Network Rail

Title
Output Specification for the Provision of an Accessible Route at Stations

Controlled Copy Number

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DDA Programme Team, Network Rail.

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DDA Output Specification
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1.0 Purpose

The purpose of the DDA programme is to provide an appropriate accessible route within the context of an existing operational railway station. Design solutions and the choice of structures will be determined in consultation with stakeholders and to suit the space constraints of each platform environment. This document provides a description of the project design requirements for the approval of: scheme proposals; structures; services investigations and proposals; provision of additional renovation work and temporary enabling works.

Due importance is given to effective inter-disciplinary teamwork for consultants and communication with the DDA team to achieve good quality, DDA approved, engineering solutions.

1.01 The Design Remit

This document is to be read in conjunction with the Outline Design (Grip Stage 4) Designer Remit, the Detail Design (Grip Stage 5) Remit and the Construction (Grip Stage 6) documents for details of the full scope of the design consultants’ services and deliverables.

2.0 An Accessible Route at Stations

2.01 Project Remit

An accessible route is defined as:

An obstacle free 'accessible route', from at least one station entrance and associated drop-off point to each platform and between platforms served by passenger trains, is to be provided for each station in the programme.

The key points to satisfy are:
- A route sufficient for a manually self-propelled wheelchair user to negotiate.
- A distance, ideally not exceeding 400m, from station entrance (or drop off point if further) to the appropriate point of entry/exit of stationed trains.
- Meeting all applicable technical standards in the Department for Transport Code of Practice Accessible Train and Station Design for Disabled People.

The specific infrastructure required to achieve this should be determined on a station by station basis.

2.01.1 Infrastructure Options

In addition to meeting the objective of an accessible route, the following elements will need consideration:

- Assessment of station entrance compliance.
- Providing access to station operator facilities.
- Providing access to station retail facilities.
- Refurbishing existing access stairs along the stepped accessible route.
- Adjustments to the existing lighting levels associated with the new facilities.
- Providing CCTV security to cover the new facilities.
- Installation of platform edge tactile paving.
- Platform end barriers and gates.
2.02 Station Design Context

New facilities forming part of this programme will conform to the Department for Transport document: Accessible Train and Station Design for Disabled People: A Code of Practice, July 2008. Under the Railways (Interoperability) Regulations 2006, major works at existing stations on the Trans European Network (TEN) will be subject to the requirements of applicable Technical Specifications for Interoperability: Persons with Reduced Mobility (PRM TSI).

The underlying principle for an obstacle free, level accessible route will not only benefit wheelchair users, other passengers with disability impairments and persons of restricted mobility but will contribute to the improved accessibility of station facilities for all.

Access Audit Reports have been carried out for each of the stations in the programme; they identify the current obstacles to an accessible route for the station as a whole. The scope of the DDA programme work is defined in item 2.01 and is the subject of the Option Selection Report prepared by Network Rail for each station.

The purpose and location of the new facilities (primarily lifts, bridges and stairs) must enable appropriate and simple navigation along a barrier free route to and from the platforms. The horizontal and vertical step-free routes will require careful planning, particularly at stations requiring complex engineering between levels.

There will be no special routes through the station for people with disabilities; the solution must reflect the goal of Inclusive Mobility for all passengers.

Bridges are often seen as aerial 'alleyways' separated visually and physically from the main body of the station. Factors which contribute to travelling anxieties among passengers are the lack of clear sightlines and the presence of recesses that are perceived as opportunities for situational crime. Dead-end corridors to lifts and blind corners must be avoided and clear sight lines arranged adjacent to lift entrances. To make passengers feel less vulnerable and at risk, the use of partially glazed door panels in lift cars and glazed sections in the lift shaft structure will be encouraged.

Well documented customer research puts the following topics as the top priorities of the travelling public when using stations and will apply in respect of footbridges:

- A customer friendly facility is one that feels and looks safe and secure.
- For people whose movement may be restricted, information and services need to be located in areas that are visible and accessible to enable simple way-finding navigation.
- The need to ensure that bridge interiors and passengers are visible to other station users and staff from outside and that people using the bridge are able to see other people and staff from within.
- The need to provide the correct information at the appropriate part of the accessible route.
- The need to provide adequate lighting throughout and to provide good quality luminance from wall and floor surfaces without undue reflection.
- The need to provide durable, cleanable, maintainable and ultimately, easily replaceable finishes and materials throughout.

There are circumstances where an open bridge and stairs may be required; however the option for a covered footbridge is also described in this specification.

The exteriors should be designed to be cleaned without interruption to the operational railway and the interiors should be designed to be cleaned without disruption to the travelling public. Ledges, with the potential to collect dirt and debris should be avoided where possible, particularly if they have potential to become bird roosts in covered bridges.
Where lifts are required, these will be supplied and installed to the Network Rail method of procurement. Guidance on lift design, drive mechanisms and all associated enabling works will be provided through Network Rail lift engineers and specialist lift installers respectively.

Accurate topographical and buried service surveys information will be needed at an early stage, especially where the available space may be restricted, within the station or on the platforms, that could influence the method and type of construction to be considered.

To suit the context of each station environment, projects are likely to differ with respect to the selection of materials and construction techniques. For example, in some instances the cladding and appearance of lift shaft structures may need to be constructed using sympathetic matching materials. Whereas, at some listed stations it may be a requirement for new structures to be designed to contrast with the existing fabric, using steel and glass.

Within their multi-disciplinary services, consultants will be required to provide co-ordinated architectural design throughout the planning and detail design stages as appropriate, for each project station.

2.03 Impact on Existing Stations

Any works proposed at a station should not reduce the accessibility of the current station environment. This includes the impact on passenger safety and security during construction.

The existing stepped access route is to be surveyed to allow an assessment to be made on the following; the width and door type of the existing station entrance for compliance; existing staircase nosings; handrails; footway surfaces; platform surfaces and tactiles. (refer also to section 4.10) Details of existing lighting levels are to be recorded. For details of existing services refer to section 5.03 Special note needs to be made of the existing platform layout which may not conform to current standards. Details of platform surface materials, falls and drainage to be noted.

Measures may need to be taken to ensure that disabled passengers do not use routes that may be perceived to be potentially hazardous.

With regard to new works, it is anticipated that additional lighting and CCTV will be needed to provide a well lit, safe station environment.

With respect to this programme, Consultants are to prepare information to enable a competent assessment of the effect that new structures may have on signal sighting. The signal sighting report is to be reviewed and approved by the nominated Network Rail signalling engineer. (Ref: 6.04)

In some cases the provision of a new bridge may supersede the role of an existing bridge structure. Provided that fire evacuation requirements can be met, a project specific instruction may be issued for the removal of a redundant bridge asset.
## 2.04 Typical Works

The accessible route from the station entrance to platform level will vary with the geography of each station. To engineer an accessible route, a number of additional components may be provided to assist both horizontal and vertical circulation in the station environment. These new components will need to be integrated into the station design with suitable ‘way finding’ devices for mobility impaired passengers.

Simplified description of typical works at stations may be as follows;

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Installing a new bridge over the tracks with stairs and lifts to platform level.</td>
</tr>
<tr>
<td>2.</td>
<td>Forming a lift shaft within an existing accommodation over-bridge.</td>
</tr>
<tr>
<td>3.</td>
<td>Installing lift/s to an existing passenger bridge. This may require the provision of a new free-standing lift shaft or the refurbishment of an existing former freight lift shaft.</td>
</tr>
<tr>
<td>4.</td>
<td>Forming a lift shaft adjacent to an existing passenger subway transfer tunnel to connect to platforms over.</td>
</tr>
<tr>
<td>5.</td>
<td>Forming a lift shaft through an existing platform support structure.</td>
</tr>
<tr>
<td>6.</td>
<td>Formation of a ramp to replace an existing step or short flight of steps.</td>
</tr>
<tr>
<td>7.</td>
<td>Addition of ramps or lifts to third party structures.</td>
</tr>
<tr>
<td>8.</td>
<td>Installing additional CCTV cameras to cover the bridge, stairs, lifts and lift entrances.</td>
</tr>
<tr>
<td>9.</td>
<td>Adjustments to the existing lighting to avoid dark areas created by the new structures to meet the current standards and the provision of new lighting.</td>
</tr>
<tr>
<td>10.</td>
<td>Renovation of existing stairs on the accessible route.</td>
</tr>
<tr>
<td>11.</td>
<td>Provision of platform tactile paving.</td>
</tr>
<tr>
<td>12.</td>
<td>Provision of a new or upgraded station power supply.</td>
</tr>
<tr>
<td>13.</td>
<td>Power operated PIR detector door entrances.</td>
</tr>
</tbody>
</table>
2.05 Statutory Requirements

- Stations that require Planning Permission, Listed Building Consent or Conservation Area Consent will be identified by Network Rail.
- Direct liaison with Local Authorities will be carried out by the Network Rail Planning Officer.
- In many cases there will be instructions to consultants to develop both the conventional planning drawings and 3D CAD images during the Form A stage, to assist in the process of establishing the details for planning submission. These will be attached to the Approval in Principle Documents. The illustrations used in this report are a product of a simple 3D CAD program Google SketchUp Pro 7.
- Drawings shall draw attention to any non-compliance to enable Network Rail to prepare appropriate applications for dispensation or derogation in relation to the relevant Codes of Practice.
- Where Statutory Consents have not been previously obtained at a Station location, the following will be required before site works are undertaken:

Planning Permission:
Network Rail will consult with the Local Authority and depending on the nature of the proposed work, Planning Permission may be required. The Network Rail Planning Officer will liaise with the relevant Local Authorities. Network Rail has general development powers covering the provision of passenger facilities within the station environment. Appropriate drawings describing the station location, plans, elevations and sections of the proposal are to be prepared. Sample finishes and technical literature which describes colours and relevant materials may be requested with the above drawings to form part of the Planning Application documentation.

Listed Building and Conservation Area Consent:
For stations that are listed either by English Heritage or are included in a designated Local Authority Conservation Area, any alteration proposed will be the subject of Listed Building Consent or planning approval. A demolition drawing indicating building fabric to be removed may be required. Appropriate drawings describing the existing building plans, elevations and sections are to be prepared. This will include drawings showing proposed alterations to buildings. Sample finishes and technical literature, which describes finishes, colours and the scheme are to be provided along with a written justification for the alteration together with the completed Listed Building Consent Application documentation.

General Development Order:
In nearly all cases, Network Rail has powers for providing freestanding passenger facilities of the type being considered. The GDO is a planning procedure and standard documentation must be provided that is similar to a formal planning application. If the work is inside a building or a refurbishment, a GDO may not be required.

Building Control:
Network Rail has an exemption from formal Building Control procedures. However, NR builds to current Building Regulations, except were HMRI Regulations override e.g. platform clearance, foundations, protection etc. Works are to be designed to the relevant Codes of Practice and European Legislation. Note: Building Control Approval is required in Scotland under the Technical Standards procedure.

Railway and Safety Standards Board and the Department for Transport Code of Practice:
Safety and DDA Code of Practice non compliances will require notification to the relevant regulatory body. The register of non compliances must be submitted by the consultant to allow procedures for an application for appropriate licence be initiated.

Party Wall etc. Act 1996
This legislation regulates and makes provision in respect of party walls, party wall fences and excavation and construction in proximity to proposed new structures and buildings either on or adjacent to the legal boundary between owners. Consultants are to notify Network Rail when proposed structures are located close to relevant boundaries with adjoining owners in order to assess whether the Party Wall Procedures apply.
2.06 Optimising circulation spaces

This specification is seeking to improve and standardise the components that are commonly used in the DDA programme based on the constraints of the platform environment. Visibility and optimising space standards are themes that apply to all elements of engineering for the DDA programme and that acknowledge the customer values. Current and future passenger numbers requires that the width of the stairs and size of the lift should be the maximum possible. However, the very introduction of new structures to facilitate access can also be seen as ‘obstructions’ that contribute to platform overcrowding. This is the Access for All platform paradox.

On narrower platforms, mandatory platform clearances tend to compress the structures and the space required for stair and lift widths. The reduction of the width of the structural enclosures to the lift and stairs is a partial solution. Less structural width to enclosures provides the maximum circulation space in a given environment.

This project will be used to explore the benefits that carefully designed structures and choice of materials can offer in this context.

Example of the resultant space on an Island Platform
2.06.1 Safety Standards and Gauging

Platform clearances are described in GI/RT7016 Part 6 Location of Buildings, structures and other items on platforms. Refer also to Part 9 on the Protection of people from aerodynamic effects of passing trains. Refer also to Accessible Train and Station Design for Disabled People: A Code of Practice, July 2008. Section W2 Platforms – platform design. Notification of non-compliance with the safety clearance rules are to be actioned by consultants. Temporary derogations for platform clearances will be required for worksite hoardings.

Applications for a Temporary Non Compliance have been given by the RSSB for site construction hoardings that are distanced 2000mm from the platform edge (where line speeds do not exceed 100mph) that are not more than 10 metres in length and do not obstruct the sight of signals or train information equipment.

Obstruction Gauging

Two thirds of the railway network is designated as Trans-European Network for high speed and conventional rail routes. Irrespective of conventional and domestic clearance heights for OLE, third rail or non electrified lines, the obstruction gauge to the underside of bridge structures has been standardised to 5200mm. This supersedes the Standard Obstruction Gauge guidelines. Lower bridge heights may be considered in the light of site specific constraints. Note that adjacent platforms are likely to have different levels. Existing overhead lines (OLE) need to be surveyed to assess actual clearances for new structures.

Terminal Tracks

At terminal tracks, no new permanent structures are to be positioned within 20 metres behind the face of the buffer and 5 metres either side of the projected centreline of the track.

2.06.2 Derogations and Dispensations

Any non compliance with safety and clearance standards must be described and illustrated in report form to be used for a Derogation Application to the Railway and Safety Standards Board.

Any non compliance with the Accessible Train and Station Design for Disabled People: A Code of Practice, July 2008 must be described and illustrated in report form to be used for a Dispensation Application to the Department for Transport.

3.0 The Elements of an Accessible Route

The provision of an accessible route is often provided by the introduction of new structures such as stairs, lifts and a bridge. The design of these structures must take into account the physical dimensions of the platform environment and ensure that the relevant safety standards and the Disability Code of Practice guidelines can be satisfied. The following is a review of the constraints and space restrictions that can influence the location and design of the heavy engineering elements that facilitate the accessible route. Topics covered are:

- Stairs
- Lift Structures
- Lift machine room
- Bridge Design
- Ramps
3.01 Stairs

The introduction of stairs into the platform environment, whether from a bridge structure or subway, will need to be assessed according to several factors that will influence their effective width as follows:

- The existing platform width(s).
  A measured survey of the platform layout will be required to check the existing width from the platform edge to ascertain the relevant boundaries. These might be to existing structures or the adjacent platform edge.
- Platform safety clearance standards.
  GI/RT7016 Issue No. 2 Dec 07 Interface between Station Platforms, Track and Trains describes platform safety clearances related to line speed.
- Current and future plans for train length assessed in relation to the number of carriages.
- Details of the station emergency fire evacuation route.
- Details of existing stairs that form part of the existing stepped access route, using bridge or subway.
- Passenger flow data.
- Platform congestion.

Where platform widths are restricted, the structure of the proposed new stairs will need to be considered to maximise the effective width of the stairs. In some cases, a derogation may be required to authorise structures that pose an unavoidable non-compliance with the mandatory platform clearances.

Stair Design Factors

Stairs shall comply with BS 8300: Design of Buildings and their Approaches to meet the needs of disabled people – Code of Practice.

No flight in a stepped access route should contain more than 12 risers. The number of risers in successive flights should be uniform. There must not be fewer than 3 risers in any flight of stairs. Refer also to section 4.04 for drainage falls.

Colour contrasting integral nosing and tread shall be fitted to the stairs. Refer also to section 4.14.7 Heavy duty 9mm x 140mm nickel bronze stair tread with machine screw fixings to be fitted to new stairs. Colour contrast risers are to be fitted at the top and bottom of each flight of stairs.

Balustrade Design
Where stairs are set at a right angle from the support structure onto the top of a flight of stairs, there shall be a minimum 1200mm long level landing, (measured from the inside of the main span truss vertical members) before the nosing of the first step. A level landing should be provided at the top and bottom of each flight of steps, its length to be at least equal to its width.

At stations close to stadiums, racecourses or other locations likely to produce crush loading, a 2m minimum length landing with handrails should be provided between the head of the stairs and the edge of the main deck.

The preferred range for the rise of a step should be 150 – 170mm. Allowance shall be made for construction tolerances to ensure that the maximum riser dimension is not exceeded.

Open risers are not permitted.

The going for a step should be 280 - 300mm with a preference for 300mm.

Proprietary nickel bronze DDA compliant nosings are preferred.

Prior to the first ascending stair flight or descending stair flight, there shall be a 800mm wide corduroy tactile band over the whole width of the stair.

Steel Treads and Risers

The space under the stair structures may be suitable for locating the lift machine room as illustrated in section 3.03. Alternatively a protective safety rail is to be fitted to provide safe headroom for passengers under the stair structure.

The covered stair option shall have rainwater down pipes integrated with the structural columns at the foot of the stairs to discharge to the platform drainage system. The roof covering shall have a lateral extended canopy of 1200mm to 1500mm, sheltering both the foot of the stairs and the route alongside.

The stair structure and roof shall be designed to enable fabricated structural sections to be hoisted into position from trackside or the nearest practical boundary, onto prepared foundations and support points.
In locations where congestion and narrow platforms occur, stairs can be planned in tandem.

The roof to covered stairs is to be designed to have an over sail of 1200mm to 1500mm.

The extended roof provides some shelter alongside the stairs on the route to the lift entrance.

Illustrations show a European example of a roof overhang to an open stair.
3.02 Lift Structures

The introduction of lift structures into the platform environment, whether from a bridge structure or subway, will need to be assessed according to several factors that will affect their passenger capacity as follows:

- The existing platform width(s). A measured survey of the platform layout will be required to determine the existing width from the platform edge to check the relevant boundaries. These might be to existing structures or the adjacent platform edge. The geometry of the existing platform may affect the practical location of the lift shaft.
- Platform safety clearance standards. GI/RT7016 Issue No. 2 Dec 07 Interface between Station Platforms, Track and Trains describes platform safety clearances related to line speed.
- Current and future plans for train length assessed in relation to the number of carriages to establish the operational platform length.
- The preferred capacity of the accessible lift proposed for the station.

Where platform widths are restricted, the structure of the proposed lift shaft will need to be considered to maximise the effective width of the lift car.

In some cases, a derogation may be required to authorise structures that pose unavoidable non compliance with mandatory platform clearances.

A 16 person general purpose lift has been selected as the most appropriate for the railway environment. A review of existing stations has resulted in a lift car dimension that is suited to the engineering constraints.

1600mm x 1600mm are the preferred internal dimensions of the car noted in the Network Rail Standard and has three possible configurations. The variation of the lift sizes has been reviewed by The Department for Transport (DfT) and Disabled Passengers Transport Advisory Committee (DPTAC) and an agreement reached for these to be deployed where there are space limitations. In most cases, however, a dispensation will be required from DfT due to space restrictions in the platform environment and the requirements of the current Code of Practice.

The lift type and configuration to be determined in consultation with the Network Rail Lift Engineer. In the station and platform environment, detailed consultation is required to determine possible variables for lift machinery, lift shaft structure and cladding to ensure that the preferred lift car size and openings can be achieved.
It is recommended that lifts are fitted with glazed door panels. This is so that passengers using the lift can be seen and passengers waiting for the lift can see if anyone is using it. (Code of Practice section R1 (p)). Glazed panels are to be fitted to the lift shaft structure.

The lift structure door frame detail shall also be agreed with specialist lift manufacturer to incorporate lift control buttons, light emitting diode (LED) indicators and speakers as required. The leading edge of the lift entrance architrave and lift entrance threshold shall have colour contrast inserts.

All the standards for the equipment, lighting and controls are noted in the Code of Practice and the Network Rail Procurement Standard.

Design and provision of the lift mechanism and the car shall be to Network Rail’s method of procurement. The lifts shall be hydraulic and comply with Network Rail Specification NR/SP/ELP/27228. Further information may be obtained from Network Rail Guidance Note NR/GN/ELP/27230.

Network Rail will normally procure the design and installation of each lift using specialist consultants and contractors. Through-lifts shall be used wherever the geography of the station allows and suits the preferred accessible route.

Access to lifts, ramps and stairways shall be parallel to the platform edge. Where circumstances prevent, suitable barriers shall be provided, a minimum of 2.5 metres from platform edge, to prevent persons or trolleys having direct access to the platform edge (3.0m for tracks with line speed greater than 100mph).

Lift lobbies shall be 2m wide on the approach to the lift entry (note that sufficient space must be provided to accommodate the standard lift control panel which may be up to 350mm wide). The design of the lift lobby recess should be planned to allow good sight lines from the main footway. This may include the use of splayed walls in existing subways, as illustrated, to minimise a concealed recess.

A covered 1500mm x 1500mm waiting area shall be provided outside lift doors. This shall not occupy the same space as the general walkway. Refer also to 4.14.5
3.02.01 Lift Shaft Cladding

The cladding of a lift shaft will be defined during the progress of the planning negotiation and conditions. It may also be affected by site constraints and the selection of the lift shaft structure.

Narrow platform clearances may rule out the use of masonry lift shaft structures leading to a steel frame structure with panel cladding or to full height pre-cast concrete structures. Where space allows, the planning negotiations may tend towards a preference for a design using similar station materials such as brick or stone.

At Listed Stations, the conservation officer may request that new structures are detailed in a contrasting architectural appearance using steel and glass.

Materials that have been specified in recent examples are:

- Steel cladding panels with steel framed corners.
- GRC cladding panels
- Transparent glass lift shafts.
- Phosphur Bronze cladding panels.
- Full height brick structure.
- Combination of brick panels and steel cladding.

Roof configurations.

- Mono pitch slate roof.
- Pyramidical slate roof construction.
- Mono pitch sheet zinc covering.
- Flat roof construction with over hanging eaves.

Gutters, rain water down pipes and external lighting shall be an integrated part of the design.

The choice of lift shaft structure and cladding will affect the sequence of the site works programme representing the difference, for example, between off-site prefabricated steel frame and onsite brick construction.

The anatomy of a lift shaft.
Designed to suit narrow platforms and to allow options for cladding materials
3.03 Lift Machine room

As illustrated, the lift machine room is often located below the stairs. However the location of the machine room may also be determined by the configuration of the lift car entrances. Prefabricated lift machine rooms may be ‘paletted’ and hoisted into position on prepared sub-foundations and platform ducts. This may have an advantage enabling time savings to the project programme, particularly for the lift installation.

One hour fire rated construction, insulation and vents shall be detailed to fit under lower stair flights. Refer to section 4.05.

Dependant on the proposed design and construction of the lift motor room, the ceiling may need to be demounted to allow for periodic structural inspections of the stairs. External cladding of the machine room may be similar to the materials described in section 3.02.01. All steelwork shall be earth bonded. Lift Motor room, bridge and stairs to be bonded for OLE and lightning.

The planning of the lift machine room enclosure shall include provision for other services such as lift power supply head, local distribution boards and CCTV equipment adjacent. These are to be planned so that access can be arranged independently of the lift machine room itself. The foundations are to be designed to accommodate easy bend service sleeves to rise within the designated cabinet areas.
3.04 Bridge Design

The type of bridge is determined by the station context and the outcome of a series of option evaluations that may be available to suit the particular situation.

Early consultations with the local authority conservation officer, in circumstances where a station is locally listed, located in a conservation area or listed with the Royal Commission of Historic Monuments, will be arranged by Network Rail.

There may be guidelines to indicate that new structures should reflect or be similar to materials and elements that characterise the station. This may apply equally to the proposed lift shaft enclosure, the stairs and the bridge and may inform decisions to use materials such as brick. Frequently, English Heritage express a preference for new development to contrast with the architectural style of the existing station and request the use of neatly detailed structures in steel and glass. For example, the lift shaft structure or it may be a requirement for an open bridge type.

The range of options developed by the DDA programme have been designed to suit most situations and typically have variables involving bridge span, bridge width, parapet design, the use of handrails and security requirements.

Each of the bridge versions shall accommodate service routes that are integrated into the design.

<table>
<thead>
<tr>
<th>Bridge Type</th>
<th>Effective width</th>
<th>Single span up to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version 01</td>
<td>2400mm</td>
<td>20 metres</td>
</tr>
<tr>
<td>Version 02</td>
<td>2400mm</td>
<td>20 metres</td>
</tr>
<tr>
<td>Version 03</td>
<td>2400mm</td>
<td>35 metres</td>
</tr>
<tr>
<td></td>
<td>3300mm</td>
<td>35 metres</td>
</tr>
<tr>
<td>Version 04</td>
<td>2400mm</td>
<td>25 metres</td>
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<tr>
<td></td>
<td>3300mm</td>
<td>25 metres</td>
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</tbody>
</table>
### Handrail options

<table>
<thead>
<tr>
<th>Handrail options</th>
<th>Parapet height</th>
<th>Safety Mesh</th>
</tr>
</thead>
<tbody>
<tr>
<td>No handrail to footway</td>
<td>1.8 metres</td>
<td>Not required</td>
</tr>
<tr>
<td>Side handrails to footway</td>
<td>1.8 metres</td>
<td>Mesh required to 2.5m</td>
</tr>
<tr>
<td>Central handrail</td>
<td>1.8 metres</td>
<td>Not required</td>
</tr>
</tbody>
</table>

After consultations the appropriate bridge type and use of materials will be instructed from the range of options.

### 3.04.1 Illustrations of Bridge Types.

The following are some illustrations of bridge types - Versions 01, 02, 03 and 04.
Further details of the bridge options will be issued when an appropriate design has been selected. The choice of bridge type may be a result of the third party stakeholder consultation process.

**Version 01: Warren truss design**

This design requires a separate side screen that can be adapted to suit local site requirements. When a mesh enclosure is requested, handrails can be fitted along the footway.

In common with all bridge types in the programme, the 1500mm high parapet sides are fitted with a glazed section to enable wheelchair passengers to view the platform from bridge level. The illustrated example has no handrails to each side of the footway and no mesh infill above the 1500mm high 'parapet'. The footway is tiled and has surface water drainage outlets. The example does not show the footbridge signage.

The load bearing masonry lift shaft structure was chosen after consultation with the Local Authority. The brick construction also suited the sequence of the building programme. Future versions of this type will have wider footway and parapet sides 1800mm high.
Version 02: Vierendeel truss with side handrails and mesh

Lift Towers constructed in brick to match the station building. Side handrails are fitted together with protective mesh. The removable angle plate above the glazed section allows for the cleaning outside face of the windows. The photographs show a practically complete example before the installation of the required footbridge signage.
Version 03: with option of central handrail

This bridge type has the option of a wider footway to suit the maximum requirement for emergency means of escape. This allows a central handrail without the need to enclose the upper bridge sides with mesh protection. The inverted roof construction and splayed sides are to provide cleaner lines and a sense of openness.
Illustration shows the basic bridge structure remains the same: an open bridge (top left) can be fitted with a roof (middle left) and a range of options for enclosure to the footway and the stairs can be incorporated.

**Version 04: An open bridge design that can be fitted with a roof**

Standard effective width of foot way is 3300mm with a central handrail.
1800mm glazed parapet design illustrated. The same principal structure allows options for higher sides, enclosed sides and for side hung glazed panel parapet construction.
Accessible service routes are incorporated below and within the footway.
The roof structure (where fitted) is supported at each end of the span.
Rainwater drainage and service risers to the roof are integrated with the primary structures.
3.05 Parapets

Parapets on footbridges over the railway may not normally have hand or footholds (usually this means handrails) unless:

a) The parapet or enclosure extends a further 1500mm above the handrail or
b) The walkway is fully enclosed, either by mesh, glazing, a roof or a combination of these.

Version 04 bridge design may be fitted with lockable, hinged and framed glazed side panels together with an outer protection of stainless steel mesh.

Over the electrified railway, the regulations require bridge parapets to be imperforate to a minimum height of 1500mm. For DDA purposes, as discussed below, the height of the parapet has been raised to an overall height of 1800mm to provide clear sight-lines for all adults.

A key requirement of DDA footbridges is for users to see and be seen.

Unless the site is particularly prone to vandalism, station footbridges should have glazing incorporated in the parapet construction to enable a view of the platforms and stairs.

Wheelchair user sight lines vary from 1150mm -1350mm and are lower than pedestrians who typically have sight lines from 1400mm – 1750mm.

Toughened laminated safety glass must be used. If using mesh infill or expanded metal sheet in cladding zone, any gaps between the edge of the infill and surrounding members must not exceed 25mm and the apertures shall not exceed 1200mm². Stainless steel mesh is preferred.

Painted steel infill cladding to bridge and stair sides may be welded to the structure. If glazing is adopted in cladding zones, glazed panels should be able to be replaced and cleaned from within the structure, to minimise the need for track possessions and station closures.

3.06 Bridge Supports

The conjunction of the bridge span, the access stairs and the bridge level lift lobby is the bridge support structure. Additionally this provides the framework for the intersection services rising from platform ducts and tray ducts across the bridge carrying lift power cables. The design and sections of the steel framework shall be co-ordinated to accommodate a planned ‘highway’ of neatly routed accessible service ducts and linking with the platform service turning chambers.
3.07 Ramps

The Code indicates that long ramps are unsuitable at stations. (Refer to DfT COP S1. Ramps) Beyond a certain height, ramps become too tiring for the user, even if a number of rest landings have been provided.

For changes in level where it is inappropriate for a lift to be installed, a dual arrangement of stairs and ramps must be provided, subject to physical constraints. Where this is done, the ramp and stairs must be near to each other. The ramp must not appear to be a secondary, inferior entrance. A station entrance may require an entrance ramp and an alternative exit may be required from a station platform.

It is recommended that ramps slope at a consistent angle at a gradient not greater than 5% (1:20).

Ramps should have a minimum width of 2000mm between handrails.

Dual height handrails should be provided on each side.

Highlight the top and bottom of the ramp by colour contrast.

The Code should be consulted on matters of slip resistance of surface materials, handrails and lighting levels.

4.0 Design Requirements

4.01 Foundations

The design of foundations for the new structures shall be based on site analysis on a station by station basis. Following the soil analysis, an early review is to be carried out with the Network Rail lift engineer to determine whether a central borehole hydraulic ram should be installed.

Reinforced concrete foundations shall be designed for the main span supports and stairs. The foundation loads and moments for the different span options shall be identified.

The foundations shall be suitably designed generally with their top surfaces set a minimum of 150mm below the surrounding platform surface. Water bars are to be detailed to the perimeter of structures.

The use of screw pile foundation methods will be discouraged due to the slenderness ratio and inability to cope with variable ground conditions.

The connection of the steelwork to the concrete foundations shall be detailed.

The foundations for a centre hydraulic ram lift and a side ram hydraulic lift arrangements and associated lift shaft shall be detailed.

The foundations for the main span support and the lift pit should allow for the positioning of two sub surface 150mm diameter ducts running from the lift motor room to the lift pit. Allowance is to be made to accommodate new and existing ground level service connections that are located close to above ground structures. The foundation design is to indicate easy bend service sleeves and ‘pockets’ for drainage gullies.

To form an edging to the reinstated platform surface around the perimeter of a structure colour contrast paviors are to be detailed.
4.02 Loading

The main span, stairs and all their column supports are deemed to be part of a footbridge, therefore the live loading and design of these must be in accordance with loads given in BD 37/01 and Group/Company Standards, which call for design to BS5400 (unless modified below).

GC/RC5510 Recommendations for the design of bridges;
GC/RT 5112 Loading requirements for the design of bridges;
Bridge supporting columns shall be designed to facilitate the maximum use of the platform area between the stair structure and the lift shaft. Where a four column framed bridge support is considered, provision must be made for an integral, purpose designed, vertical service route to rise to the footway deck. Any horizontal bracing members should be higher than 2500m above the platform. Bolted foundation connections should be below the platform level.

The cladding/parapet system must allow for horizontal crush loading taking account of footbridges serving stadiums, racecourses, concert halls and other exceptionally crowded locations. Horizontal parapet loading shall be in accordance with BS6399 Table 4 (item xi). (This is for floors greater than 3m wide in the BS, but is adopted here for any width of floor due to the confined nature of the structure.)

The footbridge live load will generally be in accordance with BD37/01 at 5 kN/m² pedestrian live load.
The roof should be designed for dead loads and superimposed load of 1.20 kN/m² (Dead + Snow + Maintenance Access)

Wind loading shall be in accordance with BD37/01.
Aerodynamic loads shall be considered, particularly for fully enclosed footbridges, and for footbridges constructed from lightweight materials, or both.

The deck shall also be designed to carry loads imposed by trolleys which the lifts can accommodate, namely four characteristic point loads of 0.4 Tonne each, positioned at the corners of a rectangle 900mm by 600mm. No other concurrent load need be considered within a perimeter 0.55m around this rectangle.

All footbridges shall satisfy the vibration serviceability requirements in BD 37. Special care shall be taken where footbridges have a mode of oscillation less than 5Hz involving vertical deck deflections and/or less than 1.5 Hz involving horizontal motion.

Handrails shall be designed in accordance with BD 29 for horizontal and vertical load of 0.7kN/m which is not additional to horizontal crowd loading.

4.03 Derailment Loading

Derailment loads on columns need not be considered where there are robust platforms (a continuous face wall with compacted backfill). Where this is absent, a local 2m wide section of robust platform (measured from the railway face of the supports) and constructed within the main platform should be provided to protect the column supports. Cross wall and plank, steel and timber platforms are not considered to be robust.

Suitable collision loading criteria or adequate protection must also be applied to footbridge structures in other appropriate circumstances, e.g. adjacent to roads, in car parks or on station platforms where road vehicles or platform vehicles are permitted.
4.04 Waterproofing and drainage to Structures

Lift pits shall be constructed so as to exclude groundwater by means of tanking, use of waterstops in construction joints, application of impermeable membranes and use of waterproof concrete where necessary.

Roof, stairs, ramps, walkways and landings shall be provided with positive drainage (unless they are fully glazed), such as crossfall or camber not greater than 1:50 and carried to suitable outfalls as simply and directly as possible. Stair treads and landings must be able to drain. Ponding can occur if the nosing is higher than the tread surfacing.

Footbridge decks, stairs and ramps shall be waterproofed unless they are protected from the effects of the weather. The selected waterproofing shall have adequate resistance to water penetration and indentation and shall not be affected by chloride ions or sunlight. Waterproofing may be a combined layer with the deck surfacing.

Walkway surfaces, stairways and landings must have adequate falls to allow water to run off. Stair treads and intermediate landings shall not slope more steeply than nominally 1 in 60 longitudinally and 1 in 40 transversely.

The illustration shows a tiled footway with drainage channels and accessible service ducts in the footway.

Details of new and existing drainage runs, drainage falls and standard details for manholes, channels are to be included on the drawings.

Rainwater pipes are to be integrated into the structures to drain the lift shaft roof, lift lobbies and roofs to bridge and stairs if required. Rainwater pipes are to discharge into sealed back inlet gulleys and connect to the platform drainage system.

Using the vertical route against the lift shaft, the surface water disposal from the bridge roof, lift lobby and lift shaft roof can be combined.

Any drainage gratings in platforms and walkways shall be set at right angles to the direction of travel and set flush with the surrounding area. Gaps between gratilles shall not exceed 12mm.

Except for drainage holes near the edges, walking surfaces must not have holes or gaps greater than 12mm across including gaps at sliding expansion joints. Gaps otherwise wider than this must be protected with cover plates or similar provision. Cover plates must be set flush with the walking surface.

Provision is required for drainage from the footbridge and its roof (if provided), above platforms and other areas occupied by people, and also above Overhead Line Electrification equipment. For roofs
where there is a risk of melting snow falling onto the platform below, provision is to be made for a 100mm supported mesh ‘snow board’
The drainage system should be quickly and easily accessed, cleaned and generally maintained, without the need for possessions and isolations wherever possible.
Bridge span bearing shelves, where applicable, shall be positively drained.

4.05 Lift structures requirements

The lift shaft structure, weather proof envelope and service ducts shall be completed and handed over to the lift installer as follows:
The lift shaft is to be constructed to be plumb and square to engineering and building construction tolerances to allow for the lift shaft dimensions provided by the lift installer. Dimensions and levels for the lift travel, the lifting beam and the lift pit shall be shown on the civils drawings together with the structural openings for the lift car entrances of 1350mm x 2300mm.
The plan dimensions will vary according to the method and type of mechanism specified by the Lift Engineer. The depth of the lift pit is 1400mm for twin ram mechanisms and 1600mm for a central ram. Each pit shall have a sump in the base of 400mm x 400mm x 400mm, fitted with a removable grating and located to the control side of the lower lift car entrance.
The shaft shall incorporate Unistrut channels or slots for the fixture of guide rails, hydraulic equipment and lift entrances. The lifting beam (certified to a minimum SWL 2500kg) and a smoke vent outlet (1%) shall be incorporated at the top of the shaft. Note that larger architectural louvres may be specified but a minimum requirement for the free area remains 1% of the lift shaft plan.
The internal surface walls of the lift shaft are to be dust sealed and painted.

The structure of the lift motor room shall be constructed to achieve a fire resistance of one hour. The plan area to approximate to 2200mm x 2200mm. Steel double security doors 1200mm wide x 2100mm high fitted with door closers and an automatic internal snib type lock are to be fitted not to open towards the platform edge. (ref materials) A 300mm x 300mm ventilation louvre is to be fitted (the estimated output of heat dissipated from the equipment may have a maximum heat output of 2kW). The lift motor room machinery operates between temperatures of 5 – 35 degrees. The enclosure may need to include insulation in the wall and ceiling construction.
A certified lifting beam (300kg SWL) spanning over the hydraulic pump/tank unit is to be provided with a clearance from FFL of 2100mm.
Two PVC lined 150mm dia ducts are to be provided between the lift motor room and the lift shaft pit for hydraulic pipework and electrical services fitted by others.

4.06 Canopies and Existing Platform Structures

A canopy (minimum dimensions 1500 x 1500mm) shall be fitted over lift shaft entrances where the lift shaft is in the open.
The location of new lift shafts and stairs may require the adaptation of existing station canopies and/or platform buildings. Consultants are to prepare appropriate survey drawings of these structures.
Allowance is to be made for dismantling canopies (using temporary structures) during the proposed works. The canopy reinstatement may require the formation of new weathered junctions with the lift shaft structure.
Allowance may be required for the preservation of heritage components.

4.07 Existing Waiting Rooms and Platform Furniture

Details of existing station furniture and advertising structures are to be recorded on the general arrangement drawings.
Furniture displaced by the works is to be stored and reinstated in agreed positions on completion.
Waiting rooms that may be displaced by the new works will need to be shown on the station change drawings.
4.08 Refurbishment of Existing Stairs

Consultants are to make an assessment of existing staircases leading to the platforms including the condition of the treads, risers, nosings, handrails and lighting. Renovation of the stairs may include the provision of new colour contrasting nosings, treads, additional handrails, corduroy hazard tactiles at the head and foot of the stairs and adjustments to the lighting. Existing handrails are to be checked for suitability. New handrails must be colour contrasted to their background and have ‘touch-comfort’ coated finish. Refer to section T3. Steps and Stairs; T4. Handrails in the Code of Practice.

Products to refurbish the stairs and landings may be 4mm preformed non slip tread and nosings and intermediate landing levels. The inset photograph indicates a typical example of existing stairs that require compliant treads, risers and nosings to be fitted. Train Operating Company Design Guides shall be consulted for details of approved products. Refurbishment of existing stairs on the stepped accessible route shall be as directed by Network Rail.

4.09 Reconstruction of existing stairs

To provide an accessible route and to accommodate a new lift shaft, it may be necessary to consider the demolition and reconstruction of an existing staircase to create sufficient space for new facilities within the station. A solution to the stepped access route may include the reconstruction of existing stairs attached to an existing bridge.

4.10 Provision of Tactile Surfaces

Based on the platform evaluation noted in the detail preliminary investigations, consultants are to assess the options for the provision of the appropriate tactile surfaces indicated in Section W2 of the Code of Practice. The location, platform preparation and choice of tactile are to be based on a reasonably practical assessment of the platforms at each location that enables consistent setting out, line and levels. Manhole covers that intrude into the line of the tactile paving are to be changed to be a recessed type. Layout drawings indicating levels, preparation, the variation of surface treatments and construction sections are to be submitted. Thermoplastic tiles will not normally be specified. Where the platform substrate is unsuitable, for either concrete or ceramic paviors, thermoplastic tiles may only be specified with agreement from the Territory Asset Engineer.
4.11 Platform Surface Reinstatement and Adjacent Works

An evaluation of the platform surface is to be made in the immediate vicinity of the new works to assess the extent of the renewal of the platform surfaces. The existing platform surface is to be reinstated around the area of the bridge support, stair structure and the lift enclosures. The reinstated surfaces will cover the areas of disturbance with a matching surface finish, make adjustments to the falls and to the platform drainage. These surfaces will generally be tarmac, brick paviers, concrete blocks or slabs.

Guidance Notes on specification are included in the Appendix to this document.

The inset picture shows a typical platform that will require a platform reinstatement strategy following the installation of new structures and tactiles.

In addition to the works notes above, the DDA construction at stations may involve alterations to adjacent features such as boundary walls, canopies, pavements etc. An assessment of the potential impact of such works is to be made to enable the inclusion of an allowance for appropriate refurbishments.

4.12 Inspection and Maintenance

Designs must ensure that future inspection and maintenance can be carried out safely and effectively. Access must be available for visual inspection of at least one side of all structural members and for painting, surface repairs etc. whilst minimising possession and isolation needs.

Steelwork is to have neat detailing to facilitate drainage, discourage dangerous trespass and prevent perching and roosting of birds.

Designers must provide a risk assessment to indicate that the arrangements for routine inspection of structural steelwork, roofing and guttering have been considered.

4.13 Demolitions

Structures due to be demolished are to be assessed to describe the sequence of de-commissioning existing services and a method of safe dismantling. Details of existing foundations and alterations of platform services and ducts affected by the demolitions are to be included.

Attention shall to be drawn to the possible presence of asbestos and the precautions required for any interface works.

4.13.1 Provision of Temporary Bridge Structures

The design of temporary bridge structures that may be required during construction shall be designed to comply with the DDA regulations regarding treads, risers, stairway widths, handrails, footway widths, parapet heights and lighting. If any reduction of the platform clearance is anticipated as a result of the temporary structure, an application for a Temporary Non Compliance will be required.
4.14 Materials

The choice of materials and methods of construction may be influenced by planning permission conditions.

Cladding materials at levels liable to collision from trolleys or vandalism must be selected to be sufficiently robust to resist these without a need for further protecting barriers which would reduce platform edge clearance or available access way width.

Suitable construction materials to resist vandalism should be used. Footway materials must withstand the effect of de-icing salts and chewing gum removal techniques. No low melting-point materials should be used.

Plastics which give off toxic fumes when subjected to heat, should not be used.

4.14.1 Glazing

Where glass is used it shall be toughened laminated safety glass and a risk assessment will be required.

Panels damaged in service shall retain enough post fracture strength to remain within their fixings. Shattered shards shall be large enough to be retained by the laminating materials.

Glazing providing a guarding function shall have containment in accordance with BS6180.

Glazed sections in the imperforate parapet zone will be framed in galvanised painted steel and fixed with machine screwed glazing beads.

4.14.2 Paint Protection

Protective Treatments for metallic railway structures are described in NR/SP/CIV/039 & NR/GN/CIV/002 and have generally consisted of four coats producing a total dry film thickness in excess of 300 microns.

Carbon steel shall receive Network Rail paint system N1 to provide a service life of 25 years.

All interfaces and fixings between metals with varying nobility are to be insulated to prevent bi-metallic corrosion. Materials of varying nobility shall not be used wherever possible. If used, such materials shall be electrically insulated from each other.

For bridges the primary structure shall be BS4800 colours;

<table>
<thead>
<tr>
<th>Material</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Framework</td>
<td>Ivory: 10 B 15</td>
</tr>
<tr>
<td>Steel infill panels</td>
<td>Dark Blue: 20 C 40</td>
</tr>
</tbody>
</table>

Consultations with Train Operating Company may alter the preferred Network Rail colours.
### 4.14.3 Materials: Performance references

**Mesh**
Stainless steel mesh: Amazon 4626/4 grade AISI 316L, natural finish, open area 80%, 5.4 kg/sm by Potter and Soar Limited or equivalent. Design life 60 years.

**Handrails**
Colour contrast handrails: Coloured nylon handrails with purpose designed bends and brackets to suit the configuration of the stairs and bridge. Normbau Combi by Laidlaw railing systems or equivalent. DL 15 years.

**Nosings**
Nickel bronze stair treads with machine screw fixings by Antislip Antiware Treads International (AATI) SN93/140mm or similar approved. Fitted with coloured abrasive inserts and coloured line along riser face to DDA requirements DL 60 years.

**Existing stair treads and nosings**
Modified glass reinforced plastic with contrasting nosings sized to suit existing treads, E.g. Austin Reynolds Limited or equivalent. DL 7 years.

**Tiling**
Fully Vitrified non slip tiles: Dorset Dark Grey Gritstone 300 x 300 x 9mm by Pilkingtons Tiles or equivalent. Piemont range PM4 (OP) by Shackerley (Holdings) Group Limited or equivalent. DL 25 years.

**Tiling adhesives**
Tiling adhesives to steel deck footway: BAL Fast Flex anti-fracture underlay, BAL flexible wide joint grouting with Admix C or equivalent. The proposed substrate and construction shall be discussed with the manufacturer. Other specialists for adhesives, mortar bedding and grouting include Ardex or equivalent. ditto.

**Lighting Fittings**
Vandal resistant light fittings: 1800mm long fittings, 30/60degree angle fitting (277mm x 176mm) mounted on multi compartment trunking system. Between each fitting a steel front plate fixed by stainless steel tamper proof screws. Photometric data to be provided. Manufactured by Designplan Lighting, Tuscan lighting trunking system IP 65 IK 10++ or equivalent, or other design to suit the location. DL 15 years.

**Colour Contrast Pavior**
Marshalls concrete Keyblock pavior soldier course 200 x 100 x 60mm thick. Buff colour PV2050750 or equivalent. DL 60 years.

**Perch Seat**
Volta Range by Macemain Amstad coated with thermal plastic coating to agreed colours. DL 15 years.

**Glazed panels and windows to footway**
Galvanised steel framed windows, fixed panel and bottom hung, factory painted with proprietary glazing beads, hinges, vandal resistant locking systems and opening stays. Crittall Windows Ltd., Corporate W20 range or equivalent. DL 50 years.

**Drainage Channels**
100mm width shallow depth drainage channels to the bridge footway to be as ACO MultiDrain: MD polymer concrete system with flexible joint sealant and black Heelguard composite grating or equivalent. DL 60 years.

**Bridge Membrane**
Elastomeric impermeable membrane to the bridge footway (version 04) to be a two component waterproofing system with bonded, sealed joint protection board to be as Servidek/Servipak system by Grace Construction or equivalent DL 25 years.

**Lift shaft cladding panels and LMR access doors**
Kingspan Optimo-A Flat Insulated Façade system KS1000, laid horizontally with complimentary components of glazed panels and louvres or equivalent. steel door range. Welded single rebated frame, double skinned painted reinforced doors with interlocking seams fitted with security lock and internal snib (no lever handles), D handle, and s/s bal bearing butt hinges. Sunray Engineering Limited or equivalent. DL 25 years.

Refer also to the Appendix for materials for platform paviors, surfacing, markings, drainage and lighting columns.
4.14.4 Finishes to Footway and Stairs

All stair tread surfaces shall have anti-slip properties. Footway flooring shall have a low risk of slipping. The 4S pendulum test method (UKSRG) describes a low potential for slip in the range of 35 to 65 in wet and dry conditions; a rating of 45 is recommended. (This is equivalent to DIN1 1309, ZH 1/571 rating D10.) Footway design shall allow for weight of a variety of floor coverings equivalent to a 100mm thickness of sand / cement screed. The flooring must achieve both fire resistance and non slip characteristics and fully vitrified ceramic tiles shall be specified. Application of a non slip epoxy emulsion and grit will not be acceptable.

Corduroy hazard warning surfaces shall be provided at the top and bottom of stair flights to give advance warning of change of level. The size at a "straight on" landing shall be 800mm measured in the direction of travel, spaced 400mm from first riser or, where there is a conspicuous turn and a handrail is provided opposite the flight, the size shall be 400mm measured in the direction of travel and spaced 400mm from the first riser. The warning surface shall extend transversely 400mm outside the line of the parapets where possible.

4.14.5 Seating adjacent to Lift entrance doors

The Code of Practice Section R1 (h) requires seating close to lift entrances. A perch seat shall be located near to the lift entrance at bridge level. The illustrated stainless steel example is available with a thermal plastic coating in two colours RAL 1021 (yellow) and RAL 5021 (blue)

Reference shall also be made for a seat close to the platform level lift entrance.

4.14.6 Handrails

Handrails must be provided on both sides of stairs, landings and ramps. Handrails are to be extended from the head of the stairs to the lift lobby. Provision of handrails on main span walkways is subject to menu option selection. The ends must be connected to the next run of handrail (e.g. on the bridge deck walkway) or otherwise turn down or back or terminate in a closed end which does not project on to a route of travel.

Handrails shall be:

- of circular section.
- between 40mm and 50mm diameter, with 40 to 50mm minimum unobstructed clearance behind.
- supported from below, to allow easy hand-travel along their length.
- nylon coated for touch comfort and colour contrast.
- extended at least 300mm (450mm preferably) beyond the top and bottom nosings of stairways.
4.14.7 Colour Contrast

Colour contrasting finishes shall be provided to isolated columns or other obstructions. Refer to The Code of Practice Unobstructed Progress – general section F1 guidance reference f. A soldier course of brick paving of a contrasting colour is to be provided to define the perimeter of the new structures and form the edging to locally reinstated platform finishes.

To assist visually impaired people, it is essential that there is adequate light and adequate visual contrast between all of the major surfaces along the accessible route. Colour and luminance contrast should be used to distinguish the boundaries of floors, stairs, walls, doors, ceilings and handrails. Walls (other than glazed surfaces) shall not be glossy. Grey finishes and stainless steel should not be combined, these can be confused by people with sight problems. Changes in level or slope shall be identified by colour contrast. The top and bottom stair risers in each flight of stairs shall have shall be painted yellow and intermediate risers painted white. Stair nosings must be colour-contrasted from the rest of the step, for the full width of the step to a depth of 50mm on the tread and 55mm on the riser. Top surfaces of nosings shall be flush with the stair tread surface.

4.14.8 Guarding for visually impaired users

Areas below steps or ramps where the soffit is less than 2.1m above ground level shall be protected by guarding and low level cane detection, or a permanent barrier giving the same degree of protection. Foundations are to be designed such that their top surfaces and any projecting fixing plates and bolts are set 150mm below the surrounding platform surface to avoid trip hazards.

4.15 Signage

Design shall allow for information signs to be fixed to clearly indicate access to/from platforms, emergency escape routes and disabled facilities where provided. Sufficient illumination shall be provided for signs to be visible in hours of darkness or low light conditions when the station is open to users.
4.15.1 Wayfinding Signage

The DDA programme is confined to the particular aspects of providing an accessible route at stations. In order to harmonise the signage at stations, it is recommended that reference is to be made to the Train Operating Company Design Guidelines.

Details of the new facilities will need to be incorporated into the station information data and details shall be supplied in a format to enable consultation and approval by the Train Operating Company. Signage shall be annotated and submitted on a general arrangement drawing of the station.

An appraisal of the existing station signage is to be carried out with recommendations for additional directional signs and pictograms to suit the new facilities.

All signage falls within the scope of The Disability Discrimination Act and proposals for signage are to comply with the requirements described in the Code of Practice: Accessible Train and Station Design for Disabled People. In particular, Section K Information at Stations, covering design standards, height of signs, text typefaces, colour and contrast, symbols and pictograms. Embossed sign recommendations and Braille may be required in some cases.

Refer also to the ‘Sign Design Guide’, A guide to Inclusive Signage by Joint Mobility Unit and Sign Design Society.

4.15.2 Text and Pictograms

Direction signs. These are the main signs for orientation. They direct users to destinations using arrows and can include directional text. Good signage will work in conjunction with orientation clues provided by the site. These could include: public transport drop-off points and approach; entrance lobby and exit; routes to the lifts within the station. Primarily a desk study, an assessment of directional signs will be reliant on site inspection for greater accuracy.

Suspended and wall mounted signs should be located at an adequate height to avoid obstruction. If a sign is to be read from a distance (for example at the end of a circulation route), this will have a bearing on the text height and resultant sign size. Reference should be made to the Height versus Distance Chart in the Sign Guide.

Lettering type face font shall be Brunel or Arial. The first word and all key words are to begin with a capital letter. Subsequent words should begin with a lower case letter.

All pictograms must conform to the relevant British or European Standards. These will include the pictogram for accessibility for disabled people and the pictogram for a wheel chair accessible lift.
4.16  Inter-disciplinary Checks (IDC)

In accordance with NR/L2/INI/02009 and the DDA Design Remit, the drawings and documentation, submitted for Approval in Principle (Grip stage 4) and Detail Design (Grip stage 5), design consultants must review and co-ordinate inter-disciplinary checks (IDC) for each of the engineering and construction disciplines. This is the responsibility of the Contractor’s Engineering Manager (CEM) prior to both submissions. The CEM is accountable for all Design and Construction information and it’s compliance with standards, specification and legislation.

At the completion of each stage, the CEM and the Contractor’s responsible engineer(s) (CRE) will arrange to present the project scheme proposals to the Network Rail team to demonstrate that this process has been completed.

The agenda for the presentation is to cover all the deliverable products relevant for each stage.

During both Grip 4 and 5 stages, Network Rail will hold interdisciplinary technical review meetings (IDR) with the design team to assist two-way communication during the progress of the project scheme, leading towards the Acceptance Review and Stage Approval.

It is imperative that all services routes and requirements for each project shall be discussed at a stage where the structural design can be adjusted. The interdependency of the structural design and the building services underlines the need for inter-disciplinary engineers and designers to collaborate throughout the design period. This applies particularly to electrical containment routes (vertical and horizontal) within the structures and to the drainage. The steel frame and foundations must be designed to accommodate service routes and drainage gullies.

Builder’s work and service requirements for the lift installation are to be co-ordinated and shown on the drawings for the main contract works.

The separate documents for Civil Engineering and Mechanical and Electrical Engineering must be submitted simultaneously.

The scheme drawings must have schedules and cross references to allow navigation to sources of written or drawn information. Drawings must be checked for consistent cross referencing to relevant drawings, detailed construction information and specification.

5.0  Electrical Requirements

5.01... Estimated Power Requirement and Distribution Equipment

With a single span footbridge with two lifts, the estimated power requirement for the proposed standard 16 person lifts and footbridge installation is 75kVA at 400V 50Hz three phase and neutral. This is based on 30kVA for each of two lifts, 5kVA for each of the two lifts ancillary services and 5kVA for the footbridge and staircases electrical services.

For a two span footbridge with an island platform the estimated power requirement for the proposed standard 16 person lifts and footbridges installation is 115kVA at 400V 50Hz three phase and neutral. This is based on 30kVA for each of three lifts; 5kVA for each of the three lifts ancillary services and 10kVA for footbridge and staircase electrical services.

In addition to the above power requirements, the incoming supply will allow for a further 20% spare capacity for future use at the station as whole.

At stations with insufficient spare electrical supply capacity the footbridge consultants will be responsible for the reinforcement of the electricity supply. Reinforcement will include calculations to determine the required supply capacity and liaison with the Distribution Network Operater (DNO), modifications to the incoming supply arrangements and main and sub distribution equipment.

Existing loads will be determined through load monitoring and assessing the existing connected load – including ‘point heating’. Calculations will identify the ‘connected load’. Liaison with the DNO will include the timely reinforcement of the power supply, all on site civil works for the DNO equipment and an accessible kiosk/cubicle to house the DNO isolation and metering devices and the station...
main distribution equipment. At existing stations with insufficient spare electrical capacity the supply will be reinforced by the footbridge M&E contractor and a new metering/main distribution kiosk will be provided as detailed. A separately accessible compartment in the kiosk to the DNO incoming supply cut outs and metering will house the main electrical distribution equipment.

The main distribution equipment will include a suitably rated incoming isolation and protective device and a main distribution switchboard with isolation and protection devices for existing and proposed loads and distribution boards.

The main distribution switchboard will include current transformer operated sub-metering for existing and proposed loads.

The footbridge electrical services distribution board and cubicle will be as detailed for the Lift Motor Room.

Details of modifications to the existing electrical distribution system including disconnection of existing supplies to equipment and the installation of new supplies to existing equipment are to be included in the submitted design.

**Cabling Installation**

Cabling from main distribution equipment will be in XLPE insulated, steel wire armoured, Low smoke Zero Halogen (LSOH) cables installed on cable trays, on structures or in platform ducts.

The proposed sub mains cabling in enclosed containment will be carried out using LSOH insulated single core conductors installed in a galvanised trunking/conduit system.

Cables from the electrical distribution equipment, communications equipment and the station fire alarm system to the roof void of the footbridge will be installed in separate ducts in the platform to a cable riser on the external face of the lift shaft, bridge support of stairs structure.

Armoured cables will be fixed to cable trays in the riser and unarmoured cables will be installed in separate trunking risers for small power and lighting cables, communications cables and fire alarm cables.

**Earthing and Bonding**

The footbridge M&E designer will install a complete earthing and bonding system in accordance with the requirements of BS7671:2008, BS7430, EHQ/SP/D/101, NR/GN/ELP/00004, NR/SP/ELP/21085 and the Distribution Network Operator.

An earth bar will be installed at low level in each electrical distribution cubicle.

**5.02 Lighting**

Bridge decks and ramps must have 100 Lux intensity, and staircases 150 Lux. The lift car must have 200 Lux internal lighting (supplied by the lift installer). These levels are suitable for CCTV surveillance.

Designers must check that light falls on the areas intended and measures are to be taken to prevent spillage of light.

There is a need to ensure that the recommended lighting levels do not affect the safe operation of the railway and in particular the need for train drivers to see signals and signs clearly. Safety on the railway must always take precedence.

Stairways, ramps, footbridge walkways and lifts adjacent to new footbridges are to be monitored by CCTV and lighting levels increased accordingly if necessary.

All footbridges at stations shall be provided with anti-vandal lighting.

Lighting is also required in the lift shaft, on top of the lift car and in the lift pit for maintenance purposes. (These facilities are provided by the Lift installer.)
Triple compartment trunking capable of accommodating power and data cables which together with anti-vandal type light fittings are to be installed.

Sufficient illumination shall be provided for signs to be visible in hours of darkness or low light conditions when the station is open to users.

The following shall be considered to form part of this specification.

- **OP/DOC/22 Operational Property Engineering Guidance Note for Lighting of Railway Premises. 2002 revised as RT/ENGP/06/22.**

- **BS5489/1/2003 Lighting**

The scope of the station and platform lighting is described in this document and does not extend to other areas of the station.

To enhance the passenger perception of security at a station and to assist in deterring crime additional levels of lighting will be required adjacent to the new facilities. These are defined in the DfT Code of Practice. Minimum lighting levels of 100 Lux and 150 Lux for the bridge and stair structures respectively are required.

Consultants are to note that the introduction of new structures is likely to displace existing lighting columns and other services. Proposals shall incorporate additional lighting in the areas affected, to maintain a design uniformity ratio for lighting the to platforms.

The designer shall make an assessment of the lighting to maintain existing platform lighting levels and to ensure that there are no darkly lit spaces. A design for temporary lighting will be required for the platforms and temporary footbridge structures outside the worksite.

The footbridge and stairs will be illuminated by means of weatherproof and vandal resistant fluorescent luminaires to achieve described above. The luminaires are to be located in positions that enable safe maintenance.

Manual override switches shall be installed in the staff office in station buildings

The platform areas under the stairs and the bridge support will be illuminated by surface mounted weatherproof and vandal resistant compact fluorescent fittings.

The design for lighting and other services is to be translated into a layout showing preferred containment routes. This is to be communicated to the civil engineer at an early stage to allow the foundation and structural frame to accommodate ducts and containment.
Emergency Lighting

The emergency lighting to fully comply with BS 5266, GI/GN7520 and GMITT 0146 will be incorporated in the general lighting luminaires with integral batteries and an inverter to switch over in the event of a local circuit or total power failure. These shall be self contained maintained units to provide autonomy from the mains supply for a minimum of three hours. Emergency lighting luminaires will be installed on the footbridge and stairs to provide 1lux of illumination.
Lift lobby lighting shall incorporate emergency lighting.
All stairs and footbridge emergency lighting shall be tested by means of a test key switch in the electrical distribution cubicle.

Self-illuminated emergency exit signs shall also be provided as required.

5.02.1 Small Power Services

A weatherproof wall mounted heavy duty metalclad general purpose 13A 230V switched socket outlet to BS1363 for the cleaners use will be provided at low level at each footbridge landing. Each socket outlet will be enclosed in a vandal resistant box and have a lockable cover to prevent unauthorised use.
A wall mounted metalclad general purpose 13A 230V switched socket outlet with RCD shall be provided in the electrical distribution cubicle. The socket outlets for general use shall be protected by 30mA rated RCD units from dedicated radial circuits protected by their own miniature circuit breaker. In third and fourth rail areas the socket outlets shall be protected by a DC immune Blakely type unit located adjacent to the ancillary distribution board.

Fire Alarm Equipment

Fire alarms are to be provided, including smoke detector in the top of the lift shaft, but only where the station is equipped with a fire alarm system. A dispensation has been obtained from the National Fire Engineer such that where there is no fire alarm system on the station, an alarm need not be installed to the footbridge/lift system.
Where there is an existing fire alarm system at a station, new fire alarm sounders will be provided at high level on the lift landings at each end of footbridge spans. The sounders will be connected to the existing station fire alarm system in compliance with BS5839 Part1: 2002. If there is no existing fire alarm system at a station, new lift fire alarm installations do not require manual or automatic smoke/heat/fire detection protection. If there is a manual or automatic smoke/heat/fire detection protection system installed at a station and the lift shaft and stairs are integral, the system shall be extended to cover:
- the lift machine room (rate of rise heat type detector).
- the lift shaft (rate of rise type heat detector).
- at each landing.

All wiring for the fire alarm system shall be carried out using mineral insulated copper cable (MICC) supplied with a red over sheath or FD200 in it's own trunking/conduit containment.

Lightning Protection Installation

Calculations according to BS EN 62305 will be carried out on a site specific basis to determine if a lightning protection system is required. If required it will be installed to protect the lift shaft housings, footbridge and stairs and where necessary incorporated into an existing station system. The building construction structural steel columns shall be used as down conductors to preclude unsightly down tapes fixed to the exterior walls of the buildings. The earth electrodes shall be installed in approved concrete housings buried in the ground with
the access covers flush level with the adjacent ground close to the external face of the buildings. The aerial connections shall utilise the metallic roofs of the lift shafts as the collection point with bonding to the top of the structural columns, which will preclude unsightly down conductors on the exterior faces of the shaft. The footbridge structural support columns shall be suitable for the down conductors of the footbridge structure.

**Services generally for the Bridge and Stairs structure**

All the structures are to be designed to accommodate service routes appropriate for the bridge facilities and to provide disciplined accessible containment for current and future needs. To supply the power for the lifts, the route will be along the underside of the stairs, the bridge support and the bridge footway.

The provision for services will include:

- Lift power and ancillary supplies.
- General power circuits.
- Lighting to the bridge and stairs.
- Telecom cables for the lift installation.
- Routes for CCTV data cables.
- Possible routes for CIS
- Possible routes for Station PA
- Possible fire alarm system.
- Spare capacity for future services.
- Accessible turning chambers and draw wires.

Conduits are to be routed so that they do not pass through the lift shaft or the machine rooms (unless they are for the lift services). Distribution boards and cupboards will not be in public areas or in the areas occupied by the lift installation but should be accessible for safe working and inspection.

**5.03 Existing Services**

Locations and routes of existing services shall be identified from station records/archives. Consultants are to carry out intrusive site investigations for all station platform services impacted by the new DDA works. Clearly marked up survey drawings are to be provided to show findings and detailed design information shall be supplied for the diversion of the services.

The illustrations of the foundation piles and supplementary platform service routes indicate that existing services are likely to be encountered and may need rerouting or diversion.

Network infrastructure services such as high voltage cables, signalling cables and overhead line equipment that are likely to be affected by the proposed works must be identified at an early stage. Proposals for such alterations will be treated as enabling works that precede the main contract. Refer to sections 6.01; 6.02; 6.03; and 6.04 in this report.
New Platform Ducts & Conduits

The introduction of new structures will impact on existing subterranean platform services. A thorough buried services investigation is required to establish the line and level of existing services and to identify services that require to be altered.

Ducting for electricity, telecoms services and fire alarms shall be provided as necessary to the appropriate sizes for their use, and their positions marked by warning tape 300mm below FFL and a trace wire if non-conductive in underground locations. The ducting shall be surrounded by an appropriate level of protective fill, with properly compacted back fill, which will support the reinstated surface.

The examples illustrate the intrusive nature of new foundations and services in the platforms.

Surface mounted ducting or electrical containment must be reviewed carefully. Conduits/trunking and tray routes should be horizontal and perpendicular to the parts of the building to which they are fixed.

Service routes for electrical containment are to be accommodated into the steel framework design above and below ground. Structural members, gussets, bearing and base plates may need to be adjusted at the design stage to simplify these routes. The services layout is to be prepared before the foundation and steel frame design is completed: this will enable the ducts and containment routes to be integrated components for the installation as a whole.

Illustration of lighting trunking fitted within painted steel channel.
Note the use of IP rated stainless steel flexible conduit.

I section column fitted with vertical services trunking for CCTV and PA.
To avoid unnecessary swan-neck and offsets to the rainwater down pipe, the structure and the foundations can be adjusted. The example illustrates the need for design coordination. Before the design of the foundations can be finalised, details of the below ground service layout should be established. This will allow service risers and rainwater down pipes to be conveniently located adjacent to the structure.

**Co-ordination with Drainage**

The construction of the new structures may affect the existing platform routes and contours for both surface and foul drainage routes. These are to be identified and suitable diversions and access manholes are to be provided together with proposals for platform falls in the area of the works. Renewed platform surfaces may be required to enable adjustments to platform falls. The design of the drainage must be co-ordinated with both the structures and with the routes of other services. Note that the covered bridge and stairs have rainwater down pipes and these must discharge directly to appropriate surface water disposal routes. Open discharge at the foot of down pipes will not be permitted.

Surface water drainage from the roofs fitted with gutters shall be rationalised and marked up on the general arrangement drawings and services layout. The gutter drainage from the bridge and lift lobby can be linked to lift roof down pipe.
5.04 Designer’s Check List for Form EA and Form EB

This check list is provided to indicate the scope and content of the services submission. Consultants must provide all these deliverables.

1. Signed document control sheet
2. Signed forms EA or EB (if applicable)
3. Signed design certification as required by BS 5839 Section 41
4. Designer’s risk assessment as required by The Construction (Design and Management) Regulations 2007. to include the construction, fabrication, implementation, use and operation of the assets, the maintenance and the renewal and/or demolition of any new or altered assets that form part of the design
5. Cable calculations for all parts of the electrical installation as required by BS 7671 (17th Edition IEE Wiring Regulations 2008)
6. Design discrimination
7. Designer’s assumed diversity factors
8. Maximum bending radius of specified cables
9. Capacities of existing/new cable containment systems
10. Designer’s preferred method of fixing cables to containment systems
11. The requirement for the use of earth links throughout containment systems, Tray and Trunking. (Client requirement)
12. Detail and sizes of support bracketry for all containment systems
13. Details, sizes and types of fixings required to support containment systems and bracketry, this will be dependant on the building fabric and specific point loading
14. In the event that the designer specifies the use of existing containment systems, clarifications will be required to confirm that support bracketry will accept the extra load without detriment
15. The method and detail to maintain the temperature range within the Lift Motor Rooms at between +5°C & +35 °C
16. Provide complete details of existing DNO supplies including ratings, fuse sizes, supply characteristics and system
17. Detail characteristics (PSCC & EFLI) at Lift Motor Room Auxiliary Distribution Boards & Switchfuses to allow for additional design by Lift Specialist
18. Provide label and cable ID schedule
19. Detail Emergency Lighting Requirements
20. Include Lighting Calculations (including normal & emergency)
21. Include detail of lighting system control and over ride – (Over ride switch to be located within the Station Supervisors office and PEC to be located on a North facing wall). This is for new bridge lighting systems only: additions to existing bridge lighting will continue with existing control systems
22. Detail Fire Alarm system type and requirements
23. Include the requirement for lightning protection systems and calculations
24. Include all manufacturers’ product specifications confirming BS, BSEN and Network Rail Standards compliance
25. Provide detail of Earthing and Bonding requirements giving due consideration to OLE and 3rd rail traction systems. This will include, but not be limited to, structural steelwork, main equipotential bonding, supplementary equipotential bonding, mains water, main gas and oil services if applicable
26. Specific Load Monitoring Reports carried out over a 7 day 24hr period.
27. Provide comprehensive detail of DNO upgrades and Station Isolation Plans for the removal of existing supplies and changeover
28. Comprehensive detail of buried and hidden services and complete design for removal/diversion
29. Buried Service Survey Reports, detailing all services detected during the designer’s physical survey. It will not be acceptable to rely solely on existing record drawings for this information
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<td>Intrusive Survey Reports</td>
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<td>Detail the requirements for Inspection &amp; Testing</td>
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<td>32</td>
<td>Detail the requirement for Emergency Lighting certification to meet the requirements of BS 6651</td>
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<tr>
<td>33</td>
<td>Provide detail of separate metering requirements for new lift &amp; footbridge installations. New systems, including lift supplies, Auxiliary DBs and footbridge lighting will require separate metering from the main DNO meter/cut out</td>
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<tr>
<td>34</td>
<td>Provide detail of the condition of the existing wiring system and interfacing assets/interfacing wiring systems. Provide survey reports within the design</td>
</tr>
<tr>
<td>35</td>
<td>Due consideration shall be made for environmental conditions including, but not limited to, salt laden air, area specific conditions and local wild life.</td>
</tr>
<tr>
<td>36</td>
<td>Include records of Electrical, Mechanical, Civils &amp; Structures IDCs</td>
</tr>
<tr>
<td>37</td>
<td>Provide confirmation that the M &amp; E systems have been &quot;Designed in&quot; to the new bridge structure and are not catered for by the use of unsightly “bolt on” systems</td>
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<tr>
<td>38</td>
<td>Provide signal sighting assessment</td>
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</table>

Transparent view of bridge, lift and stairs indicating the challenge of integrating the structural framework and the electrical services design above and below the platform level.
6.0 Additional Form EA and EB submissions

6.01 Telecoms Process and Approvals

New DDA facilities will require adjustment, alteration and supplementary works to the existing CCTV system.
Initially, consultants shall submit the details of the proposed CRE specialist to Network Rail for approval prior to undertaking any design feasibility.

The consultant will submit the scope of the work in a formal Approval in Principle Form EA for approval by Network Rail Engineers.

CCTV cameras and details of the existing CCTV arrangements at stations or groups of stations are to be established and assessed for their capacity to be extended where required. Current ownership/responsibility for maintenance shall be established.
All new stairways, footbridges and lifts adjacent to subways are to be monitored.
Consultations with British Transport Police are to review each station proposal to reduce the likelihood of situational crime and obtain advice on the provision of any additional cameras, mirrors or lighting.

Additions or alterations to the existing Network Rail CCTV system will require the submission of an Approval in Principle application to the NR Territory Engineer (Telecoms) in accordance with NR/SP/TEL/30022, Issue 4, Technical Requirements for Communications Engineering Schemes and Services.
A sample template of the form is available.

A Form EA and Form EB are to be submitted to Network Rail for approval for the proposed works by the Telecoms CRE. Approval is also required from the Train Operating Company who typically maintains the existing system at a station.
The deliverables for Approval in Principle are:

1) AIP granted by the Territory Engineer (Telecom)
2) Detail Design accepted by Project Engineer (Telecoms) for Construction
3) Product Acceptance if applicable.
4) Test Plan accepted by the Project Engineer (Telecoms)
5) Test results.
6) O & M manual
7) Hand-back site meeting with NR Asset Steward, Maintenance Engineer and Project Engineer and, in the case of retail equipment on leased stations, the TOC and the TOC maintainer.

For Lifts, the following work needs to be included in the scope of the Telecoms AIP:

1) The free issue of cameras and housings to the lift installer for incorporation into the lift car.
2) Connection of lift cameras to the station’s security CCTV system. Cameras are required in opposing corners of the lift car and at each landing. Location of Network Terminating Point (NTP) needs to be stated for the division of maintenance responsibility. It will be the connection between the lift cable and the cable to connect the lift camera to the station’s CCTV system, typically housed within the lift machine room.
3) Connection of the lift alarm to the stations’ security CCTV system. NTP is the connection to the lift’s control unit.
4) Changes to, or replacement of, the station’s security CCTV system, if the existing scenes do not adequately cover the lifts.

The Station Service operator may request that the use of the lift is to be controlled from a remote control centre.

If this service has been confirmed for a specific project, a two-way telecom audio link, synchronised with the CCTV monitoring cameras is to be installed in locations where the station is only partially manned.

Station Help Points (not part of this project remit) are to be installed adjacent to lift entrances where the lift is remotely isolated and requiring an ‘on-demand’ lift availability from a remote centre using CCTV to verify suitable lift use.

6.01.2 Lift Telecommunication

Lifts shall be equipped with voice communication equipment designed for use in an emergency.

Lifts must be “voice chipped” such that announcements are made as to the direction of travel, floor level, door opening and closing.

6.02 Overhead Line Works

In circumstances where new DDA facilities are situated in a position that will require adjustment or alteration to the existing OLE structures, the consultant shall submit the scope of the work in a formal Approval in Principle Form EA for approval by Network Rail Engineers.

Initially, consultants shall submit the details of the proposed OLE CRE specialist to Network Rail for their approval prior to any design feasibility.
The Form EA will describe:

- The scope of the works
- Details of existing equipment and record drawings indicating the current arrangements. This will include OLE layouts and cross sections, bonding plan, survey and analysis drawings.
- IDC evidence and Designer’s Risk Assessments.
- Construction requirements describing construction methodology and sequence for commissioning.
- Design Standards and Compliance Details.

Generally work to the OLE will be regarded as enabling works prior to the DDA engineering scope and consultants will need to reconcile this with the proposed site programme.

### 6.03 Signalling Work

As noted in section 2.03, a Signal Sighting report will be carried out for each station, produced in a format in accordance with Railway Group Standards to be reviewed by the Network Rail nominated signalling engineer.

In circumstances where new DDA facilities are situated in a position that will require adjustment or alteration to the existing signalling arrangements, the consultant shall submit the scope of the work in a formal Approval in Principle Form EA for approval by Network Rail Signalling Engineer. Initially, consultants shall submit the details of the proposed CRE specialist to Network Rail for approval prior to any design feasibility.

The Form EA will not necessarily be restricted to the following topics:

- Overall design concept.
- Design parameters and assumptions.
- Draft strategy for Installation, Testing and Implementation.
- Train operating requirements.
- RAMS requirements.
- Safety assurance.
- Scheme approvals.
- Product acceptance.
- Details of existing and new systems together with equipment.

Generally work to alter the signalling will be regarded as enabling works prior to the DDA engineering scope and consultants will need to reconcile this with the proposed site programme.

### 6.04 High Voltage Cables

In circumstances where new DDA facilities are situated in a position that will require adjustment or alteration to the HV cables located in the station platform, the consultant shall submit the scope of the work in a formal Approval in Principle Form EA for approval by Network Rail Power Engineers. Initially, consultants shall submit the details of the proposed CRE specialist to Network Rail for approval prior to any design feasibility.

The construction of lift, stairs and bridge supports require considerable intervention into the platform for foundations and new services. It must be assumed that the potential for encountering existing buried services is high.

Due regard and reference to the Network Rail Company Standards regarding proposed works in the vicinity of buried services, shall be made by the consultant, in the submission of any design.

(DR/L2/AMG/1010  Issue 1 Dec08  Working in the Vicinity of Buried Services)

Generally work to alter the HV feeder cables will be regarded as enabling works prior to the DDA engineering scope and consultants will need to reconcile this with the proposed site programme.
7.0 Technical Standards Schedule

These specifications shall be read in conjunction with, but not limited to, the following documents and Network Rail Group and Company Standards that also form part of the specification. The requirements of these documents shall also apply to any Sub-contractors proposed by the Principal Works Contractor for the project:

Schedule of documents relating to design of station footbridges

<table>
<thead>
<tr>
<th>Document Code</th>
<th>Year</th>
<th>Title and Details</th>
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<tbody>
<tr>
<td>BS 4449</td>
<td>2005</td>
<td>Specification for Carbon Steel Bars for the Reinforcement of concrete</td>
</tr>
<tr>
<td>BS 5395</td>
<td>Part 1</td>
<td>2000 CP for Design, Construction and Maintenance of straight stairs and winders</td>
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<tr>
<td>BS 5400</td>
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<td>Steel concrete and composite bridges</td>
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<tr>
<td>Part 1</td>
<td>1988</td>
<td>General Statement</td>
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<td>Part 2</td>
<td>2000</td>
<td>Loads (as implemented by BD37/01 DMRB 1.3)</td>
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<tr>
<td>Part 3</td>
<td>2000</td>
<td>CP for design of steel bridges</td>
</tr>
<tr>
<td>Part 9</td>
<td>1983</td>
<td>Bridge bearings</td>
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<tr>
<td>Part 10</td>
<td>1980</td>
<td>CP for fatigue</td>
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<tr>
<td>BS 5588</td>
<td>2004</td>
<td>Fire precautions in the design, construction and use of buildings.</td>
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<tr>
<td>BS 6180</td>
<td>1999</td>
<td>Barriers in and about buildings – Code of Practice</td>
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<tr>
<td>BS 6779</td>
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<td>Highway parapets for bridges and other structures</td>
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<tr>
<td>Part 1</td>
<td>1998</td>
<td>Specification for vehicle containment parapets of metal construction</td>
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<td>BS 7677</td>
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<td>IEE Wiring Regulations (noting NR qualifications on RCD protection)</td>
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<tr>
<td>BS 7818</td>
<td>1995</td>
<td>Specification for pedestrian restraint systems in metal</td>
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<td>BS 8004</td>
<td>1986</td>
<td>CP for Foundations</td>
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<td>BS 8300</td>
<td>2009</td>
<td>Design of buildings and their approaches to meet the needs of disabled people</td>
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<td>BS 8500</td>
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<td>Concrete – Complementary British Standard to BS EN 752</td>
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<td>Part 1</td>
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<td>Method of Specifying and Guidance for the Specifier</td>
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<td>2006</td>
<td>Specification for Constituent Materials and Concrete</td>
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<td>2005</td>
<td>Safety rules for the construction and installation of lifts.</td>
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<td>BS EN 50122</td>
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<td>Railway Applications – Fixed Installations</td>
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<tr>
<td>Part 1</td>
<td>1998</td>
<td>Protective provisions relating to Electrical Safety and Earthing</td>
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Territory Engineers have requested that Electrical Specifications conform to their format and standards to facilitate handback procedures.
MISCELLANEOUS
TSI Interoperability: Accessibility for People with Reduced Mobility
DfT Code of Practice July 2008 “Train and Station Design for Disabled Passengers”
Sign Design Guide, A guide to inclusive signage by Joint Mobility Unit and Sign Design Society
Building Regs 2000 section M

THE DESIGN MANUAL FOR ROADS AND BRIDGES (DMRB)

BRIDGES AND STRUCTURES, STANDARDS
BD 29/04 Design criteria for footbridges
BD 37/01 Loads for Highway Bridges
TD19/06 Requirement for Road Restraint Systems

TRAFFIC ENGINEERING AND CONTROL, STANDARDS
TD 19/06 Requirement for Road Restraint Systems

Relevant railway group standards

NR/L2/INI/02009 Issue 3 Dec 08 Engineering Management for Projects
NR/L2/INI/CP0047 Dec 08 Application of Construction Design Management Regulations to Infrastructure and Investment Projects.
GC/RT5112 Issue No. 2 Dec 08 Loading Requirements for the Design of Bridges
GC/RT5212 Issue No. 1 Feb 03 Requirements for Defining and Maintaining Clearances
Guidance Notes on the Standard Obstructions Gauge
GE/RT8063 Issue No. 1 Feb 04 Deterring Unauthorized Access and Vandalism


GC/RT5161 - Station platform design and maintenance requirements.
GI/RT7003 - Safety management of construction activities within the railway environment.
GE/RT8024 - Persons working on or near to AC electrified lines.
GE/RT/8025 Issue No. 1 Oct 01 Electrical Protective Provisions For Electrified Lines
GE/RT 8029 Structure Clearance
GC/RT 5110 Design requirements for Structures
BS EN 50122 part 1 1998 Protective provisions relating to electrical safety
GC/RT 5164 Design requirements for roofs & glazing
GI/RT7003 Issue No. 1 Aug 01 Management of Construction Works in the Railway Environment. Lighting of Railway Premises.
GI/RT7016 Issue No. 2 Dec 07 Interface Between Station Platforms, Track and Trains
RIS-7700-INS Issue No 1. Dec 07 Rail Industry Standard for Station Infrastructure
Rt/CE/C/002 Application and Reapplication of Protective Treatments to RT Infrastructure.
GK/Rt0036 Signal Positioning and Visibility
**Network Rail Company Standards (formerly line standards)**

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<td>NR/GN/CIV/002</td>
<td>Issue 4 Feb 02</td>
<td>Application and Reapplication of Protective Treatment to Network Rail Infrastructure</td>
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<td>NR/GN/CIV/008</td>
<td>Issue 1 May 95</td>
<td>Model Clauses for Specifying Civil Engineering Works.</td>
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<tr>
<td>NR/SP/CIV/003</td>
<td>Issue 2 Apr 04 Oct 01</td>
<td>Technical Approval of Design, Construction and Maintenance of Civil Engineering Infrastructure</td>
</tr>
<tr>
<td>NR/SP/CIV/039</td>
<td>Issue 4 Feb 02 Spec. RT98</td>
<td>Protective Treatments for Civil Engineering Structures.</td>
</tr>
<tr>
<td>NR/SP/CIV/071</td>
<td>Issue 2 Aug 04</td>
<td>Remediation and Geotechnical Aspects of Foundations for Structures</td>
</tr>
<tr>
<td>NR/SP/CIV/140</td>
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<td>Control and use of Model clauses</td>
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<tr>
<td>NR/GN/ELP/27228</td>
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<tr>
<td>NR/SP/ELP/27230</td>
<td>Issue 1 Oct 05</td>
<td>Guidance note for new and upgraded lifts</td>
</tr>
<tr>
<td>NR/OP/DOC/22</td>
<td>NR/ENG/06/22</td>
<td>Network Rail Engineering Policy for Lighting of Railway premises</td>
</tr>
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<td>NR/L2/AMG/1010</td>
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<tr>
<td>NR/L2/TEL30135</td>
<td>Issue 1 Dec 07</td>
<td>Technical Requirements for Security CCTV Systems on NR Infrastructure.</td>
</tr>
</tbody>
</table>

**TRACK AND OTHER Specifications** (AS APPLICABLE TO STRUCTURES)

- **RT/CE/S/069** Issue 2 Feb 05 Lineside Facilities for Personal Safety

**UIC CODES**


**Design life for new infrastructure:**

The design life, under the worst expected exposure condition shall be:

- Staircases: 120 years
- Main span supports: 120 years
- Main span primary and stiffening members: 120 years
- Main span cladding and secondary fittings: 30 years
- Lift lobby primary and stiffening members: 120 years
- Lift lobby cladding and secondary fittings: 30 years
- Lift shaft primary and stiffening members: 120 years
- Lift shaft secondary members, fittings and cladding: 30 years
- Concrete foundations: 120 years
- Electrical and mechanical: 25 years
Poor integration of services and details not to be repeated

There are several details of service routes and fittings which illustrate the apparent poor interdisciplinary co-ordination and lack of information on the drawings. The resultant installations have relied on site ‘innovation’ and (while attempting to overcome the lack of design information on the drawings) provide proof that reliance on the principle of ‘sorting things out onsite’ is likely to be unsatisfactory.

Rainwater down pipe at the foot of stairs
The stair foundation prevents vertical connection to sealed back inlet gulley. The alignment of the down pipe does not coincide with the side gutter. Both offsets are unacceptable.

Rainwater down pipe from bridge roof.
The route of the down pipe has not been anticipated on the contract drawings. This precarious slender ‘vine’ relies on rigid joints, few fixings and a final connection stapled to the bridge support. This illustrates a lack of construction guidance on the drawings.

Electrical IP-rated cabinets located adjacent to the bridge.
This vertical riser illustrated is ‘approximately’ lashed to the structure. No apparent direction given on the drawings leaving the sub-contractor to do his best.

Electrical cabinet located adjacent to lift machine room.
To avoid site improvisation, such cabinets should be integrated into the brick enclosure. Refer to the section on Lift Machine Room planning.
Note: Correct use of perimeter colour contrast soldier course.
Co-ordination of platform ducts and foundation design will avoid this detail. The only option, once built, is to cover this detail with a metal ‘club foot’ - which becomes a trip hazard.

This illustration is an inaccessible, high level platform lighting luminaire attached to the bridge cladding. A possession is required to change a bulb. This improvised site detail is a principle to avoid.

Inconsistent setting out of platform tactiles is not acceptable. (It has been corrected subsequently) The alignment of the tactiles is set by the widest coper. Details of setting out, preparation and specifications are given in the Appendix.

Existing manhole intrudes into the zone for tactile paving. The correct requirement is to remove the existing cover and provide a replacement recessed cover and frame to allow continuity of yellow line and tactile pavior.
IDC REVIEW

DDA PROGRAMME – LIFTS

<table>
<thead>
<tr>
<th>Station:</th>
<th>IDC Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lift Ref/s.:</td>
<td>IDC Date:</td>
</tr>
<tr>
<td>Lift Spec. ref.:</td>
<td>Review By:</td>
</tr>
<tr>
<td>Lift environmental drawings:</td>
<td>Company:</td>
</tr>
<tr>
<td>Lift contractor’s drawings</td>
<td></td>
</tr>
</tbody>
</table>

CHECKLIST

This is a check list for the provision of all the elements required for the preparation and installation Network Rail approved lift specialist supply contract. It confirms details and dimensions to be provided by the design consultants to be incorporated in the main contract drawings and documents.

Access to the Lift Machine Room

1. Level?  
   a) Step up or down into? Steps to be clearly marked/tripping hazards to be identified.  
   b) If steel stairs then they to be earth bonded by the electrical contractor.

2. Route (from offloading point to LMR) suitable for equipment access?  
   a) Is it an easy route?  
   b) At least 1000 wide to navigate equipment (note: hydraulic tank is nom. 1600 l x 800 w)  
   c) External lifting beams/gantries required? (permanent or temporary + details enclosed in WPPs and O&M Manual.  
   d) Requiring PTS/TVP + COSS access. Note 12 TVP p/a and a typical 40 day installation programme.

3. Well illuminated?  
   a) Part of station common area lighting?  
   b) Or requiring specific arrangements?
### Lift Machine Room (LMR)

#### 4. Size (internal):
- a) At least 1.8m w × 2.8m d (with door in 1.8m wall) if remote.
- b) At least 1.8m w × 2.5m d (with door in 1.8m wall) if adjacent.
- c) At least 2.4m w × 2.4m if remote from lift shaft.
- d) At least 2.4m w × 2.1m d (with door in 2.4m wall) if adjacent.
- e) Minimum height beneath lifting beam – 2.1m
- f) Other sizes – by consultation

#### 5. Construction:
- a) 1 hour fire rated
- b) Weatherproof
- c) Imperforate (except for ventilation see later) to unauthorised access/vermin intrusion.
- d) Offering thermal qualities to maintain +5°C to +35°C ambient operating temperature (twin bar 360w typically supplied by Lift Contractor).

#### 5. Construction (continued)…
- e) Flooring suitable to take equipment loads (tank 500Kg, accumulator 200Kg, controller 150Kg)
- f) Flooring – oil sealed (flooring paint)
- g) Walls – suitable to take fixings for switches, sockets, remote monitoring systems, intercoms, handwinding systems, trunking, tubing etc.
- h) Walls - flush lined and dust sealed white (masonry paint)
- i) Ceiling – removable for soffit inspection access?
- j) Ceiling – suitable to take fixings for light fittings etc.
- k) Ceiling – flush lined and dust sealed white (paint).

#### 6. Ventilation:
- a) Not to be extracted onto an escape route.
- b) Natural smoke vent required offering at least 1% of plan area of LMR clear ventilation.
- c) To be vandal resistant and designed/constructed/installed to prevent weather/vermin entering the LMR.
- d) To be externally and internally lined flush to negate ledges (roosting perches or dust/debris collection points).
- e) To be fitted with a notice not to obstruct if this is a risk.
  
  Forced ventilation required when LMR temperature can increase over +35°C (during summer?) considering 2KW max. thermal output of lift equipment (operating at full capacity).

#### 7. Lifting beam:
- a) 300Kg SWL.
- b) Painted and certified.
- c) Copy of the test certificate required (to BYLCL) for lift handback.
- d) 100mm space above to wrap a strop.
- e) Positioned over hydraulic tank allowing offloading for a defective pump.
  
  To be earthed by electrical contractor
### Lift Machine Room (continued)...

#### 8. Access Door/s:
- a) Open outwards (peep hole if can open onto public).
- b) Suitable for external application.
- c) To be vandal resistant.
- d) To match other doors in the vicinity (planning requirement?)
- e) To be earthed by electrical contractor if metal.
- f) Can incorporate vents (see above)
- g) Min. 1000mm wide (1200mm preferred) w x 2000 h clear opening.
- h) Can comprise of single or twin doors (space permitting).
- i) To be fitted with a door closer or be latched if subject to wind/passing trains
- j) To be fitted with handles that do not present a catch point.
- k) To be fitted with hinges that do not allow the doors to be lifted off.
- l) To be locked via a snib type lock (that can be opened from within without requiring a key).

#### 9a. Service Ducts: (LMR adjacent to lift shaft)
- a) 2 x 150mm dia. service holes to be formed through party wall. One for lift hydraulic pipe. One for lift cables (double insulated trailing flex with common insulation values).
- b) Further 50mm service hole required for lift shaft smoke detection, if required.
- c) Best marked (by Lift or Fire Alarm Contractor) and cored (by Builder) on site, offering exact location after LMR set out.
  - To be fire stopped (by Builder) after and made good and decorated where visible through door vision panels.

#### 9b. Service Ducts: (LMR remote from lift shaft)
- a) Route to be as short and straight as practicable (minimum 500mm bends) between LMR and lift shaft.
- b) Draw pits not necessary.
- c) Seek advice if distance is over 10 metres.
- d) 2 x 150mm dia. interconnecting ducts required.
- e) + 50mm duct for shaft smoke detector, if required.
- f) To enter LMR as close to a corner as practicable but not where there are incoming services.
- g) Ducts to be robust (i.e. withstand differential movement between slab and made ground) and imperforate (other than ends).
- h) Ducts to be cleaned internally prior to laying.
- i) To project a minimum 100mm above ground (preventing debris being swept within).
- j) To finish flush with lift pit wall.
- k) To enter the lift pit as close to a corner as practicable and at approx. 300mm a.f.f.l. 
- l) To be provided with a pull through rope and temporarily endstopped with rag (to maintain clean).
  - To be firestopped when lift installed.
<table>
<thead>
<tr>
<th>10.</th>
<th>Incoming Services:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>To enter LMR adjacent to LMR doors</td>
</tr>
<tr>
<td>b)</td>
<td>To be fed from above or below?</td>
</tr>
<tr>
<td>c)</td>
<td>Route and ducts/containment to be considered.</td>
</tr>
<tr>
<td>d)</td>
<td>400v 3 phase to be terminated in a TP+SN isolator with lock off facility and 50amp HRC fuses (for 16 per. VVVF accumulator hydraulic lift), typ. 1000 a.f.f.l. and within reach of doorway.</td>
</tr>
<tr>
<td>e)</td>
<td>Secondary supplies (UPS) and switch over panels?</td>
</tr>
<tr>
<td>f)</td>
<td>220v 1 phase supply to be independent from 3 ph. supply to allow lift isolation maintaining lighting etc.</td>
</tr>
<tr>
<td>g)</td>
<td>1 phase supply to be terminated in a 15 way consumer unit with MCBs to suit lift circuits (max. 13 amp draw with heating, lighting etc. on).</td>
</tr>
<tr>
<td>h)</td>
<td>Telecoms</td>
</tr>
<tr>
<td>i)</td>
<td>CCTV</td>
</tr>
<tr>
<td>j)</td>
<td>Smoke detection?</td>
</tr>
<tr>
<td>k)</td>
<td>Earth leakage device to be provided by Lift Contractor where 3rd rail train traction.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>11.</th>
<th>Lift Pit</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>To be structurally robust to suit lift loads.</td>
</tr>
<tr>
<td>b)</td>
<td>To suit the minimum plumb lift shaft requirements for the lift.</td>
</tr>
<tr>
<td>c)</td>
<td>To be the required depth.</td>
</tr>
<tr>
<td>d)</td>
<td>To be waterproof.</td>
</tr>
<tr>
<td>e)</td>
<td>To have a level base (except sump).</td>
</tr>
<tr>
<td>f)</td>
<td>To have a 400 x 400 x 500mm deep sump in the front right corner of the lift shaft (except for side slung hydraulic lifts).</td>
</tr>
<tr>
<td>g)</td>
<td>Sump to have a flush fitting grille, robust enough to stand on.</td>
</tr>
<tr>
<td>h)</td>
<td>Lift pit to be oil sealed (red or grey floor sealant paint).</td>
</tr>
<tr>
<td>i)</td>
<td>Ledges (over 150mm) on top of the pit to be ramped off. These to be earth bonded if metal.</td>
</tr>
<tr>
<td>j)</td>
<td>To incorporate a threshold rebate to suit the lift entrance.</td>
</tr>
<tr>
<td>k)</td>
<td>To incorporate P3270 unistruts cast flush into the face of the lift pit walls for fixture of the rams and guide rails and lift entrance sill.</td>
</tr>
<tr>
<td>l)</td>
<td>First level of ram/guide rail fixings to be 500mm above pit floor level.</td>
</tr>
<tr>
<td>m)</td>
<td>Entrance sill unistrut to be circa 200mm below f.f.l.</td>
</tr>
</tbody>
</table>
### Lift Shaft

<table>
<thead>
<tr>
<th></th>
<th>Construction:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>To be structurally robust to suit lift loads.</td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td>To suit the minimum plumb lift shaft requirements for the lift.</td>
<td></td>
</tr>
<tr>
<td>c)</td>
<td>To be fully enclosed and waterproof.</td>
<td></td>
</tr>
<tr>
<td>d)</td>
<td>To be designed to negate any ledges (over 150mm). Balustrade to be fitted on car roof if steel structure negating full screening requirement.</td>
<td></td>
</tr>
<tr>
<td>e)</td>
<td>To be designed not to include sharps (i.e. heads of protruding TEK screws) or other hazards.</td>
<td></td>
</tr>
<tr>
<td>f)</td>
<td>Consultation required if incorporating glass panels. Consideration to be given to: • Cleaning • Breakage/replacement • Solar gain (discomfort for those could be stuck in a lift) • Screening off unwanted viewed areas • External cladding of lift car</td>
<td></td>
</tr>
<tr>
<td>g)</td>
<td>To incorporate means of fixing the rams and guide rails (unistrut if shaft is of masonry construction, holes in structure if steel).</td>
<td></td>
</tr>
<tr>
<td>h)</td>
<td>Ram/guiderail fixings to continue @ 1250mm pitches up the shaft from the pit unistrut @ 500 a.p.f.l. (top pitch @ 200mm below lifting beam).</td>
<td></td>
</tr>
<tr>
<td>i)</td>
<td>To be internally dust sealed white (cladding finish or masonry paint).</td>
<td></td>
</tr>
<tr>
<td>j)</td>
<td>To incorporate a lifting beam.</td>
<td></td>
</tr>
<tr>
<td>k)</td>
<td>To incorporate a smoke vent at the top of the shaft.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Lifting beam:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>2500Kg SWL (for a 16 person lift)</td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td>Painted and certified.</td>
<td></td>
</tr>
<tr>
<td>c)</td>
<td>Copy of the test certificate required (to BYLCL) for lift handback.</td>
<td></td>
</tr>
<tr>
<td>d)</td>
<td>100mm space above to wrap a strop.</td>
<td></td>
</tr>
<tr>
<td>e)</td>
<td>Positioned over the hydraulic rams and lift car.</td>
<td></td>
</tr>
<tr>
<td>f)</td>
<td>To be earthed by electrical contractor (with the structure?)</td>
<td></td>
</tr>
<tr>
<td>g)</td>
<td>Vertical height from the lift car entrance threshold to the underside of the lifting beam to be 4 metres.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Ventilation:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Natural smoke vent required offering at least 1% of plan area of lift shaft as clear ventilation.</td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td>To be vandal resistant and designed/constructed/installed to prevent weather/vermin entering the lift shaft.</td>
<td></td>
</tr>
<tr>
<td>c)</td>
<td>To be externally and internally lined flush to negate ledges (roosting perches or dust/debris collection points).</td>
<td></td>
</tr>
<tr>
<td>d)</td>
<td>To be fitted with a notice not to obstruct if this is a risk.</td>
<td></td>
</tr>
</tbody>
</table>
### Lift Entrances

#### 15. Structural Openings:

- **a)** To be sized in accordance with the door requirements.
- **b)** To incorporate a threshold rebate to suit the lift entrance.
- **c)** To incorporate P3270 unistruts cast into the internal faces of the lift shaft at header and sill levels, or drillings if a structure, to suit the fixture of the lift entrances.
- **d)** Entrance sill fixings to be circa 200mm below f.f.l.
- **e)** Entrance header fixings to be circa 2550mm a.f.f.l.
- **f)** To screen off or include ramps to each side of entrances internally to negate ledges and earth bond if unconnected metal.
- **g)** To include for PFC entrance liners on steel structures to provide reinforcement to the architraves where they can not be practically backfilled to masonry surrounds.
- **h)** To include cutouts in the shaft front wall for landing operating panels (LOPs).
- **i)** To include cutouts for sump extract and indication equipment where required.
- **j)** To include for secondary steelwork or pattresses to support the LOPs and sump extract and indication equipment.
- **k)** To include for shuttering and screeding and incorporation of floor finishes up to the lift entrance sill or include site measured (after installation of the landing entrances) threshold flooring plates where a lift serves a steel footplated footbridge.
- **l)** To include a 25mm high ramp to the flooring to dissuade rain water from entering the lift shaft where entrances are exposed to weather.
- **m)** To allow interfacing of the (stainless steel) architraves to the lift lobby wall finishes, i.e. mastic seal to fairface brickwork or cladding.
- **n)** Threshold levels for the lift car entrance openings to be confirmed by the design consultant and supplied to the lift installer.

#### 16. Externally:

- **a)** To offer a 1500mm x 1500mm lobby (minimum).
- **b)** To include lift lobby lighting
- **c)** CCTV
- **d)** Smoke detection
- **e)** To offer weather protection to those waiting for a lift (canopy?)
- **f)** If including a perch seat, this to be sited away from the landing operating station (right hand side of entrance).
- **g)** Over entrance lighting (part of common area lighting or required to be lift specific)?

#### 17. Finishing:

- **a)** To offer colour contrast with a black Raltex lift architraves.
- **b)** To offer colour contrast with New Gardinia finished (BS 10 B15) landing operating panels.
- **c)** Floor finishes at each level?
Appendix B

Railway Estates Design Guidance

Note

1
1.2 Platform Surfacing
Platform Edge warning
Surface
1.2.1 Pre-cast
ConcreteTactile
Paviour – A. External
Environments

General Design Requirements

Railway Group Standard Ref:
GIERT7016 ‘Station Platform Design
Requirements’:

- Platform surfaces shall be firm, non-
slip and shall be able to be cleaned of
dirt and debris.
- Surfacing shall be constructed to
provide a fall away from the rear edge
of the copings or the platform edge as
applicable.
- Platform edges shall be non-friable.

Introduction

- Tactile surfaces are used to warn
visually impaired people that they are
approaching a hazard. There are two
hazard situations on platforms which
may require highlighting in this
manner: 1. the platform edge and 2.
the start of a staircase or publicly
used ramp.
- Guidelines for the use of tactile
surfaces is produced by the
Department For Transport
- The tactile pattern to be adopted for
use on railway station platforms is the
‘Platform Edge (Off-Street)’ pattern as
described by the DFT. This has an
offset blister when viewed side to
side and must be laid with the
direction of travel as illustrated. The
meaning of this warning surface is
‘edge hazard, stop’ Note: This
surface is different to the blister
surface used on pavements to warn
of the absence of a kerb at pedestrian
crossing points.
- Tactile surfaces are manufactured
from a number of different materials.
The majority type installed on railway
premises to date is the pre-cast
concrete version. Where extensions
to existing installations are planned
these should generally be of the same
type.
- Where there is need to match a
higher quality interior finish such as
terrazzo or stone, which is likely to
be bedded on a power floated screed,
then consideration should be given to
a thin bed ceramic tactile. (See
Guidance Note 8)
- Where operational constraints
prevent the use of concrete tactile
surfaces and where a sound and
smooth surface is present,
consideration can be given to an
adhesive tile so long as all tolerances
are met and that a life cycle guarantee
can be given.

Note: The decision whether to install tactile
surfaces in platforms hitherto tactile free
should be made in accordance with the policy
attached to this standard.

General Specification

- The preferred module size is 400mm
x 400mm x 50mm thick and is of pre-
cast concrete. The modules are to be
laid to form a strip 400mm wide along
the entire operational length of the
platform but always excluding the
ramped ends.
- The surface should never be used at
right angles to the platform edge to
mark the end of the platform. If it is
necessary to deter or prevent
passengers straying beyond the
operational area then deterrent
surfaces or barriers should be
installed.
- The tactile surface should be of
contrasting tone to the platform
surface and should not be red.
This is reserved for controlled
crossing points. Where dark bitumen
macadam is installed, the tactile
module should be buff. Where the
platform surface is light e.g. pale grey
DDA Step Free Programme at Stations

Do not lay paving if the temperature is below 3°C on a falling thermometer or below 1°C on a rising thermometer.

- Do not use frozen materials or lay bedding on frozen or frost covered bases.
- Adequately protect paving with mortar joints and/or mortar bedding from frost damage, rapid drying out and saturation until mortar has hardened.

Acceptance of base

- Prior to starting work, ensure base is sound, clean, suitably close textured, free from movement under compaction, cracks and loose material.

Mortar bedding

- Tactile paviours are to be bedded on a full 50mm thick mortar bed comprising a mix of 1:3-4 lime:sand or 1:4-5 cement sand.
- Spread and level mortar to give specified average nominal thickness after bedding of slabs.
- Lay slabs on full mortar bed and bed down to line and level with a maul.
- Keep plant and banker boards clean at all times.
- Measure materials accurately by volume using clean gauge boxes. Proportions of mixes are for dry sand: allow for bulking if sand is damp.
- Mix ingredients thoroughly to a consistence suitable for the work and free from lumps. Mortars containing air entraining admixtures must be mixed by machine, but do not overmix.
- Do not mix mortar or lay paving when the air temperature is at or below 3°C and falling or 1°C and rising.
- Do not use frozen materials or lay bedding on frozen or frost covered bases.
- Adequately protect paving with mortar joints and/or mortar bedding from frost damage, rapid drying out.

Specification and Workmanship.

Laying pre-cast concrete tactile paviours

- Care should be taken to ensure that the tactile is laid with the blisters aligned for the correct direction of travel.
- Paviours should be laid in whole units and cutting of slabs should be avoided in order to retain the integrity of the blister pattern.
- The line and level of finished pavings with adjacent finishes should be smooth and even with falls to match. (Note: The tactile surface should be laid to the same surface cross fall as the adjacent platform element. The platform edge coping should be laid horizontal in the cross section)
- Paviours must be bedded firmly so that rocking cannot occur.
- Finished paving to have an even overall appearance with even joint widths and free from mortar and sand stains.

Laying conditions
and saturation until mortar has hardened.

- Use mortar within approximately two hours of mixing at normal temperatures. Use retarded mortar within the time and site temperatures recommended by the manufacturer, but only within these time limits.

**Mortar pointed joints**

- Mortar mix shall be 1:4:1/2 semi-dry cement: sand, grading limit M.
- When the surface of the paving is dry and rain is not expected, carefully and thoroughly fill joints using a proper pointing tool and sanded masking shield. Tool to a bucket handle profile 2-3mm below the slab surface. Clean mortar from face of slabs before it sets.

**Insertion of 400mm x 400mm concrete tactile paviours in existing palform surfaces**

Where concrete tactiles are inserted behind copers in existing bitumen macadam platform surfaces:

- Neatly and accurately cut back and remove the existing surface to a minimum of 700mm behind the copers using a mechanically operated circular saw. Place the tactile directly behind the coper allowing for a 10mm joint. Ensure that the offset blister pattern is in the correct orientation and bed on a semi-dry 1:3 cement: sand mix. 30-50mm thick.
- The 300mm excavated surface behind the tactile paviour should be filled with cold laid permanent macadam such as Tarmac Pathmaster and jointed using a bituminous sealant such as Tarmac Edgemaster or similar approved product and compacted using a trench whacker. Care must be taken so as not to damage the tactile paving.
- The gap between the tactile surface and the platform coper should be filled to prevent a tripping hazard and the possible effects of differential settlement. It is recommended that Thiokol 600 elastomeric sealant or similar approved be used to seal the surface of the joint to a minimum 10mm joint width with the use of Hydrocell XL beneath it to give the sealant full support for pedestrian traffic. The Thiokol 600 should be a minimum joint depth of 20mm and the joint should be primed for maximum adhesion with Fasroc Primer 7 or similar approved product.

1. **References:**

- Department For Transport ‘Guidance on the use of Tactile Paving Surfaces’
- Strategic Rail Authority Practice ‘Train and Station Services for Disabled Passengers’
- HMRI ‘Railway Safety Principles and Guidance, Part 2 Section B, Guidance on Stations’ HS(G) 153/3
- Railway Group Standard – GI/RT7016 ‘Station Platform Design Requirements’
- Railway Group Standard – GI/RT7014 ‘Infrastructure Requirements at Stations’

**Manufacturer / Supplier**

Manufacturers who can supply materials in accordance with these notes are:

**A. Pre-cast concrete**

1. Camas Building Materials
   Hull and Ward
   Ashbourne
   Derbyshire, DE6 3ET
   Tel: 01335 370222

2. Marshalls
   Landscape House
   Premier Way
   Lowfields Business Park
   Elland HX5 9HT
   Tel: 01422 312000

**B. Ceramic**

Shackerley Holdings Ltd

Adhesive

Polydeck Ltd
Plan of copers, tactile paviours and warning lines
Scale 1:50

Cross section A - A
Scale 1:10

Cross section B - B
Scale 1:10

Plan of tactile unit
Scale 1:10

Cross section through platform
Scale 1:20

Operational Property
Railway Estates
2nd Floor The Podium
1 Everhot Street
London NW1 2DN
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Fax:

Plans and Sections
Scale: 1:20, 1:50, 1:50 @ A3
Drawn:
Date:
Revised:

Station Platform Components
Design Guidance Note
Platform Edge Warning Tactile Surface
I External Environment - Concrete
Drawing Number: NR.PO.DGN 1.2.001
Railway Estates Design Guidance

Note

1 Platform Surfacing

1.3 External Platform Surfacing
1.3.1 Bituminous Macadam

General Design Requirements

Railway Group Standard Ref: GI/RT7016 ‘Station Platform Design Requirements’:

- Platform surfaces shall be firm, non-slip and shall be able to be cleaned of dirt and debris.
- Surfacing shall be constructed to provide a fall away from the rear edge of the coping or the platform edge as applicable.
- Platform edges shall be non-friable.

Introduction

The platform surface should be firm, non-slip and free from depression, humps or irregularities. Breaks in the surface such as single steps, thresholds to doors and drainage channels across points of access should be avoided.

The surface should have a design life of 25 years.

Surface finishes should have a coefficient of friction not less than 0.45 in wet conditions.

The following specification indicates the preferred option but includes standard variations where conditions dictate.

General Specification

Wearing Course:
- 20mm thick dense bituminous macadam.
- 6mm medium grade 200pen aggregate.

- Where thicker course is unavoidable, aggregate size should be increased such that the course thickness is 3 times the aggregate size, e.g. 10mm aggregate in 30mm thick course.

Note:
Materials used for the wearing course should comply with DIT Specification for Highway Works, Clause 912 and BS 4987: part 1

Base Course:
- 50mm thick dense bituminous macadam
- 20mm medium grade 200pen aggregate.
- Where thicker base course is unavoidable, aggregate size should be increased such that the course thickness is 2.5 times the aggregate size, e.g. 28mm aggregate in 70mm course and 40mm aggregate in 100mm course.

Sub-base / fill:
- Minimum 150mm thick selected granular type 1 material in accordance with specification for Highway Works Clause 803

Note:
Basecourse materials should comply with the DIT Specification for Highway Works, Clause 906 and BS4987:part 1 and with sub-clauses 1 and 2 of clause 906. This requires the following:-

Filler - When the course aggregate is gravel, 2% by mass of the total aggregate of Portland cement or Hydrated Lime shall be added. The percentage of fine aggregate shall be reduced accordingly. Cement or Hydrated lime is not required when the gravel is limestone.

Binder – The binder shall be petroleum bitumen complying with BS3690: part 1. The penetration of the bitumen shall be either grade 100 or 200 penetration. When produced in a drum mix plant, the maximum temperature at any stage shall be 175 degC when 100% penetration is used.

Specification and Workmanship.
Supply
- Not less than two weeks prior to the commencement of work, submit as instructed the names and suppliers of bituminous material.
- At the time of delivery, submit a test certificate for each manufacturing batch. This is to include a certificate of compliance with the specification and relevant BS together with complete information on the composition of each mix.

Sub-base
Before commencing wearing course ensure that:
- The sub-base is sound, free of debris, mud and soft spots and suitably close textured.
- Levels and falls of the sub-base are as detailed within the specified tolerances of ±20mm (vehicular areas) and ±12mm (pedestrian areas)
- Drainage outlets are within +0mm to −10mm of the required finished level.
- Kerbs and edgings are complete, adequately bedded and hammered and to the required levels

Abutments
- Clean all edges of manholes, kerbs and other abutments and paint with a thin, uniform coat of bitumen

Laying – General
- Remove all loose material, foreign matter and standing water from the surfaces to receive further courses of material.
- Form neat junctions with, and prevent damage to, adjacent work. Keep clean all channels, kerbs, inspection covers etc.
- Keep new work free from traffic until it has cooled to prevailing atmospheric temperature. Do not allow allow rollers to stand on paving at any time.
- Do not use paving as a building platform or for storing, mixing or preparing materials.
- Lines and levels of finished surface to be smooth and even with regular falls to prevent ponding.
- Finished surface of paving to be of even overall texture and to be left in clean state upon completion of work.

Cold Weather
- Do not use frozen materials or lay paving on frozen or ice covered surfaces.
- Do not lay coated macadam if the temperature of the laying surface is below 2 deg. C (or 1 deg. C on a rising thermometer)

Levels
- Level of finished surface shall be within ±6mm of required levels (+6mm – 0mm adjacent to gullies and manholes)

Regularity
- Where appropriate in relation to the geometry of the surface, the variation in gap under a 3000mm straight edge (with feet) placed anywhere on the surface shall not be more than:
  - Wearing course 3mm
  - Basecourse 6mm

Completion
- Leave site in clean and tidy manner, remove all rubbish and unused materials.

References:
- HMRI ‘Railway Safety Principles and Guidance, Part 2 Section B, Guidance on Stations’ HS(G) 153/3
- Railway Group Standard – GI/RT7016 ‘Station Platform Design Requirements’
- Railway Group Standard – GI/RT7014 ‘Infrastructure Requirements at Stations’
DDA Step Free Programme at Stations

Ref: CCMS
Edition: January 2009

Plan
Scale 1:50

Cross Section A - A
Scale 1:20

Operational Property
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1 Eversholt Street
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Plans and Section
Scale: 1:20, 1:50
Drawn:
Date:
Revised:

Station Platform Components
Design Guidance Note
Platform Surface / External Environment

Drawing Number: NRPO.DGN 1.3.001
Railway Estates Design Guidance

Note

1 Platform Surface Design

1.4 Painted markings and signs

General Design Requirements

Railway Group Standard Ref: GC/RT 5161 ‘Station Platform Design Requirements:

- Platform surfaces shall be firm, non-slip and shall be able to be cleaned of dirt and debris.
- Surfacing shall be constructed to provide a fall away from the rear edge of the copings or the platform edge as applicable.
- Platform edges shall be non-friable.
- Platform copings shall be provided with a suitable restraint to prevent them from moving and thereby infringing clearances or endangering passengers.

Introduction

There are are two types of painted warning lines and markings required on platforms:

- A white line running the full length of the operational platform edge (always required)
- A yellow line set back from the edge (only where trains pass at speeds in excess of 100mph / 165km/hr; where ‘slam door’ stock is still in use or where there is a large amount of freight traffic).
- Where stepping distances are outside the HMRI maximum values, consideration shall be given to the provision of a suitable warning, such as ‘MIND THE GAP’ or ‘MIND THE STEP’ painted on the copings and readable to passengers alighting from or boarding trains (alternately)

Note: Where yellow lines are necessary, these should be accompanied by explanatory signs fixed to the adjacent buildings or structures

General Specification

White lining

- The white line should be 100mm wide on the front edge of the top face of the coper and extend downwards on the front face to the coper’s full thickness.
- The white line should terminate at the extremities of the operational length of the platform and always at the top of the end ramps. At these points, the line should return, 100mm wide, at right angles to the platform edge to the rear edge of the coper.

Yellow lining

- The yellow line should be 100mm wide and positioned at 1000mm (min) from the platform edge and parallel to it.
- The line should be continuous and extend for the full operational length of the platform, terminating at either the top of the ramp or boundary structure.
- Where a tactile strip is provided behind the copers, the yellow warning line should be positioned directly behind the tactile surface.

Specification:

- Platform edge white line paint to be brush or roller applied textured masonry finish water-borne acrylic resin based paint formulated for exterior use on concrete. Finish should be fine matt and meet slip resistance criteria, i.e. not less than 0.45 in wet conditions.
- Paint should be 40% solid volume; touch dry in 1-2 hours; low VOC content; 0.3-7.99% film thickness; 143μm (wet) and 57μm (dry)
- White line colour to be BS 4800 00-E-55 or nearest.
- ‘Cataphos’ contract white chlorinated rubber traffic paint or similar approved N.B. Reflective glass beads (Ballatini) to
produce a reflective effect, should not be added to this paint

- Yellow speed warning line to be Enfield Routemaster F81 Single Pack Epoxy or similar approved.
- Application to be with 5000 series Line Laser or similar and approved equipment
- Yellow line colour to be BS 4800 08-E-51 or nearest
- ‘Cataphos’ contract yellow chlorinated rubber traffic paint or similar approved N.B. Reflective glass beads (Ballotini) to produce a reflective effect, should not be added to this paint

Workmanship

- All markings to be of uniform width and thickness with neat straight edges
- Any paint spillages to be completely removed at time of spill
- Surfaces to be prepared by removing previous applications and any deleterious material such as grease and loose deposits.
- If re-coating, all traces of previous applications that do not register with the new application, or where a paint build up is sufficient to become a tripping hazard, should be removed particularly where lettering is involved.

References:

- SRA ‘Train and Station Services for Disabled Passengers’ – A Code of Practice
- HMRI ‘Railway Safety Principles and Guidance, Part 2 Section B Guidance on Stations
- GC/RT 5161 ‘Station Platform Design Requirements’ Railway Group Standard
Plan of painted markings
Scale 1:50

White platform edge marking to be painted on the horizontal edge (100mm) of the coper and on the full depth of the vertical face.

100mm wide yellow line set back at least 1000mm from platform edge (pref. 1250mm)
Note: Where 760mm deep copers and 400mm deep tactiles are used, the yellow line should be positioned adjacent to shear edge of the tactile surface.

Cross section A-A
Scale 1:10
Railway Estates Design Guidance Note

3 Platform Drainage

3.1 Drainage systems

General Design Requirements

Railway Group Standard Ref: GC/RT 7014 ‘Infrastructure Requirements at Stations’: Part C Station Platforms – C2 Platform and coper surfaces

C2.1 Materials for platform surfaces
Surfaces of platforms, copers and ramps (where provided), shall be firm, even and anti-slip and shall not provide slipping hazards. The design of the surfacing shall take into account the expected rainfall and the effects of any substances used for activities such as cleaning or de-icing

C2.2 Drainage
Adequate provision and maintenance of drainage for the removal of storm water and spillage shall be provided for platform surfaces, platform buildings and canopies to avoid discharge or overflow onto the platform surface

C2.3 Platform cross fall
For new platforms and alterations to platforms, unless otherwise justified, the surfacing shall be constructed to provide a fall away from the rear edge of the platform coper or platform edge if there is no separate platform coper.

C4 Materials used for cleaning and de-icing
The effect that cleaning de-icing materials have on the durability of platform surfaces shall be considered and only those that do not cause premature deterioration of the surface of the adjacent track shall be used.

Introduction
- The gradient of the fall away from the platform coper to the rear, or to the centre of island platforms should be adequate to prevent standing water at any time. Falls between 1:20 and 1:80 are acceptable. A fall of 1:40 is preferred.
- Water shall be channelled to a collection pipe and from there to a positive drainage system, or disposed into permeable ground without causing erosion.

General Specification
- Buildings and structure drainage (inc. connection to sewers) shall be designed in accordance with BS9000: parts 1,4,5,6,7 &8.1 & 8.2 and BS EN 752 pt 1:’96 pts 2 & 4:1997 pts 5 to 7 1998.
- Where footfall is not expected or is light, pre-cast concrete, open, shallow dished, drainage channels should be used for the removal of rainwater from the platform
- Dished channels should not be used where areas are more heavily trafficked; where the discharge is calculated to be high or where the channel needs to run across the top or foot of a staircase
- In locations where the pre-cast drainage channel is considered inappropriate, a medium/heavy duty channel system with grating shall be adopted. The grating should have a 'heel guard' pattern to prevent shoes becoming lodged and be able to be secured using a locking or screwed down arrangement.

Disposal of water:
- Careful consideration of options available should be given. The use of other means of disposal is in the following order of preference:
  1. Existing piped surface water drains
  2. Existing piped foul water drains (where the Local Authority has a combined system)
  3. A convenient watercourse
  4. Existing track drainage
  5. Scakaway
The use of soakaways, for disposal of surface water drainage from platforms and car parks, should only be considered as a last resort.

Contamination
- On platforms where de-icing salts are regularly used during winter the water run-off should not discharge directly into freshwater ditches or watercourses.

Pipework
- Where pipes are used they shall be a minimum diameter of 100mm. The minimum gradient shall be 1:50. Pipe material should generally be PVCU (orange) to BS EN 13598-1:2003 or BS EN 1401-1:1998. Where these are deemed unsuitable, cast iron (BS 437) or vitrified clay (BS 565 normal grade) may be used.

Pipe laying
- Pipes with spigot and socket joints shall be laid with the direction of flow into the socket.
- Use only one diameter of pipe between consecutive manholes.

Where rigid pipes with flexible joints are bedded and surrounded with concrete, a flexible joint shall be provided through the cross-section of the concrete at the free end of each pipe socket or coupling at 5000mm centres (max). The flexible joint shall contain compressible material such as expanded polystyrene, impregnated fibre board or other compressible building board 18mm thick for pipes up to 450mm diameter and 36mm for pipes greater than 450mm diameter.
- Haunching shall be to the full width of the concrete bed and equally spayed to the top of the pipe.
- Gullies, traps and other fittings shall be bedded in and surrounded in concrete, minimum grade ST4 to BS 8500: parts 1 & 2, 150mm thick.

Inspection Chambers
- Step irons to brickwork manholes shall be built into the sides of manholes or chambers exceeding 1000mm deep. If there is limited space, step irons may be corner type set in every fourth course of brickwork of the selected corner.
- Step irons in pre-cast concrete units shall be to BS5911: part 3 and BS EN 1917:2002.
- Manhole chamber covers and frames (medium / medium heavy) shall be set accurately to level, bedded and haunched solidly and appropriately in cement mortar (1:3) Covers shall be set and sealed within frames in a suitable quality grease.

Soakaways
- As a last resort soakaways may be considered subject to the following criteria:
  1. The adjacent ground must be sufficiently permeable to allow the water to get away
  2. The base of the soakaway should be above existing groundwater level
  3. There must be no likelihood that the ground water can become contaminated
4. There should be adequate storage capacity within the soakaway to accommodate a downpour.

5. The soakaway should be easily accessible for maintenance.

- Soakaway chambers shall be located not less than 6.0m from the foundation to any structure (including track). They shall also be sited so that they will not affect adjacent land or property.
- Both filled and unfilled soakaways may be used although the unfilled soakaway is preferred for obvious inspection and maintenance reasons.
- Filled soakaways should only be used for small, localised discharge e.g. isolated waiting shelter roof.
- Unfilled soakaways shall be constructed from pre-cast concrete segmented manhole units with pre-cast concrete cover. The units shall be set dry jointed, level, properly interlocked and placed onto a minimum 150mm thick concrete bed, minimum grade ST4 to BS8500: parts 1 & 2.
- Soakaways shall be surrounded by a minimum of 150mm clean crushed sound rock or gravel, 40mm nominal size, carefully placed and compacted by hand ramming in layers not exceeding 300mm.
- The cover and frame to unfilled soakaways shall be lockable and comply with BS EN 752.
- Filled soakaways shall comprise clean crushed sound rock or gravel (no fines) between 150mm and 10mm diameter nominal sizes. The end of the inlet pipe shall be surrounded only by larger pieces with a gradual reduction in size up to 550mm below finished ground level.
- Soakaway fill shall be covered with 75mm layer of 10mm nominal size chippings and back filled with economy grade topsoil to BS 3882.
- A soakaway shall not be specified until the permeability of the ground has been ascertained. The capacity of the soakaway shall relate to the amount of water arising due to a 1 in 20 year storm.

**Maintenance**
- To enable maintenance to be carried out, the soakaway should be accessible adjacent to a footpath, or hard-standing area. Chamber covers should be removable with normal manhole keys. Step irons should be provided. Rest platforms should be provided if deeper than 2000mm.

**Foul Waste**
- Foul waste shall be discharged to an existing foul sewer wherever possible, otherwise only a septic tank (R12 / 783) or pumping from the station shall be considered.

**Permeability Testing**
- It will be necessary for a permeability test to be carried out on site, in the area in which the soakaway is to be located.
- The standard test (recommended by BRE Digest 365) is to excavate a trial pit, say 1000mm square, to approximately the same depth as the proposed soakaway. The pit is then filled with water to establish the soil infiltration rate.
- The test should be carried out 3 times consecutively and the filtration rate based on the time (T) taken for the pit to go from 75% to 25% full. In order to stop the pit sides collapsing it will be necessary to fill it with a free draining material (i.e. single sized stone). A vertical perforated pipe should be placed full-depth in the centre of the pit to enable the water level to be observed.
- The calculation of the infiltration rate is:

\[
\text{Soil infiltration rate} (\text{m/sec}) = \frac{\text{Volume}}{\text{Surface Area} \times \text{Time}}
\]

Where:
  - **Volume** = effective storage volume of water in the trial pit between 75% and 25% of the effective depth
  - **Surface Area** = the internal surface area of the trial pit up to 50% effective depth, including base area (m²)
  - **Time** = time taken for the water levels to drop from 75% to 25% effective depth. The effective depth is from the invert of the inlet pipe to the base of the soakaway.

Based on the calculated rate, the soakaway should discharge from full to half volume within 24 hours.

**References:**
- HMRI _Railway Safety Principles and Guidance, Part 2 Section B Guidance on Stations_
Railway Estates Design Guidance

Note

5 Platform Lighting Column
5.1 Foundation Design:
5.1.1 ‘Root’ Foundation

General Design Requirements

Railway Group Standard Ref: GC/RT 7014 ‘Infrastructure Requirements at Stations’: Part D Structures, buildings and platform furniture :

D3 Location of isolated columns supporting lighting, signs and other equipment

- Isolated columns supporting lighting, signs and other equipment shall be positioned to avoid creating obstructions to the free flow of station users.
- Isolated columns for new lighting, signs and other equipment or alterations to such items shall be located to provide the following minimum distances to the platform edge:
  a) 3000mm from the platform edge where the permissible or enhanced permissible speed is greater than 100mph (160kph)
  b) 2500mm at other platforms
- Where particular site constraints prevent this, isolated columns for new lighting, signs or other equipment or alterations to such items shall be located not less than 2000mm from the platform edge.

Introduction

- This design guidance note refers to the platform construction work required to support the traditional ‘rise and fall’ lamp column as used throughout the network.
- The column base is of the root type, which allows for the removal and reinstatement of columns without the need to hack up and remove the base.
- Refer to separate guidance in respect of light column and luminaire design.

General Specification

- The lighting columns shall be of tubular steel / aluminium section and shall be of the rise and fall type. The standard height on a platform is 5m (preferably 6m) on manned stations. Where there is a danger of vandalism, consideration should be given to the use of 8m high columns.
- Columns should be positioned at the rear of the platforms within the platform surfacing.
- As per the Group Standard, lighting columns shall not be less than 2000mm from the platform edge, or 3000mm where the line speed is greater than 100mph (165kph).
- Columns shall be placed on a line parallel to the line of the platform edge.
- The rise and fall column must not hinge towards the track or any structure that will prevent the lowering of the luminaire to ground level. Where a fence obstructs the full lowering of the column, a gate must be provided which may be opened during maintenance.
- The lighting column should preferably be lowered in a plane parallel to the platform edge and when lowered, no part of the column, luminaire or fittings shall be closer than 1250mm from the platform edge.
- Where positioned close to structures, adequate space must be provided for the jacking equipment to engage with the column lug in the Abacus type column.
- Sprung loaded columns should be marked with a warning label or coloured band to denote the strength of the spring. This should be located close to the change in section of the column base.
- Consideration must be given to providing safe access to the luminaire for the maintainer. If the lowered column is not on a level platform, for example, a level paved strip should be provided along the length of the column.
- Hanging baskets and signs should not be attached to rise and fall lighting columns.
Column Base

- For lighting columns placed onto a solid platform, a prepared ‘root’ foundation shall be used. For columns where a prepared root foundation cannot be used, e.g. in a hollow platform, a holding down bolt arrangement shall be used subject to assessment of the supporting structure and the appropriate calculations.

Prepared Root Foundation

- The foundation shall be in accordance with the standard detail (see drawing...). A cylindrical or square hole with a minimum dimension of 300mm should be formed in a suitable sized mass concrete footing to receive the column. The base of the hole is filled with the sand / cement mortar to a depth of 25mm, the column inserted and temporarily supported by the wooden wedges while the remaining void is packed with sand. Sand packing allows the column to be rotated or extracted at a future date without disrupting the platform. COLUMNS MUST NOT BE CONCRETED IN. Once the column is secure, the wedges can be removed and replaced with a 75mm layer of sand / cement mortar. In the event that the column has to be removed, the mortar can be broken away and the column easily lifted out of the ground.
- The mass concrete footing should be sized in accordance with B5800 and constructed in undisturbed ground. Where backfill is required within 3000mm of the footing, lean mix concrete shall be used to ensure adequate positive resistance to overturning.

Holding Down Bolt Foundations

- In taller columns where the overturning moment is likely to be large or where a prepared root foundation cannot be provided, e.g. a hollow or trestle platform, it is recommended that a holding down bolt arrangement is used. (See Drawing...) This maintains the advantage of being able to completely remove the column for future replacement.
- Additional care must be taken in specifying the orientation of the holding down bolt assembly to ensure that the raising / lowering plane is not fouled by any other structure / furniture. The structure within which the bolt assembly is installed must be capable of resisting overturning moments and shear forces generated by the column and fittings. (Note: it may be necessary in DC traction areas with trestle platforms to insert insulating washers under nuts to prevent stray currents entering the columns)

Cable Ducts

- The cable ducts shall comply with Network Rail Standard...
- The minimum internal diameter of the duct shall be 100mm or 1.5 times the diameter of the cable or group of cables and shall be one of the following materials in order of preference:
  a) High Density Polyethylene to BS EN 50086 parts 2-4
  b) Unplasticised polyvinyl-chloride to BS EN 13598-1:2003 or BS3506, classes B, C, D or E
  c) Vitrified clay ducts to BS 65
- There is no general requirement for duct colour, although the designer may specify a colour to distinguish the lighting ducts form other services.
- Cable ducts shall be located a minimum 150mm away from gas and water pipes, drains, sewers and electrical contractor’s equipment. Where services cross, the clearance shall not be less than 50mm.
- Deflection from a straight line or variation in depth shall not exceed 1 in 30 horizontally or 1 in 60 vertically.
- The duct routes shall be constructed to give a maximum possible distance between the concrete surround and
the platform edge, but not less than 3000mm. In particular difficulty, the duct should not be nearer than 1500mm from the platform coped.

- Ducts located in station platforms and concourses shall be laid in a surround minimum grade C30 to BSS328: part 2. The minimum cover shall be 100mm around the ducts with a minimum depth of 200mm between the platform, or concourse, surface and the top of the concrete surround, i.e. 300mm to crown of duct.

**Cable Draw Pits**

- Cable draw pits approximately 450 x 450 x 750mm shall be provided at each change of direction, cable joint locations and in straight runs the spacing of which shall be appropriate to the cable duct construction and the method of cable insulation.
- In general, the straight run spacings that may be used are:
  
  a) 10,000mm for UPVC ducts
  b) 30,000mm for vitrified clay

- Where practicable, cable draw pits shall be located above the water table, and shall be provided with a minimum 75mm diameter soakaway drain in the cable pit base.

**Turning Chambers**

- Turning chambers approximately 450 x 450 x 750mm deep shall be provided adjacent to each lighting column, and at sharp changes in direction of ducting runs.
- Covers shall be a minimum of medium duty metal secure covers with screw down lids able to withstand the same loading requirements as the platform surface.

**Cable Troughs**

- Troughing cable routes in platforms with bitmac sub-base and wearing surface, shall be re-instated following cable pulling with double lidding and bitmac sub-base and wearing surface or similar

- Concrete cable troughing laid in walkways or other areas where persons are likely to stand shall be laid with the lid flush with the walkway surfacing or surrounding ground.
- Troughs shall be laid on a well compacted foundation. Where troughing cannot be laid on a compatible base, a blinding layer of sand to BS1200, minimum 25mm thick shall be provided.

**Manufacturers**

- Manufacturers who can supply materials in accordance with these notes are:

  **Lighting Columns:**
  
  a) Abacus Municipal Ltd
  Sutton-in-Ashfield
  Nottinghamshire
  NG17 5FT

  **Proprietary Turning Chambers and Ducts:**

  b) Poet Plastics Ltd
  First Avenue
  Bletchley
  Milton Keynes
  Bucks
  MK1 1DX

  c) Hepworth Building Products
  Hazel Head
  Crow Edge
  Sheffield
  S36 4HG

  d) B & H (Leicester) Ltd
  Union Works
  Bishop Meadow road
  Loughborough
  Leicester

**References:**

- HMRI ‘Railway Safety Principles and Guidance, Part 2 Section B Guidance on Stations
- GI/RT7016 ‘Station Platform Design Requirements’ Railway Group
- Standard

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