Typical glazing cill detail

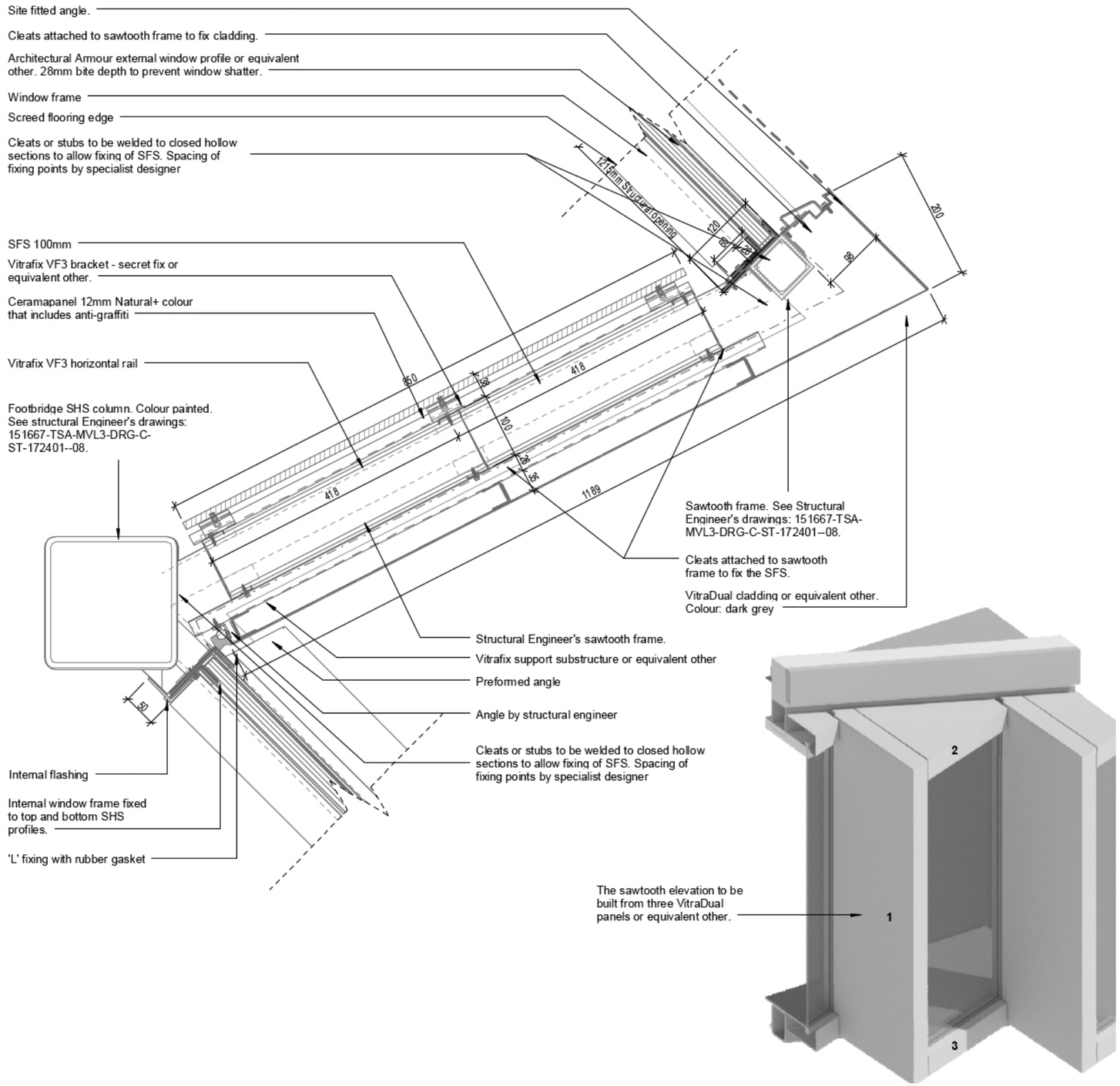


Figure 4.5.13e: Typical glazing plan detail

4.5.14 Footbridge Soffit

The soffit of the footbridge will be constructed using a similar cladding system to the underside of the new replacement Roof B. This is demountable but is also arranged so that visible and tactile inspection of the main structural members can be achieved without removing the cladding.

The soffit will also include a graphic strip that links visually back to the one on Roof B. This will be defined at a later CIMP phase.

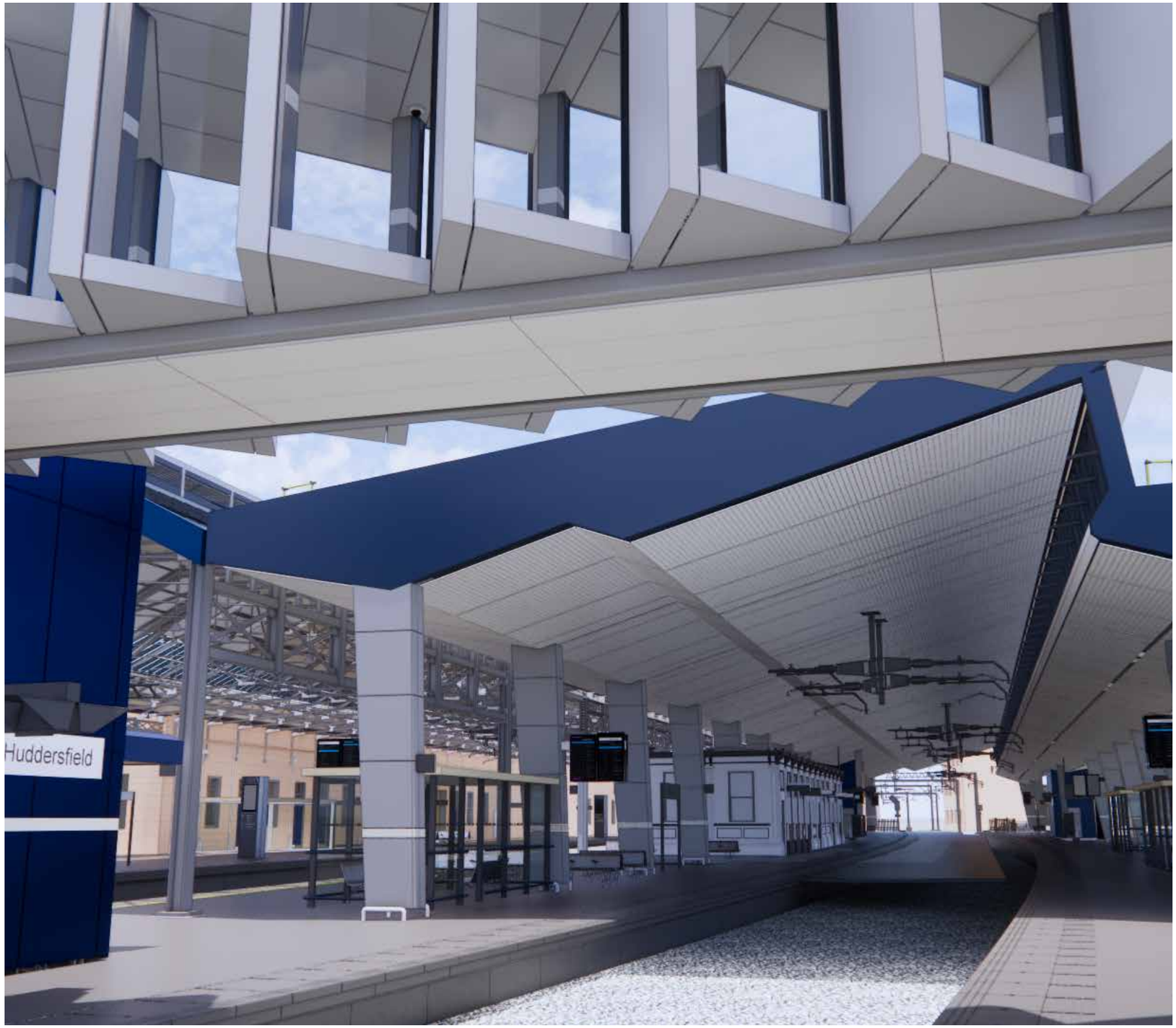


Figure 4.5.14a: View of footbridge soffit

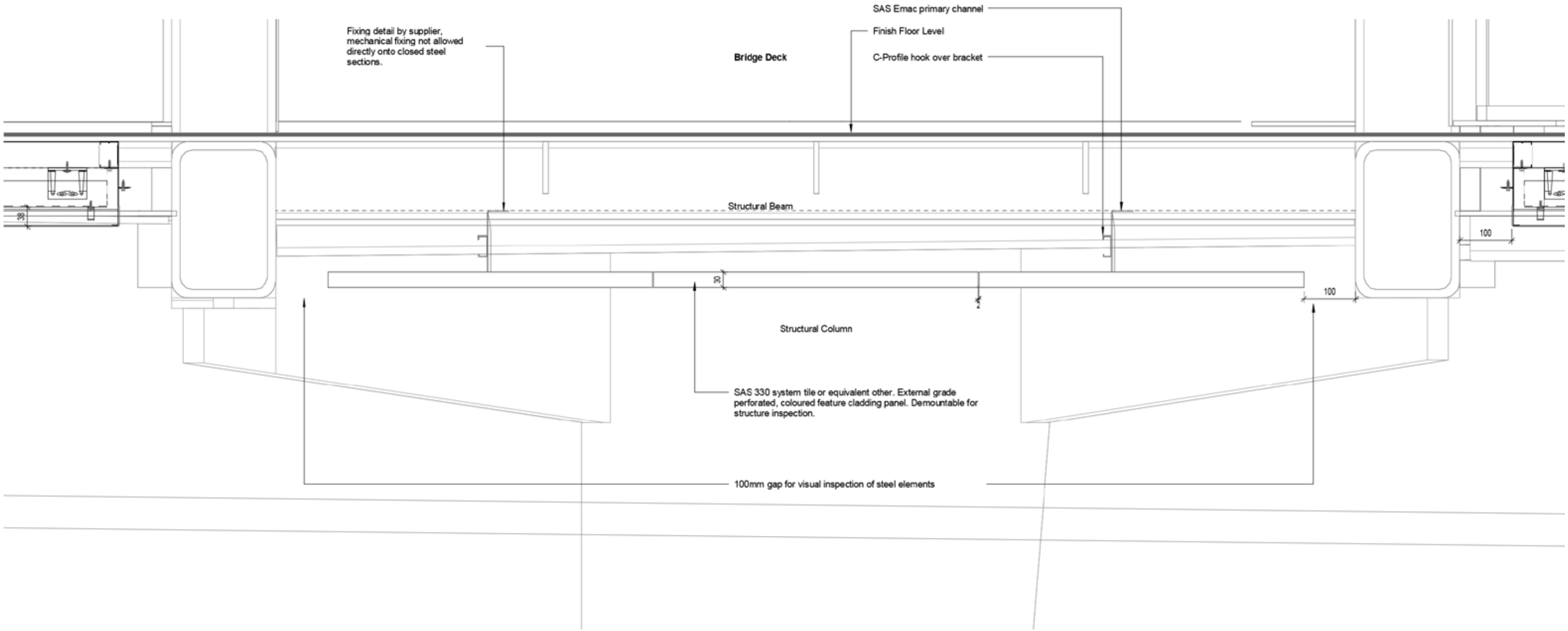


Figure 4.5.14b: Proposed soffit detail

4.5.15 Footbridge Roof

The footbridge roof will be clad in a single ply membrane that will be coloured grey. It will be set back on the main bridge span to reduce the visual impact of the bridge from platform level.

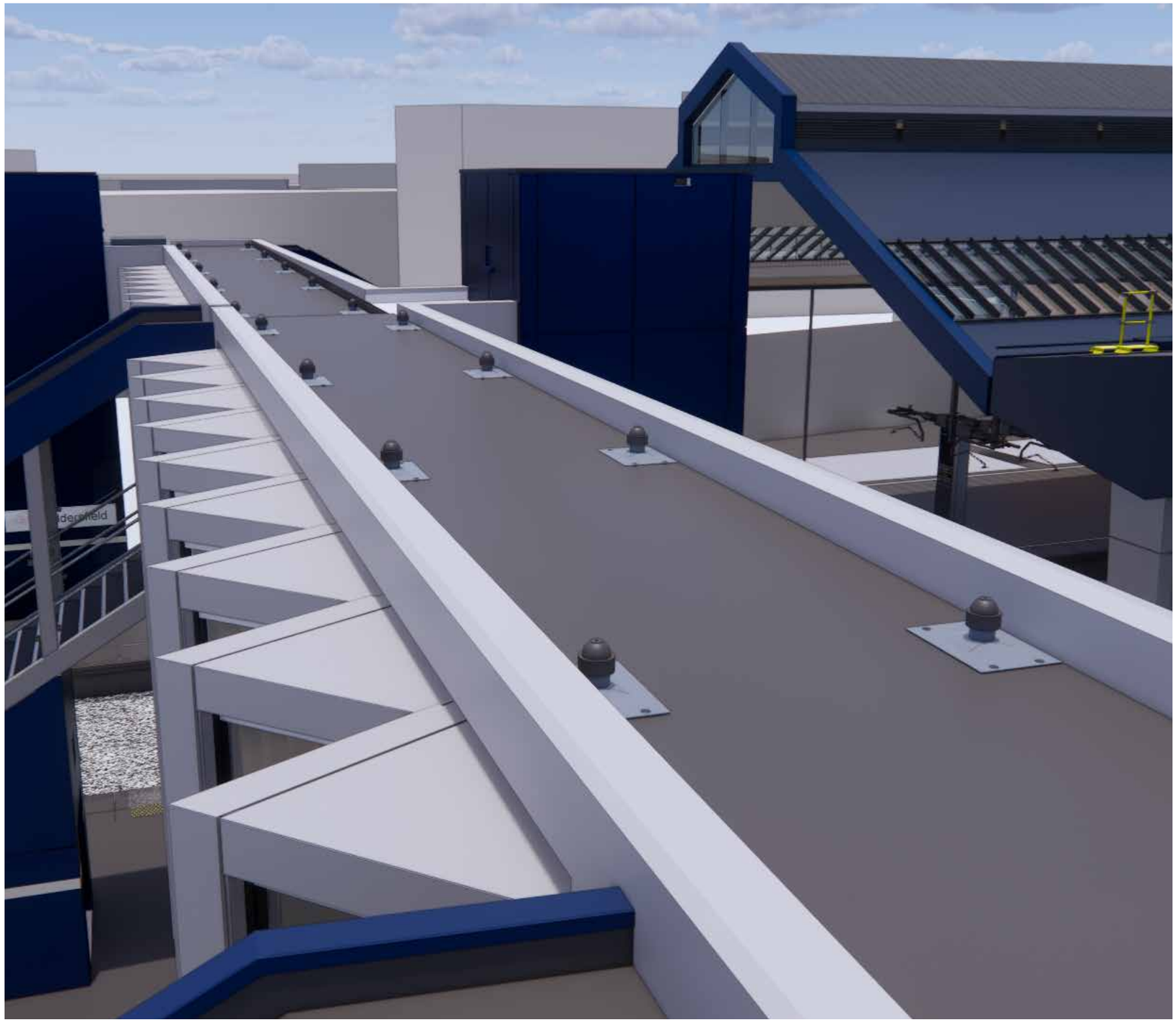


Figure 4.5.15a: View of footbridge roof

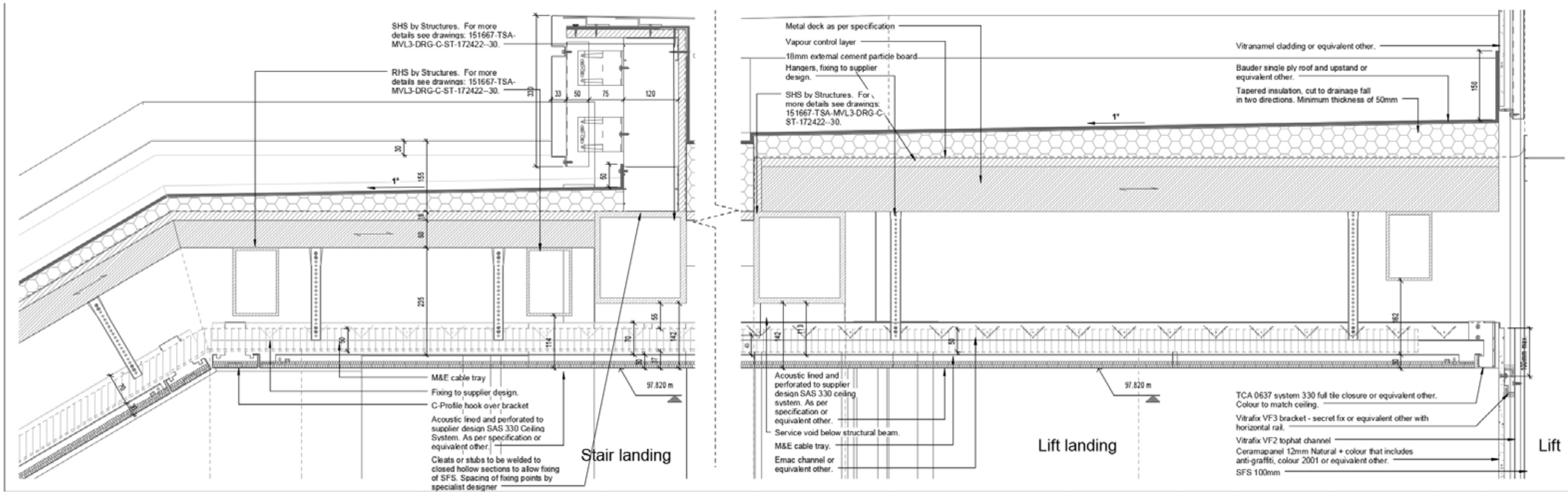


Figure 4.5.15a: Proposed footbridge roof detail

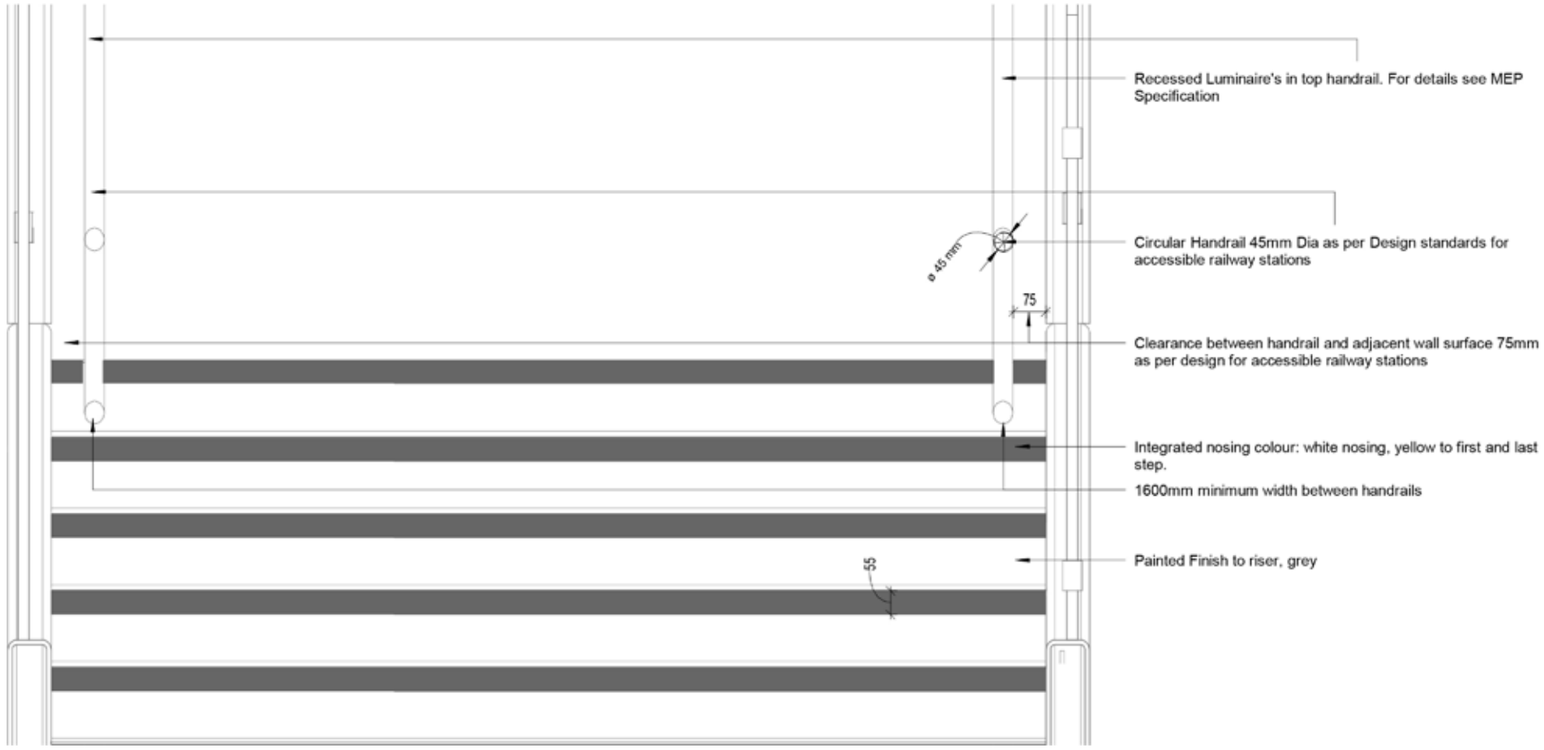
4.5.16 Footbridge Stairs

The footbridge stairs will be clad in a grey GRP covering with colour contrasting nosings. These will be white apart from the top step and the bottom step which will be yellow.

The handrails will be brushed metal with integrated lighting and a glazed balustrade.

The stairs will be supported by a grey metal stringer and each staircase will be covered with a single ply roof with blue fascia flashings to match the platform canopies, lift shafts and flashings on the new replacement and refurbished roofs.

Figure 4.5.16a: View of footbridge stairs



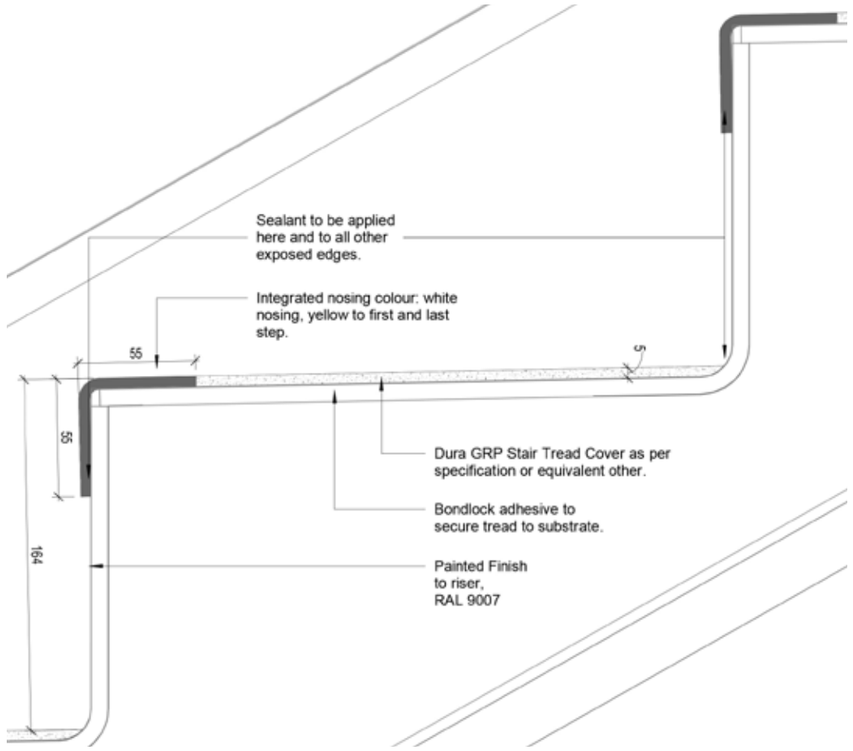


Figure 4.5.16b: Footbridge stair details

4.6 Detail Development Platform Canopies

4.6.1 Proposed form

Due to the new track alignment and platform extension towards the Leeds end of the station, there is now a requirement for platform coverage. The intention is to provide coverage for the full width of the platforms to a length suitable to provide adequate coverage for passengers queuing to enter the footbridge after alighting trains.

The Leeds end platform canopies are similar in scale to the Penistone Line canopy and will therefore be designed so the two sets of canopies will bookend Roof A and Roof B. This will mean the new canopies will be visually unobtrusive and will not detract from the gable end view of Roof A and Roof B.
The soffit for the canopies will be undulated in a similar style to the new soffit in Roof B this further tying the design together.

This will be enclosed with a new modern interpretation of the Penistone dagger boarding. The undulations will be positioned so that guttering can be installed adjacent to the tracks in the low points of troughs away from the OLE. It is important from a heritage perspective that these canopies impact on the gable end view of the trainshed and new roof as little as possible.

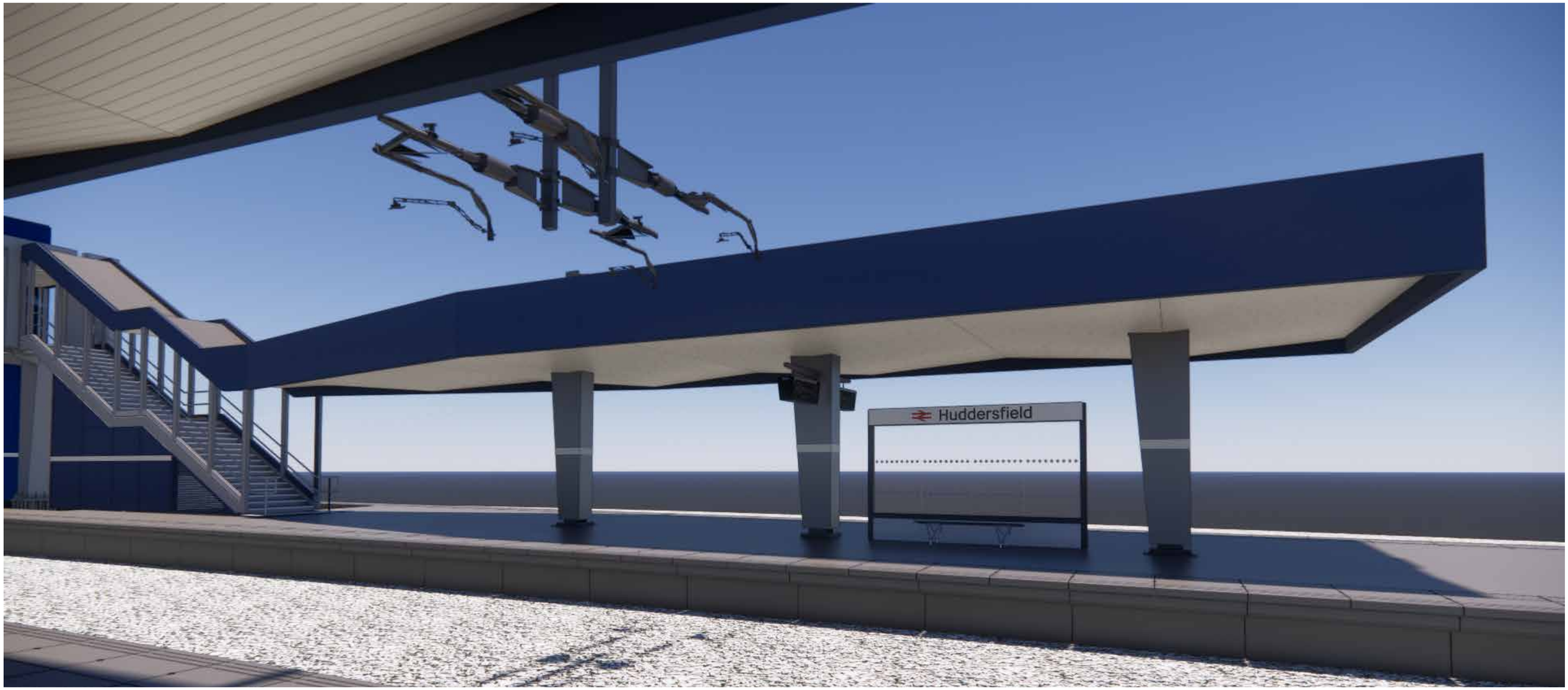


Figure 4.6a: Footbridge canopy visual

4.6.2 Materials

The Leeds end platform canopies will be designed to tie in with the new roof elements regarding the Penistone Line canopy which serves as the other book end. The undulating soffit will be the metal slated cladding of Roof B. The commonality of material in the new sections will further tie them together but will also aid with orientation and wayfinding around the station. The fascia material will be a metal cladding.

4.6.3 Colours

The colour scheme for the canopies will take queues from the Penistone line canopy. The fascia boarding will be a subtle blue tying into the Penistone Line and some of the elements on the footbridge. The column cladding will be light grey tying into the Penistone Line columns and the Roof A and B structure. Finally, the colour scheme for the soffit material will reflect the off white of Roof B which in turn ties back to Roof A. All colours to follow the Project's colour specification for the station, as reflected in the Materials Schedule submitted to discharge Condition 2 attached to the granted LBC.

Figure 4.6b: Footbridge canopy soffit

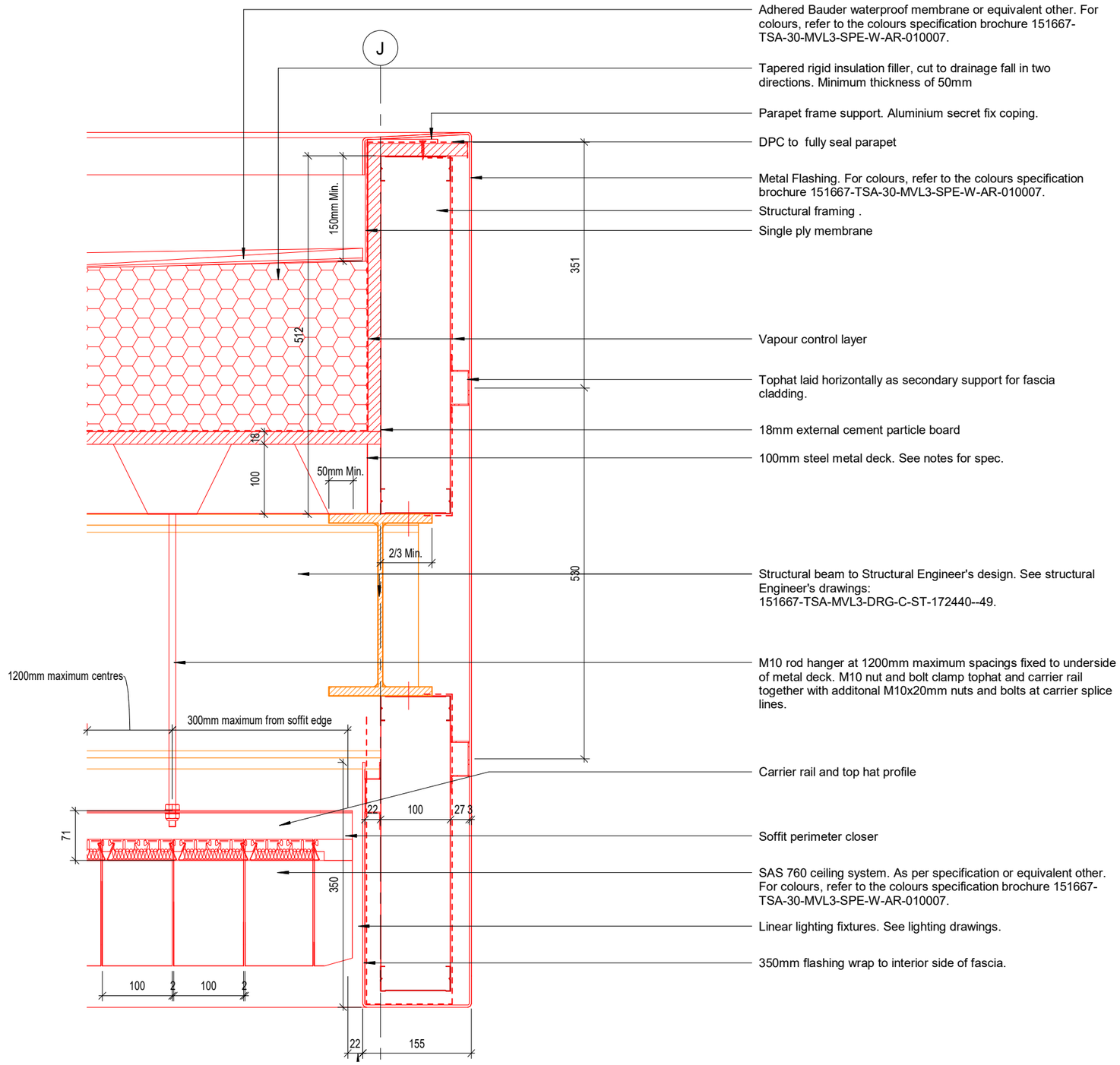


Figure 4.6c: Footbridge canopy edge detail

4.6.4 Lighting

The lighting scheme within the platform canopies has been designed in accordance with the following guides and standards:

- RIS-7702-INS Lighting at Stations
- RIS-7016-INS Interface between Station Platforms, Track, Trains and Buffer Stops
- GI/GN750 Guidance on Lighting of Railway Premises
- BS EN 12464 Part 2: Outdoor Lighting
- BS EN 5489-1:2011
- BS EN 5266-1: Emergency Lighting
- BS EN 1838: Lighting Applications - Emergency Lighting
- CIBSE SLL LG6 The Exterior Environment (2016)
- CIBSE SLL LG15 Transport Buildings (2017)
- ILP GN01 Guidance Note for Reduction of Obtrusive Light

As the Penistone Line Canopy is an existing and extended canopy that will follow the same line as Retained Roof A platform, the same lighting scheme will continue from Roof A into this canopy. A smaller version of the suspended luminaires will be mounted to illuminate the platform. The distribution of light from the suspended luminaire will also create a soft-glow of illumination on the canopy roof.

The Leeds end canopies will continue the same linear luminaire theme as the New Roof lighting. Continuous linear luminaires will

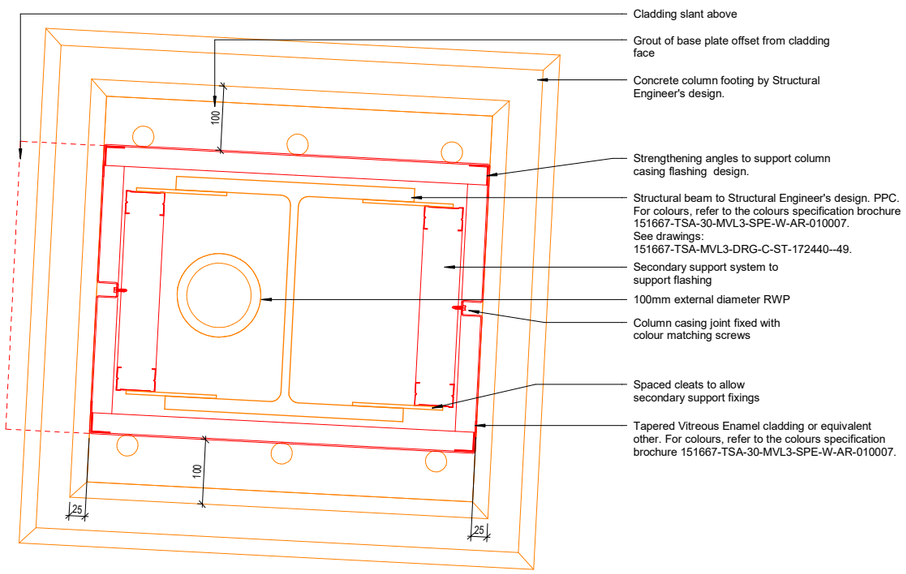


Figure 4.6d: Column casement plan detail

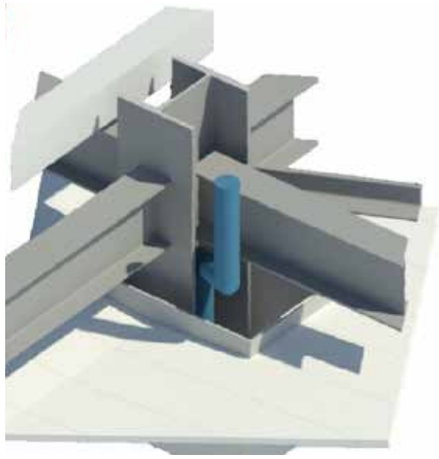


Figure 4.6e: Rainwater pipe axo view

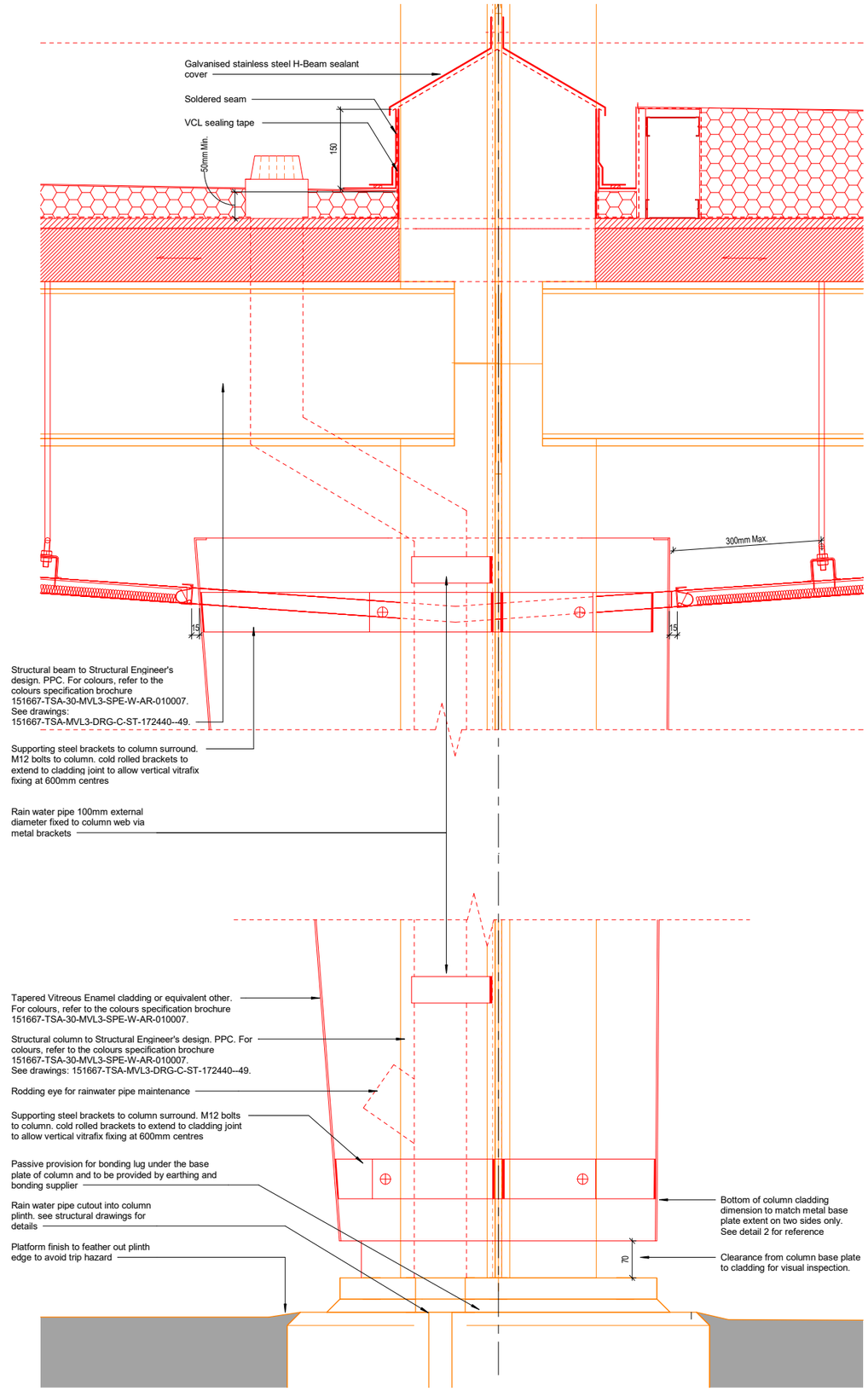


Figure 4.6f: Column casement section detail

be positioned to run parallel to the platforms and integrated within the architectural ceiling. The linear luminaires will provide a uniform lighting level which clearly defines the platform edge.

4.6.5 OLE

There will be a requirement to interface overhead line equipment into the canopies. Due to the lower height of the canopies, it will need to be situated on top. It will sit on the column locations and cantilever out over the track. Visually the OLE masts will be designed so they reference the geometry of the new roof which is derived from the Euston Truss.

4.6.6. Maintenance access

The platform canopies will be accessed from hatches on the underside. The gutters for drainage will be situated at the low points of the undulations away from the OLE. There will be a single fall arrest system line running along the centre of each canopy to allow inspection along the length.

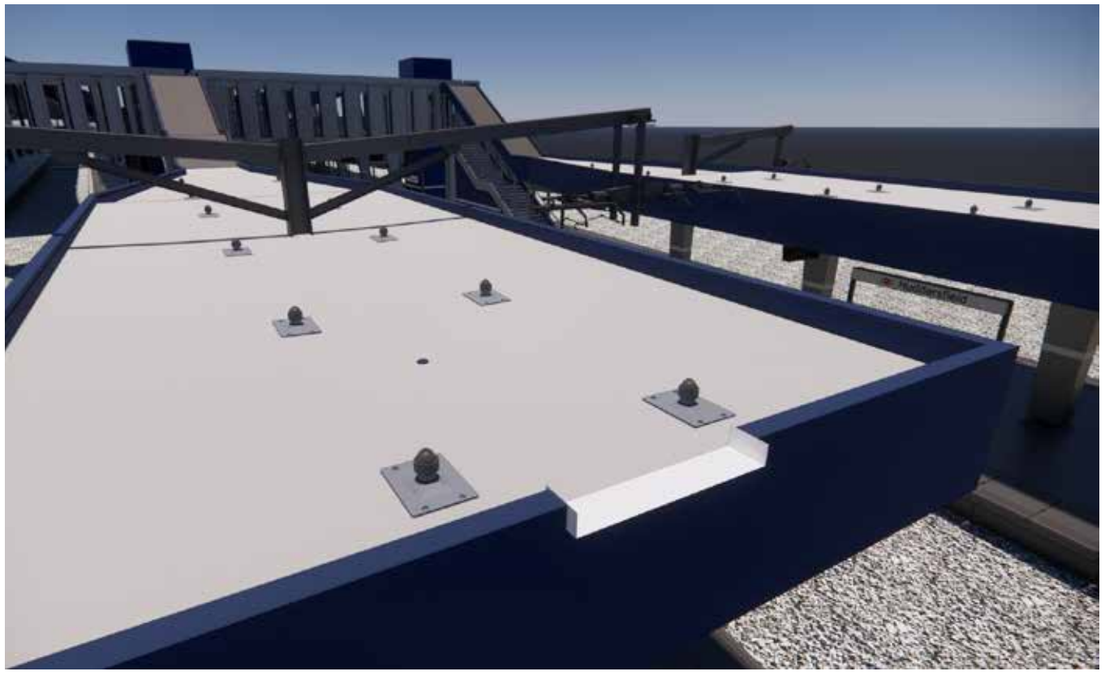


Figure 4.6g: Canopy roof visual

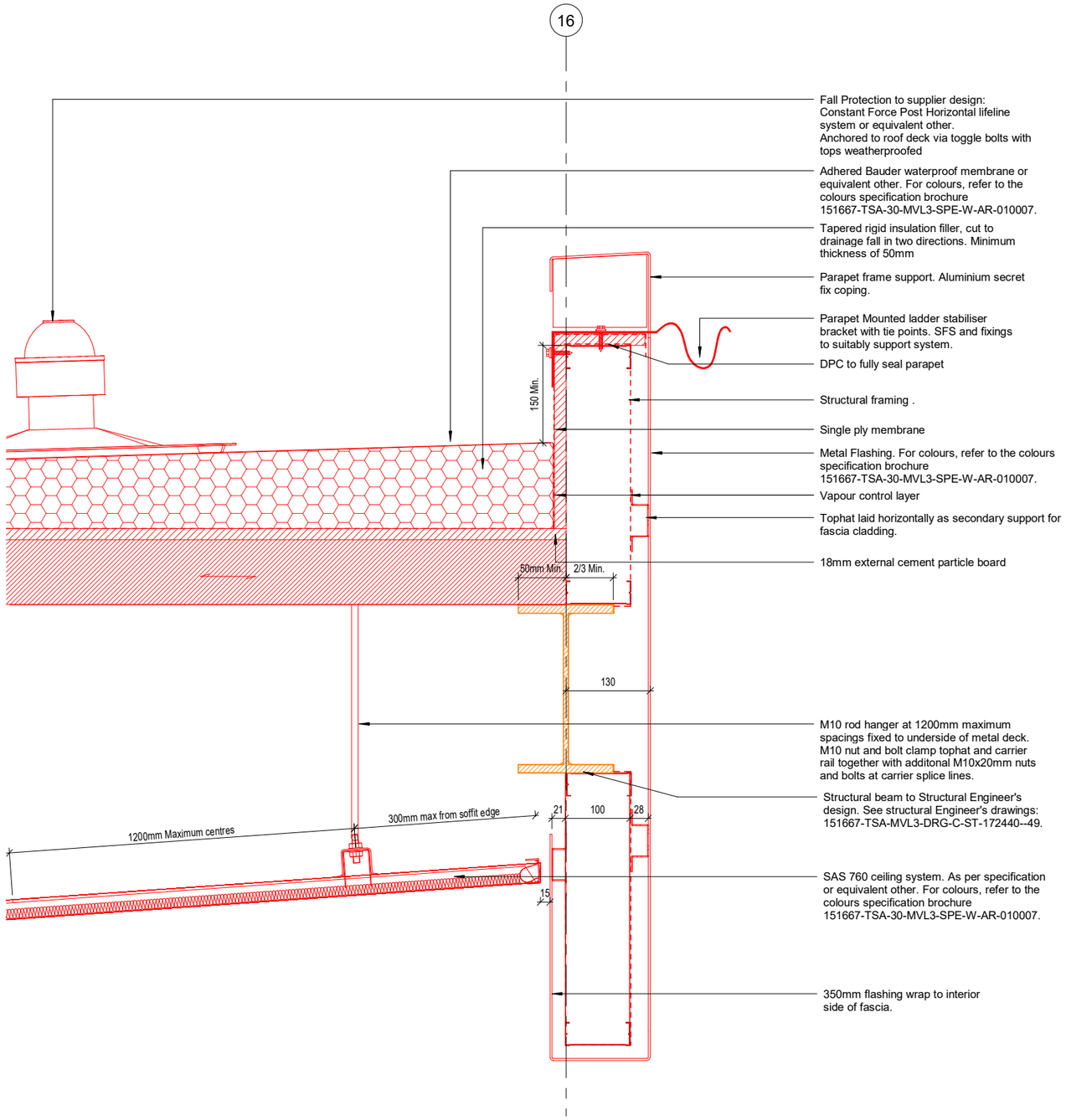


Figure 4.6h: Canopy overflow section detail

4.7 Detail Development Platforms

4.7.1 Proposed form

Proposed platforms positions and lengths are driven by the track and signalling layouts, refer to section 4.1 for details. A usable platform length of 200m is mandated in the TRU head specification for through platforms at Huddersfield Station.

A clear distance of 3.3m is required from platform edge to any platform obstruction such as lift shafts, stairs, columns, seating, waiting areas, etc. This provides sufficient space for station staff to position a boarding ramp and turn a wheelchair at any point along the platforms.

A passenger refuge area is proposed at the Leeds end of Platforms 3-4 and 5-6 to provide a safe area for persons of reduced mobility in the event of a train fire. Fire escape routes are provided at the end of the remaining platforms.

4.7.2 Accessibility and inclusivity

The platforms have been designed to meet the requirements of BS 8300: Design of an accessible and inclusive built environment, The Department of Transport Design for Accessible Railways Stations and the relevant TSI for Persons with Reduced Mobility. The platforms provide an anti-slip surface with falls between 1:80 to 1:40. Tactile paving and visual platform warning markings are provided to demarcate platform edge. Platforms shall be covered by CCTV with Help Points located on platforms.

4.7.3 Obstacle free routes

Obstacle free routes will be provided that interconnect the following public areas of the station:

- accessible entrances and exits
- information desks
- visual and audible information systems
- ticketing facilities
- customer assistance
- waiting areas
- toilet facilities
- platforms

Obstacle-free route floor surfaces and ground surfaces will have low reflecting properties to aid with visual contrast.

Figure 4.7a: Platform visual

4.7.4 Facilities within the station

Disabled WC provision with wheelchair access is provided within the station itself on Platform 1, and new facilities are to be located on Platform 3 & 4. Baby changing facilities are currently provided on Platform 1, accessible to both men and women and this location will remain unchanged.

4.7.5 Materials

The existing platforms will have their existing asphalt finishes maintained. The platform riser walls will be pre-cast concrete and the new platform finish will also be asphalt.

4.7.6 Furniture

Platform furniture and structure is to be located centrally on the platforms and include a 3.3m clearance from platform edge to allow for the placing of wheelchair threshold ramps to the train doors. This requirement has been driven by the Technical Specifications for Interoperability (TSI) for PRM's. Seating will be placed at 50m intervals to allow PRM's to rest at 50m intervals to meet the requirements of BS8300 and the Department for Transport (DfT) Design Standards / Code of Practice (COP) for Accessible Railway Stations (2015).

Any items of furniture to the new platforms and free-standing devices at stations shall contrast with their background and have rounded edges and follows the project's colour specification for the station, as reflected in the Materials Schedule submitted to discharge Condition 2 attached to the granted LBC. A separate document detailing platform furniture has been produced to discharge Condition 4 attached to the LBC, which specifically necessitates such detail.

4.7.7 Structural considerations

The new platforms and extensions consist of L-shaped concrete riser walls with solid back fill to form the platforms surface. The riser walls shall support the pre-cast concrete coper, with a tactile paving behind the coper. The platform height to edge of the coper shall be 930mm from the rail and offset 730mm from the nearest rail. Provision of a recess beneath the platform edge is provided. The recess shall be 480mm high with a minimum width of 300mm from the rail level.

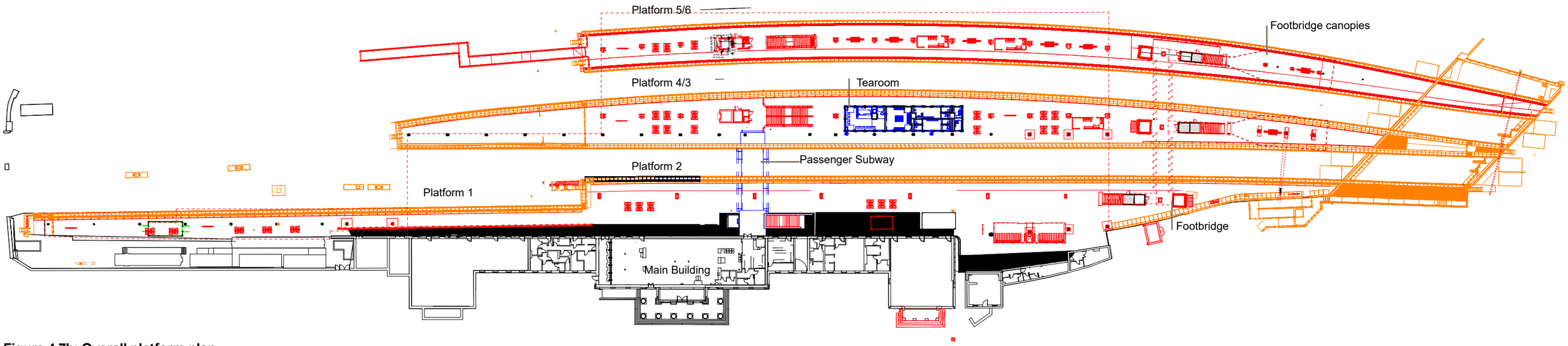


Figure 4.7b: Overall platform plan

4.7.8 Drainage

4.7.8.1 Existing station drainage

The basis of the drainage system for the existing station is as old as the station itself and is shown in Fig.4.7a. The key features are two large stone culverts.

The first of these, referred to as the Station Culvert, originates at the tunnel portals to the south of the station and provides the main drainage outfall for these tunnels. It runs northwards along the side of the station building, the rear of Platform 1. It is located deep enough to pass under the pedestrian subway. The trainshed roofs drain down rainwater pipes within their support columns, which are collected in platform storm water drainage systems. There are no restrictions on the quantity or flow-rates of the storm water discharging from the existing station drainage system.

The other existing culvert is located to the north of the station and can be accessed from a grid in the retaining wall under John William Street Bridge. This is referred to as the John William Street Culvert, see Fig.4.7e.

The main foul drainage for the station building passes northwards along a cellar walkway under the rear of Platform 1, collecting internal station connections as it proceeds, see Fig.4.7f. There is a foul drain from Platforms 3&4 which carries discharge from the Tea Rooms and operational building, this passes under the railway to connect into the main foul drain.

4.7.8.2 Proposed station drainage

The proposal is to keep significant parts of the existing drainage system operating unaltered, but supplement these with all-new drainage systems to service the remodelled parts of the station. The proposed drainage scheme is shown in Fig.4.7g. For new drainage systems, there are stringent criteria governing the discharge of storm water to reduce the risk of flooding within Huddersfield. These criteria do not apply to existing unaltered drainage systems. These criteria include the following:

- reduction in the storm water runoff peak flow rate to the surrounding sewers of 30%.
- within the drainage models, simulated storm rainfall intensities to be increased by 40% to allow for future climate change.
- this restriction requires storm water to be held within the station in a new attenuation tank with a flow control.
- the design will demonstrate compliance with these criteria for the storm return period of 1 in 100 years for the station as a whole and for 1 in 200 years for the specific railway infrastructure.

The existing culverts will remain largely unaltered. New connections will be required to this culvert and the upstream end which passes under the railway will be diverted clear of the works. There are no works planned to the John William Street culvert.

For the southern half of the station area, the existing drainage principles will remain. Tunnel and railway track drainage systems will be provided, discharging into this culvert. However other existing flows will be removed to new drainage systems, resulting in an overall reduction in discharge from this culvert to the John William Street sewer.

The station platforms and shed roofs are to be largely re-modelled, therefore a new drainage system will be required complying with the above criteria. A separate track drainage system will be provided, also flowing north to a similar cross-drain. These will both discharge into a new storm water attenuation tank, to be located within the depot site adjacent to Fitzwilliam Street.

In principle the foul drainage system will remain as existing. The primary drain will be in the cellar walkway, draining the station building. The pipe from the Tea Rooms on Platform 3&4 will remain.

Some modification will be essential due to changes in the surrounding infrastructure, however these will be minimised as far as possible. The existing outfall to the John William Street sewer will remain and flow rates should not significantly change.

Figure 4.7c: Platform 2 visual

Figure 4.7c: Island platform visual

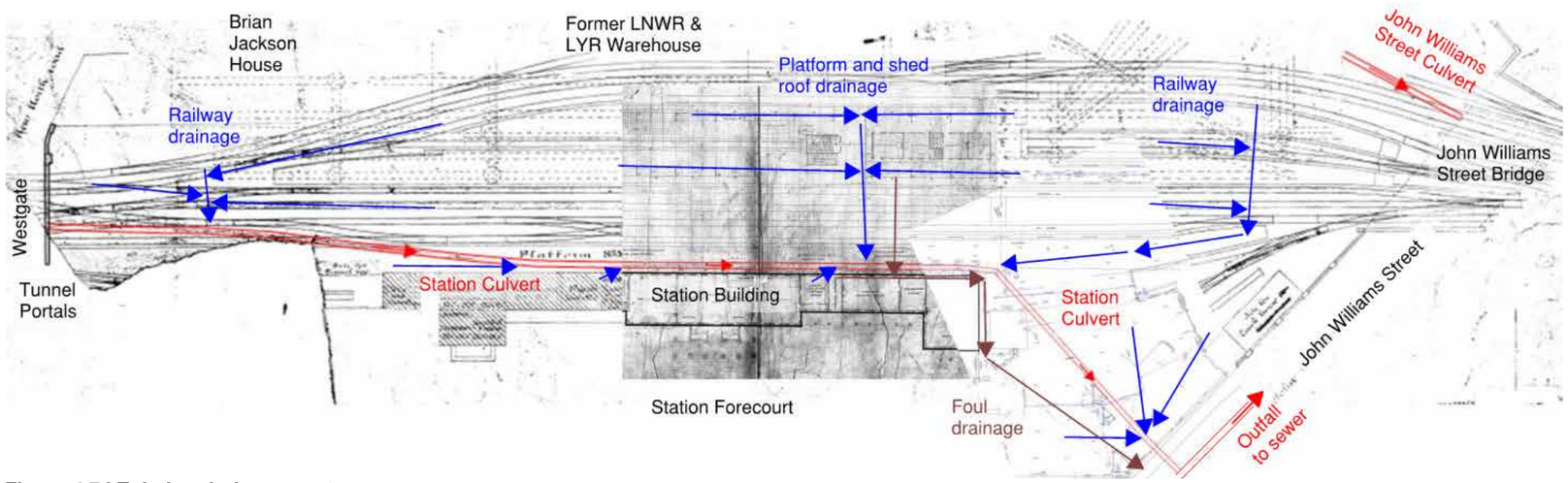


Figure 4.7d Existing drainage systems

Figure 4.7e: John William Street culvert

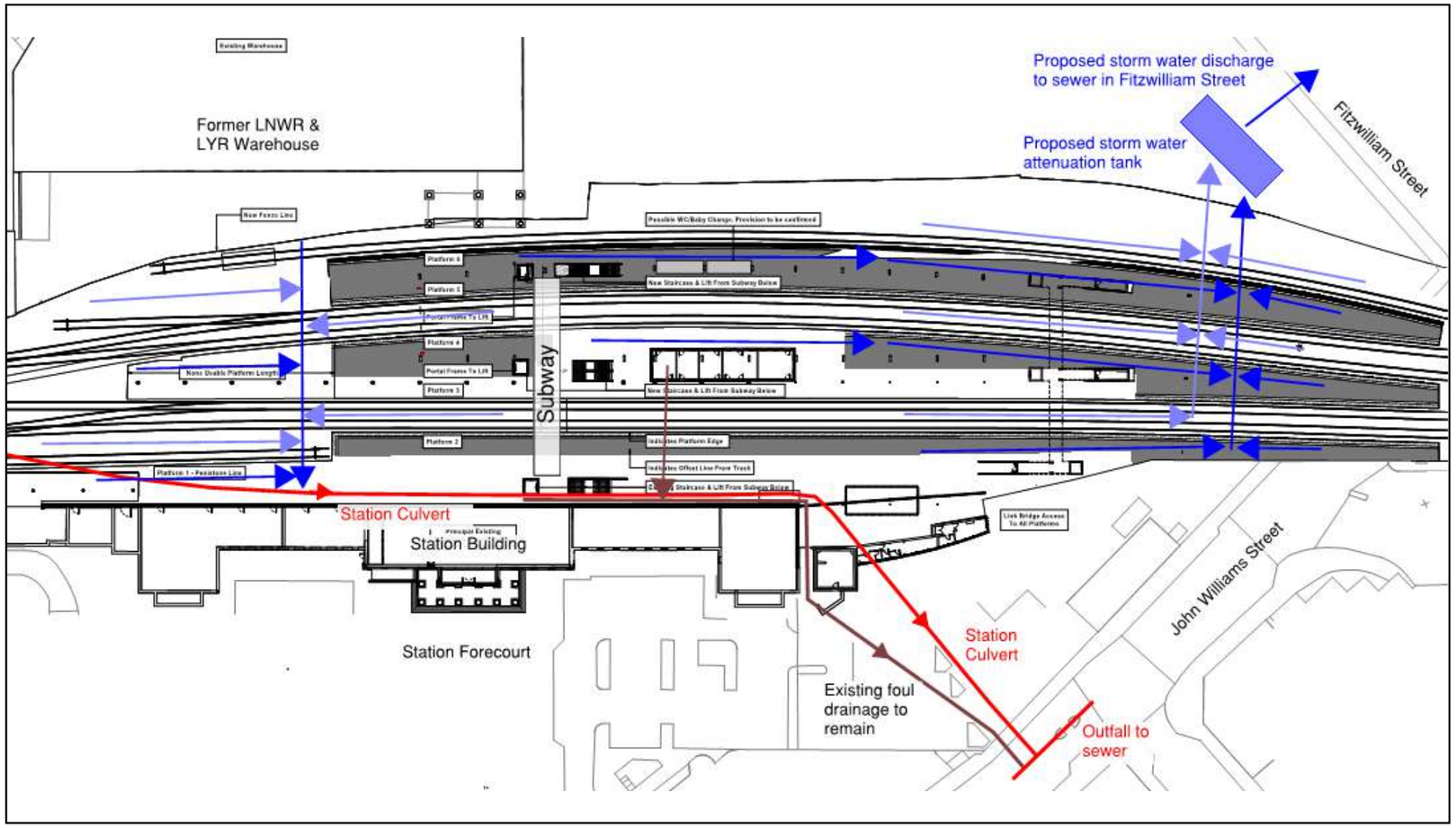


Figure 4.7g: Proposed drainage systems

Figure 4.7f: Foul and roof water drainage within station cellar walkway

4.8 Detail Development Tea Rooms

Section to be completed at a later CIMP Phase, also refer to the approved Phase 1 CIMP and accompanying Tea Rooms Methodology document.

4.9 Detail Development Subways

4.9.1 Existing Parcel Subway

The parcel subway is a disused subway that connects Platforms 1 and 4 in Huddersfield Station at a skew angle of approximately 22°. The structure is a simply supported single span underbridge which supports the Up Main and Down Main lines. The structure was constructed in 1899 and comprises two steel trough deck with concrete infill with metal rolled I-section edge beams. Each deck comprises of 12No. Troughs supported on brick abutments with sandstone padstones. Archive information indicates a 19mm thick waterproof asphalt layer sits between the steel troughing and a 50mm thick concrete deck slab. The trough decks are separated by a 900mm covered catch pit located in the six foot. Access to the subway is via series of tunnels and rooms under the station building, which is accessed from a storeroom located at the end of the pedestrian subway beneath Platform 1.

In 2009, strengthening propping works to the trough decks was undertaken. Transverse steel trough support girders were installed to each side of the existing troughs. Support girders were notched into the abutment walls to support secondary girders which in turn support the trough propping girders. The clear square span of the structure is approximately 3.05m (3.28m skew). The minimum headroom is approximately 1.455m to the strengthening works propping arrangement. There is an existing gravity sewer that runs the length of the subway.

4.9.2 Infill works

The proposed works is to partially infill the Parcel Subway with lightweight foamed concrete and utilise it as an under-track crossing (UTX). The subway shall be lined with a separation membrane and filled from the northern end, beneath Platform 4 / Tea Room, to the start of the southern trough deck, allowing the north trough deck to be removed, alleviating future maintenance liabilities with the track carry sections of the subway and addressing the sub-standard ballast depth over the structure.

The separation membrane is to protect / preserve the historical fabric of the structure should this need to be investigated in the future. A brick/blockwork separation wall is proposed to act as permanent shuttering for the concrete infill and close off the subway.

Figure 4.9a: 2009 Strengthening works

Figure 4.9b: 2009 Strengthening works

Figure 4.9c: Existing structure under Tearoom

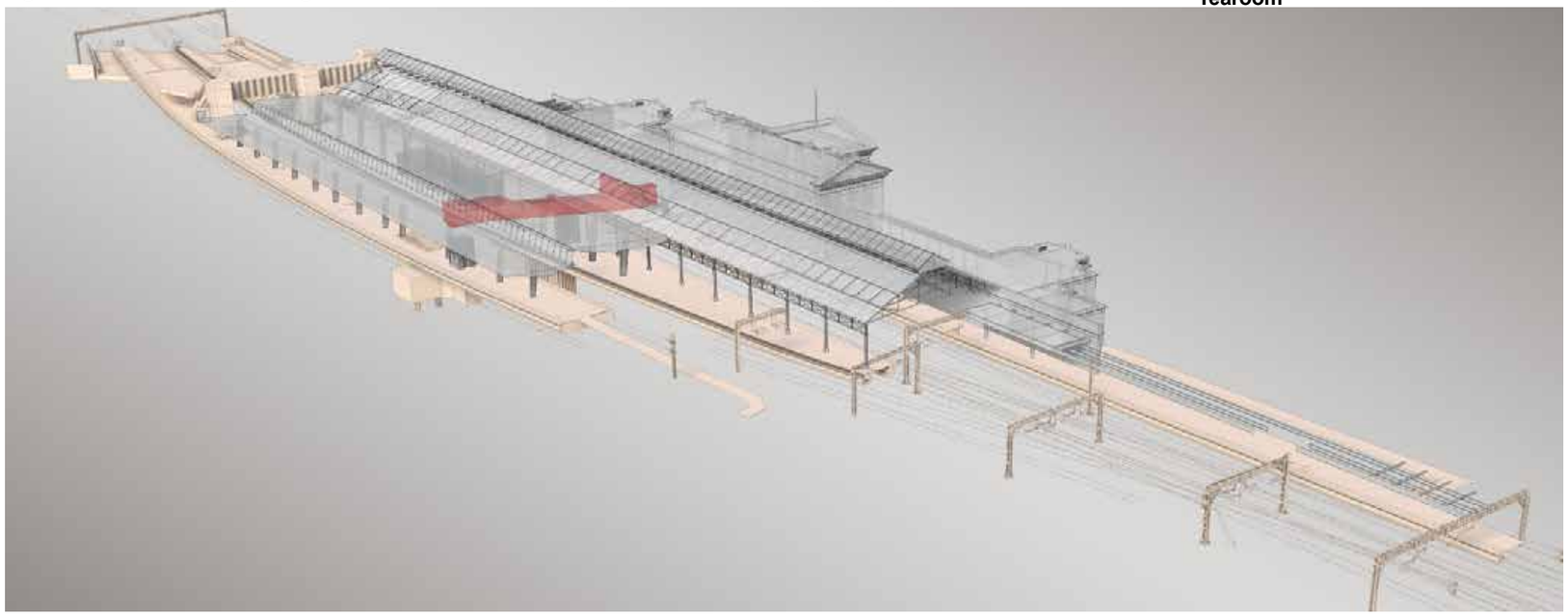


Figure 4.9d: Proposed Parcel Subway highlighted in red on visualisation

The existing sewer and services within the subway will be protected by placing within split ducting and sealed to prevent concrete ingress. Additional proposed services ducts are to be provided within the subway, which pass through the infilling to act as UTX for services between the main building and island platforms. Turning chambers shall be provided to platforms to enable access to the proposed ducts within the subway. The southern trough deck will require a localised section of the trough decking to be removed to allow the ducts to pass through the deck from the platform level into the subway.

4.9.3 Existing Passenger Subway

The existing passenger subway connects the main building entrance on platform 1 to platforms 4, 5, 6 and 8 in Huddersfield Station. It comprises a single span bridge underbridge that carries the ballasted tracks of the Up Main and Down Main lines and part of the platform surface. Access is via either a staircase or lift, located on each platform.

The structure was constructed in circa 1885 and has undergone several alterations to the layout of the stairs with the addition of 2 modern lifts installed in 2010, one lift added to platform 1 and the other to platform 4. The track carrying structure comprises of 16No. longitudinal wrought iron girders with transverse brick jack arches spanning between adjacent girders. Two masonry abutments form the substructure with the floor finished in Yorkshire sandstone paviours, which have historic value. The subway floor ramps down as it passes beneath the rail lines. The structure is square to the tracks with a clear span approximately 4.830m. The headroom clearance through the structure is a minimum of 2.460m.

The platforms over the subway are supported off RSJ's with precast concrete panels spanning between the RSJ's to form the platform surface, additionally, three plate and angles riveted girders span the subway to support a roof column on platform 4. A gravity foul sewer and a surface water sewer traverse the subway at platform 4.

4.9.4 Upgrades to existing subway

The existing staircase on platform 1 (proposed platform 2) shall receive upgraded handrails with integrated lighting. The subway will be lit using linear LED luminaries fixed to the soffit of subway. CCTV will cover the entire subway with help points located adjacent to the lifts at subway level.

Figure 4.9e: View towards platform 3/4 end

Figure 4.9f: View of platform 2 stairs

Figure 4.9g: View of platform 3/4 stairs

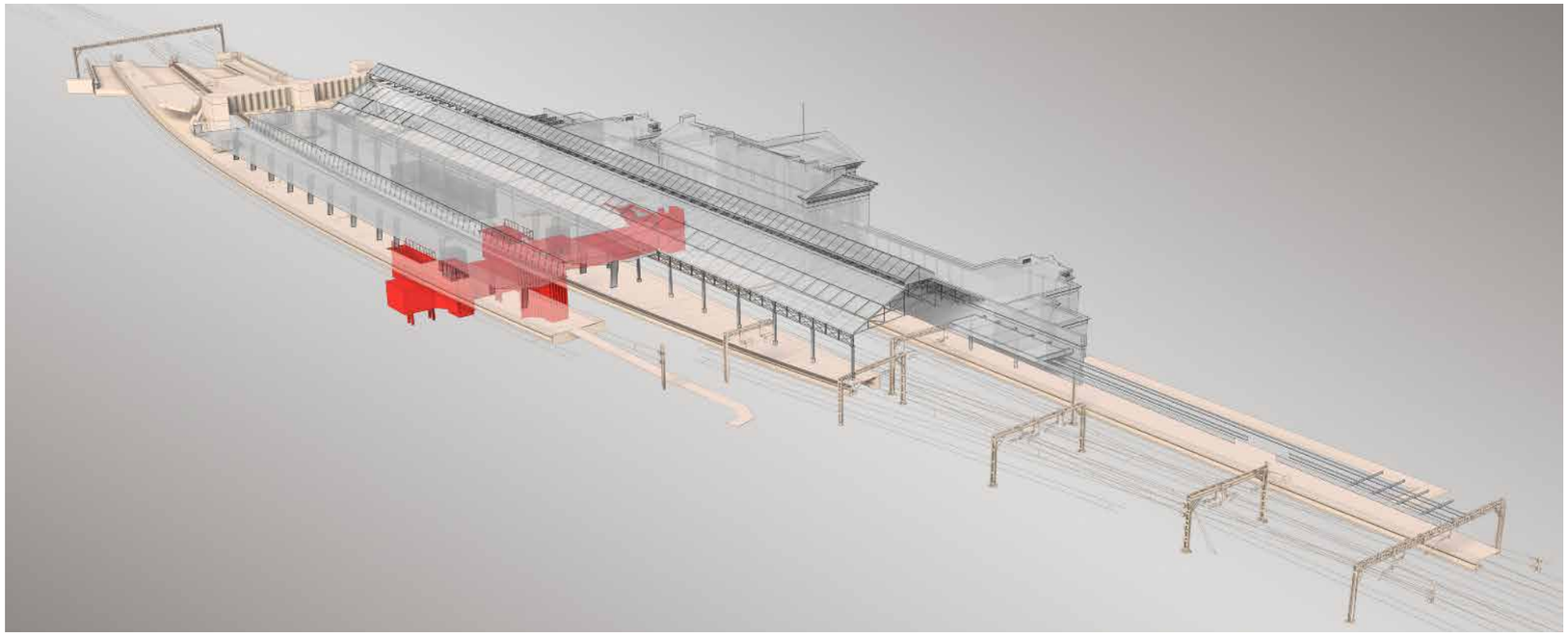


Figure 4.9h: Proposed Passenger Subway highlighted in red on visualisation

The existing subway structure (wrought iron and jack arch arrangement) under the existing track arrangement are to remain. A concrete slab for a direct fix track system may be added above the structure to address substandard ballast depths. The existing deck shall be re-waterproofed prior to the addition of the concrete slab.

4.9.5 Extension works

The proposal is to extend the existing passenger subway to provide access to the new island platform (proposed platform 5 and 6). An in-situ reinforced concrete box will form the structure of the subway extension, which will support the 2No. realigned tracks plus part of the new island platform. The extension retains the existing clear span (4.830m) and achieves minimum headroom clearance of 2.5m. The extension will connect to the existing subway with a short ramp to address the floor level differences.

4.9.6 Materials and colour

Wall finishes are to be white paint on a smooth concrete surface. Stainless steel handrails are to be provided within the subway to account for level drops. York Stone paviours are to be used within the extension section to match the existing subway. All colours to follow the Project's colour specification for the station, as reflected in the Materials Schedule submitted to discharge Condition 2 attached to the granted LBC

4.9.7 Staircases and lifts

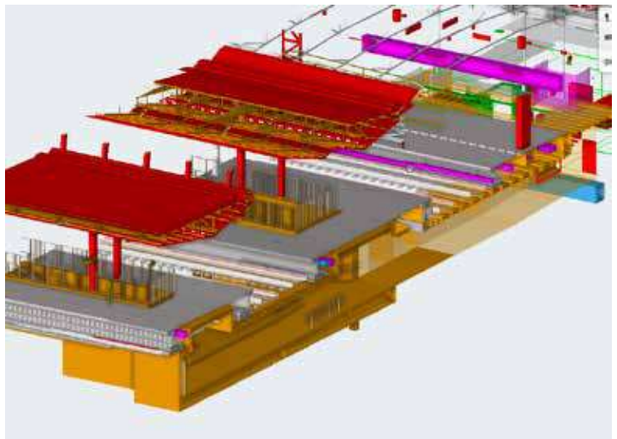
The existing staircase and lift shaft serving platforms 4, 5, 6 and 8 and parts of the subway roof are to be removed as part of the works. A new staircase and a 16 persons through lift shall be provided on the re-aligned platforms (proposed platform 3 and 4). The proposed staircase width is approximately 4m wide (wall to wall) with handrails to the side wall and a central handrail. The staircase is to have two flights of steps with 12 risers per flight and an intermediate landing.

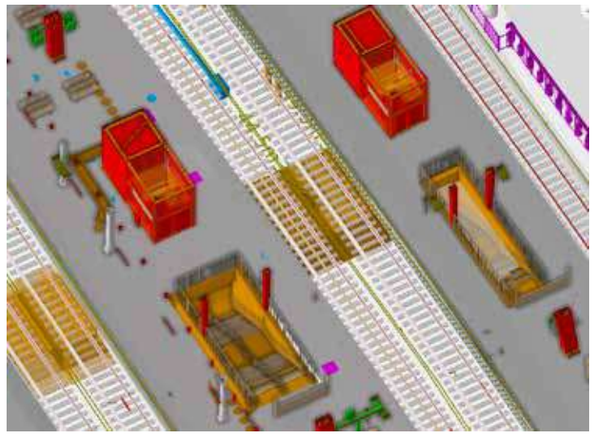
The staircase and lift shaft walls adjacent to platform 4b (proposed platform 3) shall be constructed using contiguous pile walls arrangement with the remaining structure constructed in-situ as per the subway extension to platform 5 and 6. The existing sandstone paviours shall be protected, with the disturbed paviours re-laid as part of subway extension. The staircases shall be provided with 800mm wide corduroy warning tactile to top and bottom of the stairs. Each step nosing will incorporate a permanently contrasting continuous material for the full width of the stair on both the tread and riser.

Platform 5 and 6 are to be provided with a staircase and 16 persons through lift to provide step free access. The staircase width is approximately 2.2m wide (wall to wall) with handrails to the side walls. The staircase is to have two flights of steps with 13 risers per flight and an intermediate landing. The proposed stairs and lifts shall maintain a minimum 3.3m distance from the platform coper edge. Balustrades around stairwells are to be designed to resist crowd loads.

4.9.8 Interface with Roof B

The roof columns over the staircase shall be split over the staircase side walls with a column supported off each side wall of the staircases. The lift shaft below platform level and staircases are to be in reinforced concrete. The staircase walls and lift shafts are to locally support the roof canopy. A roof column is to be integrated into the lift shaft steel frame on both island platforms.





Figures 4.9i-j: Subway relation with roofs B &C.* Colours from federated model do not reflect realistic proposed colours in the Colour Specification Brochure

Figure 4.9k: Proposed Passenger Subway section cross track.

4.9.9 Passive Provision

The subway end wall under platform 6 shall be designed for removal without damaging the remaining structure to facilitate a future extension to the north of the station beyond Network Rail land boundary to provide a northern entrance to the station.

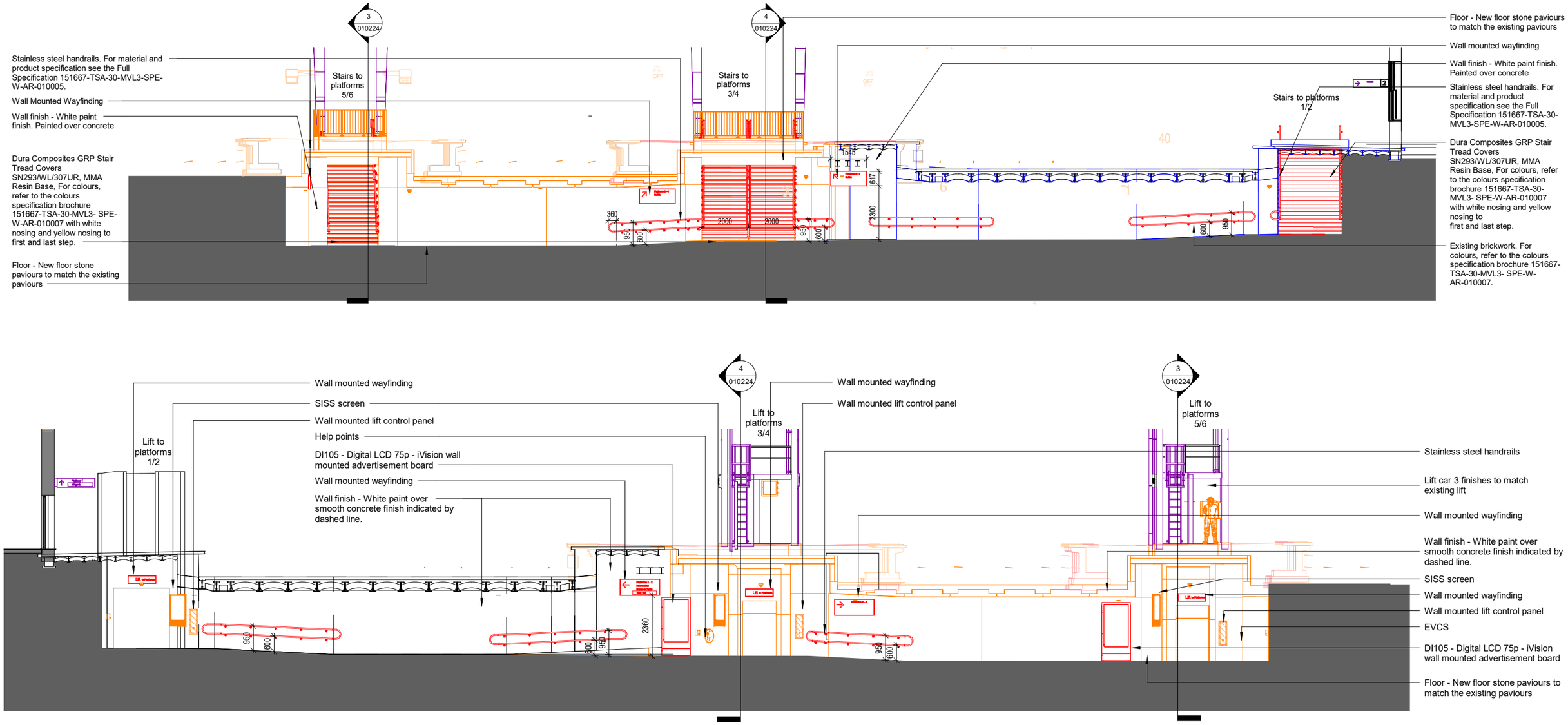


Figure 4.9I: Proposed Passenger Subway Cross track section

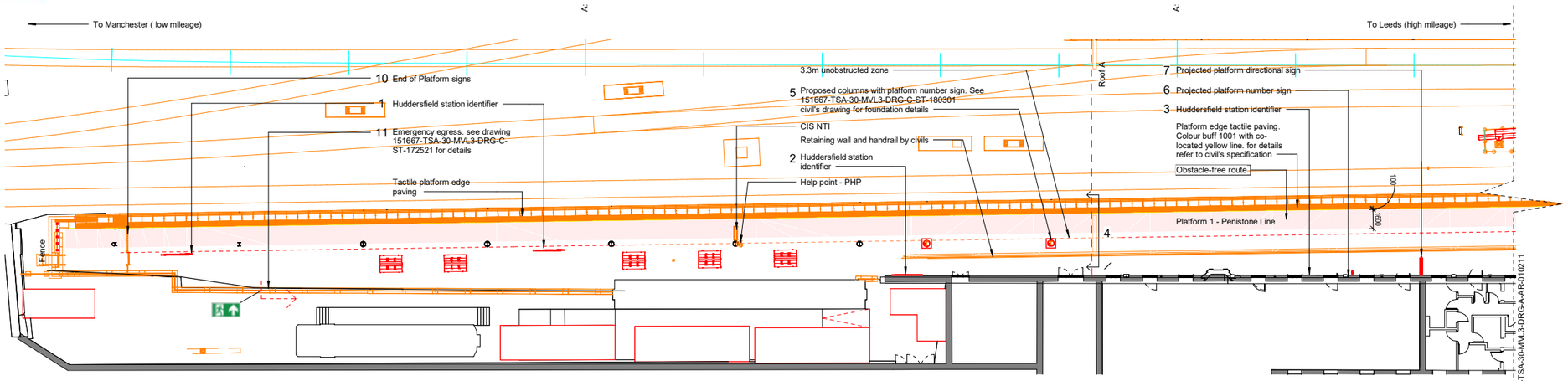
4.10 Signage

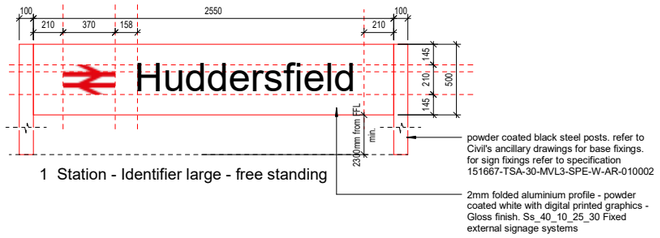
During this stage, the wayfinding strategy of the station is set out through multiple projected, wall mounted, ceiling hung and free-standing wayfinding signs. The principle is to upgrade the existing signage to the latest NR-GN-CIV-300-01 Wayfinding standard and reducing the amount of clutter to unify the signage throughout the station.

All sign font sizes satisfy the NR wayfinding standards and are visible between the ranges of 2m-20 meters. This would satisfy the inclusive mobility standards (DfT) for signage to be legible from distance.

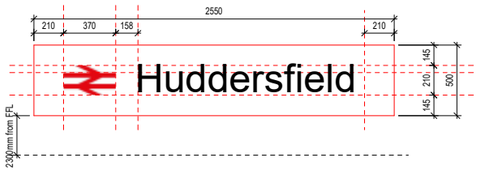
Projected signs and ceiling mounted signs could pose a potential perch location for birds, and it is recommended by the wayfinding standards to provide an off the shelf solution such as a mounted wire system (figure 4.10b). These systems can be mechanically fixed into the removable cap component of the signage which can be removed for the purpose of cleaning or replacement.

Braille and direction of travel will be included on top and bottom of handrails leading to the passenger subway as well as braille on room identification signs. It is important to note that it is recommended that the overall wayfinding strategy should be displayed in the station forecourt with braille.

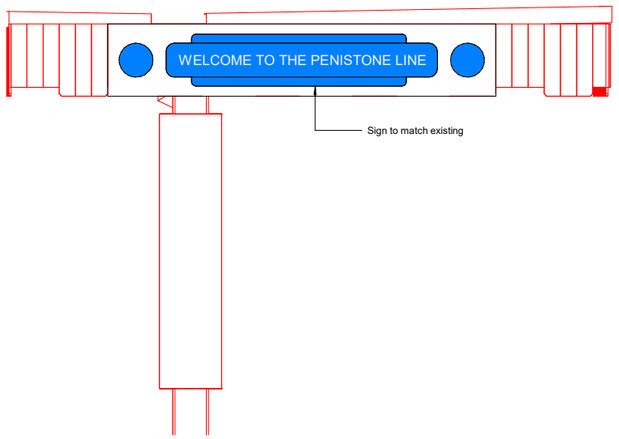




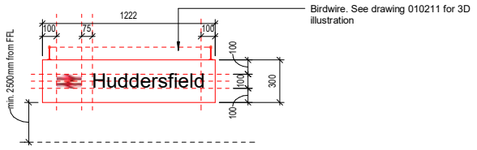
1 Station - Identifier large - free standing



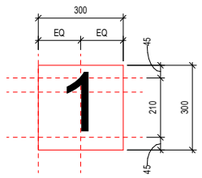
2 Station - Identifier large - Wall mounted



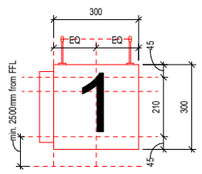
3 Proposed Penistone Line Signage



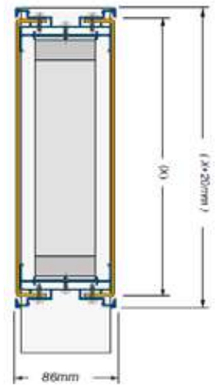
4 Station - Identifier small -Wall mount



5 PL Platform Number

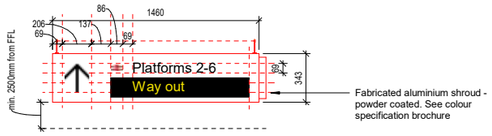


6 Platform Number Wall projected

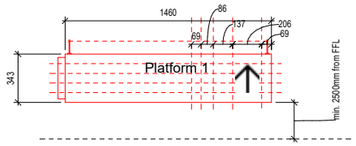


8 Typical Post and Bracket Fixing Following NR Guidance: NR-GN-CIV-300-01 - Wayfinding

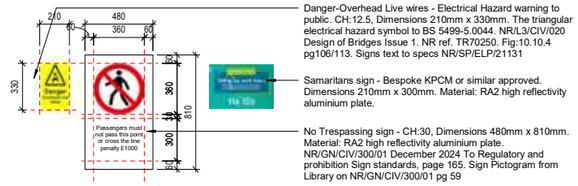
9 Typical Post and Bracket Fixing Following NR Guidance: NR-GN-CIV-300-01 - Wayfinding



7a Station Projected directional sign facing Leeds



7b Station Projected directional sign facing Manchester



10 End of Platform Signs

Fire sign size to be 300 x 100mm. For lighting / illuminated signage - refer to M&E engineers information.

11 Emergency Egress sign

Figure 4.10a: Signage layout

With regards to the tactile guidance pathway, the Requirements set out in PRM NTSN (Persons with Reduced Mobility National Technical Specification Note) and the RIS-7016-INS (Rail Industry Standard Issue 2 Interface between Station Platforms, Track, Trains and Buffer Stops) offer a solution to plan the pathway through the platforms. However, these two standards do not align in their approach to marking the Danger Area and tactile wayfinding. As stations differ, there are no useful guidance documents within the DfT, RSSB or NR standards for larger stations.

The DFT issued a letter with guidance to Network Rail Assurance Panel which concluded that each project needs to determine how they proceed to secure authorization and comply with the requirements in the PRM NTSN.

After consultation with the accessibility group, it is agreed that the principle of guidance is, as per the PRM NTSN 4.2.4.2, that all obstacle-free routes of the platforms and vertical circulation elements are connected to the tactile guidance pathway along with waiting areas, WCs, Help points, and ticket machines and information desks (entrance zone within station building) Figure 4.10c. The consultation also concluded that a parallel tactile guidance pathway along the platform edge is not recommended, as this will conflict with the edge hazard tactiles.

Figure 4.10c shows the obstacle-free route highlighted in red and the tactile pathways connecting to the former zone with the lift, stairs, help points and waiting shelters.

Figure 4.10b: Birdwire extract from NR/GN/CIV/300/01

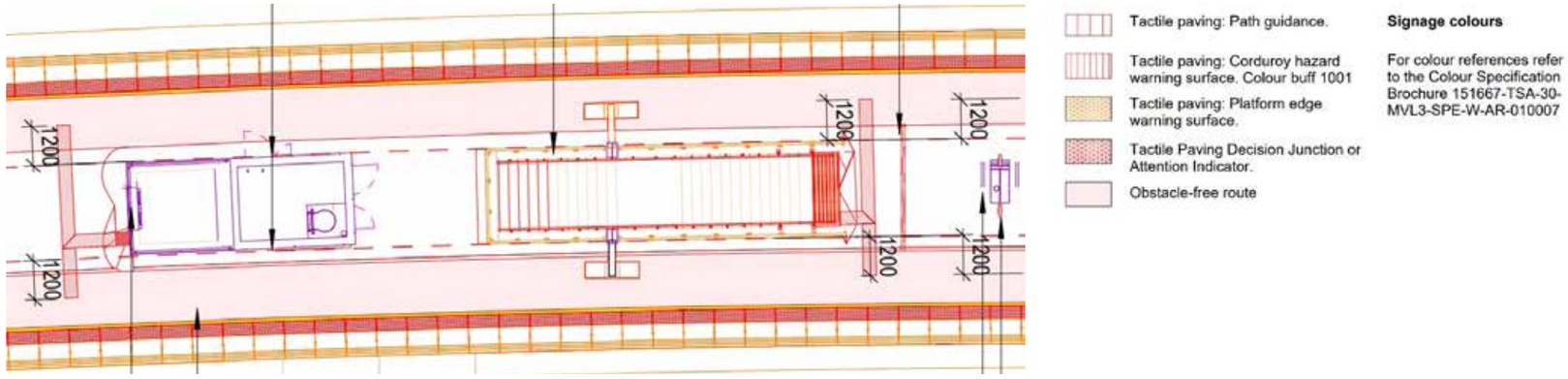


Figure 4.10c: signage and wayfinding

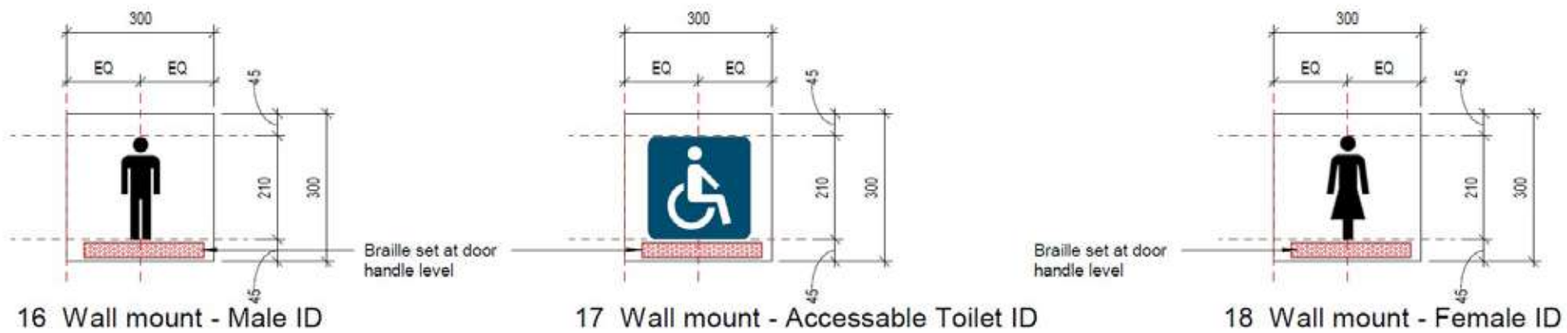


Figure 4.10d: wall mounted signage and braille

4.11 Overhead Line Equipment (OLE)

Section to be completed at a later CIMP Phase

Section 5
Access and Maintenance

05

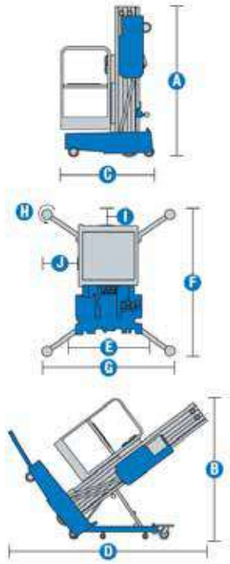
5.0 Access and Maintenance

The overall philosophy for the access and maintenance of the scheme, as mentioned in previous sections, is to minimise the visibility of walkways, ladders, steps over the roof, etc. This is reflected in different methods around the station such as positioning ladders accessing roofs B & C inside access rooms on the island platforms. Utilising subtle fall restraint systems and walkways, away from main views and edges of the roofs, hidden step overs and guardrails behind the main principle building, and centralising access ladders behind main columns reduce their visual impact on the station.

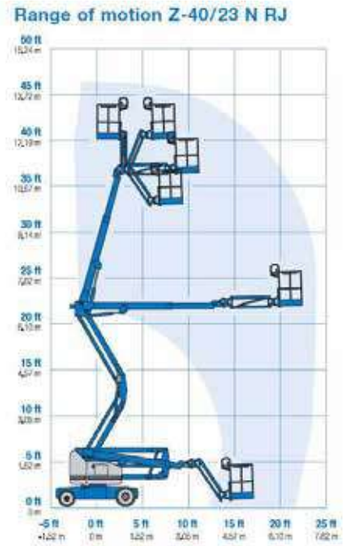
Models	AWP-40S US	AWP-40S METRIC
Measurements		
Working height max.[1]	46 ft 4 in	14.10 m
Platform height	40 ft 4 in	12.30 m
A Height - stowed (standard)	9 ft 1.5 in	2.78 m
B Height Tilted back[3] (standard)	6 ft 6 in	1.98 m
C Length - stowed (standard)	4 ft 8 in	1.42 m
D Length - tilted back[2]	9 ft 9 in	2.97 m
E Width	2 ft 5 in	0.74 m
Productivity		
Lift capacity	300 lb	136 kg
F G Outrigger footprint (l/w) (standard)	7 ft 5 in/6 ft 9 in	2.26/2.06 m
H Corner access[3] (standard)	2 ft 7 in	0.79 m
I J Wall access front/side (standard)	1 ft 3 in/2 ft 4 in	0.39/0.71 m
Standard platform dimensions (l/w/h)	27/26/44.75 in	0.69/0.66/1.14 m
Gated standard platform dimensions (l/w/h)	27/26/44.75 in	0.69/0.66/1.14 m
Gated narrow platform dimensions (l/w/h)	26/20/44.75 in	0.66/0.51/1.14 m
Weight and Floor Loading[4]		
AC models	1,040 lb	472 kg
DC models	1,130 lb	513 kg
Occupied floor pressure	0.20 psi	1.37 kPa

Power	
Power source - AC models	110V/50-60 Hz 220V/50-60 Hz
Power source - DC models	12V DC

Sound and Vibration Levels	
Sound Pressure level (ground workstation)	< 70 dBA
Sound Pressure level (platform workstation)	< 70 dBA
Vibrations	< 2.5 m/s²



AW-40S Specification



Z-40/23N RJ	
US	Metric
46 ft 5 in	14.32 m
40 ft 5 in	12.32 m
22 ft 8 in	6.91 m
21 ft 3 in	6.48 m
2 ft 6 in	0.76 m
3 ft 10 in	1.17 m
6 ft 6 in	1.98 m
21 ft 5 in	6.53 m
4 ft 11 in	1.50 m
6 ft 5 in	1.96 m
9.5 in	0.24 m

Models	
Measurements	
Working height max.[1]	
Platform height max.	
Horizontal reach max.	
Up and over clearance max.	
A Platform length	
B Platform width	
C Height - stowed	
D Length - stowed	
E Width	
F Wheelbase	
G Ground clearance - center	

Z-40/23RJ Specification

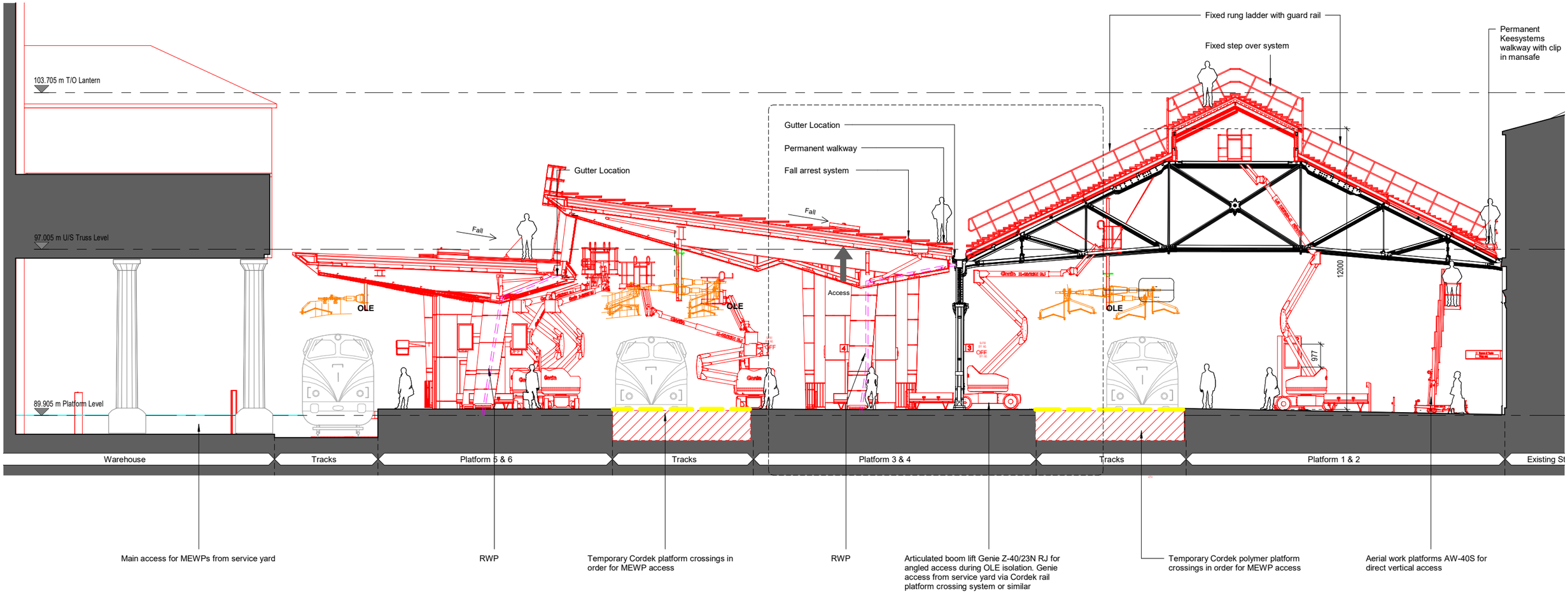


Figure 5.0a: Access and Maintenance Section

5.0 Access and Maintenance

Access and maintenance to be carried out during OLE isolation due to proximity to OLE. Access to areas over the canopies or under the main roofs would require either temporary elevated platforms, or Genie lifts to access. Areas under 12m can be cleaned via water pole from platform level.

Cordex platforms can be laid out temporarily for heavier machinery/ Genie lifts over tracks to give access between the island platforms in instances of repair or high level inspections during OLE isolation and outside hours of operation.

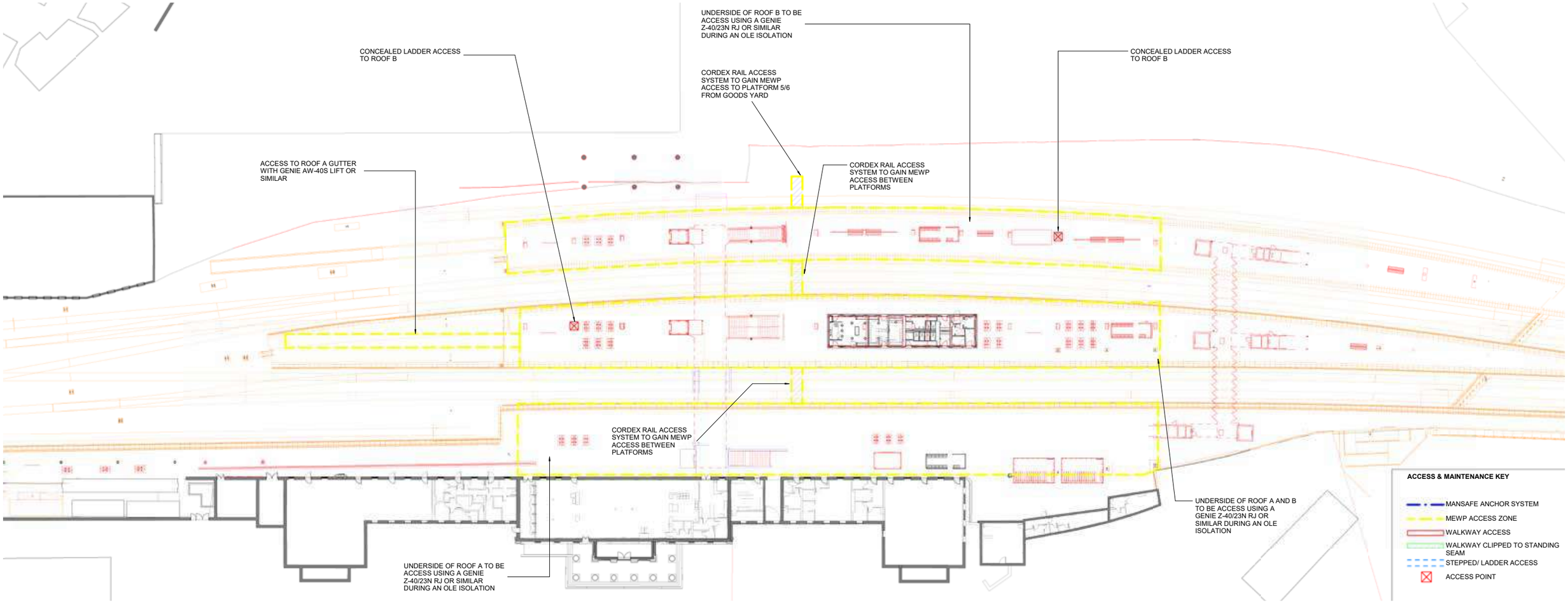


Figure 5.0b: Proposed Platform Access and Maintenance Plan

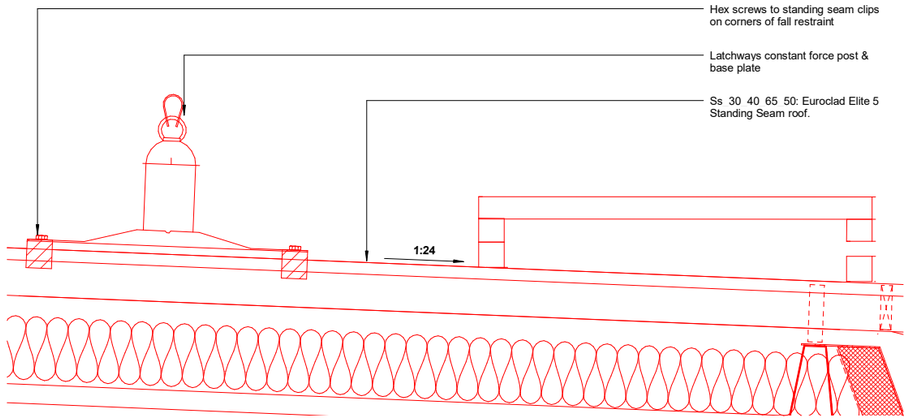


Figure 5.0c: Proposed Roof Access Walkway and Fall Restraint System

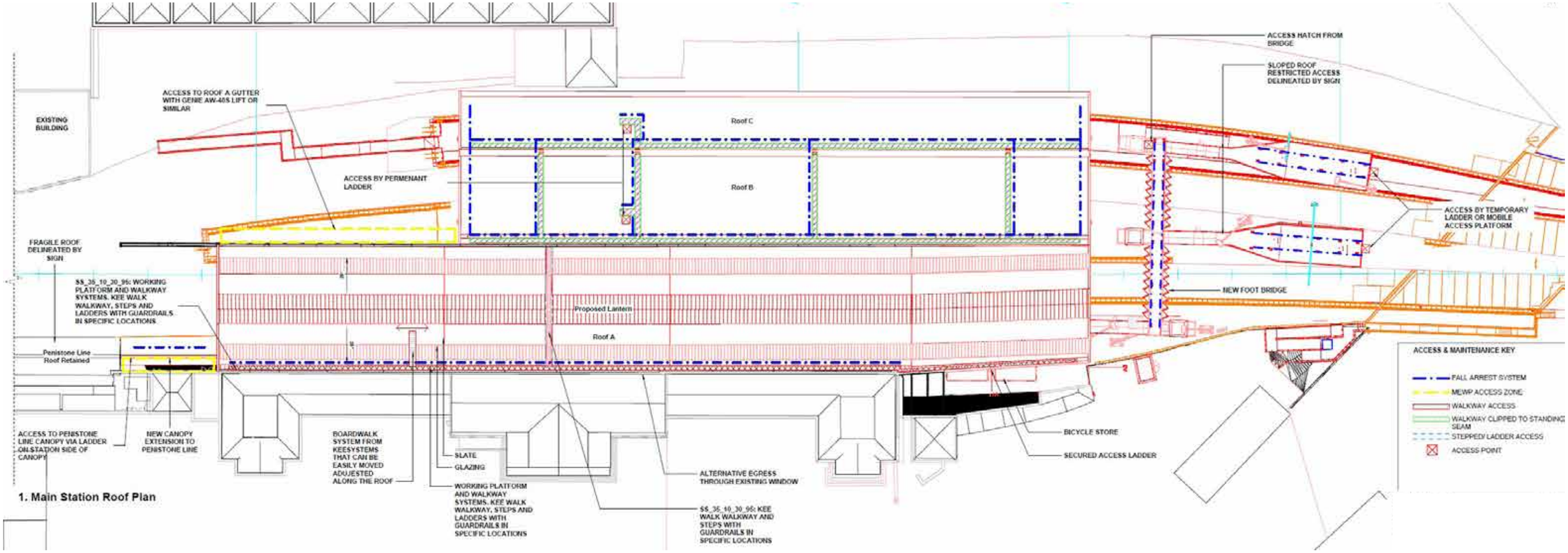


Figure 5.0d: Proposed Roof Access and Maintenance Plan

TRU WEST

Section 6
Huddersfield Viaduct

06

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6.0 Huddersfield Viaduct

Huddersfield Viaduct will be presented at a later CIMP phase.