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# A View from the Bridge

## for The Friends of the Union Chain Bridge

December and Christmas 2023



## ...Season's Greetings to all Friends...

**What an amazing year**, the culmination of 38 months of work from the felling of the trees in 2020, in preparation for the restoration to begin, to the first car driving over on 17th April this year. The Bridge's



international importance was recognised by a gathering celebrating the Bridge's role as 'the Father of Suspension Bridges' and the unveiling of the plaque presented by ASCE, JSCE and the ICE designating it as an International Historic Civil Engineering Landmark. Since then, this wonderful Bridge has received various accolades recognising this ground-breaking design by Captain Sam Brown.

From the instigation of the Friends group in 2014, the Trustees have been heartened and inspired by the interest shown by so many people in this amazing structure, and your support was instrumental in securing the funding for the restoration programme. Thank you all.

We plan to keep celebrating the Union Chain Bridge in a diversity of ways in the future and look forward to your continued support.

With all good wishes for Christmas and 2024.

Martha Andrews, Chair

## Den nya Jern-ron öfver Tweed, gransfloden melland England och Schottland

Berwick resident Eleanor Gilchrist wrote to us some time ago with an article from a Swedish arts and news magazine of 1822, "for citizens of all classes", which she had been surprised to find while researching something completely different. Like Eleanor, we pushed the article through Google translate and, with a bit of tinkering, have come up with the following:

26.

*Den nya Jern-ron öfver Tweed, gransfloden melland England och Skottland.*

Engelske Marine Capiten Brown är upfinnare och byggmästare af denna bro, som han kallar *chain-bridge of suspension* (hängande kedjebro). Hon är 330 Yards (vid pass 500 sv. alnar) lång och liksom svärfar öfver vatteutan förmedelst lodrätt hängande jernstänger *a a*, hvilka uphåras af kortare horisontelt löpande jernstänger *b b*, som i likhet med en ur ked är hopfogade och genom sin naturliga tyngd och ledfogningarne antaga formen af en båge. Vid hvardera stranden af floden äro tvenne stora, tätt upmurade och med jern-ankare sammanbundne hufvudpelare *c d*, hvarigenom ofvannämnde jernked *b b* löper, hvars förlängda ändar *e e* åter äro fästade i jorden eller klippan. Sjelfva bron *f* är sammansatt af små jernslår, som passa tätt tillsammans och öfver hvilkas fogningar äro lagda breda och tjocka jernband, til träverkets bevarande och at gifva det hela et lättare utseende. De nedanför stående detaljerne torde tydligare förklara ledernes sammansättning. — När på den undra kedje-länken *h* uti öppningen *g* passas öppningen *i* af tver-stången *k*, och derpå lägges öfra kedje-länken *m* med öppningen *l*; — i sänkingen *n* åter isättes den lodrätta stängen *p* med sin knapp *o*, och sjelfva stängen passas i rännan *q*, och sedan öppningarne *g i l* förbindas genom klink-nageln Fig. 1; så föreställes en led af kedjan, som utgör den bärande kraften, hvaraf upkommer Fig. 2. — Fig. 3. är en slå af brohotten, uti hvilken vid *u u* isättes de lodrätta stängerne *a a*. — Vid *x* är en liten jern-plåt med följande inscription: *Vis unita fortior.* (Starkare genom förenade krafter).

Denna bro öppnades första gången i November 1820, under tillopp af en otalig folkmängd och med passande högtidlighet, som slutades med en stor bal på sjelfva bron, hvartil särskilta inträdeskort utdelades.

Må det tillåtas oss en fråga: huru skulle en sådan bro se ut öfver strömmen mellan Blasii- och Skeppsholmen? — Den behöfde blott vara 320 svenska alnar lång!

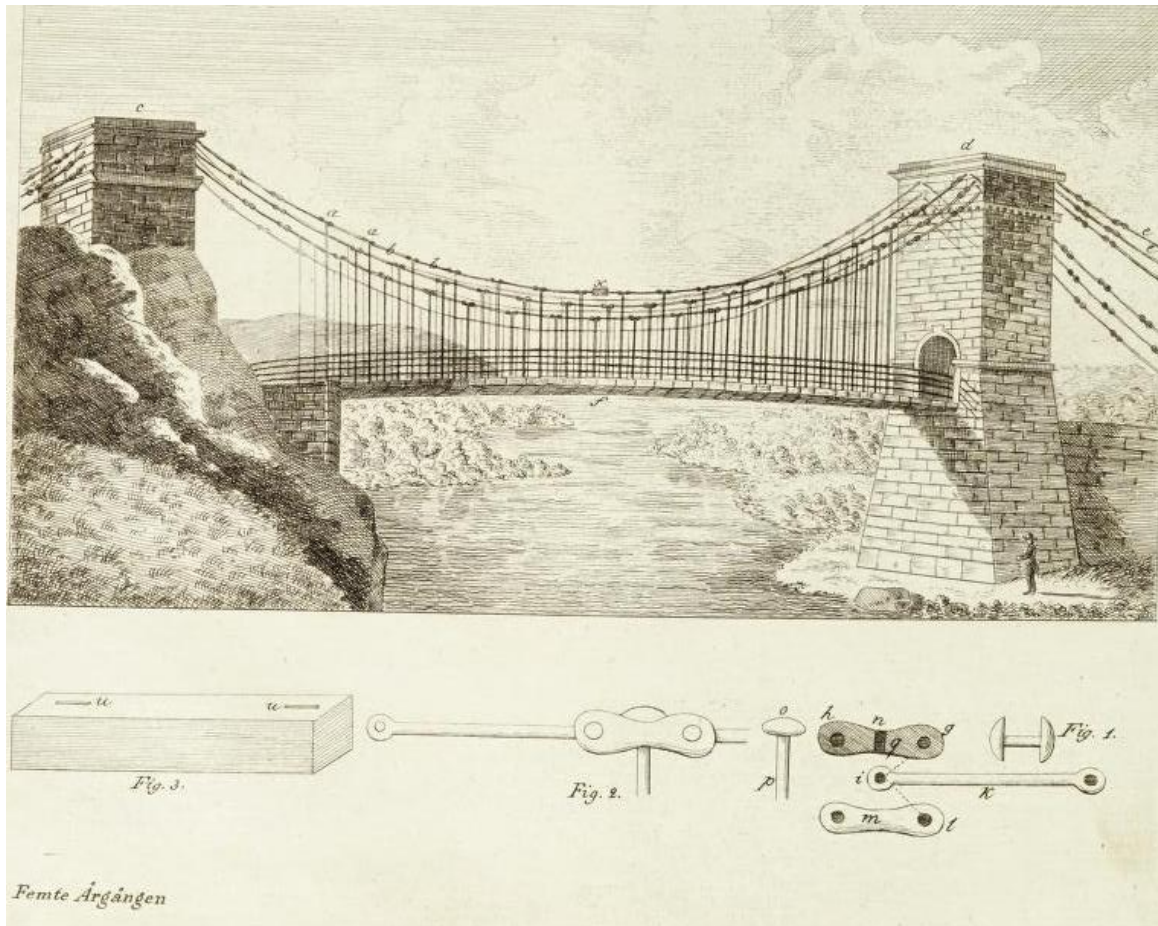
"The new Iron Bridge over the Tweed, the boundary river between England and Scotland."

English Naval Captain Brown, is the inventor and builder of this bridge, which he calls *chain-bridge of suspension*. It is 330 Yards (at pass 500 sw. cubits) long and appears to float above the surface of the water in the form of vertically hanging iron tubes (a-a), which are supported by shorter horizontal running iron tubes (b-b), which, like a watch chain, are joined together and through their natural weight and the joints assume the shape of an arch. On each bank of the river are two large main pillars (c-d) tied together with iron anchors, through which the above-mentioned iron chain runs, whose extended ends (e-e) are again fixed in the earth or the rock. The bridge itself (f) is composed of small iron battens, which fit closely together and over whose joints are laid wide and thick iron bands, to preserve the timber and to give the whole a lighter appearance. The sub-alges below should make the composition of the joints more clear. — When on the lower chain-link in the opening g, the opening i of the cross-tube /c is fitted, and then the upper chain link m with the opening l is placed; — in the recess n, the vertical rod eye p is again inserted with its button o, and the rod itself is fitted into the channel <7, and then the openings g and l are connected by means of the rivet Fig. 1; so a link of the chain is represented, which constitutes the carrying force, from which arises Fig. 2. — Fig. 3. is a beat of the bridge bottle, in which at u u the vertical rods a a are inserted. — At x is a small iron-plate with mocking inscription: *Vis unita fortior.* (Stronger through united forces).

This bridge was opened for the first time in November 1820, under the influence of an innumerable crowd and with appropriate solemnity, which ended with a large ball on the bridge itself, to which special invitation cards were distributed.

May we be allowed a question: what would such a bridge look like across the stream between Blasii and Skeppsholmen? — Dm only had to be 320 Swedish cubits long!

.....or words to that effect!



Our thanks to Eleanor Gilchrist for drawing our attention to this article.

# National Awards for the Restoration Project

## Georgian Group and National Building and Construction Awards

Northumberland County Council have issued this Press Release following two awards received by the Councils and their Contractors, the Spencer Group, for the restoration of the Bridge.



“Six months after its grand re-opening, the Union Chain Bridge has scooped a hat-trick of awards.



Restoration of the 203-year-old structure, the oldest vehicle suspension bridge in the world was completed earlier this year after every single piece was removed, checked and restored or replaced before being carefully reassembled.

Now, back to its former glory, the bridge, and the teams behind the project, have been honoured with three awards.



The Georgian Group’s Architectural Awards celebrate exemplary conservation and restoration projects in the UK, recognising those who have shown “vision and commitment” in restoring Georgian buildings and landscapes.

The bridge was a joint winner of the Diaphoros Prize, alongside restoration of the Inner Hall of Windsor Castle, with judges noting its ‘unique cross-sectoral partnership’ involved in the project.

Days later, in the National Building and Construction Awards, main contractor Spencer Group scooped gold for Restoration Project of the Year and silver for Community Engagement for the scheme.



Northumberland County Council Cabinet Member for Improving our Roads and Highways Councillor John Riddle said: “We knew how special this project was but it’s always good to have outside recognition for your work.

“A key thread throughout these awards has been the recognition of the great partnership working throughout this project – and these honours are for everyone who has played their part in this fantastic restoration.”

Spencers received the NBCA Community Engagement Award for their commitment to working closely with partners and stakeholders throughout. These included Northumberland County Council, the Scottish Borders Council, Museums Northumberland and the Friends of Union Chain Bridge.



The Spencer Bridge Engineering team became a part of the community they



worked in, taking time to help residents with roof repairs, handing out firewood, building a community bar at Horncliffe Memorial Hall and even providing medical assistance to a resident living near the bridge. Joe DiMauro, Engineering Director at Spencer Bridge Engineering, said: “We’re incredibly proud to have our work on Union Chain Bridge recognised with these prestigious industry awards. “It was a genuine privilege for the team to carry out such an important project on this iconic and cherished crossing. I’d like to congratulate the team on their incredible work and thank all of our partners and stakeholders on this project for their help.”

Above: Joe DiMauro (centre) with members of the Spencer team at the NBCA Awards.

# Samuel Brown's Welsh and Brighton Connections

We are grateful to Carol Morgan of the Institution of Civil Engineers for permission to reproduce below two articles from the current issue of the ICE's Panel for Historical Engineering Works (PHEW) Newsletter; the first, by our own Wales-based Trustee, Stephen K Jones, on the Bridge's sometimes-overlooked Welsh connection through Samuel Brown's Newbridge chainworks; the second, Carol Morgan's own blog on Brown's Brighton chain pier.

## Union Chain Bridge : The Welsh Link

by Stephen K Jones, Wales Member ICE Panel for Historical Engineering Works, Trustee Friends of Union Chain Bridge

**The completion of restoration work on the Union Chain Bridge (HEW 0143) was marked this year by three events**, the opening of the bridge to traffic on the 17 April, an event on 6 July that included a plaque unveiling and presentations by the restoration team and experts with a 26 July event reflecting the actual anniversary date in 1820. It is well known that the bridge is a link between England and Scotland but less well known is that the bridge ironwork came from Wales - a chainworks at Pontypridd, then known as Newbridge.

**This was a venture initiated by Captain (later Captain Sir) Samuel Brown (1774–1852)** as his second purpose-built chainworks. Brown developed his ideas in London, getting smiths to forge his first chain cable of twisted wrought iron links. For capital he turned to his cousin, the merchant Samuel Lenox and he conducted a practical demonstration by chartering the 400-ton Penelope and fitting it out with chain cable for both mooring and rigging cables on a four-month voyage. A successful voyage regarding chain cable and by 1811 iron chain cables were in routine use with one cable to each ship but it would be several years before hempen cables were completely replaced by the Royal Navy. Brown's patents made him the exclusive supplier of chain cable to the Navy and with regular naval contracts his first chainworks at Millwall was fully engaged and Brown decided to open a second chainworks at Newbridge on the Glamorganshire Canal, a canal used by the ironmasters of Merthyr Tydfil to send iron down to the port of Cardiff. Brown could therefore rely on bar iron in significant quality and quantity, and he was familiar with Merthyr iron, particularly that from the Cyfarthfa ironworks. It is likely that Brown choose Newbridge on the advice of Philip Thomas (1771- 1840) his smith foreman who would go on become Newbridge's first manager and joint patentee with Brown in 1816. Brown continued to improve his chain cable design by side welding and adopting stay-pins or studs to maintain the link shape and prevent its collapse. Brown and Thomas's 1816 patent covered the manufacture of cable composed of ovalshaped links, side-welded with broad-ended studs, the links formed on special machinery, also covered by the patent. This



chain cable shape has remained almost unchanged to the present day and the process of manufacture continued at Newbridge until the end of wrought iron chain production. Not content with a near monopoly on iron chain cables, Brown considered other applications, that of iron chain suspension bridges. Brown was the first to erect iron suspension bridges with a level road deck in Britain, James Finley having erected the first bridge of this type in America in 1801. Brown's innovation was for chains of flat eyebar links and pins, a design he patented in 1817. A similar design was being used by Thomas Telford at Menai and Conway. Following the testing of an experimental

span at Millwall, Brown's first chainbridge was the Union Suspension Bridge across the Tweed with ironwork coming from Newbridge. As with his chain cable he would use round bar iron of Cyfarthfa iron from the Crawshays' Merthyr Tydfil ironworks to form the links. The chainworks were on the Newbridge estate owned by Benjamin Hall who would go out of his way in 1822 to see this 'hanging bridge', Benjamin Hall

noted that 'the appearance of the bridge is very light and neat, and the general opinion is that it is likely to last and is as durable as any other'.

**On the 6 July the International Historic Civil Engineering Landmark (IHCEL) unveiling was carried out by the Institution of Civil Engineers (ICE), the American Society of Civil Engineers (ASCE) and the Japanese Society of Civil Engineers (JSCE), together with the Patron of the Friends of the Union Chain Bridge, Professor Dr Roland Paxton.** The plaque noted the contribution made by Wales in terms of the ironwork. Later in the month (26 July) the Chair of the Friends of the Union Chain Bridge, Martha Andrews, incorporated a Welsh element in the form of a leek in the bouquet that was dropped into the river Tweed to celebrate the bridge's 203 years. The international flavour continued in the afternoon of the 6th July and I was privileged to chair the historic session and to take the opportunity to pass on a message from Jeremy Lenox, the last of the Lenox family to work for Brown Lenox, who could not attend the event but who was proud of the Brown Lenox connection, '... it's nice to hear that the old firm was involved'.  
*With thanks to Stephen K Jones for his permission to use this piece*

# Samuel Brown's Royal Suspension Chain Pier at Brighton

ICE archivist Carol Morgan talks about the former Royal Suspension Chain Pier, Brighton on the 200th anniversary of its opening.



*The Royal Suspension Chain Pier in Brighton. Image credit: ICE Library*

**If you've wandered along the promenade at Brighton at low tide, you may have noticed a number of masonry blocks on the beach opposite New Stein square.**

**These are all that remains of Brighton's first pier, the Royal Suspension Chain Pier, more commonly known as the Chain Pier.**

## **Why was the pier needed?**

Like most piers, the chain bridge was originally built to allow people to embark and disembark from ships and unload goods. Previously the only way that people could take a ship was by hiring a local boatsman to take them from the beach to their vessel by rowing boat. There could be problems supplying Brighton with goods during bad weather when the ships were unable to run aground on the beach.

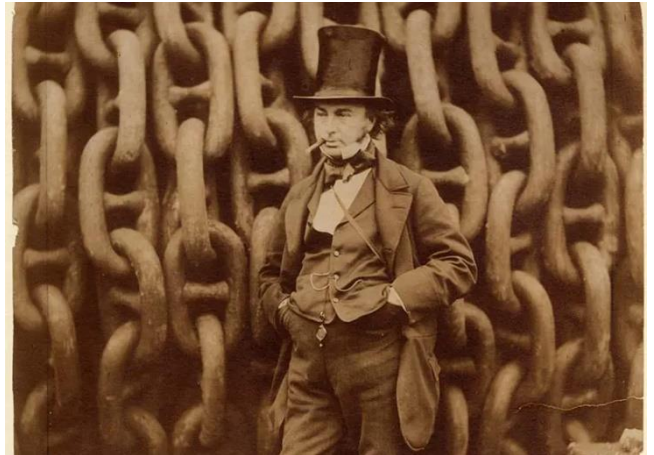
## **Who designed the pier?**

**The pier was designed by Captain Samuel Brown (1776-1852).**

Brown had originally patented wrought iron chain cables for naval use and the Royal Navy replaced their anchor ropes with chains.

The famous photograph of Isambard Kingdom Brunel at the launching of the Great Eastern (opposite) shows a drum of chains made by Brown's company, Brown Lenox Co.

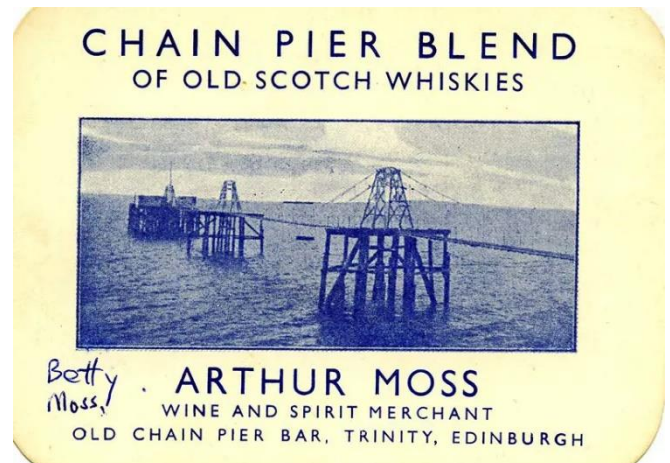
With the knowledge gained with wrought iron, Brown sought further uses. In this case, eyebar links for suspension bridges, and he built the Union Chain Bridge in 1820



*Brunel at the launch of the SS Great Eastern; ICE Library*

In 1821, Brown branched out, designing the 650-foot-long (198m) Trinity Chain Pier, at Trinity, Edinburgh.

He also created the Brightelmston (the original name for Brighton) Suspension Pier Company.



*Trinity Chain Pier: ICE Library*

## **Construction**

**Like Trinity Chain Pier, the Brighton pier consisted of four iron towers, but this pier was longer and the towers had cast iron walls, the hollow middle being used as shops.**

The first three towers were founded on 20 piles, which were driven several feet into the chalk. The piling was no easy task. Originally Brown employed a contractor to bore holes to drive the piles into. But after the machinery and staging were swept away in a storm, this plan was abandoned in favour of driving the piles directly into the chalk.

Brown took over the work, employing day labourers – mainly sailors used to the rough weather. The tower furthest from land was founded on 150 piles which were cross braced for extra strength.

Each of the towers was separated from the piles by two 2.5cm thick iron plates.

Using suspension bridge technology, the deck was supported by four suspension chains on each side of the deck.

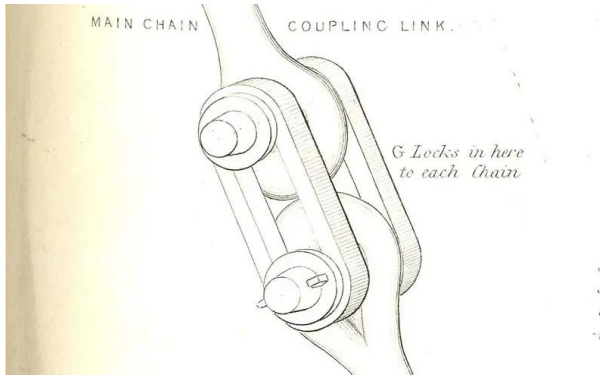


Diagram of chain links.: ICE Library

The chains were made of eyebar links 10 ft (3m) long and were hung in pairs with the upper pair 2ft (0.6m) higher than the lower. They were carried 54 ft (16.4m) into the cliffs at the land's end and passed over a saddle on each tower. They were then secured at the pier head by two large mooring stones and a huge iron plate weighing over a ton.

The wrought iron for chain links and other ironwork, including cast iron, came from the Brown Lenox chainworks at Pontypridd in south Wales. Vertical rods were attached to the links between the eyebars and a flat iron bar was suspended from the rods between each tower. Two-inch-thick (5cm-thick) planks were then placed from one side of the pier to the other, resting on the iron bar and the deck was placed lengthways across these.

### Entertainment on the pier

The pier was primarily a way of boarding and landing first by sailing ships and later steamers. However, there were a few attractions including a library and meeting room at the land end with a camera obscura: a kind of periscope which projected an image allowing people to 'spy' on the world outside.

As mentioned earlier, there were small shops of kiosks within the towers and there was a telescope and sundial at the pier head.

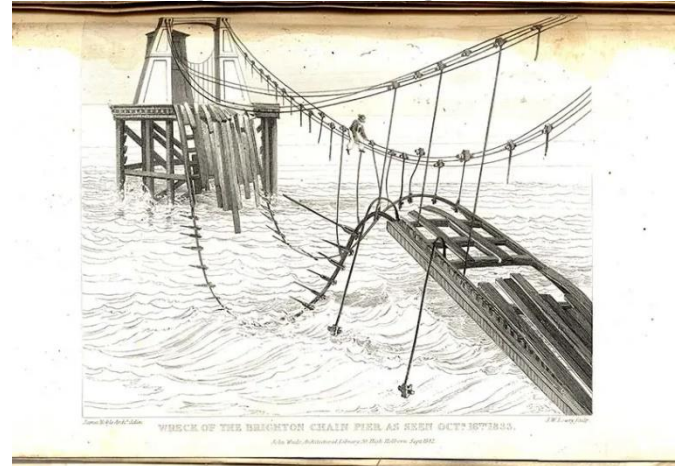


Sundial at the end of the pier. : ICE Library

### The end of the pier

**The pier was 1134ft (345.6m) long and just 15ft (4.5m) wide and the unstiffened deck was vulnerable to wind damage. This along with poor maintenance led to the demise of both Brown's chain piers.**

Brighton pier was first damaged in 1824 shortly after it opened. A hurricane tore up a number of planks from the deck, but little damage was done to the actual structure. However, a storm on 15 October 1833 caused a great deal of damage.



Damage to the pier, 16 October 1833.: ICE Library

The pier was repaired then, but eventually fell into disrepair and was finally destroyed by a storm on 4 December 1896. Two years later Trinity Chain pier was also severely damaged by a storm on 18 October 1898 and was left to rot into the sea.

The toll booths and signal cannon, used to signal the arrival of a ship at the pier, were moved to the Palace Pier where they can still be seen. In more recent years the house where Brown lived at 48 Marine Parade has been named Chain Pier House and a plaque added commemorating him.

Another plaque on the sea wall records where the pier met the shoreline.

Only one other suspension pier has ever been built in Britain and that was at Seaview, near Ryde on the Isle of Wight.

Designed by Frank Caws with a deck supported by wire cables and built in 1879-82, it suffered the same fate as Brown's piers suffering storm damage before being demolished in 1952.

Further information

Brighton Toy and Model Museum

National Piers Society

Bishop, J.G., The Brighton chain pier: in memoriam. Its history from 1823 to 1896., Brighton, 1897

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Miller, G and Jones, S K. Samuel Brown and Union Chain Bridge (Friends of the Union Chain Bridge), ISBN 978-1-5272-1616-7, 2017

## Guides meet on the Bridge

### A Scroll of Friendship tradition maintained

On a memorable evening of cross-border Guiding Friendship in late September, Guides from Berwick, Coldstream and Duns, together with Rangers, Young Leaders and invited guests, met on the newly-installed “borderline” near the middle of the Bridge to exchange Scrolls of Friendship and to re-enact an event of almost 75 years ago. The scrolls, made by the Guides, included pictures and scenes from the participating towns.



*The Scrolls of Friendship are exchanged over the Borderline.*

The ceremonies included the launch of a new Girlguiding Badge, created in collaboration with the Union Bridge Project, Girlguiding Northumberland and the Scottish Borders, the culmination of a close working relationship with the Project Team, and Carol Whinnom in particular, during the Bridge Restoration Project.



*Berwick Guides on the English side of the Bridge.*

The groups then moved to Chain Bridge Honey Farm for STEM (Science, Technology, Engineering and Maths)-related construction and bridge-building activities, including towers, beam and suspension bridges and a giant tetrahedron (and see the next article) and the evening concluded with a campfire and a song written especially for the event. It was, said Berwick Girlguiding Division Commissioner, Pauline Molloy “an evening of true Girlguiding – fun, friendship, food ...and a fire.”

## Meet Carol the STEM Surveyor

One of the most frequent questions we’ve been asked during the nine months since the Bridge reopened has been: “Who or what is the female statue meant to represent?” “Who is this unnamed young woman?”



*Out in all weathers; “Carol” the surveyor, on the Scottish approach*  
The statue, made by Welsh artist Sebastien Boyesen and affectionately christened “Carol” by the Spencer engineering team, in honour of their site secretary, has been something of an enigma and we have simply responded to enquirers that, although there wasn’t a female engineer on the project, the statue is intended to encourage girls to consider STEM-related careers. And this explanation was endorsed by the plaque (*wording below*) recently installed beside “Carol”, sponsored by Berwick Preservation Trust.

### THE UNION CHAIN BRIDGE: OUR PEOPLE

This sculpture is of an imagined contemporary engineer representative of the diverse range of people involved in the restoration of the Union Chain Bridge. Crafted by artist Sebastien Boyesen, she is one of two sculptures celebrating the people who constructed and reconstructed the bridge. In this beautiful workplace setting she aims to inspire people from all backgrounds to consider an engineering future.

Notice that the contemporary engineer is inspecting the Scottish tower. In 2023, 21th support from Berwick-upon-Tweed Preservation Trust, two timecapsules were created and placed inside the Scottish and English towers. The contents of these represent the communities who inspired and championed the restoration project. The capsules include a range of memorabilia donated by our local communities, children’s artwork from local schools and documents from The Friends of the Union Chain bridge and Berwick-upon-Tweed Preservation Trust. A Local artist, Rosemary Everett, designed and produced a pair of interconnecting paper sculptures inspired by the Bridge. Each capsule contains half of the sculpture, as it’s been designed to be reassembled in 100 years’ time.

## Congratulations to the Honey Farm!

For the past ten years, the Robson family at Chain Bridge Honey Farm, just 100m up the road from the Bridge on the English bank, have been amongst our most loyal supporters and, certainly, our most important outlet for our publications, cards, tote bags and other Bridge-related merchandise.

**75**

Heather promoted the *Project 2020 Group*, the forerunner of The Friends, with the aim of securing the Bridge's restoration in time for its Bicentenary; and she was the first Chair of The Friends.

So we are delighted to congratulate the Robsons on the 75<sup>th</sup> Anniversary of the founding of the business, and to wish them continuing success.

## Congratulations to The Fishers Arms!



Congratulations also to the Horncliffe community who have completed the purchase of the old-established Fishers Arms, completely renovated it and hope to have it opened in time for the Christmas season. When it is fully operational, the Fishers will be serving meals and will offer accommodation in two refurbished bedrooms. A new resident of the village has donated oak – from rootstock possibly 800-1000 years old – from the ancient woodland at Holystone in Upper Coquetdale, which has been used for the bar counter and, in burlled form, on the windowsills, reason in itself for a visit to the inn as soon as it opens.



The Fishers in August 2023, during restoration. The Fishers joins the Cross at Paxton, Paxton House Tea Room and the Honey Farm in offering refreshments to visitors enjoying riverside walks to and from the Bridge.

**The Friends of the Union Chain Bridge AGM** Advance Notice that our AGM will be held at 6.30pm on Thursday 15<sup>th</sup> February. Further details will be published in due course.

## Kalemouth Bridge Update



We have previously reported the sad and continuing closure of Samuel Brown's Kalemouth Bridge, over the Teviot at Eckford, west of Kelso, while Scottish Borders Council considered ways of dealing with substantial decay discovered in its decking in August 2020; and now a report to the Council has concluded that an estimated cost of £4m for a restoration project similar to that completed at Union Bridge, to allow continued vehicular use, would not represent "value for money" and, instead, is exploring ways of funding the estimated cost of £1m to renew the decking to a standard sufficient for foot and cycle use.

The "A"-listed Bridge was built by Capt Brown around 1830 (the exact date is unclear) and incorporated improvements based on his experience at Union Bridge some 10 years earlier. It carries an unclassified road over the Teviot and, prior to its closure, allowed single-file traffic, restricted to 3 tonnes, to cross between the A698 and about 12 properties in Ormiston Mains. Tests undertaken a little over three years ago found that the bridge no longer demonstrated "sufficient strength" to cope with such loads.

## Scotland of the Welcomes



These aluminium signs on the Scottish side of the Bridge leave visitors in no doubt of a **Welcome** to Scotland, the Scottish Borders and Berwickshire. In style and content they contrast starkly with the "England" and "Northumberland" signs on the other side of the Bridge

where the absence of a salutation is offset, perhaps, by the hand-painted heritage ironmongery.





# Highlights of 2023

from photographs by Jim Gibson

## April 17<sup>th</sup> – Re-opening



The Scottish party move to the borderline.....



as the English party approaches from the east



Councillor Glen Sanderson of Northumberland greets Councillor John Greenwell of Scottish Borders .....



-----and they symbolically cut the tape



The first car across is followed by pupils of Ford First School

## July 6<sup>th</sup> Plaque Unveiling and Symposium



Our Patron, Dr Professor Roland Paxton, (*second left*) with representatives of the UK, Japanese and American institutions of civil engineers, at the unveiling of the plaque commemorating the International Historic Civil Engineering landmark award.



Guests and delegates at the Talks Symposium held at Paxton House in the afternoon.....



....and outside the Paxton House marquee at the end of the day.

## July 26<sup>th</sup> – Bicentenary+3 Event



Thanks to the Union Bridge Project team for organising this event



Musicians at the Honey Farm



Very Revd Susan Brown of Greenlaw blesses the time capsules at the re-dedication ceremony.

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