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A14 CAMBRIDGE TO HUNTINGDON IMPROVEMENT SCHEME



PROJECT

A14 Cambridge to Huntingdon improvement scheme

CLIENT

Highways England

MAIN CONTRACTOR

A14 Integrated Delivery Team (IDT), a joint venture between Costain, Skanska, Balfour Beatty and Atkins/CH2M (now Jacobs)



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Cleveland Bridge expertise will allow challenging new road, rail and river crossings to be completed safely, accurately and on time.

Requirement

The A14 Integrated Delivery Team (IDT) is working on behalf of Highways England to deliver a £1.5 billion scheme to improve the A14 trunk road between Cambridge and Huntingdon. The aim is to relieve congestion, unlock economic growth, improve safety and enhance the local environment.

The existing A14 is notorious for congestion and delays. It is used by almost 85,000 vehicles every day, far more than it was originally designed for – around a quarter of which is heavy goods traffic, well above the national average for this type of road.

The improvements include a new bypass to the south of Huntingdon, widening sections of both the existing A14 and A1, the creation of new local access roads, and improved junctions on the A14. A number of major bridges are required to carry the new A14 over waterways, railways and roads.



Solution

Leading steel bridge construction company Cleveland Bridge was appointed to fabricate and construct six major new bridges on the section of the new A14 between the A1 and Cambridge. The majority of the road is being built along a new route taking the A14 around Huntingdon, Brampton and Godmanchester. This new road needs to cross the A1, the East Coast Mainline and the River Great Ouse, posing significant engineering, logistical and construction challenges for any bridge builder.

Cleveland Bridge was chosen for its proven track record and vast experience in large-scale bridge construction worldwide. The company has the biggest bridge building capacity in the UK. Its knowledge, scale and expertise were also deemed valuable in helping to reduce site works and costs, while introducing innovations and improving safety.



Project scope

To date Cleveland Bridge has been appointed to construct six new bridges along this stretch of road including:

- **A1 Brampton Interchange Bridge – an 80m curved bridge over the A1.** The bridge was constructed from 30 curved and cambered girders, each up to 34m long, weighing a total of 1,400 tonnes.
- **A 750m-long viaduct over the River Great Ouse,** which required 6,000 tonnes of steel, comprising 76 separate main girders and 800 cross girders.
- **A 40m-long bridge over the East Coast Mainline,** formed by five pairs of 40m girders, each pair weighing 85 tonnes.
- **Two identical bridges to carry a major roundabout at Bar Hill Junction over the new A14,** constructed from 44m-long girders.



Challenges

Each bridge presented different engineering and construction challenges, alongside the need to complete works on schedule in coordination with other trades and contractors.

A1 Brampton Interchange

The major challenge was the curved and cambered nature of the structure. Only Cleveland Bridge was able to produce curved girders with the degree of geometrical accuracy required. Cleveland Bridge used advanced modelling software to enable it to manufacture girders with the very tight skew and radius needed. The complex geometry meant the girders had to be shipped to site singly and then spliced and braced together on site. To achieve the total bridge length of 80m, ten lines of three girders, each up to 34m long and weighing up to 55 tonnes each, were used to span between abutments and piers. Cleveland Bridge developed a jacking system on top of the piers which allowed the girders to cantilever out beyond the central pier. This enabled a whole line of supporting trestles to be removed from the scheme, saving time for the client. All of this work had to be completed to a very tight deadline around live A1 traffic management. Switching the traffic from one carriageway to another was precisely scheduled, so bridge construction had to be completed on time to allow diverted traffic to run safely beneath the new structure.

Great Ouse Viaduct

The 750m viaduct is a showpiece element of the A14 project. A timesaving construction method was devised, which involved a subcontractor lifting prefabricated concrete slabs onto the steelwork erected by Cleveland Bridge, while steelwork installation continued ahead of this activity. A key feature of this method was the close tolerances required between the deck slabs and supporting steelwork. This required precise steelwork fabrication and installation, to ensure clashes between the slabs, projecting reinforcement and the steel were avoided. The bridge spans the river and a large area of floodplain on either side. Most of the main girders required were 40m long, 2m deep and weighed 50 tonnes. The section of bridge that crosses the river has a longer span, requiring more complex girders, with larger, deeper haunches to carry the greater load. Cleveland Bridge suggested a different steel grade for these haunch girders, making them simpler to fabricate.

The client constructed a temporary platform under the length of the new bridge to provide a solid base for cranes and lorries. Cleveland Bridge proposed that a 600-tonne crawler crane be used, which could lift all components for each bay from a single position at the side of the bridge. It meant fewer crane movements were required, with no need to move the crane across the bridge footprint – reducing site congestion and saving time and cost.

KEY STATS

7825 TONNES OF STEELWORK INCLUDING:

30 CURVED AND CAMBERED GIRDERS

76 MAIN GIRDERS

800 CROSS GIRDERS

870 TOTAL BRIDGE LENGTH IN METRES

East Coast Mainline

The main challenges were the short possession periods during which the bridge could be constructed. As one of the UK's busiest rail arteries, all construction work had to take place when no services were running, and all work had to be programmed in close partnership with Network Rail. The bridge comprised five pairs of 40m-long girders, which were due to be installed over five weekends. However, Cleveland Bridge was able to complete the work in just three weekends, within the 2am to 6am possession windows. There was no room for error since any delay could seriously disrupt rail services for thousands of passengers. Cleveland Bridge planned all works in meticulous detail to ensure all contractors' requirements were accommodated from the outset.

"Opening the road 18hrs early did not happen by accident. Everybody did what they were supposed to, sometimes even faster. It shouldn't be underestimated how much we as main contractors depend on reliable and professional supply chain partners which you truly are."

Ondrej Humplik, Construction Manager, A14 Integrated Delivery Team



Bar Hill Junction

For the twin bridges at Bar Hill junction, bridge works needed to be planned to minimise disruption to the traffic using this new stretch of the A14 at the time of installation. To reduce disruption, Cleveland Bridge minimised installation time on site by assembling the entire bridge decks off-line, instead of installing them one component at a time by crane. Once reinforced concrete was added, Cleveland Bridge lifted each bridge deck in one piece using self-propelled modular transporters (SPMTs), and positioned them onto pre-cast concrete abutments during a single weekend road closure.



Outcomes

The bridge over the A1 was completed on schedule within the tight programme timetable, ensuring traffic could continue to flow throughout the works. The entire construction of this complex bridge was completed in just nine weeks on site.

The River Great Ouse viaduct was completed on time and on budget, despite wet weather and windy conditions on the exposed site. During installation, the teams had to work towards a fixed bearing 300m away from the starting position, with limited adjustment available to accommodate any tolerance accumulation. The success of the project is a testament to the accurate fabrication of the girders and precision installation work on site.

Cleveland Bridge was able to complete the bridge over the East Coast Mainline in just three weekends – within the 2am to 6am possession windows – instead of the planned five weekends.

Both bridges at Bar Hill Junction were installed in just 11 hours. The A14 was closed to traffic for the weekend on Friday at 9pm, but the efficiency of the bridge installation work meant the road was clear for reopening 18 hours ahead of schedule.

Value engineering innovations introduced by Cleveland Bridge on a number of projects helped to save time and reduce costs for the client, enabling project deadlines to be achieved while minimising disruption to road users and local residents.

Cleveland Bridge maintained an exceptional safety record throughout all bridge works. There were no RIDDOR incidents on any project, with regular safety updates used to maintain vigilance.

Close collaboration was a hallmark of this project, particularly for the more complex bridges, enabling all parties to understand each other's requirements and to work effectively together to meet programme times. Some projects involved pre-engagement meetings to identify issues early and ensure all contractors' requirements were accommodated from the outset.

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