



Boundary Road Middlesbrough

End Client	Network Rail
Design Stages	Feasibility to Detailed Design
Design Timeframe	2021 - 2022
BIM	BIM Stage 2
Specialist Software	Autodesk Revit for modelling and drawings, AXIS VM for structural analysis

Project Overview

Managing this reconstruction from design to delivery, our teams drew upon their area expertise to complete this project during the closing weeks of 2022.

Constructed in the late 19th century, this underbridge located in Middlesborough required renewals work under the London North–Eastern CP6 Framework. The design team were tasked with providing a detailed feasibility study of deck renewal options. This was to include an outline design of new decks and the associated scope of substructure works, alongside a detailed design of the deck renewals and temporary works designs.

Key factors to include and consider

In respect of client requirements, there were a number of elements for the design team to consider:



120 YEAR SERVICE LIFE

New decks to have a service life of 120 years



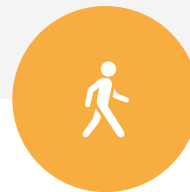
COLLISION PROTECTION

New collision protection beam to protect the structure from any vehicle collision damage



FUTURE PROOF DESIGN

The new structure to have a ballasted track formation for greater flexibility in permanent way design and serviceability



WALKWAY DESIGN

Incorporate safe access walkways waterproofing and installation of deck and drainage systems



DECK CONSTRUCTION

New form of deck construction must maintain existing headroom to footways and the road carriageways



AMCO·GIFFEN

Design Team Case Study

Innovations Applied

In line with our company SPIRIT values, our design team looked to incorporate progressive and efficient innovations into this project. For example, the orthotropic deck had no intermediate longitudinal girders between tracks, this created a clear and wide 'corridor' for track alignment. Meanwhile, the deck edges were detailed to allow for adjoining deck structures below the neighbouring freight lines.

Benefits Provided

- The provision of a collision protection beam decreased the risk of railway closures due to bridge strikes
- Safe walking routes over the structure
- Ballasted track over the structure
- Inspectable and renewable bearings
- Deck attachment for any future renewals to the Freight line deck

Project Challenges

- Compliant deck deflection limits with a shallow deck construction depth
- Deck installations had to be completed within a 72-hour blockade
- Ensuring appropriate safety measures to accommodate for a neighbouring building adjacent to the bridge structure
- Deck assembly took place on site