Design Manual
NR/GN/CIV/200/07

NetworkRail

Footbridges & Subways

Image 0.1
Stratford Station footbridge

Document Verification

Verification

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Manual Structure and System

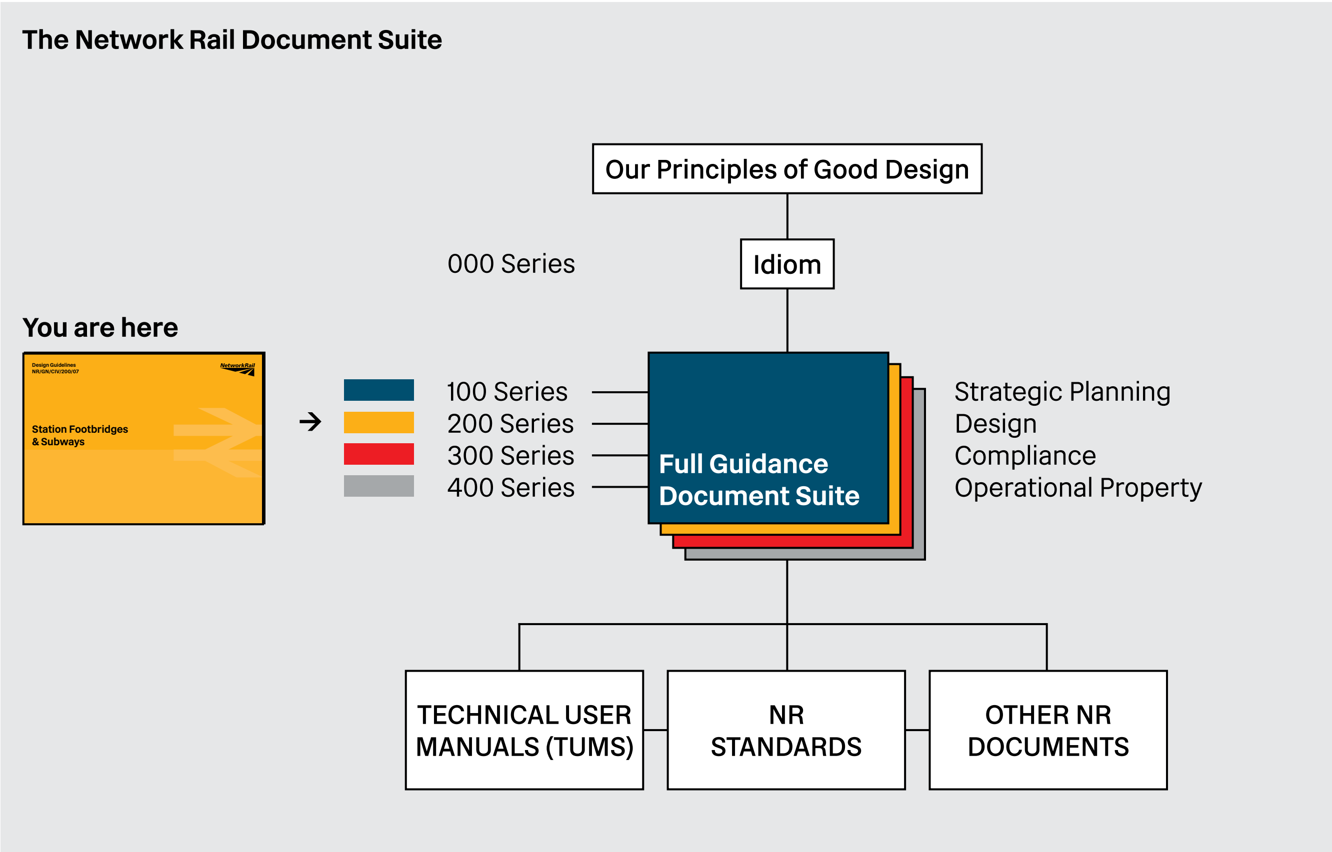


Image 0.2
Network Rail Document Suite Summary.

References
Throughout the Design Manual there are references to other relevant documents and standards which are important to the design.

A full list of relevant documents, and other guidance suite documents is contained in the appendix.

References to other documents

- Code of Practice Guidance
- National Standard
- Network Rail document
- European Standard

Example:

Standards Reference

Technical Specification for Interoperability: Accessibility for Persons with Reduced Mobility (2014)
NTSN PRM
Design of an accessible and inclusive built environment — Code of Practice (2018)
BS 8300

This guidance has a Network Rail standards Green status, and the contents do not require derogation

Contents

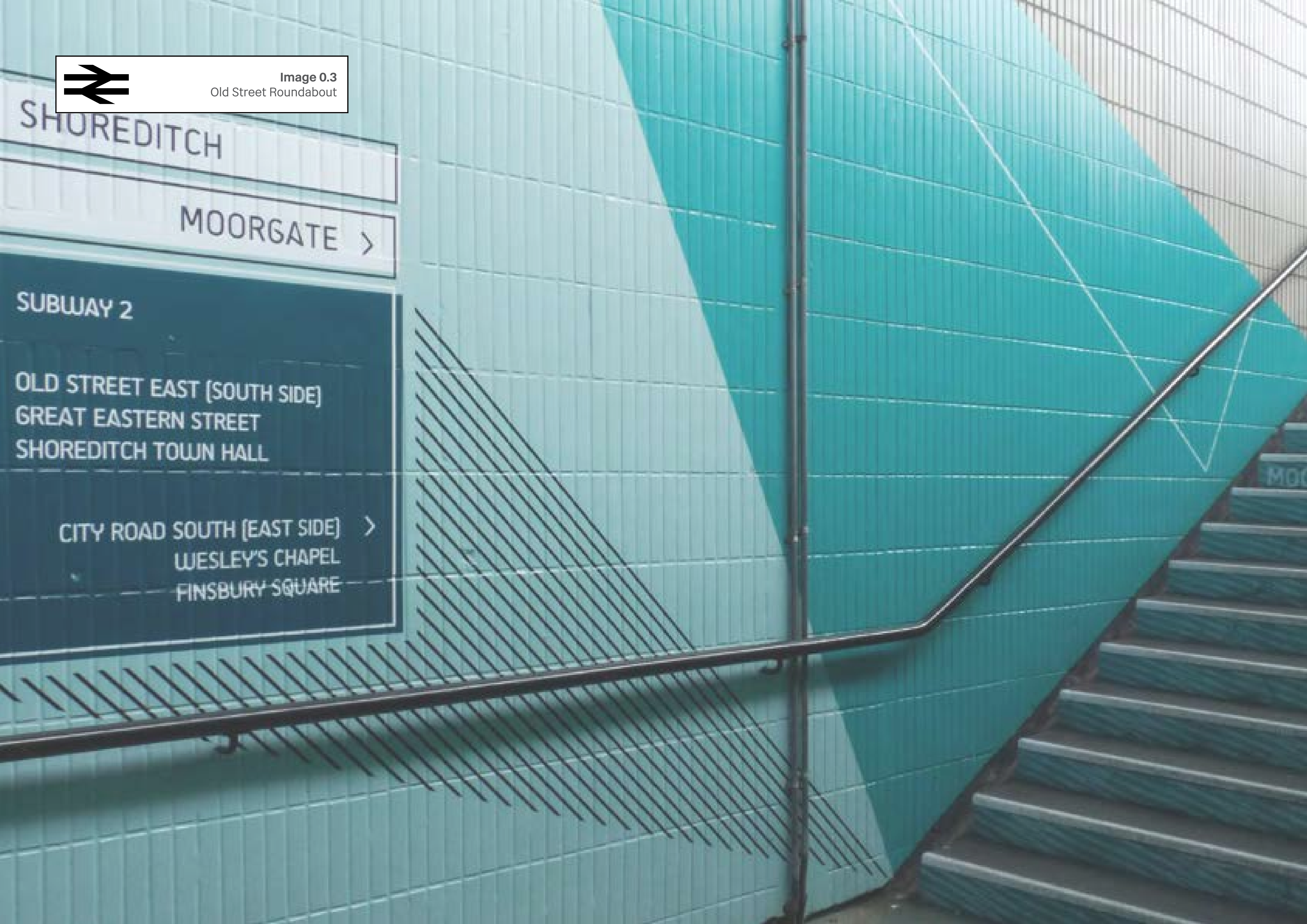


Image 0.3
Old Street Roundabout

Footbridges and Subways

How to use this document

Image 0.4
Station footbridge

How to use this document

Section Topics

1

Section 1
Footbridges or Subway:

Identifies whether you should choose a footbridge or subway solution.

2

Section 2
Standard or Bespoke Footbridge:

Guides you through the considerations that determine whether you can choose a standard footbridge or whether you should work with a bespoke solution.

3

Section 3
Standard Footbridge Design:

Explains the difference between footbridges in stations and footbridges outside station areas.

4

Section 4
Standard Footbridge Design Station Environment:

Describes the different standard footbridges for station environments and compares them based on functionality, cost and sustainability.

5

Section 5
Standard Footbridge Design Non-Station Environment:

Describes the different standard footbridges for non-station environments and compares them based on functionality, cost and sustainability.

6

Section 6
Bespoke Footbridge Considerations:

Sets out key considerations for planning a footbridge, including context and consents, security, electrical clearance, avoiding glare and whole life design, innovation and lighting.

7

Section 7
Bespoke Footbridge Design:

Provides detail on suitable choices of materials and on each element of a footbridge, in order to create successful and compliant designs.

8

Section 8
Subway Considerations:

Covers specific concerns for subways, such as lighting and space, security and challenges faced by existing subways. Features examples of improvement carried out to existing subways.

9

Section 9
Subway Design:

Provides detail on subway finishes and cladding systems, and on overcoming challenges of water management and services and containment.

A

Appendices

- → Glossary
- → Relevant Standards and Guidance
- → Footbridge Summary of Requirements
- → Roof Cover Assessment Aid
- → Lift Requirement Assessment Aid
- → Comparison of Standard Footbridge Designs
- → Sustainability
- → Capital Cost
- → Acknowledgements

Purpose and Scope

Welcome to the Design Manual for Footbridges & Subways.

This manual guides you to the most appropriate solution for your project.

Purpose

Nearly all railway stations have to provide access for passengers across the railway line, in most cases via footbridges or subways. This guidance document sets out the principles and considerations for all new footbridges and subways and helps you in the selection of the best solution for your project.

Network Rail commissioned standard footbridge designs, and these should be the first options when considering a new footbridge. This guidance sets out the principles for these designs, and identifies the overall criteria when a bespoke approach may be more appropriate.

This document also explains the challenges faced when working with existing live infrastructure, or upgrading an existing structure. Many existing subways are poorly illuminated and inadequate, with issues such as water ingress. This document advises on how these can be invigorated and made more user friendly.

Guidance is also provided on how to create a new subway, and why subways can often provide greater benefits than footbridges.

The guidance refers to a range of Network Rail and external standards that can help the user with their project. A summary of Footbridge Requirements is provided in Appendix B, and it also contains assessment criteria for establishing whether footbridges require dispensation from Roof Cover and whether Lift provision can be dispensed with, in certain locations. Appendix D and E provide a breakdown of Carbon calculations and Capital cost for the standard footbridge designs.

Scope

This document covers primarily footbridges and subways for station environments but includes also a section on standard designs of footbridges for non-station environments. It is intended for projects at the initial stages of the design or of the project-requirements definition.

Manual Tools

Helping guide
This figure appears when there are special points of attention. The figure also appears when it is possible to make a selection that leads to other areas of the manual via interactive buttons. The figure can also pose questions that should be given special attention.

3

Introducing the “Process bar”
Throughout the Design Manual starting from Section 1, this process bar indicates the position in the decision process. The process bar follows the flow of the navigation structure diagram on page 14 - image 0.4.

"Home Button"
If you need to return to the table of contents, you can always tap the logo in the top right hand corner of the document.

“Go to Button”
This button leads to the next part of the process. Typically via an active link that automatically directs to the relevant section.

A helping guide through the manual
This Design Manual describes the process, following the SPEED principles, from the initial considerations to a final decision on the most suitable solution for a specific project. To make the process as quick as possible and create a good overview, several tools have been introduced and explained on this page. The tools consist of graphic elements that either describe the next step or have an interactive function.

Introducing the helping guide
The helping guide offers input with the questions raised in the manual. Not all questions may be equally relevant to all projects.

The manual links
The Design Manual actively uses live links that help the reader to the right section. The links often appear at the end of a section when a conclusion to a question has been drawn.

Overall Considerations

When you start the work there are some questions you should consider before choosing the most appropriate solution.

The following pages outline these considerations.

Considerations

It can often be tempting to focus on the cheapest and quickest solution for the construction of a particular project. However, it may turn out that the project is overtaken by increased operation and maintenance time, leading to extra costs. In addition, having a too narrow focus can overlook many important considerations, such as the exclusion of some user groups, the visual impact on the area where the project is located, or negative environmental impacts over the lifetime of the project.

To achieve the best possible solution it is important to take a holistic view of the project.

Defining the project success criteria early in the process and understanding the needs of the users is important for the viability of the project.

The overall considerations presented in this manual fall within the frame of the term 'Minimal Viable Product'. This term aims to achieve the right balance between all the value drivers of a project. It can be a good idea to consider which are the key value drivers in the early stages of the design process. On the following pages seven overall considerations are presented – they can form the basis of an early-stage dialogue about value drivers. They are; Context - Passenger Experience – Safety – Maintenance – Buildability – Cost – Sustainability.

Overall Considerations

Passenger experience
Clear wayfinding and accessibility for all should be a high priority. Remember to include people with mobility challenges.

Safety
A solution that makes the user feel safe is essential in creating a high quality railway environment and is likely to attract more passengers.

Context
The design, the choice of materials and the functionality are key aesthetic considerations in developing a new space. Sometimes adapting to the surroundings by mimicking existing building techniques may be the most appropriate approach and sometimes radically different solutions are needed.

Buildability
Optimised construction time saves the project a lot of money and minimises inconvenience for both staff and passengers.

Overall Considerations

Maintenance
A well-maintained environment is an essential part of the user experience, but also affects the cost over time. These factors should be considered when choosing a future solution.

Cost
Cheapest isn't always best, especially in the long run. Often, the overall cost can be influenced by many factors including: passenger experience, operations, sustainability and buildability.
A holistic approach to the various solutions often pays off.

Sustainability
Station and railway environments offer at times harsh conditions and design should be able to withstand the impact over time. Some design solutions may have low carbon impact when constructed but require frequent maintenance and replacement, while others may be built with materials that require minimal maintenance. Impact on carbon emissions should be considered both for construction and for the lifetime of the design.

How to use this document
Navigation Structure

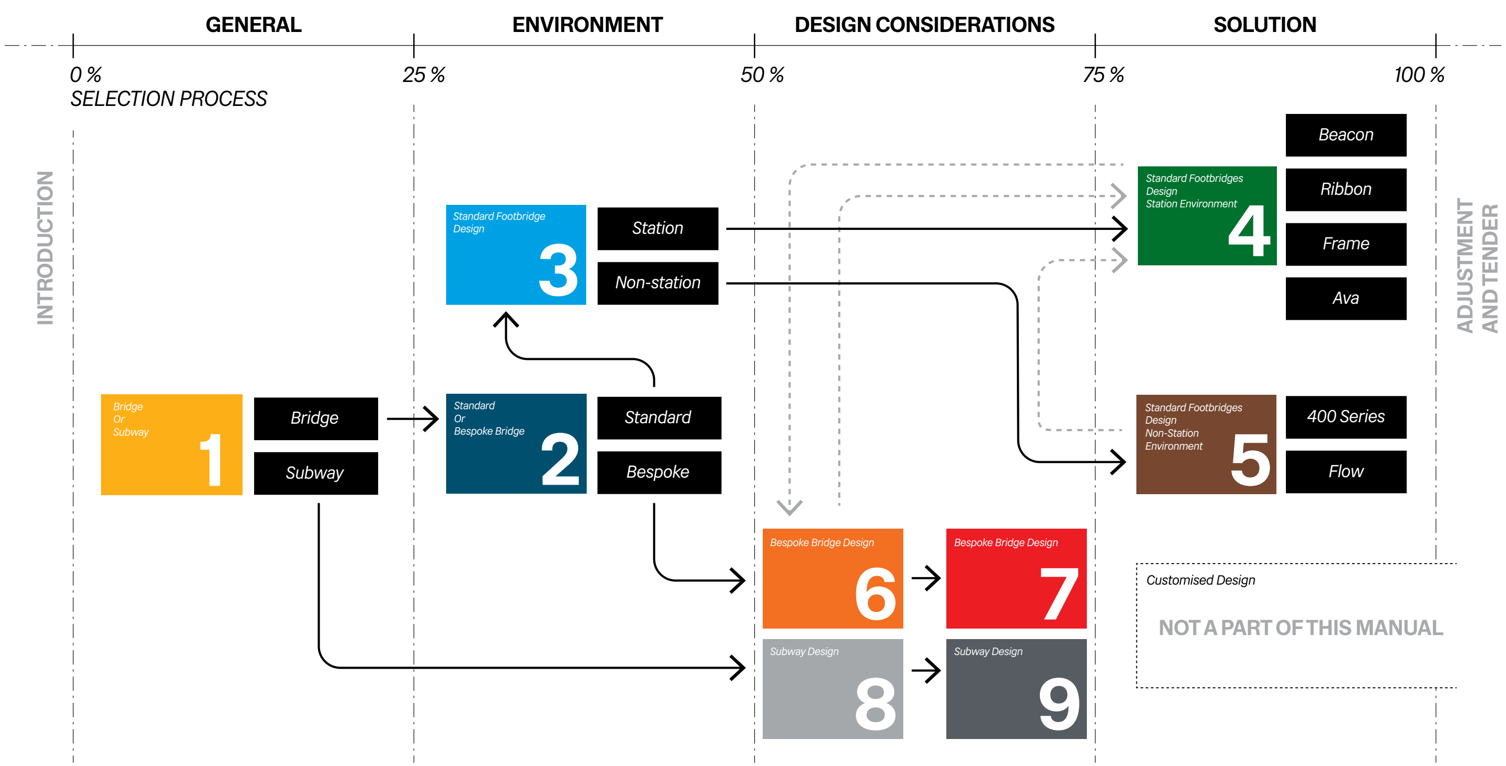


Image 0.5
Introducing the "Navigation structure"
Some choices lead to a final solution, other choices lead to a longer process where the manual's guidelines should be considered as part of a design project. For the solution that ends up being the most relevant, there is likely to be a subsequent process of customising the project and later tendering it to a contractor.

Understand the Manual Navigation structure

This manual is organised according to the navigation structure shown in this page.

The structure guides the reader through a series of questions and important considerations, allowing the reader to only focus on the content that relates specifically to a given project.

The entire manual and its sections follow this structure. Throughout the manual, the reader will be guided through the process, which consists of four categories.
General - Environment - Design Considerations - Solution.

At the end, the reader should know whether to select a bridge or a subway, if the bridge should be one of the standards or a bespoke solution may be necessary.

Image 0.6
Footbridge under construction

Footbridges and Subways

Footbridge or Subway

1

1.1 Introduction

In this section, you need to decide if the connection you are working on should be above or below the railway tracks.

1.1.1 Choosing a footbridge or a subway solution

This section will introduce several different contextual situations and help guide the decision for choosing a footbridge solution or a subway solution. The opportunities or constraints in the surrounding environment are often important parameters when deciding on the right solution.

1.1.2 General considerations

The main function of a footbridge or a subway should be to provide passengers with an accessible connection to the station platforms. However, it can always be valuable to analyse the context and explore whether the new connection can offer additional users a new passageway, for example between two neighbourhoods.

If there is sufficient space, a subway solution can provide the residents of an urban area with a new type of accessible connection potentially minimising the barrier effect created by the railway for example by having a sloping terrain. A footbridge can offer similar possibilities for improved connectivity beyond the realm of the station - as well as being an attractive landmark element. It is always a good idea to go into dialogue with local stakeholders, such as local authorities. Through a strategic collaboration with communities there is a potential for creating a synergy, fulfilling the needs for good access to station platforms as well as supporting cohesive urban development.

Simple flow and good accessibility can be provided through thoughtful consideration of the existing functions and surroundings.

Technical aspects such as ground conditions and geotechnical constraints should always be considered when choosing to create a subway or a footbridge.

If a new subway expansion for an existing structure is being explored it is important to identify the potential risks. A structure underneath a live rail track will require careful consideration of the construction possibilities and constraints. Subways offer many advantages over footbridges, such as the potential for reduced vertical travel distance, less interface with the live railway and minimal visual impact.

1.2 Context Considerations

Which of these six landscape scenarios are most similar to your project? And should you choose a footbridge or a subway for your project?

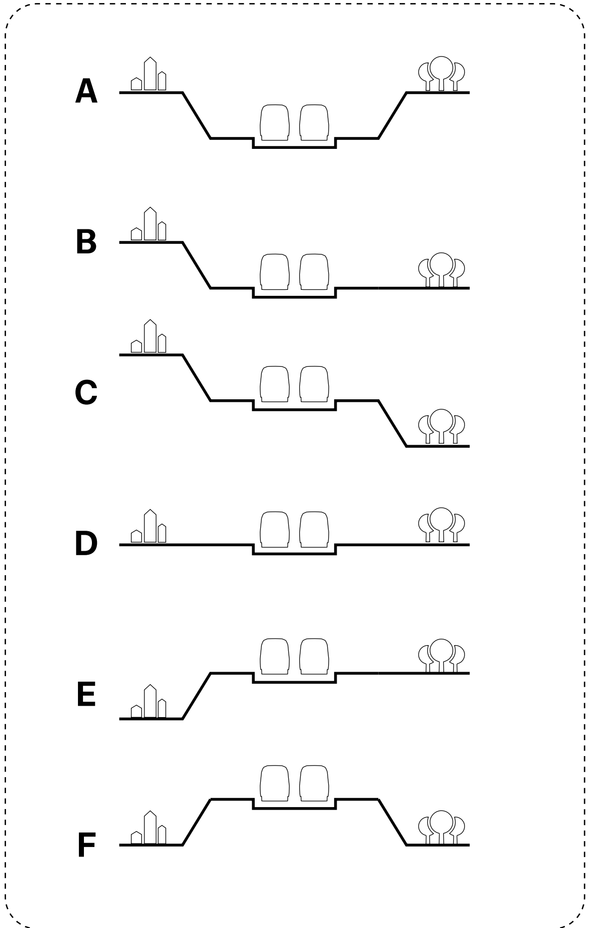


Image 1.1
Examples of variations based on local topography.

Context assumptions
The six scenarios outline different generic types of surroundings along a railway track. Although generic, they encompass most possible situations at an overall level. The following page describes the ways in which a footbridge or a subway can be integrated in these scenarios and identify the most appropriate solution.

The diagrams are sorted from A to F. Scenario A is likely to lead to the choice of a footbridge, while Scenario F points to a subway solution. However, several factors apply, which is why this is only indicative. In addition, it is important to consider the site constraints. Is there enough space to construct a subway or are the adjacent areas densely built up?

Finally, you can skip to the section that best suits your connection: a footbridge or a subway solution.

Footbridge or Subway

1.2 Context Considerations

Scenario A - Valley shape
In this scenario the most obvious solution may likely be a bridge as it provides the shortest connection.

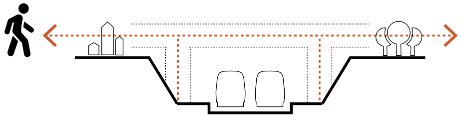


Image 1.2
Context Scenario A

Scenario B - Single sloped
For this scenario the most obvious solution may likely be a bridge as it provides the shortest connection. However, the potential to integrate improved connectivity between the surrounding areas may be important to consider.

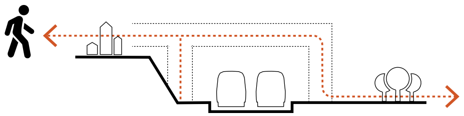


Image 1.3
Context Scenario B

Scenario C - Double sloped
In this scenario the length of the connection is possibly very similar below or above ground and it may be important to look at other factors such as buildability and visual impact. From the right the connection via a subway may be the shortest, but from the left the footbridge solution may be shorter. The primary flow of passengers may therefore be important to consider.

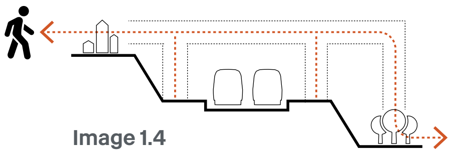


Image 1.4
Context Scenario C

Scenario D - Flat shape
The length of the pedestrian connection can be very similar in this scenario so it may be important to look at other factors such as buildability and visual impact.

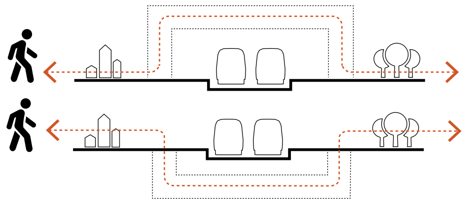


Image 1.5
Context Scenario D

Scenario E - Single embankment
The length of the connection is likely to be shorter when choosing a subway solution. The topography could offer an opportunity to give the surrounding urban areas a connection beyond the station. Geotechnical constraints and buildability would still need to be investigated. The primary flow of passengers should also be considered as the distance to the platform when arriving from the right hand side is very similar for both solutions.

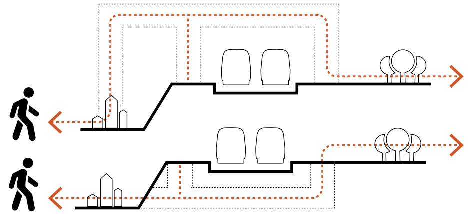


Image 1.6
Context Scenario E

Scenario F - Double embankment
The length of the connection is likely to be significantly shorter when choosing a subway solution. The topography could offer an opportunity to provide the surrounding urban areas a connection beyond the station. Geotechnical constraints and buildability would still need to be investigated.

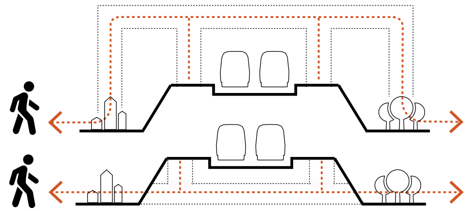


Image 1.7
Context Scenario F

Footbridge or Subway

1.3 Next Step

Image 1.8
A fully glazed and covered footbridge

Image 1.9
An open station footbridge

Image 1.10
A subway with integrated artwork

Image 1.11
A modest subway

If you want to continue working on a bridge solution, continue to section 2. 2

If you want to continue working with a subway solution, continue to section 8. 8

Image 1.12
Footbridge under construction

Footbridges and Subways

Standard or Bespoke Footbridge

2

2.1 Introduction

You should now decide if you can use one of the standard footbridge designs or if you need to develop a new footbridge bespoke solution.

2.1.1 Standard or Bespoke footbridge
Network Rail has developed four new standard footbridge designs for a station environment. Additionally, there are two standard designs for footbridges outside a station environment. The standard designs are all approved by Network Rail and the Principles of Good Design.

Whether using a standard footbridge design or proceeding with a bespoke solution always keep in mind that a bridge is more than just a functional element – it connects people and communities and should offer a sense of identity and placemaking in a station environment.

For further information on the standard footbridges beyond this manual, refer to **Appendix A** for links to additional materials concerning each of the standard footbridges.

2.2 Discontinued Station Footbridge Designs

Image 2.1
Vierendeel version of the 700 series at New Eltham (2014).

Image 2.2
700 series at West Calder (2017).

Image 2.3
Vierendeel version of the 700 series at Elgin (2017).

2.2.1 Background information

In recent years, the quality of the footbridges delivered on the UK railways has degraded. In recognition of the fact that the 400 series Standard Designs are not suitable for a station environment, modifications of it have been developed on an ad-hoc basis resulting in the 700 series and variations of it using Vierendeel structures. These were never recognised as Standard Designs with the exception of the 700 series. This resulted in reputational damage to Network Rail that was not seen to be promoting station footbridges that had the customer and stakeholder experience as an important priority. For this reason, Network Rail removed the 700 series from its portfolio of Standard Designs for station in 2019 and embarked on the development of the footbridge designs described in this document.

It should be noted that the discarded designs described on this page do not meet the Minimum Viable Product criteria and for this reason should not be considered as viable alternatives to the current Standard Designs. If a project decides it has good reason to embark on a bespoke design, it should establish valid reasons (to be submitted as a derogation under standard NR/L2/CIV/151 Application of Standard Designs and Details for Building and Civil Engineering Works) and develop its architectural and engineering design according to the principles described in Section 4, in close coordination with the Technical Authority.

Standards Reference

Technical User Manual for Railway Footbridges in Stations
NR/ CIV/SD/TUM/4000

Image 2.4
Covered stairs, Reading Station

2.3 Criteria for Bespoke Footbridge Design

2.3.1 When using the standard footbridge is not an option
The standard footbridge designs should be used for the majority of new footbridge installations.

However, in some scenarios they may not be the preferred option.

To the right are some examples of situations where a bespoke design might be appropriate.

Where a standard design is not used a dispensation is required from Head of Buildings and Architecture of NR Technical Authority.

01 Larger stations

A station with more than four platforms.

02 Interfacing with existing structure

The new footbridge connects into an existing footbridge or concourse.

03 As part of a listed station

Generally, the standard footbridge designs would be suitable, however in some circumstances they may not offer sufficient design and materiality flexibility, or the footbridge may have a visual impact on the existing listed elements.

04 Internal footbridge

Where footbridges are internal, for example within a glazed trainshed, the open variants of the standard footbridges could be used, but a bespoke design may be more effective.

05 Upgrading a footbridge

Many scenarios could involve upgrading and providing step free access to an existing footbridge. Note: If the bridge is very old and beyond repair it might be a better solution to build a new standard bridge.

06 Site specific requirements

Certain stations can not accommodate the standard designs as they exceed the parameters of the standard designs, for example by requiring longer spans across the track, or by having spatial constraints that prevent the standard designs from being incorporated.

07 A Public right of way exists

In locations with a public right of way across the station footbridge a bespoke design or modification of the standard designs is required.

These topics should help you choose if you want to continue with a standard bridge design or if it is necessary to develop a new bespoke solution.

Standard bridge 3

Bespoke solution 6

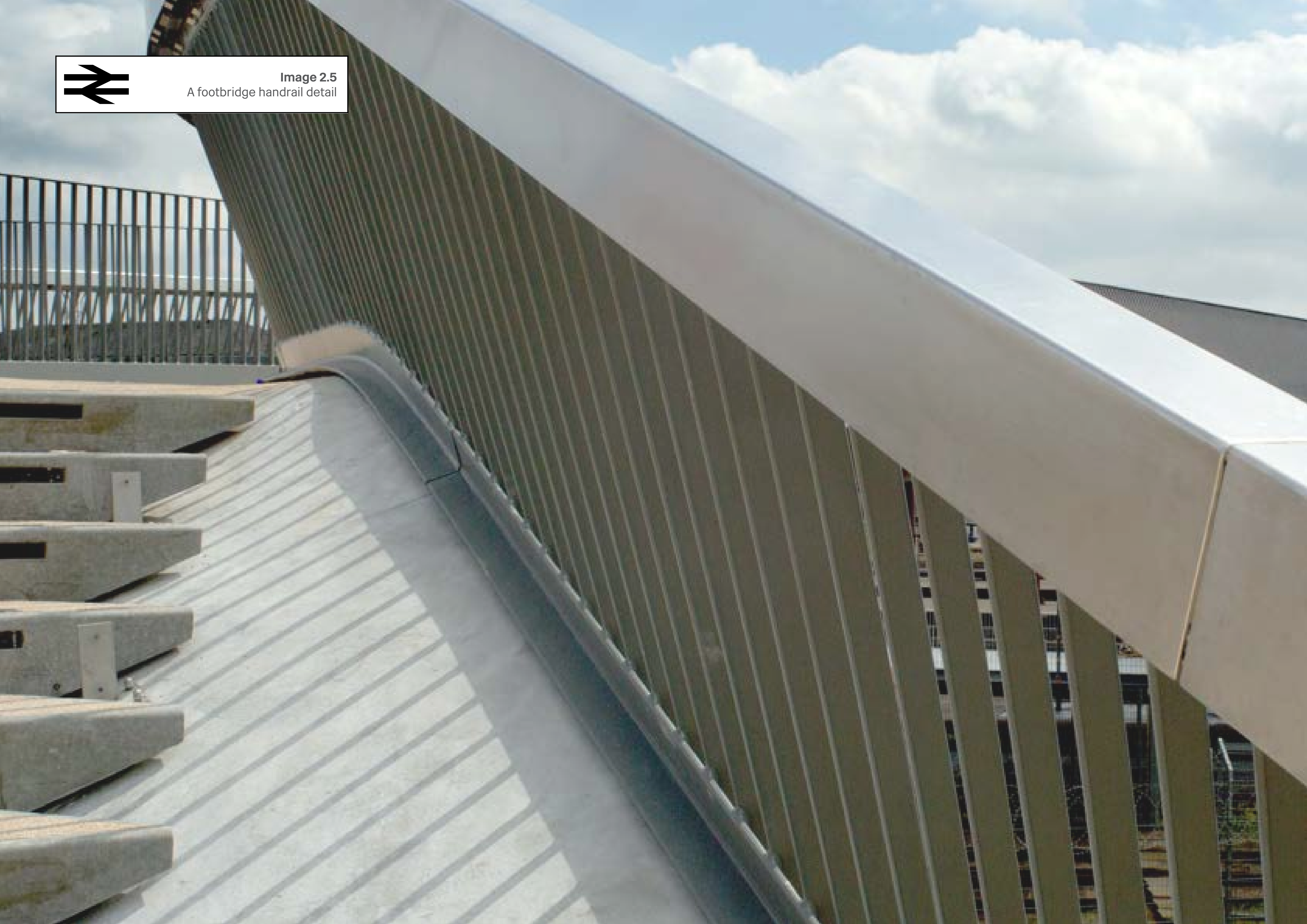


Image 2.5
A footbridge handrail detail

Footbridges and Subways

Standard Footbridge Design

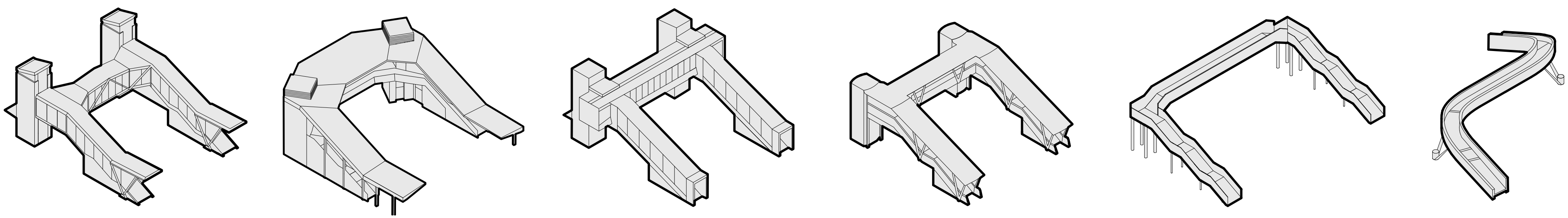
3

3.1 Introduction

Congratulations, you are about to choose one of the six Standard Footbridge Designs!

3.1.1 Standard footbridge designs
In this chapter the standard footbridge designs are introduced. Currently, the catalogue of standard footbridges consist of six different designs: Beacon, Ribbon, Frame, AVA, 400-series and Flow. Below, the different designs are shown in a diagram, and on the next page there are photos and illustrations. Additional information on the designs is provided later in this Design Manual.

Selecting a standard footbridge design is the first step towards a footbridge solution that is perfectly suited to a particular station or non-station situation.



Beacon Ribbon Frame AVA 400-series Flow

3.1 Introduction

Image 3.1
Beacon standard footbridge design in a covered version.

Image 3.2
Ribbon standard footbridge design in a covered version.

Image 3.3
Frame standard footbridge design in a covered version.

Image 3.4
AVA footbridge design in a covered version.

Image 3.5
400-series standard footbridge design.

Image 3.6
Flow footbridge design.

Standard Footbridge Design

3.1 Introduction

3.1.2 Standard footbridges for different locations

The standard footbridges can be used in two different railway environments: In a station environment or in a non-station railway environment.

A station footbridge is most likely to have lifts and to be covered, unless it has a dispensation. A standard footbridge in a non-station environment is more likely not to have lifts and not to be covered.

A standard footbridge design will most likely need to be adapted to the local situation. This could be the span of the bridge, stair directions or more.

3.1.3 Status of the standard footbridges

In a station environment four of the standard designs can be used, but it is only Beacon, Ribbon and Frame that currently have the status as standards, that have gone through the full design development process. The AVA design is emerging and does not yet have status as a standard.

In a non-station environment, the 400-series and Flow can be used, but currently it is only the 400-series that has the status as a standard design. Beacon, Ribbon, Frame and AVA can all also be used in non-station environments.

Is the location of the Standard Footbridge Design at a station?

YES *Then go to Section* 4

NO *Then go to Section* 5

	Beacon	Ribbon	Frame	AVA	400-series	Flow
Station environments						
Standard	X	X	X			
Not an official status as a standard yet				X		
Non-station environments						
Standard					X	
Not an official status as a standard yet						X
Also possible	X	X	X	X		

Table 3.1
Location and status of the standard footbridge designs.

Image 3.7
AVA footbridge design
in a covered version.

Footbridges and Subways
Standard Footbridge Design
Station Environment

4

Image 4.1
Frame standard footbridge design

4.1 Introduction

4.1.1 Prerequisites for the standard station bridges

All standard footbridges have lifts, roof and OHLE-protection. They all live up to 'Principles of Good Design' and have been assessed by the Design Council. Equally, all the designs live up to the criteria for Minimal Viable Products.

The reason for having four different bridge designs is for sponsors, stakeholders, and other involved parties to be able to select a bridge design which fits well into the local setting and meets specific local needs.

This chapter is an introduction to the four standard footbridges for station environments and includes a comparison, based on qualitative, functional parameters as well as cost and sustainability.

For further information on each of the standard footbridges beyond this manual, refer to **Appendix A** for links to additional material.

4.1.2 Span width

All four standard footbridge designs in a station environment are designed for a span width of 20 meters, which means they can span from platform to platform across 1 or 2 railway tracks.

In situations where the span is a little more than 20 meters it might be possible to use the standard designs in a bespoke version. It will require additional design changes to increase the span width to more than 20 meters, but it is worth doing these studies instead of immediately starting a new bespoke design from scratch.

In situations where the span is across 3 or more tracks a bespoke design solution will have to be chosen. Further information about bespoke bridge designs is described in section 6.

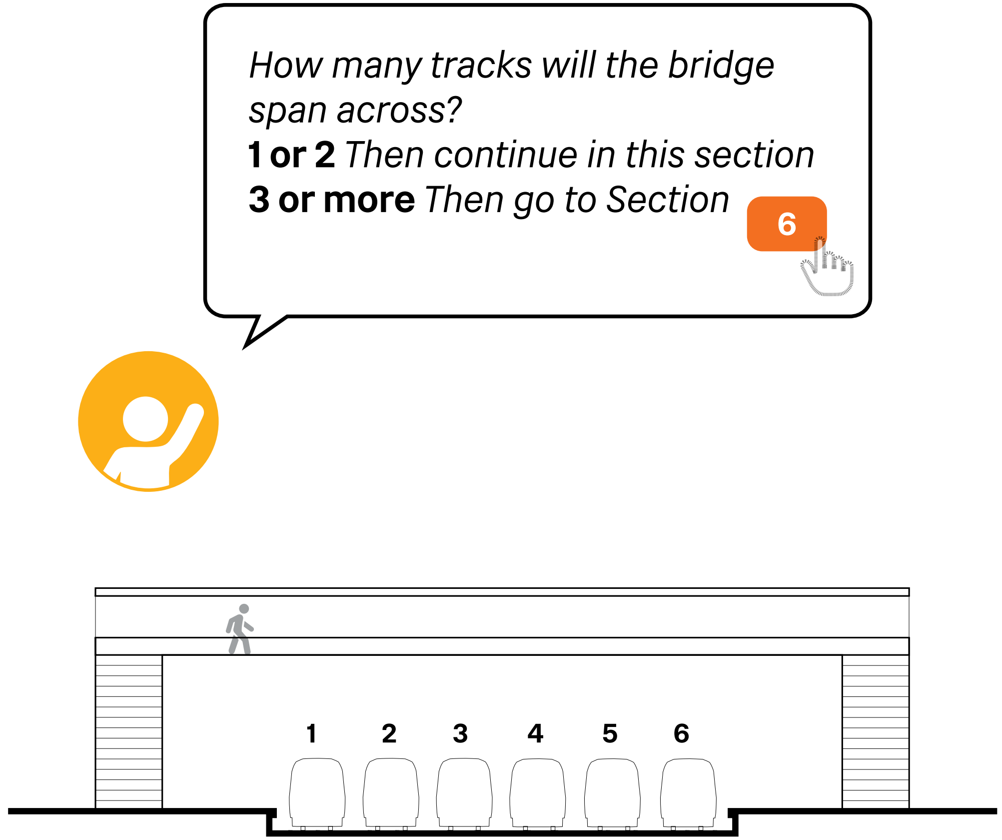
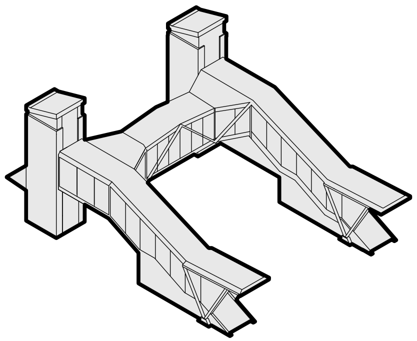


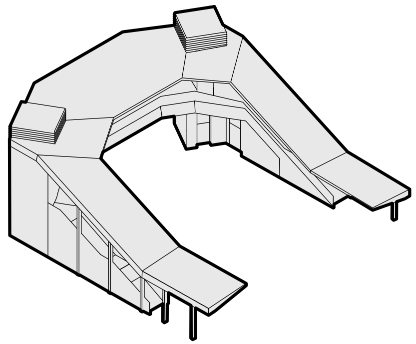
Image 4.2
Span width - How many tracks will the bridge span across?

4.1 Introduction

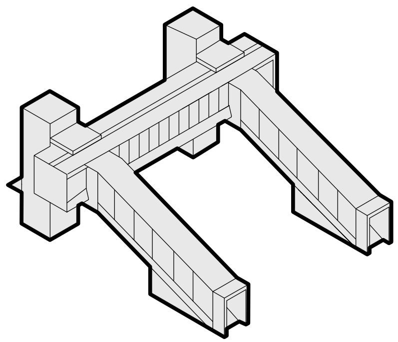
On the following pages the 4 Standard Footbridge Designs at stations will be described.



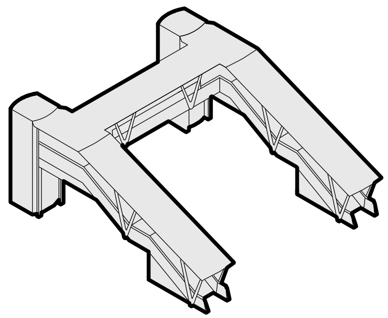
Beacon



Ribbon



Frame



AVA

4.1 Introduction

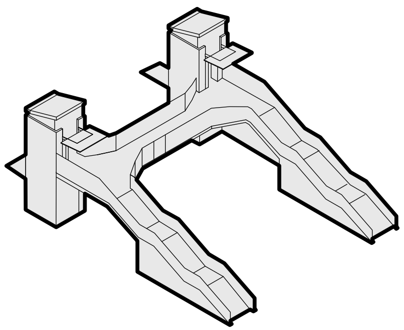
Remember that all 4 designs come in a covered and an open version.

4.1.3 Open alternatives to covered designs
All four standard designs are available in both covered and open versions. There may be several reasons for choosing an open bridge design, but an aid to making this decision can be used via this Design Manual's roof cover assessment aid in Appendix B.

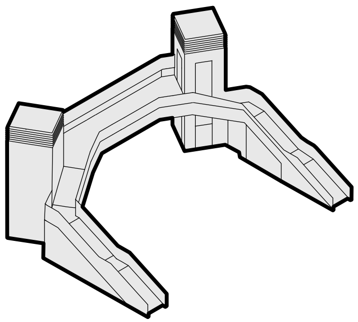
Below is a diagrammatic representation of the bridge designs. Functionally, they are largely identical in the covered versions, but the primary consequence of not having a roof is the reduced weather protection.

Uncovered designs are slightly cheaper than covered footbridges, but can result in higher maintenance costs for the steel structure. They are probably more suitable for locations where a discreet visual impact is important or in smaller stations with low footfall.

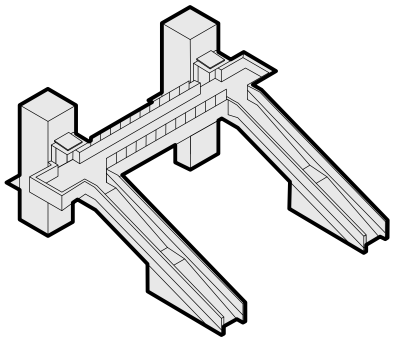
For further guidance regarding Roof Cover Assessment Aid refer **Appendix B.** Here you can also find examples of how the aid is used.



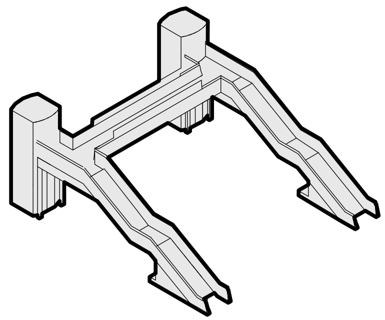
Beacon open version.



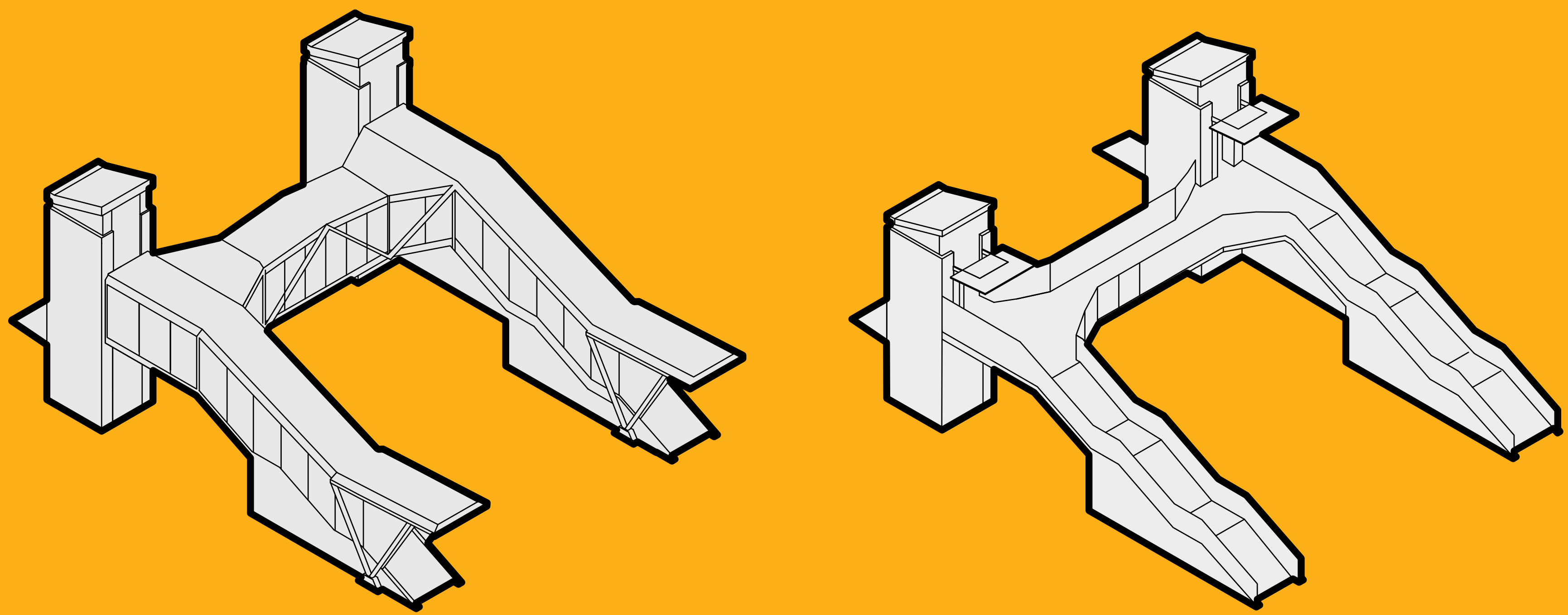
Ribbon open version.



Frame open version.



AVA open version.



Beacon

4.2 Beacon

Image 4.3
Beacon in a covered standard version stands out with its fully glazed sides on bridge and stairs.

4.2.1 Introduction

The Beacon design is characterised by a high degree of enclosure and transparency. It is aimed primarily at smaller local and commuter stations.

The lift towers supporting the minimal steel structure are emphasised and illuminated internally as beacons. This is a very modern interpretation of the traditional railway footbridge expressing structural elegance.

Local variations are restricted to the choice of cladding for the lift towers and the lift motor rooms below the stairs.

This bridge is suitable for spans of up to 20m, and it is easily adaptable for locations with multiple spans or staggered platforms, maximising potential use.

The generic design is by Haskoll and Davies Maguire.

Info
→ First bridge expected to open April 2024 at Garforth Station, West Yorkshire.
Key features
→ It is visually easily recognisable.
→ Fully glazed for maximum visibility and passenger safety.
→ Glazing can be opened to allow cleaning from the inside.

Table 4.1
Info and key features

4.2 Beacon

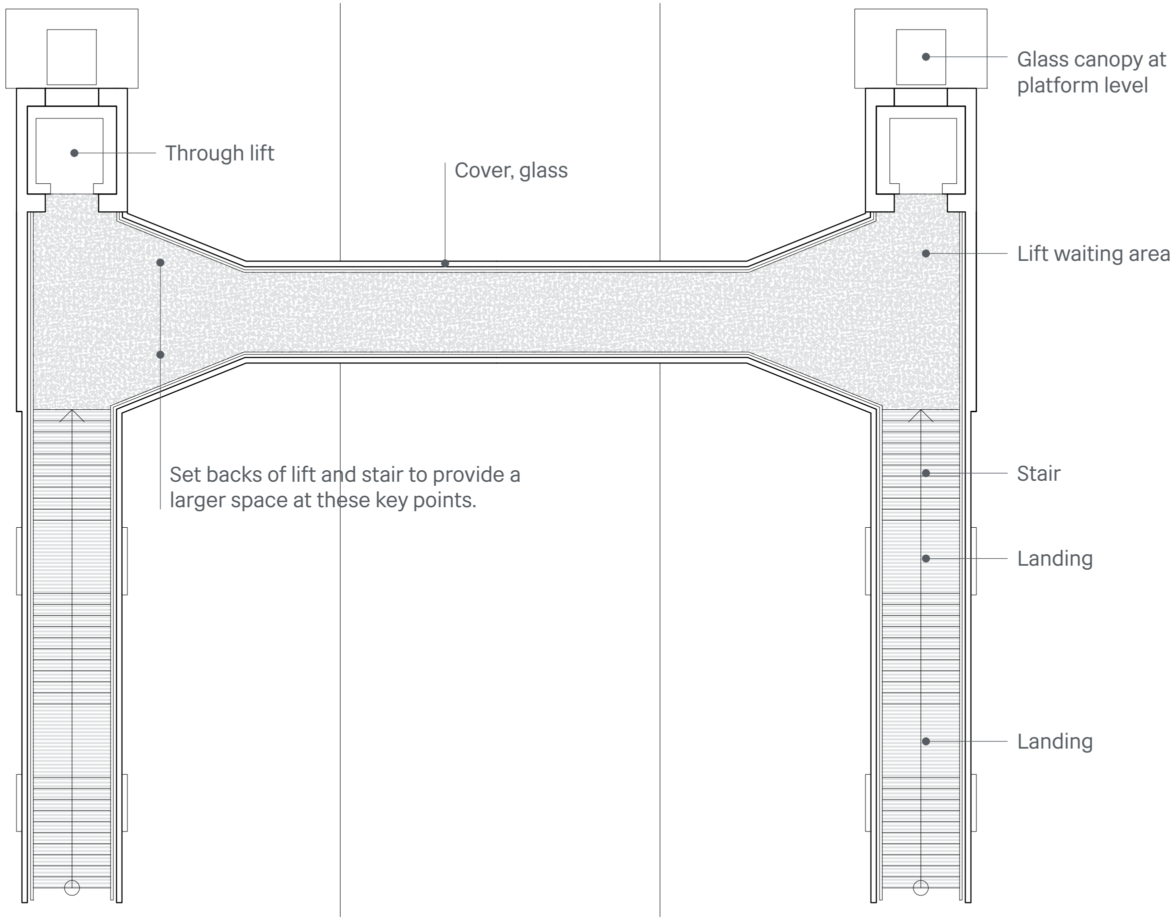


Image 4.4
Plan layout of Beacon standard version (open and covered), 1:200

Bridge	Standard version	Variations
Maximum span width	20.0 m*	Less than 20.0 m
Deck width	2.4 m	3.2 and 4.0 m
Stair		
Width	2.4 m	N/A
Landings	2	3+
Adjustable orientation	Yes	Yes
Lift		
Capacity	18 persons	26 persons
Land take per platform		
Area	26.8 x 3.1 m ($83 m^2$)	-

Table 4.2
Main key facts

The Beacon footbridge design comes in variations for site specific adaption and requirements.
*The maximum span is 20 m in the standard version but longer spans might be feasible in a bespoke version of the design.

4.2 Beacon

Image 4.5
Visualisation of the Beacon footbridge. Fully glazed for maximum visibility and with solid brick basis in technical rooms and lifts.

4.2 Beacon

4.2.2 Overview

As the bridge span of the Beacon is covered in glass from floor to ceiling, it is the most transparent of the standard bridges. Overall, it is a bridge with a lot of glass, which is good for visibility and outlook, but also demanding in terms of cleaning and possible replacement of broken glass sheets, as the panes are of many different shapes.

The glass extends to the underside of the soffit, which provides good protection from rain and wind.

Beacon can reflect the local conditions at the stations, as it provides option to use a variety of materials for the cladding. The detailing potentially needs to be customised for each application using different materials than previous Beacon bridges.

The extra-wide staircases are an advantage for users, so the station needs to have sufficiently wide platforms. The design solution includes the possibility of building walls under the stairs to create a comfortable, sheltered and covered waiting area. Local conditions should be considered carefully as these walls might reduce visibility at the station.

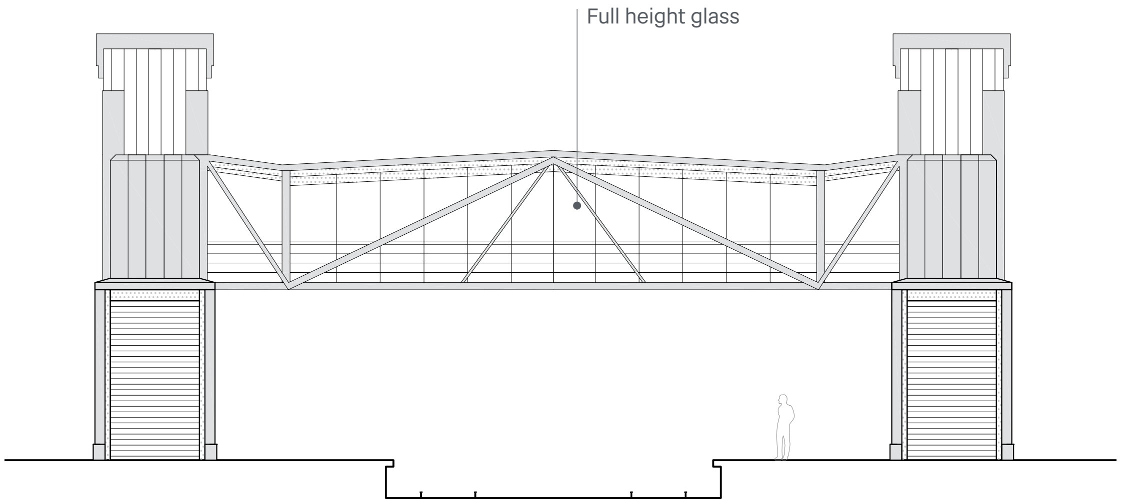


Image 4.6
Front elevation of Beacon covered standard version, 1:200

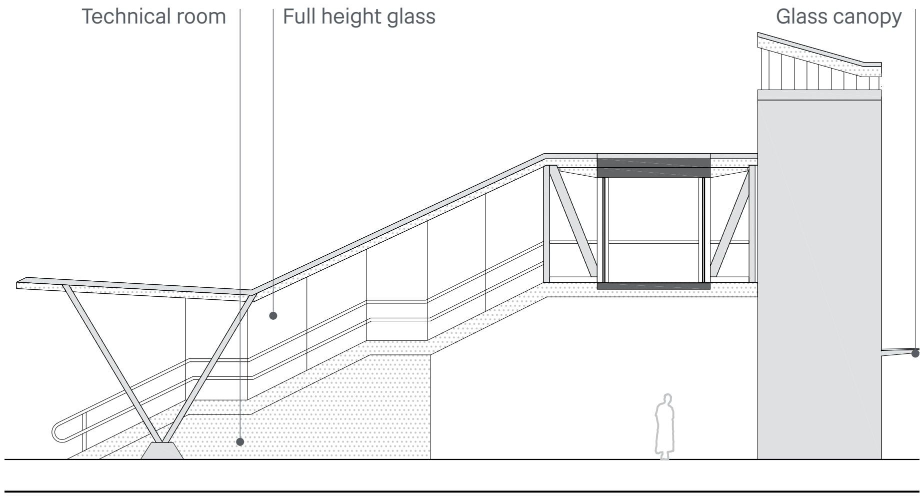


Image 4.7
Cross section of Beacon covered standard version, 1:200

4.2 Beacon

	Pros	Cons
Context	→ A broad range of materials for cladding can respond to local context.	→ The lift towers are prominent and may not be suitable in every location. → The footprint on the platform is large.
Passenger experience	→ Walk-through lifts improve accessibility. → Additional space in front of lifts improves flow on bridge level. → The design with the widest stair design in the standard layout of 2,4 meters. → Good weather protection with full glass on bridge and stairs.	→ None.
Safety	→ Fully glazed sides create very good visibility.	→ None.
Maintenance	→ Easy access to most parts.	→ Use of glass in full height and all the way to floor level might require additional level of maintenance. → Steel might have to be re-painted over time.
Buildability	→ Easy on-site construction over the railway.	→ Different glass sizes and shapes can complicate buildability.

Table 4.3
Pros and cons

4.2.3 Overview
The Beacon footbridge is also designed without a roof, to be used where a roof cover is not appropriate. Whilst the bridge is uncovered it still maintains the same overall design intentions as the covered version.

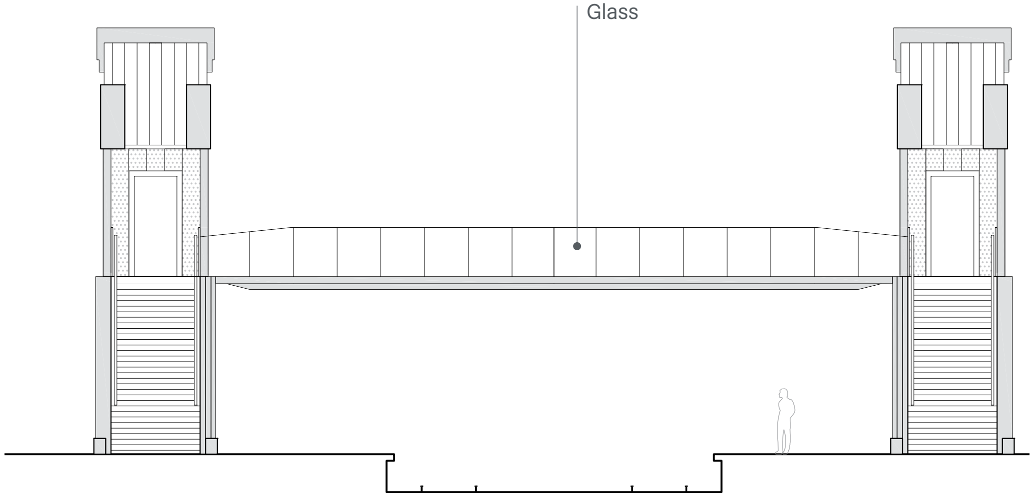


Image 4.8
Front elevation of Beacon open standard version, 1:200

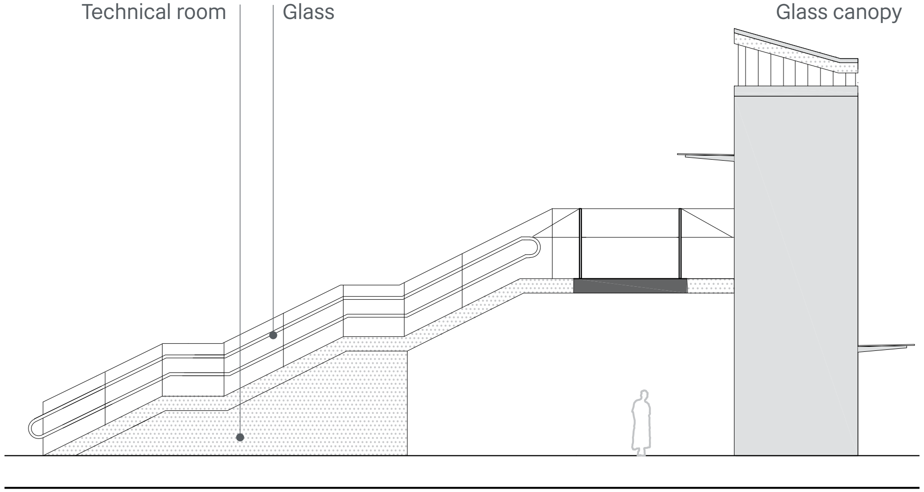
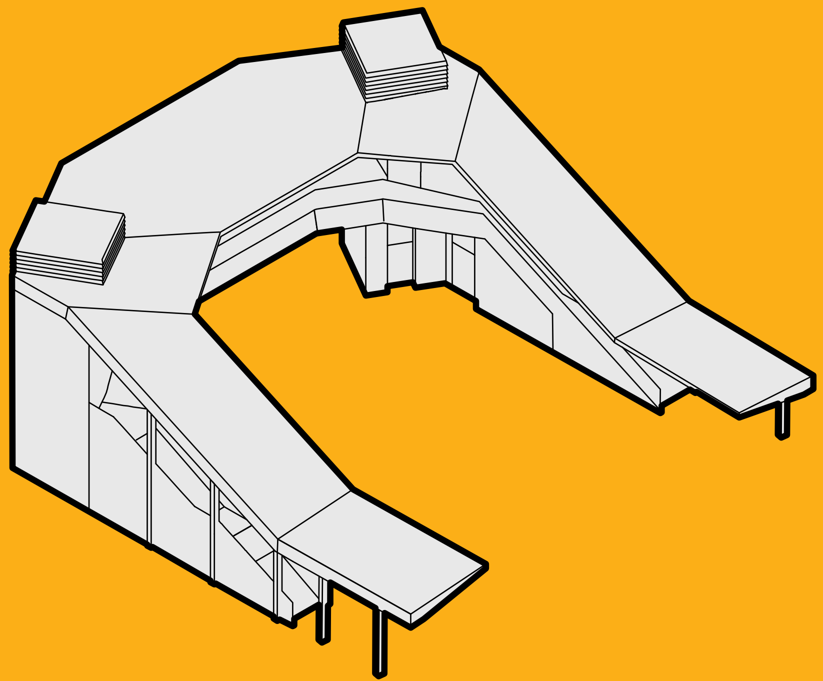
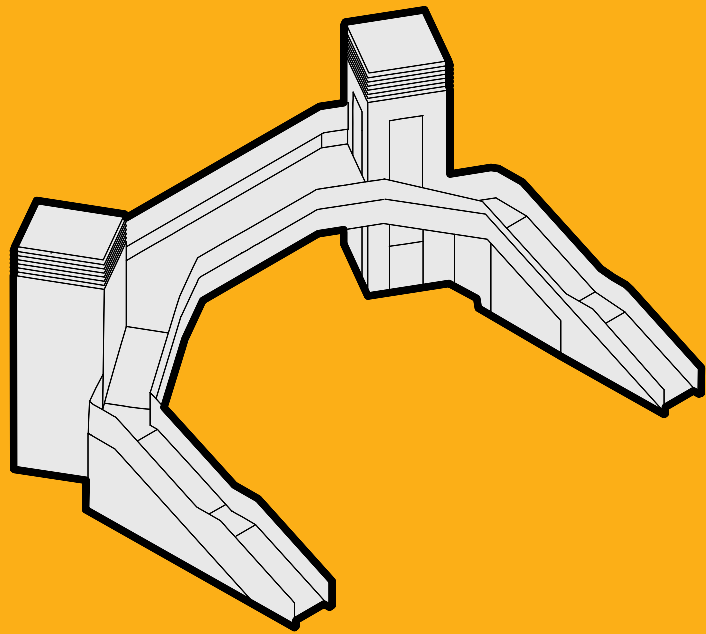


Image 4.9
Cross section of Beacon open standard version, 1:200

4.2 Beacon

Image 4.10
Visualisation of the Beacon footbridge without roof cover, fully glazed for maximum visibility and with solid brick basis in technical rooms and lifts.





Ribbon

4.3 Ribbon

Image 4.11
Ribbon in a covered standard version seen from the front.

4.3.1 Introduction

This footbridge design is characterised by the seamless continuation of the station environment when crossing the tracks. The lifts and stairs are orientated to reduce the pedestrian travel distance, creating a very inclusive passenger experience when crossing the tracks.

The key design innovation is a 30-degree rotation of the lift shaft, which improves visibility and natural wayfinding. This requires a slightly wider platform by the stairs, but the length of the stair block is short due to the bend of the third flight of steps.
The overall form is organic and continuous without emphasis on individual elements of the structure.
Local variations are restricted to the choice of cladding for the lift towers and the lift motor rooms below the stairs.

The generic design is by Knight Architects and Arup.

Info
→ Two modified Ribbon footbridges have been built in Scotland at Reston Station and East Linton Station.
Key features
→ Possibility of a seamless continuation of the station environment.
→ 30-degree rotation of lift shaft for improved visibility and wayfinding.

Table 4.4
Info and key features

4.3 Ribbon

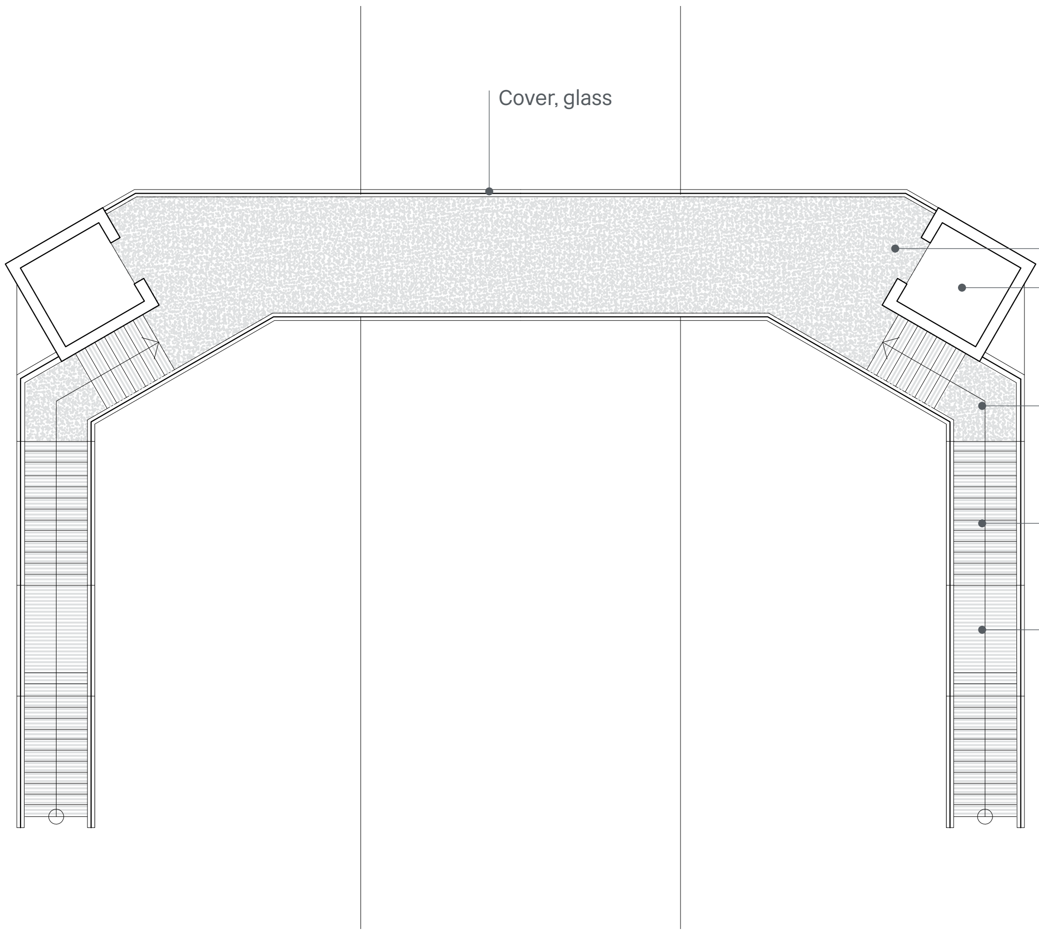


Image 4.12
Plan layout of Ribbon standard version (covered), 1:200

Bridge	Standard version	Variations
Maximum span width	20.0 m*	Less than 20.0 m
Deck width	3.2 m	4.0 m
Stair		
Width	1.6 m	2.4 m
Landings	2	3+
Adjustable orientation	Yes	Yes
Lift		
Capacity	16 persons	25 persons
Land take per platform		
Area	20.5 x 5.3 m ($108\ m^2$)	-

Table 4.5
Main key facts

The Ribbon footbridge design comes in variations for site specific adaption and requirements.
*The maximum span is 20 m in the standard version but longer spans might be feasible in a bespoke version of the design.

4.3 Ribbon

Image 4.13
Ribbon in a covered standard version seen from the front.

Image 4.14
Ribbon in a covered standard version seen from the back.

4.3 Ribbon

4.3.2 Overview
With a continuous roof that extends from one platform over the bridge to the next, Ribbon is a suitable name for this bridge, which can create a very cohesive station, especially if the roof is extended as actual platform canopies. The large roof provides good protection against the weather, but needs considerable maintenance, particularly on the bridge span where the roof extends over the tracks.

To enhance local identity, the scheme allows for a variety of cladding options on the lift shaft and under the stairs such as brick slips, metal panels or ceramic tiles.

The lifts and stairs are orientated to reduce pedestrian walking distances and improve lift visibility. The rotated lift towers support the visibility and the function of the lifts and can be applied in stations with wide platforms. In a station with 3 or more platforms, the centre lift shaft cannot be rotated.

The covered version of the bridge has a strong identity and is visually large but the uncovered version is very compact and discreet.

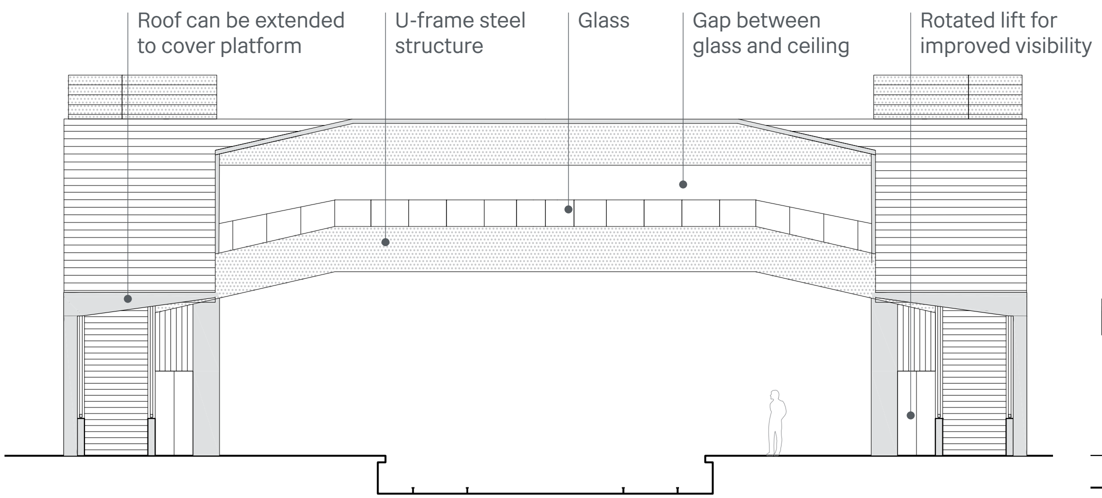


Image 4.15
Front elevation of Ribbon covered standard version, 1:200

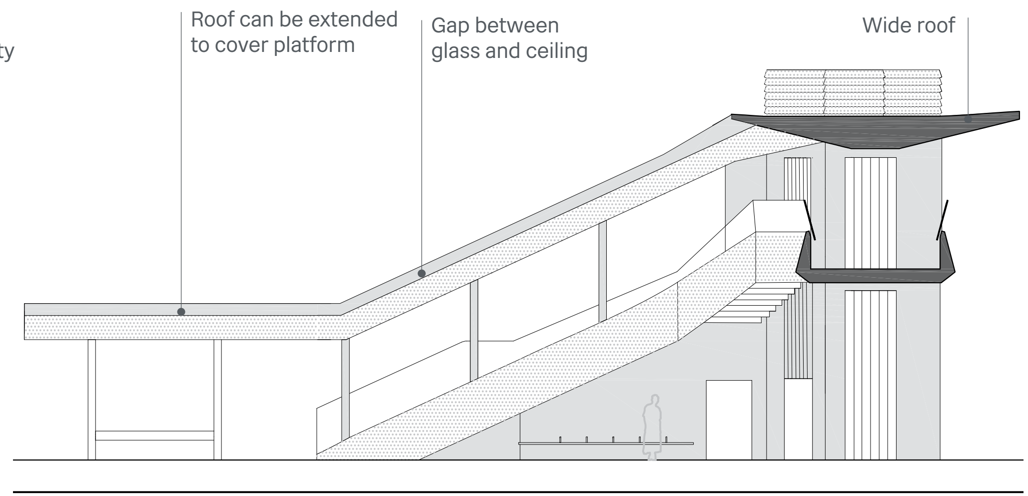


Image 4.16
Cross section of Ribbon covered standard version, 1:200

4.3 Ribbon

	Pros	Cons
Context	→ A large range of materials for cladding can respond to local context.	→ The wide roof and enclosed lift towers enlarge the visual impact. → The tall ceiling height might have a too dominant influence in certain locations.
Passenger experience	→ Rotation of the lifts makes them more visible for the users. → Large roof gives good protection from rain and sun. → Gap between glass and roof provides for natural ventilation. → Roof design can be extended to also cover the platform for at seamless continuation of the station environment. → Enclosed lift design minimises the risk of overheating. → Walls under stairs create additional weather protection on platform.	→ The design with the narrowest stair width in the standard layout of only 1,6 meters. → The benefit of increased visibility of rotated lifts is not possible at all platforms if there are three or more platforms. → The ceiling height to the canopies is rather high which might compromise weather protection.
Safety	→ Glazing creates good visibility.	→ None.
Maintenance	→ Limited use of glass in lift towers simplifies maintenance.	→ Use of wood in ceiling might require an additional level of maintenance. → Steel might have to be re-painted over time. → Service and replacement is complicated on the roof because of the large overhang. This could potentially influence on train operation.
Buildability	→ Built in a modified version.	→ Complicated roof design might increase building time over the railway. → Rotation of lifts requires more space on the platform, which is not always possible. → Future extension to more platforms is not possible if connecting lift tower is rotated. → Many different glass sizes and shapes might complicate buildability.

Table 4.6
Pros and cons

4.3.3 Overview

The Ribbon footbridge is also designed without a roof, to be used where a roof cover is not appropriate. Whilst the bridge is uncovered it still maintains the same overall design intentions as the covered version.

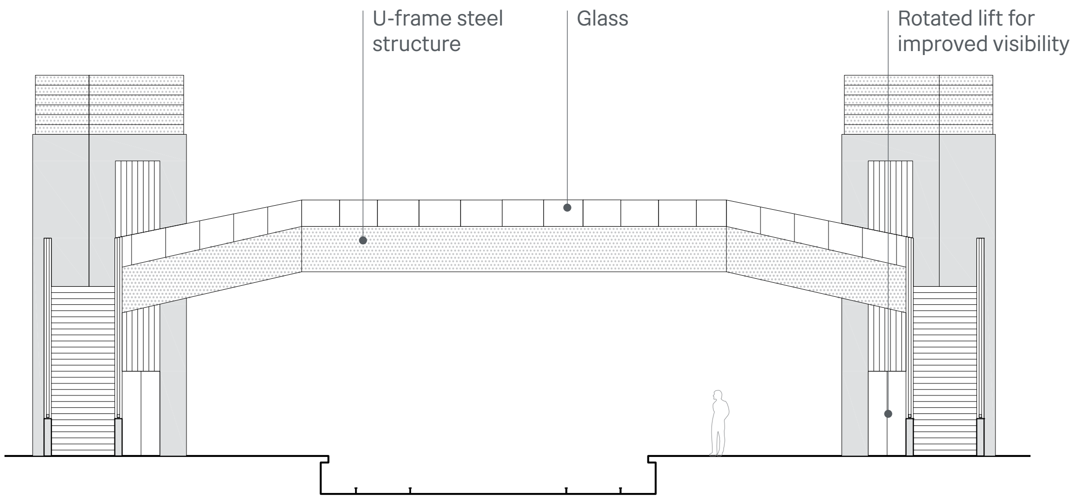


Image 4.17
Front elevation of Ribbon open standard version, 1:200

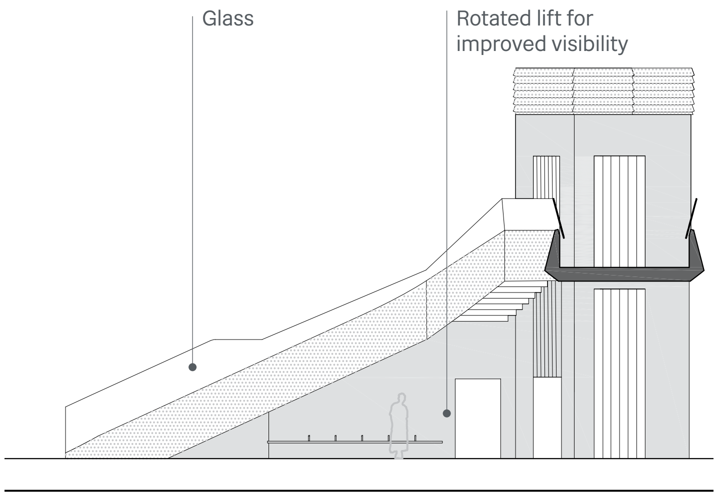
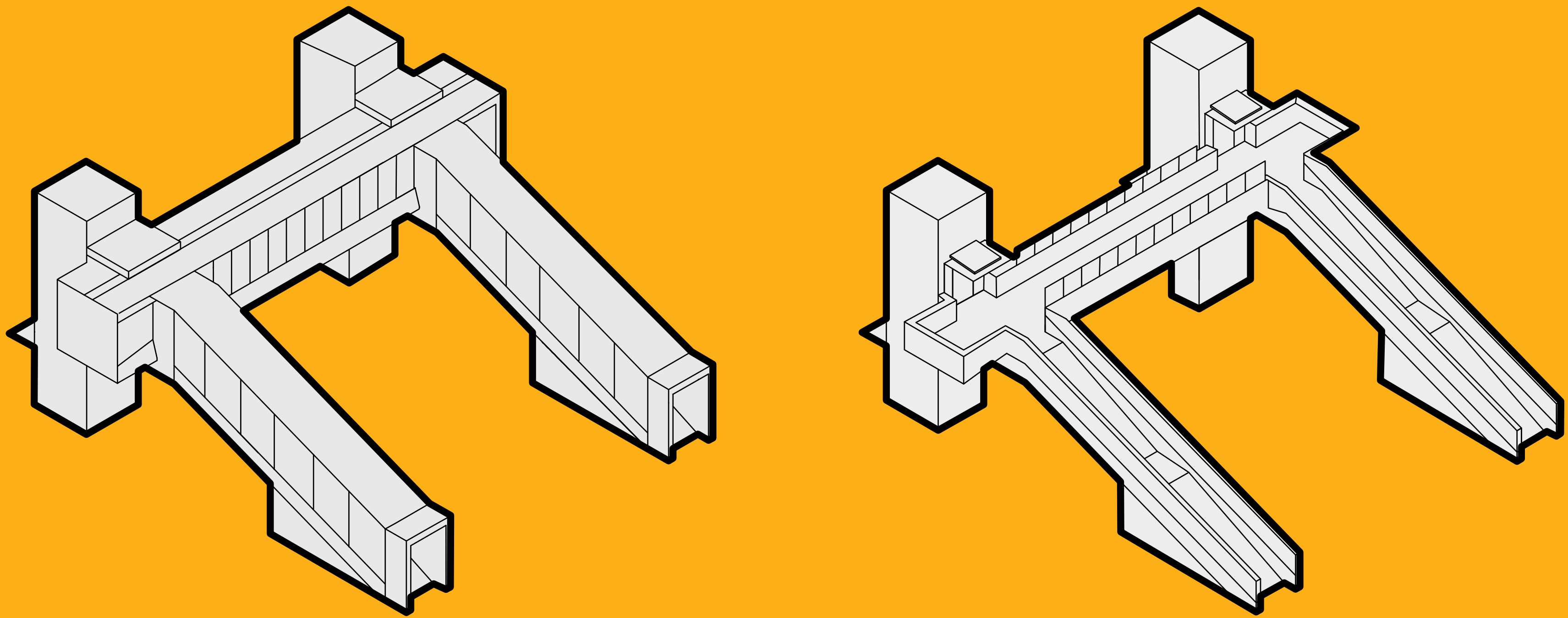


Image 4.18
Cross section of Ribbon open standard version, 1:200

4.3 Ribbon

Image 4.19
Ribbon in an open standard version.



Frame

4.4 Frame

Image 4.20
Frame in a covered standard version seen from the front with its characteristic yellow frame.

4.4.1 Introduction
This footbridge design was the winner of the RIBA (Royal Institute of British Architects) footbridge competition. It is characterised by a strong architectural form creating a frame which is defined by the spans of the roof and the deck that are extended beyond the lifts. This emphasises the horizontality of the bridge that is offset against the verticality of the lift towers.

The structure is subservient to the architecture. The roof and deck are structurally independent. The roof structures are concealed by metal cladding. This design has been demonstrated to be very modular, facilitating a great variety of possible configurations.

The stairs are fully enclosed, though a variation with open stairs also exists. The span is partially enclosed, as the glazing does not fully extend to the roof soffit.

The generic design is by Gottlieb Paludan Architects and Davies Maguire.

Info
→ Not built yet.
Key features
→ Elegant footbridge which clearly signals its function.
→ Strong visual identity with a signature yellow colour.
→ Cantilevered wings of the bridge deck.

Table 4.7
Info and key features

4.4 Frame

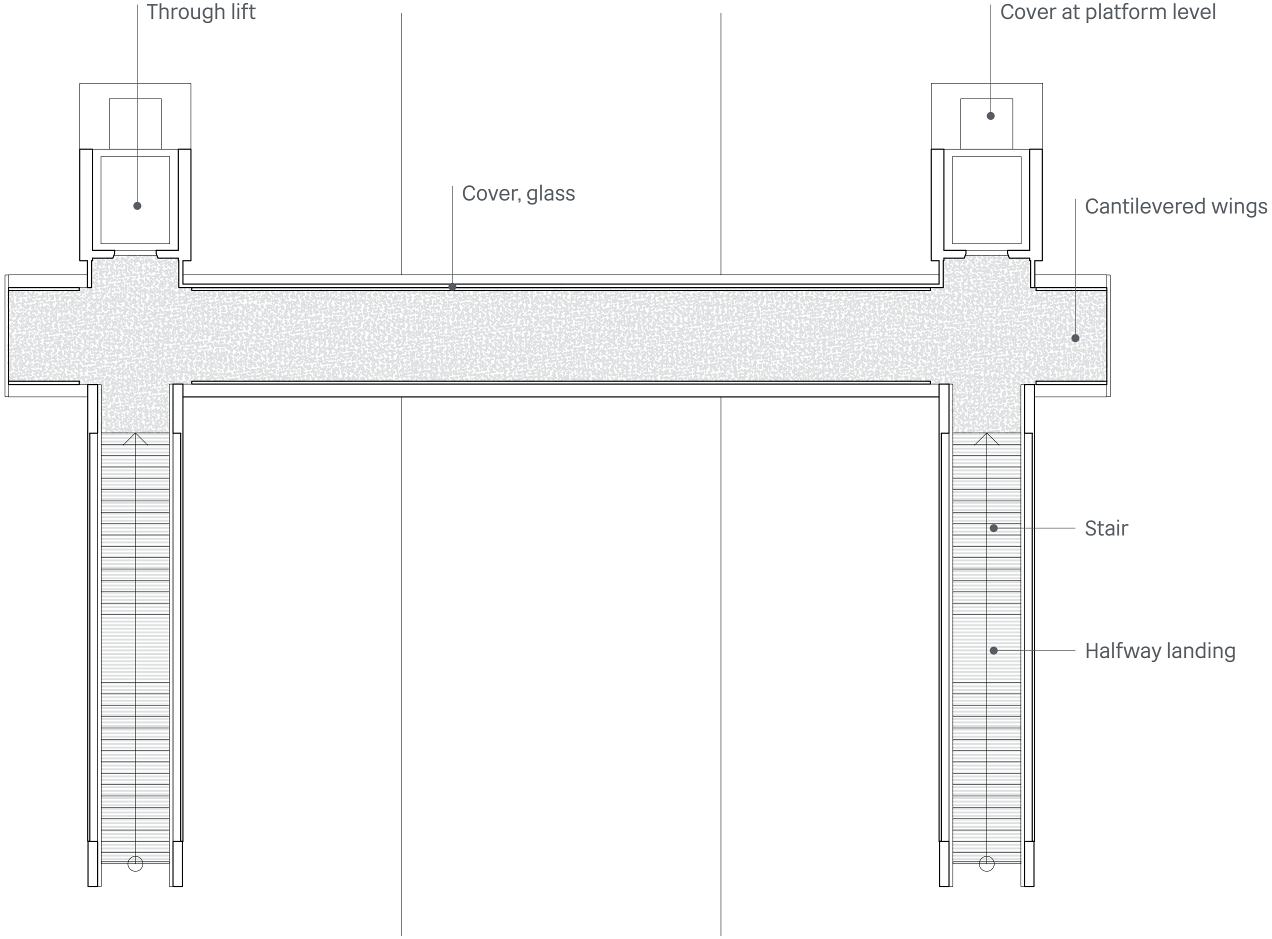


Image 4.21
Plan layout of Frame standard version 1:200

Bridge	Standard version	Variations
Maximum span width	20.0 m*	Less than 20.0 m
Deck width	2.4 m	3.2 or 4.0 m
Stair		
Width	1.8 m	2.4 m
Landings	1 halfway	2+
Adjustable orientation	Yes	Yes
Lift		
Capacity	16 persons	26 persons
Land take per platform		
Area	26.8 x 2.5m + 3.0 x 2.4m ($74 m^2$)	-

Table 4.8
Main key facts

The Frame footbridge design comes in variations for site specific adaption and requirements.
*The maximum span is 20 m in the standard version but longer spans might be feasible in a bespoke version of the design.

4.4 Frame

Image 4.22
Frame in a covered standard version seen from the back with the cantilevered wings on either side of the transparent lift towers.

Image 4.23
Natural ventilation between the glass cover and the roof.

4.4 Frame

4.4.2 Overview
The Frame bridge span has a dark exterior and a signature yellow interior. The visual impression is simplistic, stringent, and distinctly contemporary, with the dark exterior matching technical railway equipment and the signature colour a welcoming signal.

The lighting design enhances this distinction, emphasising the interior as an after dark attraction. The glare-free lighting also focuses on visual comfort, a sense of safety and security, and the ability for passengers to maintain a good connection to their surroundings while crossing the bridge at night.

At bridge level, there is a lift waiting area to keep the area clear to passengers using the stairs. The waiting area cantilevers away from the tracks and provides a view of the surroundings. On the bridge, the glazing does not extend to the soffit, reducing weather protection but improving ventilation.

The staircase only has one landing, to make it shorter. The lift machine room is very compact, contributing to a small footprint on the platform.

An online parametric design tool enables users to easily get an overview of how the bridge design can be adapted to local conditions.

The fixed material selection does not allow the bridge's expression to be customised to the surroundings, but reduces the need to revise the building details when a new bridge is built.

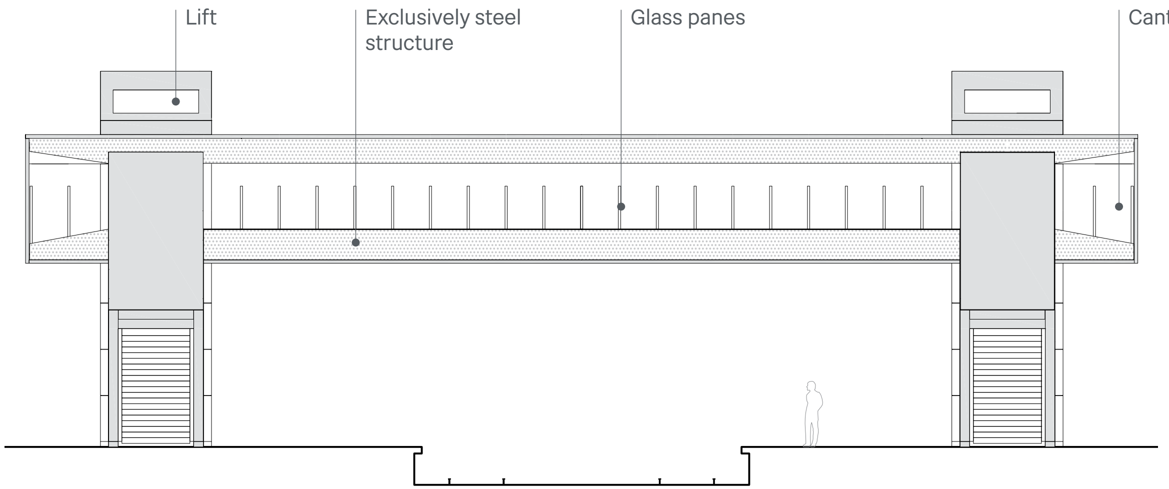


Image 4.24
Front elevation of Frame covered standard version, 1:200

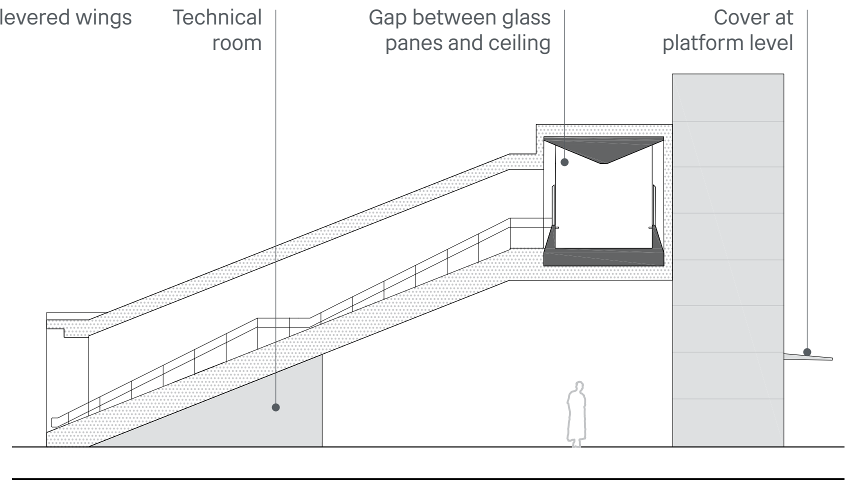


Image 4.25
Cross section of Frame covered standard version, 1:200

4.4 Frame

The Frame footbridge design can easily be modified with the online parametric tool.

Image 4.26
Click on the screen and get directly to the parametric online tool

4.4.3 Online parametric tool
A BIM parametric model has been developed for the covered Frame footbridge design that can be used without any applications or background knowledge. The online tool gives users an immediate overview of the consequences of changing the generic bridge design. The user can modify parameters such as the number of platforms, their levels and possible rotation in relation to each other. The user can also decide on the number of lifts, rotate the stairs, extend the span of the bridge and much more. The output is not only quantitative information such as the amount of steel required and the cost (prices are from 2022). The tool also automatically adds support columns if the span is very long, for example.

The parametric model works to retain the original design intent and functional integrity of Frame as it is adapted to each station, while optimising the structural design and providing a cost estimate and detailed quantity extraction directly from the model.

This helps to highlight the implications of adapting Frame to a specific site, reducing design time and the overall project schedule by moving more quickly from programme to final and approved design.

On the next pages are examples of how the design can be modified. Click on the screen on this page to get directly to the parametric online tool.

The BIM Parametric model has been developed in Revit which can also be used to develop the frame bridge for producing outline and detailed CAD designs. This Revit model allows for technical designs to be rapidly produced significantly reducing design time and cost for projects. Contact the Network Rail Buildings and Architecture team for further information.

4.4 Frame

Image 4.27
Variation of the Frame footbridge design

Image 4.28
Variation of the Frame footbridge design

4.4 Frame

Image 4.29
Variation of the Frame footbridge design

Image 4.30
Variation of the Frame footbridge design

4.4 Frame

	Pros	Cons
Context	→ Clear visual identity. → Light visual identity with minimal visual impact on the surroundings. → Since there is only one landing on the stairs it should require less space. However, in some situations there could be additional landings depending on what the required clearance is for the trains.	→ A limited range of materials respond less flexible to local context.
Passenger experience	→ Walk-through lifts improves accessibility. → Good weather protection on stairs with glass in full height.	→ Glass on bridge is not in full height which does not provide full weather protection.
Safety	→ Glazing creates good visibility.	→ None.
Maintenance	→ Easy access to most parts.	→ Steel should be re-painted over time.
Buildability	→ Industrial prefabrication for optimised production methods. → Very easy on-site assembly with minimal impact on railway operation. → Online parametric design tool for easy customisation in the planning process.	→ Cantilevered wings require space on the outside of the stairs, which is not always possible.

Table 4.9
Pros and cons

4.4 Frame

Image 4.31
Frame in an open version is also an elegant design with a clear visual identity.

4.4.4 Overview
The Frame footbridge is also designed without a roof, to be used where a roof cover is not appropriate. Whilst the bridge is uncovered it still maintains the same overall design intentions as the covered version.

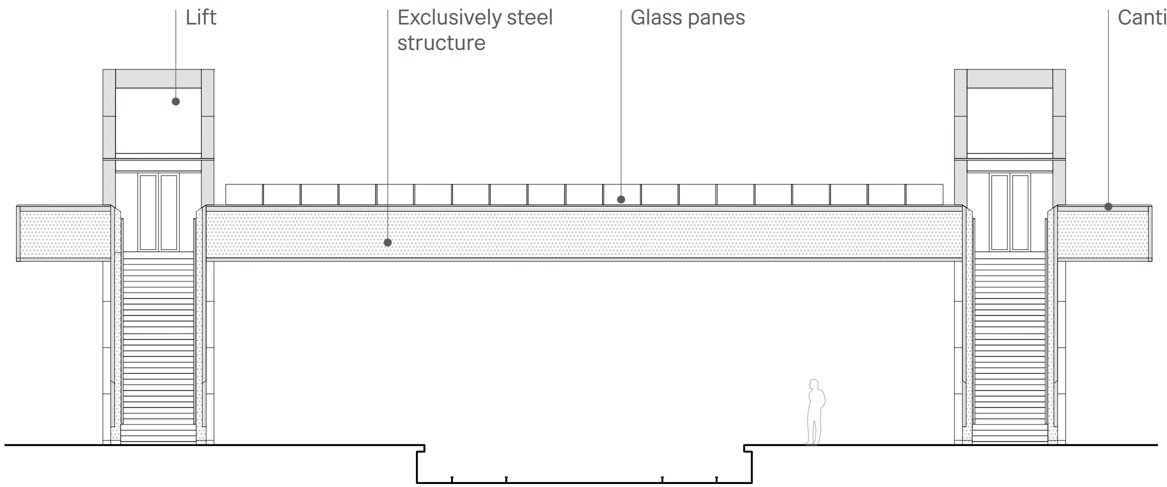


Image 4.32
Front elevation of Frame open standard version, 1:200

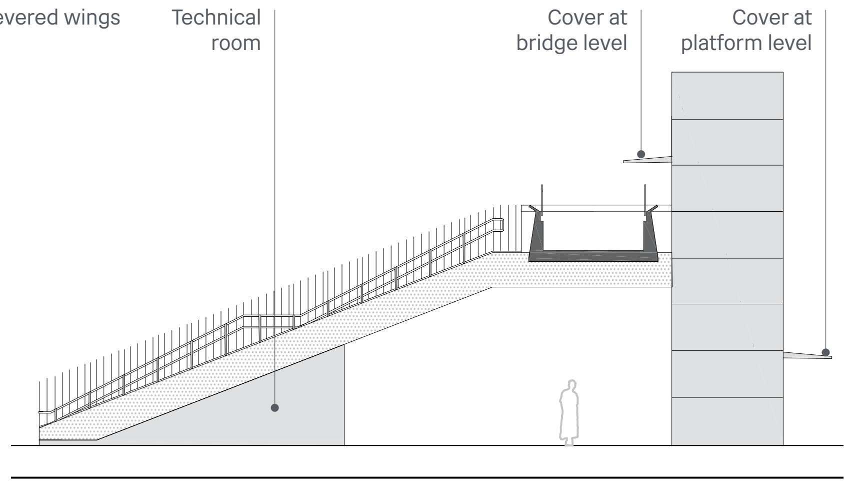
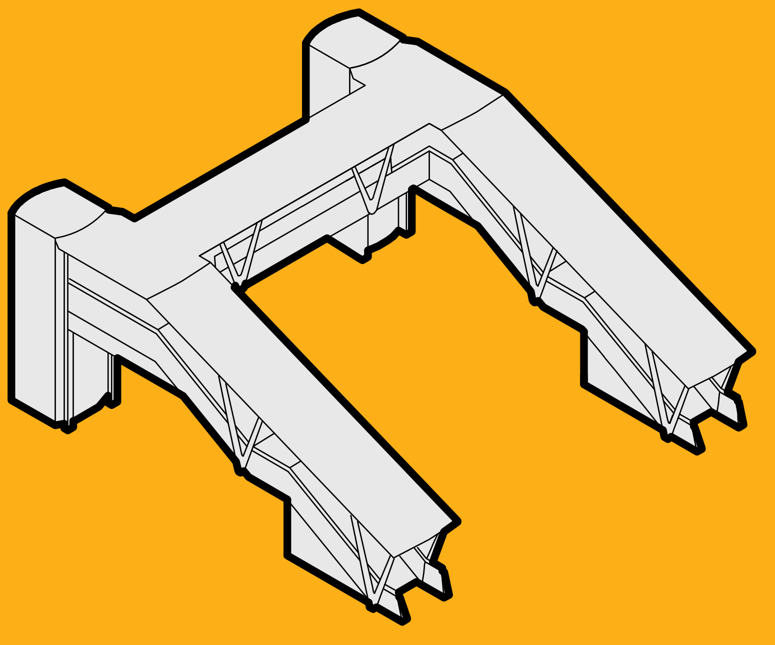
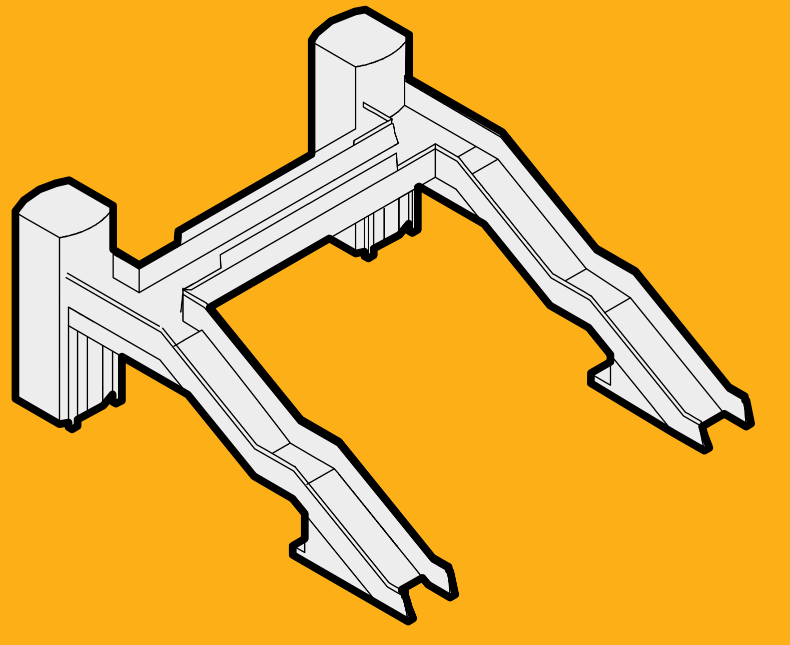


Image 4.33
Cross section of Frame open standard version, 1:200

4.4 Frame

Image 4.34
Frame in an open version seen from the front.





AVA

4.5 AVA

Image 4.35
AVA in a covered standard version seen from the back expressing the use of stainless steel.

4.5.1 Introduction
AVA differs from other bridge designs as the external cladding and the structural elements behind the cladding - are all made of stainless steel. The limited need for maintenance is clear in the appearance of the bridge, and the bridge becomes an object with a very strong identity. With its fixed choice of materials, the bridge is an almost high tech design statement.

The bridge design is developed in a close collaboration between Network Rail, the contractor, and the architect, in an effort to create a design which is easy to construct. This is expressed in a high degree of modularity, reducing building costs. The AVA footbridge design does not yet have a standard Network Rail design status, but is an emerging design.

The generic design is by Hawkins/ Brown and Expedition Engineering.

Info
→ First bridge expected to open Summer 2025 at Stowmarket Station.
Key features
→ Stainless-steel in structural elements and cladding results in low mainentence.
→ Developed with a focus on creating the design as modular as possible.

Table 4.10
Info and key features

4.5 AVA

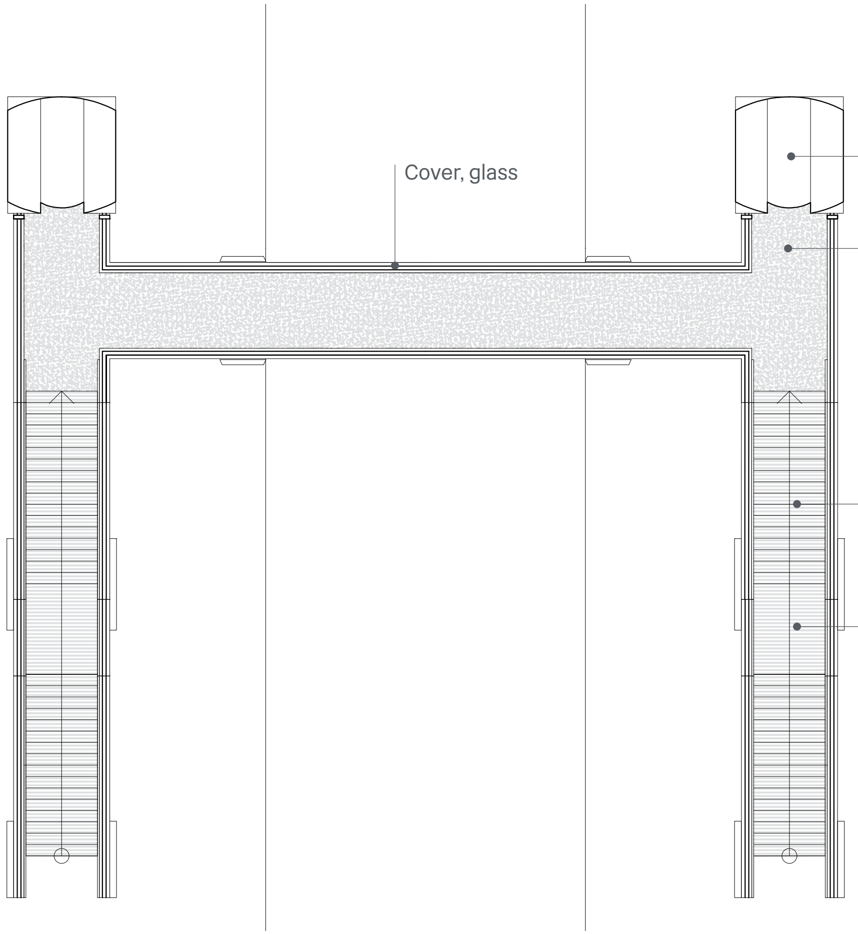


Image 4.36
Plan layout of AVA standard version (open and covered), 1:200

Bridge	Standard version	Variations
Maximum span width	20.0 m*	Less than 20.0 m
Deck width	2.0 m	Yes
Stair		
Width	2.0 m	Yes
Landings	1	2+
Adjustable orientation	Yes	Yes
Lift		
Capacity	21 persons	Yes

Table 4.11
Main key facts

The AVA footbridge design comes in variations for site specific adaption and requirements.
*The maximum span is 20 m in the standard version but longer spans might be feasible in a bespoke version of the design.

4.5 AVA

Image 4.37
AVA in a covered standard version seen from the front.

4.5 AVA

Image 4.38
AVA in a covered standard version.

Image 4.39
A closer look at the design components seen from below the bridge.

4.5 AVA

4.5.2 Overview
This stainless steel bridge has a very distinctive appearance, interior as well as the exterior, creating a distinct experience both from a distance and for the passenger using it. The footbridge has been designed to be a stand alone high quality architecture product that minimises redesign and maintenance.

This has a strong presence and character with options for minor contextually driven responses through lift cladding.

The choice of stainless steel as the only cladding material reduces the need to revise the building details when a new bridge is built.

The lighting design is based on linear luminaires set very low to provide good illumination for users at the bridge deck and steps. This choice of lighting makes the luminaires themselves stand out and are easily cleaned, mantained and replaced when required.

The stair has only one landing. The entrance to the lift at platform level is under the staircase, partly sheltered from the rain. The lift is a 180 degree turn lift to utilise cover under the main span, but, it can also be a through lift.

The ventilation of the bridge space is improved by the glass panels not extending to the underside of the soffit. The roof canopy overhangs to offer improved cover where glass does not fully enclose the space.

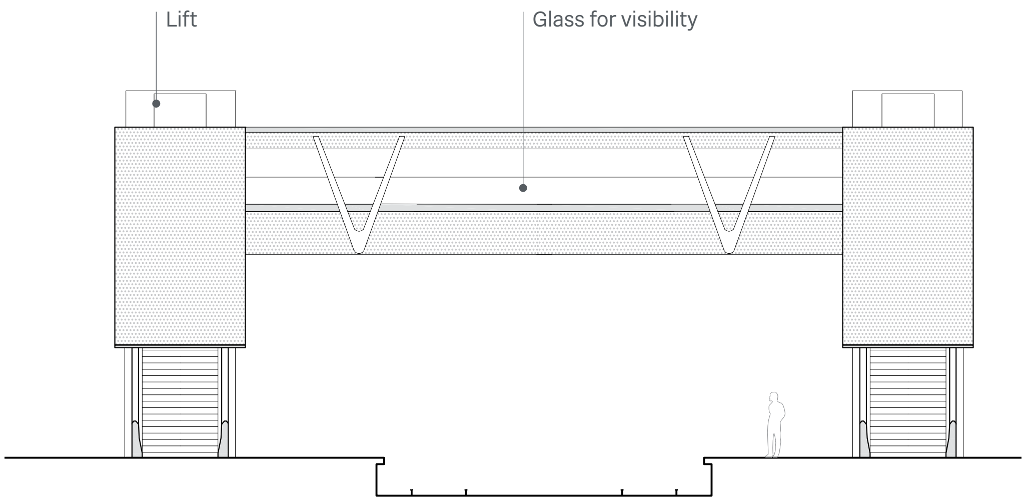


Image 4.40
Front elevation of AVA covered standard version, 1:200

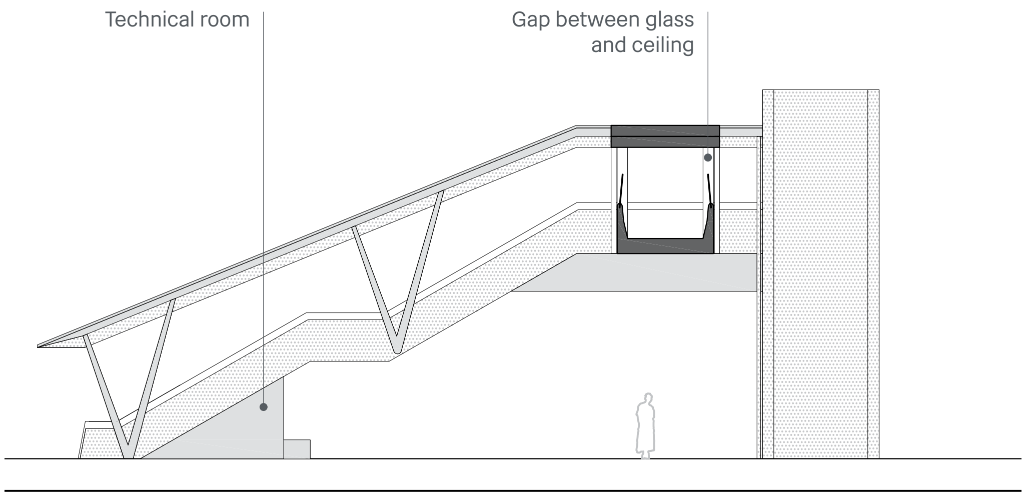


Image 4.41
Cross section of AVA covered standard version, 1:200

4.5 AVA

	Pros	Cons
Context	→ Clear visual identity.	→ The design is specific to one material and finish and cannot be tailored to other materials.
Passenger experience	→ Gap between glass and roof provides for natural ventilation.	→ The lifts can be dual entry or single entry. → Glass on bridge is not in full height which does not give full weather protection. → Glass on the stairs is not full height, which gives reduced weather protection.
Safety	→ Glazing creates good visibility. → The stainless steel has a matt finish, which should not have any risk of glare.	→ None.
Maintenance	→ Use of stainless steel in structural elements and cladding should reduce level of maintenance.	→ None.
Buildability	→ Easy on-site construction over the railway.	→ None.

Table 4.12
Pros and cons

4.5 AVA

4.5.3 Overview

The AVA footbridge is also designed without a roof, to be used where a roof cover is not appropriate. Whilst the bridge is uncovered it still maintains the same overall design intentions as the covered version.

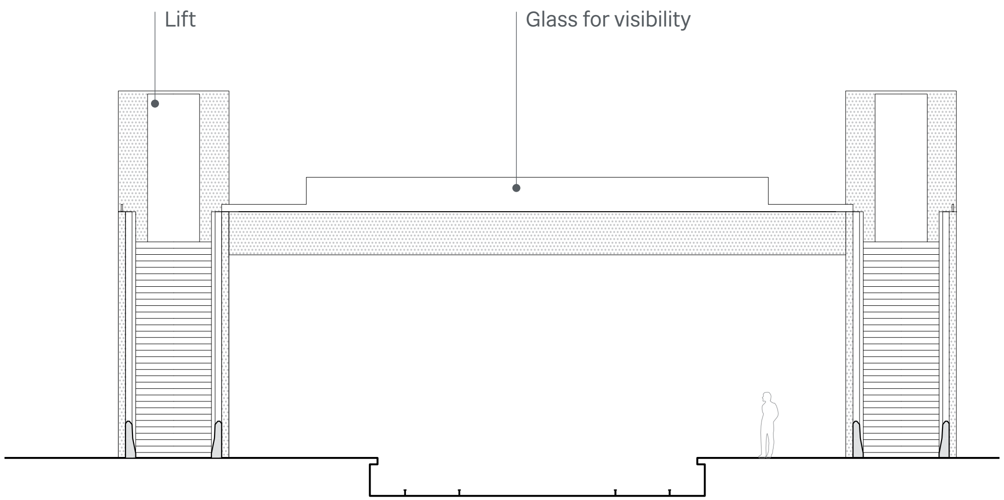


Image 4.42
Front elevation of AVA open standard version, 1:200

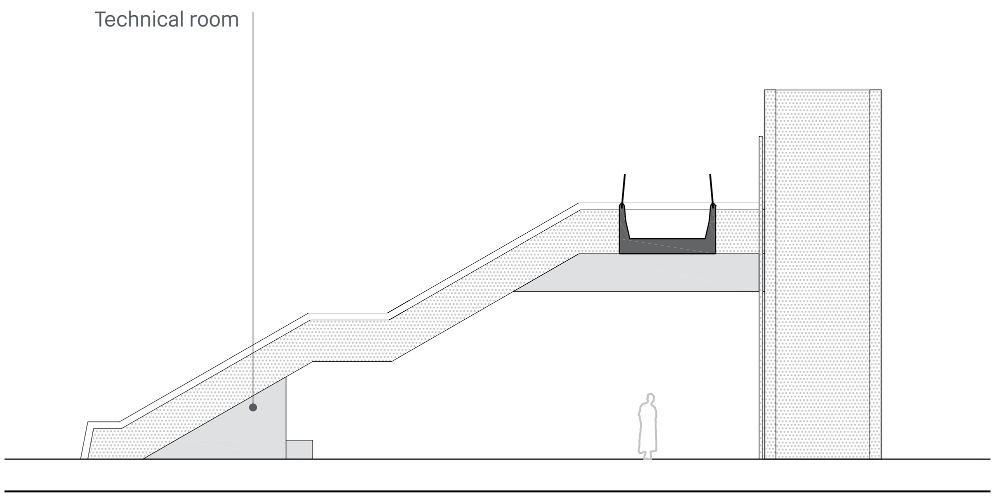
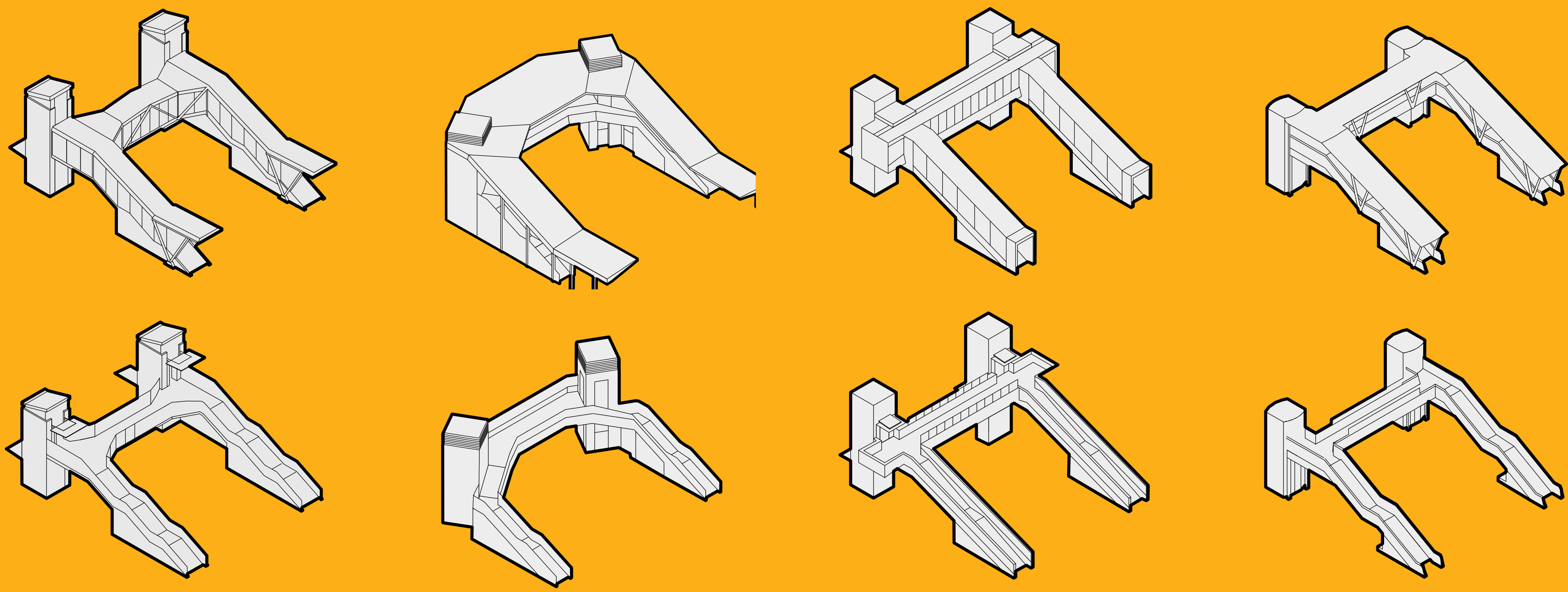
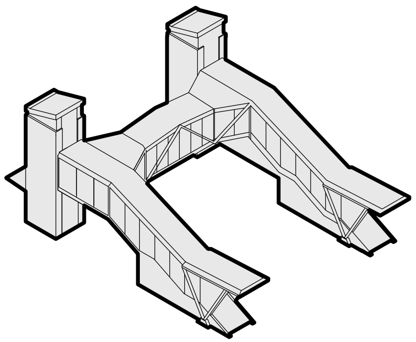


Image 4.43
Cross section of AVA open standard version, 1:200

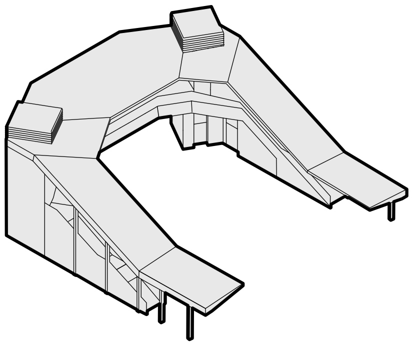


Comparison

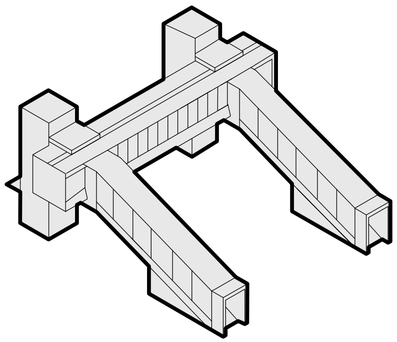
4.6 Comparison



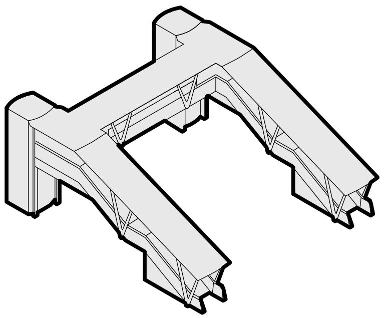
Beacon



Ribbon



Frame



AVA

4.6.1 Comparison
All four bridge designs have quantitative as well as qualitative values.

The quantitative properties of the footbridges are well represented by numbers and easy to compare. The qualitative characteristics are expressed in images and words and may be more difficult to assess. It is useful to remember that the qualitative properties, although often referred to as 'soft values', actually leave a hard impact. A good metaphor is a meal that is more than just nutrients. It is defined by its taste and appearance.

Locations vary greatly. As examples some stations are rural heritage monuments while others are placed in an industrial area or surrounded by low density housing or tall multi-storey buildings.

A balanced assessment of all the characteristics of a footbridge, taking into account its intended location, is necessary to make the right decision. Each characteristic can be seen as positive or negative, depending on the point of view. Depending on the location, some characteristics can be irrelevant and others of great importance.

4.6.2 Bridge
All four standard bridge designs are designed for spans of 20 meters, but shorter and slightly longer spans are possible in bespoke versions.

Typicial bridge widths range from Ava's 2.0 m, to Beacon's 3.2 m. Note, there are variants in widths for the standard bridges as listed in the previous chapters under each bridge. As an example; Beacon, Ribbon and Frame are available in widths of up to 4.0 meters, and AVA can be designed for a width of 3m, which is advantageous if a large flow of travellers is expected.

All bridges are available in covered and open versions, but only the covered Beacon has full-height glass for optimal weather protection. All bridge designs are adaptable to multiple platforms. By its simple form, the Frame is most adaptable to unusual sites and complex configurations and the Ribbon is the most restricted to a more standard two-platform arrangement.

4.6 Comparison

	Beacon	Ribbon	Frame	AVA
Bridge				
Maximum span width	20.0 m	20.0 m	20.0 m	20.0 m
Deck width	2.4 m	3.2 m	2.4 m	2.0 m
Stair				
Width	2.4 m	1.6 m	1.85 m	2.0 m
Landings	2	2	1	1
Adjustable orientation	Yes	Yes	Yes	Yes
Lift				
Capacity	18 persons	16 persons	16 persons	21 persons
Land take per platform				
Area	26.8 x 3.1 m ($83 m^2$)	20.5 x 5.3 m ($108 m^2$)	26.8 x 2.5m + 3.0 x 2.4m ($74 m^2$)	-

Table 4.13
Key facts of the four standard footbridge designs in station environments.

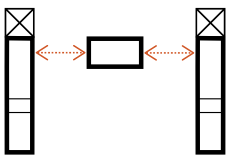


Image 4.44
Adaptable to different span widths.

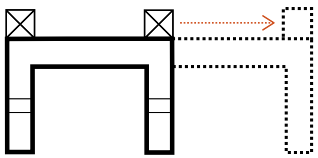


Image 4.45
Adaptable to multiple platforms.

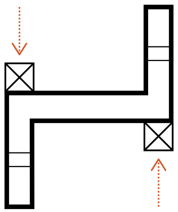


Image 4.46
Directional variation.

4.6.3 Stair

All bridges can be adjusted in their stair configuration, so they can be designed as both a "U" and a "Z" shapes to suit the expected flow pattern. The number of landings varies with either 1 or 2. By having only one landing, you can make the staircase a little shorter and have less visual impact with a smaller footprint. Conversely, having two landings makes it a little easier for people with walking difficulties to get up and down.

The widths of the stairs vary between 1.6 and 2.4 meters but note, the different designs also have variants of stair widths as indicated under each bridge design.

Only Beacon and Frame have full weather protection with full-height glass between the stairs and roof.

4.6.4 Lift

All standard bridges have lifts, which in the standard versions are placed opposite the stairs. The main difference is that Ribbon has its lift rotated 30 degrees, while the other designs are not rotated. Beacon and Frame have the best flow with through lifts, Ribbon is a 90 degrees turn while AVA lifts can be used either as through lifts or 180 degree turn.

The four standard footbridge designs have many functional similarities. However, there are some main key facts, that already at this point can make one bridge design more appropriate than another, depending on local or project requirements.

Continue reading the comparison of the standard designs at the following pages.

Remember that all four standard footbridge designs in station environment also exist in alternative versions.

See section 4.2-4.5 for an additional description of each standard footbridge design.

4.6 Comparison

4.6.5 Context
There is a difference in the visual impact of the different bridges and where you can imagine them being built. Beacon and Frame are light in appearance with either a lot of glass or a lightweight construction. Whereas, Ribbon, with its wide and high roof, is visually dominant and there will be locations where the extended roof will not be preferable.

Beacon and Ribbon differ from the other designs with a variety of cladding materials which can respond better to the local context. In the Frame and AVA designs, there is no variation in materials, which conversely provides a clearer visual identity.

4.6.6 Passenger experience
Beacon is the only bridge design where the glass goes all the way from the bridge to the roof, providing good weather protection. Other aspects of bridges, stairs and lifts are described on the previous pages.

4.6.7 Safety
In terms of safety and security all bridge designs have a good level of visibility. There are no places on the bridges and stairs that are not visually accessible and there are no unused areas under the stairs, as there are technical rooms located here.

4.6.8 Maintenance
AVA is the bridge design that is expected to have the simplest maintenance, as stainless steel is the primary material.

Beacon and Frame are also considered to have simple maintenance. Ribbon is considered to be the design with the most complicated maintenance as several areas on the underside of the bridge roof are difficult to access due to the wide design. Therefore it might be necessary to periodically shut down train operations to allow maintenance.

4.6.9 Buildability
All bridges are designed so that the bridge deck itself can be hoisted in to minimise the impact on train operations. However, Ribbon will require some customisation when completing the joints in the roof.

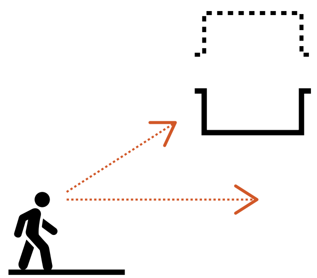


Image 4.47
Visual impact.

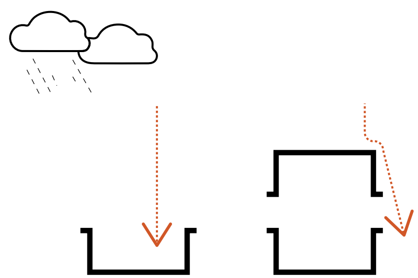


Image 4.48
Cover for wind and rain.

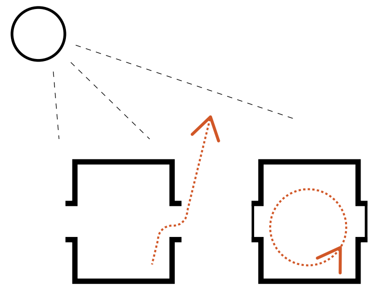


Image 4.49
Natural ventilation or not.

4.6 Comparison

4.6.11 Sustainability

The carbon estimating methodology follows the impact categories identified in RICS Whole life carbon assessment for the built environment (2nd Edition). Both upfront embodied carbon (capital carbon) and whole life carbon were calculated.

Embodied carbon of each bridge design was estimated using the quantity of materials involved and associated carbon emissions factors covering raw material extraction, transportation and processing (A1-A3), transportation (A4) and site activities (A5). Carbon factors for each material have been taken from the database held within OneClickLCA. The whole life carbon estimation includes the embodied carbon factors above, but also includes additional allowances for carbon associated with repair (B3) and replacement (B4) activities and for end of life disposal (including demolition (C1), transportation (C2), processing (C3) and disposal (C4). Estimates for the carbon impact of repair and replacement use the same lifecycle assumptions as those detailed in the lifecycle cost analysis. Carbon associated with operational energy (B6), eg for lighting and lifts, is excluded.

Where different material types with varying carbon factors could be used to meet a specification (e.g., steel with different levels of recycled content or concretes with different levels of cement replacement) a conservative assumption has been used as the basis of the analysis. It will be possible to reduce the carbon impact of each bridge by paying close attention to the sourcing and specification of steel and concrete components.

The analysis shows that total embodied carbon of the different bridge designs varies from around 338 tonnes to 534 tonnes. The most significant contributor to these emissions is the steel structure followed by cladding and services (principally the lifts). Typically, the open version of each bridge design has a lower carbon impact than the closed version. This is not always the case and for the Beacon bridge the open version has the greater carbon impact due to the increased volume of structural steel involved in this design.

For further information regarding sustainability and cost on the standard footbridges, refer to **Appendix D and E** for additional materials concerning each of the standard footbridges. Equally, abbreviations are explained in **Appendix A.**

	Covered				Open			
	Beacon	Ribbon	Frame	AVA	Beacon	Ribbon	Frame	AVA
Embodied carbon (A1-A5)	338	534	433	420	370	479	431	335
Whole life carbon (A1-C4 excl B6-7)	558	725	638	607	570	634	591	492

Table 4.14 Embodied carbon (units: tonnes CO2e)

4.6 Comparison

4.6.11 Capital cost
In order to allow equal comparison between the four different bridge designs assumptions, methodology and exclusions have been defined. They are listed below.

4.6.12 Assumptions
The Base Date is 1Q 2024

4.6.13 Location - For the basis of the estimate it has been assumed that the site is served by a road network capable of accommodating the vehicles required to both deliver the prefabricated elements and the crane to install. Further, it is assumed that land adjacent to the site is available to act as a lay-down area / site for the crane. All land is free-issue and any reinstatement costs have been excluded.

4.6.14 Programme - Please note that the assumed on-site installation time does not include for the programme duration associated with the off-site manufacturing time of the bridge itself. The bridges are assumed to be prefabricated off-site and then transported to the installation site, where they are lifted into place. This prefabrication process allows for efficient manufacturing and minimises disruption during installation.

4.6.15 Off-site manufacture - Costs included in the estimate reflect the fabrication and installation of the bridge itself. It has been assumed that the bridge will be manufactured off-site and therefore no adjustment is necessary for differential on-site manufacture duration.

4.6.16 Foundations - It is essential to acknowledge that the estimates contained within this manual may deviate from the standard bridge designs. These deviations have been made to permit a more generic approach when accounting for various factors such as site-specific conditions, overall project requirements, and design principles eg foundations relating to ground conditions.

4.6.17 Methodology

→ All works to prepare the site are by others,
→ All external works associated with the bridge are by others, including provision of services to the bridge,
→ Suitable lay-down zone for prefabrication deliveries is adjacent to the site,
→ Lifting of bridge units by mobile crane, allowance made, in one visit,
→ Cost of Kirow crane has been excluded,
→ Works are to be undertaken during a blockade,
→ Cost of blockade is excluded, assumed part of wider blockade,
→ Cost of isolating overhead lines is excluded.

4.6.18 Exclusions

→ Ground contamination.
→ Diversion of existing services.
→ Inflation.
→ Project Contingency.
→ Design Fees, including approval of Form 001, 002 & 003.
→ Network Rail Project Management.
→ Land Purchase Costs.
→ Compensation for loss of income / inconvenience.
→ Costs to reinstate land following works.

The total capital cost for all four bridges is shown in table 4.15 on the following page.

For further information regarding sustainability and cost on the standard footbridges, refer to **Appendix D and E** for additional material concerning each of the standard footbridges.

4.6 Comparison

4.6.19 Lifecycle cost
A high-level lifecycle cost (LCC) comparison has been made to consider the LCC differences between the different standard footbridge designs described within this Design Manual, and to therefore support the footbridge option selection.

The LCC typically follows the RICS NRM 3 CROME model, which considers Capital, Renewal (replacement), Operational, Maintenance and End of Life costs (as relevant to the scheme). This high-level LCC comparison specifically considers the capital and renewal (replacement) cost differences associated with the options as relevant and available at this stage.

Renewal costs are deemed to be the cyclical (expected) renewal of assets and components at the end of their service life. Sources of renewal cost information include previous NR schemes, EPDs, BCIS component lives and CIBSE Guide M.

Minor replacement and repair costs have been considered at high-level and for indicative purposes for the likes of roof and cladding assets and are deemed to include the minor intervention for replacement of parts over the life of the asset.

Note that maintenance has been excluded at this stage due to the variability in maintenance impacts and implications across the options. Refer to the assumptions section of this report for additional information on maintenance considerations.

The LCC analysis has been prepared for a 100-year period of analysis. Costs calculated within this high-level LCC comparison have been shown in today's value and aligned to capital cost plan base date costs (without any adjustment for general price inflation or deflation) and as discounted present values using the HM Treasury discount factors, for comparison purposes.

This LCC comparison has therefore been prepared for comparison purposes only and considers the LCC cost differences associated with the in-scope assets and works within each design option at this stage. The LCC does not consider impacts on the wider network operations resulting from these works. Additionally, the analysis does not consider any LCCs associated with existing assets within the area which are not part of the scope of the design options and therefore, this LCC.

Additional information about this LCC and the assumptions for the calculations can be found in appendix D of this Design Manual.

	Covered				Open			
	Beacon	Ribbon	Frame	AVA	Beacon	Ribbon	Frame	AVA
Capital cost	£ 2.901.000	£ 2.761.000	£ 3.078.000	£ 2.644.000	£ 2.516.000	£ 2.288.000	£ 2.655.000	£ 2.403.000
Major and minor replacement costs	£ 8.559.000	£ 6.904.000	£ 9.029.000	£ 7.393.000	£ 7.002.000	£ 6.656.000	£ 7.943.000	£ 7.262.000
Total costs	£ 11.460.000	£ 9.665.000	£ 12.107.000	£ 10.037.000	£ 9.518.000	£ 8.944.000	£ 10.598.000	£ 9.665.000
Total discounted costs	£ 4.642.000	£ 4.168.000	£ 4.887.000	£ 4.138.000	£ 3.967.000	£ 3.662.000	£ 4.256.000	£ 3.881.000

Table 4.15 Costs of the standard footbridge designs in station environments

4.6 Comparison

On the next pages the four standard designs will be compared in pie charts based on the earlier mentioned topics.

Now, it is your job to figure out which design to choose based on your preferred project!

4.6.20 Choice of standard footbridge design
On the following pages, the standard footbridges will be compared within the previously described topics: context, passenger experience, safety, maintenance, buildability, sustainability, and cost.

Within each topic, the different designs have been rated with a score of 1 to 3, so that it is easy to see how the bridges score within the respective topics. The more complete the pie chart is, the better. Therefore, cost should here be read as cost effective.

It is crucial that the scoring is not perceived as a mathematical sum, but that for each project it is assessed which topics are the most important for the specific project, its priorities, and opportunities. For example, context may be important for one project, while in another it is essential to prioritise sustainability and cost. The expectation is that the comparisons in this Design Manual will form the basis for good discussions about each project's priorities and that, based on this, it will be possible to choose the desired design.

Further information on how the scores have been calculated can be found in the Appendix, where the categories and subtopics are also listed.

Please note that the bridges in the scoring are assessed within each typology of covered and open, and therefore the covered bridges cannot be directly compared to the open bridges. Similarly, the bridges cannot be compared with bridges in non-station environments in the scoring.

For further information on each of the standard footbridges beyond this manual, refer to **Appendix A** for links to additional material.

4.6 Comparison

4.6.21 Comparison of covered standard designs

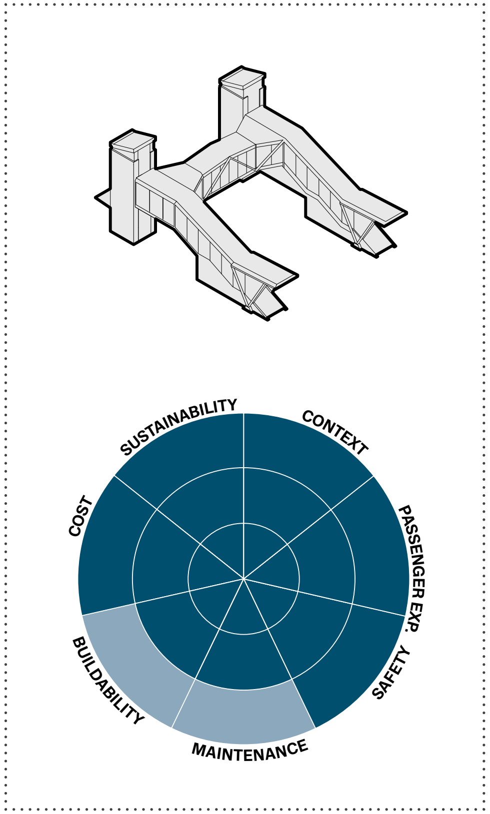


Image 4.50
Beacon covered

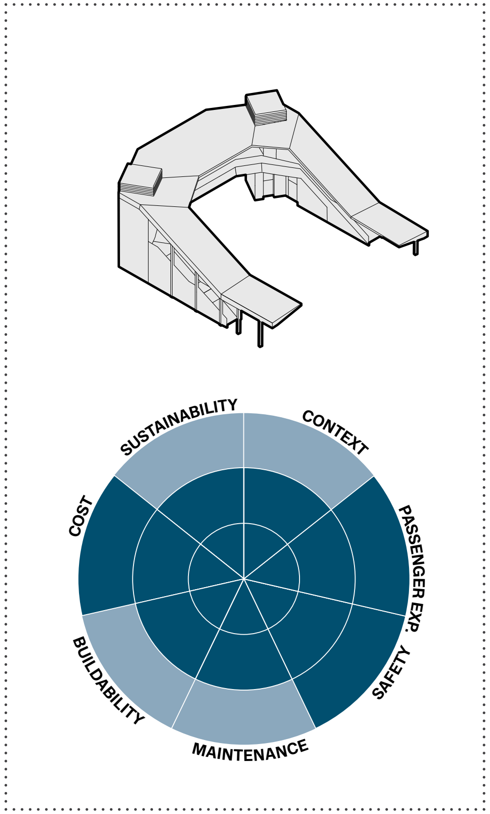


Image 4.51
Ribbon covered

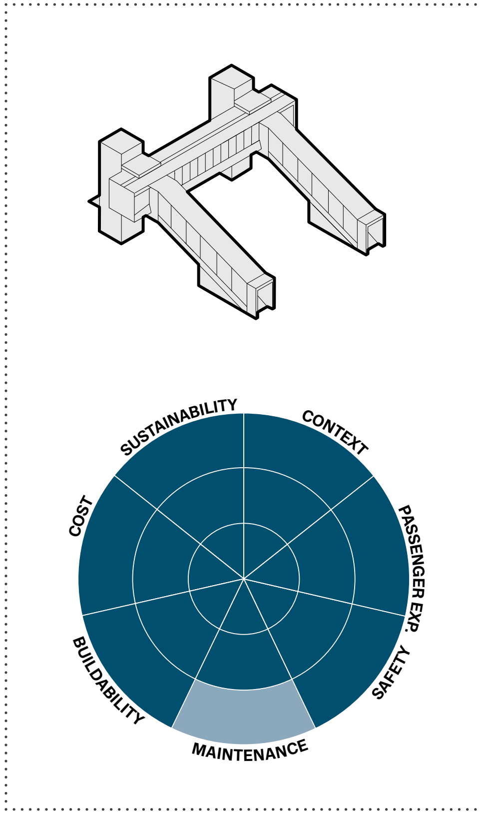


Image 4.52
Frame covered

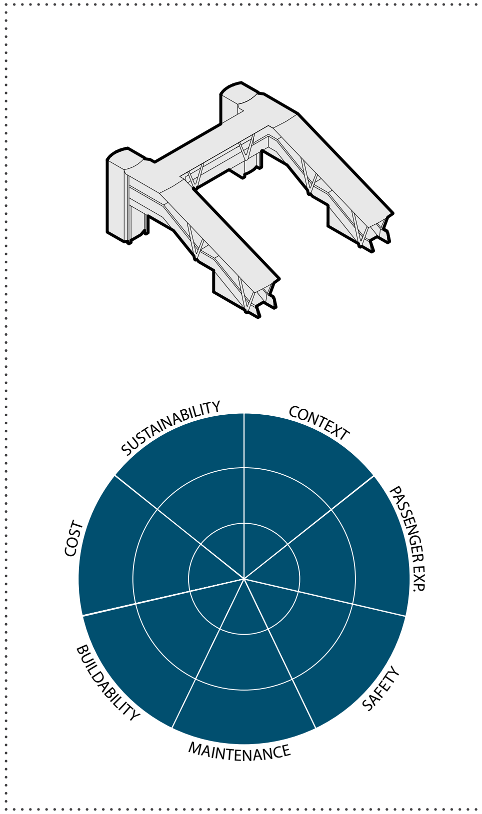


Image 4.53
AVA covered

4.6.22 Comparison of open standard designs

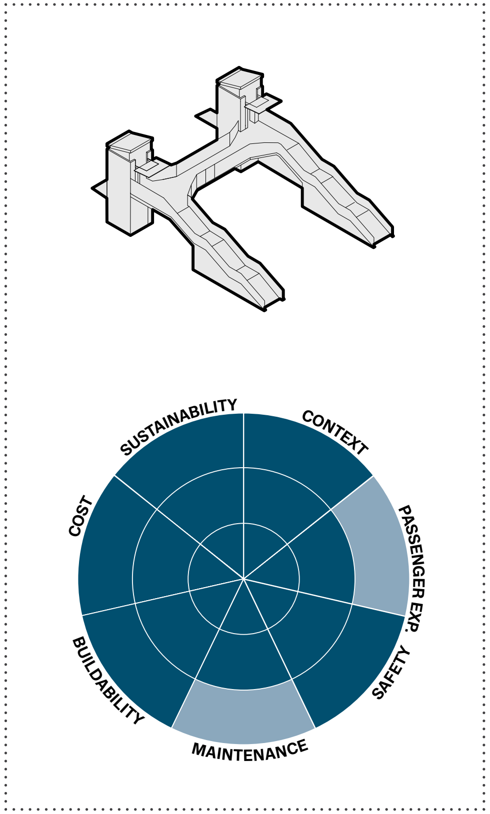


Image 4.54
Beacon open

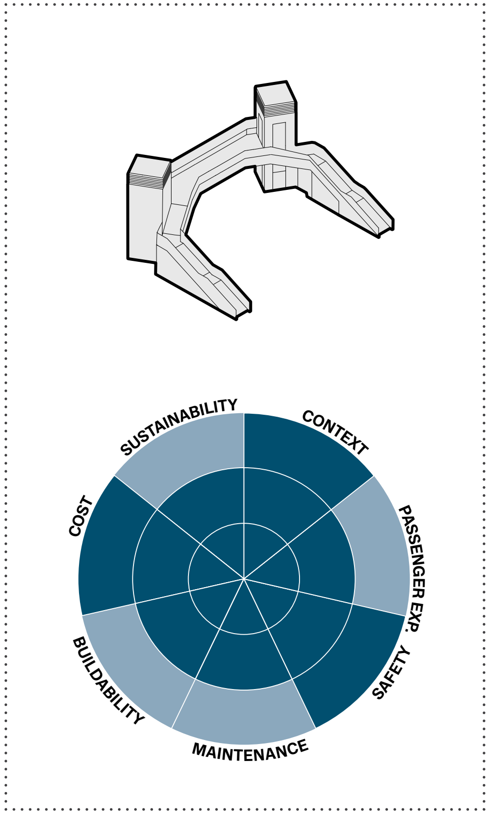


Image 4.55
Ribbon open

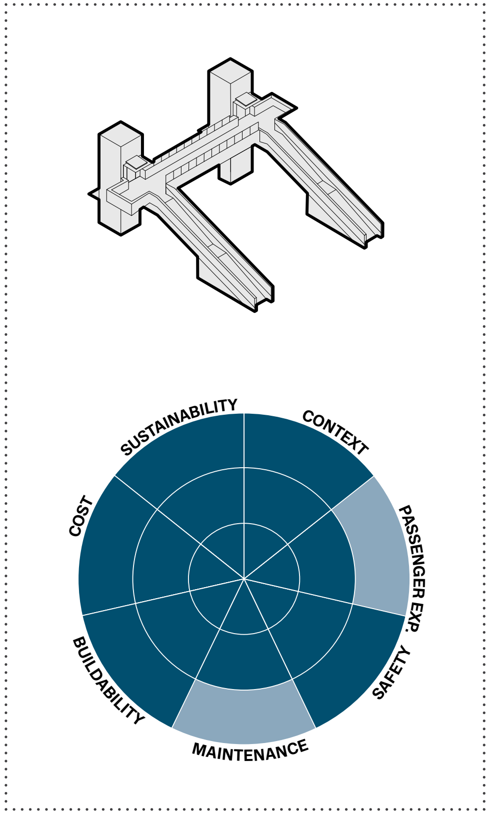


Image 4.56
Frame open

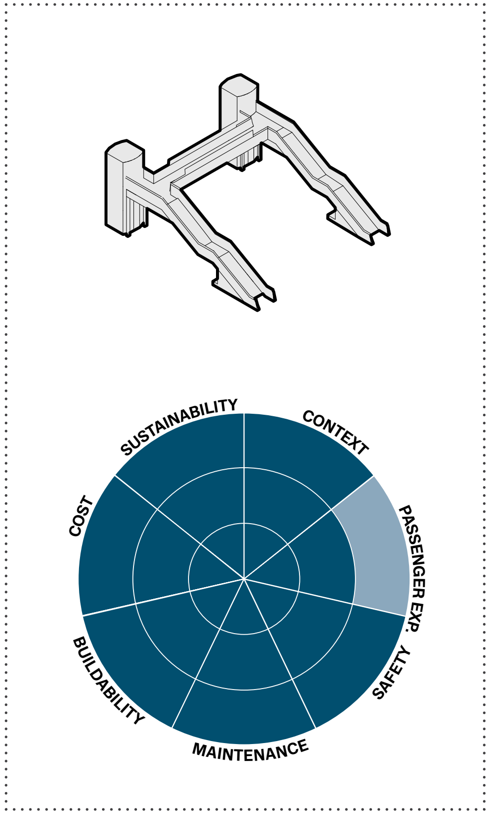


Image 4.57
AVA open

4.6 Comparison

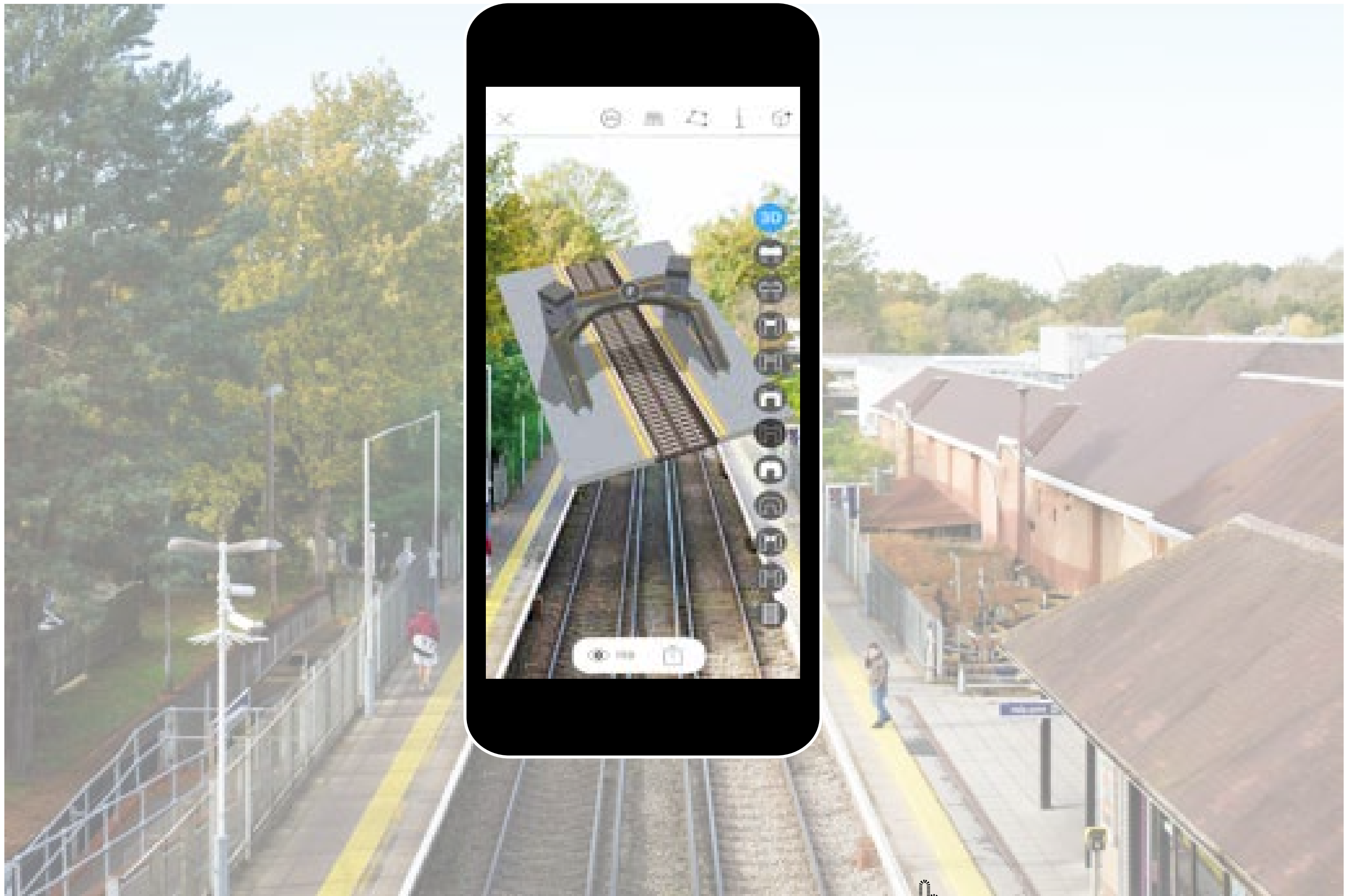


Table 4.58
Download the "Arki" app on to your mobile phone

4.6.23 Augmented reality (AR)
NR has developed an AR tool to test standard bridges in specific environments. It is possible to download an app with the tool to your mobile phone. The app called "Arki" allows you to point to a desired standard bridge, and via the camera on your mobile phone it can be placed over a selected location. The 3D model of the bridge can be rotated, scaled and positioned so that it eventually looks as if it has been built in reality.

See link to app in **Appendix A**
or search for ARKI app on your mobile phone

4.7 Next Step

4.7.1 Your chosen design
Based on the previous comparison of the standard bridges, hopefully it has been possible to choose the design that fits the specific project.

The selected design is presented in this Design Manual in its standard version, but it is important to also focus on the variants available for each bridge design. For example, consider if a version with a wider staircase or bridge should be chosen to accommodate the expected number of travellers.

In the appendix of this Design Manual, there are links to other relevant documents for each bridge design, as well as more general documents.

Guidelines to where the chosen bridge should be located on the platform are not part of this design manual, but it should be assessed where the bridge is best placed to allow the most optimal flow for travellers. Further it should be assessed how to best get from platform to platform as well as considered how the bridge best relates to other surroundings such as car parks, public paths or other.

For further information on each of the standard footbridges beyond this manual, refer to **Appendix A** for links to additional material.

Image 4.59
Bold coloured staircase

Footbridges and Subways

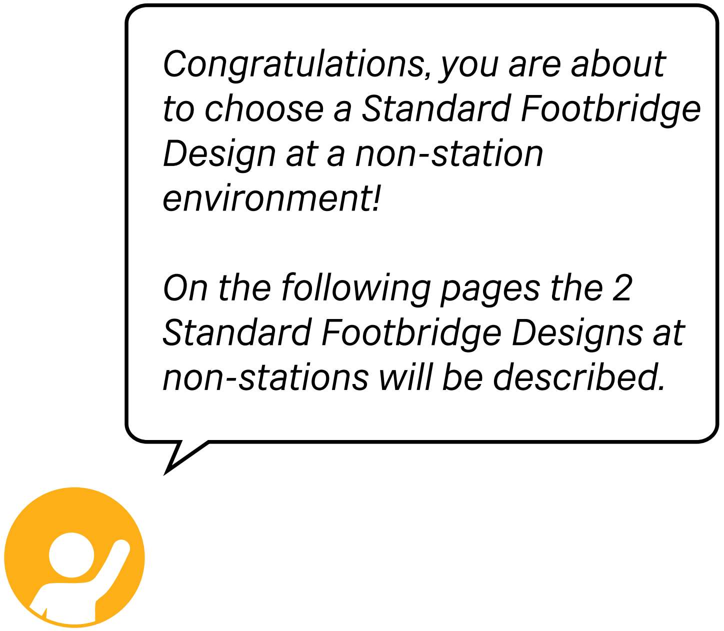
Standard Footbridge Design

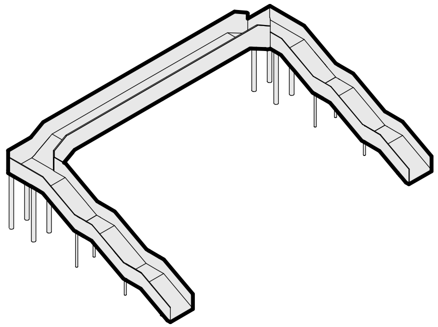
Non-Station Environment

5

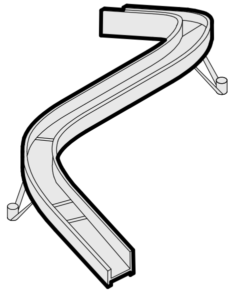
Image 5.1
Flow footbridge design

5.1 Introduction





400-series



Flow

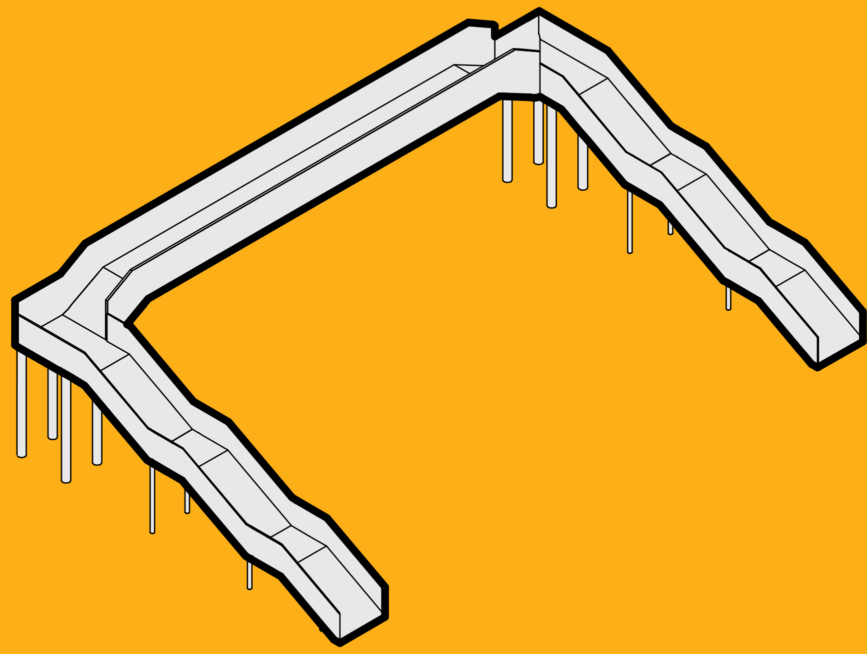
5.1.1 Non-Station environments
Standard bridges in non-station environments have different design requirements than the standard bridges in station environments. Here, lifts are not a requirement, and neither of the two standard bridges here are covered.

This chapter is an introduction to the two standard footbridges for non-station environments and includes a comparison, based on qualitative, functional parameters as well as cost and sustainability. The standard bridge designs for non-station environments are not appropriate to implement in a station environment.

The standard footbridge designs at a non-station environment are further described in section 5.2-5.3.

See section 5.4 for a full comparison between the standard footbridge designs.

For further information on each of the standard footbridges beyond this manual, refer to **Appendix A** for links to additional material.



400-series

5.2 400-series

Image 5.2
The 400-series design at Box Hill and Westhumble Station.

5.2.1. Introduction

This bridge has been built in numerous stations across the UK. The bridge has a very robust and straightforward appearance that fully reflects the fact that it is a straightforward, painted steel structure.

There are no lifts or a roof covering the bridge, so it only meets the requirements for pedestrian bridges in non-station environments.

The generic design is by Network Rail.

Info
→ Built in many places around UK.
Key features
→ The only bridge that is an official standard in a non-station environment.
→ Well known design.

Table 5.1
Info and key features

5.2 400-series

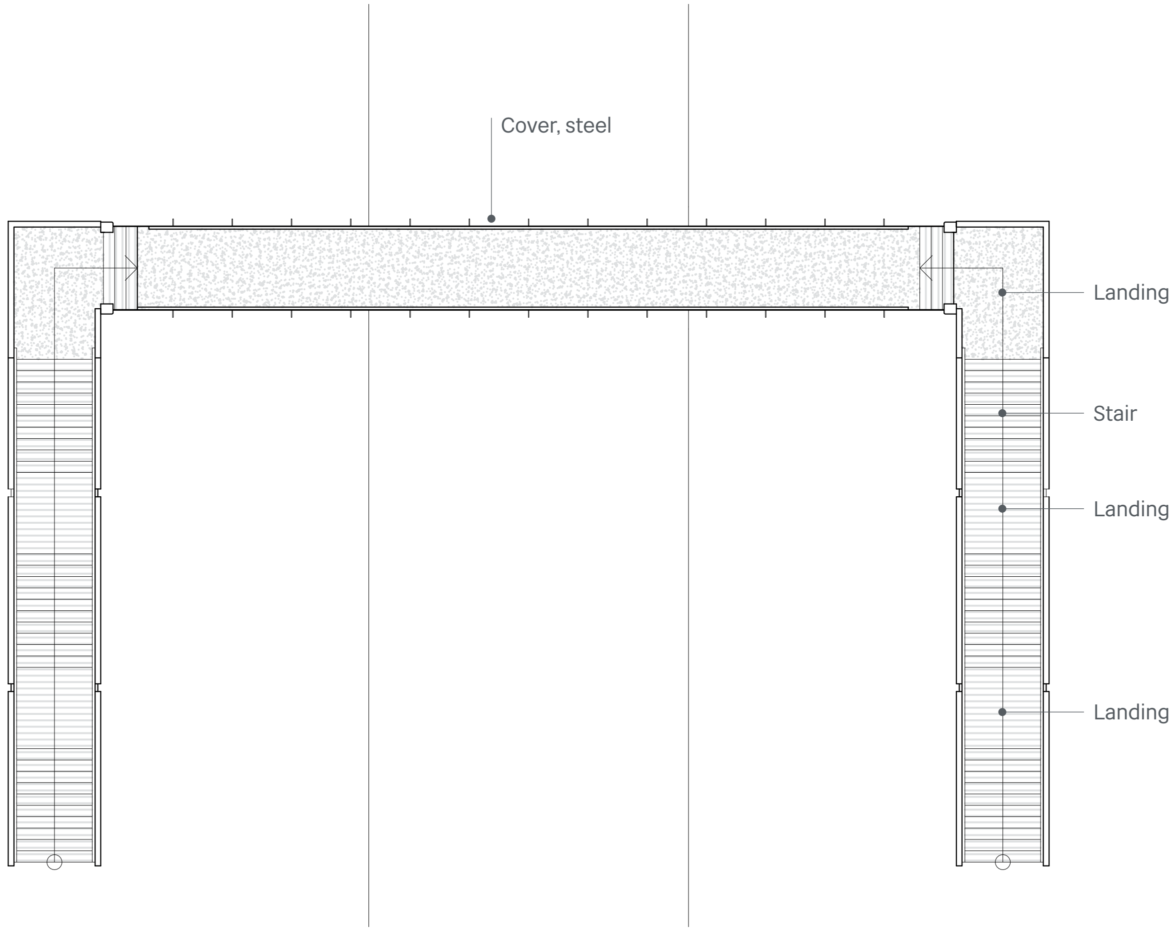


Image 5.3
Plan layout of 400-series standard version, 1:200

Bridge	Standard version	Variations
Maximum span width	26.0 m *	Yes
Deck width	2.0 m	Yes
Roof	No	Mesh
Stair		
Width	2.0 m	Yes
Roof	No	N/A
Landings	3	2 or 4+
Adjustable orientation	Yes	Yes

Table 5.2
Main key facts

The 400-series bridge design comes in variations for site specific adaption and requirements.
*The maximum span is 28.0 m between stair centerlines in the standard version but longer spans might be feasible in a bespoke version of the design.

See section 5.4 for a comparison with the other standard bridge design (Flow) at non-station environments.

5.2 400-series

Image 5.4
Wymington footbridge.

Image 5.5
Enclosed bridge sides at Wymington footbridge.

5.2.2 Overview

The simplicity and robustness of the 400-series bridge design are the primary qualities. The bridge can be painted in different colours, providing some flexibility when integrating the design in various surroundings. The closed steel parapet hides the users of the bridge.

Adding lifts, ramps, roofs or other weather protection to this bridge to provide the functionality required at a station would be a fundamental change to its design and can only be done at the expense of the bridge's qualities. Therefore, the bridge is only suitable for non-station environments.

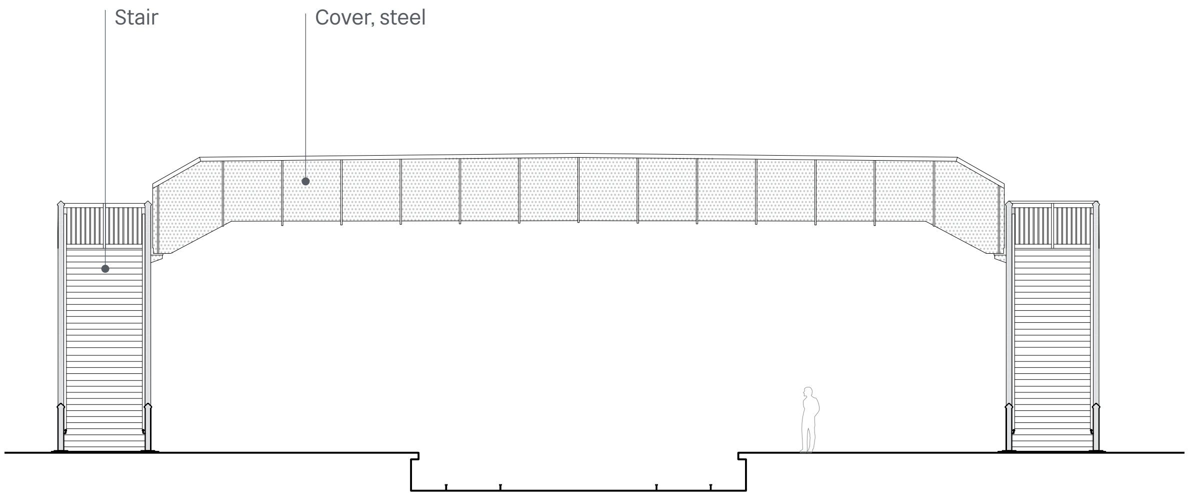


Image 5.6
Front elevation of 400-series standard version, 1:200

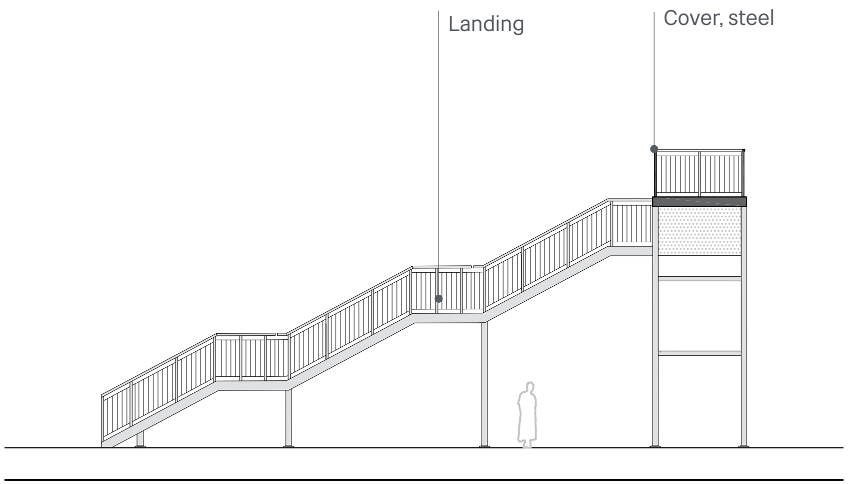
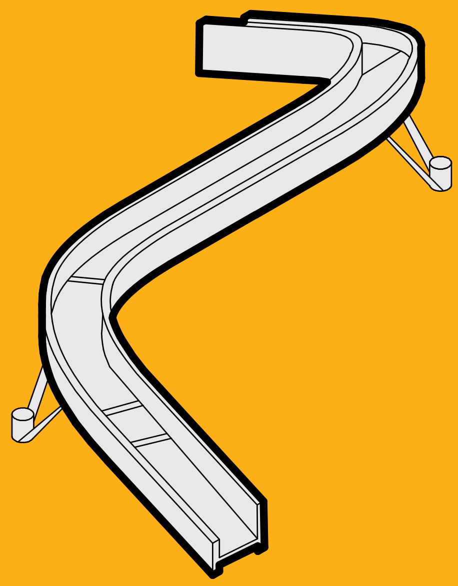


Image 5.7
Cross section of 400-series standard version, 1:200

5.2 400-series

	Pros	Cons
Context	→ The bridge can be painted in different colours, which in some situations might make it respond to local context.	→ Enclosed bridge sides with no use of glass might have a negative visual impact on the surroundings. → Possible version with ramps (not the standard version) might have a large use of space and a negative visual impact. → A limited range of materials respond less flexible to local context.
Passenger experience	→ None.	→ Not suitable for stations. → Not yet designed in a version with lifts which doesn't make the bridge accessible for all users. → Only exists in an open version which limit weather protection.
Safety	→ None.	→ Enclosed sides of bridge makes other travellers less visible, which potentially can create a feel of unsafety. → Unused space under stairs
Maintenance	→ No roof and lifts simplify maintenance. → No use of glass eliminates glass repair. → Solid materials reduce impact from vandalism.	→ Steel should be re-painted over time.
Buildability	→ Very easy on-site construction over the railway. → Limited risk since it is well known for contractors.	→ None.

Table 5.3
Pros and cons



Flow

5.3 Flow

Image 5.8
Aerial photo of the prototype version built in 2023.

5.3.1 Introduction

Flow is a bridge with an elegant and simplistic design that creates a cohesive, smooth curve over the tracks. The stairs follow the curves of the bridge and the glass offers some protection from the wind, while providing good visibility over the low parapet.

The bridge is constructed using materials with a low CO_2 impact.

This is a Network Rail led design with the architectural input provided by Knight Architects.

Info
→ Prototype has been built in 2023 at Craven Arms.
→ Another footbridge with lifts is planned to open in 2025.
→ Not currently designed to be used at stations.
Key features
→ Modern, flowing and open design.
→ Made of lightweight Fibre-Reinforced Polymer (FRP).
→ No concrete used in the structure or its foundations.
→ Modular MMC design.
→ Small component sizes with low lifting weights enabling use of small plant.
→ Built-in monitoring.

Table 5.4
Info and key features

5.3 Flow

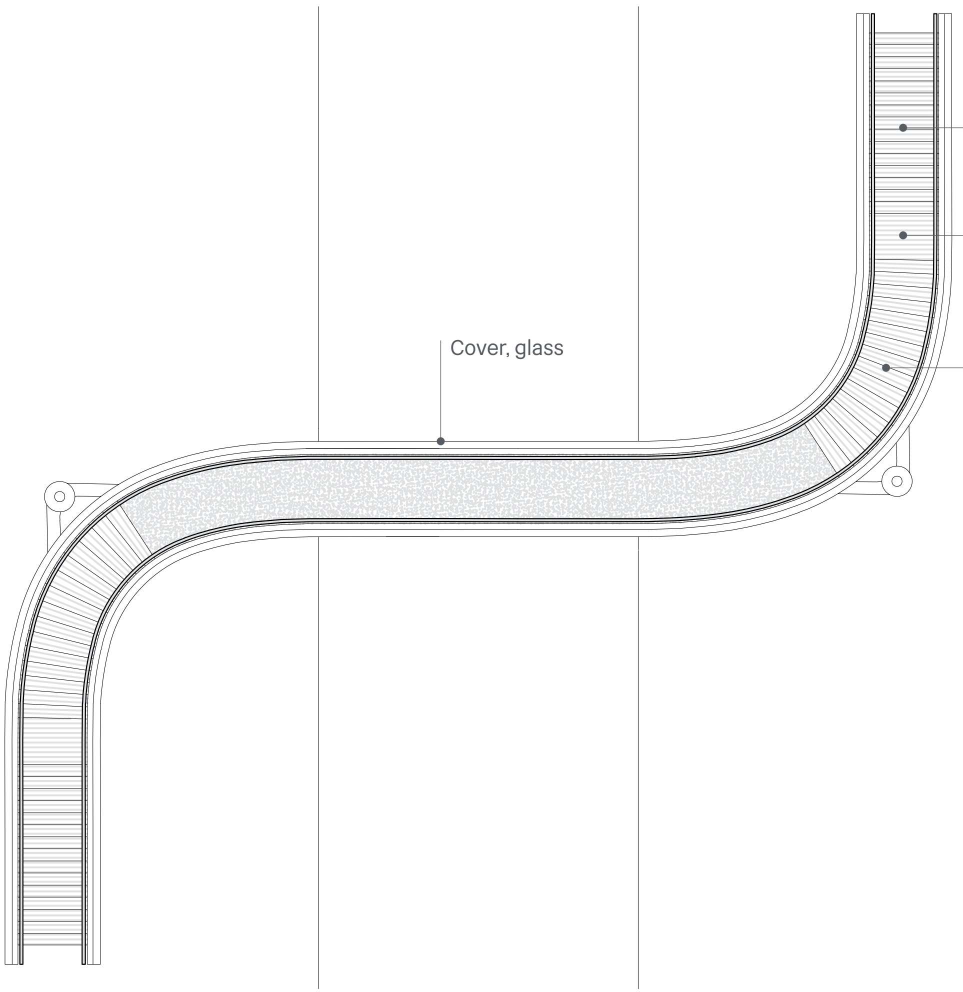


Image 5.9
Plan layout of Flow standard version 1:200

Bridge	Standard version	Variations*
Maximum span width	23 m	N/A
Deck width	1.8 m	N/A
Roof	No	No
Stair		
Width	1.8 m	N/A
Roof	No	N/A
Landings	1	N/A
Adjustable orientation	Yes	N/A

Table 5.5
Main key facts

*The Flow bridge design only comes in a prototype at the moment. Therefore, no variations are listed in the table above.

See section 5.4 for a comparison with the other standard bridge design (400-series) at non-station environments.

5.3 Flow

Image 5.10
Flow bridge where pedestrians are easily visible due to the use of glass on the sides of the bridge.

5.3.2 Overview

Flow is an elegant solution for a pedestrian bridge outside a station environment where no roof, canopy or lifts are required.

The curve of the bridge and the slender bridge piers are design qualities that give it a strong identity.

The construction is made with polymers instead of steel or concrete, which reduces the weight of the bridge and thus the need for concrete foundations. As a result, the bridge has an overall low carbon footprint.

The glass and curved shape allows for great visibility for the users.

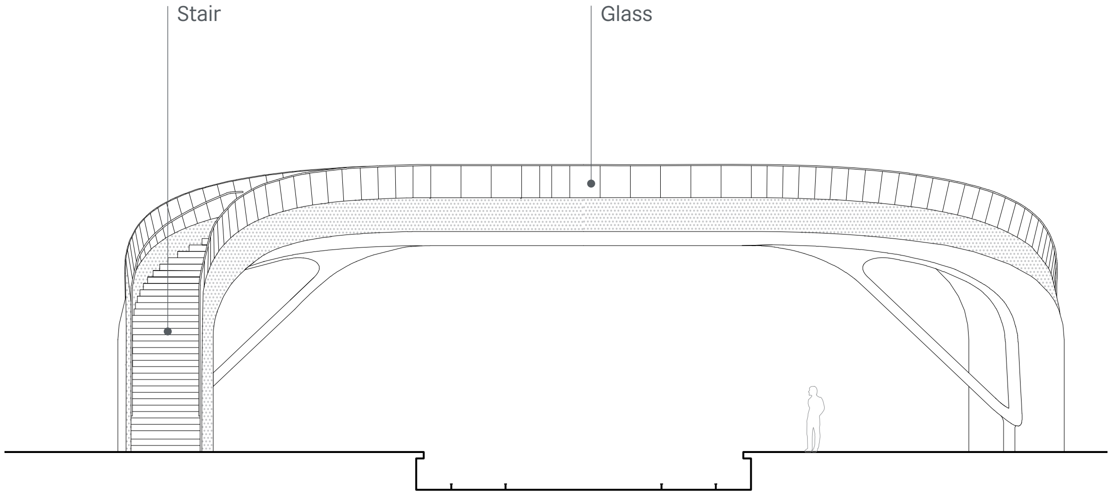


Image 5.11
Front elevation of Flow standard version, 1:200

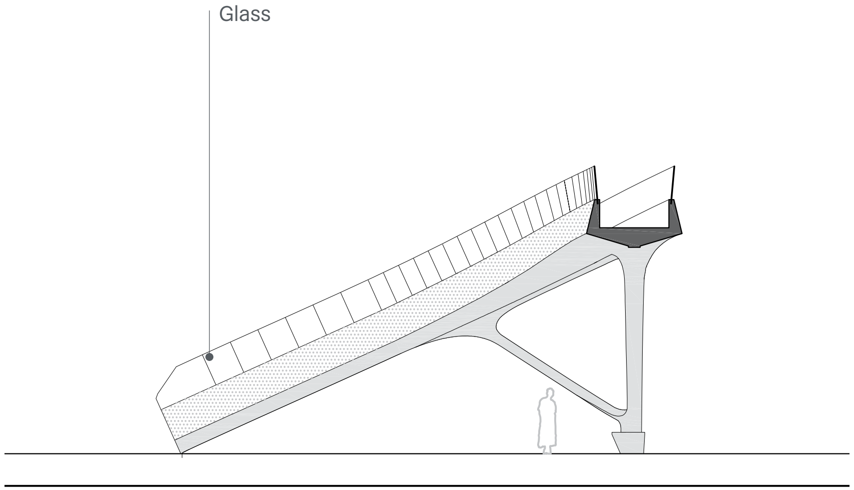
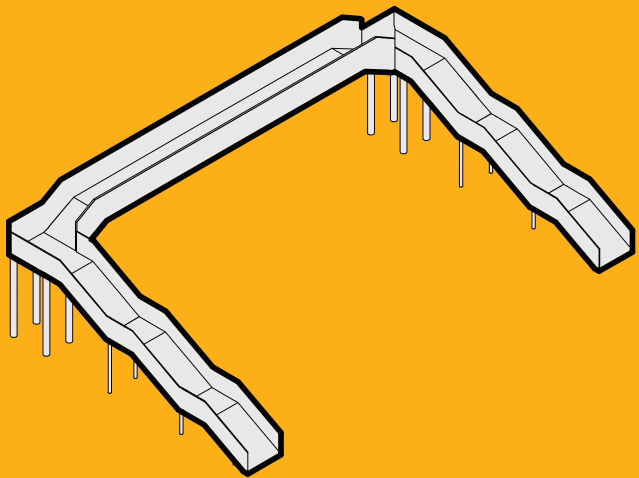
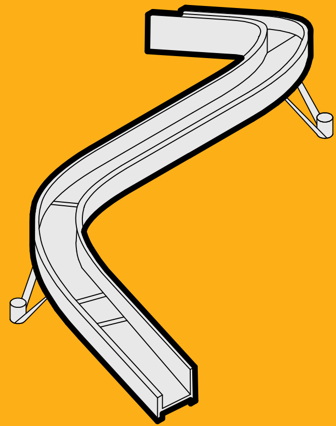


Image 5.12
Cross section of Flow standard version, 1:200

5.3 Flow

	Pros	Cons
Context	→ Clear visual identity. → Light and elegant design.	→ If lifts are added to the design the clear visual identity might be weakened due to the lifts themselves but also the technical rooms under the stairs.
Passenger experience	→ High level of visibility.	→ Not suitable for stations. → Not yet designed in a version with lifts which doesn't make the bridge accessible for all users. → Steps in curves reduce accessibility. → Only exists in an open version which limit weather protection.
Safety	→ Glazing creates good visibility.	→ Unused space under stairs
Maintenance	→ No roof and lifts simplify maintenance.	→ Use of glass might require additional level of maintenance.
Buildability	→ Easy on-site construction over the railway. → Modern and innovative approach to materials with focus on sustainability. → Possible larger span than standard bridges in station environments. → Minimal foundation because of the lightweight nature of the structure.	→ None.

Table 5.6
Pros and cons

Comparison

5.4 Comparison

5.4.1 Bridge

Bridge widths in the two standard designs range from 1.8 to 2.0 m. Note, there are variants in widths for the standard bridges as listed in the previous chapters under each bridge.

The sides of the bridge designs are very different: the 400-series has enclosed steel sides with a lack of visibility while the Flow design with glass is open and more inviting. None of the designs exist in covered versions but both are adaptable to different span widths depending on local context as the number of tracks.

5.4.2 Stair

Both bridges can be adjusted in their stair configuration, so they can be designed as both a “U” and a “Z” shape to suit the expected flow pattern.

The widths of the stairs vary between 1.8 and 2.0 meters but note, the different designs also have variants of stair widths as indicated under each bridge design.

	400-series	Flow
Bridge		
Maximum span width	26.0 m	23.0 m
Deck width	2.0 m	1.8 m
Roof	No	No
Width	2.0 m	1.8 m
Roof	No	No
Landings	3	1
Adjustable orientation	Yes	Yes

Table 5.7 Key facts of the two standard footbridge designs in non-station environments.

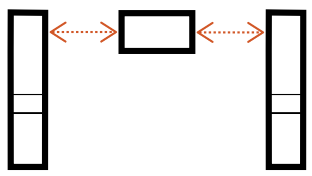


Image 5.13
Adaptable to different span widths.

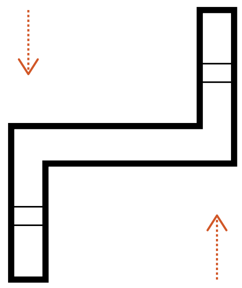


Image 5.14
Directional variation.

Remember that the two standard footbridge designs in non-station environment also exist in alternative versions.

See section 5.2-5.3 for an additional description of each standard footbridge design.

5.4 Comparison

Image 5.15
A footbridge crossing the tracks

Image 5.16
Pedestrians on a footbridge

5.4.3 Context

There is a big difference in the visual impact of the two different bridge designs. The 400-series design has the largest visual impact due to the enclosed steel sides on stairs and bridge. On the other hand, the Flow design has a more modern, flowing and open appearance with its light structure and use of glass.

The architectural language is also very different between the two standard designs which should be considered when choosing the bridge design for the specific location.

5.4.4 Passenger experience

Since both designs have no lifts, they are not suitable in station areas. This limitation hinders some users in getting across the tracks in the standard versions of the bridge designs. Although, the 400-series exists in a version with long ramps, a vertical rise of more than 2m is not compliant with BS 8300. If the DIA establishes a requirement for a lift, an open version of the station bridges should be considered. A lift version of the Flow design is currently under development.

The open sides of the Flow design with glass on either side of bridge and stairs gives a more inviting and open feel for the users.

Both designs only exist in open versions with no roof, and it gives some limitations in terms of weather protection. It is not planned to develop covered versions since it, in a non-station environment, is accepted to have reduced weather comfort across the bridge.

5.4 Comparison

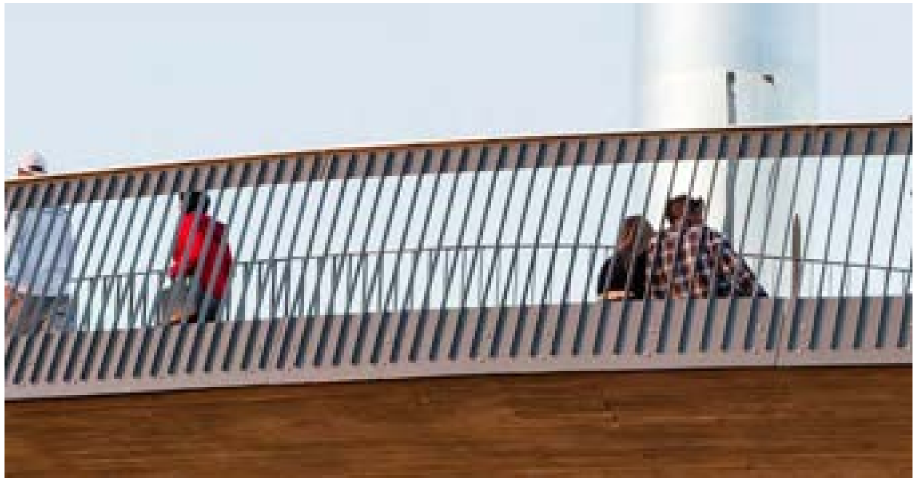


Image 5.17
A view from the platform

Image 5.18
Hoisting a footbridge into position

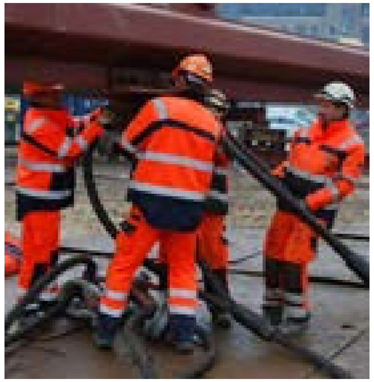


Image 5.19
Preparing the hoist

5.4.5 Safety
In terms of safety and security the 400-series potentially can feel a little unsafe for some users because there is a lack of visibility due to the fully enclosed sides of the stairs and bridge. On the other hand, the Flow design provides a high level of visibility heightening the sense of safety.

In both designs there is unused space under the stairs closest to the ground which in terms of security is not optimal.

5.4.6 Maintenance
The use of steel in the 400-series design makes it very solid and vandal-proof. The bridge should be repainted over time.

Because of the extensive use of glass in the Flow design it is advisable to consider self-cleaning glass to minimise maintenance.

5.4.7 Buildability
Both designs have been built which limit risks in the project. The 400-series has been built at many locations while the Flow design has only been built as a prototype.

5.4 Comparison

Sustainability	400-series	Flow
Embodied carbon (A1-A5)	465	237
Whole life embodied carbon (A1-C4 excl B6-7)	584	532

Table 5.8 Embodied carbon (units: tonnes CO2e)

Cost	400-series	Flow
Capital cost	£ 847.000	£ 1.287.000
Major and minor replacement costs	£ 1.114.000	£ 2.457.000
Total costs	**£ 1.961.000**	**£ 3.744.000**
Total discounted costs	**£ 1.080.000**	**£ 1.757.000**

Table 5.9 Costs of the standard footbridge designs in non-station environments

For further information regarding sustainability and cost on the standard footbridges, refer to **Appendix D and E** for additional materials concerning each of the standard footbridges. Equally, abbreviations are explained in **Appendix A.**

5.4.8 Sustainability

The carbon estimating methodology follows the impact categories identified in RICS Whole life carbon assessment for the built environment (2nd Edition). Both upfront embodied carbon (capital carbon) and whole life carbon were calculated.

The methodology and estimation are similar to the standard station bridges as mentioned in section 4.6.1 and can also be seen in the appendix.

The two non-station environment bridges perform quite differently in embodied carbon terms with the Flow bridge having a significantly lower impact due to the extensive use of fibre reinforced polymer rather than steel. However, if it is assumed that the Flow structure (excluding foundations) would need to be replaced once within the 100-year period of analysis then this increases the associated whole life carbon to a level that is closer to that of the 400 series bridge (albeit still over 50 tonnes lower over 100 years).

5.4.9 Capital Cost

A calculation of the capital cost of the two bridges has been carried out, the total sums are shown in table 5.9. In order to allow equal comparison between the two different bridge designs assumptions, methodology and exclusions have been defined. The full list can be found in section 4.6.11 to 4.6.18 and further information in Appendix E. It should be noted that the capital cost for the Flow footbridge design is based on a protoype version, which is considered less cost effective.

5.4.10 Lifecycle Cost

A high-level lifecycle cost (LCC) comparison has been made to consider the LCC differences between the different standard footbridge designs being considered within this Design Manual, and to therefore support the footbridge option selection.

Additional information about this LCC and the assumptions for the calculations can be found in appendix D of this Design Manual.

Image 5.20
Footbridge handrail detail

5.4 Comparison

Now, it is your job to figure out which design to choose based on the priorities for your project!

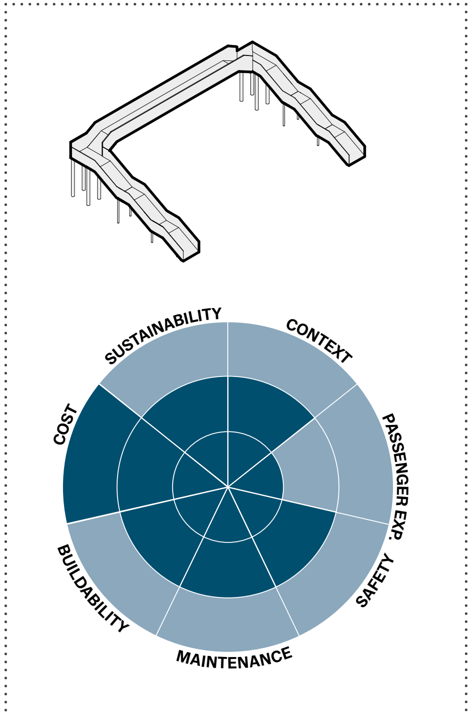


Image 5.21
400-series

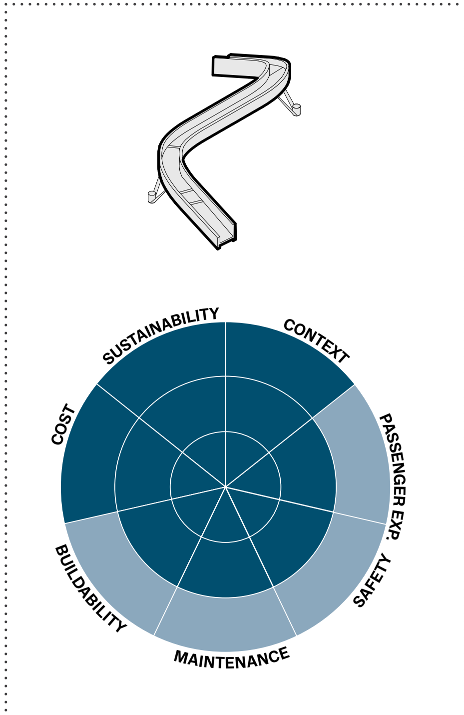


Image 5.22
Flow

5.4.11 Choice of standard footbridge design
The two standard footbridges in non-station environments have been compared within the previously described topics: context, passenger experience, safety, maintenance, buildability, sustainability, and cost.

Within each topic, the different designs have been rated with a score of 1 to 3, so that it is easy to see how the bridges score within the respective topics. The more complete the pie chart is, the better, therefore cost should here be read as cost effective.

It is crucial that the scoring is not perceived as a mathematical sum, but that for each project it is assessed which topics are the most important. As an example, context may be crucial for one project, while in another it is essential to prioritise sustainability and cost. The comparisons in this Design Manual should form the basis for good discussions about each project's priorities allowing for informed decision-making.

Further information on how the scores have been derived can be found in the Appendix C, where the categories and subtopics are also listed.

Please note that the scoring cannot be directly compared to the standard designs in station environments since scoring are assessed within each of the three main typologies: covered and open station bridges and the non-station bridges.

5.5 Next Step

5.5.1 Your chosen design

Based on the previous comparison of the standard bridges, hopefully it has been possible to choose the design that fits your project.

The selected design is presented in this Design Manual in its standard version, but it is important to also emphasise the variants available for each bridge design. For example, consider if a version with a wider staircase or bridge should be chosen to accommodate a high expected number of users. It might also be relevant to consider if one of the standard footbridge designs for stations environment are appropriate.

In the appendix of this Design Manual, there are links to other relevant documents for each bridge design, as well as more general documents.

For further information on the standard footbridges beyond this manual, refer to **Appendix A** for links to additional materials concerning each of the standard footbridges.

For further information about the standard footbridge designs for station environments can be found in Section 4.

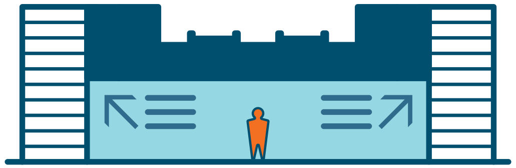
Image 5.23
Flow footbridge design

6

Footbridges and Subways

Bespoke Footbridge Considerations

6.1 Introduction



01 Stabilisation / Maintenance

Limited works to be carried out to an existing subway.

This may include areas such as:

→ Improving lighting and signage
→ Structural remediation
→ Management of water ingress and degradation

02 Upgrade / Provision of Step Free Access

An existing subway requires substantial works.

This may be an upgrade focused on improving accessibility, or a project to carry out structural upgrades or provide new finishes.

03 New Subway

A new subway is required.

New subways offer many advantages over footbridges, such as reduced travel distance, less interface with the live railway, and minimal visual impact.

New subways should create generous and legible space, where natural wayfinding is maximised, and natural lighting is used as much as possible.

6.1 Introduction

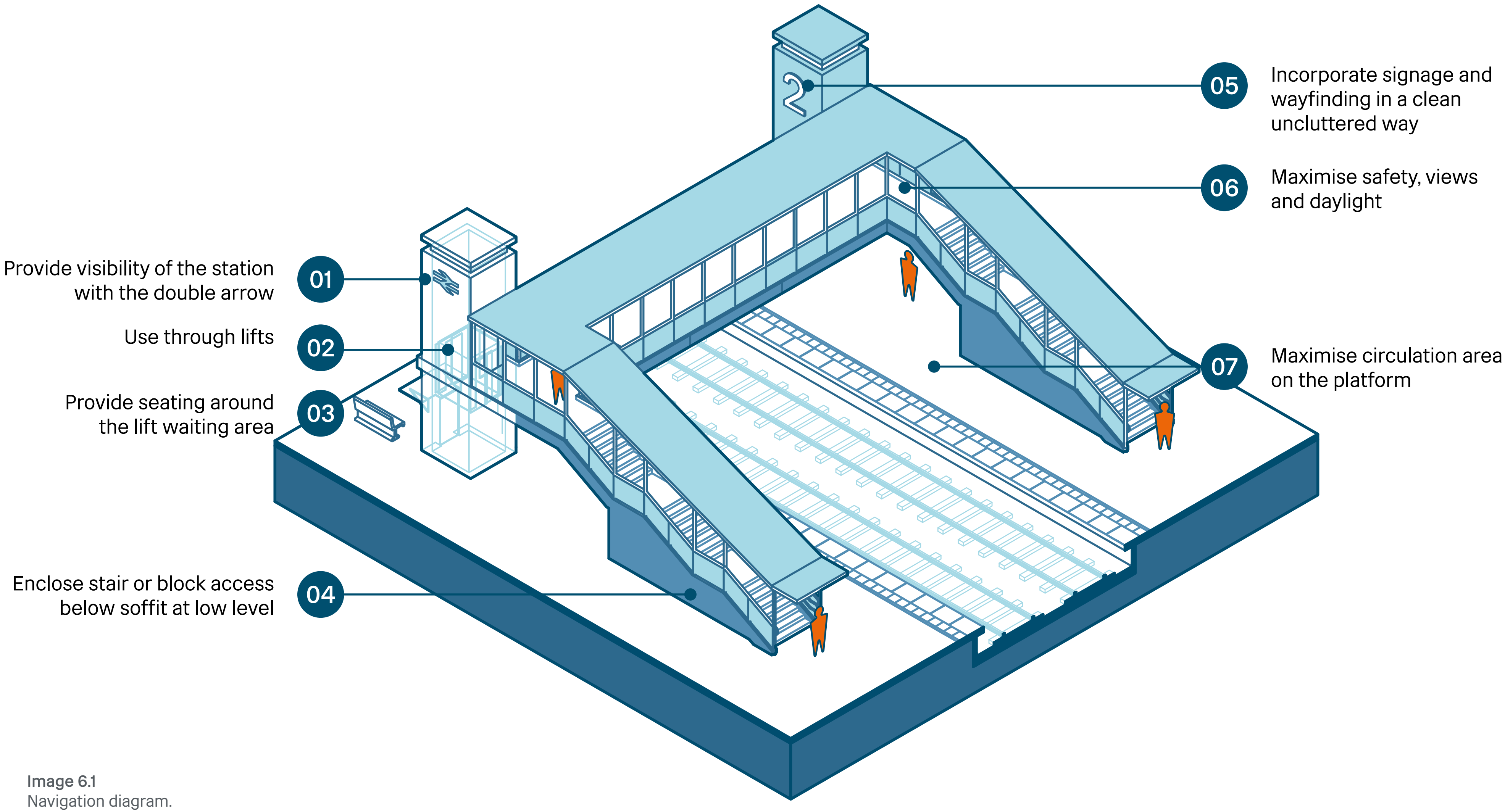


Image 6.1
Navigation diagram.

6.2 Accessibility

6.2.1 Locating the Footbridge

Very often there are various challenges when locating a footbridge.

The footbridge should be located in an area of the platform that is not overloaded, and where it doesn't interfere with the main passenger flows to and from the platforms.

The strategic location of the bridge is ideally in the centre of the platforms and near the entrance, but it might also end up being located at the ends of the platforms due to local constraints, however the travel distance to the footbridge and lift should be as short as possible, to assist all station users.

Stairs, lifts and ramps should all be visible, if possible, as intuitive wayfinding is much more effective than reliance on signage.

6.2.2 Accessibility

The design of stairs is very important. Poorly designed stairs can create a barrier for a large proportion of passengers including those with cognitive, sensory and mobility disabilities.

Lifts are an essential feature for people who are unable to climb steps, including wheelchair users and some ambulant disabled people where the change in level is greater than 2 m and where there is no space to provide a suitable ramp. Lifts are also helpful for older people and families with young children.

Passengers with luggage should always have the option to use lifts rather than stairs and escalators, for safety reasons.

It is vital that a lift's size is appropriate for the intended pedestrian flow. It should be accessible for all users including people using mobility equipment.

Lifts should be designed to be obvious on the approach to stairs and escalators at all levels. This message should be emphasised by using colour, tone, lighting and signage.

Diversity and inclusion assessments (DIA) and consultations with the Built Environment Accessibility Panel (BEAP) are an integral part of the design process. In addition, an access consultant should be part of the design team.

Standards Reference

Persons with Reduced Mobility — Technical Specification for Interoperability
PRM NTSN

Design of an accessible and inclusive built environment — Code of Practice
BS 8300

6.3 Existing Footbridges

6.3.1 Maintaining Existing Structures
Regular inspection and maintenance is vital for managing structures that are fit for purpose and not degrading. Coatings and paint finishes also have an important role to play in protecting a structure from rust and weathering, in addition to maintaining the appearance.

Structures of different design and from different historic periods require different maintenance regimes and have separate challenges associated with them.

6.3.2 Upgrading Existing Structures
Existing structures often contain many non-compliant finishes and do not meet current standards for accessibility.

Some of these issues can be rectified by upgrading treads, deck surfaces, and installing modern handrails. Care should be taken with heritage structures so that upgrades do not harm the existing structure and that any changes are compliant with legislation and guidance. The Railway Heritage Trust may be able to advise and recommend the right approach in such instances.

Network Rail's Heritage Care and Development Guidance provides advice on the procedures to follow in case the station or railway property is listed or located within a conservation area.

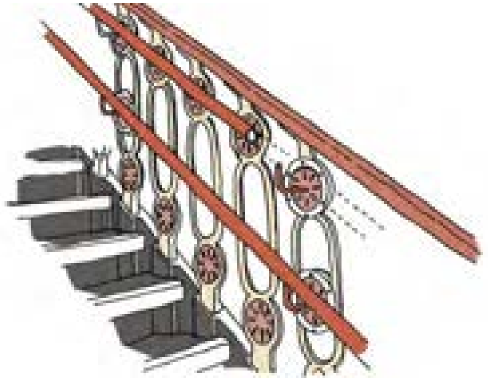


Image 6.2
Upgrading Handrails. Example from Llanfairpwll station footbridge.

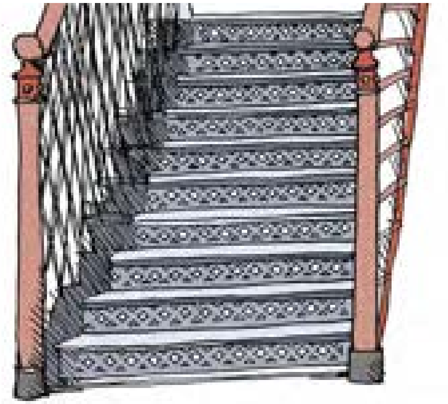


Image 6.3
Existing, Non-compliant Features. Example of open risers that are not permitted on electrified lines.

Image 6.4
Maintaining Structure and Finishes. Aging structures require appropriate treatment and finishes.

Standards Reference
Heritage Care and Development NR/GN/CIV/100/05

6.4 Context

Image 6.5
Using Traditional Materials. Stone facing detailing to new lifts at Wellingborough station.

Image 6.6
Modern approach to differentiate new additions. At King's Cross station the lift shafts have a modern simple aesthetic, with colour tying the lifts to existing structure.

Image 6.7
Modern materials and detailing. At Clapham Junction station lift shafts and new staircases have been fitted to the existing footbridge.

6.4.1 Impact on Context
In most instances, the new footbridge will be built in an existing station which is likely to have a distinctive architecture related to the time of its construction. Many UK railway stations are listed or within conservation areas.

The addition of a footbridge has significant visual impact. The lift towers often are the tallest elements and are likely to have the highest visibility. Care should be taken to locate them in a way that minimises impact on the station and its setting. Siting of the footbridge and the choice of materials can help mitigate the visual impact. This should be done whilst balancing the accessibility needs of passengers.

Where possible, subways should be considered as an alternative approach to footbridges, due to the lower visual impact and vertical displacement.

6.4.2 Aesthetic Considerations
There is not one specific approach to designing in an existing station. Many successful examples use a modern style to contrast with existing elements.

Traditional materials should be considered, and these can also work well when combined with appropriate detailing to create a contemporary proposal that is respectful to the context. Section 7.2 of this document identifies how materials that are commonly used in stations, such as brick and ceramics can be used in a variety of ways.

Pastiche approaches should be avoided, particularly where there is not a clear distinction between new and existing elements.

6.5 Environmental Impact

The visual and environmental impact of railway footbridges can be considerable and in small stations they can be the most prominent visual element. It should be noted that where a subway is feasible, the vertical displacement can be halved in comparison with a footbridge (whose deck is typically 6m high), with great benefits to the passenger flow and accessibility. This advantage, not to mention its low visual impact and lower maintenance costs, is why subways should always be considered as alternatives to footbridges.

Functionally, there are three generic types of footbridges on the network:

Public Path — These bridges do not serve stations and are typically simpler, often without the need for stairs and lift, and usually do not require roof cover.

Station — These bridges involve movement of passengers, sometimes in large numbers, between platforms and the station entrance. Normally they require roof cover (see Appendix B).

Combined — These bridges combine Station and Public use, usually with a separating barrier between the two. It is not uncommon also to see the two functions completely separated, with two bridges in one station location.

The proximity of the structures to residential premises, potential for loss of privacy and the impacts of lighting from the structures are key considerations that should be considered when designing the new structures.

Although Network Rail benefits from various permitted development rights, in all cases, stakeholders should be consulted and he necessary consents obtained. This should be done by first consulting Network Rail's town planning team regarding any proposals. This team can advise on relevant planning matters, including advice on any consent required. The following is a non-exhaustive list of potential stakeholders and consultees:

→ Local Authorities
→ Community groups
→ Train Operating Companies (TOCs)
→ Local Transport Authorities
→ Environmental Agency
→ Natural England
→ Rail Network Operations
→ Rail Asset Managers and Engineers
→ Rail Safety specialists
→ Station Capacity teams
→ Network Rail Fire Engineers
→ Network Rail BEAP Panel
→ British Transport Police
→ Property Managers and Retail clients
→ The Railway Heritage Trust
→ Environment Agency and Natural England, or Natural Resources Wales, or Scottish Environment Protection Agency and Nature Scot

Image 6.8
Aristotle Lane, Oxford. The form and colour of this public crossing footbridge blends well into the landscape and is barely noticeable from a distance.

Image 6.9
Listed bridge in Appleby station that was salvaged from another station.

6.6 Security

6.6.1 Maximising visibility
Areas should feel open and be well lit, avoiding corners and changes in direction where possible in order to open up clear lines of site, and avoid blind spots. They should be at least partially transparent from 1m above floor level, and enclosed passageways on footbridges should be minimised.

The use of glazing on decks and stairs can open up visual connectivity, reduce the feeling of claustrophobia and increase passive surveillance and the perception of security. Lighting should provide uniform intensity and coverage, and allow all passengers to read information and signage clearly at all times of day.

6.6.2 Use of Materials
Durable finishes that perform well against everyday wear and tear, and are easy to maintain and replace also play a part in creating the feeling of a safe and secure environment. Advice should be sought to achieve the correct security ratings for windows and doors, and specifying materials that perform as expected in all anticipated scenarios.

6.6.3 Designing out unused spaces
Unusable and cramped spaces should be designed out, avoiding accessible spaces under the base of the stairs for instance, that are potential hiding places, and are also challenging to clean and maintain.

6.6.4 CCTV
CCTV coverage should be maximised, with blackspots minimised. CCTV should be positioned to maximise the amount of coverage from each camera. Cameras should be discrete and integrated into the architectural finishes. Cameras that protrude should be avoided and small dome style cameras should be used where possible.

6.6.5 Secure Stations Scheme
British Transport Police (BTP) input is available through the Secure Stations Scheme, and guidance is provided online at the Secure Stations website.

Standards Reference

SIDOS — Security in the design of stations (2018)
Centre for the Protection of National Infrastructure

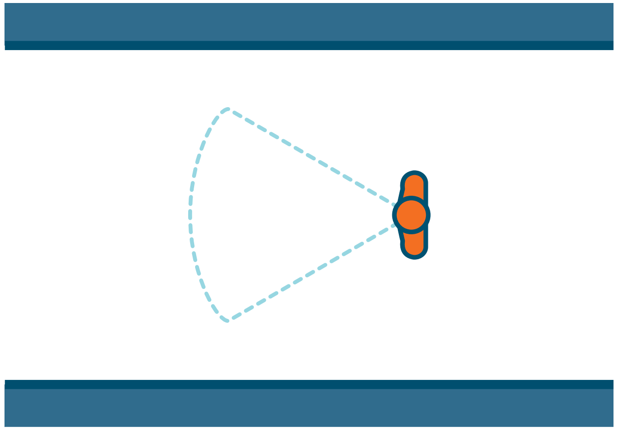


Image 6.10
Clear visibility of routes, no hidden corners.

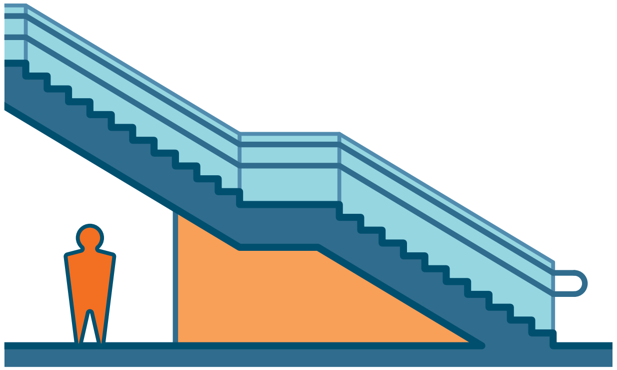


Image 6.11
Unusable space under stairs is avoided or sealed off.

6.7 Provision for OHLE

Image 6.12
Example of footbridge over OHLE at Drem Station

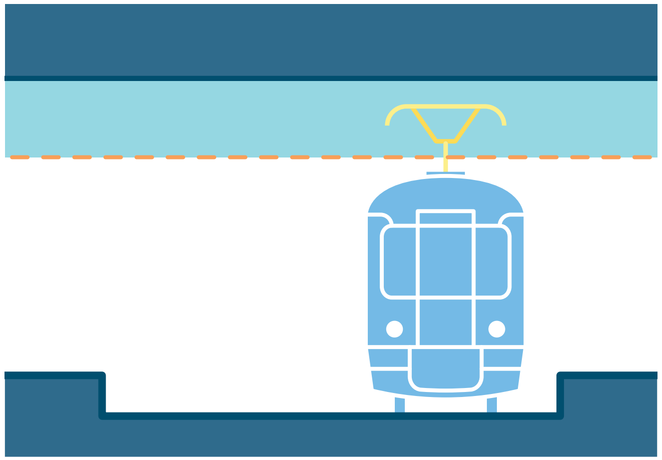


Image 6.13
Space proofing for provision for OHLE zone

Any new bridge being installed over a railway line should be designed with the appropriate clearances and provision to allow for future (or existing) Overhead Line Electrification (OHLE), even if the OHLE is not present and a third rail line is in place as per the requirements in the Infrastructure National Technical Specification Notice (NTSN).

It should be noted that the Standard Footbridge Designs described previously in this document, were designed prior to the publication of standards NR/L2/ELP/27716 Issue 1 - Electrical and mechanical clearances on overhead electrified railways and NR/L2/ELP/27717 Issue 1 - Bridge parapet electrical risk assessment. Although these standards are currently only applicable to existing footbridges, its content has potential implications (yet to be published) for new footbridges as they define the process including risk assessments to set potentially less onerous requirements for the clearance to electrification and thus potentially impact the required minimum height of footbridges over the track and the minimum footbridge parapet heights.

NR/L3/CIV/020 Issue 1 states that parapets over a railway shall not be less that 1500mm high (or 1800mm where the Bridge is frequently used by equestrian traffic or is over an automatic/driverless railway). The term 'over a railway' applies to any parapet within Network Rail land ownership.

Projects that are considering reducing the parapet height contained in NR/L3/CIV/020 and the height of new footbridges over the track, are advised to undertake a risk assessment taking into account the findings of NR/L2/ELP/27716 and NR/L2/ELP/27717, trespass and suicide risks and consider other UK standards which define parapet heights (e.g. CD377 Revision 4 and BS 6180:2011) and liaise with Network Rails' Technical Authority prior to submitting a standards variation application to Network Rail standards.

It should be noted that it is not acceptable, due to the risk of climbing on the handrail and falling from height, to reduce the parapet height to less than 1500m where a second handrail is required. On stairs or ramps where a second handrail is required on an obstacle free route (as per the Persons of Reduced Mobility (PRM) NTSN/Department for Transport Design Standards for Accessible Railway Stations - Code of Practice), projects should include the climbing hazard when undertaking a risk assessment to establish optimal parapet heights on a footbridge in a rail environment ('over the railway' is also considered as a rail environment).

6.7 Provision for OHLE

Image 6.14
Sheffield station — external walkway for maintenance

Image 6.15
Cambridge station — inwardly openable glass panels

Image 6.16
Godalming station — glazing at high level only

There are many examples of footbridges that are enclosed by full-height glass walls and these bridges tend in general to have a more modern appearance. They are usually Vierendeel truss footbridges (3 examples shown above). If the glazing is fixed, the cleaning has to be from the outside, as image 6.14 of Sheffield station demonstrates. If this station had OHLE however, this arrangement would require a maintenance regime that allows for an isolation period of the lines while the glass is being cleaned.

In recent footbridge installations in Cambridge and Winchester stations, the glazed panels were fitted behind the structure and are open-able inwards, refer to image 6.15. However, this solution also requires that overhead lines are not live when the glass is being cleaned.

Different systems can have their own advantages and disadvantages, and the cleaning, maintenance and replacement strategies should be weighed up before deciding on a design approach.

In both Cambridge and Winchester stations there have been issues with the breakage of the glass, giving fully glazed bridges a bad reputation in the industry. However, with the right design and specification, these issues can be overcome.

The BRE (Building Research Establishment) Defects Report for Cambridge Station contains recommendations for future glazed designs, including a demountable handrail installed in front of the glass as a safety feature that also avoids the toughened glass getting scratched by passengers.

At Godalming, shown in image 6.16 the glazed part of the parapet is limited to inward opening windows, avoiding glazing at low level. This provides an acceptable level of protection from any future OHLE provision. Although it integrates well with its location which is a listed station it appears bulky in comparison with the fully glazed examples.

6.8 Glare

Glare is a harsh dazzling light that can affect safety and the ability to see. There are two significant types of glare commonly associated with sunlight. These are:

Discomfort Glare — this causes discomfort without necessarily impairing the visibility of objects.

Disability Glare — this impairs the visibility of objects without necessarily causing discomfort. This type of glare has the intensity to impair vision.

Glare issues should be considered early on for areas of glazing and materials with high reflectivity, such as glazed ceramics, stainless steel, and other metallic cladding systems. Sunlight Reflection Analysis should be used, and further site specific signalling assessments would be required in some locations.

Glass is vital to provide a safe and open environment on the footbridge, so glare reduction should not focus on reducing or eliminating glazing.

Glare can occur from lift shafts and stairs and in many cases these are the primary source of glare, not the overbridge. The angle of the glazing, or other materials can also impact the level of glare. East/ West orientations have been found to have greater reflectivity issues over the course of the day and year than North/South.

The generic designs have undergone Sunlight Reflection Analysis to identify the orientations that might lead to glare issues from the train drivers' point of view.

These studies are not site specific but they give a good indication of the track orientations and times of year when reflections resulting solely from the footbridge might occur.

It should be noted, that in most cases, direct sunlight in the driver's direction is as likely to be an issue as any light reflection from the footbridge.

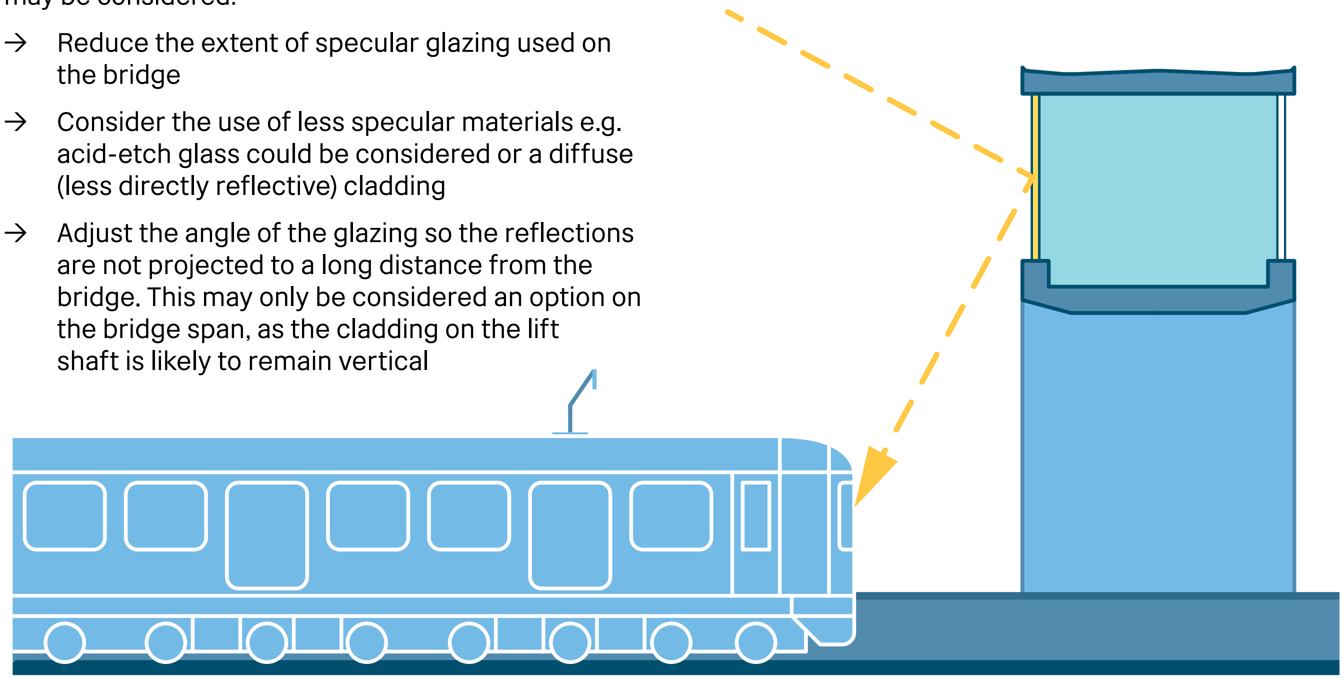
Where glazing is identified as a potential source of discomfort, the following three mitigation methods may be considered:

→ Reduce the extent of specular glazing used on the bridge

→ Consider the use of less specular materials e.g. acid-etch glass could be considered or a diffuse (less directly reflective) cladding

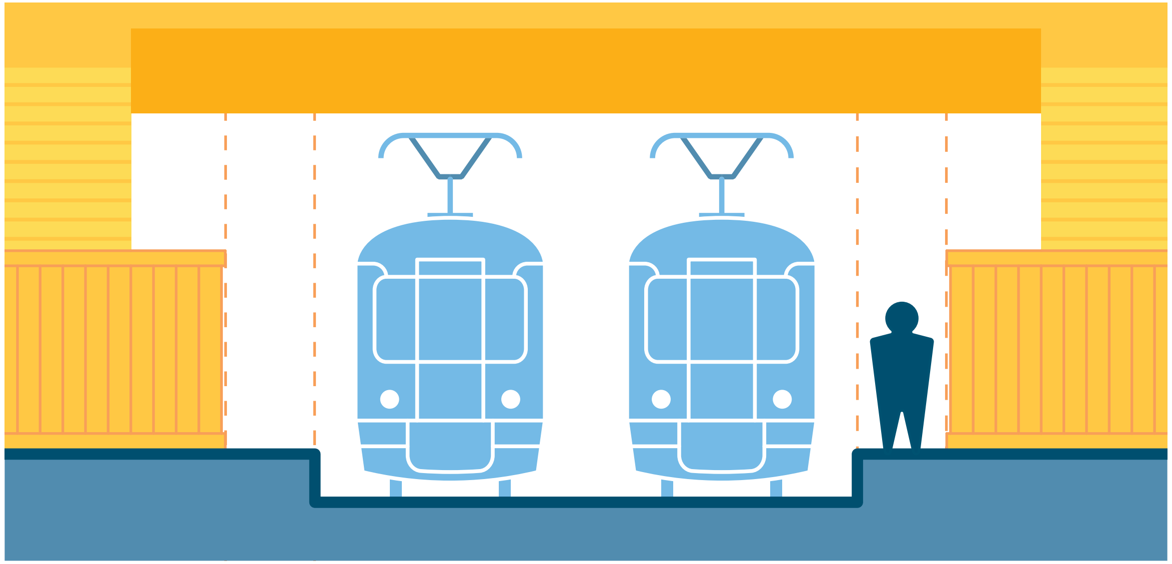
→ Adjust the angle of the glazing so the reflections are not projected to a long distance from the bridge. This may only be considered an option on the bridge span, as the cladding on the lift shaft is likely to remain vertical

Image 6.17
Illustration of glare on a footbridge.



6.9 Constructibility

01 Work over live railway
Projects should be designed to minimise the need for possessions and other disruptions to the railway.



02 Maintaining Platform Width
Work sites should be located to maintain compliant platform widths and should be kept to a minimum with neat tidy hoardings.

Image 6.18
Illustration of construction hoardings

6.9.1 Separation of railway and construction
Safe access is to be provided to the construction site, which is to be segregated from both passenger areas and station operations. Work sites are to be separated from passenger areas using secure hoardings.

6.9.2 Maintaining passenger areas and station requirements
Passenger areas need to meet station design requirements for clear widths, and run-offs during construction works.

Consideration should be given to lines of sight, wayfinding, lighting and ambience for temporary works and scenarios with the same attention as the final condition. Hoardings should not impact lines of sight to signalling equipment and train dispatch equipment. Passengers will be less familiar with temporary arrangements, so good wayfinding should not be forgotten.

6.9.3 Minimising construction over the railway
In the construction of a footbridge there is a need to build over the railway. Where the railway is operational, this should be minimised through using methods such as launching the footbridge or lifting it into place in one piece. The length and number of possessions should always be minimised.

Standards Reference

Interface between Station Platforms, Track, Trains and Buffer Stops (2019)
RIS-7016-INS

6.10 Whole Life Design

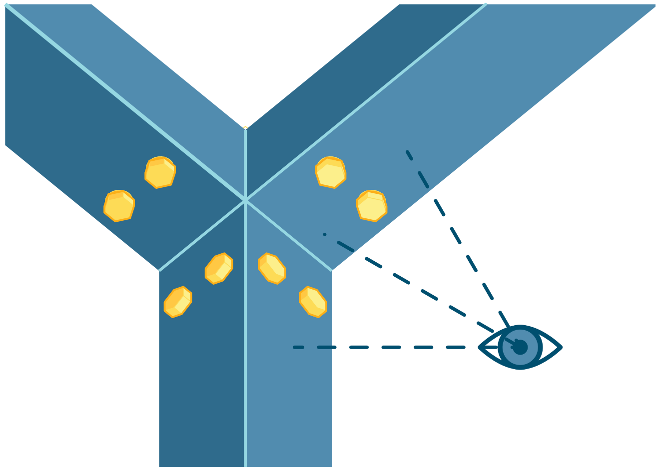


Image 6.19
Expressed Structure and connections:
Elegant exposed structure is easier to inspect as it is always visible.

6.10.1 Maintenance and Inspection
In many cases maintenance can be the largest cost in the lifespan of a footbridge. The following methods can help keep make maintenance more efficient:

→ Keep structural connections visible where possible, minimising the need to remove items or work at height to carry out inspections. Avoid items and finishes that require temporary access to clean or maintain, particularly where above the railway.

→ Use self-finished materials such as brick and stainless steel instead of applied coatings where possible, to avoid the need for regular repainting. Where applied coatings are used, consider products that can achieve a long service life without reapplication.

→ Use standard sizes and components where appropriate. This is more cost effective for sourcing replacements

Consideration should be given at design stage as to how items can be repaired and replaced. This can be challenging for large items such as cladding panels and glazing, which can have substantial weight.

Consider the cleaning requirements and method for all elements. This is particularly demanded for glazing on footbridges, where access to clean is restricted when above live rail.

6.10.2 Operational Costs
Whilst large areas of glass can add to construction costs, maximising natural light reduces levels of artificial lighting required, leading to lower running costs. Energy usage and efficiency should be considered when comparing lift installations.

Standards Reference

Design for Bridges
NR/L3/CIV/020
Design Requirements for Structures
GC/RT 5110

6.10.3 Sustainability
Embodied energy is expressed through two aspects in bridge design: optimisation of structures and through material selection. Optimised design impacts the amount of construction needed. There is also much to gain in material selection, and contemporary sustainability perspectives favour the use of materials with low climate impact, especially in the production phases. This could include biogenic materials, such as wood. In all cases, a life cycle assessment should form the basis for the right decision regarding material selection, lifespans, and expected maintenance. To the extent that materials with relatively high impacts in production phases, such as concrete and steel, are used, it should be specified that concrete with low clinker content cement and recycled steel be used to the widest extent possible.

Energy efficiency means focusing on the operation of the bridge. This includes both lighting and any heating, as well as factors such as winter measures and other energy-intensive operational aspects. Another example of this could be fossil-free construction sites.

The future sustainability perspective is circular. This means that using reusable and recyclable building components and materials in the bridge is advisable. There are several ways to approach this. Looking backward, one possible method is to reuse existing building components and utilise recycled materials, either wholly or partially. Moving forward, the opportunities can be optimised for reuse within this bridge design. Thus, it should be possible to reuse or recycle at all scales and levels, ranging from entire bridge decks to fasteners, to the recycling of clean waste fractions.

The cornerstone of a circular economy is design for disassembly and adaptability. This entails, for example, intuitive assembly details that may also be visible if it serves a purpose. It involves appropriate layering of structures, allowing layers with shorter lifespans to be replaced without affecting structures with longer lifespans. Additionally, it involves avoiding chemical bonds and surface treatments that diminish the materials' ability to be recycled.

Life cycle design takes into consideration the technical lifespan of the main components and life cycle costs and business case. Structures can be differentiated so that different sub-components have different lifespans, and the bridge design allows for the replacement of certain of these sub-components. This could involve, for example, appropriate layering of structures, allowing layers with shorter lifespans to be replaced without affecting structures with longer lifespans.

Our infrastructure solutions and needs are evolving rapidly, influencing the strategic choices we make when initiating new construction projects. Therefore, it is beneficial to consider if the bridge design can support the possibility of reusing entire segments for different or similar purposes elsewhere in the future.

Waste generated at construction sites is more challenging to recycle compared to waste generated at workshops or by manufacturers. Therefore, consider avoiding assembly at the construction site that involves working with sheet materials or battens that need to be cut on-site.

Social sustainability can, for example, be expressed through education and capacity building among local contractors and manufacturers in the form of apprenticeships and more. Similarly, the bridge design should be inclusive for everyone, regardless of physical, mental or social abilities.

6.11 Innovation

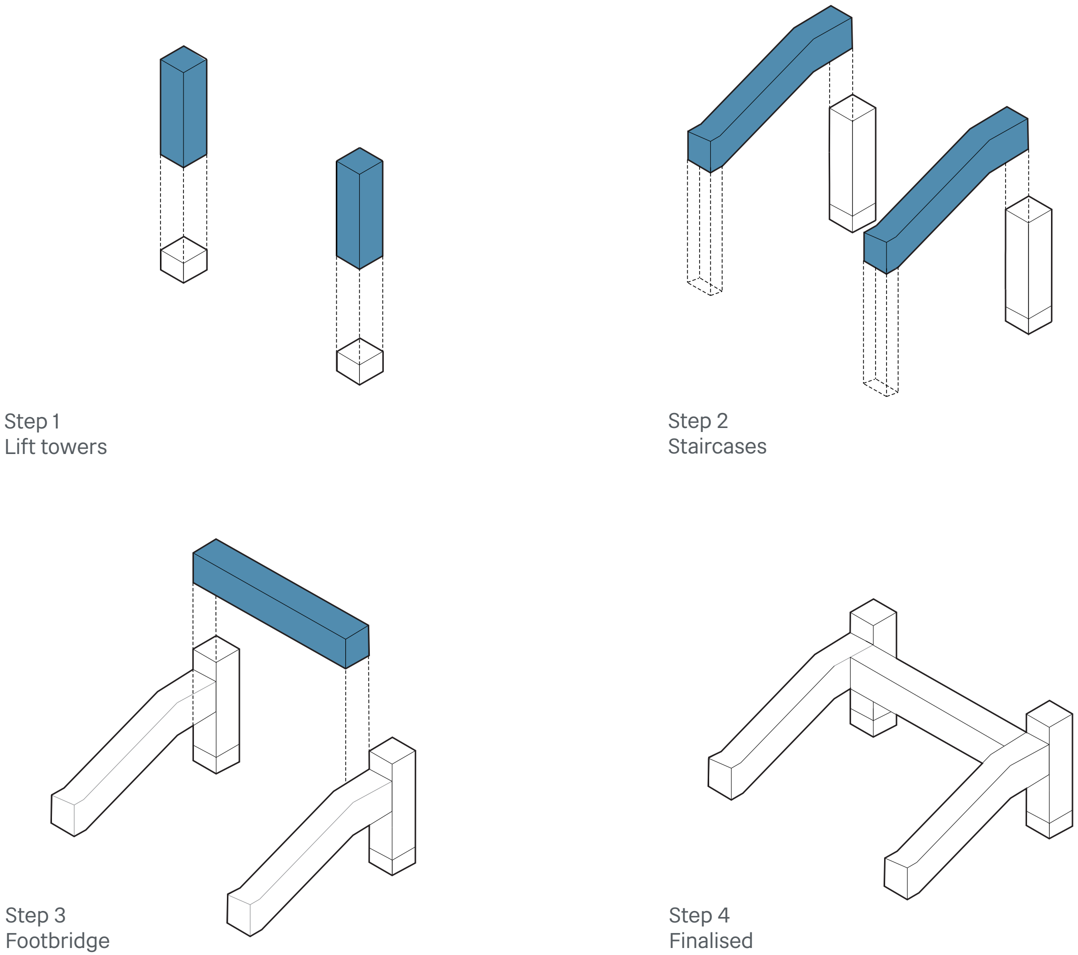


Image 6.20
Steps of implementation of a footbridge with off-site construction.

6.11.1 Modern Methods of Construction (MMC)

Off-site construction methods are particularly suited to footbridge construction, where staircase and overbridge elements are usually suitable dimensions to be delivered to site as a complete element and lifted into place by crane.

Off-site construction minimises the amount of time needed to maintain a presence on site. Site activities often require smaller worksites for the majority of the build, as site tasks are often more focused, for example installing foundations. At many stations space is very restricted, constructing as much as possible off-site can help manage site constraints.

Off-site fabrication has a good reputation for high quality of finish, as the construction process can be well controlled within a factory environment.

6.11.2 Building information Modelling (BIM)

The use of BIM in design can help aid the design and construction process, and the BIM model can be retained for building and facilities management (FM).

Image 6.21
Staircase being craned into place at Sittingbourne station.

Image 6.22
Footbridge element being connected to pre-installed base elements at West Drayton station.

6.11.3 Innovative Ideas — RIBA Competition
In June 2018, Network Rail held an international competition for footbridge design ideas. This attracted 121 entries from a range of architects, structural engineers, civil engineers and students of these design disciplines.

The winning entry, The Framing Bridge has been developed for use as one of the standard footbridge designs, and is described in Section 4.4.

The competition generated a huge range of ideas and different approaches. The full selection is available to view on the Network Rail website.

The ideas submitted cover a wide range of different material approaches, and ways to create great spaces. These entries show a creative variety of ideas and design considerations.

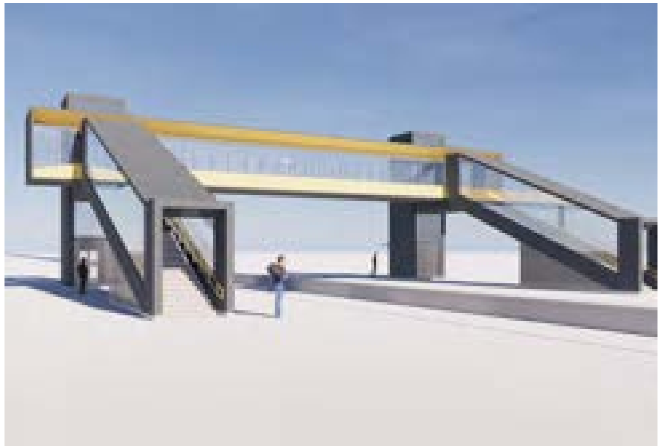


Image 6.23
The Frame Bridge — Gottlieb Paludan Architects, DK with Strasky, Husty and Partners Ltd, CZ.

6.12 Lighting

6.12.1 Lighting
Light with good colour rendering properties shows people's faces well, assisting the facial recognition and thereby the assessment of other passengers. This improves the feeling of security. Cold light can feel clinical, icy, and unwelcoming while warmer light feels nicer, more gentle, almost domestic. The colour temperature should not be colder than 4000K and not warmer than 2700K. Glare from luminaires is highly uncomfortable and makes for a low-quality experience of even the best design. As glare reduces visual efficacy a person affected by glare sees less and thus feels unsafe. Glare can be avoided with luminaires that are well shielded off and by directing luminaires down.

Looking up may be necessary when approaching a footbridge. However, looking up into luminaires can be very unpleasant, so the position and nature of luminaires on a bridge should take this into account. Also, the visual qualities of a footbridge may be contradicted by glary light perceived as low quality.

Overlighting should be avoided as very strong lighting is perceived as put in place to counteract problems such as crime. More light is not necessarily better light.

The number and position of luminaires is important, as passengers standing in or walking through a cone of strong light may feel dazzled as well as exposed to the surroundings, almost like a stage performer. While fewer but stronger luminaires may give the same calculated illuminance as more, dimmer luminaires they are likely to cause such unwanted 'light showers'.

A lift waiting space may have a slightly higher light level to assist the passage of other passengers as well as the smooth interaction between those exiting the lift and those about to enter. A slightly brighter pool of light at the top and bottom steps makes it easier to find the stairs, and safer to use them. The stronger light also nudges users to move on instead of blocking the way for those coming right after. Furthermore, intuitive wayfinding and spatial legibility is assisted by a focused light e.g. where a stair leads up from the subway.

Wayfinding is further improved by illumination of signage and information.

A good view out as well as visual contact to the surroundings is better maintained if reflexions in the glass is limited. This allows footbridge users to orientate themselves and not feel isolated.

Platform lighting under a footbridge should be in place to eliminate dark spaces under a bridge or staircase.

A conscious night-time approach to the design of the lighting in the footbridge can make the bridge look good in the dark hours, making it recognisable as a bridge, easy to find and be as welcoming for the night-time users as for the daytime users.

Image 6.24
Light from the low set fixtures is reflected by the paving onto the passengers whose faces are clearly visible. The experience is embracing and positive, the view of the surroundings is maintained and the luminaries are hardly visible from the surroundings.

Image 6.25
The luminaires are a distinct design element on this footbridge. The light illuminates only the footbridge itself and causes no problems neither to the cars below nor to the trains at both sides of the footbridge.

Image 6.26
Reading station

7

Footbridges and Subways

Bespoke Footbridge Design

Bespoke Footbridge Design

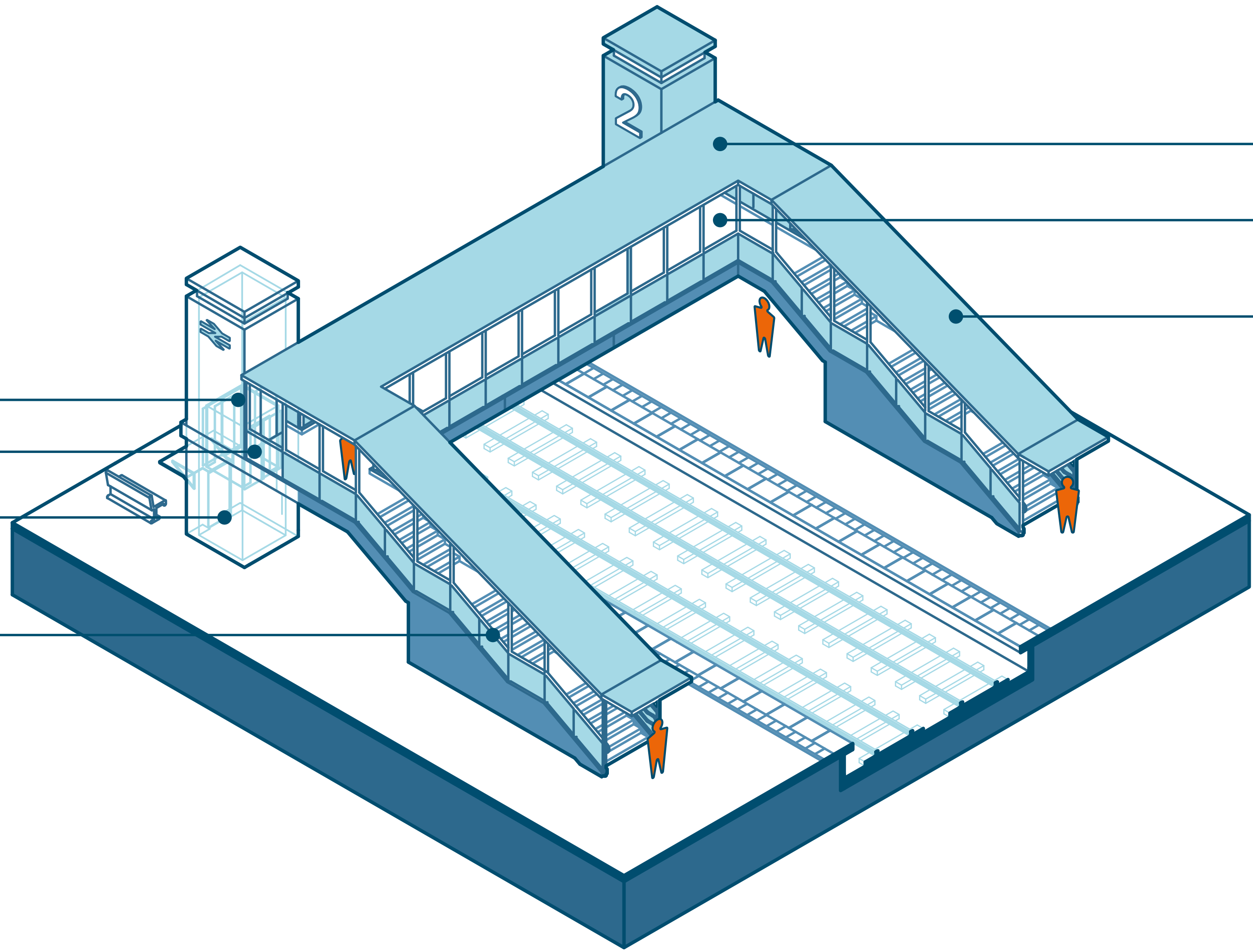


Image 7.1
Navigation diagram.

7.1 Structural Materials

7.1.1 Steel
Most railway footbridge structures are constructed from steel. The main advantage of using steel is that it is strong in tension and can provide relatively light structures. This is a prime consideration in a railway environment that requires off-site fabrication followed by a quick assembly operation on site. A shortcoming of steel is its tendency to corrode. All critical elements that are likely to corrode should be simple to inspect. The electrical conductivity of steel necessitates special isolation measures so that the structure should be electrically continuous. Typically steel bridges are painted in a factory environment to a strict specifications An alternative would be to use weathering steel that provides a natural protection of the steel that improves with time, but this require careful details that will not stain.

7.1.2 Concrete
Concrete is heavy in comparison to the alternatives and this makes it less suitable as a construction solution where quick assembly on site in pre-fabricated sections is required. However precast stairs can be used effectively in conjunction with a steel structure, for instance at Denmark Hill station.

7.1.3 Timber
Timber used to be the natural choice for the construction of railway bridges before it was replaced by steel, predominantly due to issues with the durability of timber. With the new industrial processes of heat treatment and laminating, timber is again becoming an economically viable alternative to steel in the production of lightweight footbridges. Timber also has a less industrial look and feel. In the rail environment it has the advantage of being electrically non-conductive. Unless treated, timber fades to grey over time and this visual aspect has to be taken into account. Colour preserving maintenance treatments are generally not be suitable for a railway environment. Timber is combustible and appropriate preventative measures should be agreed with a Network Rail Fire Specialist. Timber has a substantially lower carbon footprint than other materials, so should be considered where possible, despite its other disadvantages.

7.1.4 Fibre Reinforced Plastic (FRP)
Fibre reinforced plastic has the advantage of being extremely lightweight and durable. It can be designed to take any form or colour and has already been used at some locations. This is a very promising material for the future, however it should comply with all fire requirements, including BS 476 part 21 for fire resistance, and the proximity to other buildings should to be considered. The recycling aspects of this material can however be very problematic and should also be considered.

7.1.5 Aluminium
Aluminium is very light weight and therefore worth considering where weight is an issue. Aluminium is typically more expensive than steel and is easier to dent and scratch.

Image 7.2
Timber bridge at Martins Heron station

Image 7.3
One of a series of FRP bridges in Rotterdam.

7.2 Finishes Materials

With careful specification and detailing a wide range of materials can be suitable as finishes:

7.2.1 Timber
Timber can provide a sense of warmth and a natural variable finish. Different types of timber can provide a range of colours, and it has better acoustic absorbance than most other materials. Fire Design should be considered both for the timber and any treatments.

7.2.2 Expressing structure without finishes
Expressing structure such as steel or concrete as a finish can be effective for providing a low maintenance finish over the railway. Particular care should be paid to the detailing of junctions and visible fixings, and the formwork and grade of concrete. Coatings should have a long lifespan to avoid a regular maintenance regime.

7.2.3 Metal cladding panels
Metal cladding panels can be used with a variety of finishes and effects, such as anodising, vitreous enamel and powder coating. Many proprietary panel systems and fixings are available. Consideration should be given to durability, maintenance, replacement strategy, and glare.

7.2.4 Ceramics
Ceramics are available in a wide range of finishes and colours, from unglazed terracotta through to colourful glazed ceramics. They require very little cleaning or maintenance, and can be used in contemporary ways and can be hung in panels or cassettes.

Image 7.4
Timber clad lifts in Peterborough Station.

Image 7.5
Steel Footbridge.

Image 7.6
Metal Cladding panels in Paddington Station.

Image 7.7
Ceramics.

7.2.5 Glass Fibre Reinforced Concrete
GRC/GFRC is available in a wide range of colours and finishes is very durable. It is much lighter than precast /in situ concrete as it can be used in much thinner applications of approx 50mm. The reduced weight makes it ideal for use on an overbridge. GRC/GFRC is not as robust as in situ/precast concrete, so care should be taken at using it at ground level, where exposed edges and corners could be at risk of damage in a rail environment.

7.2.6 Precast Concrete
Precast Concrete requires very little maintenance, but the weight may restrict where it can be used. Acid etching, sand blasting and different types of formwork can provide a wide range of surface finishes.

7.2.7 Transparent Glass / Opaque Fritted Glass
Glass is hardwearing, and a good choice for internal and external use. Glare should be considered, and also the cleaning strategy when over the railway. Attention should to be given to how glass performs when damaged. When opaque it should be ceramic fritted as some back painting can deteriorate. Coloured inter-layers can also be used.

7.2.8 Masonry
Masonry can be used both structurally and as a finish. A wide variety of colours and textures can be achieved. Much of the existing station estate is brick, and therefore it is a good choice when trying to complement existing features. Contemporary detailing and palettes can be used to distinguish new elements from older parts of the station.

Image 7.8
Precast Concrete.

Image 7.9
Transparent glass with lower section obscured..

Image 7.10
Brick.

7.3 Stair Details

Stairs on accessible routes in stations should be designed in accordance with the DfT Code of Practice Standards that in stations take precedence over the Building Regulations and the Highway Standards. This includes stairs on platforms leading to access and interchange footbridges.

The minimum clearance between the stair and the platform edge should be established by capacity calculations, but it cannot be below 2.5m or 3m (depending on line speeds) without a derogation. In constrained situations, the right balance should be provided between the width of the stairs and the width of the platform beside it. Figure 7.11 demonstrates the constraints to be considered if a derogation is required. The freeway should at least allow the passage of a wheelchair outside the danger area.

The top of the stairs should always have a minimum landing of 1.2m depth before a turn onto the bridge span. Corduroy hazard warning surfaces should be provided at the top and bottom of stairs to give advance warning of change of level. The length should be 800mm measured in the direction of travel, spaced 400mm from first and last risers. Refer to image 7.12. The warning surface should extend transversely 400mm beyond the edge of the stair tread.

The roof of the stairs should extend past the top and bottom of the stairs to provide shelter, and ideally provide sufficient overhang to cover the platform.

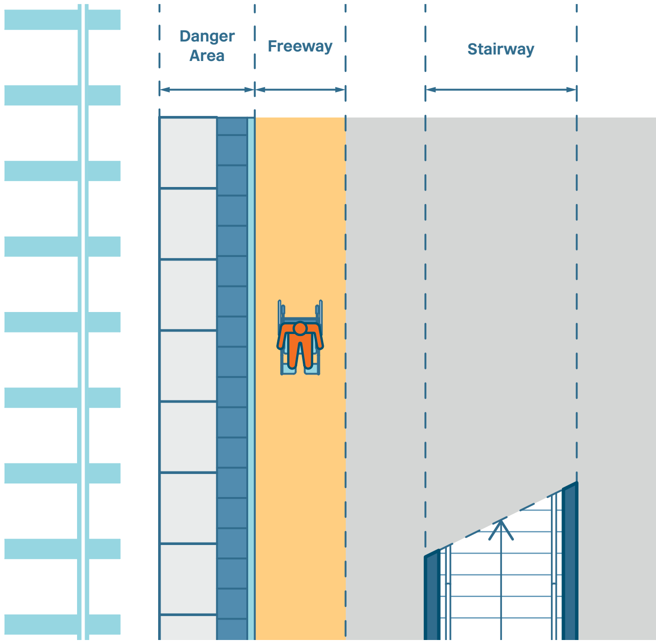


Image 7.11
Freeway clearance zone between stairway and platform edge.

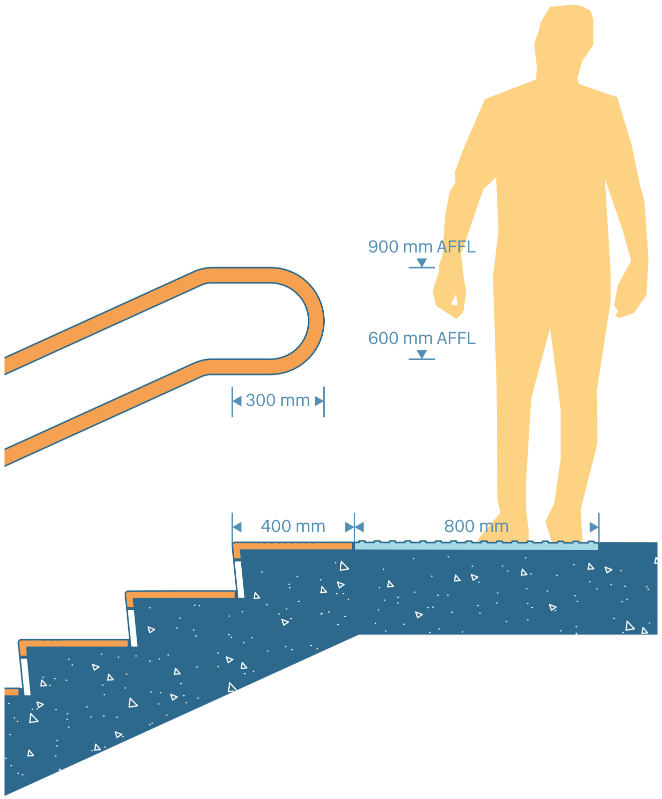


Image 7.12
Inclusion of tactiles at top and bottom of staircase, and robust slip resistant nosings to stair edges. Correct positioning of handrails, with a contrasting colour and a warm to the touch finish.

7.3 Stair Details

Landings should have a cross-fall gradient towards the parapets of no more than 1:50 to drain any surface water that might collect. Landings should be square, but in situations where achieving this is problematic due to site restrictions a minimum of 1.6m depth could be justified, subject to dispensation from the DfT.

7.3.1 Slip Resistance

The choice of deck finish should be influenced by the extent to which it is protected from the weather.
The slip resistance value (SRV) should be at least 55 in wet conditions.

Perforated or open decking should not be used due to safety considerations on an electrified railway. For similar reasons metal floor finishes should be avoided.

7.3.2 Colour Contrast

A 30% colour contrast should be provided to stair nosings, threads and corduroy tactiles, between handrails and walls, and between stairs and skirtings.

Image 7.13
Staircase at Winchester station.

Standards Reference

HSE Guidance
Assessing Slip Resistance of Flooring
The DfT Code of Practice Standards
Design Standards for Accessible Railway Stations

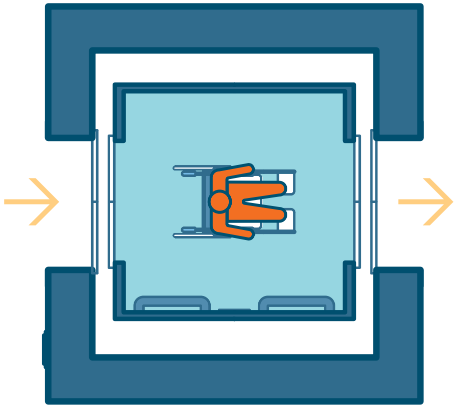


Image 7.14
Through lifts avoid the need to turn around within the lift or outside the lift.

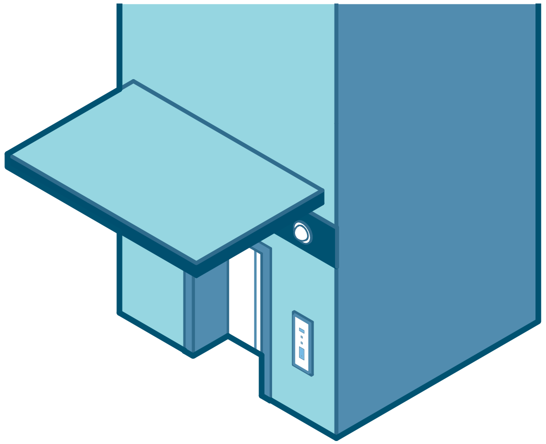


Image 7.15
A canopy at the lift entrance shelters the users and the lift threshold.

Lifts are an indispensable feature for people who are unable to negotiate steps, including wheelchair users and some ambulant disabled people. Lifts are also helpful for older people, families with young children and people with large pieces of luggage. Lifts should be accessible for all users including people with mobility equipment.

7.4.1 Design Requirements

Through lifts describe lifts with doors on opposite sides of the lift car at footbridge and platform level. They are preferable as they remove the need to turn around within the lift or outside the lift, where there is the potential for this to be busy with people waiting. Should a through lift not be possible lifts should be large enough for a wheelchair user to turn around within the lift. A run off and waiting space should be provided at the top off the footbridge, so that the lift does not open directly into the flow of people. A canopy should be provided over the lift entrance, and consideration should be given to allow rainwater drainage falls away from the lift doors. Waiting areas near lifts should be provided with seating that is preferably sheltered. The lift typically requires a lift equipment room. These requirements should be defined early on, so that the space can be provided in the design.

7.4.2 Accessibility Requirements

The lift car should have handrails, and the control panel height and positioning should meet current accessibility legislation. At landings, the lift architrave should have a colour contrast with the surrounding wall treatments and the car doors.

7.4.3 Security

NR/L2/CIV/193 sets requirements for CCTV cameras in lift cars. Some lifts can be controlled remotely, instead of the lift operating by the call button, a remote operator is notified who can operate the lift via CCTV images and using the lift remote monitoring system. This functionality may be suitable at quite times of day in areas of anti-social behaviour.

7.4.4 Provision of a ramp instead of a lift

In cases where the vertical height does not exceed 2m, the provision of a ramp can be considered, subject to a Disability Impact Assessment (DIA). Slopes with gradients shallower than 1:21 (or less) can be a preferable alternative to ramps with landings and should be considered.

Alternative Route — If an alternative accessible route already exists, stairs may be sufficient. This alternative route would be subject to a DIA assessment and should include rest points at 50m intervals.

Refer to the Lift Requirement Assessment Aid in Appendix B for guidance on when a lift may not be required.

Standards Reference

Policy Management of Lift Assets
NR/L1/CIV/192
Standard Specification for New and Upgraded Lifts
NR/L2/CIV/193

Image 7.16
Winchester station

7.5 Services and Containment

7.5.1 Integration of Services
Many services may need to be included in a footbridge, including but not limited to cables for lighting, CCTV, power, fire detection and telecoms. Services should be concealed behind finishes wherever possible. This protects the services from damage, and prevents passengers from coming into contact with them.

Concealing the services helps to provide a clean, clutter free aesthetic, and stop the services from being exposed to grime and dirt. Many proprietary systems existing for lighting and cable management systems (CMS) that integrate the services within the lighting run. Cables should not be externally mounted to the footbridge parapet. This would not allow for safe access and maintenance of services.

For open footbridges, water ingress protection and exposure to the elements also should be considered.

7.5.2 Providing ease of access
Services should be secure but easily accessible to maintenance personnel, without reliance on working at height or hard to obtain specialist equipment.

Services should be accessed from the footbridge enclosure as much as possible, so that there is not a reliance on accessing services over a live railway. Ceiling and wall access are preferable, but access can also be from the floor deck. Where panels are provided in walls it is advisable to make these hinged, so that items are not fully removed for access avoiding them being damaged or reinstalled incorrectly.

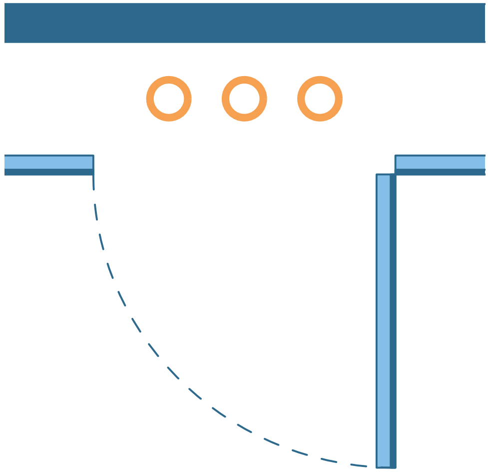


Image 7.17
Section showing services above ceiling finishes.

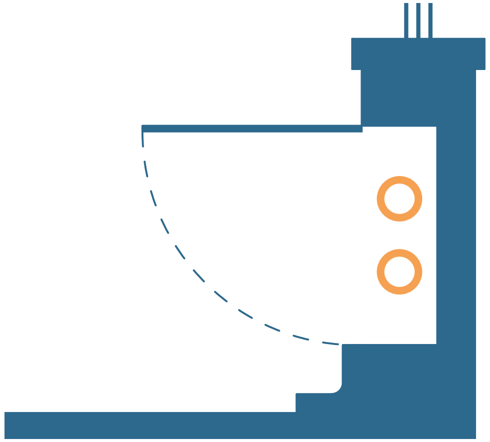


Image 7.18
Section showing services in wall zone accessible through hinged panels.

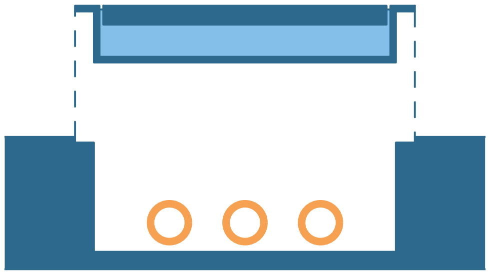


Image 7.19
Section showing services concealed in floor zone accessible from within footbridge with lift out covers.

7.5 Services and Containment

The examples on this page highlight common bad practice in CMS (Cable Management Systems) and services integration.

Here are some considerations on how these could have been avoided:

- → Plan service routes early in the design, so that they can be integrated into structure or behind finishes
- → Run service above structure or through openings in beams
- → Group services into combined CMS where possible
- → Use integrated lighting booms with CMS where CMS cannot be fully concealed

Image 7.20
CMS should not duck and dive under structure, consider castellated beams or cut outs. An integrated CMS lighting boom would have further improved this installation.

Image 7.21
Poor integration of the lighting and service runs with the structural design, and an excess of services, that could have been grouped into a combined CMS and set out better.

Image 7.22
Vertical service routes not integrated with the design. Services should have been considered earlier in the design. This is particularly poor as the services are located next to a plant room.

The choice of deck finish is influenced by the extent to which it is protected from the weather. The slip resistance value (SRV) should be a minimum of 40 under cover and minimum of 50 in the open. Perforated or open decking should not be used due to safety considerations on an electrified railway. For similar reasons metal floor finishes should be avoided. The colour of the floor finish should contrast with the colour of the parapet wall.

7.6.1 Screeds

Waterproof applications onto a solid deck can provide a lightweight finish that meets the slip-resistance value and does not require much maintenance. Examples of such products are Asphalt, Resins (such as Flowcrete) or Gripfast Slurry.

7.6.2 Proprietary Panels

There are a range of slip-resistant floor panels that can be fixed to the structural deck including Fibre Reinforced Plastics or Composites such as Polydeck.

7.6.3 Tiling

Terrazzo, Ceramic or Stone tiling with the appropriate slip resistance can be used on covered footbridges. Lighter weight alternatives may be preferable to limit the loads imposed on the structure.

7.6.4 Parapets

Unlike other footbridges, the parapets of footbridges over OHLE lines have to be solid.
The upper part of the parapet (above 1m) should allow visibility and therefore has to be glazed or have a pattern of small perforations.

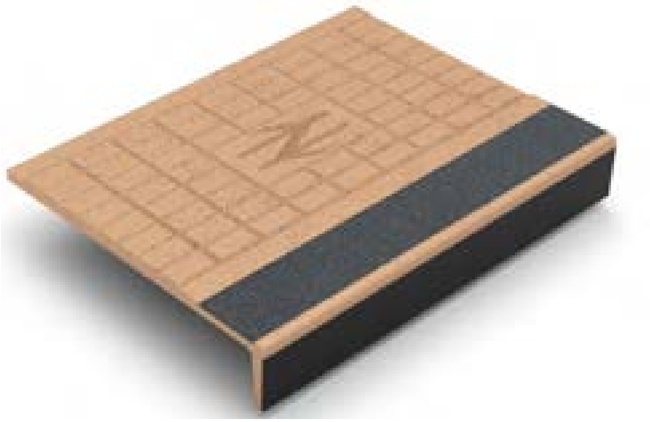


Image 7.23
Anti slip cast metal full depth tread is preferable.

The degree to which the bridge should be enclosed is discussed in Appendix B.
The lower part of the deck and stair parapets fall into any of the following three categories:

- As integral part of the Structure (eg. Steel trough, FRP, Steel lattice)
- Infill panel in a frame structure (typically in Vierendeel trusses)
- Part of a fully glazed wall

The materials used should be lightweight, resistant to pedestrian impact, durable and easy to clean.
The advantage of integrating the parapets into the structure is the potential for a more economical and lighter structure. It can also reduce the number of different materials being used.

Image 7.24
Internal view of Alton station footbridge.

The following considerations should be taken into account for glazing:

- All glazing should be heat-soaked-thermally-toughened laminated glass.
- Due to the issues of cleaning glass over the railway it is recommended that all glazing that cannot be accessed easily from the platforms should be to a self-cleaning specification tested to BS EN 1096-5:2016. Typically, the manufacturers' instructions require that the glass must be exposed to ultraviolet light and rain in order to allow the cleaning of the glass to occur naturally (ie. not to be used under cover or overhangs).
- It is possible to use obscured or back-painted glass for the lower section of the parapet. Films should be avoided on the exterior face of the glass.

7.7 Roof Cover and Drainage

On an open footbridge there is no option other than to slope the deck so that it drains towards the platforms where it can be picked up by the platform drainage network. This same principle should also apply to the drainage of roofs over footbridges. Unfortunately the roofs of most of the covered footbridges on the network incorporate built-in gutters. This is an unnecessary safety hazard and maintenance liability and should be avoided. Instead the whole roof should be set to a fall towards the platforms from a high point at the midpoint of the bridge. This simple measure should save a considerable amount of whole life and capital cost.

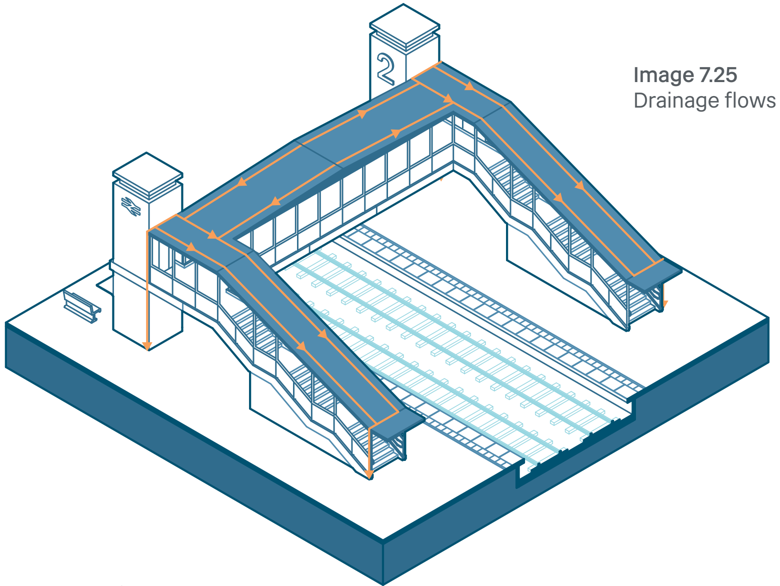


Image 7.25
Drainage flows on a footbridge.

7.7.1 Considerations for Roof Cover

There is often confusion as to whether bridges and stairs should be covered by a roof and also about the extent of enclosure that is required above the parapets. Providing the requirement of roof cover is considered from the very start, evidence shows that the material cost of the cover does not have a major impact on the overall project cost.

From maintenance, whole life and asset protection point of view there are also advantages to the covering of the footbridges, avoiding chemical anti-frost treatments of the deck surfaces which are polluting and also known to damage the steel structure. Additionally, the current version of the DfT Code of Practice requires a dispensation for not covering the stairs on an accessible route in a station.

7.7.2 Roof Finishes

In most cases the roof finishes are not visible, except for the roof over the stairs that is visible from the platforms. However, in locations where the station is in a cutting or is surrounded by tall buildings, the roof appearance is visible and should be considered as another elevation.
Normally the roof finish can be of metal sheet, typically a proprietary steel or aluminium product. Even though there is no requirement to insulate the bridge, there have been cases of condensation on uninsulated bridge roofs.

For this reason, roofs covering stairs and footbridges should be thermally insulated. The underside of the roof is visible to the passengers and should be integrated visually with the other finishes under the roof.

Where the bridge is not fully enclosed a sufficient overhang should be provided. In this case the roof should be integrated with the station canopies as much as possible. Where access to the roof is required, a fall arrest system should be considered.

For further guidance regarding Roof Cover Assessment Aid refer **Appendix B.** Here you can also find examples of how the aid is used.

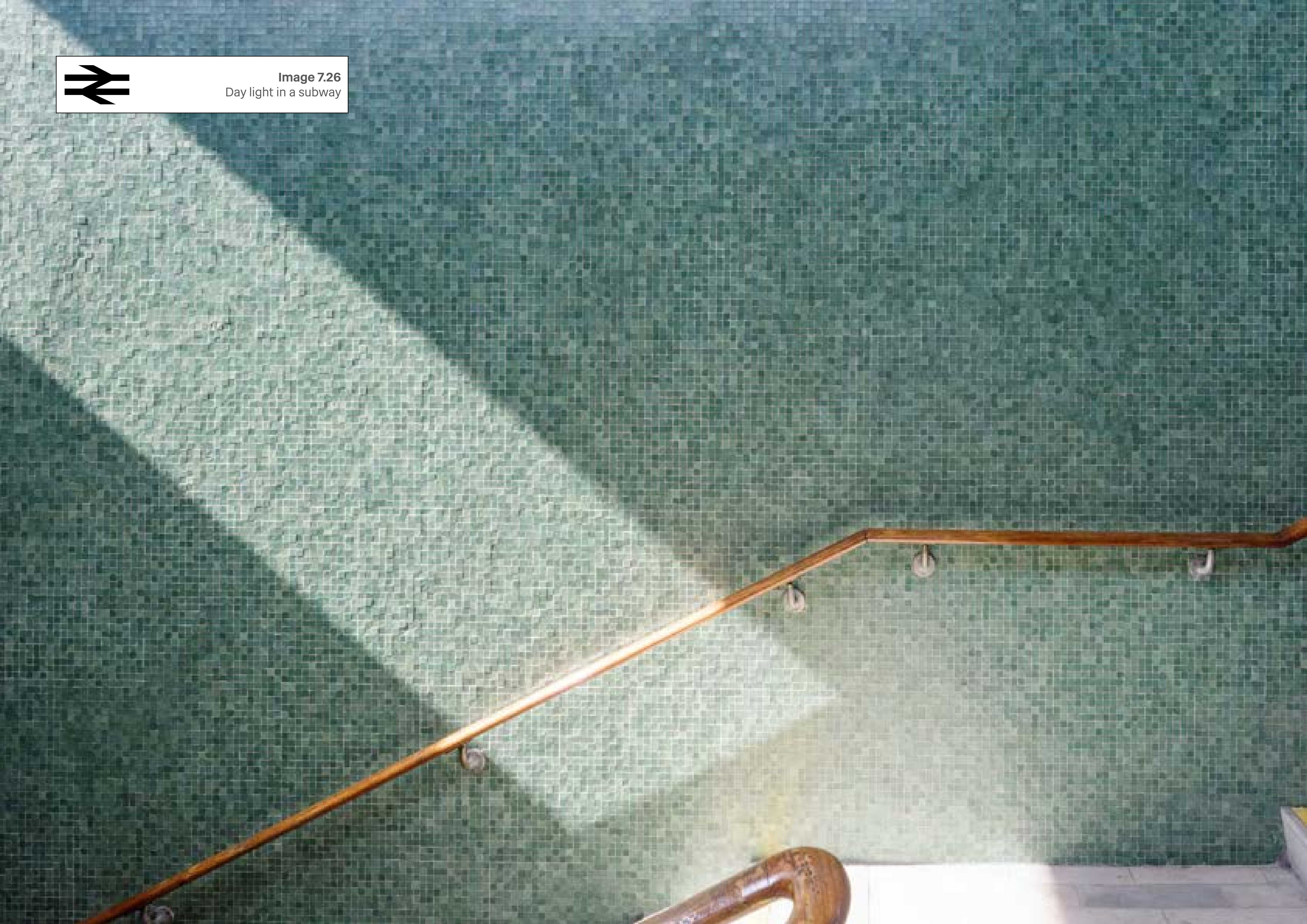


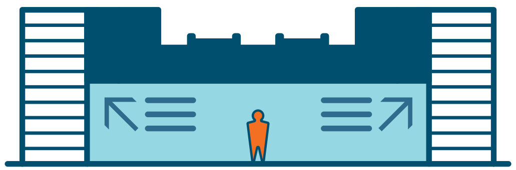
Image 7.26
Day light in a subway

Footbridges and Subways

Subway Considerations

8

8.1 Introduction



01 Stabilisation / Maintenance

Limited works to be carried out to an existing subway.

This may include areas such as:

- → Improving lighting and signage
- → Structural remediation
- → Management of water ingress and degradation

02 Upgrade / Provision of Step Free Access

An existing subway requires substantial works.

This may be an upgrade focused on improving accessibility, or a project to carry out structural upgrades or provide new finishes.

03 New Subway

A new subway is required.

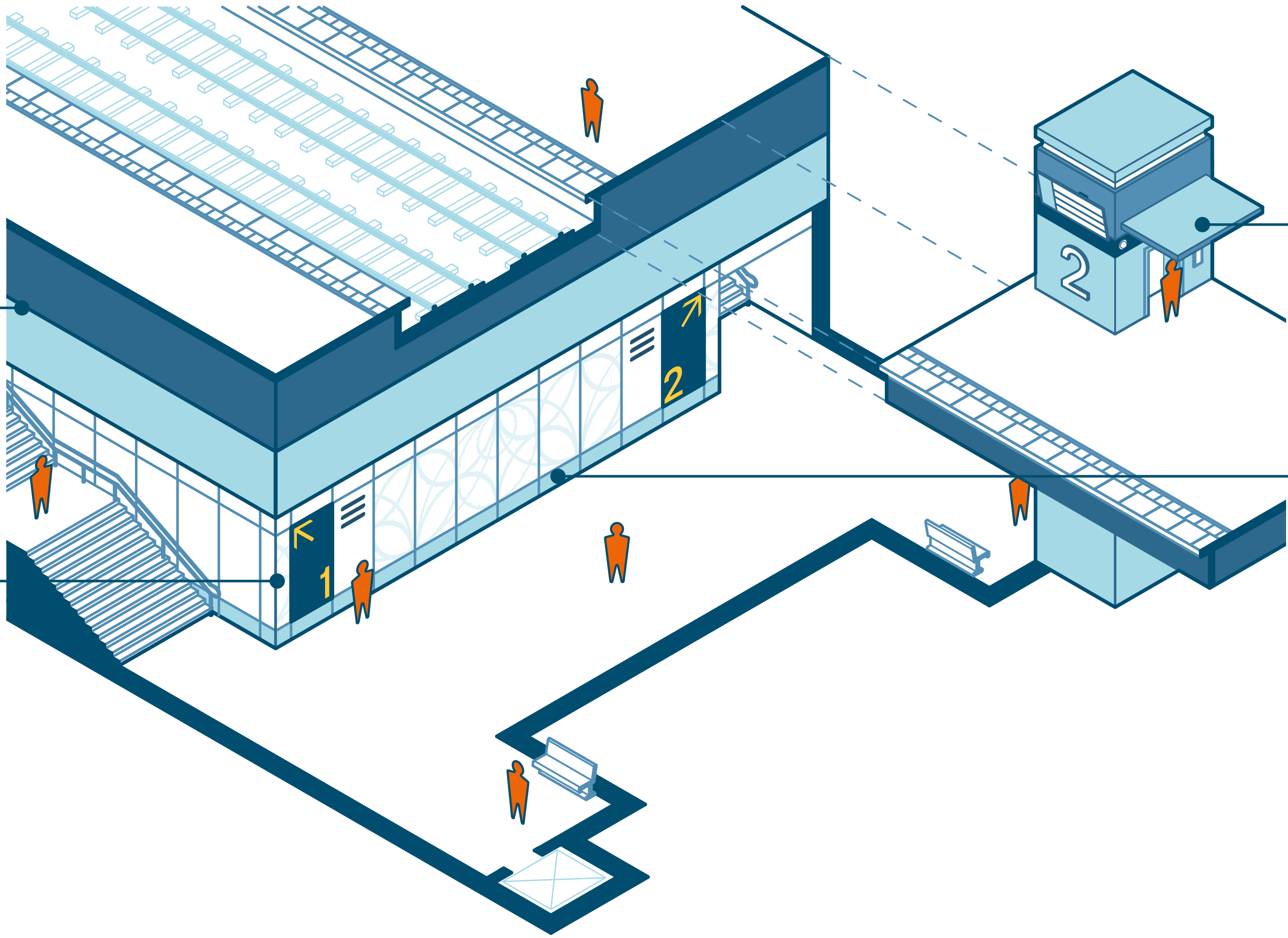
New subways offer many advantages over footbridges, such as reduced travel distance, less interface with the live railway, and minimal visual impact.

New subways should create generous and legible space, where natural wayfinding is maximised, and natural lighting is used where possible.

Standards Reference

The DfT Code of Practice Standards
Design Standards for Accessible Railway Stations

8.1 Introduction



01 Underpass Space should be as wide and high as practicable

02 Clear platform signage and headline destinations aid clear wayfinding

03 Lifts provided directly from the main underpass — long corridors should be avoided

04 Cladding Should be light, easy to clean and maintain finishes, with concealed water management where needed

Image 8.1
Navigation diagram.

8.2 Lighting and Space

Image 8.2
Lighting and architecture go together to form a unified experience of this tunnel.

8.2.1 Lighting
Many subway spaces are constrained both in height and width. The use of creative lighting wall treatments can help to add drama to spaces and elevate them aesthetically.

This can help to counteract the common perception of these spaces as dark and oppressive, and can also help to aid wayfinding, where distinctions on colour and pattern are made.

Project scopes may vary from a comprehensive upgrade, through to the simple addition of a strong lighting scheme.

Where wall treatments are introduced, improvements in lighting levels and colour rendering can contribute to the overall effect.

Natural daylight should be maximised wherever possible. This can be achieved through skylights and lanterns, and by using extensive glazing over staircases. Maximising daylight over staircases is also an effective way to aid natural wayfinding.

8.2.2 Good lighting in subways
As confined spaces with only few ways out, chances are passengers are uncomfortable in subways. The absence of daylight only adds to this perception. As the electric light is not only indispensable but also always on, it may as well be designed with care for the best possible passenger experience.

In a subway where the light hits not only the floor but the walls too, the space feels large, and the dark corners are fewer. In fact, illuminated walls are more important for the feeling of safety and security than a bright floor.

Light with good colour rendering properties shows people's faces well, assisting the facial recognition and thereby the assessment of other passengers. This improves the feeling of security.

Cold light can feel clinical, icy, and unwelcoming while warmer light feels nicer, more considerate, almost domestic. The colour temperature should not be colder than 4000K and not warmer than 2700K.

Image 8.3
In this narrow and low tunnel the linear luminaire is asymmetrically positioned to highlight one of the walls. The bluish skylights are artificial.

Subway Considerations

8.2 Lighting and Space

Glare from luminaires is highly uncomfortable and makes for a low-quality experience of even the best design. As glare reduces visual efficacy a person affected by glare sees less and thus feels unsafe. Glare can be avoided with luminaires that are well shielded off and by directing luminaires down.

If light levels vary considerably between the subway and the outside surroundings, passengers passing from bright to less bright may momentarily feel that they are walking into the dark. To avoid this, the illumination of the subway and the connecting areas should be considered as a whole.

Even in the daytime, entering the subway should not be an abrupt transition from bright to (relatively) dark. Subway illumination should be brighter during the day than at night because the ‘competition’ with daylight is stronger.

The number and position of luminaires is important, as passengers standing in or walking through a cone of strong light may feel dazzled as well as exposed to the surroundings, almost like a stage performer. While fewer but stronger luminaires may give the same calculated illuminance as more, dimmer luminaires they are likely to cause such unwanted ‘light showers’.

A lift waiting space may have a slightly higher light level to assist the passage of other passengers as well as the smooth interaction between those exiting the lift and those about to enter.

A slightly brighter pool of light at the top and bottom steps makes it easier to find the stairs, and safer to use them. The stronger light also nudges users to move on instead of blocking the way for those coming right after. Furthermore, intuitive wayfinding and spatial legibility is assisted by accent light where e.g., a stair leads up from the subway.

Wayfinding is further improved by illumination of signage and information in the subway.

Finally, lighting of a decorative or artistic nature can make a subway feel as a high-quality space, one which has been subject to dedication, which emanates empathy, feels welcoming and is worth experiencing in its own right.

Image 8.4
Railway Bridge — Balham station. The illumination of the faïence relief makes the space feel wide and large and assists the sense of place and uniqueness.

Image 8.5
The artificial skylight makes the tunnel seem taller and marks the access to the platforms.

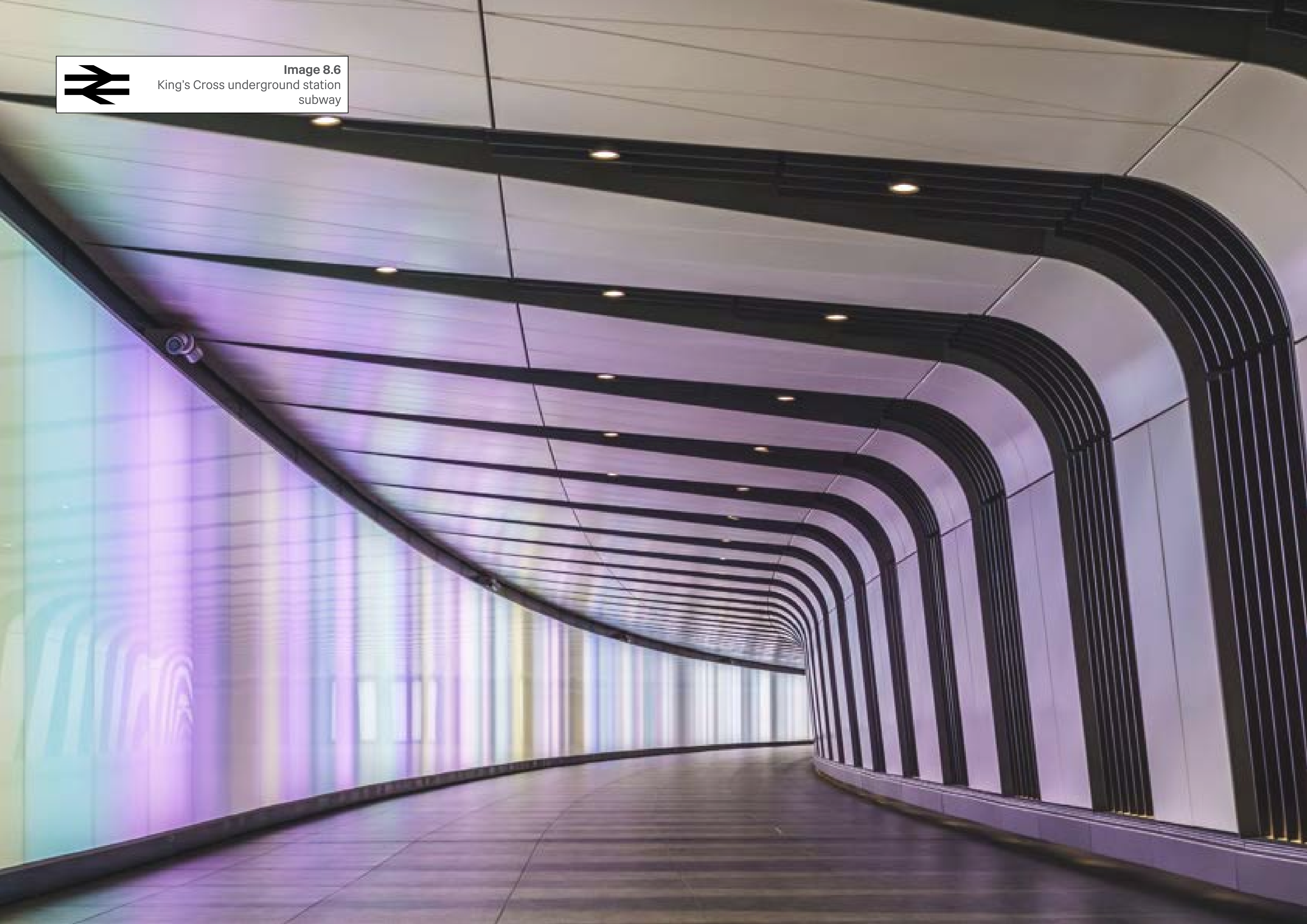


Image 8.6
King's Cross underground station subway

8.3 Existing Subways

8.3.1 Maintaining Existing Structures
Regular inspection and maintenance is crucial for assuring structures are fit for purpose and not degrading. The biggest challenges to existing subways often are related to water ingress.

For local issues water management systems can be deployed to avoid water encroaching on the passenger environment. Specialist expertise should be sought where significant water ingress occurs, to identify the causes and to determine if this is causing structural degradation.

8.3.2 Upgrading Existing Structures
Historic structures can often contain many non-compliant finishes and that would not meet current standards for accessibility.

Some of these issues can be rectified by upgrading floor surfaces, and installing modern handrails.

Care should be sought with heritage structures, and those that are listed or in a conservation area, that upgrades do not harm the existing structure and that any changes are compliant with legislation and guidance. The Railway Heritage Trust is able to advise and recommend in instances where a listed building application may be required.

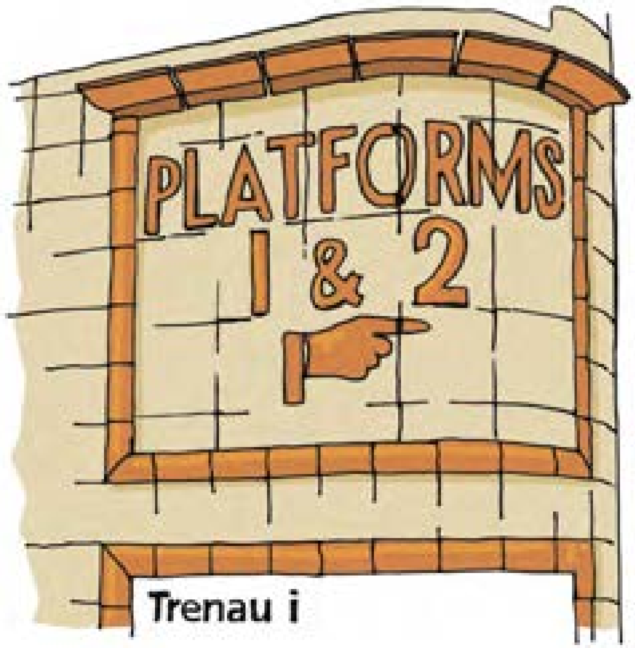


Image 8.7
Preserving heritage features, Cardiff Central station.

Image 8.8
Existing elements in need of care: At this station glazed bricks have discoloured due to water ingress, with stain damage at high level, and phosphorescence to the bricks below dado height.

8.4 Subway Improvement

On some projects there may not be scope for a comprehensive upgrade covering cladding, floor finishes and lighting. Where scope is very limited, the projects here show how the user experience can be vastly improved in a cost effective manner.

8.4.1 Improving Wayfinding
Bold graphics and large lettering can direct passengers in a punchy manner that has more direct visual impact that conventional signage.

8.4.2 Creating Interest
The examples shown here all generate a visual surprise that lifts an otherwise drab setting that in some instances calls for a more comprehensive upgrade. Where less permanent finishes such as vinyl film are used there is less pressure to design in a timeless way — these projects can appeal to the here and now.

8.4.3 Generating Community Engagement
At Thessaly Road a competition was held, with six shortlisted proposals. The shortlisted practices were introduced to residents, members of the local community and key stakeholders in order to further inform their final proposals, and the process culminated with an exhibition.

At Baker Street Wonderpass by Bigg Design the history and attractions of the area are showcased, providing an engaging and informative experience.
Such projects help to engender a sense of community ownership and pride in these assets.

Image 8.9
Old Street Roundabout. Using colours to aid wayfinding around four different arms of the subway, and to enhance the passageways.

Image 8.10
Baker Street Wonderpass. Creating an inviting entrance that makes users feel welcome and excited.

Image 8.11
Thessaly Road Bridge — Nine Elms. Revitalisation of a bridge under the railway as part of the London Festival of Architecture.

Image 8.12
Baker Street Wonderpass. Featuring information and displays within the subway, so that there is visual interest and stimulation.

8.5 Security

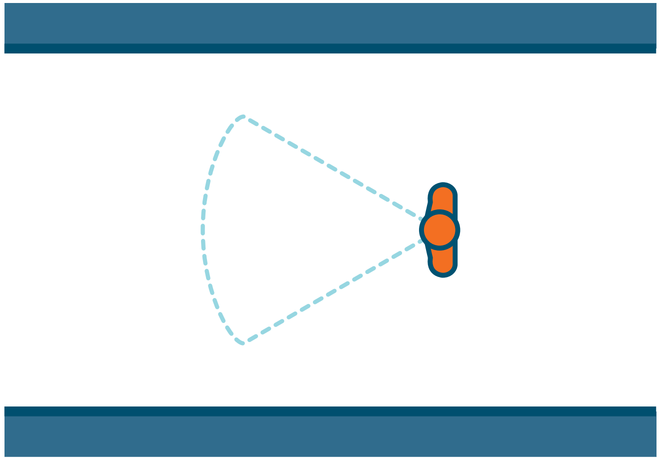


Image 8.13
Clear visibility of routes, no hidden corners.

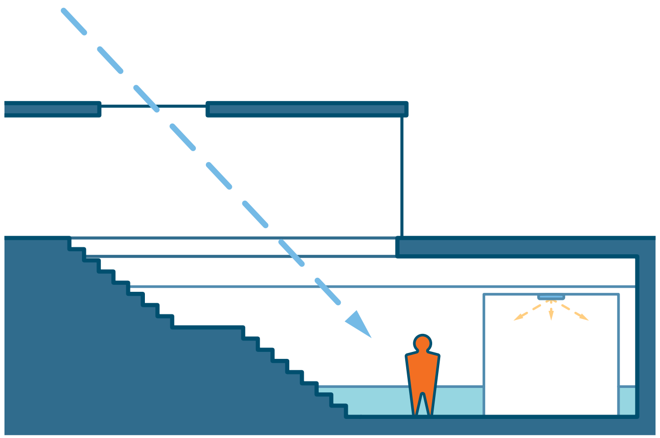


Image 8.14
Maximising Natural light.

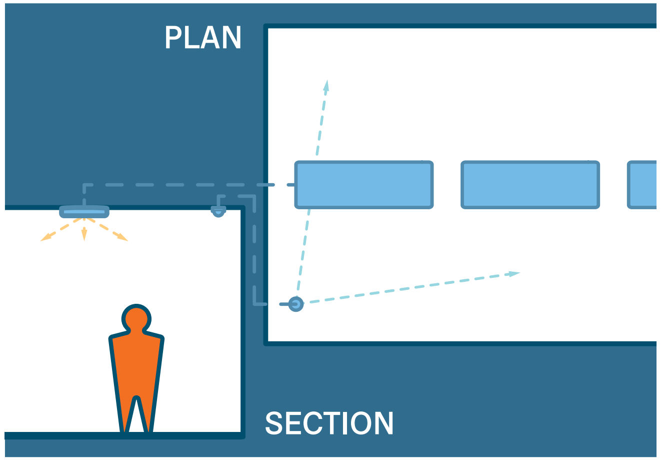


Image 8.15
Artificial Lighting.

8.5.1 Maximising visibility
Subways should feel open, and provide clear lines of site, avoiding corners and changes in direction where possible. Wide passageways and keeping ceilings as high as possible create a more expansive feel that improves the perception of security.

8.5.2 Providing good lighting
Good lighting is crucial in subway spaces, which have traditionally felt cramped and under illuminated. Artificial lighting should have good colour rendering, and provide uniform intensity and coverage, at all times of day. Coloured lighting is good for providing feature lighting, but should not hinder passengers comfortably reading information and signage, or the function of CCTV

Natural lighting should be used wherever possible, and this helps to improve the perception of security and creates a connection with the outside. When natural light is maximised at routes in and out of subways such as over a stair, natural light can assist with intuitive wayfinding.

8.5.3 Use of Materials
Durable finishes that are easy to maintain and replace, perform well against wear and tear, play a part in creating the feeling of a safe and secure environment.

8.5.4 CCTV
CCTV coverage should be maximised, with blackspots minimised. Position CCTV to maximise the amount of coverage from each camera. Cameras should be discrete and integrated into the architectural finishes. Avoid cameras that protrude and use small dome style cameras where possible.

8.5.5 Secure Stations Scheme
British Transport Police (BTP) input is available through the Secure Stations Scheme, and guidance is provided online at the Secure Stations website.

Subway Design

8.6 Constructibility

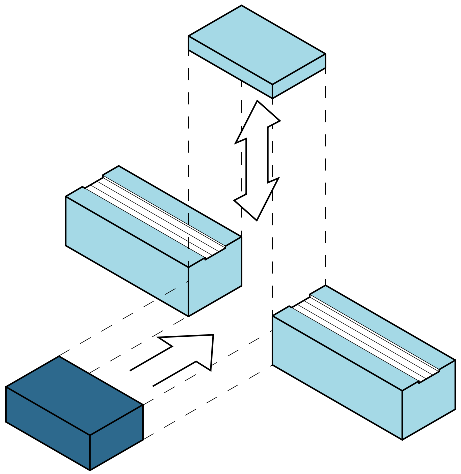


Image 8.16
Construction method - "Cut and cover".

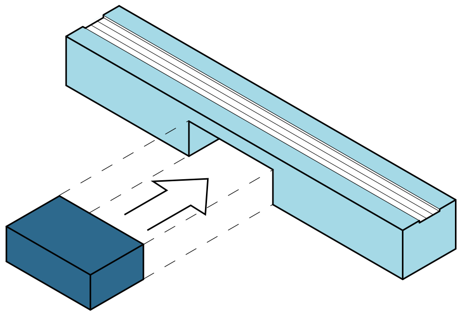


Image 8.17
Construction method - "Tunnelling".

8.6.1 Construction methods
When constructing a new subway structure, the initial step involves conducting a ground investigation of the site to determine the nature of the soil strata and the water levels. Depending on the findings of this investigation, and an analysis of the specific site constraints, there are two primary construction methods to consider: "Cut and Cover" or "Tunnelling".

With the “Cut and Cover” method individual tracks need to be shut down to excavate the ground, install the subway, and then restore the ground surface and tracks. In contrast, the “Tunnelling” method involves pushing tunnel elements forward in sections beneath the existing tracks, which may therefore not need to be closed. Moreover, construction may occur during night time possessions when the disruption to train operations are minimal. The choice of method depends on the soil conditions, stiff cohesive soils lend themselves to tunnelling whereas granular soils, particularly with a high water table, would point towards cut and cover.

Both methods typically have permanent structural elements of precast concrete, which have the capability of being pre-fitted with the necessary services.

Both methods require extensive temporary works considerations, such as the use of sheet piling, the design of which need to be advanced alongside the design and methodology of the permanent works.

In situations where access to a central platform is required, sheet piling may be utilized between the tracks, followed by "Cut and Cover" construction to create the connection to the subway.

Additionally, it’s important to take into account the volume of passengers using the specific subway line. Implementing replacement buses may be more feasible on lines with lower passenger traffic compared to busy and critical lines.

Moreover, careful consideration of the area around the construction site is necessary. Adequate space should be reserved to allow that the construction can proceed as smoothly as possible.

Stations should in general be designed in accordance with the DfT Code of Practice, which recommends that the approach to the subways is to make them as wide as possible. It is recommended that subways are at least 4,8 m wide and have clear headroom of 3 m.

Standards Reference

The DfT Code of Practice Standards
Design Standards for Accessible Railway Stations

8.6.2 Sustainability
Embodied energy is expressed through two aspects in the subway design: optimisation of structures and through material selection. Optimised design impacts the amount of construction needed. There is much to gain in material selection, and contemporary sustainability perspectives favour the use of materials with low climate impact, especially in the production phases.

In all cases, a life cycle assessment should form the basis for the right decision regarding material selection, lifespans, and expected maintenance. To the extent that materials with relatively high impacts in production phases, such as concrete and steel, are used, it should be specified that concrete with low clinker content cement and recycled steel be used to the widest extent possible.

Many other design strategies may be used to a more sustainable subway design. These include circular economy and design for disassembly and adaptability, but also strategies for reuse of components and use of stacked element that are reusable instead of cast-in-place options.

Climate adaptability should also be considered, protecting the subway by design from flooding and other damage is good for the investment of embodied carbon in the materials.


Image 8.18
Concrete panels could allow for disassembly

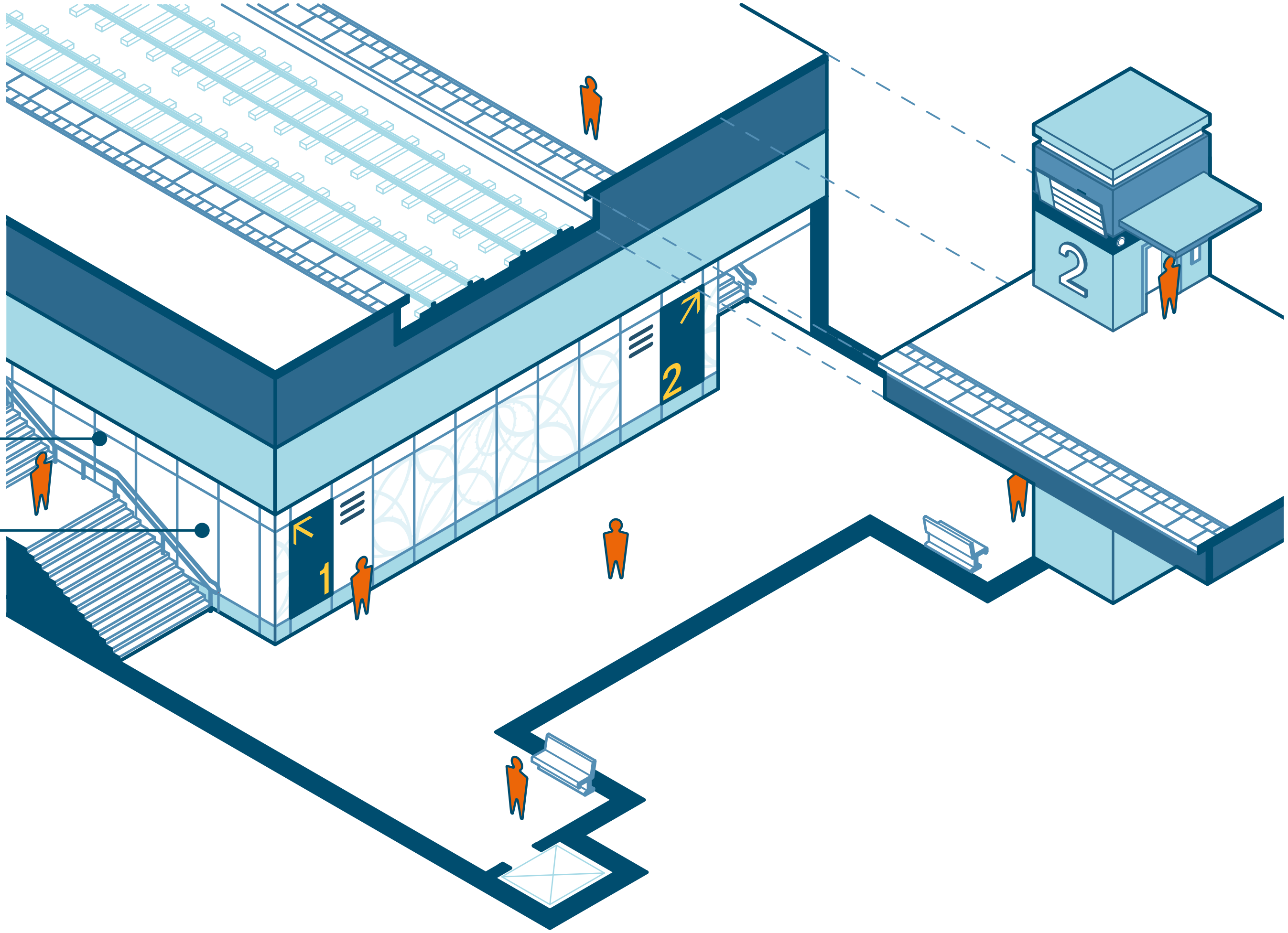
Image 8.19
Artwork along the staircase to the platform

Footbridges and Subways

Subway Design

9

Subway Design



Soffits, Floors and Wall Systems 9.1

Finishes Materials 9.2

Services and Containment 9.3

Water Management 9.4

7.3 Stair Details

7.4 Lift Details

Refer to Section 7

Image 9.1
Navigation diagram.

9.1 Soffits, Floors and Wall Systems

Image 9.2
Glazed ceramic tile wall cladding

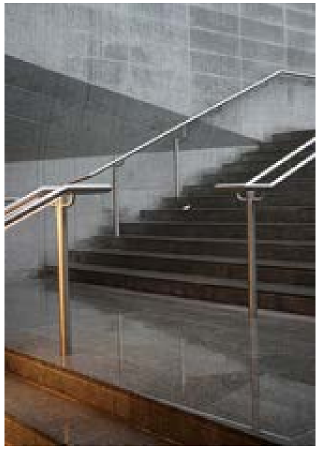


Image 9.3
Granite walls, floors and steps

Image 9.4
Concrete element wall cladding elements

Image 9.5
Ceramic tile wall cladding

Image 9.6
Illuminated glass walls

Materials should be robust and hardwearing, and resist the impact of water for wet cleaning.

9.1.1 Soffits

Structure can be exposed where a high quality and consistent finish is achieved. However water management should be fully considered first.
It is preferable to leave existing structure and services exposed if appearance is acceptable.
Where access is required for accessing services or inspecting structure, demountable ceiling elements may be required. Excessive cladding that reduces unnecessarily the headroom or width of the subway should always be avoided.

Metal ceiling panel systems are easy to clean and allow for ease of access. Micro-perforations can be incorporated with an acoustic fleece behind to provide acoustic attenuation. When acoustic materials are used, the way they are assembled should be checked for meeting the fire requirements of the station.

Rendering and plastering can provide a robust finish, but dry lining boards should be robust, fire resistant and moisture resistant where necessary. Hatches can be used to provide access behind plastered ceilings or plastered ceilings can be used alongside accessible metal panelled ceiling systems. Rendering and plastering is also suitable for walls at high level where it is not be subjected to the same level of wear and tear as wall finishes that are at a reachable height.

9.1.2 Floor finishes

Terrazzo, ceramic and stone can be used, provided they achieve the correct slip resistance. As stone is a natural material, its performance can be less predictable, and it can be harder to match replacements.

Concrete pavers and asphalt are discouraged as they do not contribute to a high quality station environment.

9.1.3 Wall systems

Consider how regularly access is required to areas behind the finishes zone and if there are any specific concerns or durability issues for the station. Section 9.2 discusses a range of appropriate finishes to consider.

9.2 Finishes Materials

Shown here are some suggested finish materials, however other materials choices are available.

9.2.1 Vitreous Enamel panels
Vitreous Enamel panels are suitable for use in subways as they are hard wearing and easy to clean, and available in light colours, with a glossy finish. Patterns can be screen printed onto the panels before firing. Panels can be hinged, providing access to services or for structural inspection.

9.2.2 Metal cladding panels
Metal cladding panels can be used with a variety of finishes and effects, such as anodising, powder coating and stainless steel. Many proprietary panel systems and fixings are available. Consider durability, maintenance, replacement strategy, and ease of access if services or water management is behind.

9.2.3 Ceramics
Ceramics can be used in the form of faience tiles, glazed bricks or applied tiling. They can be applied for both traditional and contemporary aesthetics, and are available in a wide range of formats, colours and textures. They are easy to clean and maintain.

9.2.4 Mosaic tiling
Mosaic tiling can create impressive visual effects, but can often require a higher level of maintenance than other ceramics, as the overall proportion of grout is larger.

9.2.5 Opaque Fritted Glass
Refer to Section 7.2 (Footbridges).

Image 9.7 — Vitreous Enamel Large format openable panels with a striking graphic motif screen printed onto the panel before baking.

Image 9.8 — Mosaic Tiling At Los Angeles airport, walls of mosaic tiles shift colour spectrum to aid wayfinding over long subways

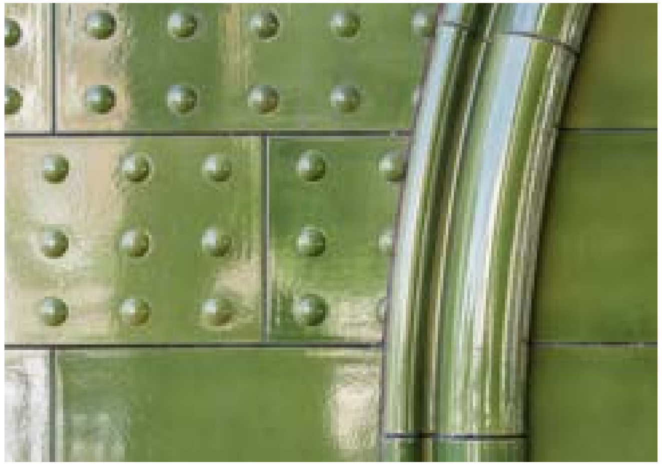


Image 9.9 — Ceramics, Faïence tiles Bold faience tiles used with relief designs in a contemporary interpretation of a traditional material

Image 9.10 — Metal Cladding Panels Strong use of colour, and vertical staggered arrangement

Image 9.11
Hackney Wick station, London

9.3.1 Integration of Services
Services should be concealed wherever possible. This can be achieved by concealing services behind cladding panels, ceiling panels, or integrated into fittings. Services can also be concealed within structure in cast in conduits.

Concealing the services helps to provide a clean, clutter free aesthetic, and could stop the services from being exposed to grime and dirt. It also reduces damage and help avoid passenger contact. In any instances where cables cannot be concealed, they should always be within conduit, and not mounted onto trays.

Many proprietary systems existing for lighting and cable management systems (CMS) that integrate the services within the lighting run.

Conduits can be cast in to structures for the provision of services, but how these are accessed, maintained, and future provision should also be considered.

9.3.2 Providing ease of access
Services should be secure but easily accessible to maintenance personnel, without reliance on working at height on hard to obtain specialist equipment.

Where panels are provided in walls it is advisable to make them hinged, so that items do not have to be fully removed for access. This risks them being damaged or reinstalled incorrectly.

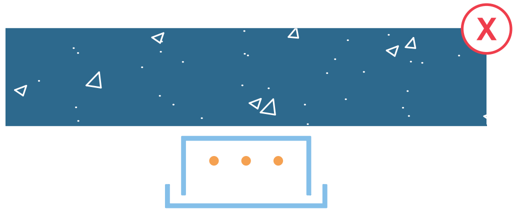


Image 9.12
Surface mounted conduit with lid, typically galvanised steel. Widely used but should be avoided in preference of more integrated solutions

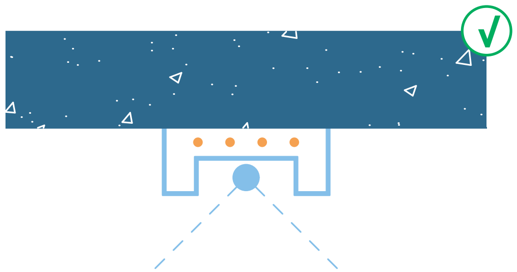


Image 9.13
Luminaire with integrated cable management to avoid secondary CMS.

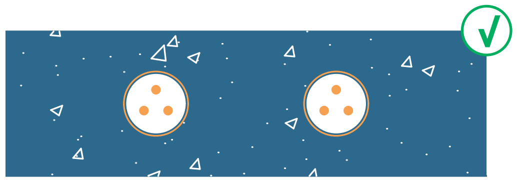


Image 9.14
Cast in conduits to allow services to be concealed. Access should be provided for change in direction.

9.4 Water Management

9.4.1 Water Ingress to existing structures
Many structures can suffer from water ingress to soffits and walls. Where working with existing structures, the first stage should be to verify that any water ingress is manageable, and is not having an unacceptable impact on structure or building fabric.

Water ingress should then be managed so that it is drained away safely, without causing any secondary impact to building fabric. The drainage should be concealed behind ceiling finishes or wall panels. Panels should be opened at regular intervals in order to allow access for inspection, monitoring and maintenance. Hinged panels are recommended where access is required as they can be easily accessed without having to lift heavy loads, or run the risk of panels being damaged or reinstated incorrectly.

Water ingress along a retaining structure can be captured with a half round drainage channel. This should be concealed behind full length wall panels so that it is not visible within areas occupied by the public or used as staff accommodation.

Pumps to manage and remove water ingress should be considered where necessary.

9.4.2 Designing New Structures
For new structures it is preferable to have a dry structure with high-quality exposed structural finishes, to reduce the build-up of layers that result in reducing the height of the subway. The design team should have sufficient structural expertise on the waterproofing of new structures. Measures such as re-injectable grout hoses can be designed in to new structures to allow for remediation.

A decision should be taken with new structures whether structure is exposed and how much is concealed behind finishes. Expressed structure and soffits are desirable, but there should be confidence that these would not suffer water staining and water ingress in the future.

9.4.3 Fire Regulations
Where wall and/or cladding systems are used, these should be compliant with all requirements for combustibility.

All voids created behind walls or above ceilings should be provided with fire separation at the required intervals to comply with regulations. Additionally, fire detection systems are required in voids over a certain size.

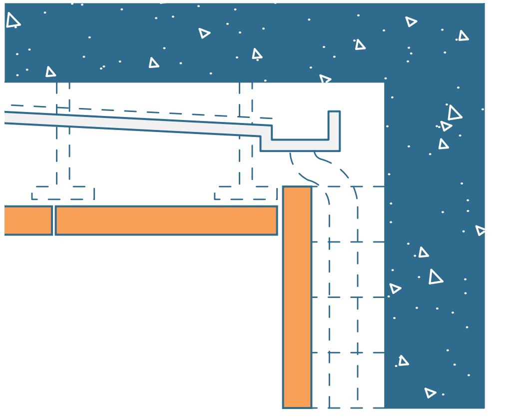


Image 9.15 Drip tray concealed above ceiling finishes, drained at low level

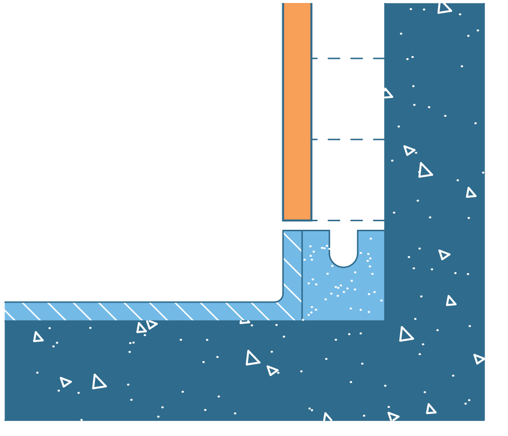


Image 9.16 Drainage channel in areas of water ingress, concealed behind wall finishes, but easily accessed

Image 9.17
Clink Street bridge tunnel:
This arch space has been drastically improved through an LED mesh lighting system, without the addition of much other upgrade work

Footbridges and Subways

Appendices

A

Image A.1
Faïence relief — Balham station.

Glossary

Accessible Route
A primary public access route to a building, station or train also referred to as Unobstructed Route in the DfT Code Of Practice. There should be at least one such route in a station from the entrance to the train. It should not exceed 400m and be at least 1.6m wide with no obstacles (including steps) that might impede the movement of any passenger.

AfA
The DfT 'Access for All' programme is delivered by Network Rail and provides accessibility improvements at selected stations.

BEAP
Network Rail Built Environment Accessibility Panel (Network Rail BEAP) assists Network Rail, to deliver an inclusive and accessible rail built environment for disabled people, as well as for people of all cultures, faiths and ages.

BCIS
Building Cost Information Service refers to an organisation that regularly collects and publishes building costs to the construction industry.

BIM
Building Information Model is shared digital representation of physical and functional characteristics of any built object.

CDM
Construction Design and Management refers to regulations issued in 2015 by the Health and Safety Executive that place legal duties on clients, designers and contractors involved in construction activity.

CIBSE
Chartered Institute of Building Services Engineers refers to a professional body that regulates the activities of the services engineers, providing regulations and support to its members.

CSM and CSM REA
Common Safety Method for Risk Evaluation and Assessment is an ORR imposed European regulation that places duties on those in charge of projects who wish to implement a change to a technical, operational or organisational aspect of the railway system.

DIA
Diversity Impact Assessment is the process by which Network Rail assesses and consults, under the Equal ity Act (2010), on the effects that a project can have on different groups in the community.

Deviation or Derogation
The Network Rail process is defined in NR/L2/CSG/STP001/04 'Managing Variations to Network Rail Standards and Control Documents and Railway Group Standards'.

EPD
Environmental Product Declaration refers to a document in which data can be found about the environmental impact of a certain building material. This data is presented in a standardised way, which makes it easier to compare different materials.

FRP
Fibre-reinforced plastic

GRC/GFRC
Glassfibre Reinforced Concrete

LCA
Life Cycle Assessment refers to a process of evaluating the effects that a product has on the environment over the entire period of its life thereby increasing resource-use efficiency and decreasing liabilities.

MMC
Modern Methods of Construction

NRM 3
New Rukes of Measurement refers to a set of rules published by the RICS and provides an order of cost estimating and cost planning for building maintenance works.

OHLE/OLE
Over Head Line Equipment refers to the overhead wires and supporting equipment that carry electricity to power trains.

ORR
The Office of Rail and Road Regulation is the independent safety and economic regulator for Britain's railways.

PRM NTSN
'Persons with Reduced Mobility — Technical Specification for Interoperability' is a European standard which provides the accessibility requirements of rail vehicles and railway stations. The NTSN's apply to the entire UK rail network with the exception of the exclusions listed on the DfT website.

RICS
Royal Institution of Chartered Surveyors refers to a professional body that regulates the activities of the surveying profession as well as providing regulations and support to its members.

Route Asset Manager (RAM)
Route asset managers are responsible for defining the scope of work via the Route Requirement Document (RRD). They participate in the selection and approval of the selected design (Approval in Principle forms 001 & 004) as they will be eventually in charge of the new infrastructure.

RSSB
The Rail Standards and Safety Board measure safety performance and analyse risk for the UK rail industry, and publishes Railway Group Standards. www.rssb.co.uk

SFO or TOC
Usually the Station Facilities Operator or Train Operating Company franchises the station from Network Rail and is legally responsible for its operation. Hence it has a major interest in all design stages. In managed stations, it is not uncommon for Network Rail to be the operator of the station (the SFO) that provides service to a number of train operators (TOCs) using the station.

Station Category
The DfT's station categorisation reflects the number of passengers using the station and the importance of the station.

Third Rail
A rail electrification system that uses an electrified rail at track level, rather than an overhead line.

Appendix A
Relevant Standards and Guidance

DfT Code of Practice
'Design Standards for Accessible Railway Stations'. (2015)

NTSN PRM
Technical Specification for Interoperability: Accessibility for Persons with Reduced Mobility (2014) PRM NTSNs were substituted by PRM NTSNs in UK that may differ slightly from the NTSNs

BS 5400
Steel, Concrete and Composite Bridges (1983-2000) BS 6180 Barriers in and about buildings – Code of Practice (1999)

BS 8300
Design of an accessible and inclusive built environment – Code of Practice (2018)

BS 9992
Fire safety in the design, management and use of rail infrastructure – Code of practice (2020)

BS EN 50122
Protective provisions relating to electrical safety

Equality Act 2010
The Equality Act 2010 legally protects people from discrimination in the workplace and in wider society

Network Rail
Station Design Principles for Network Rail (2014)
Inclusive Design Strategy (2015)
Station Flooring Guidance & Floor Selection (2014)

FIB
Guidelines for the design of Footbridges (bulletin 32, 2015)

DfT
Guidance on use of tactile paving surfaces (1998)

HSE
Assessing Slip Resistance of Flooring

BRE
Review of Cambridge footbridge design and defects

CIRIA
Fibre-reinforced polymer bridges C779

Highway Structures & Bridges Design
Design of fibre reinforced polymer bridges and highway structures CD368

Railway Bridge Construction
F A W Mann (1972) Hutchinson Educational

RSSB Standards:
RIS-7016-INS
Interface between Station Platforms, Track ,Trains and Buffer Stops

GI-RT-7020
Guidance on Station Platform Geometry

GI-RT-7073
Requirements for the Position of Infrastructure and for Defining and Maintaining Clearances

RIS-7700-INS
Rail Industry Standard for Station Infrastructure

GL-RT-1210
AC Energy Subsystem and Interfaces to Rolling Stock Subsystem

GL-RT-5110
Design Requirements for Structures

Institute of Structural Engineers
How to calculate embodied energy (2020)

For dated references, only the edition cited applies.
For undated references, the latest edition of the reference (including any amendments) applies.

Relevant Standards and Guidance

NR Standards:

NR/L3/CIV/020
Design of Bridges

NR/L3/CIV/151/F010
Standard Designs and Details for Building and Civil Engineering

NR/CIV/TUM/4000
Technical User Manual for Railway Footbridges in Stations

NR/L2/CIV/140
Model Clauses for Specifying Civil Engineering Works

NR/L2/CIV/003
Engineering and Architectural Assurance of Building and Civil Engineering Works

NR/L3/CIV/040
Work Instruction for the use of protective coating systems

NR/L1/CIV/192
Policy Management of Lift Assets
Module 01 Lift Asset Data/Information Management

NR/L2/OHS/00135
Diversity Impact Assessments

NR/L2/CIV/039
Assessment and certification of protective coatings

Module 02 Lift Design
Module 03 Lift Construct, Commission and Decommission
Module 04 Lift Maintenance
Module 05 Lift Measure
Module 06 Lift Assurance

NR/L1/CIV/192
Policy Management of Lift Assets

NR/L2/CIV/193
Standard Specification for New and Upgraded Lifts

NR/L3/CIV/194
Selection and Design of New and Upgraded Lifts

NR/GN/CIV/100/05
Heritage Care and Development

NR/GN/CIV/200/01
Materials & Components

NR/GN/CIV/200/05
Vertical Circulation

NR/GN/CIV/200/08
Lighting at Stations

NR/GN/CIV/300/02
Security at Stations

NR/GN/CIV/300/04
Inclusive Design

NR/GN/CIV/300/07
Diversity Impact Assessment guidance

NR/GN/CIV/002
Use of Protective Treatments and Sealants

NR/GN/CIV/100/03
Station Capacity Planning

NR/L2/ELP/21085
Earthing and Bonding on A.C. Electrified Railways

NR Websites:

Network Rail Standards Website
https://www.networkrail.co.uk/industry-and-commercial/third-party-investors/network-rail-is-open-for-business/reviewing-our-standards/

Network Rail B+A design hub
https://brand.networkrail.co.uk/b/www/c/en-GB/Registration

Buildings and architecture design guidance (strategy and policy documents, design guidance manuals and brochures for Beacon, Ribbon and Frame Footbridge Designs)
https://www.networkrail.co.uk/industry-and-commercial/supply-chain/existing-suppliers/buildings-and-architecture-design-guidance/

NR Apps:

Arki app, augmented reality
https://apps.apple.com/us/app/arki/id700695106

Online parametric tool for Frame Footbridge
https://www.shapediver.com/app/m/parametric-frame-bridge-6

Image A.2
Leeds Station

Footbridges & Subways

Footbridge Summary of Requirements

Roof Cover Assessment Aid

Lift Requirements Assessment Aid

B

Appendix B
Footbridge Summary of Requirements

All Network Rail footbridges should be designed to the following requirements:	
01	Footbridges in stations should be designed to one of the NR Standard Designs (NR/L3/CIV/151) and any departure from these design standards should be approved through the Network Rail standards Buildings and Civils derogation process.
02	The width of the bridge and the stairs should be determined by a capacity assessment but in any case, the clear passage on the bridge should be a minimum 2 m width and the clear passage on the stairs should be a minimum 1.6 m width.
03	Special consideration should be given to lighting of open footbridges which is more difficult due to the fact that there is no overhead roof to carry the light fittings and cable runs.
04	No handrails or footholds should be provided along the parapet of an open or unenclosed footbridge.
05	The top of the parapet on an open or unenclosed footbridge should be designed to prevent any foothold.
06	The minimum headroom on the footbridge should not be below 2.5 m (2.3 m under beams, bulkheads or signage allowed).
07	The users of the footbridge should be able to see out and also be seen from outside. Taking into account wheelchair users and children, the viewing zone (glazed or other) should be at least 1m to 1.8m above deck (if horizontal bars are required, they should be no lower than 1.8m above the deck).
08	Glazing should be heat soaked thermally toughened laminated glass. Self-cleaning glass tested to EN1096-2 is preferable where appropriate.
09	A methodology of cleaning and replacing the glazing should be agreed with the RAM at ES4 design stage.
10	Roof cover to footbridges should be insulated to prevent condensation and the eaves should be designed to provide continuous natural ventilation.
11	Special consideration should be given for maintenance and inspection access to the roof and to the rainwater gutters.
12	The base of covered stairs should have a minimum extended cover of 1.2m beyond the stairs.
13	The roof to a footbridge should be designed with falls towards the platform avoiding the need for gutters over the tracks.
14	A covered footbridge and stair should either be enclosed or have a sufficient roof overhang beyond the parapet.
15	All services (power, CCTV and data) should be integrated into the design at ES4 design stage.
16	Wherever it is possible, a dual-entry lift that allows passengers to enter and exit the lift without turning 180^0 is usually preferable, depending on site conditions and safety preferences, site conditions and safety preferences.
17	The waiting area in front of the lift, minimum 1.5 m deep, should not be within the passage area of the footbridge span.
18	All lift entrances should be covered either by a roof or a canopy at least 1.5 m deep by 2.5 m wide.

Appendix B
Roof Cover Assessment Aid

There is a certain amount of confusion as to whether bridges and stairs at stations should be covered by a roof and also about the extent of enclosure that is required above the parapets. Image C.1 illustrates the two stair options (open, covered) and it follows that the spans would be treated in a consistent manner with any of these options.

A rough cost analysis of recent Access for All (AfA) bridge installations indicates that the cost of the roof and enclosure does not add significantly to the overall cost of a new footbridge project. This does not seem a high price to pay for a safer and more comfortable environment on the station platforms. From maintenance, whole life and asset protection point of view there are also advantages to the covering of the footbridges, avoiding chemical antifrost treatments of the deck surfaces which are polluting and also known to damage the steel structure. The DIA is a good process for establishing the needs and preferences of the local community.

In any case, the current version of the DfT code of practice requires the stairs on an accessible route in a station to be covered or a dispensation from the DfT for not covering them. The DfT text is extracted from the BS8300 and the bridge span should be viewed, for all practical purposes, as a landing between a number of stairs and lifts.

Below are listed the criteria which should be considered when making the decision if to cover a footbridge at stations. An assessment aid is suggested which could be used for making a request for a DfT dispensation, if the intention is to install an open footbridge. In any case the station operator should always be consulted for the final decision.

The Criteria suggested are :

1. **Station Category —** Number of people using the stairs (higher numbers increase risk of accidents).

2. **Futureproofing —** Likelihood of use increasing in the next 50 years.

3. **Staffing/Security —** Degree of staff availability in the station in case of an accident and or vandalism.

4. **Local Weather —** Likelihood of frost or snow on the stairs (increased risk of accident).

5. **Local Exposure —** Likelihood of wind driven pollution or sea exposure rusting the structure.

6. **Canopy Provision —** On platforms without canopies, a covered footbridge might become a waiting area and this carries a new risk of overcrowding and rushing on the stairs when the train arrives.

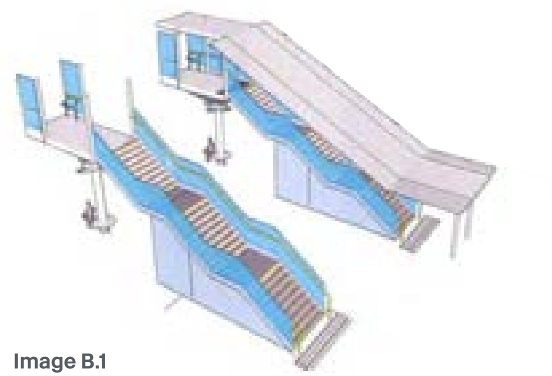


Image B.1
The two stair options

7. **Heritage —** In some situations with listed stations, a covered bridge might impact negatively on the integrity of the station or an conservation area. (In such a case a written statement should be sought from the Railway Heritage).

8. **Feasibility —** In some very rare situations it might be physically impossible to provide the enclosure due to height or access restrictions.

Roof Cover Assessment Aid

Station Category	Cat A, B, and C	Cat D	Cat E and F
Score	2	1	0

Futureproofing	Very Likely	Possible	Very Unlikely
Score	2	1	0

Staffing/Security	Staffed	Partly Staffed	Unstaffed
Score	2	1	0

Local Weather	Severe	Moderate (UK)	Sheltered
Score	2	1	0

Local Exposure	Exposed	Normal	Unexposed
Score	2	1	0

Canopy Provision	All Platforms	Some Platforms	No Canopies
Score	2	1	-3

Heritage		No planning restriction	Heritage Objection
Score	Usually 0	0	-13

Feasibility		Normal	Impossible
Score	Usually 0	0	-13

Sum of Scores	0 or more	Below 0
Bridge Type	Covered	Open

Example A:	Score
Category D Station	1
Likely to Expand	1
Unstaffed Regularly	0
Moderate Weather	1
Exposed to Sea	2
Some Platforms	1
No Heritage Issues	0
Feasibility	0
Total:	6

Bridge can be Covered

Example B:	Score
Category E Station	0
Likely to expand	1
Partly Staffed	1
Sheltered	0
Unexposed	0
No Canopies	-3
No Heritage Issues	0
Feasibility	0
Total:	-1

Bridge can be Open

Cwmbran Station, Wales

B.1 Introduction
Projects can apply to the DfT for dispensation against providing roof cover to station footbridges and they can use the Roof Cover Assessment Aid (in this appendix B on previous pages) as one way of justification. It should be noted that cost should not be used as a criteria. Local planning objections can be used as a valid justification but they should always be submitted with clear evidence of planning or heritage objections that would prevent delivery with roof cover.

The following example of a derogation application for a footbridge in Cwmbran station in Wales is a good example of how to base the application on the risk factor of people slipping on the stairs (which is the reason behind the requirement of covering the footbridge) . Please note the following aspects of this application:

- → The project has analysed the risk of slips in the station based on usage and demonstrated the low level of risk
- → The project obtained and demonstrated the support of the local accessibility panel
- → The application highlights the 2018 changes to the BS8300 that were issued since the current 2015 version of the DfT COP. The update suggests that other factors than cover should be considered to avoid slips on the stairs.
- → The project is proposing to mitigate the risk of falls by increasing the depth of the threads from 300 to 350mm

B.2 Cwmbran Roof Cover Derogation
The Access for All scheme at Cwmbran is proposing a new footbridge to support the provision of lifts for the benefit of step-free access. It is proposed that this footbridge is uncovered.

To do so will necessitate a derogation from the Design Standards for Accessible Railway Stations (2015) Q1 National Standards (BS8300:5.9.1).

This clause states "If feasible, stepped access routes should be protected from inclement weather."

B.3 Substantiation

B.3.1 Change in BS8300 Standard
The Q1 National Standard clause referenced in the Design Standards for Accessible Railway Stations (the Design Standards) is BS8300:5.9.1. This states "*If feasible, stepped access routes should be protected from inclement weather.*"

This places the onus on the applicant to demonstrate that provision of protection from inclement weather is not feasible, or to do so would itself bring about an unacceptable safety risk. In most instances this will be unlikely.

This however cites BS8300 (2009). Subsequent to the 2015 release of the Design Standards, BS8300 has a new 2018 publication where clause 5.9.1 has been removed and replaced with an equivalent BS8300 (Part 1) clause 9.1.1. This revised clause states:

"*When exposure conditions indicate, weather protection should be provided on a stepped route, e.g. extra horizontal or vertical cover from the greatest risk from precipitation, sun or wind, depending on the context.*

NOTE In some external environments the impact and need for protection from wind is greater than the risks from rain, sleet or snow. In some climates or locations the sun is far more of a risk.

The effects of the urban environment should be taken into account, e.g. wind around corners or between large buildings, particularly the cumulative effect of surrounding buildings or trees on the microclimate of the external environment on a stepped route."

This updated clause removes the presumption that stepped access routes should in the first instance be protected from inclement weather unless not feasible and replaces it with the consideration that prevailing weather conditions is the primary factor for assessment.

In the case of Cwmbran station, there is nothing to suggest it would be anything out of the ordinary, both on a UK or microclimate level. Being both inland and in the south western part of UK, the station is not subject to frequent adverse cold weather and neither is it exposed to adverse wind conditions.

B.3.2 Incident Data

Analysis of both national station incident data and station specific incidents leads to the view that in the instance of a station with a footfall similar to that of Cwmbran's (386,224 16/17 entries and exits), the risk of slips, trips and falls due to inclement weather is not a principal factor in the incident rate and that the incident rate is not materially mitigated to the extent that all stepped access routes should start from the position of being covered unless proved unfeasible. This is assumed to be supported by the removal of that starting principle under the current version of BS8300 Part 1.

National data in the form of July 2016-December 2020 Station STF Incidents shows the overarching prevalence of slip, trip and fall incidents occur at stations with high footfall. In this period there were a total of 4893 recorded slip, trip and fall incidents at stations nationally. It should be noted that these are whole station environment instances, and not those specific to stepped access routes. Counting the number of instances at each station against footfall it follows that those stations with the higher footfall have the higher number of instances, but they are also shown to have a disproportionately higher incident rate.

It can reasonably be expected that most, if not all stations over a certain footfall per annum (pa) will already have covered stepped access routes. A broad assumption could be that generally stations with a footfall greater than 1million passengers pa will have covered stepped access routes. There may be a few instances where that is not the case and for further beneficial analysis the incident data at those particular stations can be reviewed for weather related incidents and compared against stations of similar footfall with covered access.

Based on counts of instances against total station footfalls, the tables below give the incident rates for two scenarios – those total footfall and incident counts for stations with footfall < and > 500k pa and those with footfall < and > 1m pa. All footfall data is based on 2016/17 entries and exits.

Station footfall pa	Incidents	No. of stations	Total footfall	Passengers/incident
<500k	86	1666	238,542,967	2,773,755
>500k	4807	890	2,700,807,945	561,849

Table B.1
Station footfalls and incidents.

Station footfall pa	Incidents	No. of stations	Total footfall	Passengers/incident
<1m	129	2005	479,128,111	3,714,171
>1m	4764	551	2,460,222,801	516,420

Table B.2
Station footfalls and incidents.

With an incident rate of 1 for every 516,420 passengers at stations >1m pa vs 1 incident for every 3,714,171 passengers at stations with <1m pa, it is suggested that the position in respect to slip, trip and fall data is being disproportionately skewed by those stations with higher footfall and higher incident rates and that these rates do not proportionately translate to stations with a lower footfall such as Cwmbran. Noting also these are whole station incidents and not just stepped access route incidents, it also suggests that factors affecting the volume of slips, trips and falls at stations are not contingent on weather protected stepped access routes.

Locally provided information supplied for Cwmbran by TfW Rail Ltd shows that between March 2015 and January 2020 there were a total of 8 slip, trip and fall incidents at the station. Of those incidents, four relate to the footbridge and of those four, one instance is attributed to ice build-up on the footbridge with the complainant citing that the footbridge had not been gritted. The footbridge has recently been refurbished, including the provision of renewed anti-slip surfacing. One of these incidents has occurred post refurbishment works.

Of all the stations within the CP6 Wales & Borders AfA portfolio[1] this is the only recorded incident relating to both weather and stepped access routes, while as many incidents have occurred at the covered footbridge in Llanelli as the other uncovered station footbridges. Generally, the incident count on footbridges is in the minority compared to platforms and train/platform interface.

Information on these incidents is given in the following Annexes.

B.3.3 Station Amenity

Subject to formal endorsement by TfW's Accessibility and Inclusion Panel, the principle of uncovered footbridges is generally accepted. This is in recognition that the primary benefit and the basis in which the project exists is to achieve step-free access from principal drop-off to all operational platforms.

Where the existing infrastructure permits, this would preferably be through the provision of lifts to an existing footbridge. As is generally the case though, a new footbridge that can accommodate lifts is required. Where this is the case, the provision of the new footbridge as part of the project is almost entirely down to it being the most practical solution to enable lift or ramp access from platform level to bridge deck level.

In that context, the provision of weather protection as an amenity to the station as opposed to the intent under BS8300 (2009) cl. 5.9.1 is a secondary consideration of scope to the achievement of step-free access. Especially so at stations where the accessible route from parking/drop-off through to the respective covered waiting area is predominantly exposed, a covered footbridge will offer only a relatively small incremental benefit. At Cwmbran for instance, coverage on Platform 1 constitutes 8.1% of the platform area, while inclusive of the station building this raises to 30% on Platform 2.

Where a new footbridge is necessitated only by virtue of the existing footbridge being unable to accommodate lifts or ramps, it is proposed that through the correct consultation process it should be at the project's discretion as to whether or not a new footbridge is covered for the purposes of providing an overall benefit to the station facilities. Examples of differing scenarios and conclusions within the current and past AfA programme where that decision making has taken place include:

→ a. Llanelli: Ticket office and extensive canopies together with an existing enclosed footbridge allows for a fully protected route from drop-off

[1] 59 incidents in total across Abergavenny, Barry Town, Llanelli, Flint, Cwmbran, Tenby, Ludlow and Newtown, with 13 being attributed to footbridges at these stations.

to all platforms. It should be expected the new footbridge retains this provision and as such is proposed to be covered.

→ b. Abergavenny: Ticket office, café, toilet and extensive canopy coverage on both platforms allow for a predominantly protected route, with the exception of the existing uncovered footbridge. A new covered footbridge is proposed as this will facilitate a complete protected route from drop-off to all station facilities.

→ c. Radyr: Limited waiting facilities and open platforms together with an uncovered footbridge. A covered footbridge would offer limited benefit along the overall route from drop-off to waiting areas, while creating the risk of people lingering on the stairs and blocking access routes during periods of inclement weather. This scheme was completed with an uncovered footbridge.

The other significant consideration of a covered/uncovered footbridge is planning approval and the station's listed status. While several stations could fall into a similar category as Abergavenny, it is clear through consultation with Local Authority Conservation Officers that uncovered footbridges with low massing and scale would have the greatest prospect of achieving Listed Building Consent.

Similarly prior approval is required for non listed stations and the siting, appearance and design of any footbridge are key considerations with regard to whether to grant prior approval consent.

Under these scenarios it fits that the footbridge at Cwmbran remains uncovered.

B.4 Proposed Mitigations

The clauses under consideration in BS8300 2009 & 2018 are supported by the following contextual text:

"*Slips on steps and stairs occur in both ascent and descent, but a slip on descent is more likely to lead to a fall and an injury. Research [23] has shown that slips while descending stairs are more likely to occur when the user oversteps, placing only 50% to 60% of their foot on the tread. The likelihood of an overstep decreases significantly with increased going size, and beyond 300mm, is very rare. Beyond 350 mm, it is unlikely that a large overstep will occur within the lifetime of the building, even with 2 000 users per day*[2]."

Regardless of whether a footbridge is covered or uncovered, it is apparent that the primary mitigation to slips, trips and falls is going length. As a basic requirement, the Design Standards require the going to be a minimum of 300mm. It is proposed that development of Cwmbran will include an assessment for maximising so far as practical the going length within the 300mm-350mm range. This will be set as a principle for all current and future AfA schemes in development. Further mitigations through detailed design will include options for maximising cross-falls to manage risk of water ponding and ice formation, alongside continuation of existing day-to-day mitigations such as inspections, gritting and maintenance of anti-slip treads.

[2] *730,000 users per annum*

Lift Requirements Assessment Aid

Network Rail's policy of requiring a DIA for projects means that the decision on whether to provide a lift on a footbridge or subway should be thoroughly considered in a way that takes into account the users and locality. The following criteria can assist projects in assessing if they may have any grounds for not providing a lift to a public or station footbridge:

1. **Ramp Feasibility** — In cases where the vertical height does not exceed 2m, the provision of a ramp can be considered subject to a DIA.
2. **Gradient Feasibility** — Gradients with slopes above of 1:21 (or less) can be a preferable alternative to ramps with landings and should be considered.
3. **Alternative Route** — If an alternative acceptably accessible route already exists in the location, stairs may be sufficient. This alternative route would be subject to a DIA assessment and should include rest points at 50m intervals.
4. **Usage** — If the usage of the bridge is very low, this could be grounds to consider omitting lift access to the bridge, subject to the DIA outcome. For Station locations the PRM NTSN states: When renewed or upgraded, existing stations that have a daily passenger flow of 1000 passengers or less, combined embarking and disembarking, averaged over a 12 month period are not required to have lifts or ramps where these would otherwise be necessary to provide a step-free route if another station within 50 km on the same route provides a fully compliant obstacle-free route. In such circumstances the design of stations should incorporate provision for the future installation of a lift and/or ramps to make the station accessible to all categories of PRM.
5. **Environment** — If the area or destination either side of the bridge is inaccessible and difficult terrain, this could be grounds to consider omitting an accessible vertical route to the bridge, subject to the DIA outcome.

Standards Reference

Diversity Impact Assessments
NR/L2/OHS/00135
Diversity Impact Assessment guidance
NR/GN/CIV/300/07

Image B.1
Station footbridge

C

Footbridges & Subways

Comparison of Standard Footbridge Designs

Image C.1
Southampton Airport station

	Station bridges Covered			
	Beacon	Ribbon	Frame	Ava
Visual impact	3	2	3	3
Local adaption	3	3	3	2
Identity	3	2	3	3
Context	3,0	2,3	3,0	2,7
Accessibility	3	3	3	3
Flow	3	3	3	3
Weather protection	3	2	3	2
Passenger experience	3,0	2,7	3,0	2,7
Visibility	3	3	3	3
Fire performance	3	3	3	3
Safety	3,0	3,0	3,0	3,0
Materials (maintenance/durability)	2	2	2	3
Service and replacement	2	2	2	3
Maintenance	2,0	2,0	2,0	3,0
Work over the railway	3	2	3	3
Spatial constraints and flexibility	2	2	2	3
Mass production and module sizes	2	2	3	3
Future adaptability	2	1	3	3
Buildability	2,3	1,8	2,8	3,0
Capital cost	3	3	3	3
Major and minor replacement cost	2	3	2	3
Cost	2,5	3,0	2,5	3,0
Embodied carbon	3	1	2	2
Whole life embodied carbon	3	2	3	3
Sustainability	3,0	1,5	2,5	2,5

Context	3,0	2,3	3,0	2,7
Passenger experience	3,0	2,7	3,0	2,7
Safety	3,0	3,0	3,0	3,0
Maintenance	2,0	2,0	2,0	3,0
Buildability	2,3	1,8	2,8	3,0
Cost	2,5	3,0	2,5	3,0
Sustainability	3,0	1,5	2,5	2,5

Table C.1.1

C.1.1 Evaluation and points

The different standard bridge designs have been evaluated based on the following topics: context, passenger experience, safety, maintenance, buildability, cost, and sustainability. All topics have subtopics as listed in the table and the score of each topic is the average of the subtopics. Points are given from 1 to 3, 3 being the best. The scoring is not done across all footbridges but in three distinct groups: Station bridges covered, station bridges open and non-station bridges. The scoring should be not be perceived as a mathematical sum. For each project it should be assessed which topics are the most important for the specific project, its priorities, and opportunities. For example, context may be crucial for one project, while in another it is most important to prioritise sustainability and cost.

In the Design Manual the score of the topics for each bridge design is shown as pie charts for station bridges in section 4.6 and for non-station bridges in section 5.4.

Please note, the bridges in the scoring are assessed within each typology of covered and open, and therefore the covered bridges cannot be directly compared to the open bridges. Similarly, the bridges cannot be compared with bridges in non-station environments in the scoring.

C.1.2 Covered station footbridges

On this page the scoring for station footbridges in a covered versions is shown. See section 4.6 for pie charts and additional information about the different bridge designs.

	Station bridges				
	Open				
	700 series	Beacon	Ribbon	Frame	Ava
Visual impact	2	3	3	3	3
Local adaption	2	3	3	3	3
Identity	1	3	3	3	3
Context	1,7	3,0	3,0	3,0	3,0
Accessibility	2	3	3	3	3
Flow	1	3	3	3	3
Weather protection	1	1	1	1	1
Passenger experience	1,3	2,3	2,3	2,3	2,3
Visibility	1	3	3	3	3
Fire performance	3	3	3	3	3
Safety	2,0	3,0	3,0	3,0	3,0
Materials (maintenance/durability)	2	2	2	2	3
Service and replacement	2	2	2	2	3
Maintenance	2,0	2,0	2,0	2,0	3,0
Work over the railway	3	3	3	3	3
Spatial constraints and flexibility	3	3	2	2	3
Mass production and module sizes	1	2	2	3	3
Future adaptability	2	2	1	3	3
Buildability	2,3	2,5	2,0	2,8	3,0
Capital cost	3	3	3	3	3
Major and minor replacement cost	3	3	3	2	3
Cost	3,0	3,0	3,0	2,5	3,0
Embodied carbon	1	3	2	2	3
Whole life embodied carbon	1	3	2	3	3
Sustainability	1,0	3,0	2,0	2,5	3,0
Context	1,7	3,0	3,0	3,0	3,0
Passenger experience	1,3	2,3	2,3	2,3	2,3
Safety	2,0	3,0	3,0	3,0	3,0
Maintenance	2,0	2,0	2,0	2,0	3,0
Buildability	2,3	2,5	2,0	2,8	3,0
Cost	3,0	3,0	3,0	2,5	3,0
Sustainability	1,0	3,0	2,0	2,5	3,0

Table C.1.2

C.1.3 Open station footbridges
On this page the scoring for station footbridges in open versions is shown. See section 4.6 for pie charts and additional information about the different bridge designs.

	Non-station bridges	
	Open	
	400 series	Flow
Visual impact	2	3
Local adaption	2	2
Identity	1	3
Context	1,7	2,7
Accessibility	1	1
Flow	2	3
Weather protection	1	1
Passenger experience	1,3	1,7
Visibility	1	3
Fire performance	3	1
Safety	2,0	2,0
Materials (maintenance/durability)	2	1
Service and replacement	2	2
Maintenance	2,0	1,5
Work over the railway	3	3
Spatial constraints and flexibility	3	2
Mass production and module sizes	1	2
Future adaptability	2	2
Buildability	2,3	2,3
Capital cost	3	3
Major and minor replacement cost	3	3
Cost	3,0	3,0
Embodied carbon	1	3
Whole life embodied carbon	2	2
Sustainability	1,5	2,5
Context	1,7	2,7
Passenger experience	1,3	1,7
Safety	2,0	2,0
Maintenance	2,0	1,5
Buildability	2,3	2,3
Cost	3,0	3,0
Sustainability	1,5	2,5

Table C.1.3

C.1.4 Non-station footbridges
On this page the scoring for non-station footbridges is shown. See section 5.4 for pie charts and additional information about the different bridge designs.

Image C.2
Ceramics, Faïence tiles

D

Footbridges & Subways

Sustainability

D.1.1 Embodied Carbon of footbridge designs
The carbon estimating methodology follows the impact categories identified in the RICS Whole life carbon assessment for the built environment (2nd Edition). Both upfront embodied carbon (capital carbon) and whole life carbon were calculated.

The embodied carbon of each bridge design was estimated using the quantity of materials involved and associated carbon emissions factors covering raw material extraction, transportation and processing (A1-A3), transportation (A4) and site activities (A5). Carbon factors for each material have been taken from the database held within OneClickLCA.

The whole life carbon estimation includes the embodied carbon factors above, but also includes additional allowances for carbon associated with repair (B3) and replacement (B4) activities and for end of life disposal (including demolition (C1), transportation (C2), processing (C3) and disposal (C4).

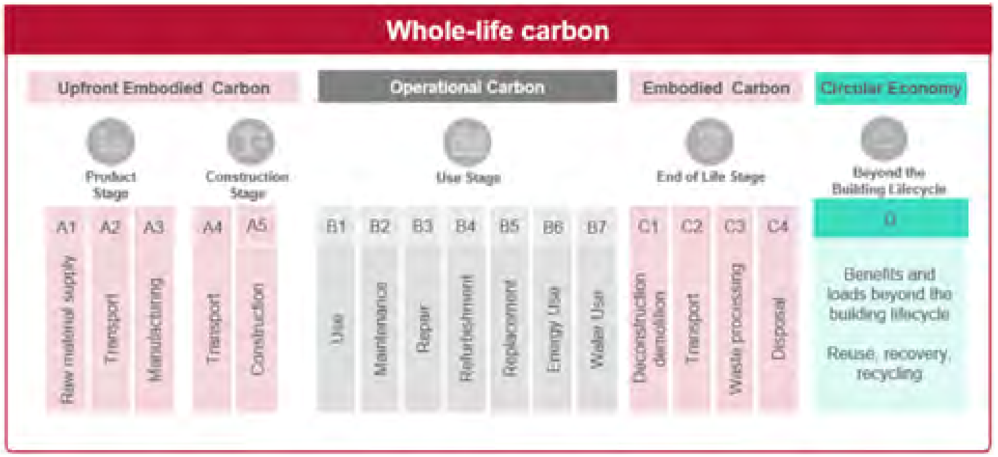


Image D.1
Whole-life carbon.

Estimates for the carbon impact of repair and replacement use the same lifecycle assumptions as those detailed in the lifecycle cost analysis. Carbon associated with operational energy (B6), eg for lighting and lifts, and operational water (B7) is excluded.

Where different material types with varying carbon factors could be used to meet a specification (eg steel with different levels of recycled content or concretes with different levels of cement replacement) a conservative assumption has been used as the basis of the analysis. It will be possible to reduce the carbon impact of each bridge by paying close attention to the sourcing and specification of steel and concrete components and it is recommended that the carbon intensity of these materials is explicitly considered within procurement processes.

The analysis shows that total embodied carbon of the different bridge designs varies from around 237 tonnes for the Flow bridge to 534 tonnes for the closed Ribbon design. However it is important to remember that the Flow bridge excludes both covering and lifts and has a projected lifespan of around half that of the other bridge designs.

The most significant contributor to carbon emissions for all bridges structure (typically steel but fibre reinforced plastic in the Flow design) followed by cladding and services (principally the lifts). Typically the open version of each bridge design has a lower carbon impact than the closed version. This is not always the case and for the Beacon bridge the open version has the greater carbon impact due to the increased volume of structural steel involved in this design.

D.1.2 Assumptions

- Carbon associated with – the assumptions included within OneClickLCA for transportation distance and mode and for site related carbon have been retained. Details of transportation distance and mode for key materials are shown below, the actual figures for any given project will vary but are not anticipated to materially affect the overall carbon figures for each bridge design.
- Material quantities – these are taken from the estimates produced for cost analysis of each design option and reflect the level of detail therein.
- Lifecycle carbon – carbon associated with repair (B3) and replacement (B4) activities is included in the Whole life carbon analysis using the same lifecycle assumptions as those detailed in the lifecycle cost analysis. Carbon associated with operational energy (B6), eg for lighting and lifts, is excluded.
- Foundations – foundation designs assume the same ground conditions for each bridge. In practice, ground conditions will vary and with associated implications for the carbon associated with foundations, most notably where site circumstances necessitate the use of piled foundations.

Material	Distance (km)	Transport mode
Concrete	60	Mixer Truck
Steel	110	Trailer, combination, 40 tonne capacity, 100% fill rate
Insulated wall/roof cladding	80	
PVC waterproof membrane	80	
Zinc coated bridge railing	110	
Precast drainage channels	60	
Rainwater drainage pipe	110	Large delivery truck, 9 tonne capacity, 100% fill rate
Epoxy powder paint	130	
2.5t capacity elevator	100	

Table D.1
Distance and transport mode for materials.

D.1.3 Exclusions

- Remediation of ground contamination.
- Diversion of existing services.
- Carbon from wastage / rework
- Carbon linked to operational energy use
- Carbon linked to design or project management activities

D.1.4 Results

The tables and chart below show the breakdown of results for upfront (A1-A5) and whole life carbon for both the bridges in a station environment and those in a non-station environment. Chart 1 summarises this breakdown by element for A1-A5 for the covered beacon bridge illustrating the significance of structure in the upfront carbon of each option.

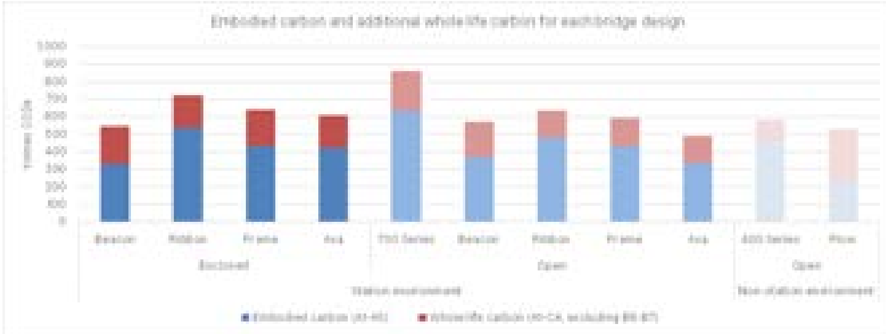
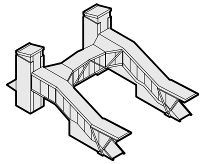


Image D.2
Embodied carbon (A1-A5) and WLC.

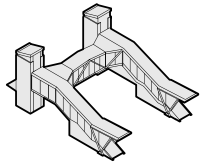
	Station																Non-station	
	Covered								Open								Open	
	Beacon		Ribbon		Frame		AVA		700 Series		Beacon		Ribbon		Frame		AVA		400 Series		Flow	
	A1-A5	WLC	A1-A5	WLC	A1-A5	WLC	A1-A5	WLC	A1-A5	WLC	A1-A5	WLC	A1-A5	WLC	A1-A5	WLC	A1-A5	WLC	A1-A5	WLC	A1-A5	WLC
Foundations	25	42	52	98	25	42	25	42	37	63	25	42	44	82	25	42	25	42	26	46	18	23
Structure	132	133	222	225	224	226	217	219	427	486	196	199	206	208	204	206	141	142	394	453	135	301
Cladding	87	95	149	143	94	88	94	97	72	72	69	103	149	147	126	121	94	97	0	0	58	127
Roofing	11	18	30	33	8	35	10	43	1	5	3	4	1	5	1	5	1	4	0	0	0	0
Finishes	28	102	25	57	27	80	19	38	39	68	22	54	23	24	20	51	19	38	39	68	22	70
MEP	55	167	55	168	55	166	55	167	55	168	55	167	55	168	55	166	55	167	6	18	3	10
Drainage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Total	338	558	534	725	433	638	420	607	632	861	370	570	479	634	431	591	335	492	465	584	237	532

Table D.2
Breadown of results for A1-A5 and WLC.

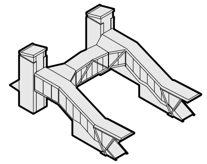


D.2.1 Beacon covered

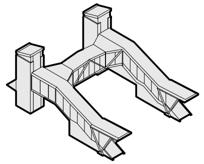
Specification	Quant		Carbon Factor (kgCO$_2$e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Foundations															
Pad Foundations to Lift Shaft (1.5 x 1.5 x 1.0m)	**8.00**	Nr													
Pads foundation total volume	18.00	m3													
Pads foundation concrete	17.54	m3	382	19	16	417	-	-	7	1	- 79	425	-	7,314	7,452
Pads foundation rebar (Kg)	3600.00	kg												-	
Pads foundation rebar (Tonnes)	3.60	Tonnes	1,180	4	59	1,244	-	-	38	2	- 49	2,528	-	4,477	9,100
Pads foundation rebar (m3)	0.46	m3												-	
Strip Foundation to Stair Roof Support (3.0 x 1.0 x 1.0m)	**2.00**	Nr												-	
Strip foundation total volume	6.00	m3												-	
Strip foundation concrete	5.85	m3	382	19	16	417	-	-	7	1	- 79	842		2,438	4,922
Strip foundation rebar (Kg)	1200.00	kg												-	
Pads foundation rebar (Tonnes)	1.20	Tonnes	1,180	4	59	1,244	-	-	38	2	- 49	2,528	-	1,492	3,033
Strip foundation rebar (m3)	0.15	m3												-	
Strip Foundation to base of staircase (3.0 x 1.5 x 1.5m)	**2.00**	Nr												-	
Strip foundation total volume	13.50	m3												-	
Strip foundation concrete	13.16	m3	382	19	16	417	-	-	7	1	- 79	842		5,486	11,074
Strip foundation rebar (Kg)	2700.00	kg												-	
Pads foundation rebar (Tonnes)	2.70	Tonnes	1,180	4	59	1,244	-	-	38	2	- 49	2,528	-	3,358	6,825
Strip foundation rebar (m3)	0.34	m3												-	
Structure: Staircase														-	
400 x 200 x 8 RHS	5.71	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	18,915	19,146
200 x 100 x 8 RHS	1.88	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	6,228	6,304
180 x 180 x 10 SHS	2.02	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	6,691	6,773
Top landing - 8mm thick plate	1.73	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	5,721	5,791
Mid landing - 8mm thick plate	0.63	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	2,080	2,106
Lower landing - 8mm thick plate	0.63	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	2,080	2,106
Structure: Liftshaft														-	-
254 x 254 x 89 UC	7.92	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	26,236	26,556
305 x 102 x 25 UB	1.84	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	6,095	6,170
100 x 100 x 6.3 SHS	2.10	t	2,593	4	87	2,685	-	-	38	2	- 1,594	2,725	-	5,638	5,723
	0.00	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	-	-
Structure: Staircase Roof														-	-
152 x 152 x 30 UC	0.55	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	1,822	1,844
180 x 180 x 10 SHS	2.42	t	2,593	4	87	2,685	-	-	38	2	- 1,594	2,725	-	6,497	6,595
100 x 100 x 8 SHS	0.10	t	2,593	4	87	2,685	-	-	38	2	- 1,594	2,725	-	268	273



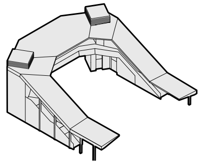
Specification	Quant		Carbon Factor (kgCO₂e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
88.9 x 6.3 CHS	0.22	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	729	738
Structure: Bridge Deck Slab														-	-
8mm thick top plate	3.66	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	12,120	12,268
150 x 150 x 6.3 SHS	2.20	t	2,593	4	87	2,685	-	-	38	2	- 1,594	2,725	-	5,906	5,995
100 x 100 x 6.3 SHS	0.25	t	2,593	4	87	2,685	-	-	38	2	- 1,594	2,725	-	671	681
200 x 200 x 10 SHS	1.30	t	2,593	4	87	2,685	-	-	38	2	- 1,594	2,725	-	3,490	3,543
150 x 150 x 8 SHS	0.96	t	2,593	4	87	2,685	-	-	38	2	- 1,594	2,725	-	2,577	2,616
180 x 180 x 10 SHS	0.35	t	2,593	4	87	2,685	-	-	38	2	- 1,594	2,725	-	940	954
Structure: Bridge Deck Roof														-	-
180 x 180 x 10 SHS	1.08	t	2,593	4	87	2,685	-	-	38	2	- 1,594	2,725	-	2,899	2,943
100 x 100 x 8 SHS	0.26	t	2,593	4	87	2,685	-	-	38	2	- 1,594	2,725	-	698	709
88.9 x 6.3 CHS	0.26	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	861	872
Structure: Fittings														-	-
Allowance for Fittings (10% of total structure)	3.81	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	12,608	12,762
														-	-
														-	-
Cladding: Staircase														-	-
13.52mm toughened laminated glass panels (fixed) with PVB interlayer, 1500mm high	167.70	m2	110	0	-	110	-	-	2	0	- 1	112	-	18,467	18,861
Sandwich panel with insulation foam core and double steel siding, U = 0.18 W/m2K, 100 mm, 11.788 kg/m2, 117.88 kg/m3, KS 1000 Trapezoidal Quadcore RW Panel (Kingspan)	0.00					-								-	-
Staircase, top landing	0.00					-								-	-
13.52mm toughened laminated glass panels (fixed) with PVB interlayer, 1500mm high	27.50	m2	110	0	-	110	-	-	2	0	- 1	112	-	3,028	3,093
Cladding: Lift Shaft														-	-
Internal metal lining	292.64	m2	133	0	3	136	-	-	2	0	- 204	138	-	39,931	40,397
External facing brickwork	292.64	m2	24	-	1	25	-	-	-	26	-	51	-	7,316	14,925
Pilkington Profilit backlit frosted glazing	35.40	m2	110	0	-	110	-	-	2	0	- 1	113	-	3,898	3,986
						-								-	-
Cladding: Bridge Deck														-	-
13.52mm toughened laminated glass panels with PVB interlayer, 1500mm high	78.00	m2	110	0	-	110	-	-	2	0	- 1	112	-	8,589	8,772
13.52mm toughened laminated glass panels with PVB interlayer, 1500mm high	48.00	m2	110	0	-	110	-	-	2	0	- 1	112	-	5,286	5,398
Roof: Lift Shaft														-	-
Lift Shaft	15.60	m2	133	0	3	136	-	-	2	0	- 204	138	-	2,129	2,153
Extra over for Kingspan insulated membrane lined LPCB gutter	22.40	m	10	0	2	11	-	48	0	6	- 18	65	-	256	1,459
Glass canopy over lift door at platform level	2.00	Nr	38	0	3	42	-	135	0	7	- 17	209	-	84	418



Specification	Quant		Carbon Factor (kgCO₂e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Roof: Staircase														-	-
Kingspan KS500 insulated roof panel with standing seam, fixed with purlins to structural frame	104.50	m2	41	0	3	45	-	-	0	-	0	45	-	4,677	4,681
Extra over for Kingspan insulated membrane lined LPCB gutter	16.34	m	10	0	2	11	-	48	0	6	- 18	65	-	186	1,064
Extra over for Kingspan KS500 verge flashing	41.80	m	10	0	2	11	-	48	0	6	- 18	65	-	477	2,722
Roof: Deck														-	-
Kingspan KS500 insulated roof panel with standing seam, fixed with purlins to structural frame	58.26	m2	41	0	3	45	-	-	0	-	0	45	-	2,608	2,610
Extra over for Kingspan KS500 verge flashing	34.52	m	10	0	2	11	-	48	0	6	- 18	65	-	394	2,248
Extra over for Kingspan KS500 ridge flashing	2.60	m	10	0	2	11	-	48	0	6	- 18	65	-	30	169
Floor Finishes: Staircase														-	-
Staircase	0.00					-								-	-
Top landing - Light grey Altro finish	15.09	m2	28	0	3	31	-	311	0	-	0	342	-	469	5,160
Top landing, lift waiting area - Dark grey Altro finish	8.25	m2	28	0	3	31	-	311	0	-	0	342	-	256	2,821
Mid landing - Light grey Altro finish	10.00	m2	28	0	3	31	-	311	0	-	0	342	-	311	3,419
Lower landing - Light grey Altro finish	10.00	m2	28	0	3	31	-	311	0	-	0	342	-	311	3,419
Tactile pavings at foot of stairs	4.16	m2	19	0	-	19	-	-	0	0	- 2	19	-	78	79
Tactile pavings at head of stairs	4.16	m2	19	0	-	19	-	-	0	0	- 2	19	-	78	79
Treads & risers; metal step, 2500mm wide, 300m going	58.00	Nr	109	0	8	117	-	-	2	0	- 67	119	-	6,805	6,897
Extra over for applied finish	58.00	Nr	include in above	include in above	include in above	include in above	include in above	include in above	include in above	include in above	include in above	include in above	include in above	-	-
Extra over for 2500mm long AATI nosings to top / landing steps	6.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Extra over for 2500mm long AATI nosings to intermediate steps	52.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Nylon coated handrails, double rail to stairs	60.00	m	152	0	15	167	-	-	2	0	- 114	169	-	10,045	10,159
Nylon coated handrails, single rail to top landing	10.00	m	152	0	15	167	-	-	2	0	- 114	169	-	1,674	1,693
Floor Finishes: Bridge Deck														-	-
Bridge Deck - Light grey Altro finish	58.26	m2	28	0	3	31	-	311	0	-	0	342	-	1,810	19,922
Ceiling Finishes														-	-
Staircase						-								-	-
90 x 18mm flat timber panels with 10mm shadow gaps (Austratus or similar)	40.20	m2	33	1	6	40	-	-	1	213	42	296	-	1,608	11,899
30 x 60mm profiled timber slats set at 170 centres (Austratus or similar)	64.30	m2	33	1	6	40	-	-	1	213	42	296	-	2,572	19,033
						-								-	-
Deck						-								-	-
30 x 60mm profiled timber slats set at 170 centres (Austratus or similar)	58.26	m2	33	1	6	40	-	-	1	213	42	296	-	2,330	17,245
Signage														-	-
Network Rail logo	2.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Platform numbering	2.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Mechanical & Electrical Services														-	-



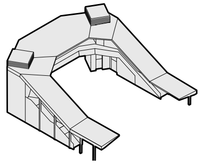
Specification	Quant		Carbon Factor (kgCO₂e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Electrical Installations	0.00													-	-
Electrical mains and sub-mains distribution	179.00	m2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Power installations	179.00	m2	20	0	0	20	-	61	0	0	- 32	82	-	3,662	14,658
Lighting installations	179.00	m2	12	0	0	12	-	-	0	0	- 3	12	-	2,224	2,236
	0.00					-								-	-
Specialist Lighting installations	0.00					-								-	-
Local electricity generation systems	0.00					-								-	-
Earthing and bonding systems	179.00	m2	0	0	0	0	-	1	0	0	- 1	1	-	56	227
16 person through lift	2.00	Nr	24,601	75	-	24,676	-	50,032	310	92	- 48,174	75,049	- 62	49,353	150,097
	0.00					-								-	-
Lift Motor Room	1.00	Nr	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	-	-
Fire Fighting Systems	0.00													-	-
Lighting Protection	179.00	m2	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	-	-
Drainage														-	-
Staircase	0.00					-								-	-
Linear drainage channel	27.00	m	11	0	-	11	-	-	0	0	- 2	11	-	294	297
Aluminium rainwater down pipe	18.00	m	3	0	0	3	-	3	0	0	- 3	7	-	61	119
General Allowances														-	-
Main Contractors Preliminaries		%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Main Contractors Overheads & Profit		%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Extra over for specialist crane hire	1.00	Item	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Extra over for NwR Possession Staff - Excluded; assumed works to be undertaken as part of rail wider possession		Excl												-	-
														-	-
Project No. 108713-104												TOTALS		337,686	558,288



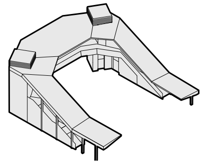
D.2.2 Ribbon covered

Specification	Quant		Carbon Factor (kgCO$_2$e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Foundations															
Pad Foundations to Lift Shaft (1.5 x 1.5 x 1.0m)	**8.00**	Nr													
Pads foundation total volume	18.00	m3													
Pads foundation concrete	17.54	m3	382	19	16	417	-	-	7	1	- 79	425	-	7,314	7,452
Pads foundation rebar (Kg)	3600.00	kg												-	
Pads foundation rebar (Tonnes)	3.60	Tonnes	1,180	4	59	1,244	-	-	38	2	- 49	2,528	-	4,477	9,100
Pads foundation rebar (m3)	0.46	m3												-	
Strip Foundation to Stair Roof Support (3.0 x 1.0 x 1.0m)	**12.00**	Nr												-	
Strip foundation total volume	36.00	m3												-	
Strip foundation concrete	35.08	m3	382	19	16	417	-	-	7	1	- 79	842		14,628	29,532
Strip foundation rebar (Kg)	7200.00	kg												-	
Pads foundation rebar (Tonnes)	7.20	Tonnes	1,180	4	59	1,244	-	-	38	2	- 49	2,528	-	8,954	18,199
Strip foundation rebar (m3)	0.92	m3												-	
Pad Foundation to Stair Canopy Extension (assumed 1.0 x 1.0 x 1.0m)	**4.00**	Nr												-	
Strip foundation total volume	12.00	m3												-	
Strip foundation concrete	11.69	m3	382	19	16	417	-	-	7	1	- 79	842		4,876	9,844
Strip foundation rebar (Kg)	2400.00	kg												-	
Pads foundation rebar (Tonnes)	2.40	Tonnes	1,180	4	59	1,244	-	-	38	2	- 49	2,528	-	2,985	6,066
Strip foundation rebar (m3)	0.31	m3												-	
Strip Foundation to base of staircase (3.0 x 1.5 x 1.5m)	**2.00**	Nr												-	
	13.50	m3												-	
	13.16	m3	382	19	16	417	-	-	7	1	- 79	842		5,486	11,074
	2700.00	kg												-	
	2.70	Tonnes	1,180	4	59	1,244	-	-	38	2	- 49	2,528	-	3,358	6,825
	0.34	m3												-	
Structure: Staircase														-	
Support columns, taken as 150kg/m, 6 Nr per stair	9.60		3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	31,801	32,189
Stringers,taken as 100kg/m	8.16	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	27,031	27,361
Stiffener to stair riser; 15mm thick vertical plate	6.56	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	21,718	21,984

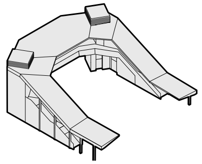
Appendix D
Sustainability



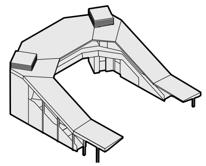
Specification	Quant		Carbon Factor (kgCO₂e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Mid landing - 8mm thick plate	0.63	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	2,080	2,106
Lower landing - 8mm thick plate	0.63	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	2,080	2,106
Structure: Liftshaft														-	
Corner posts; 200 x 200 x 10 SHS	4.92	t	2,593	4	87	2,685	-	-	38	2	- 1,594	2,725	-	13,208	13,407
Horizontals; 203 UC (taken as 86kg/m)	1.38	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	4,571	4,627
Horizontals; 150 x 100 x 8 RHS	0.30	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	994	1,006
Diagonals; 150 x 100 x 8 RHS	1.02	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	3,379	3,420
Diagonals; 150 x 90 x 15 angle	1.20	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	3,975	4,024
Cantilever beam 1	0.85	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	2,816	2,850
Cantilever beam 2	0.85	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	2,816	2,850
Cantilever beam 3	0.35	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	1,159	1,174
Structure: Bridge Deck Slab														-	
10mm thick top plate	4.15	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	13,755	13,923
Deck stiffeners; 15mm thick vertical plate at 725mm centres	22.18	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	73,473	74,370
Structure: Fittings														-	
Allowance for Fittings	5.32	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	17,614	17,830
Cladding: Staircase														-	
13.52mm toughened laminated glass panels (fixed), 1150mm high maximum	87.85	m2	38	0	6	44	0	0	0	- 6	45	-	45	3,869	
10mm thick top plate	10.55	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	34,949	35,376
Allowance for Fittings (10% of total structure)														-	
Internal metal lining	241.80	m2	133	0	3	136	-	-	2	0	- 204	138	-	32,994	33,379
Cladding type A, assumed to be Alucobond metal panel	241.80	m2	133	0	3	136	-	-	2	0	- 204	138	-	32,994	33,379
Louvres	12.40	m2	133	0	3	136	-	-	2	0	- 204	138	-	1,692	1,712
Pilkington Profilit backlit frosted glazing	35.40	m2	110	0	-	110	-	2	0	- 1	112	-	112	3,898	-
														-	
13.52mm toughened laminated glass panels, 1000mm high	128.58	m2	110	0	-	110	-	-	2	0	- 1	112	-	14,159	14,461
15mm thick plate	3.89	t	3,201	4	107	3,313	-	-	38	2	- 2,277	3,353	-	12,894	13,051



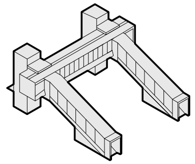
Specification	Quant		Carbon Factor (kgCO₂e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Parapet stiffeners; 15mm thick vertical plate at 725mm centres	0.87	t	3,201	4	107	**3,313**	-	-	38	2	- 2,277	3,353	-	2,883	2,919
15mm thick top plate; painted in highlight colour	1.30	t	3,201	4	107	**3,313**	-	-	38	2	- 2,277	3,353	-	4,298	4,350
20mm thick top plate; bent "balustrade"	1.30	t	3,201	4	107	**3,313**	-	-	38	2	- 2,277	3,353	-	4,298	4,350
Roof: Lift Shaft														-	-
Insulated sloping roof panel with standing seam, fixed with purlins to structural frame	14.28	m2	41	0	3	**45**	-	-	0	-	0	45	-	639	640
Extra over for insulated membrane lined LPCB gutter	21.40	m	10	0	2	**11**	-	48	0	6	- 18	65	-	244	1,394
Solid canopy over lift door at platform level	14.28	m2	38	0	3	**42**	-	135	0	7	- 17	184	-	598	2,624
Roof														-	
Stair canopy structure; box girder spanning between structural supports together with cantilever arms taken at 1m centres	0.63	t	3,201	4	107	**3,313**	-	-	38	2	- 2,277	3,353	-	2,080	2,106
Stair canopy covering comprising single skin standing seam metal roof, integral gutter and soffit panel; includes for 5m extension beyond foot of stairs	0.63	t	3,201	4	107	**3,313**	-	-	38	2	- 2,277	3,353	-	2,080	2,106
Deck canopy structure; box girder spanning between lift shaft structure	3.64	t	3,201	4	107	**3,313**	-	-	38	2	- 2,277	3,353	-	12,066	12,213
Deck canopy covering comprising single skin standing seam metal roof, integral box gutter running centrally and soffit panel	3.64	t	3,201	4	107	**3,313**	-	-	38	2	- 2,277	3,353	-	12,066	12,213
Floor Finishes: Bridge Deck															
Tactile pavings at foot of stairs	4.16	m2	382	19	16	**417**	-	-	7	1	- 79	842	-	1,735	3,502
Tactile pavings at head of stairs															
Mid landing - Applied finish	10.00	m2	28	0	3	**31**	-	311	0	-	0	342	-	311	3,419
Lower landing - Applied finish	10.00	m2	19	0	-	**19**	-	-	0	0	- 2	19	-	189	190
Treads & risers; metal step, 2500mm wide, 300m going	59.40	m2	109	0	8	**117**	-	-	2	0	- 67	119	-	6,969	7,063
Extra over for applied finish	58.00	nr	Exclude	Exclude	Exclude	**Exclude**	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Extra over for 2500mm long AATI nosings to top / landing steps	6.00	Nr	Exclude	Exclude	Exclude	**Exclude**	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Extra over for 2500mm long AATI nosings to intermediate steps	52.00	Nr	Exclude	Exclude	Exclude	**Exclude**	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Nylon coated handrails, double rail to stairs	80.00	m	152	0	15	**167**	-	-	2	0	- 114	169	-	13,393	13,546
Bridge Deck - Applied finish															
Bridge Deck - Coloured non-slip finish	87.00	m2	28	0	3	**31**	-	311	0	-	0	342	-	2,702	29,749
Signage														-	



Specification	Quant		Carbon Factor (kgCO$_2$e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Network Rail logo	2.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Platform numbering	2.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Mechanical & Electrical Services														-	
Electrical Installations														-	
Electrical mains and sub-mains distribution	183.00	m2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Power installations	183.00	m2	20	0	0	20	-	61	0	0	- 32	82	-	3,744	14,986
Lighting installations	183.00	m2	12	0	0	12	-	-	0	0	- 3	12	-	2,273	2,286
Specialist lighting installations														-	-
Local electricity generation systems														-	-
Earthing and bonding systems	183.00	m2	0	0	0	0	-	1	0	0	- 1	1		57	232
16 person through lift	2.00	Nr	24,601	75	-	24,676	-	50,032	310	92	- 48,174	75,049		49,353	150,097
														-	-
														-	-
Lift Motor Room	1.00	Nr	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift		-	-
Fire Fighting Systems														-	-
Lightning Protection	183.00	m2	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems		-	-

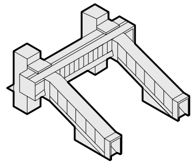


Specification	Quant		Carbon Factor (kgCO$_2$e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Drainage														-	-
Staircase														-	-
Linear drainage channel	27.00	m	11	0	-	11	-	-	0	0	- 2	11		294	297
Rainwater down pipe	18.00	m	3	0	0	3	-	3	0	0	- 3	7		61	119
General Allowances														-	-
Main Contractor's Preliminaries		%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Main Contractor's Overheads & Profit		%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Extra over for specialist crane hire	1.00	Item	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Extra over for NwR Possession Staff -		Excl													
Project No. 108713-104												TOTALS		534,329	725,077

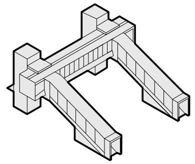


D.2.3 Frame covered

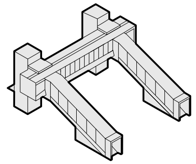
Specification	Quant		Carbon Factor (kgCO$_2$e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Foundations															
Pad Foundations to Lift Shaft (1.5 x 1.5 x 1.0m)	**8.00**	Nr													
Pads foundation total volume	18.00	m3													
Pads foundation concrete	17.54	m3	382	19	16	417	-	-	7	1	-79	425	-	7,314	7,452
Pads foundation rebar (Kg)	3600.00	kg												-	
Pads foundation rebar (Tonnes)	3.60	Tonnes	1,180	4	59	1,244	-	-	38	2	-49	2,528	-	4,477	9,100
Pads foundation rebar (m3)	0.46	m3												-	
Strip Foundation to Stair Roof Support (3.0 x 1.0 x 1.0m)	**2.00**	Nr												-	
Strip foundation total volume	6.00	m3												-	
Strip foundation concrete	5.85	m3	382	19	16	417	-	-	7	1	-79	842		2,438	4,922
Strip foundation rebar (Kg)	1200.00	kg												-	
Pads foundation rebar (Tonnes)	1.20	Tonnes	1,180	4	59	1,244	-	-	38	2	-49	2,528	-	1,492	3,033
Strip foundation rebar (m3)	0.15	m3												-	
Strip Foundation to base of staircase (3.0 x 1.5 x 1.5m)	**2.00**	Nr												-	
Strip foundation total volume	13.50	m3												-	
Strip foundation concrete	13.16	m3	382	19	16	417	-	-	7	1	-79	842		5,486	11,074
Strip foundation rebar (Kg)	2700.00	kg												-	
Pads foundation rebar (Tonnes)	2.70	Tonnes	1,180	4	59	1,244	-	-	38	2	-49	2,528	-	3,358	6,825
Strip foundation rebar (m3)	0.34	m3												-	
Structure: Staircase														-	
152 x 152 x 23 UC	2.01	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	6,658	6,740
305 x 165 x 46 UB	2.36	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	7,818	7,913
70 x 70 x 6.3 SHS	0.93	t	2,593	4	87	2,685	-	-	38	2	-1,594	2,725	-	2,497	2,534
830 x 200 x 200 x 20 x 20 x 10 PFC	6.04	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	20,023	20,267
60 x 60 x 5 SHS	0.38	t	2,593	4	87	2,685	-	-	38	2	-1,594	2,725	-	1,020	1,036
Mid landing - 8mm thick top plate	0.50	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,664	1,685
Underside of staircase - 8mm thick top plate	1.76	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	5,825	5,896
Structure: Liftshaft														-	
254 x 254 x 73 UC	5.44	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	18,020	18,241
457 x 152 x 74 UB	1.58	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	5,234	5,298



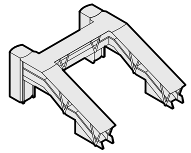
Specification	Quant		Carbon Factor (kgCO₂e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
152 x 152 x 37 UC	2.26	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	7,486	7,578
100 x 100 x 8 SHS	2.37	t	2,593	4	87	2,685	-	-	38	2	-1,594	2,725	-	6,363	6,458
Structure: Bridge Deck Slab														-	
203 x 203 x 46 UC	4.03	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	13,350	13,513
200 x 75 x 23 PFC	0.12	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	398	402
890 x 300 x 50 x 10 FB	12.00	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	39,751	40,236
Walking surface of bridge deck - 8mm thick plate	5.46	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	18,099	18,320
Underside of bridge deck - 8mm thick plate	5.46	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	18,099	18,320
Structure: Deck Roof														-	
406 x 178 x 54 UB	3.24	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	10,733	10,864
70 x 70 x 6.3 SHS	1.55	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	5,134	5,197
Underside of bridge deck roof - 10mm thick plate	5.46	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	18,099	18,320
Structure: Fittings														-	
Allowance for Fittings	5.27	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	17,461	17,675
Cladding: Staircase														-	
Metal grillage														-	-
	133.84	m2	38	0	6	44	0	0	0	-6	45	-	45	5,895	
	447.03	Kg	2	0	0	2	-	0	0	-1	2	-	2	977	
Allowance for Fittings (10% of total structure)	44.77	m2	133	0	3	136	-	-	2	0	-204	138	-	6,109	6,180
Cladding: Lift Shaft														-	
Internal metal lining	103.33	m2	133	0	3	136	-	-	2	0	-204	138	-	14,099	14,264
External metal cladding	135.74	m2	133	0	3	136	-	-	2	0	-204	138	-	18,522	18,738
Glazed panels	81.04	m2	110	0	-	110	-	-	2	0	-1	112	-	8,924	9,114
														-	
Toughened laminated glass panels (openable) with PVB interlayer	128.58	m2	110	0	-	110	-	-	2	0	-1	112	-	14,159	14,461
Nylon coated handrails, single rail to bridge deck level	66.82	m	152	0	15	167	-	-	2	0	-114	169	-	11,186	11,314
Metal upstand edging to base of glazed cladding	22.32	m2	133	0	3	136	-	-	2	0	-204	138	-	3,046	3,081
Metal sloping upstand edging to external face of glazed cladding	52.19	m2	133	0	3	136	-	-	2	0	-204	138	-	7,121	7,204
External metal cladding, to ends (rate allows for internal and external finish)	16.00	m2	230	0	18	248	-	-	3	0	-721	251	-	3,962	4,014



Specification	Quant		Carbon Factor (kgCO_2e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Roof: Lift Shaft														-	-
Insulated sloping roof panel with standing seam, fixed with purlins to structural frame	14.28	m2	41	0	3	45	-	-	0	-	0	45	-	639	640
Extra over for insulated membrane lined LPCB gutter	21.40	m	10	0	2	11	-	48	0	6	-18	65	-	244	1,394
Solid canopy over lift door at platform level	14.28	m2	38	0	3	42	-	135	0	7	-17	184	-	598	2,624
Roof: Staircase														-	-
Insulated sloping roof panel with standing seam, fixed with purlins to structural frame	66.38	m2												-	-
Extra over for insulated membrane lined LPCB gutter	55.32	m	10	0	2	11	-	48	0	6	-18	65	-	631	3,602
Extra over for verge flashing	55.32		38	0	3	42	-	135	0	7	-17	184	-	2,316	10,167
Metal entrance portal	5.46	m2	38	0	3	42	-	135	0	7	-17	184	-	229	1,003
Roof: Bridge Deck														-	-
Insulated sloping roof panel with standing seam, fixed with purlins to structural frame	87.00	m2												-	-
Extra over for verge flashing	57.22	m	38	0	3	42	-	135	0	7	-17	184	-	2,395	10,516
Extra over for valley flashing	25.20	m	38	0	3	42	-	135	0	7	-17	184	-	1,055	4,631
Floor Finishes: Staircase														-	
Mid landing - Coloured non-slip finish	10.00	m2	28	0	3	31	-	311	0	-	0	342	-	311	3,419
Tactile pavings at foot of stairs, 2m x 2m	8.00	m2	19	0	-	19	-	-	0	0	-2	19	-	377	380
Tactile surface at head of stairs, 3m x 2m	12.00	m2	19	0	-	19	-	-	0	0	-2	19	-	566	570
Treads & risers; metal step, 2000mm wide, 300m going	59.40	m2	109	0	8	117	-	-	2	0	-67	119	-	6,969	7,063
Extra over for applied finish	59.40	m2	include in above	include in above	include in above	include in above	include in above	include in above	include in above	include in above	include in above	include in above	include in above	-	-
Extra over for 1800mm long AATI nosings to top / landing steps	4.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Extra over for 1800mm long AATI nosings to intermediate steps	62.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Nylon coated handrails, double rail to stairs	55.92	m	152	0	15	167	-	-	2	0	-114	169	-	9,362	9,468
Floor Finishes: Bridge Deck														-	
Bridge Deck - Coloured non-slip finish	87.00	m2	28	0	3	31	-	311	0	-	0	342	-	2,702	29,749
Ceiling Finishes: Staircase														-	
Triangular soffit, metal panel, fixed with purlins to structural frame (measured flat, rate uplifted for sloping surfaces)	66.38	m2	38	0	3	42	-	135	0	7	-17	184	-	2,779	12,199
Metal entrance portal; soffit, internal face	5.46	m2	38.47	0.0098	3.38	41.8598	0	135.3	0.012	6.61	-16.84	183.7818	0	229	1,003
Ceiling Finishes: Bridge Deck														-	
Triangular soffit, perforated metal panel, fixed with purlins to structural frame (measured flat, rate uplifted for sloping surfaces)	87.00	m2	38	0	3	42	-	135	0	7	-17	184	-	3,642	15,989
Signage														-	

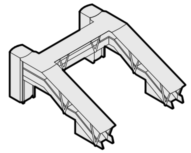


Specification	Quant		Carbon Factor (kgCO₂e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Network Rail logo	2.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Platform numbering	2.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Mechanical & Electrical Services														-	
Electrical Installations														-	
Electrical mains and sub-mains distribution	167.66	m2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Power installations	167.66	m2	20	0	0	20	-	61	0	0	-32	82	-	3,430	13,730
Lighting installations	167.66	m2	12	0	0	12	-	-	0	0	-3	12	-	2,083	2,094
Specialist lighting installations														-	-
Local electricity generation systems														-	-
Earthing and bonding systems	167.66	m2	0	0	0	0	-	1	0	0	-1	1		53	213
16 person through lift	2.00	Nr	24,601	75	-	24,676	-	50,032	310	92	-48,174	75,049		49,353	150,097
														-	-
														-	-
Lift Motor Room	1.00	Nr	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift		-	-
Fire Fighting Systems														-	-
Lightning Protection	167.66	m2	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems		-	-
Drainage														-	-
Staircase														-	-
Linear drainage channel	27.96	m	11	0	-	11	-	-	0	0	-2	11		304	308
Rainwater down pipe	18.00	m	3	0	0	3	-	3	0	0	-3	7		61	119
General Allowances														-	-
Main Contractor's Preliminaries		%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Main Contractor's Overheads & Profit		%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Extra over for specialist crane hire	1.00	Item	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Extra over for NwR Possession Staff -		Excl													
Project No. 108713-104												TOTALS		432,620	638,249

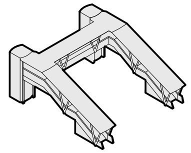


D.2.4 AVA covered

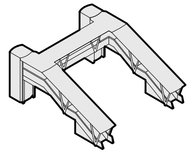
Specification	Quant		Carbon Factor (kgCO$_2$e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Foundations															
Pad Foundations to Lift Shaft (1.5 x 1.5 x 1.0m)	**8.00**	Nr													
Pads foundation total volume	18.00	m3													
Pads foundation concrete	17.54	m3	382	19	16	417	-	-	7	1	-79	425	-	7,314	7,452
Pads foundation rebar (Kg)	3600.00	kg												-	
Pads foundation rebar (Tonnes)	3.60	Tonnes	1,180	4	59	1,244	-	-	38	2	-49	2,528	-	4,477	9,100
Pads foundation rebar (m3)	0.46	m3												-	
Strip Foundation to Stair Roof Support (3.0 x 1.0 x 1.0m)	**2.00**	Nr												-	
Strip foundation total volume	6.00	m3												-	
Strip foundation concrete	5.85	m3	382	19	16	417	-	-	7	1	-79	842		2,438	4,922
Strip foundation rebar (Kg)	1200.00	kg												-	
Pads foundation rebar (Tonnes)	1.20	Tonnes	1,180	4	59	1,244	-	-	38	2	-49	2,528	-	1,492	3,033
Strip foundation rebar (m3)	0.15	m3												-	
Strip Foundation to base of staircase (3.0 x 1.5 x 1.5m)	**2.00**	Nr												-	
Strip foundation total volume	13.50	m3												-	
Strip foundation concrete	13.16	m3	382	19	16	417	-	-	7	1	-79	842		5,486	11,074
Strip foundation rebar (Kg)	2700.00	kg												-	
Pads foundation rebar (Tonnes)	2.70	Tonnes	1,180	4	59	1,244	-	-	38	2	-49	2,528	-	3,358	6,825
Strip foundation rebar (m3)	0.34	m3												-	
Structure: Staircase														-	
300 x 300 x 12 SHS	3.56	t	2,593	4	87	2,685	-	-	38	2	-1,594	2,725	-	9,557	9,701
300 x 225 x 12 RHS	1.34	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	4,439	4,493
200 X 200 X 8 SHS	0.40	t	2,593	4	87	2,685	-	-	38	2	-1,594	2,725	-	1,074	1,090
B1 8mm thick	0.69	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	2,286	2,314
B2 8mm thick	0.77	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	2,551	2,582
B3 8mm thick	1.03	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	3,412	3,454
B4	0.20	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	663	671
B6	0.23	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	762	771
B7 Assumption 8mm thickness	0.08	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	265	268
B8 10mm thick	0.21	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	696	704



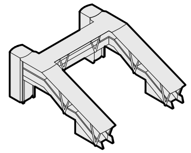
Specification	Quant		Carbon Factor (kgCO$_2$e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
B9 Assumption 8mm thick	0.08	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	265	268
B10 Assumption 8mm thick	0.03	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	99	101
B11 10mm thick	0.41	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,358	1,375
B12 10mm thick	0.21	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	696	704
B13 10mm thick	0.40	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,325	1,341
BR1 8mm thick	1.10	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	3,644	3,688
	0.00	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	-	-
Stair beams	1.00	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	3,313	3,353
	0.00	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	-	-
1139 DEEP C-BEAM	2.66	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	8,811	8,919
988 DEEP C-BEAM	5.39	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	17,855	18,073
972 DEEP C-BEAM	0.32	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,060	1,073
Structure: Liftshaft														-	
254 x 254 x 73 UC	5.44	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	18,020	18,241
457 x 152 x 74 UB	1.58	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	5,234	5,298
152 x 152 x 37 UC	2.26	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	7,486	7,578
100 x 100 x 8 SHS	2.37	t	2,593	4	87	2,685	-	-	38	2	-1,594	2,725	-	6,363	6,458
Structure: Bridge Deck														-	
Allowance for Fittings (10% of total structure)	2.06	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	6,824	6,907
B4	0.59	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,954	1,978
B5	0.13	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	431	436
BR1	0.61	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	2,021	2,045
B14	0.06	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	192	194
	0.08	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	265	268
	0.00	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	-	-
1139 DEEP C-BEAM	4.41	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	14,608	14,787
Structure: Roof															
B50	2.91	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	9,640	9,757
B51	2.67	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	8,845	8,953
B52	0.65	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	2,153	2,179



Specification	Quant		Carbon Factor (kgCO_2e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
B53	0.55	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,822	1,844
B54	4.76	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	15,768	15,960
B55	0.78	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	2,584	2,615
B56	0.65	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	2,153	2,179
B57	0.07	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	232	235
B58	0.26	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	861	872
B59	0.07	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	232	235
B60	0.10	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	331	335
B61	0.10	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	331	335
B62	0.10	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	331	335
B63	1.48	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	4,903	4,962
	0.00	t	3,201	4	107		-	-	38	2	-2,277	3,353	-	-	-
V-COLUMN	7.74	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	25,639	25,953
Structure: Fittings														-	
Allowance for Fittings	3.97	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	13,150	13,311
														-	
														-	
Cladding: Staircase														-	
Toughened laminated glass panels (fixed) with PVB interlayer	133.84	m2	110	0	-	110	-	-	2	0	-1	112	-	14,738	15,052
Metal stringer to sides of staircase	42.83	m2	133	0	3	136	-	-	2	0	-204	138	-	5,844	5,912
Metal entrance portal; outside face	17.84	m2	133	0	3	136	-	-	2	0	-204	138	-	2,434	2,463
Metal entrance portal; inner face	17.84	m2	133	0	3	136	-	-	2	0	-204	138	-	2,434	2,463
Nylon coated handrails, double rail to bridge stairs	112.00	m	152	0	15	167	-	-	2	0	-114	169	-	18,750	18,964
Cladding: Lift Shaft														-	
Internal metal lining	103.33	m2	132.91	0.17	3.37	136.45	0	0	1.51	0.083	-203.63	138.043	0	14,099	14,264
External metal cladding	135.74	m2	133	0	3	136	-	-	2	0	-204	138	-	18,522	18,738
Glazed panels	81.04	m2	110	0	-	110	-	-	2	0	-1	112	-	8,924	9,114
						-								-	-



Specification	Quant		Carbon Factor (kgCO$_2$e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Cladding: Bridge Deck														-	
Aluminium decking	51.00	m2	13	-	1	14	-	-	8	21	-3	40	-	714	2,040
Toughened laminated glass panels (openable) with PVB interlayer	21.00	m2	110	0	-	110	-	-	2	0	-1	112	-	2,313	2,362
External metal cladding, to ends (rate allows for internal and external finish)	41.00	m2	133	0	3	136	-	-	2	0	-204	138	-	5,594	5,660
	0.00					-								-	-
	0.00					-								-	-
	0.00					-								-	-
Roof: Lift Shaft														-	-
Stainless steel canopy	14.28	m2	38	0	3	42	-	135	0	7	-17	184	-	598	2,624
Extra over for insulated membrane lined LPCB gutter	21.40	m	10	0	2	11	-	48	0	6	-18	65	-	244	1,394
Stainless steel over lift door at platform level	2.00	Nr				-								-	-
Roof: Staircase															
Stainless steel canopy	109.00	m2	38	0	3	42	-	135	0	7	-17	184	-	4,563	20,032
Extra over for insulated membrane lined LPCB gutter	31.00	m	10	0	2	11	-	48	0	6	-18	65	-	354	2,019
Roof: Bridge Deck															
Stainless steel canopy	85.00	m2	38	0	3	42	-	135	0	7	-17	184	-	3,558	15,621
Extra over for insulated membrane lined LPCB gutter	23.00	m	10	0	2	11	-	48	0	6	-18	65	-	262	1,498
Floor Finishes: Staircase														-	
Mid landing - Coloured non-slip finish	10.00	m2	28	0	3	31	-	311	0	-	0	342	-	311	3,419
Tactile pavings at foot of stairs, 2m x 2m	8.00	m2	19	0	-	19	-	-	0	0	-2	19	-	151	152
Tactile surface at head of stairs, 3m x 2m	12.00	m2	19	0	-	19	-	-	0	0	-2	19	-	226	228
Treads & risers; metal step, 2000mm wide, 300m going	66.00	m2	109	0	8	117	-	-	2	0	-67	119	-	7,744	7,848
Extra over for applied finish	66.00	Nr	include in above	include in above	include in above	include in above	include in above	include in above	include in above	include in above	include in above	include in above	include in above	-	-
Extra over for 1800mm long AATI nosings to top / landing steps	4.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Extra over for 1800mm long AATI nosings to intermediate steps	62.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Nylon coated handrails, double rail to stairs	55.92	m	152	0	15	167	-	-	2	0	-114	169	-	9,362	9,468
Floor Finishes: Bridge Deck														-	
Bridge Deck - Coloured non-slip finish	50.00	m2	28	0	3	31	-	311	0	-	0	342	-	1,553	17,097
Signage														-	
Network Rail logo	2.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Platform numbering	2.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Mechanical & Electrical Services														-	



Specification	Quant		Carbon Factor (kgCO₂e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Electrical Installations	0.00													-	
Electrical mains and sub-mains distribution	177.00	m2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Extra over for NwR Possession Staff - Excluded; assumed works to be undertaken as part of rail wider possession	177.00	m2	20	0	0	20	-	61	0	0	-32	82	-	3,621	14,495
Lighting installations	177.00	m2	12	0	0	12	-	-	0	0	-3	12	-	2,199	2,211
	0.00					-								-	-
Specialist Lighting installations	0.00					-								-	-
Local electricity generation systems	0.00					-								-	-
Earthing and bonding systems	177.00	m2	0	0	0	0	-	1	0	0	-1	1	-	56	225
16 person through lift	2.00	Nr	24,601	75	-	24,676	-	50,032	310	92	-48,174	75,049	-62	49,353	150,097
	0.00					-								-	-
Lift Motor Room	1.00	Nr	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	-	-
Fire Fighting Systems	0.00													-	-
Lighting Protection	177.00	m2	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	-	-
Drainage														-	-
Staircase	0.00					-								-	-
Linear drainage channel	27.00	m	11	0	-	11	-	-	0	0	-2	11	-	294	297
Aluminium rainwater down pipe	18.00	m	3	0	0	3	-	3	0	0	-3	7	-	61	119
General Allowances														-	-
Main Contractors Preliminaries		%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	
Main Contractors Overheads & Profit		%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Extra over for specialist crane hire	1.00	Item	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Extra over for NwR Possession Staff - Excluded; assumed works to be undertaken as part of rail wider possession		Excl													
												TOTALS		419,942	607,479

D.2.5 700-series

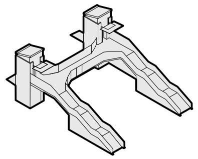
Specification	Quant		Carbon Factor (kgCO$_2$e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Foundations															
Pad Foundations to Lift Shaft (1.5 x 1.5 x 1.0m)	**8.00**	**Nr**													
Pads foundation total volume	18.00	m3													
Pads foundation concrete	17.54	m3	382	19	16	**417**	-	-	7	1	-79	425	-	7,314	7,452
Pads foundation rebar (Kg)	3600.00	kg												-	
Pads foundation rebar (Tonnes)	3.60	Tonnes	1,180	4	59	**1,244**	-	-	38	2	-49	2,528	-	4,477	9,100
Pads foundation rebar (m3)	0.46	m3												-	
Strip Foundation to Stair Support (3.0 x 1.0 x 1.0m)	**6.00**	**Nr**													
Pads foundation total volume	13.50	m3													
Pads foundation concrete	13.16	m3	382	19	16	**417**	-	-	7	1	-79	425	-	5,486	5,589
Pads foundation rebar (Kg)	2700.00	kg												-	-
Pads foundation rebar (Tonnes)	2.70	Tonnes	1,180	4	59	**1,244**	-	-	38	2	-49	2,528	-	3,358	6,825
Pads foundation rebar (m3)	0.34	m3												-	-
Strip Foundation to Deck support (3.0 x 1.0 x 1.0m)	**4.00**	**Nr**												-	-
Strip foundation total volume	12.00	m3												-	-
Strip foundation concrete	11.69	m3	382	19	16	**417**	-	-	7	1	-79	842		4,876	9,844
Strip foundation rebar (Kg)	2400.00	kg												-	-
Pads foundation rebar (Tonnes)	2.40	Tonnes	1,180	4	59	**1,244**	-	-	38	2	-49	2,528	-	2,985	6,066
Strip foundation rebar (m3)	0.31	m3												-	-
Strip Foundation to base of staircase (3.0 x 1.5 x 1.5m)	**2.00**	**Nr**												-	-
	13.50	m3												-	-
	13.16	m3	382	19	16	**417**	-	-	7	1	-79	842		5,486	11,074
	2700.00	kg												-	-
	2.70	Tonnes	1,180	4	59	**1,244**	-	-	38	2	-49	2,528	-	3,358	6,825
	0.34	m3												-	-
Structure: Liftshaft														-	
Corner posts; 200 x 200 x 10 SHS	4.92	t	2,593	4	87	**2,685**	-	-	38	2	-1,594	2,725	-	13,208	13,407
Horizontals; 203 UC (taken as 86kg/m)	1.38	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	4,571	4,627
Horizontals; 150 x 100 x 8 RHS	0.30	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	994	1,006
Diagonals; 150 x 100 x 8 RHS	1.02	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	3,379	3,420

Specification	Quant		Carbon Factor (kgCO$_2$e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Diagonals; 150 x 90 x 15 angle	1.20	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	3,975	4,024
Cantilever beam 1	0.85	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	2,816	2,850
Cantilever beam 2	0.85	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	2,816	2,850
Cantilever beam 3	0.35	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,159	1,174
Structure: Staircase														-	
Base support - 250 x 150 x 12.5 RHS	0.19	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	636	644
2 leg Type 5 support - 250 x 100 x 10 RHS	0.33	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,096	1,110
2 leg Type 3 support - 250 x 150 x 12.5 RHS	0.99	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	3,283	3,323
2 leg Type 3 support - 150 x 150 x 12.5 SHS	0.24	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	778	788
Baseplates			Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Headplate			Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Flight 1 staircase (Drawing 428)															
Strings - 250 x 150 x 12.5 RHS	1.09	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	3,621	3,665
Strings - 150 x 75 x 10 RSA	0.27	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	901	912
Plate kicker - 60 x 6mm plate	1.00	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	3,328	3,369
Treads - 8mm thick plate	1.10	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	3,636	3,681
Mid landing - 8mm thick top plate	0.43	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,435	1,453
Stiffeners to underside of deck - 75 x 10mm	0.13	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	416	421
Allowance for Fittings (10% of total structure)														-	-
Balustrade - 100 x 65 x 5 RHS post	0.34	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,140	1,153
Balustrade - Plate & stiffener to 100 x 65 x 5 RHS post	1.26	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	4,161	4,211
Balustrade - 100 x 65 x 5 RHS top rail	0.21	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	702	711
Balustrade Panel - 40 x 12 flat bottom bar			3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	-	-
Steel frame	0.34	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,113	1,127
Balustrade Panel - 40 x 12 flat top bar			3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	-	-
Flight 2 & 3 staircase (Drawing 424)														-	-
Strings - 250 x 150 x 12.5 RHS	4.78	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	15,837	16,031
Strings - 150 x 75 x 10 RSA	1.19	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	3,942	3,990
Plate kicker - 60 x 6mm plate	4.40	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	14,562	14,740
Support Stiffener - 152 x 152 x 25 UC	0.12	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	381	386

Specification	Quant		Carbon Factor (kgCO$_2$e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Treads - 8mm thick plate	1.92	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	6,364	6,441
Mid landing - 8mm thick top plate	2.02	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	6,699	6,780
Stiffeners to underside of deck - 75 x 10mm	0.19	t	133	0	3	136	-	-	2	0	-204	138	-	26	26
														-	-
Balustrade - 100 x 65 x 5 RHS post	0.55	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,822	1,844
Balustrade - Plate & stiffener to 100 x 65 x 5 RHS post	32.00	nr												-	-
Balustrade - 100 x 65 x 5 RHS top rail	0.92	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	3,061	3,098
Balustrade Panel - 40 x 12 flat bottom bar	70.00	m2	133	0	3	136	-	-	2	0	-204	138	-	9,552	9,663
Balustrade Panel - 26.9 x 3.2 CHS vertical bars	0.67	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	2,226	2,253
Balustrade Panel - 40 x 12 flat top bar	70.00	m2	133	0	3	136	-	-	2	0	-204	138	-	9,552	9,663
Structure: Bridge Deck Slab														-	
2 leg Type 2 support - 250 x 150 x 12.5 RHS	2.71	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	8,961	9,070
2 leg Type 2 support - 150 x 150 x 12.5 SHS	0.47	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,557	1,576
2 leg Type 2 support - 150 x 100 x 8 RHS cross bracing	0.30	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,000	1,013
Baseplates															
Headplate															
Deck (Drawing 430) - 23m long															
Walking surface of bridge deck - 10mm thick plate	4.00	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	13,262	13,424
Stiffeners to underside of deck - 75 x 10mm	0.38	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,248	1,263
U' Frame to deck and side panels - 20mm thick plate	12.09	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	40,046	40,535
Side panels to bridge deck - 10mm thick plate	6.20	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	20,543	20,794
Extra over for painted finishes to plate deck	158.00	m2	28	0	3	31	-	311	0	-	0	373	-	4,908	58,935
Top rail - 150 x 150 x 12.5 SHS	3.44	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	11,408	11,548
Structure: Fittings														-	
Allowance for Fittings	38.43	t	3201.24	4.21	107.12	3312.57	0	0	38.29	2.18	-2277.4	3353.04	0	127,294	128,849
Allowance for Splices	19.20	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	63,615	64,392

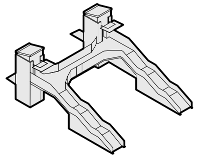
Specification	Quant		Carbon Factor (kgCO_2e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
														-	
Cladding: Lift Shaft														-	
Internal metal lining	241.80	m2	133	0	3	136	-	-	2	0	-204	138	-	32,994	33,379
Cladding type A, assumed to be Alucobond metal panel	241.80	m2	133	0	3	136	-	-	2	0	-204	138	-	32,994	33,379
Louvres	12.4	m2	133	0	3	136	-	-	2	0	-204	138	-	1,692	1,712
Pilkington Profilit backlit frosted glazing	35.40	m2	110	0	-	110	-	-	2	0	-1	112	-	3,898	3,981
Roof: Lift Shaft														-	-
Insulated sloping roof panel with standing seam, fixed with purlins to structural frame	14.28	m2	41	0	3	45	-	-	0	-	0	45	-	639	640
Extra over for insulated membrane lined LPCB gutter	21.40	m	10	0	2	11	-	48	0	6	-18	65	-	244	1,394
Solid canopy over lift door at platform level	14.28	m2	38	0	3	42	-	135	0	7	-17	184	-	598	2,624
Floor Finishes: Staircase														-	
Mid landing - Coloured non-slip finish	6.90	m2	28	0	3	31	-	311	0	-	0	342	-	214	2,359
Flight 2 & 3 staircase (Drawing 424)															
Mid landing - Coloured non-slip finish	32.20	m2	28	0	3	31	-	311	0	-	0	342	-	1,000	11,011
Tactile pavings at foot of stairs, 2m x 2m	8.00	m2	19	0	-	19	-	-	0	0	-2	19	-	377	380
Tactile surface at head of stairs, 3m x 2m	8.00	m2	19	0	-	19	-	-	0	0	-2	19	-	377	380
Treads & risers; metal step, 2000mm wide, 300m going	59.40	m2	109	0	8	117	-	-	2	0	-67	119	-	6,969	7,063
Extra over for applied finish			Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Extra over for 1800mm long AATI nosings to top / landing steps			Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Extra over for 1800mm long AATI nosings to intermediate steps			Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Flight 1 staircase (Drawing 428)															
Handrail - 42.4 diameter CHS handrail supported by 16 diameter bars welded to RHS post	32.00	m	152	0	15	167	-	-	2	0	-114	169	-	5,357	5,418
Flight 2 & 3 staircase (Drawing 424)															
Handrail - 42.4 diameter CHS handrail supported by 16 diameter bars welded to RHS post	140.00	m	152	0	15	167	-	-	2	0	-114	169	-	23,437	23,705

Specification	Quant		Carbon Factor (kgCO_2e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Floor Finishes: Bridge Deck														-	
Bridge Deck - Coloured non-slip finish	51.00	m2	28	0	3	31	-	311	0	-	0	342	-	1,584	17,439
Signage														-	
Network Rail logo	2.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Platform numbering	2.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Mechanical & Electrical Services														-	
Electrical Installations														-	
Electrical mains and sub-mains distribution	183.00	m2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Power installations	183.00	m2	20	0	0	20	-	61	0	0	-32	82	-	3,744	14,986
Extra over for NwR Possession Staff - Excluded; assumed works to be undertaken as part of rail wider possession	183.00	m2	12	0	0	12	-	-	0	0	-3	12	-	2,273	2,286
Specialist lighting installations														-	-
Local electricity generation systems														-	-
Earthing and bonding systems	183.00	m2	0	0	0	0	-	1	0	0	-1	1		57	232
16 person through lift	2.00	Nr	24,601	75	-	24,676	-	50,032	310	92	-48,174	75,049		49,353	150,097
														-	-
	0.00													-	-
Lift Motor Room	1.00	Nr	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift		-	-
														-	-
Fire Fighting Systems														-	-
Lightning Protection	183.00	m2	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems		-	-
General Allowances														-	-
Main Contractor's Preliminaries		%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Main Contractor's Overheads & Profit		%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Extra over for specialist crane hire	1.00	Item	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Extra over for NwR Possession Staff -		Excl													
Project No. 108713-104												TOTALS		632,169	861,480

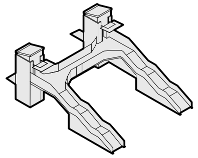


D.2.6 Beacon open

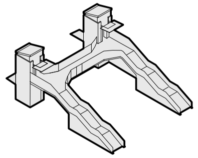
Specification	Quant		Carbon Factor (kgCO₂e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Foundations															
Pad Foundations to Lift Shaft (1.5 x 1.5 x 1.0m)	**8.00**	**Nr**													
Pads foundation total volume	18.00	m3													
Pads foundation concrete	17.54	m3	382	19	16	**417**	-	-	7	1	-79	425	-	7,314	7,452
Pads foundation rebar (Kg)	3600.00	kg												-	
Pads foundation rebar (Tonnes)	3.60	Tonnes	1,180	4	59	**1,244**	-	-	38	2	-49	2,528	-	4,477	9,100
Pads foundation rebar (m3)	0.46	m3												-	
Strip Foundation to Stair Roof Support (3.0 x 1.0 x 1.0m)	**2.00**	**Nr**												-	
Strip foundation total volume	6.00	m3												-	
Strip foundation concrete	5.85	m3	382	19	16	**417**	-	-	7	1	-79	842		2,438	4,922
Strip foundation rebar (Kg)	1200.00	kg												-	
Pads foundation rebar (Tonnes)	1.20	Tonnes	1,180	4	59	**1,244**	-	-	38	2	-49	2,528	-	1,492	3,033
Strip foundation rebar (m3)	0.15	m3												-	
Strip Foundation to base of staircase (3.0 x 1.5 x 1.5m)	**2.00**	**Nr**												-	
Strip foundation total volume	13.50	m3												-	
Strip foundation concrete	13.16	m3	382	19	16	**417**	-	-	7	1	-79	842		5,486	11,074
Strip foundation rebar (Kg)	2700.00	kg												-	
Pads foundation rebar (Tonnes)	2.70	Tonnes	1,180	4	59	**1,244**	-	-	38	2	-49	2,528	-	3,358	6,825
Strip foundation rebar (m3)	0.34	m3												-	
Structure: Staircase														-	
400 x 200 x 8 RHS	5.71	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	18,915	19,146
200 x 100 x 8 RHS	1.88	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	6,228	6,304
180 x 180 x 10 SHS	2.02	t	2,593	4	87	**2,685**	-	-	38	2	-1,594	2,725	-	5,423	5,505
Top landing - 8mm thick plate	1.73	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	5,721	5,791
Mid landing - 8mm thick plate	0.63	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	2,080	2,106
Lower landing - 8mm thick plate	0.63	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	2,080	2,106
Structure: Liftshaft														-	
254 x 254 x 89 UC	7.92	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	26,236	26,556
305 x 102 x 25 UB	1.84	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	6,095	6,170
100 x 100 x 6.3 SHS	2.10	t	2,593	4	87	**2,685**	-	-	38	2	-1,594	2,725	-	5,638	5,723



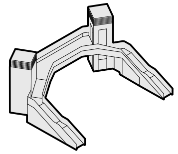
Specification	Quant		Carbon Factor (kgCO$_2$e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
	0.00	t												-	-
Structure: Bridge Deck Slab														-	
15mm thick top plate	3.66	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	12,120	12,268
150 x 150 x 10 SHS	2.46	t	2,593	4	87	2,685	-	-	38	2	-1,594	2,725	-	6,604	6,704
15mm thick vertical plate	9.02	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	29,883	30,249
20mm thick bottom plate	15.47	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	51,229	51,855
	0.00	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	-	-
Structure: Fittings														-	
Allowance for Fittings	5.51	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	18,238	18,461
														-	
														-	
Cladding: Staircase														-	
13.52mm toughened laminated glass panels (fixed) with PVB interlayer, 1500mm high	89.40	m2	110	0	-	110	-	-	2	0	-1	112	-	9,845	10,054
	0.00					-								-	-
Staircase, top landing	0.00					-								-	-
13.52mm toughened laminated glass panels (fixed) with PVB interlayer, 1500mm high	16.50	m2	110	0	-	110	-	-	2	0	-1	112	-	1,817	1,856
Cladding: Lift Shaft														-	
Internal metal lining	292.64	m2	133	0	3	136	-	-	2	0	-204	138	-	39,931	40,397
Allowance for Fittings (10% of total structure)	292.64	m2	24	-	1	25	-	-	1	26	-	138	-	7,316	40,397
Pilkington Profilit backlit frosted glazing	35.40	m2	110	0	-	110	-	-	2	0	-1	112	-	3,898	3,981
						-								-	-
Cladding: Bridge Deck														-	
	39.00	m2	110	0	-	110	-	-	2	0	-1	112	-	4,295	4,386
13.52mm toughened laminated glass panels with PVB interlayer, 1500mm high	18.00	m2	110	0	-	110	-	-	2	0	-1	112	-	1,982	2,024
	0.00					-								-	-
	0.00					-								-	-
	0.00					-								-	-
	0.00					-								-	-



Specification	Quant		Carbon Factor (kgCO$_2$e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Roof: Lift Shaft														-	-
Lift Shaft	15.60	m2	133	0	3	136	-	-	2	0	-204	138	-	2,129	2,153
Extra over for Kingspan insulated membrane lined LPCB gutter	22.40	m	10	0	2	11	-	48	0	6	-18	65	-	256	1,459
Glass canopy over lift door at platform level	2.00	Nr	38	0	3	42	-	135	0	7	-17	209	-	84	418
Glass canopy over lift door at deck level	2.00	Nr	38	0	3	42	-	135	0	7	-17	209	-	84	418
Floor Finishes: Staircase														-	
Staircase	0.00					-								-	-
Tactile pavings at foot of stairs	4.16	m2	19	0	-	19	-	-	0	0	-2	19	-	78	79
Tactile pavings at head of stairs	4.16	m2	19	0	-	19	-	-	0	0	-2	19	-	78	79
	0.00					-								-	-
Staircase	0.00					-								-	-
Top landing - Light grey Altro finish	15.09	m2	28	0	3	31	-	311	0	-	0	342	-	469	5,160
Top landing, lift waiting area - Dark grey Altro finish	8.25	m2	28	0	3	31	-	311	0	-	0	342	-	256	2,821
Mid landing - Light grey Altro finish	10.00	m2	28	0	3	31	-	311	0	-	0	342	-	311	3,419
Lower landing - Light grey Altro finish	10.00	m2	28	0	3	31	-	311	0	-	0	342	-	311	3,419
Treads & risers; metal step, 2500mm wide, 300m going	58.00	Nr	109	0	8	117	-	-	2	0	-67	119	-	6,805	6,897
Extra over for applied finish	58.00	Nr	include in above	include in above	include in above	include in above	include in above	include in above	include in above	include in above	include in above	include in above	include in above	-	-
Extra over for 2500mm long AATI nosings to top / landing steps	6.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Extra over for 2500mm long AATI nosings to intermediate steps	52.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Nylon coated handrails, double rail to stairs	60.00	m	152	0	15	167	-	-	2	0	-114	169	-	10,045	10,159
Nylon coated handrails, single rail to top landing	10.00	m	152	0	15	167	-	-	2	0	-114	169	-	1,674	1,693
Floor Finishes: Bridge Deck														-	
Bridge Deck - Light grey Altro finish	58.26	m2	28	0	3	31	-	311	0	-	0	342	-	1,810	19,922
Signage														-	
Network Rail logo	2.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Platform numbering	2.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Mechanical & Electrical Services														-	

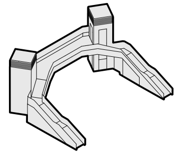


Specification	Quant		Carbon Factor (kgCO_2e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Electrical Installations	0.00													-	
Electrical mains and sub-mains distribution	179.00	m2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Power installations	179.00	m2	20	0	0	20	-	61	0	0	-32	82	-	3,662	14,658
Lighting installations	179.00	m2	12	0	0	12	-	-	0	0	-3	12	-	2,224	2,236
	0.00					-								-	-
Specialist Lighting installations	0.00					-								-	-
Local electricity generation systems	0.00					-								-	-
Earthing and bonding systems	179.00	m2	0	0	0	0	-	1	0	0	-1	1	-	56	227
16 person through lift	2.00	Nr	24,601	75	-	24,676	-	50,032	310	92	-48,174	75,049	-62	49,353	150,097
	0.00					-								-	-
Lift Motor Room	1.00	Nr	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	-	-
Fire Fighting Systems	0.00													-	-
Lighting Protection	179.00	m2	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	-	-
Drainage														-	-
Staircase	0.00					-								-	-
Linear drainage channel	27.00	m	11	0	-	11	-	-	0	0	-2	11	-	294	297
Aluminium rainwater down pipe	18.00	m	3	0	0	3	-	3	0	0	-3	7	-	61	119
General Allowances														-	-
Main Contractors Preliminaries		%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Main Contractors Overheads & Profit		%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Extra over for specialist crane hire	1.00	Item	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Extra over for NwR Possession Staff - Excluded; assumed works to be undertaken as part of rail wider possession		Excl													
Project No. 108713-104												TOTALS		370,176	570,175

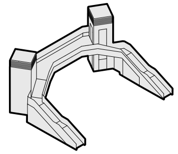


D.2.7 Ribbon open

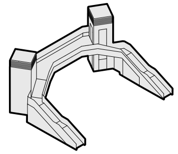
Specification	Quant		Carbon Factor (kgCO₂e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Foundations															
Pad Foundations to Lift Shaft (1.5 x 1.5 x 1.0m)	**8.00**	**Nr**													
Pads foundation total volume	18.00	m3													
Pads foundation concrete	17.54	m3	382	19	16	**417**	-	-	7	1	-79	425	-	7,314	7,452
Pads foundation rebar (Kg)	3600.00	kg												-	
Pads foundation rebar (Tonnes)	3.60	Tonnes	1,180	4	59	**1,244**	-	-	38	2	-49	2,528	-	4,477	9,100
Pads foundation rebar (m3)	0.46	m3												-	
Strip Foundation to Stair Roof Support (3.0 x 1.0 x 1.0m)	**12.00**	**Nr**												-	
Strip foundation total volume	36.00	m3												-	
Strip foundation concrete	35.08	m3	382	19	16	**417**	-	-	7	1	-79	842		14,628	29,532
Strip foundation rebar (Kg)	7200.00	kg												-	
Pads foundation rebar (Tonnes)	7.20	Tonnes	1,180	4	59	**1,244**	-	-	38	2	-49	2,528	-	8,954	18,199
Strip foundation rebar (m3)	0.92	m3												-	
Strip Foundation to base of staircase (3.0 x 1.5 x 1.5m)	**2.00**	**Nr**												-	
Strip foundation total volume	13.50	m3												-	
Strip foundation concrete	13.16	m3	382	19	16	**417**	-	-	7	1	-79	842		5,486	11,074
Strip foundation rebar (Kg)	2700.00	kg												-	
Pads foundation rebar (Tonnes)	2.70	Tonnes	1,180	4	59	**1,244**	-	-	38	2	-49	2,528	-	3,358	6,825
Strip foundation rebar (m3)	0.34	m3												-	
Structure: Staircase														-	
Support columns, taken as 150kg/m, 6 Nr per stair	4.50		3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	14,907	15,089
Stringers,taken as 100kg/m	8.16	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	27,031	27,361
Stiffener to stair riser; 15mm thick vertical plate	6.56	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	21,718	21,984
Mid landing - 8mm thick plate	0.63	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	2,080	2,106
Lower landing - 8mm thick plate	0.63	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	2,080	2,106
Structure: Liftshaft														-	
Corner posts; 200 x 200 x 10 SHS	4.92	t	2,593	4	87	**2,685**	-	-	38	2	-1,594	2,725	-	13,208	13,407
Horizontals; 203 UC (taken as 86kg/m)	1.38	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	4,571	4,627
Horizontals; 150 x 100 x 8 RHS	0.30	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	994	1,006
Diagonals; 150 x 100 x 8 RHS	1.02	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	3,379	3,420
Diagonals; 150 x 90 x 15 angle	1.20	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	3,975	4,024



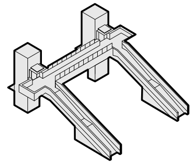
Specification	Quant		Carbon Factor (kgCO_2e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Cantilever beam 1	0.85	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	2,816	2,850
Cantilever beam 2	0.85	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	2,816	2,850
Cantilever beam 3	0.35	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,159	1,174
Structure: Bridge Deck Slab														-	
10mm thick top plate	4.15	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	13,755	13,923
Deck stiffeners; 15mm thick vertical plate at 725mm centres	22.18	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	73,473	74,370
Structure: Fittings														-	
Allowance for Fittings	5.32	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	17,614	17,830
Cladding: Staircase														-	
13.52mm toughened laminated glass panels (fixed), 1150mm high maximum	87.85	m2	38	0	6	44	0	0	0	-6	45	-	45	3,869	-
10mm thick top plate	10.55	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	34,949	35,376
Cladding: Lift Shaft														-	
Internal metal lining	241.80	m2	133	0	3	136	-	-	2	0	-204	138	-	32,994	33,379
Cladding type A, assumed to be Alucobond metal panel	241.80	m2	133	0	3	136	-	-	2	0	-204	138	-	32,994	33,379
Louvres	12.4	m2	133	0	3	136	-	-	2	0	-204	138	-	1,692	1,712
Pilkington Profilit backlit frosted glazing	35.40	m2	110	0	-	110	-	-	2	0	-1	112	-	3,898	3,981
Cladding: Bridge Deck														-	
Allowance for Fittings (10% of total structure)	128.58	m2	110	0	-	110	-	-	2	0	-1	112	-	14,159	14,461
15mm thick plate	3.89	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	12,894	13,051
Parapet stiffeners; 15mm thick vertical plate at 725mm centres	0.87	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	2,883	2,919
15mm thick top plate; painted in highlight colour	1.30	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	4,298	4,350
20mm thick top plate; bent "balustrade"	1.30	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	4,298	4,350
														-	-
Insulated sloping roof panel with standing seam, fixed with purlins to structural frame	14.28	m2	41	0	3	45	-	-	0	-	0	45	-	639	640
Extra over for insulated membrane lined LPCB gutter	21.40	m	10	0	2	11	-	48	0	6	-18	65	-	244	1,394
Solid canopy over lift door at platform level	14.28	m2	38	0	3	42	-	135	0	7	-17	184	-	598	2,624
Floor Finishes: Staircase														-	
Mid landing - Applied finish	10.00	m2	28	0	3	31	-	311	0	-	0	342	-	311	3,419
Lower landing - Applied finish	10.00	m3	19	0	-	19	-	-	0	0	-2	19	-	189	190



Specification	Quant		Carbon Factor (kgCO₂e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Treads & risers; metal step, 2500mm wide, 300m going	59.40	m2	109	0	8	117	-	-	2	0	-67	119	-	6,969	7,063
Extra over for applied finish															
Extra over for 2500mm long AATI nosings to top / landing steps	6.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Extra over for 2500mm long AATI nosings to intermediate steps	52.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Nylon coated handrails, double rail to stairs	80.00	m	152	0	15	167	-	-	2	0	-114	169	-	13,393	13,546
Bridge Deck - Applied finish	61.98	m2	28	0	3	31	-	311	0	-	0	342	-	1,925	
Signage														-	
Network Rail logo	2.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Platform numbering	2.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Mechanical & Electrical Services														-	
Electrical Installations														-	
Electrical mains and sub-mains distribution	183.00	m2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Power installations	183.00	m2	20	0	0	20	-	61	0	0	-32	82	-	3,744	14,986
Lighting installations	183.00	m2	12	0	0	12	-	-	0	0	-3	12	-	2,273	2,286
Specialist lighting installations														-	-
Local electricity generation systems														-	-
Earthing and bonding systems	183.00	m2	0	0	0	0	-	1	0	0	-1	1		57	232
16 person through lift	2.00	Nr	24,601	75	-	24,676	-	50,032	310	92	-48,174	75,049		49,353	150,097
														-	-
	0.00													-	-
Lift Motor Room	1.00	Nr	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift		-	-
Fire Fighting Systems														-	-
Lightning Protection	183.00	m2	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems		-	-
Drainage														-	-
Staircase														-	-
Linear drainage channel	27.00	m	10.8	0.087	0	10.887	0	0	0.11	0.013	-1.68	11.01		294	297

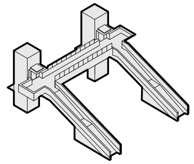


Specification	Quant		Carbon Factor (kgCO₂e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Rainwater down pipe	18.00	m	3	0	0	3	-	3	0	0	-3	7		61	119
General Allowances														-	-
Main Contractor's Preliminaries		%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Main Contractor's Overheads & Profit		%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Extra over for specialist crane hire	1.00	Item	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Extra over for NwR Possession Staff -		Excl													
Project No. 108713-104												TOTALS		478,770	634,159

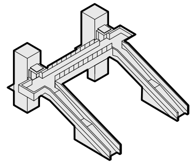


D.2.8 Frame open

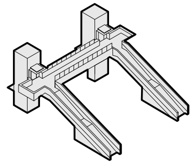
Specification	Quant		Carbon Factor (kgCO₂e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Foundations															
Pad Foundations to Lift Shaft (1.5 x 1.5 x 1.0m)	**8.00**	Nr													
Pads foundation total volume	18.00	m3													
Pads foundation concrete	17.54	m3	382	19	16	417	-	-	7	1	-79	425	-	7,314	7,452
Pads foundation rebar (Kg)	3600.00	kg												-	
Pads foundation rebar (Tonnes)	3.60	Tonnes	1,180	4	59	1,244	-	-	38	2	-49	2,528	-	4,477	9,100
Pads foundation rebar (m3)	0.46	m3												-	
Strip Foundation to Stair Roof Support (3.0 x 1.0 x 1.0m)	**2.00**	Nr												-	
Strip foundation total volume	6.00	m3												-	
Strip foundation concrete	5.85	m3	382	19	16	417	-	-	7	1	-79	842		2,438	4,922
Strip foundation rebar (Kg)	1200.00	kg												-	
Pads foundation rebar (Tonnes)	1.20	Tonnes	1,180	4	59	1,244	-	-	38	2	-49	2,528	-	1,492	3,033
Strip foundation rebar (m3)	0.15	m3												-	
Strip Foundation to base of staircase (3.0 x 1.5 x 1.5m)	**2.00**	Nr												-	
Strip foundation total volume	13.50	m3												-	
Strip foundation concrete	13.16	m3	382	19	16	417	-	-	7	1	-79	842		5,486	11,074
Strip foundation rebar (Kg)	2700.00	kg												-	
Pads foundation rebar (Tonnes)	2.70	Tonnes	1,180	4	59	1,244	-	-	38	2	-49	2,528	-	3,358	6,825
Strip foundation rebar (m3)	0.34	m3												-	
Structure: Staircase														-	
152 x 152 x 23 UC	0.26	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	861	872
830 x 200 x 200 x 20 x 20 x 10 PFC	15.11	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	50,053	50,664
Mid landing - 8mm thick top plate	0.50	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,664	1,685
Underside of staircase - 8mm thick top plate	1.76	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	5,825	5,896
Structure: Liftshaft														-	
254 x 254 x 73 UC	5.44	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	18,020	18,241
457 x 152 x 74 UB	1.58	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	5,234	5,298
152 x 152 x 37 UC	2.26	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	7,486	7,578
100 x 100 x 8 SHS	2.37	t	2,593	4	87	2,685	-	-	38	2	-1,594	2,725	-	6,363	6,458
Structure: Bridge Deck Slab														-	



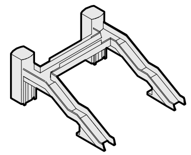
Specification	Quant		Carbon Factor (kgCO₂e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
203 x 203 x 46 UC	4.03	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	13,350	13,513
200 x 75 x 23 PFC	0.12	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	398	402
890 x 300 x 50 x 10 FB	12.00	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	39,751	40,236
Walking surface of bridge deck - 8mm thick plate	5.46	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	18,099	18,320
Underside of bridge deck - 8mm thick plate	5.46	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	18,099	18,320
Structure: Fittings														-	
Allowance for Fittings	5.64	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	18,669	18,897
														-	
														-	
Cladding: Staircase														-	
Metal grillage														-	-
	133.84	m2	38	0	6	44	0	0	0	-6	45	-	45	5,895	
	447.03	Kg	2	0	0	2	-	0	0	-1	2	-	2	977	
Metal stringer to sides of staircase	44.77	m2	133	0	3	136	-	-	2	0	-204	138	-	6,109	6,180
Cladding: Lift Shaft														-	
Internal metal lining	103.33	m2	133	0	3	136	-	-	2	0	-204	138	-	14,099	14,264
External metal cladding	135.74	m2	133	0	3	136	-	-	2	0	-204	138	-	18,522	18,738
Glazed panels	81.04	m2	110	0	-	110	-	-	2	0	-1	112	-	8,924	9,114
Allowance for Fittings (10% of total structure)	3646.8	kg	3	0	0	3	-	-	0	0	-2	3	-	11,033	11,180
Cladding: Bridge Deck														-	
Toughened laminated glass panels (openable) with PVB interlayer	128.58	m2	110	0	-	110	-	-	2	0	-1	112	-	14,159	14,461
Stainless steel support of laminated-glazed (with PVB interlayer) Hight = 1.8 m	8164.80	kg	3	0	0	3	-	-	0	0	-2	3	-	24,701	25,032
Metal grillage; 1.8m high		m2				-								-	-
	66.82	m	152	0	15	167	-	-	2	0	-114	169	-	11,186	11,314
Metal upstand edging to base of glazed cladding	22.32	m2	133	0	3	136	-	-	2	0	-204	138	-	3,046	3,081
Metal sloping upstand edging to external face of glazed cladding	52.19	m2	133	0	3	136	-	-	2	0	-204	138	-	7,121	7,204
Roof: Lift Shaft														-	-
Insulated sloping roof panel with standing seam, fixed with purlins to structural frame	14.28	m2	41	0	3	45	-	-	0	-	0	45	-	639	640
Extra over for insulated membrane lined LPCB gutter	21.40	m	10	0	2	11	-	48	0	6	-18	65	-	244	1,394



Specification	Quant		Carbon Factor (kgCO_2e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Solid canopy over lift door at platform level	14.28	m2	38	0	3	42	-	135	0	7	-17	184	-	598	2,624
Floor Finishes: Staircase														-	
Mid landing - Coloured non-slip finish	10.00	m2	28	0	3	31	-	311	0	-	0	342	-	311	3,419
Tactile pavings at foot of stairs, 2m x 2m	8.00	m2	19	0	-	19	-	-	0	0	-2	19	-	377	380
Tactile surface at head of stairs, 3m x 2m	12.00	m2	19	0	-	19	-	-	0	0	-2	19	-	566	570
Treads & risers; metal step, 2000mm wide, 300m going	59.40	m2	109	0	8	117	-	-	2	0	-67	119	-	6,969	7,063
Extra over for applied finish	59.40	m2	included in above	included in above	included in above	included in above	included in above	included in above	included in above	included in above	included in above	included in above	included in above	-	-
Extra over for 1800mm long AATI nosings to top / landing steps	4.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Extra over for 1800mm long AATI nosings to intermediate steps	62.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Nylon coated handrails, double rail to stairs	55.92	m	152	0	15	167	-	-	2	0	-114	169	-	9,362	9,468
Floor Finishes: Bridge Deck														-	
Bridge Deck - Coloured non-slip finish	87.00	m2	28	0	3	31	-	311	0	-	0	342	-	2,702	29,749
Signage														-	
Network Rail logo	2.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Platform numbering	2.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Mechanical & Electrical Services														-	
Electrical Installations														-	
Electrical mains and sub-mains distribution	167.66	m2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Power installations	167.66	m2	20	0	0	20	-	61	0	0	-32	82	-	3,430	13,730
Lighting installations	167.66	m2	12	0	0	12	-	-	0	0	-3	12	-	2,083	2,094
Specialist lighting installations														-	-
Local electricity generation systems														-	-
Earthing and bonding systems	167.66	m2	0	0	0	0	-	1	0	0	-1	1		53	213
16 person through lift	2.00	Nr	24,601	75	-	24,676	-	50,032	310	92	-48,174	75,049		49,353	150,097
														-	-
														-	-
Lift Motor Room	1.00	Nr	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift		-	-

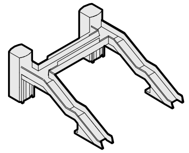


Specification	Quant		Carbon Factor ($kgCO_2e$/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Fire Fighting Systems														-	-
Lightning Protection	167.66	m2	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems		-	-
Drainage														-	-
Staircase														-	-
Linear drainage channel	27.96	m	11	0	-	11	-	-	0	0	-2	11		304	308
Rainwater down pipe	18.00	m	3	0	0	3	-	3	0	0	-3	7		61	119
General Allowances														-	-
Main Contractor's Preliminaries		%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Main Contractor's Overheads & Profit		%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Extra over for specialist crane hire	1.00	Item	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Extra over for NwR Possession Staff -		Excl													
Project No. 108713-104												TOTALS		431,258	591,223

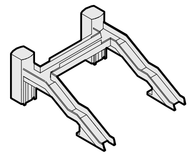


D.2.9 AVA open

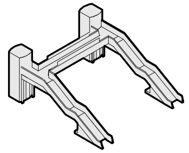
Specification	Quant		Carbon Factor (kgCO$_2$e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Foundations															
Pad Foundations to Lift Shaft (1.5 x 1.5 x 1.0m)	**8.00**	**Nr**													
Pads foundation total volume	18.00	m3													
Pads foundation concrete	17.54	m3	382	19	16	**417**	-	-	7	1	-79	425	-	7,314	7,452
Pads foundation rebar (Kg)	3600.00	kg												-	
Pads foundation rebar (Tonnes)	3.60	Tonnes	1,180	4	59	**1,244**	-	-	38	2	-49	2,528	-	4,477	9,100
Pads foundation rebar (m3)	0.46	m3												-	
Strip Foundation to Stair Roof Support (3.0 x 1.0 x 1.0m)	**2.00**	**Nr**												-	
Strip foundation total volume	6.00	m3												-	
Strip foundation concrete	5.85	m3	382	19	16	**417**	-	-	7	1	-79	842		2,438	4,922
Strip foundation rebar (Kg)	1200.00	kg												-	
Pads foundation rebar (Tonnes)	1.20	Tonnes	1,180	4	59	**1,244**	-	-	38	2	-49	2,528	-	1,492	3,033
Strip foundation rebar (m3)	0.15	m3												-	
Strip Foundation to base of staircase (3.0 x 1.5 x 1.5m)	**2.00**	**Nr**												-	
Strip foundation total volume	13.50	m3												-	
Strip foundation concrete	13.16	m3	382	19	16	**417**	-	-	7	1	-79	842		5,486	11,074
Strip foundation rebar (Kg)	2700.00	kg												-	
Pads foundation rebar (Tonnes)	2.70	Tonnes	1,180	4	59	**1,244**	-	-	38	2	-49	2,528	-	3,358	6,825
Strip foundation rebar (m3)	0.34	m3												-	
Structure: Staircase														-	
300 x 300 x 12 SHS	3.56	t	2,593	4	87	**2,685**	-	-	38	2	-1,594	2,725	-	9,557	9,701
300 x 225 x 12 RHS	1.34	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	4,439	4,493
200 X 200 X 8 SHS	0.40	t	2,593	4	87	**2,685**	-	-	38	2	-1,594	2,725	-	1,074	1,090
B1 8mm thick	0.69	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	2,286	2,314
B2 8mm thick	0.77	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	2,551	2,582
B3 8mm thick	1.03	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	3,412	3,454
B4	0.20	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	663	671
B6	0.23	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	762	771
B7 Assumption 8mm thickness	0.08	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	265	268
B8 10mm thick	0.21	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	696	704



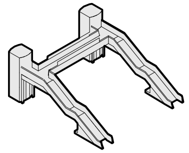
Specification	Quant		Carbon Factor (kgCO$_2$e/ unit)										Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
B9 Assumption 8mm thick	0.08	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	265	268
B10 Assumption 8mm thick	0.03	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	99	101
B11 10mm thick	0.41	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,358	1,375
B12 10mm thick	0.21	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	696	704
B13 10mm thick	0.40	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,325	1,341
BR1 8mm thick	1.10	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	3,644	3,688
	0.00	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	-	-
Stair beams	1.00	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	3,313	3,353
	0.00	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	-	-
1139 DEEP C-BEAM	2.66	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	8,811	8,919
988 DEEP C-BEAM	5.39	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	17,855	18,073
972 DEEP C-BEAM	0.32	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,060	1,073
Structure: Liftshaft														-	
254 x 254 x 73 UC	5.44	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	18,020	18,241
457 x 152 x 74 UB	1.58	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	5,234	5,298
152 x 152 x 37 UC	2.26	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	7,486	7,578
100 x 100 x 8 SHS	2.37	t	2,593	4	87	2,685	-	-	38	2	-1,594	2,725	-	6,363	6,458
Structure: Bridge Deck														-	
Allowance for Fittings (10% of total structure)	2.06	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	6,824	6,907
B4	0.59	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,954	1,978
B5	0.13	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	431	436
BR1	0.61	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	2,021	2,045
B14	0.06	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	192	194
	0.08	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	265	268
	0.00	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	-	-
1139 DEEP C-BEAM	4.41	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	14,608	14,787
	0.00	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	-	-
Structure: Fittings														-	
Allowance for Fittings	3.97	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	13,150	13,311
														-	
														-	



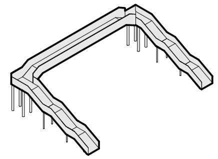
Specification	Quant		Carbon Factor (kgCO$_2$e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Cladding: Staircase														-	
Toughened laminated glass panels (fixed) with PVB interlayer	133.84	m2	110	0	-	110	-	-	2	0	-1	112	-	14,738	15,052
Metal stringer to sides of staircase	42.83	m2	133	0	3	136	-	-	2	0	-204	138	-	5,844	5,912
Metal entrance portal; outside face	17.84	m2	133	0	3	136	-	-	2	0	-204	138	-	2,434	2,463
Metal entrance portal; inner face	17.84	m2	133	0	3	136	-	-	2	0	-204	138	-	2,434	2,463
Nylon coated handrails, double rail to bridge stairs	112.00	m	152	0	15	167	-	-	2	0	-114	169	-	18,750	18,964
Cladding: Lift Shaft														-	
Internal metal lining	103.33	m2	133	0	3	136	-	-	2	0	-204	138	-	14,099	14,264
External metal cladding	135.74	m2	133	0	3	136	-	-	2	0	-204	138	-	18,522	18,738
Glazed panels	81.04	m2	110	0	-	110	-	-	2	0	-1	112	-	8,924	9,114
						-								-	-
Cladding: Bridge Deck														-	
Aluminium decking	51.00	m2	13	-	1	14	-	-	8	21	-3	40	-	714	2,040
Toughened laminated glass panels (openable) with PVB interlayer	21.00	m2	110	0	-	110	-	-	2	0	-1	112	-	2,313	2,362
External metal cladding, to ends (rate allows for internal and external finish)	41.00	m2	133	0	3	136	-	-	2	0	-204	138	-	5,594	5,660
	0.00					-								-	-
	0.00					-								-	-
	0.00					-								-	-
Roof: Lift Shaft														-	-
Stainless steel canopy	14.28	m2	38	0	3	42	-	135	0	7	-17	184	-	598	2,624
Extra over for insulated membrane lined LPCB gutter	21.40	m	10	0	2	11	-	48	0	6	-18	65	-	244	1,394
Stainless steel over lift door at platform level	2.00	Nr				-								-	-
Floor Finishes: Staircase														-	
Mid landing - Coloured non-slip finish	10.00	m2	28.18	0.052	2.83	31.062	0	310.87	0.013	0	0.011	341.945	0	311	3,419
Tactile pavings at foot of stairs, 2m x 2m	8.00	m2	19	0	-	19	-	-	0	0	-2	19	-	151	152
Tactile surface at head of stairs, 3m x 2m	12.00	m2	19	0	-	19	-	-	0	0	-2	19	-	226	228
Treads & risers; metal step, 2000mm wide, 300m going	66.00	m2	109	0	8	117	-	-	2	0	-67	119	-	7,744	7,848
Extra over for applied finish	66.00	Nr	include in above	include in above	include in above	include in above	include in above	include in above	include in above	include in above	include in above	include in above	include in above	-	-



Specification	Quant		Carbon Factor (kgCO_2e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Extra over for 1800mm long AATI nosings to top / landing steps	4.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Extra over for 1800mm long AATI nosings to intermediate steps	62.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Nylon coated handrails, double rail to stairs	55.92	m	152	0	15	167	-	-	2	0	-114	169	-	9,362	9,468
Floor Finishes: Bridge Deck														-	
Bridge Deck - Coloured non-slip finish	50.00	m2	28	0	3	31	-	311	0	-	0	342	-	1,553	17,097
Signage														-	
Network Rail logo	2.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Platform numbering	2.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Mechanical & Electrical Services														-	
Electrical Installations	0.00													-	
Electrical mains and sub-mains distribution	177.00	m2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Power installations	177.00	m2	20	0	0	20	-	61	0	0	-32	82	-	3,621	14,495
Lighting installations	177.00	m2	12	0	0	12	-	-	0	0	-3	12	-	2,199	2,211
	0.00					-								-	-
Specialist Lighting installations	0.00					-								-	-
Local electricity generation systems	0.00					-								-	-
Earthing and bonding systems	177.00	m2	0	0	0	0	-	1	0	0	-1	1	-	56	225
16 person through lift	2.00	Nr	24,601	75	-	24,676	-	50,032	310	92	-48,174	75,049	-62	49,353	150,097
	0.00					-								-	-
Lift Motor Room	1.00	Nr	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	Include in lift	-	-
Fire Fighting Systems	0.00													-	-
Lighting Protection	177.00	m2	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	-	-

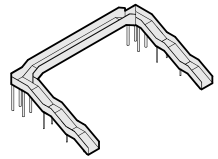


Specification	Quant		Carbon Factor (kgCO_2e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Drainage														-	-
Staircase	0.00					-								-	-
Linear drainage channel	27.00	m	11	0	-	11	-	-	0	0	- 2	11	-	294	297
Aluminium rainwater down pipe	18.00	m	3	0	0	3	-	3	0	0	- 3	7	-	61	119
General Allowances														-	-
Main Contractors Preliminaries		%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Main Contractors Overheads & Profit		%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Extra over for specialist crane hire	1.00	Item	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Extra over for NwR Possession Staff - Excluded; assumed works to be undertaken as part of rail wider possession		Excl													
Project No. 108713-104												TOTALS		335,380	491,558

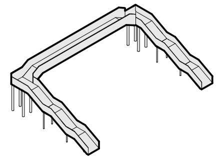


D.2.10 400-series

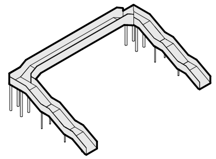
Specification	Quant		Carbon Factor (kgCO₂e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Foundations															
Strip Foundation to Stair Support (3.0 x 1.0 x 1.0m)	**6.00**	**Nr**													
Pads foundation total volume	13.50	m3													
Pads foundation concrete	13.16	m3	382	19	16	**417**	-	-	7	1	-79	425	-	5,486	5,589
Pads foundation rebar (Kg)	2700.00	kg												-	-
Pads foundation rebar (Tonnes)	2.70	Tonnes	1,180	4	59	**1,244**	-	-	38	2	-49	2,528	-	3,358	6,825
Pads foundation rebar (m3)	0.34	m3												-	-
Strip Foundation to Deck support (3.0 x 1.0 x 1.0m)	**4.00**	**Nr**												-	-
Strip foundation total volume	12.00	m3												-	-
Strip foundation concrete	11.69	m3	382	19	16	**417**	-	-	7	1	-79	842		4,876	9,844
Strip foundation rebar (Kg)	2400.00	kg												-	-
Pads foundation rebar (Tonnes)	2.40	Tonnes	1,180	4	59	**1,244**	-	-	38	2	-49	2,528	-	2,985	6,066
Strip foundation rebar (m3)	0.31	m3												-	-
Strip Foundation to base of staircase (3.0 x 1.5 x 1.5m)	**2.00**	**Nr**												-	-
Strip foundation total volume	13.50	m3												-	-
Strip foundation concrete	13.16	m3	382	19	16	**417**	-	-	7	1	-79	842		5,486	11,074
Strip foundation rebar (Kg)	2700.00	kg												-	-
Pads foundation rebar (Tonnes)	2.70	Tonnes	1,180	4	59	**1,244**	-	-	38	2	-49	2,528	-	3,358	6,825
Strip foundation rebar (m3)	0.34	m3												-	-
Structure: Staircase														-	
Base support - 250 x 150 x 12.5 RHS	0.19	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	636	644
2 leg Type 5 support - 250 x 100 x 10 RHS	0.33	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	1,096	1,110
2 leg Type 3 support - 250 x 150 x 12.5 RHS	0.99	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	3,283	3,323
2 leg Type 3 support - 150 x 150 x 12.5 SHS	0.24	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	778	788
Baseplates			Exclude	Exclude	Exclude	**Exclude**	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Headplate			Exclude	Exclude	Exclude	**Exclude**	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Flight 1 staircase (Drawing 428)															
Strings - 250 x 150 x 12.5 RHS	1.09	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	3,621	3,665
Strings - 150 x 75 x 10 RSA	0.27	t	3,201	4	107	**3,313**	-	-	38	2	-2,277	3,353	-	901	912



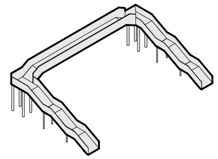
Specification	Quant		Carbon Factor (kgCO$_2$e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Plate kicker - 60 x 6mm plate	1.00	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	3,328	3,369
Treads - 8mm thick plate	1.10	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	3,636	3,681
Mid landing - 8mm thick top plate	0.43	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,435	1,453
Stiffeners to underside of deck - 75 x 10mm	0.13	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	416	421
														-	-
Balustrade - 100 x 65 x 5 RHS post	0.34	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,140	1,153
Balustrade - Plate & stiffener to 100 x 65 x 5 RHS post	1.26	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	4,161	4,211
Balustrade - 100 x 65 x 5 RHS top rail	0.21	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	702	711
Balustrade Panel - 40 x 12 flat bottom bar			3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	-	-
Balustrade Panel - 26.9 x 3.2 CHS vertical bars	0.34	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,113	1,127
Balustrade Panel - 40 x 12 flat top bar			3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	-	-
Flight 2 & 3 staircase (Drawing 424)														-	-
Strings - 250 x 150 x 12.5 RHS	4.78	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	15,837	16,031
Strings - 150 x 75 x 10 RSA	1.19	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	3,942	3,990
Plate kicker - 60 x 6mm plate	4.40	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	14,562	14,740
Support Stiffener - 152 x 152 x 25 UC	0.12	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	381	386
Treads - 8mm thick plate	1.92	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	6,364	6,441
Mid landing - 8mm thick top plate	2.02	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	6,699	6,780
Stiffeners to underside of deck - 75 x 10mm	0.19	t	133	0	3	136	-	-	2	0	-204	138	-	26	26
Allowance for Fittings (10% of total structure)														-	-
Balustrade - 100 x 65 x 5 RHS post	0.55	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,822	1,844
Balustrade - Plate & stiffener to 100 x 65 x 5 RHS post	32.00	nr												-	-
Balustrade - 100 x 65 x 5 RHS top rail	0.92	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	3,061	3,098
Balustrade Panel - 40 x 12 flat bottom bar	70.00	m2	133	0	3	136	-	-	2	0	-204	138	-	9,552	9,663
Steel frame	0.67	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	2,226	2,253
Balustrade Panel - 40 x 12 flat top bar	70.00	m2	133	0	3	136	-	-	2	0	-204	138	-	9,552	9,663
Structure: Bridge Deck Slab														-	
2 leg Type 2 support - 250 x 150 x 12.5 RHS	2.71	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	8,961	9,070
2 leg Type 2 support - 150 x 150 x 12.5 SHS	0.47	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,557	1,576



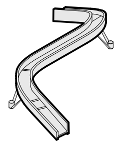
Specification	Quant		Carbon Factor (kgCO_2e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
2 leg Type 2 support - 150 x 100 x 8 RHS cross bracing	0.30	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,000	1,013
Baseplates															
Headplate															
Deck (Drawing 430) - 23m long															
Walking surface of bridge deck - 10mm thick plate	4.00	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	13,262	13,424
Stiffeners to underside of deck - 75 x 10mm	0.38	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	1,248	1,263
U' Frame to deck and side panels - 20mm thick plate	12.09	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	40,046	40,535
Side panels to bridge deck - 10mm thick plate	6.20	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	20,543	20,794
Extra over for painted finishes to plate deck	158.00	m2	28	0	3	31	-	311	0	-	0	373	-	4,908	58,935
Top rail - 150 x 150 x 12.5 SHS	3.44	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	11,408	11,548
Structure: Fittings														-	
Allowance for Fittings	38.43	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	127,294	128,849
Allowance for Splices	19.20	t	3,201	4	107	3,313	-	-	38	2	-2,277	3,353	-	63,615	64,392
														-	
Floor Finishes: Staircase														-	
Mid landing - Coloured non-slip finish	6.90	m2	28	0	3	31	-	311	0	-	0	342	-	214	2,359
Flight 2 & 3 staircase (Drawing 424)															
Mid landing - Coloured non-slip finish	32.20	m2	28	0	3	31	-	311	0	-	0	342	-	1,000	11,011
Tactile pavings at foot of stairs, 2m x 2m	8.00	m2	19	0	-	19	-	-	0	0	-2	19	-	377	380
Tactile surface at head of stairs, 3m x 2m	8.00	m2	19	0	-	19	-	-	0	0	-2	19	-	377	380
Treads & risers; metal step, 2000mm wide, 300m going	59.40	m2	109	0	8	117	-	-	2	0	-67	119	-	6,969	7,063
Extra over for applied finish			Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Extra over for 1800mm long AATI nosings to top / landing steps			Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Extra over for 1800mm long AATI nosings to intermediate steps			Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Flight 1 staircase (Drawing 428)															



Specification	Quant		Carbon Factor (kgCO$_2$e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Handrail - 42.4 diameter CHS handrail supported by 16 diameter bars welded to RHS post	32.00	m	152	0	15	167	-	-	2	0	-114	169	-	5,357	5,418
Flight 2 & 3 staircase (Drawing 424)															
Handrail - 42.4 diameter CHS handrail supported by 16 diameter bars welded to RHS post	140.00	m	152	0	15	167	-	-	2	0	-114	169	-	23,437	23,705
Floor Finishes: Bridge Deck														-	
Bridge Deck - Coloured non-slip finish	51.00	m2	28	0	3	31	-	311	0	-	0	342	-	1,584	17,439
Signage														-	
Network Rail logo	2.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Platform numbering	2.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	-	-
Mechanical & Electrical Services														-	
Electrical Installations														-	
Electrical mains and sub-mains distribution	183.00	m2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Power installations	183.00	m2	20	0	0	20	-	61	0	0	-32	82	-	3,744	14,986
Lighting installations	183.00	m2	12	0	0	12	-	-	0	0	-3	12	-	2,273	2,286
Specialist lighting installations														-	-
Local electricity generation systems														-	-
Earthing and bonding systems	183.00	m2	0	0	0	0	-	1	0	0	-1	1		57	232
														-	-
Fire Fighting Systems														-	-
Lightning Protection	183.00	m2	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems		-	-

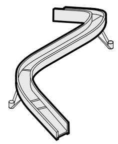


Specification	Quant		Carbon Factor (kgCO₂e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
General Allowances														-	-
Main Contractor's Preliminaries		%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Main Contractor's Overheads & Profit		%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Extra over for specialist crane hire	1.00	Item	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-
Extra over for NwR Possession Staff -		Excl													
Project No. 108713-104												TOTALS		465,049	584,365

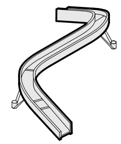


D.2.11 Flow

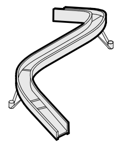
Specification	Quant		Carbon Factor (kgCO_2e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Foundations															
Pad Foundations to Lift Shaft (1.5 x 1.5 x 1.0m)	8.00	Nr													
Pads foundation total volume	18.00	m3													
Pads foundation concrete	17.54	m3	382	19	16	417	-	-	7	1	-79	425	-	7,314	7,452
Pads foundation rebar (Kg)	3600.00	kg												-	
Pads foundation rebar (Tonnes)	3.60	Tonnes	1,180	4	59	1,244	-	-	38	2	-49	2,528	-	4,477	9,100
Pads foundation rebar (m3)	0.46	m3												-	
Strip Foundation to base of staircase (3.0 x 1.5 x 1.5m)	2.00	Nr												-	
Strip foundation total volume	13.50	m3												-	
Strip foundation concrete	13.16	m3	382	19	16	417	-	-	7	1	-79	425	-	5,486	5,589
Strip foundation rebar (Kg)	2700.00	kg												-	
Pads foundation rebar (Tonnes)	2.70	Tonnes	382	19	16	417	-	-	7	1	-79	425	-	1,126	1,147
Strip foundation rebar (m3)	0.34	m3												-	
Structure: Staircase														-	
Fibre Reinforced Polymer	1.00	Nr													
Steel - dimensions: 700mm x 450 x 30mm	0.01	m3	5,506	33	202	5,741	-	5,741	301	52	-381	11,835	-	54	112
	0.36	Tonnes	13,867	36	982	14,885	-	14,885	304	2,082	-1,746	32,158	-	5,431	11,733
	0.32	Tonnes	13,867	36	982	14,885	-	14,885	304	2,082	-1,746	32,158	-	4,699	10,152
	1.32	Tonnes	13,867	36	982	14,885	-	14,885	304	2,082	-1,746	32,158	-	19,649	42,448
Horizontal 1	0.53	Tonnes	13,867	36	982	14,885	-	14,885	304	2,082	-1,746	32,158	-	7,907	17,082
Horizontal 2	0.53	Tonnes	13,867	36	982	14,885	-	14,885	304	2,082	-1,746	32,158	-	7,907	17,082
Curve 3B - 1B	1.32	Tonnes	13,867	36	982	14,885	-	14,885	304	2,082	-1,746	32,158	-	19,649	42,448
Ramp 2B	0.32	Tonnes	13,867	36	982	14,885	-	14,885	304	2,082	-1,746	32,158	-	4,699	10,152
Ramp 1B	0.36	Tonnes	13,867	36	982	14,885	-	14,885	304	2,082	-1,746	32,158	-	5,431	11,733
Stair Heel	0.01	m3	5,506	33	202	5,741	-	5,741	301	52	-381	11,835	-	54	112
MOLDS FOR FLOW BRIDGE															



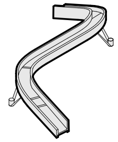
Specification	Quant		Carbon Factor (kgCO$_2$e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Structure: Pier Support Legs															
Pier Stool	1.00	Nr													
Pier 1A Leg	0.36	Tonnes	13,867	36	982	14,885	-	14,885	304	2,082	-1,746	32,158	-	5,364	11,588
Pier 1B Leg	0.36	Tonnes	13,867	36	982	14,885	-	14,885	304	2,082	-1,746	32,158	-	5,364	11,588
Curve 1A Bottom	1.00	Nr						-				-			
Curve 3A Bottom	1.00	Nr						-				-			
Pier Stool	0.01	m3	5,506	33	202	5,741	-	5,741	301	52	-381	11,835	-	54	112
Pier 2A Leg	0.51	Tonnes	13,867	36	982	14,885	-	14,885	304	2,082	-1,746	32,158	-	7,611	16,442
Pier 2B Leg	0.51	Tonnes	13,867	36	982	14,885	-	14,885	304	2,082	-1,746	32,158	-	7,611	16,442
Curve 1B Bottom		Nr													
Curve 3B Bottom	1.00	Nr													
Structure: Ribs															
Ramp 1 (10 Nr)	14.00	m2	145	0	13	158	-	158	0	35	-24	351	-	2,214	4,920
Curve 1A - 3A (24 Nr)	33.00	m2	145	0	13	158	-	158	0	35	-24	351	-	5,219	11,598
Deck (15 Nr)	21.00	m2	145	0	13	158	-	158	0	35	-24	351	-	3,321	7,381
Curve 3B - 1B (24 Nr)	33.00	m2	145	0	13	158	-	158	0	35	-24	351	-	5,219	11,598
Ramp 2 (10 Nr)	14.00	m2	145	0	13	158	-	158	0	35	-24	351	-	2,214	4,920
Structure: Deck; Stepped stairs; fibre reinforced polymer laminate type SG07															
Ramp 1 (10 Nr)	16.00	m2	145	0	13	158	-	158	0	35	-24	351	-	2,530	4,920
Curve 1A - 3A (24 Nr)	22.00	m2	145	0	13	158	-	158	0	35	-24	351	-	3,479	11,598
Curve 3B - 1B (24 Nr)	22.00	m2	145	0	13	158	-	158	0	35	-24	351	-	3,479	7,381
Allowance for Fittings (10% of total structure)	16.00	m2	145	0	13	158	-	158	0	35	-24	351	-	2,530	11,598
Deck; U-Shaped deck slab module; fibre reinforced polymer laminate type SG01															
Deck	18.00	m2	145	0	13	158	-	158	0	35	-24	351	-	2,847	6,326
Soffit fascia panel; fibre reinforced polymer laminate type SG01															
Ramp 1A	16.77	m2	145	0	13	158	-	158	0	35	-24	351	-	2,652	5,894
	14.51	m2	145	0	13	158	-	158	0	35	-24	351	-	2,295	5,100



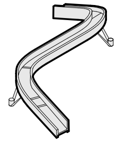
Specification	Quant		Carbon Factor (kgCO$_2$e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Curve 1A - 3A	58.00	m2	145	0	13	158	-	158	0	35	-24	351	-	9,172	20,385
Horizontal 1	24.42	m2	145	0	13	158	-	158	0	35	-24	351	-	3,861	8,581
Horizontal 2	24.42	m2	145	0	13	158	-	158	0	35	-24	351	-	3,861	8,581
Curve 3B - 1B	58.00	m2	145	0	13	158	-	158	0	35	-24	351	-	9,172	20,385
Ramp 2B	14.51	m2	145	0	13	158	-	158	0	35	-24	351	-	2,295	5,100
Ramp 1B	16.77	m2	145	0	13	158	-	158	0	35	-24	351	-	2,652	5,894
Soffit Facia to underside of central spine; fibre reinforced polymer laminate type KS02															
Ramp 1A	1.02	m2	145	0	13	158	-	158	0	35	-24	351	-	161	357
Ramp 2A	0.88	m2	145	0	13	158	-	158	0	35	-24	351	-	139	309
Curve 1A - 3A	4.00	m2	145	0	13	158	-	158	0	35	-24	351	-	633	1,406
Horizontal 1	1.48	m2	145	0	13	158	-	158	0	35	-24	351	-	234	519
Horizontal 2	1.48	m2	145	0	13	158	-	158	0	35	-24	351	-	234	519
Curve 3B - 1B	4.00	m2	145	0	13	158	-	158	0	35	-24	351	-	633	1,406
Ramp 2B	0.88	m2	145	0	13	158	-	158	0	35	-24	351	-	139	309
Ramp 1B	1.02	m2	145	0	13	158	-	158	0	35	-24	351	-	161	357
Lower inner fascia interchangeable panel, fibre reinforced polymer laminate type SG08															
Ramp 1A	4.46	m2	145	0	13	158	-	158	0	35	-24	351	-	705	1,567
Ramp 2A	3.86	m2	145	0	13	158	-	158	0	35	-24	351	-	610	1,356
Curve 1A - 3A	16.00	m2	145	0	13	158	-	158	0	35	-24	351	-	2,530	5,623
Horizontal 1	6.49	m2	145	0	13	158	-	158	0	35	-24	351	-	1,026	2,281
Horizontal 2	6.49	m2	145	0	13	158	-	158	0	35	-24	351	-	1,026	2,281
Curve 3B - 1B	16.00	m2	145	0	13	158	-	158	0	35	-24	351	-	2,530	5,623
Ramp 2B	3.86	m2	145	0	13	158	-	158	0	35	-24	351	-	610	1,356
Ramp 1B	4.46	m2	145	0	13	158	-	158	0	35	-24	351	-	705	1,567
Upper glazed fascia panel, toughened glass parapet system enclosed in stainless steel frame															
Ramp 1A	6.44	m2	110	0	-	110	-	110	2	0	-1	223	-	709	1,434
Ramp 2A	5.57	m2	110	0	-	110	-	110	2	0	-1	223	-	614	1,241



Specification	Quant		Carbon Factor (kgCO₂e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Curve 1A - 3A	23.00	m2	110	0	-	110	-	110	2	0	-1	223	-	2,533	5,119
Horizontal 1	9.38	m2	110	0	-	110	-	110	2	0	-1	223	-	1,033	2,087
Horizontal 2	9.38	m2	110	0	-	110	-	110	2	0	-1	223	-	1,033	2,087
Curve 3B - 1B	23.00	m2	110	0	-	110	-	110	2	0	-1	223	-	2,533	5,119
Ramp 2B	5.57	m2	109.98	0.14	0	110.12	0	110.12	2.33	0.016	-0.8	222.586	0	614	1,241
Ramp 1B	6.44	m2	110	0	-	110	-	110	2	0	-1	223	-	709	1,434
Structure: Fittings															
Allowance for fittings			Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude		
Floor Finishes: Staircase															
Mid landing - Coloured non-slip finish	5.00	m2	28	0	3	31	-	311	0	-	0	342	-	155	1,710
Treads & risers - Coloured non-slip finish 300m going	71.00	m2	28	0	3	31	-	311	0	-	0	342	-	2,205	24,278
Extra over for 1800mm long AATI nosings to all steps	68.00	Nr	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude		



Specification	Quant		Carbon Factor (kgCO_2e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Nylon coated handrails, double rail to stairs:															
Ramp 1A	13.27	m	152	0	15	167	-	167	2	0	-114	337	-	2,221	4,468
Ramp 2A	11.48	m	152	0	15	167	-	167	2	0	-114	337	-	1,922	3,866
Curve 1A - 3A	12.00	m	152	0	15	167	-	167	2	0	-114	337	-	2,009	4,041
Horizontal 1	19.32	m	152	0	15	167	-	167	2	0	-114	337	-	3,234	6,504
Horizontal 2	19.32	m	152	0	15	167	-	167	2	0	-114	337	-	3,234	6,504
Curve 3B - 1B	12.00	m	152	0	15	167	-	167	2	0	-114	337	-	2,009	4,041
Ramp 2B	11.48	m	152	0	15	167	-	167	2	0	-114	337	-	1,922	3,866
Ramp 1B	13.27	m	152	0	15	167	-	167	2	0	-114	337	-	2,221	4,468
Floor Finishes: Bridge Deck															
Bridge Deck - Coloured non-slip finish	18.00	m2	28	0	3	31	-	311	0	-	0	342	-	559	6,155
Signage															
Network Rail logo			Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude		
Platform numbering			Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude	Exclude		
Mechanical & Electrical Services															
Electrical Installations															
Electrical mains and sub-mains distribution															
Power installations	94.00	m2	20	0	0	20	-	61	0	0	-32	82	-	1,923	7,698
Lighting installations	94.00	m2	12	0	0	12	-	12	0	0	-3	25	-	1,168	2,341
Specialist lighting installations															
Local electricity generation systems															
Earthing and bonding systems	94.00	m2	0	0	0	0	-	1	0	0	-1	1	-	30	119
16 person through lift															
Lift Motor Room															
Fire Fighting Systems															
Lightning Protection	94.00	m2	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems	Include in Earthing and bonding systems		



Specification	Quant		Carbon Factor (kgCO₂e/ unit)											Carbon Total (kgCO2e)	
Description	Qty	Unit	A1-A3	A4	A5	A1-A5	B3	B4	C2	C3	D	TOTAL	BioC	A1-A5	WLC
Drainage															
Staircase															
Linear drainage channel	92.06	m	11	0	-	11	-	-	0	0	- 2	11	-	1,002	1,014
Extra over for NwR Possession Staff - Excluded; assumed works to be undertaken as part of rail wider possession															
Main Contractor's Preliminaries			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Main Contractor's Overheads & Profit			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Extra over for specialist crane hire			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Extra over for NwR Possession Staff -			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
Project No. 108713-104													Total	236,564	532,343

Image D.3 - Llanfairpwll station
This heritage footbridge has been upgraded to incorporate compliant handrails, new treads, and has been refurbished and repainted

E

Footbridges & Subways

Capital Cost and Lifecycle Cost (LCC)

Image E.1
Winchester station

Capital Cost

E.1.1 Introduction
The capital costs for bridge construction have been calculated and assessed. Each of the six bridge designs presented in this manual has been costed and measured based on standardised drawings provided.

Note that the cost estimations provided are based on ideal conditions prevailing up to the second quarter of 2024. These ideal conditions encompass various factors such as favourable weather, stable ground, and efficient construction methodologies. By establishing these ideal conditions, we aim to provide a baseline for cost estimation that aligns with industry standards and facilitates accurate budgeting for bridge projects.

Furthermore, the cost estimations presented in this manual are derived from a thorough analysis of material costs, labour rates, equipment expenses, and other relevant factors. Rigorous research and consultation with industry experts have been undertaken to ensure the accuracy and reliability of these estimations.

It is essential to recognise that while every effort has been made to provide accurate cost estimations, real-world construction projects may encounter unforeseen challenges and variables that could impact costs. Therefore, these estimations should serve as a guideline, and project managers are encouraged to conduct their assessments based on specific project requirements and conditions.

Appendix E
Capital Cost

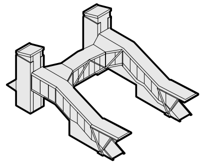
	Covered				Open				
	Beacon	Ribbon	Frame	AVA	700 Series	Beacon	Ribbon	Frame	AVA
Foundations	20,829	27,641	20,670	20,670	33,097	20,829	25,021	20,670	20,670
Structure	149,066	170,507	251,063	264,778	381,407	268,232	148,460	193,670	166,105
Cladding	794,075	494,998	786,326	528,834	231,715	500,598	494,998	708,521	528,834
Roof	137,713	379,982	148,653	147,931	90,888	90,888	14,076	50,366	50,366
Floor Finishes	155,594	159,139	169,998	162,783	143,887	155,594	159,139	169,998	162,783
Ceiling Finishes	95,947	0	117,806	0	-	-	-	-	-
Signage	32,750	32,750	32,500	32,500	30,533	32,750	32,750	32,500	32,500
M&E	936,545	942,263	943,469	952,575	942,263	936,545	942,263	943,469	952,575
Drainage	13,559	13,559	13,767	13,455	-	13,559	13,559	13,767	13,455
OH&P	563,336	539,424	593,482	519,076	439,559	497,541	458,380	520,589	478,357
Total	2,899,413	2,760,263	3,077,734	2,642,603	2,293,350	2,516,536	2,288,645	2,653,550	2,405,645
Lower Quartile*	2,899,413	2,760,263	3,077,734	2,642,603	2,293,350	2,516,536	2,288,645	2,653,550	2,405,645
Upper Quartile*	3,769,238	3,588,341	4,001,054	3,435,384	2,981,355	3,271,497	2,975,239	3,449,615	3,127,338

Table E.1
Station footbridge designs.

	Open	
	400 Series	Flow
Foundations	22,838	8,908
Structure	331,923	268,006
Cladding	-	301,844
Roof	-	-
Floor Finishes	143,887	190,797
Moulds	-	100,000
Signage	30,533	30,533
M&E	110,833	51,661
Drainage	-	28,109
OH&P	208,081	306,444
Total	848,095	1,286,302
Lower Quartile*	848,095	1,286,302
Upper Quartile*	1,102,524	1,672,192

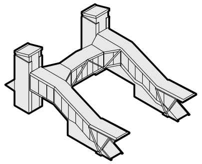
Table E.2
Non-station footbridge designs.

*30% Range for Cap Cost:
The reason for the range selected was to provide balance between specificity and adaptability. This range allows for flexibility to accommodate variations in cost factors while still providing a reasonably constrained estimate framework. It strikes a balance between precision and practicality, enhancing the manual's utility and relevance in real-world applications.
Price fluctuation may be caused by change in cost (material and labour cost), market conditions (inflation, Interest and currency fluctuation), market demand and technology enhancements.

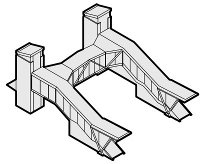


E.2.1 Beacon covered

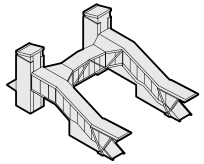
Code	Description	Quantity	UOM	Rate	SubTotal	Inflation Uplift	Total	Sub Totals
	DESIGN 1 - BEACON COVERED							
1.1	**Foundations**							
1.1.1	Pad Foundations to Lift Shaft (1.5 x 1.5 x 1.0m)	8	Nr	1,050	8,400	1.31	11,004	20,829
1.1.2	Strip Foundation to Stair Roof Support (3.0 x 1.0 x 1.0m)	2	Nr	1,400	2,800	1.31	3,668	
1.1.3	Strip Foundation to base of staircase (3.0 x 1.5 x 1.5m)	2	Nr	2,350	4,700	1.31	6,157	
2.1	**Structure**							
	Staircase (Gridline A-B / 2-)							149,066
2.1.1	400 x 200 x 8 RHS	6	t	3,000	17,130	1.31	22,440	
2.1.2	200 x 100 x 8 RHS	2	t	3,000	5,640	1.31	7,388	
2.1.3	180 x 180 x 10 SHS	2	t	3,000	6,060	1.31	7,939	
2.1.4	Top landing - 8mm thick plate	28	m2	110	3,025	1.31	3,963	
2.1.5	Mid landing - 8mm thick plate	10	m2	110	1,100	1.31	1,441	
2.1.6	Lower landing - 8mm thick plate	10	m2	110	1,100	1.31	1,441	
	Liftshaft							
2.1.7	254 x 254 x 89 UC	8	t	2,750	21,780	1.31	28,532	
2.1.8	305 x 102 x 25 UB	2	t	2,750	5,060	1.31	6,629	
2.1.9	100 x 100 x 6.3 SHS	2	t	3,000	6,300	1.31	8,253	
	Staircase Roof							
2.1.10	152 x 152 x 30 UC	1	t	2,750	1,513	1.31	1,981	
2.1.11	180 x 180 x 10 SHS	2	t	3,000	7,260	1.31	9,511	
2.1.12	100 x 100 x 8 SHS	0	t	3,000	300	1.31	393	
2.1.13	88.9 x 6.3 CHS	0	t	3,000	660	1.31	865	
	Deck Slab							
2.1.14	8mm thick top plate	58	m2	110	6,409	1.31	8,395	
2.1.15	150 x 150 x 6.3 SHS	2	t	3,000	6,600	1.31	8,646	



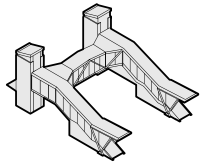
2.1.16	100 x 100 x 6.3 SHS	0	t	3,000	750	1.31	983	
2.1.17	200 x 200 x 10 SHS	1	t	3,000	3,900	1.31	5,109	
2.1.18	150 x 150 x 8 SHS	1	t	3,000	2,880	1.31	3,773	
2.1.19	180 x 180 x 10 SHS	0	t	3,000	1,050	1.31	1,376	
	Deck Roof							
2.1.20	180 x 180 x 10 SHS	1	t	3,000	3,240	1.31	4,244	
2.1.21	100 x 100 x 8 SHS	0	t	3,000	780	1.31	1,022	
2.1.22	88.9 x 6.3 CHS	0	t	3,500	910	1.31	1,192	
2.1.23	Allowance for fittings	10	%	103,446	10,345	1.31	13,551	
3.1	**Cladding**							
	Staircase							794,075
3.1.1	13.52mm toughened laminated glass panels (fixed) with PVB interlayer	168	m2	1,260	211,302	1.31	276,806	
	Staircase, top landing							
3.1.2	13.52mm toughened laminated glass panels (fixed) with PVB interlayer	28	m2	1,260	34,650	1.31	45,392	
	Lift Shaft							
3.1.4	Internal metal lining	293	m2	200	58,528	1.31	76,672	
3.1.5	External facing brickwork	293	m2	350	102,424	1.31	134,175	
3.1.6	Pilkington Profilin backlit frosted glazing	35	m2	450	15,930	1.31	20,868	
	Bridge Deck							
	13.52mm toughened laminated glass panels (openable) with PVB interlayer, average 3m high	78	m2	1,575	122,850	1.31	160,934	
3.1.7	13.52mm toughened laminated glass panels (fixed) with PVB interlayer	48	m2	1,260	60,480	1.31	79,229	
4.1	**Roof**							137,713
4.1.1	Lift Shaft	16	m2	350	5,460	1.31	7,153	
4.1.2	Extra over for Kingspan insulated membrane lined LPCB gutter	22	m	175	3,920	1.31	5,135	
4.1.3	Glass canopy over lift door at platform level	2	Nr	15,000	30,000	1.31	39,300	
	Staircase							



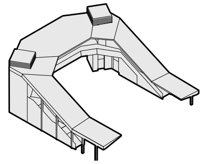
4.1.4	Kingspan KS500 insulated roof panel with standing seam, fixed with purlins to structural frame	105	m2	350	36,575	1.31	47,913	
4.1.5	Extra over for Kingspan insulated membrane lined LPCB gutter	16	m	175	2,860	1.31	3,746	
4.1.6	Extra over for Kingspan KS500 verge flashing	42	m	75	3,135	1.31	4,107	
	Deck							
4.1.7	Kingspan KS500 insulated roof panel with standing seam, fixed with purlins to structural frame	58	m2	350	20,391	1.31	26,712	
4.1.8	Extra over for Kingspan KS500 verge flashing	35	m	75	2,589	1.31	3,392	
4.1.9	Extra over for Kingspan KS500 ridge flashing	3	m	75	195	1.31	255	
5.1	**Floor Finishes**							155,594
	Staircase							
5.1.1	Top landing - Light grey Altro finish	15	m2	100	1,509	1.31	1,977	
5.1.2	Top landing, lift waiting area - Dark grey Altro finish	8	m2	100	825	1.31	1,081	
5.1.3	Mid landing - Light grey Altro finish	10	m2	100	1,000	1.31	1,310	
5.1.4	Lower landing - Light grey Altro finish	10	m2	100	1,000	1.31	1,310	
5.1.5	Tactile pavings at foot of stairs	4	m2	200	832	1.31	1,090	
5.1.6	Tactile pavings at head of stairs	4	m2	200	832	1.31	1,090	
5.1.7	Treads & risers; metal step, 2500mm wide, 300m going	58	Nr	300	17,400	1.31	22,794	
5.1.8	Extra over for applied finish	58	Nr	75	4,350	1.31	5,699	
5.1.9	Extra over for 2500mm long AATI nosings to top / landing steps	6	Nr	1,550	9,300	1.31	12,183	
5.1.10	Extra over for 2500mm long AATI nosings to intermediate steps	52	Nr	950	49,400	1.31	64,714	
5.1.11	Nylon coated handrails, double rail to stairs	60	m	400	24,000	1.31	31,440	
5.1.12	Nylon coated handrails, single rail to top landing	10	m	250	2,500	1.31	3,275	
5.1.13	Bridge Deck - Light grey Altro finish	58	m2	100	5,826	1.31	7,632	



6.1	**Ceiling Finishes**							95,947
	Staircase							
6.1.1	90 x 18mm flat timber panels with 10mm shadow gaps (Austratus or similar)	40	m2	450	18,090	1.31	23,698	
6.1.2	30 x 60mm profiled timber slats set at 170 centres (Austratus or similar)	64	m2	450	28,935	1.31	37,905	
	Deck							
6	30 x 60mm profiled timber slats set at 170 centres (Austratus or similar)	58	m2	450	26,217	1.31	34,344	
7.1	**Signage**							32,750
7.1.1	Network Rail logo	2	Nr	7,500	15,000	1.31	19,650	
7.1.2	Platform numbering	2	Nr	5,000	10,000	1.31	13,100	
8.1	**Mechanical & Electrical Services**							936,545
	Electrical Installations							
8.1.2	Electrical mains and sub-mains distribution	179	m2					
8.1.3	Power installations	179	m2	200	35,800	1.31	46,898	
8.1.4	Lighting installations	179	m2	350	62,650	1.31	82,072	
	Specialist Lighting installations							
	Local electricity generation systems							
8.1.5	Earthing and bonding systems	179	m2	100	17,900	1.31	23,449	
8.1.6	16 person through lift	2	Nr	210,500	421,000	1.31	551,510	
8.1.7	Lift Motor Room	1	Nr	159,670	159,670	1.31	209,168	
	Fire Fighting Systems							
8.1.8	Lighting Protection	179	m2	100	17,900	1.31	23,449	
9.1	**Drainage**							
	Staircase							13,559
9.1.1	Linear drainage channel	27	m	250	6,750	1.31	8,843	
9.1.2	Aluminium rainwater down pipe	18	m	200	3,600	1.31	4,716	
10.1	**Overhead, Profit & Preliminaries**							563,336
10.1.1	Main Contractors Preliminaries	15	%	1,783,265	267,490	1.31	350,412	
10.1.2	Main Contractors Overheads & Profit	5	%	2,050,755	102,538	1.31	134,324	

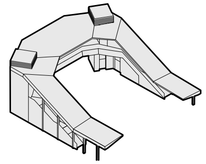


10.1.3	Extra over for specialist crane hire	1	Item	60,000	60,000	1.31	78,600	
10.1.4	Extra over for NwR Possession Staff - Excluded; assumed works to be undertaken as part of rail wider possession		Excl					
	TOTAL Design 1 - BEACON Covered						**2,899,413**	**2,899,413**

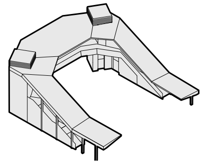


E.2.2 Ribbon covered

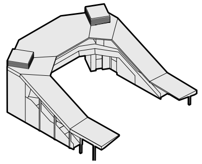
Code	Description	Quantity	UOM	Rate	SubTotal	Inflation Uplift	Total	Sub Totals
	DESIGN 2 - RIBBON COVERED							
1.1	**Foundations**							27,641
1.1.1	Pad Foundations to Lift Shaft (assumed 1.5 x 1.5 x 1.0m)	8	Nr	1,050	8,400	1.31	11,004	
1.1.2	Pad Foundation to Stair / Canopy Support (assumed 1.0 x 1.0 x 1.0m)	12	Nr	500	6,000	1.31	7,860	
1.1.3	Pad Foundation to Stair Canopy Extension (assumed 1.0 x 1.0 x 1.0m)	4	Nr	500	2,000	1.31	2,620	
1.1.4	Strip Foundation to base of staircase (assumed 3.0 x 1.5 x 1.5m)	2	Nr	2,350	4,700	1.31	6,157	
1.1.5	Structure; based on stair having 1600mm clear width & deck having 3200mm clear width							
2.1	**Structure**							170,507
	Staircase							
2.1.1	Support columns, taken as 150kg/m, 6 Nr per stair	10	t	3,000	28,800	1.31	37,728	
2.1.2	Stringers, taken as 100kg/m	8	t	3,000	24,480	1.31	32,069	
2.1.3	Stiffener to stair riser; 15mm thick vertical plate	56	m2	210	11,693	1.31	15,318	
2.1.4	Mid landing - 8mm thick plate	10	m2	110	1,100	1.31	1,441	
2.1.5	Lower landing - 8mm thick plate	10	m2	110	1,100	1.31	1,441	
2.1.6	Liftshaft							
2.1.7	Corner posts; 200 x 200 x 10 SHS	5	t	3,000	14,760	1.31	19,336	
2.1.8	Horizontals; 203 UC (taken as 86kg/m)	1	t	3,000	4,140	1.31	5,423	
2.1.9	Horizontals; 150 x 100 x 8 RHS	0	t	3,000	900	1.31	1,179	
2.1.10	Diagonals; 150 x 100 x 8 RHS	1	t	3,000	3,060	1.31	4,009	
2.1.11	Diagonals; 150 x 90 x 15 angle	1	t	3,000	3,600	1.31	4,716	
2.1.12	Cantilever beam 1	1	t	3,000	2,550	1.31	3,341	
2.1.13	Cantilever beam 2	1	t	3,000	2,550	1.31	3,341	



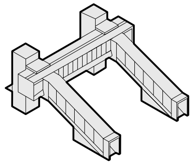
2.1.14	Cantilever beam 3	0	t	3,000	1,050	1.31	1,376	
	Deck Slab							
2.1.15	10mm thick top plate	66	m2	210	13,885	1.31	18,190	
2.1.16	Deck stiffeners; 15mm thick vertical plate at 725mm centres	22	t	210	4,658	1.31	6,102	
2.1.17	Allowance for Fittings	10	%	118,326	11,833	1.31	15,501	
3.1	**Cladding**							494,998
	Staircase							
3.1.1	13.52mm toughened laminated glass panels (fixed), 1150mm high maximum	88	m2	1,260	110,691	1.31	145,005	
3.1.2	10mm thick top plate	168	m2	210	35,280	1.31	46,217	
3.1.3	**Lift Shaft**							
3.1.4	Internal metal lining	242	m2	200	48,360	1.31	63,352	
3.1.5	Cladding type A, assumed to be Alucobond metal panel	242	m2	350	84,630	1.31	110,865	
3.1.6	Louvres	12	m2	400	4,960	1.31	6,498	
3.1.7	Pilkington Profilin backlit frosted glazing	35	m2	450	15,930	1.31	20,868	
	Bridge Deck							
3.1..8	15mm thick plate	62	m2	210	13,016	1.31	17,051	
3.1..9	Parapet stiffeners; 15mm thick vertical plate at 725mm centres	14	m2	210	2,911	1.31	3,813	
3.1..10	15mm thick top plate; painted in highlight colour	21	m2	210	4,339	1.31	5,684	
3.1..11	20mm thick top plate; bent "balustrade"	21	m2	275	5,682	1.31	7,443	
3.1..12	13.52mm toughened laminated glass panels, 1000mm high	41	m2	1,260	52,063	1.31	68,203	
4.1	**Roof**							379,982
4.1.1	Stair canopy structure; box girder spanning between structural supports together with cantilever arms taken at 1m centres	236	m2	275	64,881	1.31	84,994	



4.1.2	Stair canopy covering comprising single skin standing seam metal roof, integral gutter and soffit panel; includes for 5m extension beyond foot of stairs	267	m2	475	126,972	1.31	166,334	
4.1.3	Deck canopy structure; box girder spanning between lift shaft structure	125	m2	275	34,383	1.31	45,042	
4.1.4	Deck canopy covering comprising single skin standing seam metal roof, integral box gutter running centrally and soffit panel	112	m2	475	53,081	1.31	69,536	
	Lift Shaft	16	m2	350	5,460	1.31	7,153	
4.1.5	Extra over for Kingspan insulated membrane lined LPCB gutter	22	m	175	3,920	1.31	5,135	
4.1.6	Glass canopy over lift door at platform level		Nr	15,000				
4.1.7	Glass canopy over lift door at deck level		Nr	15,000				
4.1.8	Standing seam metal roof to rear elevation of lift shaft	4	m2	350	1,365	1.31	1,788	
5.1	**Floor Finishes**							159,139
	Staircase							
5.1.1	Tactile pavings at foot of stairs	4	m2	200	832	1.31	1,090	
5.1.2	Tactile pavings at head of stairs		m2	200				
	Staircase							
5,1,3	Mid, turn landing - Applied finish	10	m2	100	1,000	1.31	1,310	
5,1,4	Lower landing - Applied finish	10	m2	100	1,000	1.31	1,310	
5,1,5	Treads & risers; metal step, 2500mm wide, 300m going	58	Nr	300	17,400	1.31	22,794	
5,1,6	Extra over for applied finish	58	Nr	75	4,350	1.31	5,699	
5,1,7	Extra over for 2500mm long AATI nosings to top / landing steps	6	Nr	1,550	9,300	1.31	12,183	
5,1,8	Extra over for 2500mm long AATI nosings to intermediate steps	52	Nr	950	49,400	1.31	64,714	
5,1,9	Nylon coated handrails, double rail to stairs	80	m	400	32,000	1.31	41,920	

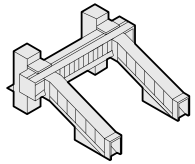


5,1,10	Bridge Deck - Applied finish	62	m2	100	6,198	1.31	8,119	
7.1	**Signage**							32,750
7.1.1	Network Rail logo	2	Nr	7,500	15,000	1.31	19,650	
7.1.2	Platform numbering	2	Nr	5,000	10,000	1.31	13,100	
8.1	**Mechanical & Electrical Services**							942,263
	Electrical Installations							
	Electrical mains and sub-mains distribution	183	m2					
8.1.1	Power installations	183	m2	200	36,600	1.31	47,946	
8.1.2	Lighting installations	183	m2	350	64,050	1.31	83,906	
	Specialist Lighting installations							
	Local electricity generation systems							
8.1.3	Earthing and bonding systems	183	m2	100	18,300	1.31	23,973	
8.1.4	16 person through lift	2	Nr	210,500	421,000	1.31	551,510	
8.1.5	Lift Motor Room	1	Nr	161,035	161,035	1.31	210,956	
	Fire Fighting Systems							
8.1.6	Lighting Protection	183	m2	100	18,300	1.31	23,973	
9.1	**Drainage**							13,559
	Staircase							
9.1.1	Linear drainage channel	27	m	250	6,750	1.31	8,843	
9.1.2	Aluminium rainwater down pipe	18	m	200	3,600	1.31	4,716	
10.1	**Overhead, Profit & Preliminaries**							539,424
10.1.1	Main Contractors Preliminaries	15	%	1,695,297	254,294	1.31	333,126	
10.1.2	Main Contractors Overheads & Profit	5	%	1,949,591	97,480	1.31	127,698	
10.1.3	Extra over for specialist crane hire	1	Item	60,000	60,000	1.31	78,600	
	Extra over for NwR Possession Staff - Excluded; assumed works to be undertaken as part of rail wider possession		Excl					
	TOTAL Design 2 - RIBBON Covered						**2,760,263**	**2,760,263**

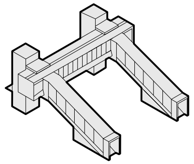


E.2.3 Frame covered

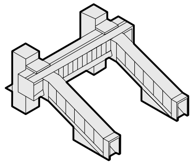
Code	Description	Quantity	UOM	Rate	SubTotal	Inflation Uplift	Total	Sub Totals
	DESIGN 3 - FRAME COVERED							
1.1	**Foundations**							20,670
1.1.2	Pad Foundations to Lift Shaft (1.5 x 1.5 x 1.0m)	8	Nr	1,050	8,400	1.30	10,920	
1.1.3	Strip Foundation to Stair Roof Support (3.0 x 1.0 x 1.0m)	2	Nr	1,400	2,800	1.30	3,640	
1.1.4	Strip Foundation to base of staircase (3.0 x 1.5 x 1.5m)	2	Nr	2,350	4,700	1.30	6,110	
2.1	**Structure**							251,063
	Staircase							
2.1.1	152 x 152 x 23 UC	2	t	2,750	5,528	1.30	7,186	
2.1.2	305 x 165 x 46 UB	2	t	2,750	6,490	1.30	8,437	
2.1.3	70 x 70 x 6.3 SHS	1	t	2,750	2,558	1.30	3,325	
2.1.4	830 x 200 x 200 x 20 x 20 x 10 PFC	96	m2	305	29,356	1.30	38,163	
2.1.5	60 x 60 x 5 SHS	0	t	3,000	1,140	1.30	1,482	
2.1.6	Mid landing - 8mm thick top plate	8	m2	110	880	1.30	1,144	
2.1.7	Underside of staircase - 8mm thick top plate	28	m2	110	3,080	1.30	4,004	
	Liftshaft							
2.1.8	254 x 254 x 73 UC	5	t	2,750	14,960	1.30	19,448	
2.1.9	457 x 152 x 74 UB	2	t	2,750	4,345	1.30	5,649	
2.1.10	152 x 152 x 37 UC	2	t	2,750	6,215	1.30	8,080	
2.1.11	100 x 100 x 8 SHS	2	t	3,000	7,110	1.30	9,243	
	Bridge Deck Slab							
2.1.12	203 x 203 x 46 UC	4	t	2,750	11,083	1.30	14,407	
2.1.13	200 x 75 x 23 PFC	0	t	2,750	330	1.30	429	
2.1.14	890 x 300 x 50 x 10 FB	153	m2	250	38,220	1.30	49,686	
2.1.15	Walking surface of bridge deck - 8mm thick plate	87	m2	110	9,570	1.30	12,441	



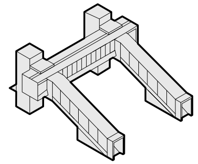
2.1.16	Underside of bridge deck - 8mm thick plate	87	m2	110	9,570	1.30	12,441	
	Bridge Deck Roof							
2.1.13	406 x 178 x 54 UB	3	t	2,750	8,910	1.30	11,583	
2.1.14	70 x 70 x 6.3 SHS	2	t	2,750	4,263	1.30	5,541	
2.1.15	Underside of bridge deck roof - 10mm thick plate	87	m2	138	11,963	1.30	15,551	
	Fittings							
2.1.16	Allowance for Fittings	10	%	175,569	17,557	1.30	22,824	
3.1	**Cladding**							786,326
	Staircase							
3.1.1	Toughened laminated glass panels (fixed) with PVB interlayer	134	m2	850	113,764	1.30	147,893	
3.1.2	Metal stringer to sides of staircase	43	m2	350	14,991	1.30	19,488	
3.1.3	Metal entrance portal; outside face	18	m2	350	6,244	1.30	8,117	
3.1.4	Metal entrance portal; inner face	18	m2	350	6,244	1.30	8,117	
	Lift Shaft							
3.1.5	Internal metal lining	103	m2	200	20,666	1.30	26,866	
3.1.6	External metal cladding	136	m2	350	47,509	1.30	61,762	
3.1.7	Glazed panels	81	m2	1,260	102,110	1.30	132,744	
	Bridge Deck							
3.1.8	Toughened laminated glass panels (openable) with PVB interlayer	152	m2	1,575	239,180	1.30	310,933	
3.1.9	Nylon coated handrails, single rail to bridge deck level	67	m	250	16,705	1.30	21,717	
3.1.10	Metal upstand edging to base of glazed cladding	22	m2	350	7,812	1.30	10,156	
3.1.11	Metal sloping upstand edging to external face of glazed cladding	52	m2	350	18,267	1.30	23,746	
3.1.12	External metal cladding, to ends (rate allows for internal and external finish)	16	m2	700	11,375	1.30	14,788	



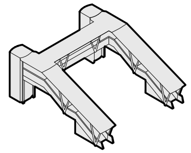
4.1	**Roof**							148,653
	Liftshaft							
4.1.1	Insulated sloping roof panel with standing seam, fixed with purlins to structural frame	14	m	350	4,998	1.30	6,497	
4.1.2	Extra over for insulated membrane lined LPCB gutter	21	Nr	175	3,745	1.30	4,869	
4.1.3	Solid canopy over lift door at platform level	2	Nr	15,000	30,000	1.30	39,000	
	Staircase							
4.1.4	Insulated sloping roof panel with standing seam, fixed with purlins to structural frame	66	m2	350	23,233	1.30	30,203	
4.1.5	Extra over for insulated membrane lined LPCB gutter	55	m	175	9,681	1.30	12,585	
4.1.6	Extra over for verge flashing	55	m	75	4,149	1.30	5,394	
4.1.7	Metal entrance portal	5	m2	350	1,911	1.30	2,484	
4.1.8	Bridge Deck							
4.1.9	Insulated sloping roof panel with standing seam, fixed with purlins to structural frame	87	m2	350	30,450	1.30	39,585	
4.1.10	Extra over for verge flashing	57	m	75	4,292	1.30	5,579	
4.1.11	Extra over for valley flashing	25	m	75	1,890	1.30	2,457	
5.1	**Floor Finishes**							169,998
	Staircase							
5.1.1	Mid landing - Coloured non-slip finish	10	m2	150	1,500	1.30	1,950	
5.1.2	Tactile pavings at foot of stairs, 2m x 2m	8	m2	200	1,600	1.30	2,080	
5.1.3	Tactile surface at head of stairs, 3m x 2m	12	m2	200	2,400	1.30	3,120	
5.1.4	Treads & risers; metal step, 2000mm wide, 300m going	66	Nr	300	19,800	1.30	25,740	
5.1.5	Extra over for applied finish	66	Nr	75	4,950	1.30	6,435	
5.1.6	Extra over for 1800mm long AATI nosings to top / landing steps	4	Nr	1,550	6,200	1.30	8,060	
5.1.7	Extra over for 1800mm long AATI nosings to intermediate steps	62	Nr	950	58,900	1.30	76,570	



5.1.8	Nylon coated handrails, double rail to stairs	56	m	400	22,368	1.30	29,078	
	Bridge Deck							
5.1.19	Bridge Deck - Coloured non-slip finish	87	m2	150	13,050	1.30	16,965	
6.1	**Ceiling Finishes**							117,806
	Staircase							
6.1.1	Triangular soffit, metal panel, fixed with purlins to structural frame (measured flat, rate uplifted for sloping surfaces)	66	m2	550	36,509	1.30	47,462	
6.1.2	Metal entrance portal; soffit, internal face	5	m2	350	1,911	1.30	2,484	
	Bridge Deck							
6.1.3	Triangular soffit, perforated metal panel, fixed with purlins to structural frame (measured flat, rate uplifted for sloping surfaces)	87	m2	600	52,200	1.30	67,860	
7.1	**Signage**							32,500
7.1.1	Network Rail logo	2	Nr	7,500	15,000	1.30	19,500	
7.1.2	Platform numbering	2	Nr	5,000	10,000	1.30	13,000	
8.1	**Mechanical & Electrical Services**							943,469
	Electrical Installations							
	Electrical mains and sub-mains distribution	168	m2					
8.1.1	Power installations	168	m2	200	33,532	1.30	43,592	
8.1.2	Lighting installations	168	m2	350	58,681	1.30	76,285	
	Specialist Lighting installations							
	Local electricity generation systems							
8.1.3	Earthing and bonding systems	168	m2	100	16,766	1.30	21,796	
8.1.4	16 person through lift	2	Nr	220,000	440,000	1.30	572,000	
8.1.5	Lift Motor Room	1	Nr	160,000	160,000	1.30	208,000	
	Fire Fighting Systems							
8.1.6	Lighting Protection	168	m2	100	16,766	1.30	21,796	
9.1	**Drainage**							
	Staircase							13,767
9.1.1	Linear drainage channel	28	m	250	6,990	1.30	9,087	

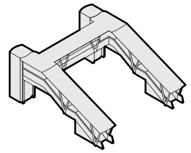


9.1.2	Aluminium rainwater down pipe	18	m	200	3,600	1.30	4,680	
10.1	**Overhead, Profit & Preliminaries**							593,482
10.1.1	Main Contractors Preliminaries	15	%	1,910,963	286,644	1.30	372,638	
10.1.2	Main Contractors Overheads & Profit	5	%	2,197,607	109,880	1.30	142,844	
10.1.3	Extra over for specialist crane hire	1	Item	60,000	60,000	1.30	78,000	
	Extra over for NwR Possession Staff - Excluded; assumed works to be undertaken as part of rail wider possession		Excl					
	TOTAL Design 3 - FRAME Covered						**3,077,734**	**3,077,734**

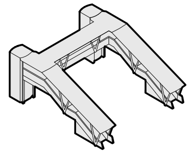


E.2.4 AVA covered

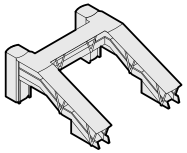
Code	Description	Quantity	UOM	Rate	SubTotal	Inflation Uplift	Total	Sub Totals
	DESIGN 4 - AVA COVERED							
1.1	**Foundations**							20,670
1.1.1	Pad Foundations to Lift Shaft (1.5 x 1.5 x 1.0m)	8	Nr	1,050	8,400	1.30	10,920	
1.1.2	Strip Foundation to Stair Roof Support (3.0 x 1.0 x 1.0m)	2	Nr	1,400	2,800	1.30	3,640	
1.1.3	Strip Foundation to base of staircase (3.0 x 1.5 x 1.5m)	2	Nr	2,350	4,700	1.30	6,110	
2.1	**Structure**							264,778
	Staircase							
2.1.1	300 x 300 x 12 SHS	4	t	3,000	10,671	1.30	13,872	
2.1.2	300 x 225 x 12 RHS	1	t	2,750	3,685	1.30	4,791	
2.1.3	200 X 200 X 8 SHS	0	t	3,000	1,212	1.30	1,576	
2.1.4	B1 8mm thick	1	t	3,000	2,070	1.30	2,691	
2.1.5	B2 8mm thick	1	t	3,000	2,310	1.30	3,003	
2.1.6	B3 8mm thick	1	t	3,000	3,090	1.30	4,017	
2.1.7	B4	0	t	2,750	550	1.30	715	
2.1.8	B6	0	t	2,750	635	1.30	826	
2.1.9	B7 Assumption 8mm thickness	0	t	3,000	240	1.30	312	
2.1.10	B8 10mm thick	0	t	3,000	630	1.30	819	
2.1.11	B9 Assumption 8mm thick	0	t	3,000	240	1.30	312	
2.1.12	B10 Assumption 8mm thick	0	t	3,000	90	1.30	117	
2.1.13	B11 10mm thick	0	t	3,000	1,230	1.30	1,599	
2.1.14	B12 10mm thick	0	t	3,000	630	1.30	819	
2.1.15	B13 10mm thick	0	t	3,000	1,200	1.30	1,560	
2.1.16	BR1 8mm thick	1	t	3,000	3,300	1.30	4,290	
2.1.17	Stair beams	1	t	3,000	3,000	1.30	3,900	
2.1.18	1139 DEEP C-BEAM	3	t	3,000	7,980	1.30	10,374	



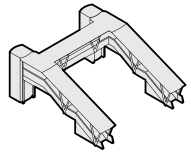
2.1.19	988 DEEP C-BEAM	5 t	3,000	16,170	1.30	21,021
2.1.20	972 DEEP C-BEAM	0 t	3,000	960	1.30	1,248
	Liftshaft					
2.1.21	254 x 254 x 73 UC	5 t	2,750	14,960	1.30	19,448
2.1.22	457 x 152 x 74 UB	2 t	2,750	4,345	1.30	5,649
2.1.23	152 x 152 x 37 UC	2 t	2,750	6,215	1.30	8,080
2.1.24	100 x 100 x 8 SHS	2 t	3,000	7,110	1.30	9,243
	Bridge Deck					
2.1.25	B1	2 t	3,000	6,180	1.30	8,034
2.1.26	B4	1 t	2,750	1,623	1.30	2,109
2.1.27	B5	0 t	2,750	358	1.30	465
2.1.28	BR1	1 t	3,000	1,830	1.30	2,379
2.1.29	B14	0 t	3,000	174	1.30	226
2.1.30	B13	0 t	3,000	240	1.30	312
2.1.31	1139 DEEP C-BEAM	4 t	3,000	13,230	1.30	17,199
	Roof					
2.1.35	B50	3 t	3,000	8,730	1.30	11,349
2.1.36	B51	3 t	3,000	8,010	1.30	10,413
2.1.37	B52	1 t	3,000	1,950	1.30	2,535
2.1.38	B53	1 t	3,000	1,638	1.30	2,129
2.1.39	B54	5 t	3,000	14,289	1.30	18,576
2.1.40	B55	1 t	3,000	2,340	1.30	3,042
2.1.41	B56	1 t	3,000	1,950	1.30	2,535
2.1.42	B57	0 t	2,750	182	1.30	236
2.1.43	B58	0 t	2,750	723	1.30	940
2.1.44	B59	0 t	2,750	190	1.30	247
2.1.45	B60	0 t	4,500	450	1.30	585
2.1.46	B61	0 t	4,500	450	1.30	585
2.1.47	B62	0 t	4,500	450	1.30	585
2.1.48	B63	1 t	3,000	4,437	1.30	5,768
2.1.49	V-COLUMN	8 t	3,000	23,214	1.30	30,178



	Fittings							
2.1.50	Allowance for Fittings	10	%	185,160	18,516	1.30	24,071	
3.1	**Cladding**							528,834
	Staircase							
3.1.1	Toughened laminated glass panels (fixed) with PVB interlayer	134	m2	850	113,764	1.30	147,893	
3.1.2	Metal stringer to sides of staircase	43	m2	350	14,991	1.30	19,488	
3.1.3	Metal entrance portal; outside face	18	m2	350	6,244	1.30	8,117	
3.1.4	Metal entrance portal; inner face	18	m2	350	6,244	1.30	8,117	
3.1.5	Nylon coated handrails, double rail to bridge stairs	112	m2	250	28,000	1.30	36,400	
3.1.6	Internal metal lining	103	m2	200	20,666	1.30	26,866	
3.1.7	External metal cladding	136	m2	350	47,509	1.30	61,762	
3.1.8	Glazed panels	81	m2	1,260	102,110	1.30	132,744	
	Bridge Deck							
3.1.9	Aluminium decking	51	m2	140	7,140		7,140	
3.1.10	Toughened laminated glass panels (openable) with PVB interlayer	21	m2	1,575	33,075	1.30	42,998	
3.1.11	External metal cladding, to ends (rate allows for internal and external finish)	41	m2	700	28,700	1.30	37,310	
4.1	**Roof**							147,931
	Liftshaft							
4.1.1	Stainless steel canopy	14	m	350	4,998	1.30	6,497	
4.1.2	Extra over for insulated membrane lined LPCB gutter	21	Nr	175	3,745	1.30	4,869	
4.1.3	Stainless steel over lift door at platform level	2	Nr	15,000	30,000	1.30	39,000	
	Staircase							
4.1.4	Stainless steel canopy	109	m2	350	38,150	1.30	49,595	
4.1.5	Extra over for insulated membrane lined LPCB gutter	31	m	175	5,425	1.30	7,053	
	Bridge Deck							
4.1.6	Stainless steel canopy	85	m2	350	29,750	1.30	38,675	



4.1.7	Extra over for insulated membrane lined LPCB gutter	23	m	75	1,725	1.30	2,243	
5.1	**Floor Finishes**							162,783
	Staircase							
5.1.1	Mid landing - Coloured non-slip finish	10	m2	150	1,500	1.30	1,950	
5.1.2	Tactile pavings at foot of stairs, 2m x 2m	8	m2	200	1,600	1.30	2,080	
5.1.3	Tactile surface at head of stairs, 3m x 2m	12	m2	200	2,400	1.30	3,120	
5.1.4	Treads & risers; metal step, 2000mm wide, 300m going	66	Nr	300	19,800	1.30	25,740	
5.1.5	Extra over for applied finish	66	Nr	75	4,950	1.30	6,435	
5.1.6	Extra over for 1800mm long AATI nosings to top / landing steps	4	Nr	1,550	6,200	1.30	8,060	
5.1.7	Extra over for 1800mm long AATI nosings to intermediate steps	62	Nr	950	58,900	1.30	76,570	
5.1.8	Nylon coated handrails, double rail to stairs	56	m	400	22,368	1.30	29,078	
	Bridge Deck							
5.1.9	Bridge Deck - Coloured non-slip finish	50	m2	150	7,500	1.30	9,750	
7.1	**Signage**							32,500
7.1.1	Network Rail logo	2	Nr	7,500	15,000	1.30	19,500	
7.1.2	Platform numbering	2	Nr	5,000	10,000	1.30	13,000	
8.1	**Mechanical & Electrical Services**							952,575
	Electrical Installations							
	Electrical mains and sub-mains distribution	177	m2					
8.1.1	Power installations	177	m2	200	35,400	1.30	46,020	
8.1.2	Lighting installations	177	m2	350	61,950	1.30	80,535	
	Specialist Lighting installations							
	Local electricity generation systems							
8.1.3	Earthing and bonding systems	177	m2	100	17,700	1.30	23,010	
8.1.4	16 person through lift	2	Nr	220,000	440,000	1.30	572,000	
8.1.5	Lift Motor Room	1	Nr	160,000	160,000	1.30	208,000	



	Fire Fighting Systems							
8.1.6	Lighting Protection	177	m2	100	17,700	1.30	23,010	
9.1	**Drainage**							
	Staircase							13,455
9.1.1	Linear drainage channel	27	m	250	6,750	1.30	8,775	
9.1.2	Aluminium rainwater down pipe	18	m	200	3,600	1.30	4,680	
10.1	**Overhead, Profit & Preliminaries**							519,076
10.1.1	Main Contractors Preliminaries	15	%	1,635,130	245,269	1.30	318,850	
10.1.2	Main Contractors Overheads & Profit	5	%	1,880,399	94,020	1.30	122,226	
10.1.3	Extra over for specialist crane hire	1	Item	60,000	60,000	1.30	78,000	
	Extra over for NwR Possession Staff - Excluded; assumed works to be undertaken as part of rail wider possession		Excl					
	TOTAL Design 4 - AVA Covered						**2,642,603**	**2,642,603**

E.2.5 700-series

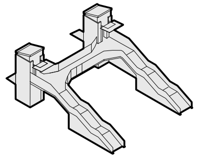
Code	Description	Quantity	UOM	Rate	SubTotal	Inflation Uplift	Total	Sub Totals
	DESIGN 5 - SERIES 700 OPEN							
	The following measure is based on straight stair flights with flat deck utilising the design for the trestle support system.							
1.1	**Foundations**							33,097
1.1.1	Pad Foundations to Lift Shaft (1.5 x 1.5 x 1.0m)	8	Nr	1,050	8,400	1.22	10,259	
1.1.2	Strip Foundation to stair support (3.0 x 1.0 x 1.0m)	6	Nr	1,400	8,400	1.22	10,259	
1.1.3	Strip Foundation to base of staircase (3.0 x 1.5 x 1.5m)	2	Nr	2,350	4,700	1.22	5,740	
1.1.4	Strip Foundation to deck support (3.0 x 1.0 x 1.0m)	4	Nr	1,400	5,600	1.22	6,839	
2.1	**Structure: Staircase**							381,407
	Staircase							
	Supports (Drawings 428 & 411):							
2.1.1	Base support - 250 x 150 x 12.5 RHS	0	t	3,000	576	1.22	703	
2.1.2	2 leg Type 5 support - 250 x 100 x 10 RHS	0	t	3,000	993	1.22	1,213	
2.1.3	2 leg Type 3 support - 250 x 150 x 12.5 RHS	1	t	3,000	2,973	1.22	3,631	
2.1.4	2 leg Type 3 support - 150 x 150 x 12.5 SHS	0	t	3,000	705	1.22	861	
2.1.5	Baseplates	6	nr	350	2,100	1.22	2,565	
2.1.6	Headplate	6	nr	500	3,000	1.22	3,664	
	Flight 1 staircase (Drawing 428)							
2.1.7	Strings - 250 x 150 x 12.5 RHS	1	t	3,000	3,279	1.22	4,005	
2.1.8	Strings - 150 x 75 x 10 RSA	0	t	3,000	816	1.22	997	
2.1.9	Plate kicker - 60 x 6mm plate	16	m2	110	1,760	1.22	2,149	
2.1.10	Treads - 8mm thick plate	17	m2	110	1,923	1.22	2,348	
2.1.11	Mid landing - 8mm thick top plate	7	m2	110	759	1.22	927	
2.1.12	Stiffeners to underside of deck - 75 x 10mm	2	m2	160	320	1.22	391	
2.1.13	Balustrade - 100 x 65 x 5 RHS post	0	t	3,000	1,032	1.22	1,260	

2.1.14	Balustrade - Plate & stiffener to 100 x 65 x 5 RHS post	20	nr	1,000	20,000	1.22	24,426
2.1.15	Balustrade - 100 x 65 x 5 RHS top rail	0	t	3,000	636	1.22	777
2.1.16	Balustrade Panel - 40 x 12 flat bottom bar	16	m2	220	3,520	1.22	4,299
2.1.17	Balustrade Panel - 26.9 x 3.2 CHS vertical bars	0	t	4,500	1,512	1.22	1,847
2.1.18	Balustrade Panel - 40 x 12 flat top bar	16	m2	220	3,520	1.22	4,299
2.1.19	Flight 2 & 3 staircase (Drawing 424)						
2.1.20	Strings - 250 x 150 x 12.5 RHS	5	t	3,000	14,343	1.22	17,517
2.1.21	Strings - 150 x 75 x 10 RSA	1	t	3,000	3,570	1.22	4,360
2.1.22	Plate kicker - 60 x 6mm plate	70	m2	110	7,700	1.22	9,404
2.1.23	Support Stiffener - 152 x 152 x 25 UC	0	t	2,750	316	1.22	386
2.1.24	Treads - 8mm thick plate	31	m2	110	3,365	1.22	4,110
2.1.25	Mid landing - 8mm thick top plate	32	m2	110	3,542	1.22	4,326
2.1.26	Stiffeners to underside of deck - 75 x 10mm	3	m2	160	480	1.22	586
2.1.27	Balustrade - 100 x 65 x 5 RHS post	1	t	3,000	1,650	1.22	2,015
2.1.28	Balustrade - Plate & stiffener to 100 x 65 x 5 RHS post	32	nr	1,000	32,000	1.22	39,082
2.1.29	Balustrade - 100 x 65 x 5 RHS top rail	1	t	3,000	2,772	1.22	3,385
2.1.30	Balustrade Panel - 40 x 12 flat bottom bar	70	m2	220	15,400	1.22	18,808
2.1.31	Balustrade Panel - 26.9 x 3.2 CHS vertical bars	1	t	4,500	3,024	1.22	3,693
2.1.32	Balustrade Panel - 40 x 12 flat top bar	70	m2	220	15,400	1.22	18,808
	Bridge Deck Slab						
	Supports (Drawing & 411):						
2.1.33	2 leg Type 2 support - 250 x 150 x 12.5 RHS	3	t	3,000	8,115	1.22	9,911
2.1.34	2 leg Type 2 support - 150 x 150 x 12.5 SHS	0	t	3,000	1,410	1.22	1,722
2.1.35	2 leg Type 2 support - 150 x 100 x 8 RHS cross bracing	0	t	3,000	906	1.22	1,106
2.1.36	Baseplates	8	nr	350	2,800	1.22	3,420
2.1.37	Headplate	8	nr	500	4,000	1.22	4,885
2.1.38	Deck (Drawing 430) - 23m long						

2.1.39	Walking surface of bridge deck - 10mm thick plate	51	m2	160	8,160	1.22	9,966	
2.1.40	Stiffeners to underside of deck - 75 x 10mm	6	m2	160	960	1.22	1,172	
2.1.41	U' Frame to deck and side panels - 20mm thick plate	77	m2	370	28,490	1.22	34,795	
2.1.42	Side panels to bridge deck - 10mm thick plate	79	m2	160	12,640	1.22	15,437	
2.1.43	Extra over for painted finishes to plate deck	158	m2	35	5,530	1.22	6,754	
2.1.44	Top rail - 150 x 150 x 12.5 SHS	3	t	3,000	10,332	1.22	12,618	
	Liftshaft							
2.1.45	254 x 254 x 89 UC	8	t	2,750	21,780	1.31	28,532	
2.1.46	305 x 102 x 25 UB	2	t	2,750	5,060	1.31	6,629	
2.1.47	100 x 100 x 6.3 SHS	2	t	3,000	6,300	1.31	8,253	
2.1.48	**Fittings**							
2.1.49	Allowance for Splices	5	%	269,469	13,473	1.22	16,455	
2.1.50	Allowance for Fittings	10	%	269,469	26,947	1.22	32,910	
3.1	**Cladding**							231,715
	Staircase							
	Metal balustrade side panels measured above under structure							
	Bridge Deck							
	Metal plate side panels measured above under structure							
	Lift Shaft							
3.1.1	Internal metal lining	293	m2	200	58,528	1.31	76,672	
3.1.2	External facing brickwork	293	m2	350	102,424	1.31	134,175	
3.1.3	Pilkington Profilin backlit frosted glazing	35	m2	450	15,930	1.31	20,868	
4.1	**Roof**							90,888
4.1.1	Lift Shaft	16	m2	350	5,460	1.31	7,153	
4.1.2	Extra over for Kingspan insulated membrane lined LPCB gutter	22	m	175	3,920	1.31	5,135	
4.1.3	Glass canopy over lift door at platform level	2	Nr	15,000	30,000	1.31	39,300	

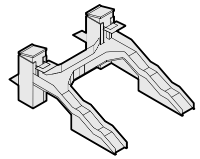
4.1.4	Glass canopy over lift door at deck level	2	Nr	15,000	30,000	1.31	39,300	
5.1	**Floor Finishes**							143,887
	Flight 1 staircase (Drawing 428)							
5.1.1	Mid landing - Coloured non-slip finish	7	m2	150	1,035	1.22	1,264	
5.1.2	Flight 2 & 3 staircase (Drawing 424)							
5.1.3	Mid landing - Coloured non-slip finish	32	m2	150	4,830	1.22	5,899	
5.1.4	Tactile pavings at foot of stairs, 2m x 2m	8	m2	200	1,600	1.22	1,954	
5.1.5	Tactile surface at head of stairs, 3m x 2m	12	m2	200	2,400	1.22	2,931	
5.1.6	Treads & risers; metal step, 2000mm wide, 300m going	44	Nr	300	13,200	1.22	16,121	
5.1.7	Extra over for applied finish	44	Nr	75	3,300	1.22	4,030	
5.1.8	Extra over for 1800mm long AATI nosings to top / landing steps	6	Nr	1,550	9,300	1.22	11,358	
5.1.9	Extra over for 1800mm long AATI nosing to intermediate steps	6	Nr	950	5,700	1.22	6,961	
5.1.10	Flight 1 staircase (Drawing 428)							
5.1.11	Handrail - 42.4 diameter CHS handrail supported by 16 diameter bars welded to RHS post	32	m	400	12,800	1.22	15,633	
	Flight 2 & 3 staircase (Drawing 424)							
5.1.12	Handrail - 42.4 diameter CHS handrail supported by 16 diameter bars welded to RHS post	140	m	400	56,000	1.22	68,393	
	Bridge Deck							
5.1.13	Bridge Deck - Coloured non-slip finish	51	m2	150	7,650	1.22	9,343	
	Staircase							
	Bridge Deck							
7.1	**Signage**							30,533
7.1.1	Network Rail logo	2	Nr	7,500	15,000	1.22	18,320	
7.1.2	Platform numbering	2	Nr	5,000	10,000	1.22	12,213	

8.1	**Mechanical & Electrical Services**								942,263
	Electrical Installations								
	Electrical mains and sub-mains distribution	183	m2						
8.1.1	Power installations	183	m2	200	36,600	1.31	47,946		
8.1.2	Lighting installations	183	m2	350	64,050	1.31	83,906		
	Specialist Lighting installations								
	Local electricity generation systems								
8.1.3	Earthing and bonding systems	183	m2	100	18,300	1.31	23,973		
8.1.4	16 person through lift	2	Nr	210,500	421,000	1.31	551,510		
8.1.5	Lift Motor Room	1	Nr	161,035	161,035	1.31	210,956		
	Fire Fighting Systems								
8.1.16	Lighting Protection	183	m2	100	18,300	1.31	23,973		
9.10	**Drainage**								0
	Staircase								
9.1.1	Linear drainage channel		m	250	0	1.22	0		
9.1.2	Aluminium rainwater down pipe		m	200	0	1.22	0		
10.1	**Overhead, Profit & Preliminaries**								439,559
10.1.1	Main Contractors Preliminaries	15	%	1,445,351	216,803	1.22	264,781	#	
10.1.2	Main Contractors Overheads & Profit	5	%	1,662,154	83,108	1.22	101,499		
10.1.3	Extra over for specialist crane hire	1	Item	60,000	60,000	1.22	73,278		
	Extra over for NwR Possession Staff - Excluded; assumed works to be undertaken as part of rail wider possession		Excl						
	TOTAL Design 5 - SERIES 700 Open						**2,293,350**		**2,293,350**

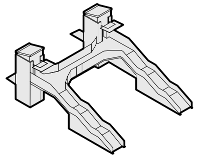


E.2.6 Beacon open

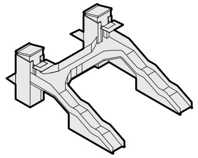
Code	Description	Quantity	UOM	Rate	SubTotal	Inflation Uplift	Total	Sub Totals
	DESIGN 6 - BEACON OPEN							
1.1	**Foundations**							20,829
1.1.1	Pad Foundations to Lift Shaft (1.5 x 1.5 x 1.0m)	8	Nr	1,050	8,400	1.31	11,004	
1.1.2	Strip Foundation to Stair Roof Support (3.0 x 1.0 x 1.0m)	2	Nr	1,400	2,800	1.31	3,668	
1.1.3	Strip Foundation to base of staircase (3.0 x 1.5 x 1.5m)	2	Nr	2,350	4,700	1.31	6,157	
2.1	**Structure**							268,232
	Staircase (Gridline A-B / 2-)							
2.1.1	400 x 200 x 8 RHS	6	t	3,000	17,130	1.31	22,440	
2.1.2	200 x 100 x 8 RHS	2	t	3,000	5,640	1.31	7,388	
2.1.3	180 x 180 x 10 SHS	2	t	3,000	6,060	1.31	7,939	
2.1.4	Top landing - 8mm thick plate	28	m2	110	3,025	1.31	3,963	
2.1.5	Mid landing - 8mm thick plate	10	m2	110	1,100	1.31	1,441	
2.1.6	Lower landing - 8mm thick plate	10	m2	110	1,100	1.31	1,441	
	Liftshaft							
2.1.7	254 x 254 x 89 UC	8	t	2,750	21,780	1.31	28,532	
2.1.8	305 x 102 x 25 UB	2	t	2,750	5,060	1.31	6,629	
2.1.9	100 x 100 x 6.3 SHS	2	t	3,000	6,300	1.31	8,253	
	Deck Slab							
2.1.10	15mm thick top plate	58	m2	210	12,235	1.31	16,027	
2.1.11	150 x 150 x 10 SHS	2	t	3,000	7,380	1.31	9,668	
2.1.12	15mm thick vertical plate	144	m2	210	30,167	1.31	39,518	
2.1.13	20mm thick bottom plate	246	m2	275	67,722	1.31	88,715	
2.1.14	Allowance for Fittings	10	%	200,598	20,060	1.31	26,278	



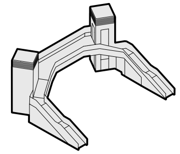
3.1	**Cladding**							500,598
	Staircase							
3.1.1	13.52mm toughened laminated glass panels (fixed) with PVB interlayer, 1500mm high	89	m2	1,260	112,644	1.31	147,564	
	Staircase, top landing							
3.1.2	13.52mm toughened laminated glass panels (fixed) with PVB interlayer, 1500mm high	17	m2	1,260	20,790	1.31	27,235	
	Lift Shaft							
3.1.3	Internal metal lining	293	m2	200	58,528	1.31	76,672	
3.1.4	External facing brickwork	293	m2	350	102,424	1.31	134,175	
3.1.5	Pilkington Profilin backlit frosted glazing	35	m2	450	15,930	1.31	20,868	
	Bridge Deck							
3.1.6	13.52mm toughened laminated glass panels with PVB interlayer, 1500mm high	39	m2	1,260	49,140	1.31	64,373	
3.1.7	13.52mm toughened laminated glass panels with PVB interlayer, 1500mm high	18	m2	1,260	22,680	1.31	29,711	
4.1	**Roof**							90,888
4.1.1	Lift Shaft	16	m2	350	5,460	1.31	7,153	
4.1.2	Extra over for Kingspan insulated membrane lined LPCB gutter	22	m	175	3,920	1.31	5,135	
4.1.3	Glass canopy over lift door at platform level	2	Nr	15,000	30,000	1.31	39,300	
4.1.4	Glass canopy over lift door at deck level	2	Nr	15,000	30,000	1.31	39,300	
5.1	**Floor Finishes**							155,594
	Staircase							
5.1.1	Tactile pavings at foot of stairs	4	m2	200	832	1.31	1,090	
5.1.2	Tactile pavings at head of stairs	4	m2	200	832	1.31	1,090	
5.1.3	Top landing - Light grey Altro finish	15	m2	100	1,509	1.31	1,977	
5.1.4	Top landing, lift waiting area - Dark grey Altro finish	8	m2	100	825	1.31	1,081	
5.1.5	Mid landing - Light grey Altro finish	10	m2	100	1,000	1.31	1,310	



5.1.6	Lower landing - Light grey Altro finish	10	m2	100	1,000	1.31	1,310	
5.1.7	Treads & risers; metal step, 2500mm wide, 300m going	58	Nr	300	17,400	1.31	22,794	
5.1.8	Extra over for applied finish	58	Nr	75	4,350	1.31	5,699	
5.1.9	Extra over for 2500mm long AATI nosings to top / landing steps	6	Nr	1,550	9,300	1.31	12,183	
5.1.10	Extra over for 2500mm long AATI nosings to intermediate steps	52	Nr	950	49,400	1.31	64,714	
5.1.11	Nylon coated handrails, double rail to stairs	60	m	400	24,000	1.31	31,440	
5.1.12	Nylon coated handrails, single rail to top landing	10	m	250	2,500	1.31	3,275	
5.1.13	Bridge Deck - Light grey Altro finish	58	m2	100	5,826	1.31	7,632	
7.1	**Signage**							32,750
7.1.1	Network Rail logo	2	Nr	7,500	15,000	1.31	19,650	
7.1.2	Platform numbering	2	Nr	5,000	10,000	1.31	13,100	
8.1	**Mechanical & Electrical Services**							
	Electrical Installations							936,545
	Electrical mains and sub-mains distribution	179	m2					
8.1.1	Power installations	179	m2	200	35,800	1.31	46,898	
8.1.2	Lighting installations	179	m2	350	62,650	1.31	82,072	
	Specialist Lighting installations							
	Local electricity generation systems							
8.1.3	Earthing and bonding systems	179	m2	100	17,900	1.31	23,449	
8.1.4	16 person through lift	2	Nr	210,500	421,000	1.31	551,510	
8.1.5	Lift Motor Room	1	Nr	159,670	159,670	1.31	209,168	
	Fire Fighting Systems							
8.1.6	Lighting Protection	179	m2	100	17,900	1.31	23,449	
9.1	**Drainage**							13,559
	Staircase							
9.1.1	Linear drainage channel	27	m	250	6,750	1.31	8,843	
9.1.2	Aluminium rainwater down pipe	18	m	200	3,600	1.31	4,716	

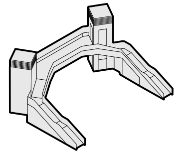


10.1	**Overhead, Profit & Preliminaries**								497,541
10.1.1	Main Contractors Preliminaries	15	%	1,541,217	231,183	1.31	302,849		
10.1.2	Main Contractors Overheads & Profit	5	%	1,772,400	88,620	1.31	116,092		
10.1.3	Extra over for specialist crane hire	1	Item	60,000	60,000	1.31	78,600		
	Extra over for NwR Possession Staff - Excluded; assumed works to be undertaken as part of rail wider possession		Excl						
	TOTAL Design 6 - BEACON Open						**2,516,536**		**2,516,536**

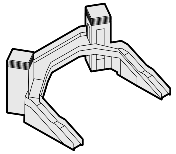


E.2.7 Ribbon open

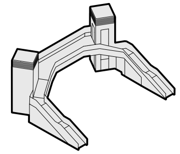
Code	Description	Quantity	UOM	Rate	SubTotal	Inflation Uplift	Total	Sub Totals
	DESIGN 7 - RIBBON OPEN							
1.1	**Foundations**							25,021
1.1.1	Pad Foundations to Lift Shaft (1.5 x 1.5 x 1.0m)	8	Nr	1,050	8,400	1.31	11,004	
1.1.2	Strip Foundation to Stair Roof Support (3.0 x 1.0 x 1.0m)	12	Nr	500	6,000	1.31	7,860	
1.1.3	Strip Foundation to base of staircase (3.0 x 1.5 x 1.5m)	2	Nr	2,350	4,700	1.31	6,157	
1.1.4	Structure; based on stair having 1600mm clear width & deck having 3200mm clear width							
2.1	**Structure**							
	Staircase							148,460
2.1.1	Support columns, taken as 150kg/m, 6 Nr per stair	5	t	3,000	13,500	1.31	17,685	
2.1.2	Stringers, taken as 100kg/m	8	t	3,000	24,480	1.31	32,069	
2.1.3	Stiffener to stair riser; 15mm thick vertical plate	56	m2	210	11,693	1.31	15,318	
2.1.4	Mid landing - 8mm thick plate	10	m2	110	1,100	1.31	1,441	
2.1.5	Lower landing - 8mm thick plate	10	m2	110	1,100	1.31	1,441	
	Liftshaft							
2.1.6	Corner posts; 200 x 200 x 10 SHS	5	t	3,000	14,760	1.31	19,336	
2.1.7	Horizontals; 203 UC (taken as 86kg/m)	1	t	3,000	4,140	1.31	5,423	
2.1.8	Horizontals; 150 x 100 x 8 RHS	0	t	3,000	900	1.31	1,179	
2.1.9	Diagonals; 150 x 100 x 8 RHS	1	t	3,000	3,060	1.31	4,009	
2.1.10	Diagonals; 150 x 90 x 15 angle	1	t	3,000	3,600	1.31	4,716	
2.1.11	Cantilever beam 1	1	t	3,000	2,550	1.31	3,341	
2.1.12	Cantilever beam 2	1	t	3,000	2,550	1.31	3,341	
2.1.13	Cantilever beam 3	0	t	3,000	1,050	1.31	1,376	
	Deck Slab							
2.1.12	10mm thick top plate	66	m2	210	13,885	1.31	18,190	



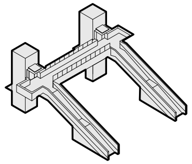
2.1.13	Deck stiffeners; 15mm thick vertical plate at 725mm centres	22	t	210	4,658	1.31	6,102	
2.1.14	Allowance for Fittings	10	%	103,026	10,303	1.31	13,496	
3.1	**Cladding**							
	Staircase							494,998
3.1.1	13.52mm toughened laminated glass panels (fixed), 1150mm high maximum	88	m2	1,260	110,691	1.31	145,005	
3.1.2	10mm thick top plate	168	m2	210	35,280	1.31	46,217	
	Lift Shaft							
3.1.3	Internal metal lining	242	m2	200	48,360	1.31	63,352	
3.1.4	Cladding type A, assumed to be Alucobond metal panel	242	m2	350	84,630	1.31	110,865	
3.1.5	Louvres	12	m2	400	4,960	1.31	6,498	
3.1.6	Pilkington Profilin backlit frosted glazing	35	m2	450	15,930	1.31	20,868	
	Bridge Deck							
3.1.7	15mm thick plate	62	m2	210	13,016	1.31	17,051	
3.1.8	Parapet stiffeners; 15mm thick vertical plate at 725mm centres	14	m2	210	2,911	1.31	3,813	
3.1.9	15mm thick top plate; painted in highlight colour	21	m2	210	4,339	1.31	5,684	
3.1.10	20mm thick top plate; bent "balustrade"	21	m2	275	5,682	1.31	7,443	
3.1.11	13.52mm toughened laminated glass panels, 1000mm high	41	m2	1,260	52,063	1.31	68,203	
4.1	**Roof**							14,076
4.1.1	Lift Shaft	16	m2	350	5,460	1.31	7,153	
4.1.1	Extra over for Kingspan insulated membrane lined LPCB gutter	22	m	175	3,920	1.31	5,135	
4.1.2	Glass canopy over lift door at platform level		Nr	15,000				
4.1.3	Glass canopy over lift door at deck level		Nr	15,000				
4.1.4	Standing seam metal roof to rear elevation of lift shaft	4	m2	350	1,365	1.31	1,788	



5.1	**Floor Finishes**							159,139
	Staircase							
5.1.1	Tactile pavings at foot of stairs	4	m2	200	832	1.31	1,090	
5.1.2	Tactile pavings at head of stairs		m2	200				
5.1.3	**Staircase**							
5.1.4	Mid, turn landing - Applied finish	10	m2	100	1,000	1.31	1,310	
5.1.5	Lower landing - Applied finish	10	m2	100	1,000	1.31	1,310	
5.1.6	Treads & risers; metal step, 2500mm wide, 300m going	58	Nr	300	17,400	1.31	22,794	
5.1.7	Extra over for applied finish	58	Nr	75	4,350	1.31	5,699	
5.1.8	Extra over for 2500mm long AATI nosings to top / landing steps	6	Nr	1,550	9,300	1.31	12,183	
5.1.9	Extra over for 2500mm long AATI nosings to intermediate steps	52	Nr	950	49,400	1.31	64,714	
5.1.10	Nylon coated handrails, double rail to stairs	80	m	400	32,000	1.31	41,920	
5.1.11	Bridge Deck - Applied finish	62	m2	100	6,198	1.31	8,119	
7.1	**Signage**							32,750
7.1.1	Network Rail logo	2	Nr	7,500	15,000	1.31	19,650	
7.1.2	Platform numbering	2	Nr	5,000	10,000	1.31	13,100	
8.1	**Mechanical & Electrical Services**							942,263
	Electrical Installations							
	Electrical mains and sub-mains distribution	183	m2					
8.1.1	Power installations	183	m2	200	36,600	1.31	47,946	
8.1.2	Lighting installations	183	m2	350	64,050	1.31	83,906	
	Specialist Lighting installations							
	Local electricity generation systems							
8.1.3	Earthing and bonding systems	183	m2	100	18,300	1.31	23,973	
8.1.4	16 person through lift	2	Nr	210,500	421,000	1.31	551,510	
8.1.5	Lift Motor Room	1	Nr	161,035	161,035	1.31	210,956	
	Fire Fighting Systems							
8.1.6	Lighting Protection	183	m2	100	18,300	1.31	23,973	

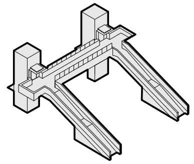


9.1	**Drainage**							
	Staircase							13,559
9.1.1	Linear drainage channel	27	m	250	6,750	1.31	8,843	
9.1.2	Aluminium rainwater down pipe	18	m	200	3,600	1.31	4,716	
10.1	**Overhead, Profit & Preliminaries**							458,380
10.1.1	Main Contractors Preliminaries	15	%	1,397,149	209,572	1.31	274,540	
10.1.2	Main Contractors Overheads & Profit	5	%	1,606,721	80,336	1.31	105,240	
10.1.3	Extra over for specialist crane hire	1	Item	60,000	60,000	1.31	78,600	
	Extra over for NwR Possession Staff - Excluded; assumed works to be undertaken as part of rail wider possession		Excl					
	TOTAL Design 7 - RIBBON Open						**2,288,645**	**2,288,645**

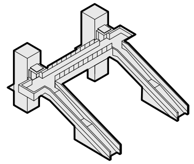


E.2.8 Frame open

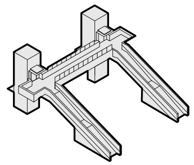
Code	Description	Quantity	UOM	Rate	SubTotal	Inflation Uplift	Total	Sub Totals
	DESIGN 8 - FRAME OPEN							
1.1	**Foundations**							20,670
1.1.1	Pad Foundations to Lift Shaft (1.5 x 1.5 x 1.0m)	8	Nr	1,050	8,400	1.30	10,920	
1.1.2	Strip Foundation to Stair Roof Support (3.0 x 1.0 x 1.0m)	2	Nr	1,400	2,800	1.30	3,640	
1.1.3	Strip Foundation to base of staircase (3.0 x 1.5 x 1.5m)	2	Nr	2,350	4,700	1.30	6,110	
2.1	**Structure**							193,670
	Staircase							
2.1.1	152 x 152 x 23 UC	0	t	2,750	715	1.30	930	
2.1.2	830 x 200 x 200 x 20 x 20 x 10 PFC	96	m2	305	29,356	1.30	38,163	
2.1.3	Mid landing - 8mm thick top plate	8	m2	110	880	1.30	1,144	
2.1.4	Underside of staircase - 8mm thick top plate	28	m2	110	3,080	1.30	4,004	
	Liftshaft							
2.1.5	254 x 254 x 73 UC	5	t	2,750	14,960	1.30	19,448	
2.1.6	457 x 152 x 74 UB	2	t	2,750	4,345	1.30	5,649	
2.1.7	152 x 152 x 37 UC	2	t	2,750	6,215	1.30	8,080	
2.1.8	100 x 100 x 8 SHS	2	t	3,000	7,110	1.30	9,243	
	Bridge Deck Slab							
2.1.9	203 x 203 x 46 UC	4	t	2,750	11,083	1.30	14,407	
2.1.10	200 x 75 x 23 PFC	0	t	2,750	330	1.30	429	
2.1.11	890 x 300 x 50 x 10 FB	153	m2	250	38,220	1.30	49,686	
2.1.12	Walking surface of bridge deck - 8mm thick plate	87	m2	110	9,570	1.30	12,441	
2.1.13	Underside of bridge deck - 8mm thick plate	87	m2	110	9,570	1.30	12,441	
2.1.14	**Fittings**							
2.1.15	Allowance for Fittings	10	%	135,434	13,543	1.30	17,606	



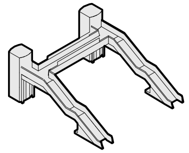
	Staircase							
3.1.1	Metal grillage	134	m2	850	113,764	1.30	147,893	
3.1.2	Metal stringer to sides of staircase	45	m2	350	15,670	1.30	20,370	
	Lift Shaft							
3.1.3	Internal metal lining	103	m2	200	20,666	1.30	26,866	
3.1.4	External metal cladding	136	m2	350	47,509	1.30	61,762	
3.1.5	Glazed panels	81	m2	1,260	102,110	1.30	132,744	
	Bridge Deck							
3.1.6	Toughened laminated glass panels (openable) with PVB interlayer	129	m2	1,575	202,514	1.30	263,268	
5.3.7	Metal grillage; 1.8m high		m2	850		1.30		
5.3.8	Nylon coated handrails, single rail to bridge deck level	67	m2	250	16,705	1.30	21,717	
5.3.9	Metal upstand edging to base of glazed cladding	22	m2	350	7,812	1.30	10,156	
5.3.10	Metal sloping upstand edging to external face of glazed cladding	52	m2	350	18,267	1.30	23,746	
4.10	**Roof**							50,366
	Liftshaft							
4.1.1	Insulated sloping roof panel with standing seam, fixed with purlins to structural frame	14	m	350	4,998	1.30	6,497	
4.1.2	Extra over for insulated membrane lined LPCB gutter	21	Nr	175	3,745	1.30	4,869	
4.1.3	Solid canopy over lift door at platform level	2	Nr	15,000	30,000	1.30	39,000	
5.1	**Floor Finishes**							169,998
	Staircase							
5.1.1	Mid landing - Coloured non-slip finish	10	m2	150	1,500	1.30	1,950	
5.1.2	Tactile pavings at foot of stairs, 2m x 2m	8	m2	200	1,600	1.30	2,080	
5.1.3	Tactile surface at head of stairs, 3m x 2m	12	m2	200	2,400	1.30	3,120	
5.1.4	Treads & risers; metal step, 2000mm wide, 300m going	66	Nr	300	19,800	1.30	25,740	



5.1.5	Extra over for applied finish	66	Nr	75	4,950	1.30	6,435	
5.1.6	Extra over for 1800mm long AATI nosings to top / landing steps	4	Nr	1,550	6,200	1.30	8,060	
5.1.7	Extra over for 1800mm long AATI nosings to intermediate steps	62	Nr	950	58,900	1.30	76,570	
5.1.8	Nylon coated handrails, double rail to stairs	56	m	400	22,368	1.30	29,078	
	Bridge Deck							
5.1.9	Bridge Deck - Coloured non-slip finish	87	m2	150	13,050	1.30	16,965	
7.1	**Signage**							32,500
7.1.1	Network Rail logo	2	Nr	7,500	15,000	1.30	19,500	
7.1.2	Platform numbering	2	Nr	5,000	10,000	1.30	13,000	
8.1	**Mechanical & Electrical Services**							943,469
	Electrical Installations							
	Electrical mains and sub-mains distribution	168	m2					
8.1.1	Power installations	168	m2	200	33,532	1.30	43,592	
8.1.2	Lighting installations	168	m2	350	58,681	1.30	76,285	
	Specialist Lighting installations							
	Local electricity generation systems							
8.1.3	Earthing and bonding systems	168	m2	100	16,766	1.30	21,796	
8.1.4	16 person through lift	2	Nr	220,000	440,000	1.30	572,000	
8.1.5	Lift Motor Room	1	Nr	160,000	160,000	1.30	208,000	
	Fire Fighting Systems							
8.1.6	Lighting Protection	168	m2	100	16,766	1.30	21,796	
9.1	**Drainage**							13,767
	Staircase							
9.1.1	Linear drainage channel	28	m	250	6,990	1.30	9,087	
9.1.2	Aluminium rainwater down pipe	18	m	200	3,600	1.30	4,680	
10.1	**Overhead, Profit & Preliminaries**							
10.1.1	Main Contractors Preliminaries	15	%	1,640,739	246,111	1.30	319,944	520,589
10.1.2	Main Contractors Overheads & Profit	5	%	1,886,850	94,342	1.30	122,645	

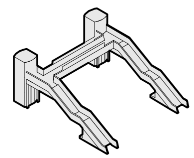


10.1.3	Extra over for specialist crane hire	1	Item	60,000	60,000	1.30	78,000	
	Extra over for NwR Possession Staff - Excluded; assumed works to be undertaken as part of rail wider possession		Excl					
	TOTAL Design 8 - FRAME Open						**2,653,550**	**2,653,550**

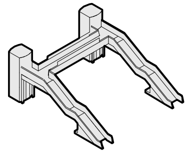


F.2.9 AVA open

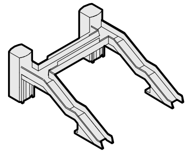
Code	Description	Quantity	UOM	Rate	SubTotal	Inflation Uplift	Total	Sub Total
	DESIGN 9 - AVA OPEN							
1.1	**Foundations**							20,670
1.1.1	Pad Foundations to Lift Shaft (1.5 x 1.5 x 1.0m)	8	Nr	1,050	8,400	1.30	10,920	
1.1.2	Strip Foundation to Stair Roof Support (3.0 x 1.0 x 1.0m)	2	Nr	1,400	2,800	1.30	3,640	
1.1.3	Strip Foundation to base of staircase (3.0 x 1.5 x 1.5m)	2	Nr	2,350	4,700	1.30	6,110	
2.1	**Structure**							166,105
	Staircase							
2.1.1	300 x 300 x 12 SHS	4	t	3,000	10,671	1.30	13,872	
2.1.2	300 x 225 x 12 RHS	1	t	2,750	3,685	1.30	4,791	
2.1.3	200 X 200 X 8 SHS	0	t	3,000	1,212	1.30	1,576	
2.1.4	B1 8mm thick	1	t	3,000	2,070	1.30	2,691	
2.1.5	B2 8mm thick	1	t	3,000	2,310	1.30	3,003	
2.1.6	B3 8mm thick	1	t	3,000	3,090	1.30	4,017	
2.1.7	B4	0	t	2,750	550	1.30	715	
2.1.8	B6	0	t	2,750	635	1.30	826	
2.1.9	B7 Assumption 8mm thickness	0	t	3,000	240	1.30	312	
2.1.10	B8 10mm thick	0	t	3,000	630	1.30	819	
2.1.11	B9 Assumption 8mm thick	0	t	3,000	240	1.30	312	
2.1.12	B10 Assumption 8mm thick	0	t	3,000	90	1.30	117	
2.1.13	B11 10mm thick	0	t	3,000	1,230	1.30	1,599	
2.1.14	B12 10mm thick	0	t	3,000	630	1.30	819	
2.1.15	B13 10mm thick	0	t	3,000	1,200	1.30	1,560	
2.1.16	BR1 8mm thick	1	t	3,000	3,300	1.30	4,290	
2.1.17	Stair beams	1	t	3,000	3,000	1.30	3,900	



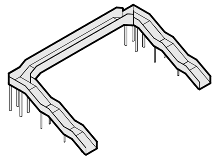
2.1.18	1139 DEEP C-BEAM	3 t	3,000	7,980	1.30	10,374	
2.1.19	988 DEEP C-BEAM	5 t	3,000	16,170	1.30	21,021	
2.1.20	972 DEEP C-BEAM	0 t	3,000	960	1.30	1,248	
	Liftshaft						
2.1.21	254 x 254 x 73 UC	5 t	2,750	14,960	1.30	19,448	
2.1.22	457 x 152 x 74 UB	2 t	2,750	4,345	1.30	5,649	
2.1.23	152 x 152 x 37 UC	2 t	2,750	6,215	1.30	8,080	
2.1.24	100 x 100 x 8 SHS	2 t	3,000	7,110	1.30	9,243	
	Bridge Deck						
2.1.25	B1	2 t	3,000	6,180	1.30	8,034	
2.1.26	B4	1 t	2,750	1,623	1.30	2,109	
2.1.27	B5	0 t	2,750	358	1.30	465	
2.1.28	BR1	1 t	3,000	1,830	1.30	2,379	
2.1.29	B14	0 t	3,000	174	1.30	226	
2.1.30	B13	0 t	3,000	240	1.30	312	
2.1.31	1139 DEEP C-BEAM	4 t	3,000	13,230	1.30	17,199	
	Fittings						
2.1.32	Allowance for Fittings	10 %	116,157	11,616	1.30	15,100	
3.1	**Cladding**						528,834
	Staircase						
3.1.1	Toughened laminated glass panels (fixed) with PVB interlayer	134 m2	850	113,764	1.30	147,893	
3.1.2	Metal stringer to sides of staircase	43 m2	350	14,991	1.30	19,488	
3.1.3	Metal entrance portal; outside face	18 m2	350	6,244	1.30	8,117	
3.1.4	Metal entrance portal; inner face	18 m2	350	6,244	1.30	8,117	
3.1.5	Nylon coated handrails, double rail to bridge stairs	112 m2	250	28,000	1.30	36,400	
	Lift Shaft						
3.1.6	Internal metal lining	103 m2	200	20,666	1.30	26,866	
3.1.7	External metal cladding	136 m2	350	47,509	1.30	61,762	
3.1.8	Glazed panels	81 m2	1,260	102,110	1.30	132,744	



	Bridge Deck							
3.1.9	Aluminium decking	51	m2	140	7,140		7,140	
3.1.10	Toughened laminated glass panels (openable) with PVB interlayer	21	m2	1,575	33,075	1.30	42,998	
3.1.11	External metal cladding, to ends (rate allows for internal and external finish)	41	m2	700	28,700	1.30	37,310	
4.1	**Roof**							
	Lift Shaft							50,366
4.1.1	Stainless steel canopy	14	m	350	4,998	1.30	6,497	
4.1.2	Extra over for insulated membrane lined LPCB gutter	21	Nr	175	3,745	1.30	4,869	
4.1.3	Stainless steel over lift door at platform level	2	Nr	15,000	30,000	1.30	39,000	
5.10	**Floor Finishes**							162,783
	Staircase							
5.1.1	Mid landing - Coloured non-slip finish	10	m2	150	1,500	1.30	1,950	
5.1.2	Tactile pavings at foot of stairs, 2m x 2m	8	m2	200	1,600	1.30	2,080	
5.1.3	Tactile surface at head of stairs, 3m x 2m	12	m2	200	2,400	1.30	3,120	
5.1.4	Treads & risers; metal step, 2000mm wide, 300m going	66	Nr	300	19,800	1.30	25,740	
5.1.5	Extra over for applied finish	66	Nr	75	4,950	1.30	6,435	
5.1.6	Extra over for 1800mm long AATI nosings to top / landing steps	4	Nr	1,550	6,200	1.30	8,060	
5.1.7	Extra over for 1800mm long AATI nosings to intermediate steps	62	Nr	950	58,900	1.30	76,570	
5.1.8	Nylon coated handrails, double rail to stairs	56	m	400	22,368	1.30	29,078	
	Bridge Deck							
5.1.9	Bridge Deck - Coloured non-slip finish	50	m2	150	7,500	1.30	9,750	
7.1	**Signage**							32,500
7.1.1	Network Rail logo	2	Nr	7,500	15,000	1.30	19,500	
7.1.2	Platform numbering	2	Nr	5,000	10,000	1.30	13,000	

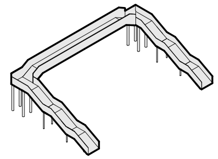


8.1	**Mechanical & Electrical Services**							952,575
	Electrical Installations							
	Electrical mains and sub-mains distribution	177	m2					
8.1.1	Power installations	177	m2	200	35,400	1.30	46,020	
8.1.2	Lighting installations	177	m2	350	61,950	1.30	80,535	
	Specialist Lighting installations							
	Local electricity generation systems							
8.1.3	Earthing and bonding systems	177	m2	100	17,700	1.30	23,010	
8.1.4	16 person through lift	2	Nr	220,000	440,000	1.30	572,000	
8.1.5	Lift Motor Room	1	Nr	160,000	160,000	1.30	208,000	
	Fire Fighting Systems							
8.1.6	Lighting Protection	177	m2	100	17,700	1.30	23,010	
9.1	**Drainage**							13,455
	Staircase							
9.1.1	Linear drainage channel	27	m	250	6,750	1.30	8,775	
9.1.2	Aluminium rainwater down pipe	18	m	200	3,600	1.30	4,680	
10.1	**Overhead, Profit & Preliminaries**							478,357
10.1.1	Main Contractors Preliminaries	15	%	1,484,177	222,627	1.30	289,414	
10.1.2	Main Contractors Overheads & Profit	5	%	1,706,803	85,340	1.30	110,942	
10.1.3	Extra over for specialist crane hire	1	Item	60,000	60,000	1.30	78,000	
	Extra over for NwR Possession Staff - Excluded; assumed works to be undertaken as part of rail wider possession		Excl					
	TOTAL Design 9 - AVA Open						**2,405,645**	**2,405,645**

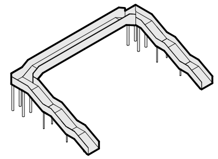


E.2.10 400-series

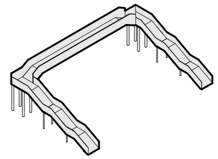
Code	Description	Quantity	UOM	Rate	SubTotal	Inflation Uplift	Total	Sub Total
	DESIGN 10 - SERIES 400 OPEN							
	Design Option						0	
	The following measure is based on straight stair flights with flat deck utilising the design for the trestle support system.							
1.1	**Foundations**							22,838
1.1.1	Strip Foundation to stair support (3.0 x 1.0 x 1.0m)	6	Nr	1,400	8,400	1.22	10,259	
1.1.2	Strip Foundation to base of staircase (3.0 x 1.5 x 1.5m)	2	Nr	2,350	4,700	1.22	5,740	
1.1.3	Strip Foundation to deck support (3.0 x 1.0 x 1.0m)	4	Nr	1,400	5,600	1.22	6,839	
2.1	**Structure: Staircase**							331,923
	Supports (Drawings 428 & 411):							
2.1.1	Base support - 250 x 150 x 12.5 RHS	0	t	3,000	576	1.22	703	
2.1.2	2 leg Type 5 support - 250 x 100 x 10 RHS	0	t	3,000	993	1.22	1,213	
2.1.3	2 leg Type 3 support - 250 x 150 x 12.5 RHS	1	t	3,000	2,973	1.22	3,631	
2.1.4	2 leg Type 3 support - 150 x 150 x 12.5 SHS	0	t	3,000	705	1.22	861	
2.1.5	Baseplates	6	nr	350	2,100	1.22	2,565	
2.1.6	Headplate	6	nr	500	3,000	1.22	3,664	
	Flight 1 staircase (Drawing 428)							
2.1.7	Strings - 250 x 150 x 12.5 RHS	1	t	3,000	3,279	1.22	4,005	
2.1.8	Strings - 150 x 75 x 10 RSA	0	t	3,000	816	1.22	997	
2.1.9	Plate kicker - 60 x 6mm plate	16	m2	110	1,760	1.22	2,149	
2.1.10	Treads - 8mm thick plate	17	m2	110	1,923	1.22	2,348	
2.1.11	Mid landing - 8mm thick top plate	7	m2	110	759	1.22	927	
2.1.12	Stiffeners to underside of deck - 75 x 10mm	2	m2	160	320	1.22	391	
2.1.13	Balustrade - 100 x 65 x 5 RHS post	0	t	3,000	1,032	1.22	1,260	



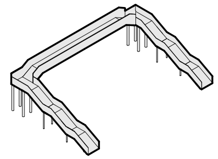
2.1.14	Balustrade - Plate & stiffener to 100 x 65 x 5 RHS post	20	nr	1,000	20,000	1.22	24,426
2.1.15	Balustrade - 100 x 65 x 5 RHS top rail	0	t	3,000	636	1.22	777
2.1.16	Balustrade Panel - 40 x 12 flat bottom bar	16	m2	220	3,520	1.22	4,299
2.1.17	Balustrade Panel - 26.9 x 3.2 CHS vertical bars	0	t	4,500	1,512	1.22	1,847
2.1.18	Balustrade Panel - 40 x 12 flat top bar	16	m2	220	3,520	1.22	4,299
	Flight 2 & 3 staircase (Drawing 424)						
2.1.19	Strings - 250 x 150 x 12.5 RHS	5	t	3,000	14,343	1.22	17,517
2.1.20	Strings - 150 x 75 x 10 RSA	1	t	3,000	3,570	1.22	4,360
2.1.21	Plate kicker - 60 x 6mm plate	70	m2	110	7,700	1.22	9,404
2.1.22	Support Stiffener - 152 x 152 x 25 UC	0	t	2,750	316	1.22	386
2.1.23	Treads - 8mm thick plate	31	m2	110	3,365	1.22	4,110
2.1.24	Mid landing - 8mm thick top plate	32	m2	110	3,542	1.22	4,326
2.1.25	Stiffeners to underside of deck - 75 x 10mm	3	m2	160	480	1.22	586
2.1.26	Balustrade - 100 x 65 x 5 RHS post	1	t	3,000	1,650	1.22	2,015
2.1.27	Balustrade - Plate & stiffener to 100 x 65 x 5 RHS post	32	nr	1,000	32,000	1.22	39,082
2.1.28	Balustrade - 100 x 65 x 5 RHS top rail	1	t	3,000	2,772	1.22	3,385
2.1.29	Balustrade Panel - 40 x 12 flat bottom bar	70	m2	220	15,400	1.22	18,808
2.1.30	Balustrade Panel - 26.9 x 3.2 CHS vertical bars	1	t	4,500	3,024	1.22	3,693
2.1.31	Balustrade Panel - 40 x 12 flat top bar	70	m2	220	15,400	1.22	18,808
	Structure: Bridge Deck Slab						
	Supports (Drawing & 411):						
2.1.32	2 leg Type 2 support - 250 x 150 x 12.5 RHS	3	t	3,000	8,115	1.22	9,911
2.1.33	2 leg Type 2 support - 150 x 150 x 12.5 SHS	0	t	3,000	1,410	1.22	1,722
2.1.34	2 leg Type 2 support - 150 x 100 x 8 RHS cross bracing	0	t	3,000	906	1.22	1,106
2.1.35	Baseplates	8	nr	350	2,800	1.22	3,420
2.1.36	Headplate	8	nr	500	4,000	1.22	4,885



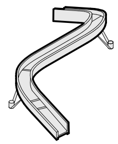
	Deck (Drawing 430) - 23m long							
2.1.37	Walking surface of bridge deck - 10mm thick plate	51	m2	160	8,160	1.22	9,966	
2.1.38	Stiffeners to underside of deck - 75 x 10mm	6	m2	160	960	1.22	1,172	
2.1.39	U' Frame to deck and side panels - 20mm thick plate	77	m2	370	28,490	1.22	34,795	
2.1.40	Side panels to bridge deck - 10mm thick plate	79	m2	160	12,640	1.22	15,437	
2.1.41	Extra over for painted finishes to plate deck	158	m2	35	5,530	1.22	6,754	
2.1.42	Top rail - 150 x 150 x 12.5 SHS	3	t	3,000	10,332	1.22	12,618	
	Structure: Fittings							
	Allowance for Splices		%	5	11,816	1.22	14,431	
	Allowance for Fittings		%	10	23,633	1.22	28,863	
3.1	**Cladding**							
	Cladding: Staircase							
	Metal balustrade side panels measured above under structure							
	Cladding: Bridge Deck							
	Metal plate side panels measured above under structure							
	Floor Finishes: Staircase							
	Flight 1 staircase (Drawing 428)							143,887
3.1.1	Mid landing - Coloured non-slip finish	7	m2	150	1,035	1.22	1,264	
	Flight 2 & 3 staircase (Drawing 424)							
3.1.2	Mid landing - Coloured non-slip finish	32	m2	150	4,830	1.22	5,899	
3.1.3	Tactile pavings at foot of stairs, 2m x 2m	8	m2	200	1,600	1.22	1,954	
3.1.4	Tactile surface at head of stairs, 3m x 2m	12	m2	200	2,400	1.22	2,931	
3.1.5	Treads & risers; metal step, 2000mm wide, 300m going	44	Nr	300	13,200	1.22	16,121	
3.1.6	Extra over for applied finish	44	Nr	75	3,300	1.22	4,030	
3.1.7	Extra over for 1800mm long AATI nosings to top / landing steps	6	Nr	1,550	9,300	1.22	11,358	



3.1.8	Extra over for 1800mm long AATI nosings to intermediate steps	6	Nr	950	5,700	1.22	6,961	
	Flight 1 staircase (Drawing 428)							
3.1.9	Handrail - 42.4 diameter CHS handrail supported by 16 diameter bars welded to RHS post	32	m	400	12,800	1.22	15,633	
	Flight 2 & 3 staircase (Drawing 424)							
3.1.10	Handrail - 42.4 diameter CHS handrail supported by 16 diameter bars welded to RHS post	140	m	400	56,000	1.22	68,393	
5.1	**Floor Finishes: Bridge Deck**							
5.1.1	Bridge Deck - Coloured non-slip finish	51	m2	150	7,650	1.22	9,343	
7.1	**Signage**							30,533
7.1.1	Network Rail logo	2	Nr	7,500	15,000	1.22	18,320	
7.1.2	Platform numbering	2	Nr	5,000	10,000	1.22	12,213	
8.1	**Mechanical & Electrical Services**							110,833
	Electrical Installations							
	Electrical mains and sub-mains distribution	121	m2					
8.1.1	Power installations	121	m2	200	24,200	1.22	29,555	
8.1.2	Lighting installations	121	m2	350	42,350	1.22	51,722	
	Specialist Lighting installations							
	Local electricity generation systems							
8.1.3	Earthing and bonding systems	121	m2	100	12,100	1.22	14,778	
8.1.4	16 person through lift		Nr	220,000	0	1.22	0	
8.1.5	Lift Motor Room		Nr	160,000	0	1.22	0	
	Fire Fighting Systems							
8.1.6	Lighting Protection	121	m2	100	12,100	1.22	14,778	
9.1	**Drainage**							0
	Staircase							
9.1.1	Linear drainage channel		m	250	0	1.22	0	
9.1.2	Aluminium rainwater down pipe		m	200	0	1.22	0	

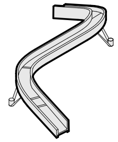


10.1	**Overhead, Profit & Preliminaries**							
10.1.2	Main Contractors Preliminaries		%	15	78,606	1.22	96,002	206,081
10.1.3	Main Contractors Overheads & Profit		%	5	30,132	1.22	36,801	
10.1.4	Extra over for specialist crane hire	1	Item	60,000	60,000	1.22	73,278	
	Extra over for NwR Possession Staff - Excluded; assumed works to be undertaken as part of rail wider possession		Excl					
	TOTAL Design 10 - SERIES 400 Open						**846,095**	**846,095**

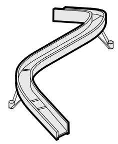


E.2.11 Flow

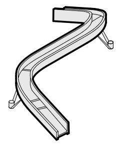
Code	Description	Quantity	UOM	Rate	SubTotal	Inflation Uplift	Total	Sub Total
	DESIGN 11 - FLOW OPEN							
1.1	**Foundations:**							
1.1.1	Pad Foundations (assumed 1.5 x 1.5 x 1.0m)	2	Nr	1,050	2,100	1.31	2,751	
1,1,2	Strip Foundation to base of staircase (3.0 x 1.5 x 1.5m)	2	Nr	2,350	4,700	1.31	6,157	
2.1	**Structure**							8,908
	Staircase							
	FRP Main Spine:							
2.1.1	Stair Heel	1	Nr	5,000	5,000		5,000	
2.1.2	Ramp 1A	3	m	1,200	3,980		3,980	
2.1.3	Ramp 2A	3	m	1,200	3,444		3,444	
2.1.4	Curve 1A - 3A	12	m	1,200	14,400		14,400	
2.1.5	Horizontal 1	5	m	1,200	5,795		5,795	
2.1.6	Horizontal 2	5	m	1,200	5,795		5,795	
2.1.7	Curve 3B - 1B	12	m	1,200	14,400		14,400	
2.1.8	Ramp 2B	3	m	1,200	3,444		3,444	
2.1.9	Ramp 1B	3	m	1,200	3,980		3,980	
2.1.10	Stair Heel	1	Nr	5,000	5,000		5,000	
2.1.11	Pier Support Legs:							
2.1.12	Pier Stool	1	Nr	5,000	5,000		5,000	
	Pier 1A Leg	3	m	1,200	3,931		3,931	
2.1.13	Pier 1B Leg	3	m	1,200	3,931		3,931	
2.1.14	Curve 1A Bottom	1	Nr	7,500	7,500		7,500	
2.1.15	Curve 3A Bottom	1	Nr	7,500	7,500		7,500	
2.1.16	Pier Stool	1	Nr	5,000	5,000		5,000	
2.1.17	Pier 2A Leg	5	m	1,200	5,578		5,578	



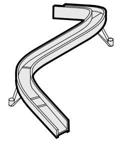
2.1.18	Pier 2B Leg	5	m	1,200	5,578	5,578
2.1.19	Curve 1B Bottom	1	Nr	7,500	7,500	7,500
2.1.20	Curve 3B Bottom	1	Nr	7,500	7,500	7,500
	Ribs:					
2.1.21	Ramp 1 (10 Nr)	14	m2	1,250	17,500	17,500
	Curve 1A - 3A (24 Nr)	33	m2	1,250	41,250	41,250
2.1.22	Deck (15 Nr)	21	m2	1,250	26,250	26,250
2.1.23	Curve 3B - 1B (24 Nr)	33	m2	1,250	41,250	41,250
2.1.24	Ramp 2 (10 Nr)	14	m2	1,250	17,500	17,500
	Deck; Stepped stairs; fibre reinforced polymer laminate type SG07					
2.1.25	Ramp 1 (10 Nr)	16	m2	500	8,000	8,000
2.1.26	Curve 1A - 3A (24 Nr)	22	m2	500	11,000	11,000
2.1.27	Curve 3B - 1B (24 Nr)	22	m2	500	11,000	11,000
2.1.28	Ramp 2 (10 Nr)	16	m2	500	8,000	8,000
	Deck; U-Shaped deck slab module; fibre reinforced polymer laminate type SG01					
2.1.29	Deck	18	m2	500	9,000	9,000
	Soffit fascia panel; fibre reinforced polymer laminate type SG01					
2.1.30	Ramp 1A	17	m2	500	8,385	8,385
2.1.31	Ramp 2A	15	m2	500	7,255	7,255
2.1.32	Curve 1A - 3A	58	m2	500	29,000	29,000
2.1.33	Horizontal 1	24	m2	500	12,208	12,208
2.1.34	Horizontal 2	24	m2	500	12,208	12,208
2.1.35	Curve 3B - 1B	58	m2	500	29,000	29,000
2.1.36	Ramp 2B	15	m2	500	7,255	7,255
2.1.37	Ramp 1B	17	m2	500	8,385	8,385
	Soffit Facia to underside of central spine; fibre reinforced polymer laminate type KS02					
2.1.39	Ramp 1A	1	m2	500	508	508



2.1.40	Ramp 2A	1	m2	500	439		439
2.1.41	Curve 1A - 3A	4	m2	500	2,000		2,000
2.1.42	Horizontal 1	1	m2	500	739		739
2.1.43	Horizontal 2	1	m2	500	739		739
2.1.44	Curve 3B - 1B	4	m2	500	2,000		2,000
2.1.45	Ramp 2B	1	m2	500	439		439
2.1.46	Ramp 1B	1	m2	500	508		508
	Lower inner fascia interchangeable panel, fibre reinforced polymer laminate type SG08						
2.1.47	Ramp 1A	4	m2	300	1,337		1,337
2.1.48	Ramp 2A	4	m2	300	1,157		1,157
2.1.49	Curve 1A - 3A	16	m2	300	4,800		4,800
2.1.50	Horizontal 1	6	m2	300	1,947		1,947
2.1.51	Horizontal 2	6	m2	300	1,947		1,947
2.1.52	Curve 3B - 1B	16	m2	300	4,800		4,800
2.1.53	Ramp 2B	4	m2	300	1,157		1,157
2.1.54	Ramp 1B	4	m2	300	1,337		1,337
	Upper glazed fascia panel, toughened glass parapet system enclosed in stainless steel frame						
2.1.55	Ramp 1A	6	m2	600	3,865		3,865
2.1.56	Ramp 2A	6	m2	600	3,344		3,344
2.1.57	Curve 1A - 3A	23	m2	600	13,800		13,800
2.1.58	Horizontal 1	9	m2	600	5,627		5,627
2.1.59	Horizontal 2	9	m2	600	5,627		5,627
2.1.60	Curve 3B - 1B	23	m2	600	13,800		13,800
2.1.61	Ramp 2B	6	m2	600	3,344		3,344
2.1.62	Ramp 1B	6	m2	600	3,865		3,865
	Structure: Fittings						
2.1.63	Allowance for Fittings	10%	%	507,829	50,783	1.22	62,021



5.1	**Floor Finishes**							569,850
	Staircase							
5.1.1	Mid landing - Coloured non-slip finish	5	m2	150	750	1.22	916	
5.1.2	Treads & risers - Coloured non-slip finish 300m going	71	m2	150	10,650	1.22	13,007	
5.1.3	Extra over for 1800mm long AATI nosings to all steps	68	Nr	1,550	105,400	1.22	128,725	
5.1.4	Nylon coated handrails, double rail to stairs:							
5.1.5	Ramp 1A	13	m	400	5,307		5,307	
5.1.6	Ramp 2A	11	m	400	4,592		4,592	
5.1.7	Curve 1A - 3A	12	m	400	4,800		4,800	
5.1.8	Horizontal 1	19	m	400	7,726		7,726	
5.1.9	Horizontal 2	19	m	400	7,726		7,726	
5.1.10	Curve 3B - 1B	12	m	400	4,800		4,800	
5.1.11	Ramp 2B	11	m	400	4,592		4,592	
5.1.12	Ramp 1B	13	m	400	5,307		5,307	
5.1.13	Bridge Deck							
5.1.14	Bridge Deck - Coloured non-slip finish	18	m2	150	2,700	1.22	3,298	
6.1	**Bridge Moulds**							190,797
6.1.1	Allowance for moulds to form laminate beams	1	Item	100,000	100,000		100,000	
7.1	**Siganage**							100,000
	Network Rail logo	2	Nr	7,500	15,000	1.22	18,320	
7,1,1	Platform numbering	2	Nr	5,000	10,000	1.22	12,213	30,533
8.1	**Mechanical & Electrical Services**							
	Electrical Installations							
	Electrical mains and sub-mains distribution		m2					
8.1.1	Power installations	94	m2	100	9,400	1.22	11,480	
8.1.2	Lighting installations	94	m2	150	14,100	1.22	17,220	
	Specialist Lighting installations							
	Local electricity generation systems							



8.1.2	Earthing and bonding systems	94	m2	100	9,400	1.22	11,480	
	'16 person through lift		Nr	220,000		1.22		
	Lift Motor Room		Nr	160,000		1.22		
	Fire Fighting Systems							
8.1.3	Lighting Protection	94	m2	100	9,400	1.22	11,480	51,661
9.1	**Drainage**							
	Staircase							
9.1.1	Linear draiage channel	92	m	250	23,016	1.22	28,109	
10.1	**General Allowances**							28,109
10.1.1	Main Contractors Preliminaries	15%	%	920,079	138,012	1.22	168,554	
10.1.2	Main Contractors Overheads & Profit	5%	%	1,058,091	52,905	1.22	64,612	
10.1.3	Extra over for specialist crane hire	1	Item	60,000	60,000	1.22	73,278	306,444
	Extra over for NwR Possession Staff - Excluded; assumed works to be undertaken as part of rail wider possession		Excl					
	TOTAL Design 11 - FLOW Open						**1,286,302**	**1,286,302**

E.3.1 Assumptions General

The base date of this LCC comparison is as per the capital cost plan, with inflation to 4Q24.

This assessment is based on the information known and available at this stage and may be subject to further refinement and update at future design stages and as additional/ more detailed information becomes available.

The LCC summary has been structured in line with the carbon and cost team outputs to provide a unified presentation of costs (where possible). Additionally, this means that items have been assigned to the element of work to which they are allocated within the cost plan.

The high-level LCC comparison has been aligned with the whole life carbon assessment where possible and relevant. These have been prepared in line with the capital cost plan and therefore, reflect the level of detail and accuracy therein.

Operations costs have been excluded from this analysis at this stage. Generally it is anticipated there will be no significant differences between the options.

Capital cost of moulds for the flow bridge have been included in an updated cost plan for the flow bridge. This is deemed to have no impact on the LCC and therefore has not been considered.

E.3.2 Renewal/ replacement

The renewal costs include on-costs as provided within the capital cost plan for preliminaries and overheads and profits. We would typically expect renewal costs to incur lower indirect costs than the construction costs. (For example, the preliminaries costs may be lower to align with the duration of individual asset replacement rather than the full construction works).

Generally, assumptions have been made with regards to finishes and associated interventions e.g., non-slip finish and applied finishes to the bridge deck flooring. This has been assumed to be an epoxy resin finish at this stage, and aligned to the carbon life cycle assessment.

The Flow bridge design uses fibre reinforced polymer materials. There are a variety of reference lives and EPDs for this material ranging from 50 - 100+ years. Noting the UV degradation impacts on this material and a proposed design life of 50 years, we have assumed that the flow bridge will incur a full replacement during the period of analysis. The LCC therefore provides an indicative replacement cost for the flow bridge at an asset level and in line with associated capital costs but does not consider the full reinstatement of the bridge and the associated costs which may arise in the future.

Minor replacement and repair allowances have been made in relation to the following assets: roof coverings, cladding systems, timber slat and panel ceilings and downpipes and gutters.

E.3.3 Maintenance considerations

Mechanical and electrical assets have been costed on a similar basis across the options and therefore we anticipate no significant differences in the maintenance of MEP systems across the options. There will, however, be an additional cost associated with the maintenance of lifts in designs 1-8, where the remaining designs do not have lifts.

It has been assumed that all bridge options will require similar visual, structural and condition inspection. This will at a minimum include an annual visual inspection and a 6 or 12 yearly detailed deck and superstructure examination (as relevant, followed by necessary/ recommended repair works).

Additional maintenance impacts and activities should be considered in bridge selection. These include (but are not limited to):

→ Re-painting of painted steel structures and components (varying extent across the bridge

- types and in comparison to stainless steel)
- Cleaning of bridge components to avoid debris build-up and impact on coatings
- Cleaning of toughened laminated glazed panels (noting difference in the extent of glazing between closed and open designs)
- Maintenance of deck joints and connections
- Masonry brick repairs and repointing

The cost implications of these activities are highly variable depending on extent of the asset within each bridge design, location of the works, access and possession costs and overlap of maintenance requirements with other works.

It is recommended that maintenance activities are planned so that they occur at the same time, or in conjunction with other station works. This is in order to encourage efficiencies in the work. This is specifically applicable to complex activities such as the re-painting of the steel bridges, which is likely to occur three times over a 100-year period of analysis, and to incur high costs associated with the increased preliminaries of extended works duration, scaffolding requirements and the cost of possessions to enable the works to be undertaken.

	Covered				Open				
	Beacon	Ribbon	Frame	AVA	700 Series	Beacon	Ribbon	Frame	AVA
Foundations	£0	£0	£0	£0	£0	£0	£0	£0	£0
Structure	£0	£0	£0	£0	£27,000	£0	£0	£0	£0
Cladding	£1,826,000	£882,000	£1,949,000	£1,164,000	£0	£946,000	£882,000	£1,600,000	£1,164,000
Roof	£215,000	£217,000	£235,000	£159,000	£525,000	£251,000	£17,000	£132,000	£54,000
Floor Finishes	£600,000	£608,000	£694,000	£643,000	£428,000	£600,000	£608,000	£694,000	£643,000
Ceiling Finishes	£154,000	£0	£229,000	£0	£0	£0	£0	£0	£0
Signage	£138,000	£138,000	£137,000	£137,000	£128,000	£138,000	£138,000	£137,000	£137,000
Mechanical & Electrical Services	£3,664,000	£3,679,000	£3,727,000	£3,754,000	£3,679,000	£3,664,000	£3,679,000	£3,727,000	£3,754,000
Drainage	£20,000	£20,000	£21,000	£20,000	£0	£20,000	£20,000	£21,000	£20,000
Overheads, Profit & Preliminaries	£1,373,000	£1,150,000	£1,451,000	£1,219,000	£993,000	£1,166,000	£1,109,000	£1,310,000	£1,198,000
Total costs	£7,990,000	£6,694,000	£8,443,000	£7,096,000	£5,780,000	£6,785,000	£6,453,000	£7,621,000	£6,970,000
Total discounted costs	£1,608,000	£1,357,000	£1,675,000	£1,428,000	£1,186,000	£1,398,000	£1,326,000	£1,526,000	£1,413,000

Table E.3
Replacement Costs per design, Station footbridge designs.

	Covered				Open				
	Beacon	Ribbon	Frame	AVA	700 Series	Beacon	Ribbon	Frame	AVA
Foundations	£0	£0	£0	£0	£0	£0	£0	£0	£0
Structure	£0	£0	£0	£0	£0	£0	£0	£0	£0
Cladding	£337,000	£150,000	£379,000	£227,000	£0	£161,000	£150,000	£249,000	£227,000
Roof	£44,000	£12,000	£46,000	£6,000	£6,000	£6,000	£6,000	£5,000	£2,000
Floor Finishes	£1,000	£0	£2,000	£2,000	£2,000	£1,000	£0	£2,000	£2,000
Ceiling Finishes	£77,000	£0	£47,000	£0	£0	£0	£0	£0	£0
Signage	£0	£0	£0	£0	£0	£0	£0	£0	£0
Mechanical & Electrical Services	£6,000	£6,000	£5,000	£5,000	£6,000	£6,000	£6,000	£5,000	£5,000
Drainage	£6,000	£6,000	£6,000	£6,000	£0	£6,000	£6,000	£6,000	£6,000
Overheads, Profit & Preliminaries	£98,000	£36,000	£101,000	£51,000	£3,000	£37,000	£35,000	£55,000	£50,000
Total costs	£569,000	£210,000	£586,000	£297,000	£17,000	£217,000	£203,000	£322,000	£292,000
Total discounted costs	£133,000	£50,000	£134,000	£66,000	£3,500	£53,000	£48,000	£75,000	£65,000

Table E.4
Minor Replacement Costs per design, Station footbridge designs.

	Open	
	400-Series	**Flow**
Foundations	£0	£0
Structure	£27,000	£676,000
Cladding	£0	£0
Roof	£0	£0
Floor Finishes	£428,000	£899,000
Ceiling Finishes	£0	£100,000
Signage	£128,000	£128,000
Mechanical & Electrical Services	£338,000	£164,000
Drainage	£0	£25,000
Overheads, Profit & Preliminaries	£191,000	£413,000
Total costs	£1,112,000	£2,405,000
Total discounted costs	£233,000	£458,000

Table E.5
Replacement Costs per design, Non-station footbridge designs.

	Open	
	400-Series	**Flow**
Foundations	£0	£0
Structure	£0	£32,000
Cladding	£0	£0
Roof	£0	£0
Floor Finishes	£2,000	£0
Ceiling Finishes	£0	£0
Signage	£0	£0
Mechanical & Electrical Services	£0	£0
Drainage	£0	£11,000
Overheads, Profit & Preliminaries	£0	£9,000
Total costs	£2,000	£52,000
Total discounted costs	£0	£12,000

Table E.6
Minor Replacement Costs per design, Non-station footbridge designs.

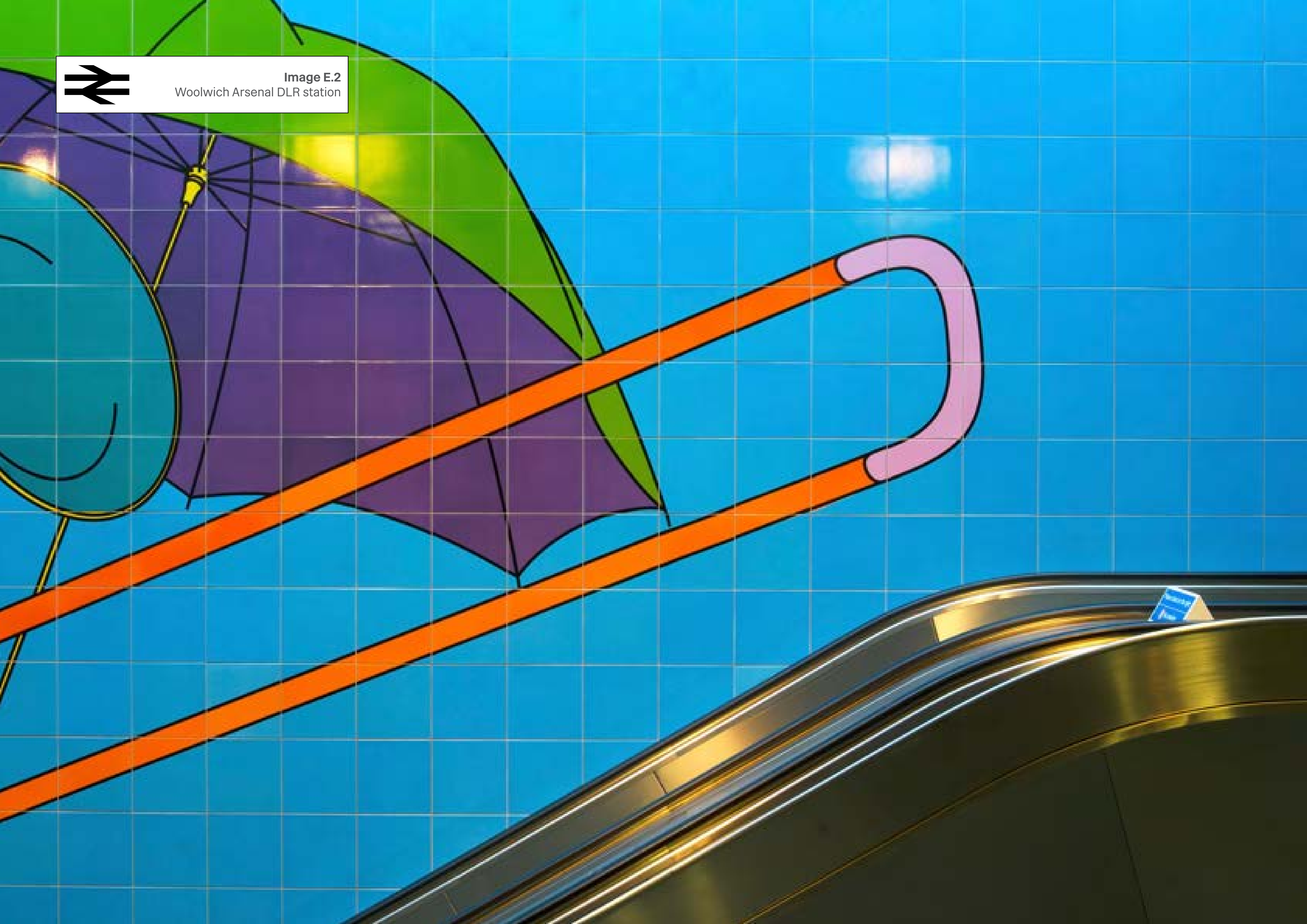


Image E.2
Woolwich Arsenal DLR station

Footbridges & Subways

Acknowledgements

F

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