Spring Bank West Underbridge Reconstruction, Hull

CASS HAYWARD CONSULTING ENGINEERS





Client	J Murphy & Sons Ltd. for Network Rail
Project Description	The reconstruction of this 130 year old heavily skewed railway bridge was an especially complex project undertaken under severe time and site constraints. Headroom over the road and below rail level was so constrained that there was no room for ballast and special direct track fixings were needed. The new steel bridge has reinforced concrete abutments that wrap around the old weak brick walls and are founded on new piles installed using a low headroom rig operating in an area riddled with services. Possession works included demolition of the degraded metal structure and installation of the new half-through bridge - both using Self Propelled Modular Trailers (SPMT).
Cass Hayward Role(s)	• Concept and detailed design of new bridge including foundations • Temporary works design for the new bridge installation on trailers with precast bearing cills hung below • Temporary works design for the jacking up and removal of the old bridge on trailers • Design of new skewed track alignment
Project Statistics	• Cost £4.2m • Completed after 54 hour possession at Christmas 2013 • New bridge span 33m set at a skew of 56° to the highway • SPMT installation weight of new bridge and cills - 500 tonnes including 315 tonnes of steelwork
Special Features	• Rails directly fixed to the steel deck required verification by advanced analysis of potential fatigue effects exacerbated by skew • Skewed-end trimmer steelwork had to be carefully proportioned and detailed to limit track-twist effects • The steelwork was designed to be transportable in components for pre-assembly on trestles at site. It's complexity demanded a strictly controlled assembly sequence to ensure fit that was proved at trial erection • Soil nailing was used to temporarily anchor the existing brick abutments to the soil mass of the embankment during excavation for pile cap construction
Awards	• ICE Wales Cymru – Designed in Wales Award Winner