

Iron viaduct repaired with steel

A crucial piece of infrastructure serving the Hampshire to Isle of Wight ferry service has been fully restored and refurbished with new steelwork.

The viaduct carries a single railway line across Lymington Harbour.

A wrought iron Victorian viaduct in Lymington, Hampshire has been given a new lease of life following the installation of a series of new steel elements.

Opened in 1884, as part of a railway extension from Lymington town centre, the 64m-long viaduct carries a single track over the harbour and connects to the Isle of Wight ferry terminal.

Over time, the harsh coastal environment has taken its toll on the viaduct, resulting in significant corrosion damage to critical steel elements.

To ensure the train service between Lymington and Brockenhurst remains safe and reliable, a strengthening and refurbishment project has been carried out.

Working on behalf of Octavius Infrastructure as part of the Network Rail Southern Renewals

Enterprise, Four Tees Engineers (FTE) fabricated, supplied and installed more than 4,000 new steel components.

Much of this work was successfully completed during a week-long suspension to rail services during the December festive period. Following this, and without any disruption to the half hourly train service, work was carried out on areas under the viaduct.

The 10-span structure comprises nine pairs of piers, supporting two lines of outer main girders, which are connected by a series of cross members. The cross members support rail bearers that act as a tray for the railway track's specially profiled hardwood wheel timbers.

The majority of FTE's work involved the repair and replacement of these iron rail bearers, but some cross members and the viaduct's supporting

columns also needed strengthening with steel plates, bands and bracings.

As the work had to be carried out over water, gaining access to the viaduct proved to be challenging. Prior to the work starting, a temporary access scaffold and platform was installed to one side of the structure.

Bolted to the underside of the viaduct, it extended the full length of the structure, from abutment to abutment, and allowed work to be undertaken below and above the spans.

"There have been a number of repairs carried out over the years to the original iron viaduct, but none as significant as the work delivered in this blockade," says FTE Managing Director Tim Stedman.

Following a comprehensive survey of the structure, and before starting work onsite, FTE fabricated all of the new steel components.



FACT FILE

Lymington Viaduct, Hampshire

Main client: Network Rail

Main contractor: Octavius Infrastructure

Structural engineer: Atkins

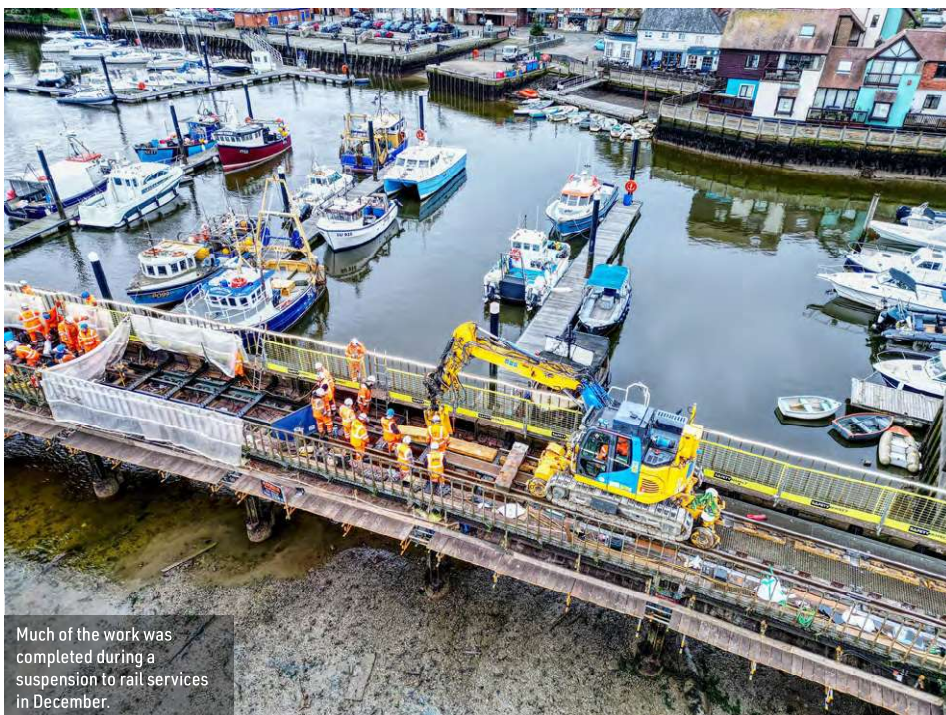
Steelwork contractor: Four Tees Engineers

Steel tonnage: 50t

Most of the elements were bespoke and had to be installed at exact locations, as the bridge is slightly curved on plan. Working over water and on a site with no room for materials to be stored presented another challenge to the team.

The steelwork was initially delivered to a nearby quayside and transported by boat to a storage pontoon. From there, a small spider crane moved individual items from the pontoon to the viaduct, where they were welded or bolted into place. This work was undertaken after the existing rail bearers had been gas-cut out and removed via a gantry.

In total, FTE removed and replaced 54 of the viaduct's 82 iron rail bearers. The new steel bearers were fabricated from plate with underslung bolted angles to tie them together. They were delivered to site in 1.4m-long lengths, which weighed approximately 140kg each.



Much of the work was completed during a suspension to rail services in December.



Steel strengthening bands have been clamped around the original iron columns.



Most of the steel elements, designed and fabricated by FTE, were bespoke items intended for exact locations on the viaduct.

The work also included the repair of retained bearers at 26 locations. This involved welding steel plates to the top flanges of the original ironwork.

In order to create an efficient programme, the work commenced at each end of the viaduct simultaneously, with two teams working progressively towards the middle of the structure. Within each bay, the removal of the old components proved to be challenging due to the complex structural arrangement, which was not immediately visible.

Once exposed, many of the existing angles, plates and rivets hindered the removal of the rail bearers.

"We created an effective solution to address this challenge, and lost productivity was recovered, with an increase in efficiency across the remaining bays," says Mr Stedman.

"Our solution resulted in an additional 800 original rivets being removed and replaced with new bolts, with no detriment to the project completion date."

Once the steel strengthening works were completed, another subcontractor, EIS Services, applied a protective coating to the elements that would not be accessible once the track was installed.

New rail timbers were then placed on the rail bearers and the railway track was installed.

Mark Goodall, Network Rail's Wessex Route

"There have been a number of repairs carried out over the years to the original iron viaduct, but none as significant as the work delivered in this blockade."

Director, says: "This maintenance was crucial for the continued safe and reliable operation of the Lymington branch line.

"Throughout the project, we worked closely with our train operator partner, South Western Railway, and Wightlink Ferry company to ensure passengers could continue their journeys seamlessly. We maintained close collaboration with our partners to ensure the Christmas closure also ran smoothly."

Summing up, Octavius Managing Director for Rail, Matt Smith, says: "Working together as one, in partnership with our suppliers, the Octavius team and the wider SRE team, we planned and delivered a successful and safe outcome for this project.

"Collectively, we understood and managed the risks associated with the challenging location. FTE identified and recommended improvements to the access and working platform arrangements that increased productivity during the blockade works." ■