

Historic Border Bridges

This leaflet and the places you can visit will provide an insight into the historic significance of the magnificent Border Bridges. The list of bridges worth noting in this beautiful county of Northumberland is endless but the following nine bridges are particularly impressive structures worthy of note.

A bridge must support its own weight (deadload), the weight of the traffic upon it (liveload) and withstand the forces of nature (windload) and decay. Bridge types can be classified in basic categories (as below), many of which are exemplified in this leaflet:



Arch: Arch-shaped with abutments at each end, the bridge's weight is thrust into the abutments at either side.



Suspension: The bridge is suspended from cables which hang from towers that are attached to caissons or cofferdams that are implanted deep into the floor of a lake or river.



Beam: Weight on the horizontal beams pushes straight down on the supporting piers at either end of the bridge. A beam is in compression (squashed) at the top and in tension (stretched) at the bottom.



Trussed: Composed of connected elements, they have a solid deck and a lattice of pin-jointed or gusset-joined girders for the sides.



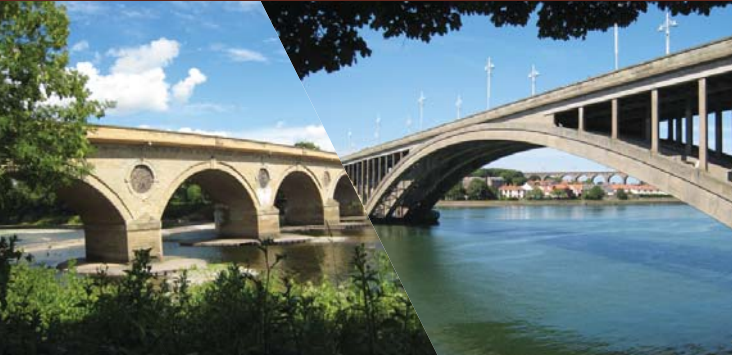
Cable Stayed: Cable Stayed bridges, like suspension bridges are held up by cables in tension. However, they require less cable and the towers holding the cables are proportionately shorter than suspension bridges.



Cantilever: Uses horizontal beams supported on only one end. Most use two cantilever arms extending from opposite sides of the obstacle to be crossed, meeting at the centre.

Images above: **Arch** - Twizel Bridge; **Beam** - Canty's Bridge; **Cable Stayed** - Northumbria University Intersite Bridge; **Cantilever** - Redheugh Bridge, Newcastle upon Tyne; **Suspension** - Union Chain Bridge and **Truss** - King Edward VII, Newcastle upon Tyne

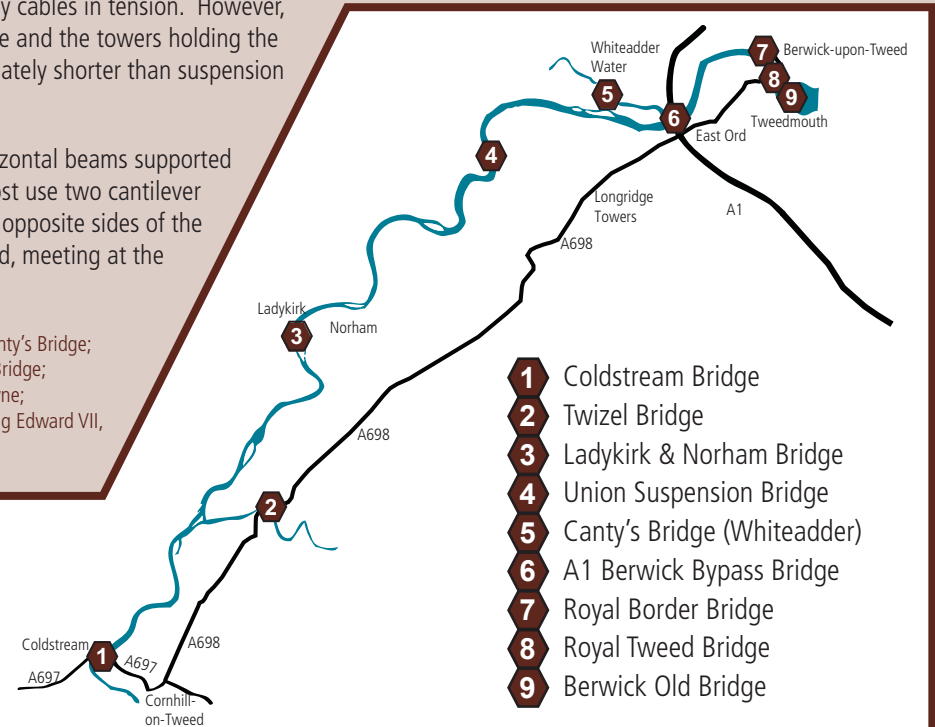
Historic Border Bridges



England's Border Country has a wealth of important and historic bridges

Sites and Locations to Visit

Historic Border Bridges Map



- 1 Coldstream Bridge
- 2 Twizel Bridge
- 3 Ladykirk & Norham Bridge
- 4 Union Suspension Bridge
- 5 Canty's Bridge (Whiteadder)
- 6 A1 Berwick Bypass Bridge
- 7 Royal Border Bridge
- 8 Royal Tweed Bridge
- 9 Berwick Old Bridge

1 Coldstream Bridge

Traditional multi-span arched masonry bridge
Built: 1763 - 1766
Engineer: John Smeaton FRS



The first of John Smeaton's bridge designs incorporating seven equal arches was built between 1763 and 1766 for the Tweed Bridges Trust. The original cost of the bridge was £6,000.

Subsequent work, included the 1784 construction of a downstream weir as an anti erosion measure. In 1828, the spandrel walls had to be reconstructed under the direction of Sir John Rennie. Concrete reinforcement of the foundations followed in 1922 and, in 1960, further repairs were undertaken including the construction of cantilevered footways added to both sides of the bridge to extend the original 6.7metre (22ft) wide roadway.

In the centre of the bridge there are two plaques, one depicts construction dates and names; the other was erected on the 7th May 1926 to commemorate the crossing of Robert Burns entering England for the first time on the 7th May 1787.



At the north end of the bridge is the Coldstream Marriage-house, where marriages took place from 1754 until 1856 without banns being called. The tolls were also collected there until the system was abandoned in 1826.

2 Twizel Bridge

Traditional arched bridge
Built: 1511
Engineer: Christopher Scune



A medieval single-arch stone bridge that crosses the River Till at Twizel. The bridge was crossed by English army troops marching to fight at Flodden Field in 1513. Twizel Bridge stands about six miles downstream from the Barmoor Wood, and the army would have been about five miles away from the Flodden Hill upon which the Scots were encamped.

Twizel Bridge, although being narrow, was chosen for the crossing place because it was substantial enough to handle weight of the twenty-two pieces of artillery.

It comprises a single arch springing from wide abutments with a span of 27.4 metres (90ft). It was the greatest single span of any bridge in England when it was built.

The parapets were repaired and possibly rebuilt in the 19th century. The medieval bridge was slightly altered in the 18th century when the grounds of Twizel Castle were landscaped. The bridge was closed to vehicular traffic in 1983 and a modern road bridge built alongside.

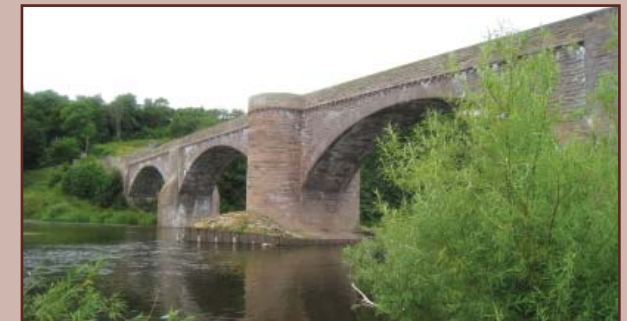
3 Ladykirk and Norham Bridge

Traditional multi-span arched masonry bridge
Built: 1885 - 1887
Engineers: Thomas Codrington & Cuthbert Breerton



Ladykirk and Norham Bridge spans the River Tweed and is a late stone built road bridge designed by Thomas Codrington and Cuthbert A Breerton for the Tweed Bridges Trust to replace an earlier wooden structure. Construction lasted from 1885 to 1887.

A four-span bridge, with dressed-stone arch rings, coursed-rubble spandrels and wing walls, red sandstone rock-faced with ashlar dressings, apsidal central cutwater with similar projection in parapet, outer cutwaters triangular and broached. The central pier has a rounded cutwater carried up to form a pedestrian refuge; the other piers have triangular cutwaters.



4 Union Suspension Bridge

Suspension bridge

Built: 1819 - 1820

Engineer: Captain Samuel Brown RN



The bridge, known locally as the Union Chain Bridge, was built at the upper tidal limit of the River Tweed, on the site of a former ford. Advice on the building of the towers and abutments was sought from eminent engineer John Rennie.

The roadway is timber suspended from pairs of wrought-iron chains with elongated bars connected by wrought iron. Captain Samuel Brown invented the bar link and, by using it here, constructed the bridge at a quarter of the cost of a masonry equivalent. When it opened on 26th July 1820 it was the longest wrought iron suspension bridge in the world with a span of 137 metres (449 ft), and the first vehicular bridge of its type in the UK. The opening ceremony was attended by leading Scottish engineer Robert Stevenson among others. Captain Brown tested the bridge in a currie towing twelve carts, before a crowd of about 700 spectators crossed. The final cost was £6,449.

The timber bridge deck was substantially renewed in 1871, and again in 1974, with the chains reinforced at intervals throughout its life. In 1902 it was strengthened by the addition of a steel cable. The bridge was closed to motor vehicles for several months during 2007 due to one of the bridge hangers breaking. In December 2008, the bridge was closed to traffic as a result of a landslide.

5 Canty's Bridge (Whiteadder Bridge)

Steel and reinforced concrete

Built: 1973



The current steel and reinforced concrete Whiteadder bridge, opened in 1973, replaced a temporary Bailey bridge which at the time was the longest in the country (133.5m/ 438 ft long). It was erected by The Royal Engineers after the old stone bridge of 1868 was swept away in the Great Flood of 1947.

6 A1 Berwick Bypass Bridge

Steel and reinforced concrete bridge

Built: 1983

Engineer: Bullen & Partners



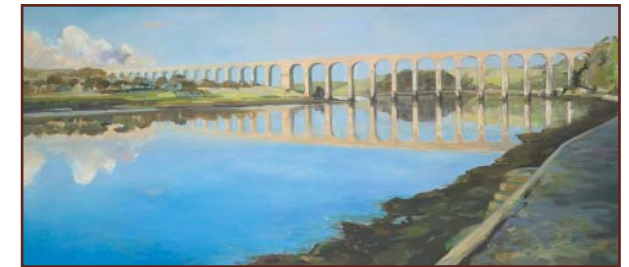
The bridge is a four span structure of composite beam and slab construction with continuous deck of fabricated steel beams and insitu reinforced concrete slabs. The superstructure is supported by concrete columns and cantilever abutments constructed on spread footings and steel piled foundations. The overall length of the structure is 195 metres (639 ft 9in) and was designed by Bullen and Partners and commissioned in 1982.

7 Royal Border Bridge

Traditional multi-arched masonry bridge

Built: 1847 - 1850

Engineer: Robert Stephenson



The Royal Border Bridge over the river Tweed at Berwick formed the last link in the east coast railway connection between London and Edinburgh. The Newcastle and Berwick Railway (N&BR) was formed in 1845 and, with Robert Stephenson as its engineer, construction began almost immediately.

With the exception of the bridges, the railway line (London to Edinburgh) was completed in July 1847. Temporary timber viaducts were used in the meantime. The Royal Border Bridge itself was designed by Robert Stephenson with the assistance of Thomas Elliot Harrison. The resident engineer was (Sir) George Barclay Bruce and the contractors were James McKay and J Blackstock.

Queen Victoria officially opened the majestic Royal Border Bridge on 29th August 1850. The viaduct is built on a curve and consists of 28 arches each of 18.6 metres (61 ft 6in) span; the rails are 38.4 metres (126 ft) above the river and the total length is 658 metres (2,159 ft). The bridge is constructed in masonry with brickwork soffits (undersides of the arches) covered by stone cladding.

The painting above depicting the Royal Border Bridge by the Limner, Jon Hall, was commissioned by ICE North East.

8 Royal Tweed Bridge

Reinforced concrete multi-span arched bridge

Built: 1925 - 1928

Engineer: L G Mouchel and Partners



The Royal Tweed Bridge was designed by L G Mouchel and Partners to take much of the through traffic from the 17th century Berwick Bridge. The design is of reinforced concrete and consists of four unequal arches. The bridge altogether spans a distance just short of 430 metres (1,410ft).

The design exploited the advances in reinforced concrete technology that had been made by the Swiss engineer Robert Maillart.

The Royal Tweed Bridge was officially opened on 16th May 1928 by Edward Prince of Wales (later Edward VIII). At the time that it was opened, it had the longest concrete arch in Britain spanning 108.5 metres (355ft).



9 Berwick Old Bridge

Traditional multi-arched masonry bridge

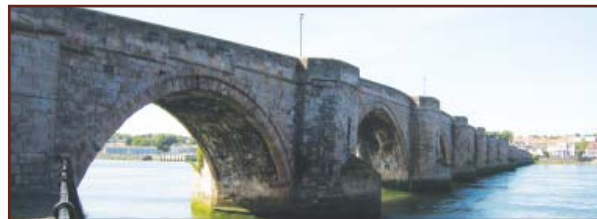
Built: 1611 - 1634

Engineer: James Burrell



Berwick Old Bridge was built between 1611 to 1634 by James Burrell. The bridge is 355 metres (1,164ft 6in) long and 5 metres (16ft 3in) wide with 15 red sandstone arches. When the bridge was almost complete, in 1621, severe flooding set back completion by several years. The cost of construction was £15,000.

Five previous bridges stood on the site. The original bridge was destroyed flooding in 1199, the second by an English attack in 1216 and, in 1294, the third bridge was also ruined by flooding. The fourth bridge, built in 1376, was replaced by a wooden bridge built in the reign of Henry VII (after 1485). This wooden bridge served until the king (James I of England and James VI of Scotland) ordered the construction of the present bridge. At the time, the bridge was on the main road from Edinburgh to London, and in 1603 King James had to cross over what was then a dilapidated wooden bridge while travelling to London for his coronation.



Berwick-upon-Tweed is the most northerly town in England and being the Border town has changed hands between England and Scotland thirteen times.

Crossing the majestic River Tweed and its tributaries is an everyday occurrence and we frequently fail to notice how beautiful many of the bridge structures are. This leaflet details the background to these magnificent feats of civil engineering.

Further Reading, Information & Useful Websites

- Civil Engineering Heritage, Northern England. R W Rennison; Thomas Telford Publishing; 1981
- Bob's Bridges, Jottings from a Northumbrian Foreman's diaries. Robert Robson; Northumberland County Council; 1998
- Land of Singing Waters, Rivers and Great floods of Northumbria. David Archer; The Spredden Press; 1992
- Engineering Timelines www.engineering-timelines.com
- Heritage Explorer www.heritage-explorer.org.uk
- Union Chain Bridge <http://unionchainbridge.blogspot.com>
- Flodden 1513 www.flodden.net
- Coldstream Bridge www.coldstream-scotland.co.uk/history_bridge.htm
- Royal Border Bridge www.robertstephensontrust.com

With thanks to:

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The Institution of Civil Engineers (ICE) is one of the pre-eminent engineering institutions in the world. Established as a learned society in 1818, it has 80,000 members and provides a voice for civil engineering, continuing professional development and promoting best practice throughout the industry.

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