

**TECHNICAL USER MANUAL
FOR THE USE OF UNDERBRIDGE
STANDARD DESIGNS AND DETAILS**

Summary

This technical user manual is applicable to the standard underbridges and ancillary details. It provides guidance on the selection and application of Network Rail's suite of standard drawings. The standard designs and details within these drawings will generally be used for new-build structures, and part replacement e.g. deck replacement.

Issue record

This technical user manual will be updated when necessary by distribution of a complete replacement. A vertical black line in the margin will mark amended or additional parts of revised pages.

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GLOSSARY

Box	A bridge girder fabricated from steel plate into a box section.
Bridge	A deck and its supporting structure (e.g. impost / cill, abutment or piers).
Cill	Alternative name for impost. The (usually) concrete beam on which the lower part of the bridge bearings are located.
D-Type	A standard underbridge arrangement that supports a single track and comprises a pair of I shaped main girders, a floor and four bearings.
Deck	A pair of main girders and a floor that form an underbridge.
Designer	The person responsible for selecting the relevant standard designs and details to suit the specific requirements for a particular scheme.
E-Type	A standard underbridge arrangement that supports a pair of tracks and comprises a pair of I shaped main girders, a floor and four bearings.
Filler Beam	A steel and concrete floor arrangement comprising transverse spanning steel sections encased within and acting compositely with a concrete slab.
Floor	The transverse element that supports the ballast and track. May comprise filler beams composite with concrete slab, or steel transverse ribs and steel plate.
Impost	Alternative name for cill. The (usually) concrete beam on which the lower part of the bridge bearings are located.
Main Girder	The primary load sustaining element that spans between bearings and supports the floor. Comprises a pair of flanges, possibly flange doubler plates, a web, web stiffeners and bearing stiffeners.
Protective Treatment	A treatment applied to structural elements to protect them from environment.
Scheme	Any planned work that involves the replacement of an existing bridge or deck.

TUM	Technical User Manual.
SDD	Standard Designs and Details.
Underbridge	An under line bridge.
U-Type	A standard underbridge arrangement that supports a single track and comprises a pair of main girders with an offset top flange and a full width transverse stiffened steel floor plate.
Walkway	A standard detail comprising brackets attached to web stiffeners and longitudinal spanning members positioned to allow railway personnel traverse the bridge away from the track.
Waterproofing	Measures applied to handle and remove water off the deck and away from structural elements.
Z-Type	A standard underbridge arrangement that supports a single track and comprises a pair of Z shaped main girders, a floor and four bearings.

1 INTRODUCTION TO STANDARD DESIGNS AND DETAILS

The development of the Standard Designs and Details (SDD) has been undertaken by Network Rail to improve safety, asset reliability and increase efficiency. Their development is linked to Network Rail's overall business objectives, to improve reliability of the railways and reduce the funding requirements for on-going management and maintenance of the network. The basis of the SDD focuses on two main areas that derive from these issues:

- Ensuring that the design meets Network Rail's requirements
- The design is as successful as the designs of previous railway engineers, who built and maintained bridges that have given good service for approaching 150 years.

The use of the SDDs is promoted from the highest level within Network Rail. Alternatives to the SDDs will only be considered where it can be demonstrated that a SDD cannot be used and must be agreed with Network Rail's professional head of civil engineering. Failure to use a SDD may lead to project authority being withheld.

1.1 Network Rail's Requirements

Network Rail's requirements are split between two areas, delivery and function:

1.1.1 Delivery Requirements

The SDDs have been taken to a stage where Form As and Form Bs for each aspect covered (underbridge design, ancillary details etc.) have been submitted and approved. This leads to the following benefits:

- A reduction in the design development timescales and costs.
- Minimising contractor and sub-contractor costs associated with uncertainties in detailing requirements.
- Streamlining the technical approval process for commonly used designs and details.

1.1.2 Functional Requirements

The SDD have been developed to ensure satisfactory performance of the asset under both normal operations and abnormal operations (both planned and unplanned). A further consideration has been Network Rail's requirement to reduce the volume of maintenance and management costs through the adoption of good practice. This leads to a number key design drivers including: