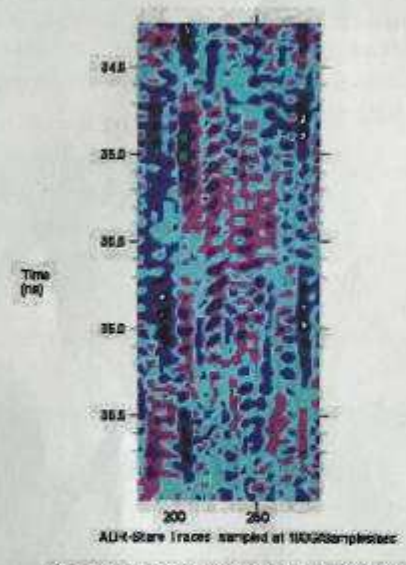
Capt Samuel Brown's Trinity Chain Pier at Newhaven

by Prof/Dr Roland Paxton, MBE FRSE FICE *Co-Patron of the Friends*

Chain P ier, Newhaven (c1845?) Calotype Album Vol 2; *Reproduced with acknowledgement to the Trustees of the National Library of Scotland*

Recently, Ted Cawthorn (Friends' Trustee), Prof David McGuigan (ICE Scotland Museum) and I took up an invitation to visit the Leith laboratories of Adrok Ltd [who in a joint radar research exercise with Heriot-Watt University last year located inaccessible anchorages at Union Chain Bridge]. Dr Colin Stove provided a fascinating account of the firm's facilities and work, including determination of hidden geological detail at great depths below the earth's surface. He then passed a maser through a Union Chain Bridge **wrought iron link of 1820** using his latest spectroscopic procedure and determined the image below and a mean value for its **Dielectric Constant of 1.7578751** as measured against the speed of light (0.2997925m/ns), a value of the same order as that identified by underground scanning at the bridge allowing for other factors. This means that the link had slowed down the speed of light by a factor of 1.325848822x [Dr. Stove].



Adrok scan of Union Chain Bridge link

Afterwards, we visited the site of the Trinity Chain Pier at Newhaven, near Leith. This little-known pier, another innovative icon of Capt. Brown, erected in 1821 just 13 months after the opening of Union Chain Bridge, attracted the attention of leading British and French engineers, including Baron Charles Dupin and C.L.M.H. Navier. The pier facilitated passenger transport, mainly between ports on the Firth of Forth, at the dawn of the rapidly developing paddle-steam-boat era. In mid-1830 the *Royal George* carried 8,168 passengers to Dysart, Leven and Largo in a two-month period, as well as 1,181 pleasure trippers who did not land in Fife. In 1831 the *Victory* and *Lady of the Lake* made daily sailings from the Chain Pier to the same destinations [Wikipedia]. A decline in this usage gathered pace in the 1840s as the railways and larger boats and ports developed. Later it had a fascinating extension of use as a popular sea-bathing facility. The pier was demolished by a storm in 1898. Although inadequately designed by modern standards, the pier deserves to be remembered as a triumph of the experimental technology of its time and a landmark in iron pier development.

Plaque at the Old Chain Pier pub; for "Anchorage" read "Land pier"

The 700ft(213m) overall length pier with its 4ft(1.2m) wide deck at about 10f([3m) above High Water provided a safe and convenient way of crossing the foreshore to a steam-boat landing in deep water. It was proposed by Lt. George Crichton R.N., Chief Agent of the London and Edinburgh Steam Navigation Co. and commissioned by the Trinity Pier Company, which included proprietors of steam vessels employed in the Firth of Forth. The Company contracted for the pier to be made and erected by Capt. Brown which he did in less than 12 months at a cost of about £4,000, much less than if it had been constructed in stone.

The pier's catenaries differed from that of Union Bridge in having 3 spans of 209ft(64m) with a central dip of about 1/16.8 span [Drewry/Navier], and in having just one chain at each side of the deck, both of which Capt. Brown proved with a load of 39.3 tons(39.9t). It had inclined eye-bar stays of 1in(25mm) dia. above and, from 1822, beneath the walkway [see Drewry/Navier figure]. The main chain eye-bolt links were 10ft(3m) long, diminishing in diameter from 2in(51mm) at the supports to 1.875in(48mm) near ¼ span and 1.75in(44mm) near and at mid-span which, although on a correct principle in achieving a modest economy were, as Capt Brown appreciated, not accurately proportioned to a catenary of uniform strength which was, and still is, impractocable. The pier, although of light construction and vibrating sensibily with the passage of a single person, had not shown any signs of failure by 1832 [Drewry]. It satisfactorily accommodated a walkway test

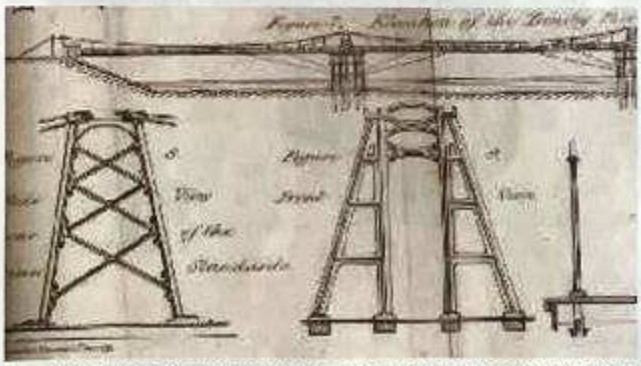
load of 21tons(21.3t) of pig-iron placed between the various points of suspension whilst passengers crossed. Although inadequately designed by modern standards, the pier deserves to be remembered as a triumph of the experimental technology of its time and as a landmark in iron pier development.

View of 'Land pier' tower building and first 209ft (64m) span; *from Capt Brown's specification enrolled in the Court of Chancery, Edinburgh: [Edin.Phil..J Vl 1821]*

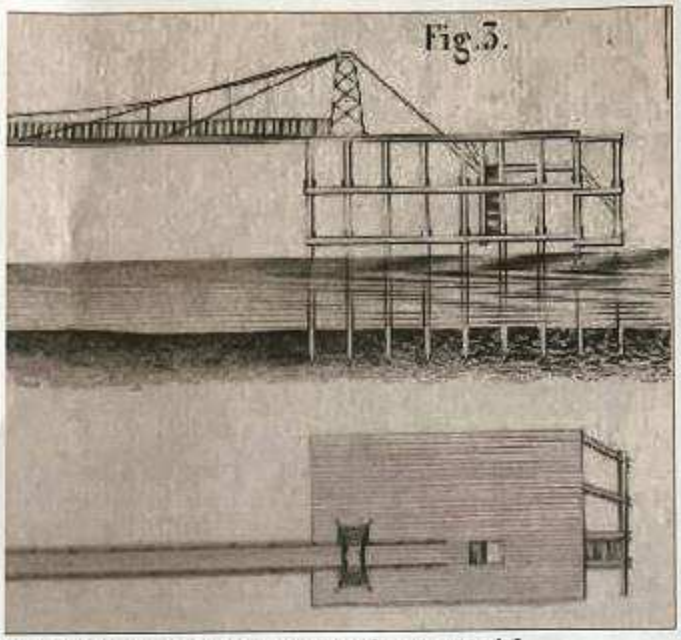
An abridgment of *The Scotsman* coverage of 25th August 1821 reporting the opening of the Pier:

'The advantages that have been derived by the public since the introduction of steam navigation in the Firth of Forth, have been in no small degree counter-balanced by the difficulty and danger encountered in the communication between the steam vessels and the shore, hitherto principally by means of small boats, rendered particularly unsafe from their being generally crowded or overloaded. This unpleasant part of the voyage is now at an end; for at all times of the tide the steam-boats can now approach close to the new chain pier to receive and land passengers.

This novel and elegant structure has been some time in progress under the superintendence of Captain Brown, R.N., whose ingenuity and ability require no comment. It was on Tuesday last [21st August] opened to the public in the presence of a numerous party of gentlemen. The pier was decorated with flags. Soon after eleven o'clock, the Lord Provost and Magistrates and other gentlemen, accompanied by Mr Scott of Trinity, Mr Crichton, Mr Stevenson, Mr Ramsay, and other proprietors, walked in procession from the Trinity Hotel along the pier, from whence they embarked in two steam-boats attended by a band of music, two vessels on each side of the pier firing a salute and, after an excursion to the Roads, returned and partook of an elegant cold collation provided by Mr Maclaren of the Trinity Hotel, under a tent erected on the platform at the extremity of the pier, to which upwards of 500 sat down. The scientific gentlemen present expressed themselves completely satisfied with the design and execution of the pier, which reflects the highest credit on the skill and ingenuity of Captain Brown and the spirited individuals at whose risk and expense this undertaking has been carried through'



Braced iron supports with saddles for main chains lay. Back chains from the 20ft (6m) tower at 45 degrees were stopped into iron plates 'on the principle of a mushroom anchor' [Drewry 1832, after Navier 1823]



Pier platform with Steps to landings [Dupin 1821/5]

Masonry of shore terminal incorporated into the Old Chain Pier pub. Chains in niche not part of pier. See fig 2 for plaque wording at niche crown. [© D McGuigan]

Main sources: **Brown Capt S,** 'Description of the Trinity Pier...' *Edin.Phil.J.*Vl 22-28; **Drewry, C S** *A Memoir on Suspension Bridges;* **Navier, C M L H,** *Memoire sur la Ponts Suspendus,* 1823; **Dupin, C***Voyages dand la Grade Bretagne, 1825. Planches. Pt iii, Pl Vi;* **Paxton, R** *Historic Berwick on Tweed Bridges* H-WU, IIE. 2018

Institute for Infrastructure and Environment, Heriot-Watt University, Edinburgh 28.11.2019

The Old Chain Pier Pub and Restaurant at Newhaven, Edinburgh