

CASE HISTORY

ROYAL BORDER BRIDGE, ENGLAND, U.K.



Royal Border Bridge, carrying London -Edinburgh mainline train. Photo : Mel Holley ©

As part of Railtrack's major programme of repair and refurbishment of the land-based arches, work was authorised on numbers 1–15 of the Royal Border Railway Bridge. The bridge carries the main Inter-City East Coast rail line between Edinburgh (Waverley Street) and London (King's Cross). George Stephenson's magnificent 28-arch, 128 feet high viaduct spans the tidal estuary of the River Tweed between Berwick and Tweedmouth, two and a half miles south of the Anglo-Scottish border. Queen Victoria and Prince Albert opened the 2160 feet long bridge in 1850; the structure will celebrate its 150th Anniversary at the Millennium. The project was complicated by both environmental and technical factors.

Green nylon based Debris-Mesh surrounded the main work areas to contain dust and debris from the drilling which, if uncontained, would cause environmental problems to the residents of the 36-house Riverdene Estate lying directly below the bridge. The covering material also provided a degree of shelter from the strong prevailing winds which blow eastwards down



the Tweed River valley. Furthermore, certain areas of the 61' 6" span brick arches provided roosting areas for galleries of bats and, because they are a "protected species", provision had to be made to keep their exits clear with minimum disturbance to the bats' areas. The ornamental stone-work which forms the top parapet of the viaduct, is also a nesting site for House Martins; also, in 1996 a pair of Kestrels were observed nesting under one of the electricity catenary poles.

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ANCHOR DESIGN



About 60 men were employed on the repair work and, to minimise the noise associated with work on a scaffolded structure, drilling and the movement of heavy vehicles delivering materials, the contractors were obliged to limit their work to between 8 am and 5 pm.

The project required the installation of 1256 Cintec anchors spread over 15 arches; the project was carried out during 1995 and 1996. The first stage dealt with the northern based arches which cross the River near Berwick Railway Station which is built on the site of the old castle. To enable the second stage of the repairs, an intricate network of scaffolding supported wooden staging boards from ground level to the top of the bridge (126 feet). The size of the undertaking can be gauged by the amount of steel scaffolding tubes required which, if laid end to end, would cover 65 miles.

The Cintec anchors (see figs 1 & 2) were installed horizontally through the voussoirs to varying sizes and drilled depth in order to prevent the problem of creating a shear line in the parent material.

The project was partly funded by English Heritage. Apart from the erection of the electrification gantries and cables on the high-speed 125 Inter-City expresses some years earlier, this refurbishment is the first major repair work to be carried out to the Royal Border Bridge for over nearly 150 years – a tribute to the engineering skills of the Victorian builders and also an indication of the faith now placed in the Cintec Anchor System.

