

Barmouth Viaduct Metallic Spans Replacement, Wales

PROJECT TEAM

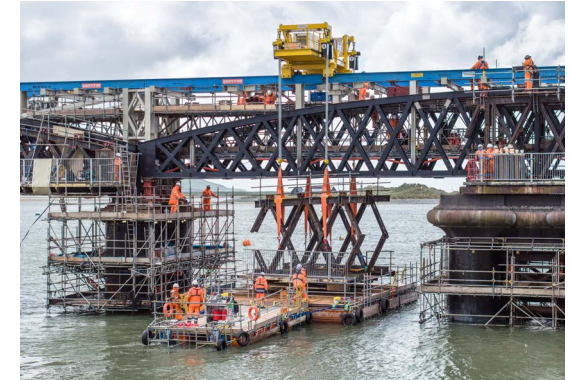
Structural Engineer:
Tony Gee and Partners LLP

Main Contractor:
Alun Griffiths (Contractors) Ltd

Client:
Network Rail



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Barmouth Viaduct is a Grade II* listed railway and pedestrian bridge located in northwest Wales, spanning 760 metres across the Mawddach Estuary. It is formed of five metallic spans to the north and the rest to the south are timber. Those in the north were corroding and deteriorating, so needed to be replaced, along with reinstatement of the swing mechanism. To add to the complexity, the project team had to work with the estuarial conditions, concealed services, remote location and preserve the historic character while meeting modern engineering standards. The new steel structure replicates the original design, including imitation rivets and retained swing mechanism elements, and reuses the original cast iron caissons to minimise environmental impact and cost.

The viaduct's renewal presented exceptional design and engineering challenges. The bespoke steel rocker bearings, built-up sections, and complex connections required detailed analysis and coordination. A new H-frame was designed to over-sail the retained swing mechanism, providing structural support and enabling future maintenance. The staged installation demanded precise sequencing, and stability checks at every phase, with the permanent and temporary works designed in tandem to ensure compatibility.

A 3D model was used to verify geometry and avoid clashes. The imitation rivets were CNC cut and manually welded to maintain heritage aesthetics. The steelwork

was delivered on a strict timeline for trial erection and movement in the site compound before the track closed for the main works to begin.

Construction was executed during a three-month autumn track blockade to avoid peak tourism disruption. The narrow corridor, tidal conditions, and limited lifting capacity required bespoke gantry cranes and temporary gantry beams integrated into the new trusses. The northern abutment's limitations led to innovative installation methods, including site welding and staged lifting. The swing span was jacked to cantilever over its support, allowing horizontal installation of the H-frame steelwork.

Environmental sensitivity was central to the project. No new foundations were constructed, and the estuary bed remained untouched. Scaffolding platforms were supported off existing caissons, and materials were transported via rail across the timber viaduct, avoiding plant movement on the sand. Work was scheduled outside breeding seasons, and UK-based fabrication reduced transport emissions.

Collaboration between designers, contractors, and suppliers ensured the project was delivered on time and with minimal disruption. Barmouth Viaduct's renewal is a landmark achievement in heritage-sensitive engineering, showcasing innovation, precision, and environmental stewardship in a uniquely challenging setting.

Judges' comment

This new viaduct replicates an iconic listed structure which had deteriorated due to the harsh estuarine environment. The new superstructure was designed to fit within the existing enabling it to be moved into position using the existing railway, and to support the old as it was dismantled. An outstanding example of construction-led design.