



GARFORTH STATION

Temporary works to remove cast iron footbridge

DESIGN TEAM CASE STUDY: CLIENT – NETWORK RAIL

INTRODUCTION:

Innovative temporary works solution to lift a 190-year-old cast iron arched footbridge within a limited railway line possession time.

PROJECT OVERVIEW:

As part of Network Rail's 'Access for All' programme, AmcoGiffen has replaced a footbridge at Garforth station which was constructed circa 1832 on the Leeds to Hull route. The existing footbridge was comprised of timber deck planks and two cast iron elliptical arch ribs with bolted connections. Due to its historical significance, the bridge was to be transported to a railway heritage museum in Kent for restoration.

BACKGROUND:

AmcoGiffen's design and engineering team was tasked with calculating the weight of the footbridge and designing the temporary works to enable safe removal. Due to the fragility and brittleness of the cast iron structure, the established method would be to prop the bridge in situ to enable the individual elements to be unbolted and taken away for reconstruction. However, due to limited possession times on the busy line, this would not be possible, and the bridge would have to be lifted out in one piece. Research showed that lifting similar structures had proved unsuccessful on other schemes

OUR SOLUTION:

The design team proposed an innovative temporary support frame to be constructed to cradle the structure during the lift.

BENEFITS PROVIDED:

The temporary support frame ensured that the bridge was safely removed and avoided damage to the structure during lifting and transportation. To minimise the risk of fracturing the cast iron elements, the temporary support frame was designed so that any deflection would be negligible. The frame was made up of a pair of braced universal beam sections manufactured at our steel fabrication workshop, and a scaffold framework which included screw jacks for adjustment under the existing bridge beams.

As part of the package, we calculated the weight of the bridge and also assessed the effects of the lift on the existing structure. To increase the rigidity of the structure, scaffold bracing to the cast iron ribs was detailed.

The temporary works design was drawn using 3D software which allowed the site team to visualise the arrangement, assisted the scaffolders with constructing the frame on site and provided added confidence that the temporary arrangement could be installed during the possession without clashing with any other elements.



Super proud of the team working at Garforth station to get the historical footbridge removed safely so that works can commence on installing a modern and accessible alternative. Thanks to Jon Burnett, Principal Engineer for the unique and bespoke design and for helping us achieve this significant milestone



*Kafui Agbo,
Senior Project Engineer, Network Rail*

CHALLENGES OVERCOME

Due to the very limited time constraints, the support frame was constructed in the site compound before the line possession.

This meant that the support frame had to be lifted from the compound to the site and then pulled in to position underneath the existing footbridge on the night.

To overcome this problem, we detailed temporary trestles on the station platform that the lifting frame was lowered onto.

The lifting frame was then winched into position on roller bearings which sat within channel sections fixed to the trestle units.

