Global Rail Construction

CASE STUDY

Selby Swing Bridge

LOCATION:	Leeds to Hull – 30m 70ch
CLIENT:	Siemens
DATE COMMISSIONED:	December 2012

Introduction

Global Rail Construction were selected by Siemens as design and build civil engineering contractor for a Horizontal Directional Drill (HDD) that was required to cross under a Grade 2 listed building, the Great River Ouse, Ouse Road and the East Coast Mainline railway in the heart of Selby town centre.

Utilising their in-house multi-disciplinary design team, Global Rail Construction were able to offer Siemens a complete design and build solution.

The civil engineering works, which formed part of the Selby Rail Swing Bridge Signalling Interlocking Renewal being undertaken by signalling product specialist Siemens, were being specifically undertaken to renew the existing electricity cables, which had been installed in 1956 and were located under the river.

The project consisted of the replacement of the swing bridge cabin signalling interlocking onto a new interlocking building, incorporating new lineside equipment from locations 128, 129, 130 and 131, which also required cables to traverse under the river at this location.

The conventional approach of simply running the signalling cable across the bridge was not appropriate, as one 40m span of the swing bridge - which was built in circa 1900 - allowed river traffic to pass. Hence, Global Rail Construction designed a suitable ducted solution to carry telecommunication, signalling and power cables on behalf of their client.

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The Deliverables

Global Rail Construction provided a full design, build and handover service, works included:

- Design and build of a helical piled Relocatable Equipment Building [REB] base, single and full location case hardstands, undertrack crossings and the 'under river crossing'.
- Undertaking 30m deep boreholes to establish the soil formation including both drift (cohesive) and solid (bedrock) geology.
- Design and Construction of the under river crossing using 3No 180mm medium density polyethylene welded ducts 6m below the bed of the River Ouse and just 0.5m above the sandstone rock head [21m below ground level] for a distance of nearly 300m from entry to exit. The entire crossing was navigated to predetermined 3D co-ordinates to an accuracy of +/- 20mm over a 40m run.
- Full project handback including an as-drilled log for every metre completed, as-built documentation and drawings.

Challenges and Solutions

The project faced some difficult challenges from the start.

Due to land access and easement issues, a complicated three radius horizontal plan was required. This involved a left turn followed by a turn to the right with a combination radius of 225m.

This project also had a 475m vertical radius and 250m horizontal radius to ensure that once installed, the cables would be located within agreed land boundaries.

In addition, due to the presence of listed buildings and steel infrastructure [metallic swing bridge, sheet piled flood defence and railway lines] an allowance was made for drilling the pilot bore using advanced and accurate gyroscope steering technology [GST]. This technology was not affected by magnetic interference, removed the need for setting out wire grids along the drilling route and therefore provided the most cost-effective and technically sound engineering solution.

To reduce the quantity of drilling mud disposed, the drilled cuttings were pumped through recycling plant positioned adjacent to the slurry pits, which removed the cuttings allowing the mud to be re used back down into the drill hole. The re-cycling plant used separated over 100 cubic metres of drilling fluid [mud] from 150 tonnes of drilled solids which were all re-cycled.

The pilot drill was completed in a five-day period, reaming and pipe installation were carried out over a further five-day period. The accuracy of the GST, despite substrata complexities requiring the use of a 'mud motor' for a short section to cut through the sandstone formation, the drill-head exited with high accuracy. Works were delivered on time, to budget and to a very high standard.

The project itself although a relatively straightforward interlocking renewal, provided a complex and challenging civil engineering problem, one which Global Rail Construction delivered with assurance and which helped to ensure that the project was a complete success.

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The Benefits

Global Rail Construction as a Railway Principal Contractor was able to use their full management systems to deliver this complex design and build civil engineering project with confidence.

Having in-house design also allowed the business to provide a joined up delivery solution, one, which provided confidence to both the client Siemens, and the ultimate end user Network Rail.

The business having in house capability across a number of railway system and construction disciplines - offering signalling, E&P, and building - was able to use this integrated experience when working with others on this standalone civils project and understand the interdisciplinary nature of railway infrastructure works.