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LONDON BRIDGE STATION

PROJECT
London Bridge Station

CLIENT
Network Rail

MAIN CONTRACTOR
Costain

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London Bridge Station is a major rail hub within the heart of London on the south bank of the river Thames, at the foot of the Shard. It is one of the biggest stations in the UK, transporting 56 million passengers every year. In 2013 the station underwent major redevelopment, creating a modern, spacious, fully accessible station, capable of transporting over 80 million passengers per year.

Requirement

Cleveland Bridge was awarded the contract by Costain on behalf of Network Rail to supply the steelwork for rail decks and concourse bridge decks. The work included fabrication, painting, delivery and installation.

Project scope

Cleveland Bridge were responsible for fabrication, trial erection, delivery and installing 29 plate girder rail bridge decks, consisting of 6 main girders braced together. These girders were then filled with concrete. The project was split into six phases which were due on site at various planned dates between October 2013 and May 2017.

In total eight decks were installed, with a combined tonnage of 6,600. Due to the limited space on site the phasing had to be meticulous. There were 27 different crane lifts, 87 using crane and SPMT, the last two stages, Deck B and A, were extremely complicated due to the lack of space and the vast number of contractors on site. All this was achieved with an accident frequency rate of 0%.

Solution

The concourse bridge decks span the open concourse area of the station, allowing more lines to pass through the station. The concourse bridge decks are made up of 3 - 4 spans of supported decks for each rail line. Each deck consists of six plate girders braced and tied at the ends with trimmer beams. When installed, the beams were mass filled with concrete and fitted with platforms, rail lines and canopies.

All steelwork was fabricated and painted at our facility in Darlington. All the girders were of a plate girder configuration, the lengths required were such that they could be complete within our facility and no additional longitudinal splices were required. The steelwork was prepared using our profiling equipment, consisting of a T&I machine and saw and drill line with a lot of shop welding. After fabrication, all the components were put into pairs and then put together for a trial assembly to check for fit and alignment issues. Upon completion of the trial erection, the deck was separated into the pairs ready for dispatch.

"The management team have been pro-active and have worked with us to improve the process at each stage, resulting in time and safety improvements."

Mark Howard,
Delivery Director, Costain.

Challenges

The main challenge for the project was to keep the station fully operational throughout the long build programme, every task had to prioritise the various stakeholders and scheduling for follow-on trades. Health and safety was paramount and logistically the severely restricted site access was also a key challenge. Our solution maximised the level of prefabrication and modular offsite construction, components were preassembled before being delivered to site to a strict schedule and installed. This reduced the pressure on the construction programme.

Due to the demanding logistics of this project, we had to be agile in order to facilitate fast reaction and response times on-site which meant applying best practice project management and thinking creatively to solve problems in real time. This ensured that we had close co-ordination of deliveries with the main contractor and TFL for abnormal load deliveries into the heart of London to ensure least disruption possible.

Installation of the bridge bearings was complicated by the fact there was minimal space on the pier heads to allow both longitudinal and rotational construction movement needed for installation. This was resolved by Cleveland Bridge's suggested use of a tapered plate between the bearing and bridge steelwork to allow the bearing rotation.

Detailed consideration had to be given to the method of installation, for example if a crane could be used, if the site tower crane could be utilised or would it require more than one crane. These considerations had to be made for every deck as each had differing location constraints, not only accessing site with the crane, but then using it. Each crane lift was different and there were 27 in total with the maximum size 24m long and 2.7m wide, weighing 74 tonnes. The lifting schemes for all steelwork installations were planned by our in-house project teams and included the innovative use of heavy capacity scissor lifts mounted on the top of SPMTs to solve access and installation problems.

Outcomes

The final Deck was installed December 2016, with the de-jacking to reset bearings on both decks being early 2017 to complete the works. The overall project was delivered within budget and ahead of schedule, exceeding the client's expectations.

In 2018 Cleveland Bridge was shortlisted in the Project of the Year by a Specialist Contractor category at the Construction News Specialist Awards and was awarded again at the Structural Steel Design Awards for work delivered on London Bridge Station.

2018 CN SPECIALISTS AWARDS finalist

WINNER Structural Steel DESIGN AWARDS