

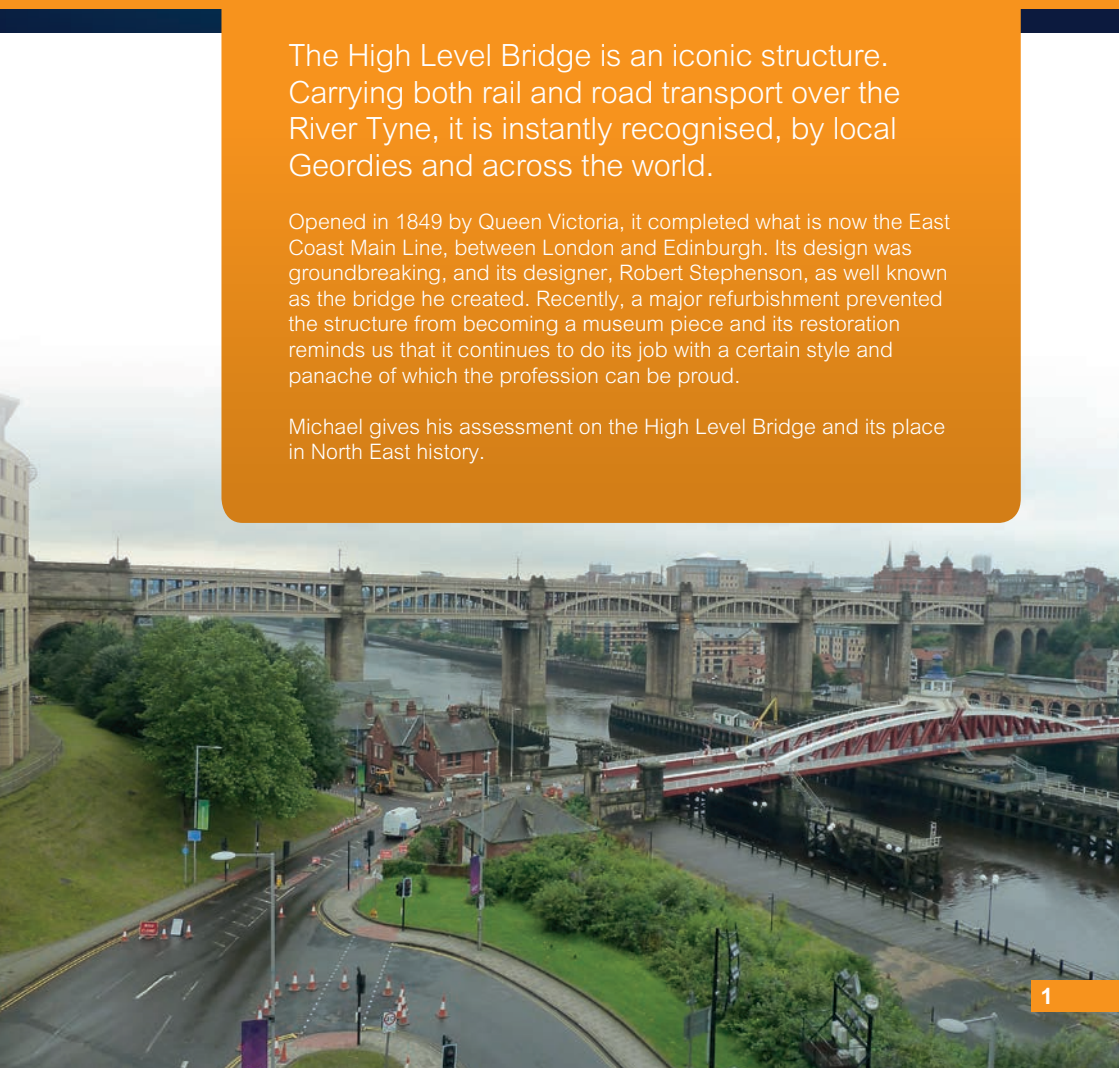
The High Level Bridge A North East Icon

A personal view by J Michael Taylor MBE

The High Level Bridge is an iconic structure. Carrying both rail and road transport over the River Tyne, it is instantly recognised, by local Geordies and across the world.

Opened in 1849 by Queen Victoria, it completed what is now the East Coast Main Line, between London and Edinburgh. Its design was groundbreaking, and its designer, Robert Stephenson, as well known as the bridge he created. Recently, a major refurbishment prevented the structure from becoming a museum piece and its restoration reminds us that it continues to do its job with a certain style and panache of which the profession can be proud.

Michael gives his assessment on the High Level Bridge and its place in North East history.



Choose a favourite road or rail bridge in the north east and you will be spoilt for choice. There are many and readers will all have their favourite. Perhaps it would be the Middlesbrough Transporter Bridge, Stockton and Darlington Railway Bridge, Hounds Gill Viaduct, Kingsgate Bridge at Durham, Tyne and Wear Metro Bridge, Gateshead Millennium Bridge, Telford Bridge at Morpeth, or the Royal Border Bridge at Berwick. The list seems endless but I choose the High Level Bridge over the Tyne Gorge at Newcastle which seems to me to bring so many of the key elements of a “Highways and Transportation icon” together.

By the middle of the 19th Century there had been a number of proposals to cross the Tyne at “high level” between Gateshead and Newcastle but it was the “Railway King”, George Hudson and the need to join his York, Darlington, Gateshead railway with his Newcastle to Berwick railway that caused the formation of the High Level Bridge company. Hudson’s engineer for his schemes in the north of England was Robert Stephenson.

Had the CIHT existed in the middle of the eighteenth century there is no doubt in my mind that he would have been a prominent member of the Institution.

Robert Stephenson was assisted by another eminent engineer, Thomas Elliot Harrison and the bridge was built between 1847 and 1849. It is the first major example of a wrought iron tied arch or bow-string girder bridge, a fine and long standing engineering solution to a difficult problem – the spanning of 1,337 feet (408m) of river valley, including 512 feet (156m) across water.



The High Level Bridge has six river spans of 125 feet (38m) length, sitting on masonry piers 46 by 16 feet (14 by 4.9m) in section and up to 131 feet (40m) height. There are also four land spans on each side, of 36 feet 3 inches (11m). The single carriageway road and pedestrian walkways occupy the lower deck of the spans, 85 feet (26m) above the high water mark, and the railway the upper deck 112 feet (34m) above the high water mark. The total weight of the structure is 5,000 tons.

The bridge completed the line of a London-Edinburgh railway, today known as the East Coast Main Line. It was opened to rail traffic, without ceremony, on 15th August 1849, officially opened on 27th September 1849 by Queen Victoria and brought into ordinary use on 4th February 1850. The bridge was constructed at the same time as Newcastle Central Station which was also opened by Queen Victoria in 1850. A history of the planning and construction of both is given in the book “The High Level Bridge and Newcastle Central Station – 150 years across the Tyne”, published in 1999 by North Eastern Railway Association and supported by the CIHT.

The total cost of the bridge was £491,153, including £112,000 for the metal work, which was produced by Messers Hawks, Crawshay & Co. There were 650 Newcastle and 130 Gateshead families who were relocated when their homes were compulsory purchased to enable the bridge construction.

Currently this cast iron Grade I listed heritage structure is one of Network Rail’s 'Major Structures' and provides a strategic turning loop on the East Coast Mainline.

During the 160 years of the bridge’s life a number of maintenance schemes and alterations have taken place. In May 2008 the bridge reopened following a £42m extensive programme of repair and strengthening to extend the life expectancy of the structure and conserve it as an important piece of national heritage.



The designer for the most recent work was Network Rail and the contractor May Gurney, with Mott MacDonald carrying out detailed inspections, structural assessments and design of all repairs and strengthening works. All structural works were designed to adhere with heritage and conservation engineering principles which were developed by the team in close collaboration with English Heritage, Newcastle City Council and Gateshead Council.

Works included the visual condition inspection and non destructive testing of 57,000m² of cast and wrought iron. Full-scale fatigue testing of structural components was also undertaken in conjunction with the University of Manchester. This research and development work successfully alleviated the need for extensive strengthening of the rail deck that might otherwise have been required by a more conventional design process.

The £42m refurbishment and strengthening works comprised the complete replacement of the suspended road deck including the sympathetic installation of an alternative load path away from 'fatigued' cast iron girders and also replacement of corroded sections of original wrought iron suspension hangers. New drainage and deck waterproofing was also provided.

Other works included extensive metalwork repairs and a complete repaint of the structure in Heritage colours.

When questioned whether a new bridge would have been a cheaper option than the recent refurbishment, the design engineer's response was that a new bridge would have cost about the same. However he also added a new bridge would have meant major demolition in Newcastle and Gateshead together with disruption to the East Coast Main Rail line. His conclusion was that the scheme represented good value for money.



Recent works did however place restrictions on traffic using the bridge, with vehicles only able to travel across the bridge from Newcastle to Gateshead. One departure from the strict Heritage constraint was the installation of vehicle impact protection to safeguard the structure from impact by road vehicles, as can be seen on the photograph of signing to the bridge. This has reduced the width of an already narrow carriageway.

It is perhaps sad to say that our profession received some criticism over what was widely reported as poorly designed and ineffective signage on the approach to the bridge. To prevent overloading, the only permitted vehicles are local buses, commercial vehicles less than 3 tonnes weight and taxis.

In other words, use by private cars and large goods vehicles is not permitted but there were some 50,000 illegal crossings of the bridge in the three months following reopening indicating all was not clear to the general motorist. It certainly would have been easier to defend the signage scheme, as shown in the photograph, if it had been more effective.

While the bridge remains a working structure, its international recognition is fully exploited. Images appear widely, in opening titles of television news programmes, on tourist brochures and calendars, the list is endless. It remains a popular subject for artists and photographers.



The bridge has caught the public's imagination from very early on in its life. The Gateshead fiddler, composer, James Hill, wrote "The High Level Hornpipe" to commemorate the opening of the bridge in 1850. The music is still played today and used as a test piece for young fiddle players. James Hill is commemorated on Bottle Bank, Gateshead, in an artwork by sculptor Peter Coates.

It is difficult to deny that the High Level Bridge does its job with a certain style and panache of which the profession, and the region, can be proud.

Thanks to J Michael Taylor, MBE, CEng, MICE, FICHT, for preparing this article.

All opinions in this article are the author's own.

