

Pontcysyllte Aqueduct



The Pontcysyllte Aqueduct today. Courtesy of Kim Price.

Designed by Thomas Telford, the ‘Stream in the Sky’ remains one of the most impressive features of canal engineering, and is still the highest aqueduct in Britain.

The original concept of the Ellesmere Canal was to create a link between the Rivers Dee and Mersey, and also connecting to the River Severn, thus a strategic link between the ports of Liverpool and Bristol. Such a canal would supply the prosperous agricultural district of Shropshire with coal, lime and other goods, be able to access coal and iron from around Ruabon, as well as linking in to the iron and the brick/tile industries in Acrefair.

In 1791, the nearest canal to Shropshire was the Chester Canal. This ran from Chester to Nantwich, but connected to no other waterway apart from the Dee at Chester. The original idea was to construct the Middlewich branch to join Trent and Mersey Canal, but the Trent and Mersey Canal Company, fearing traffic being taken away rather than added, had a clause inserted in the Chester Canal Company’s Act of 1777 forbidding the branch to approach within 50 yards of the Trent and Mersey. So the branch was never built and the Chester Canal became isolated, impoverished and derelict.

Instead, two other possible routes were proposed.

The Western route.

Originally, this was the route favoured by William Jessop, but would have been one of the most costly canals ever built. It would have required a ladder of locks to climb up from Chester to Wrexham and Ruabon, then a 4,600yard (over 2 ½ mile) tunnel, then a low level aqueduct over the Dee, more difficult cutting and another 1 mile tunnel and another aqueduct over the Ceiriog at Pontfaen! The promoters were daunted mainly by the length of the tunnel, and Jessop was requested to make fresh surveys to avoid it!

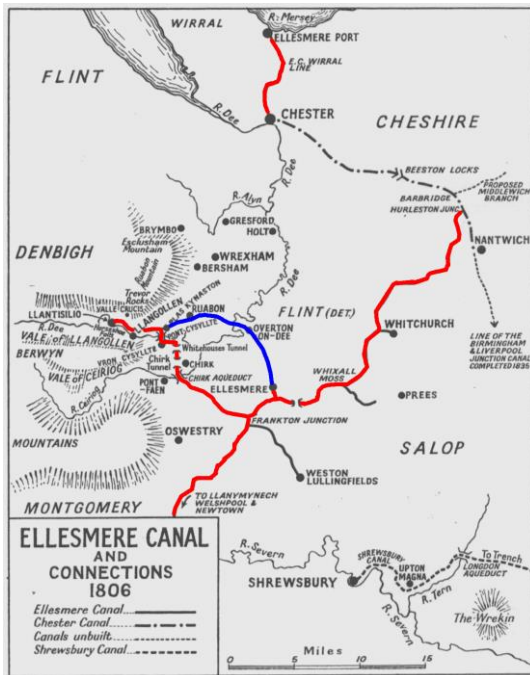


The two proposed routes – the Western Route (right) and the Eastern Route (left).

The Eastern route

This route was the closest to that eventually built, although at time it received Royal Assent on 30th April 1793, the solutions to crossing the Dee and Ceiriog had not been solved.

This eastern route was the one originally suggested by the original proponents of the canal, although they had envisaged a different final branch to cross the Dee at Overton, climb to a 210ft summit at Ruabon, skirt Wynnstay Park and go onwards to Plas Kynaston and Llangollen.



The first design for the canal crossing over the River Dee was prepared by William Turner, a Whitchurch born architect who would design Chalmodley Castle in 1801. He was responsible, along with John Duncombe, for the first surveys of the routes for the Ellesmere Canal. He favoured eastern route for the canal, which had been proposed by his cousin Joseph Turner. William Turner lost out to Thomas Telford for the job of General Agent in 1793, even though he had been supported by William Jessop.

The minute book of the Managing Committee on 17th January 1794 recorded:

“that the plan of the Aqueduct at Pontcysyllte with three arches as prepared by Mr William Turner of Whitchurch, architect, shall be adopted by this committee with such alterations as Mr Jessop shall communicate to Mr Telford, and that Mr Telford do prepare a specification and proper sections and working drawings to enable workmen to give in estimates”.

Having just 3 arches, this would have been a standard low level crossing, with locks on each side of the valley. These would have come with the associated construction costs and water loss. Whether somebody whispered in the Committee members ears we do not know, but just two weeks later, the Committee agreed to postpone putting Turner's aqueduct out to tender and awarded Thomas Telford £100 towards cost of preparing an alternative design!! A very disgruntled William Turner left the company!!

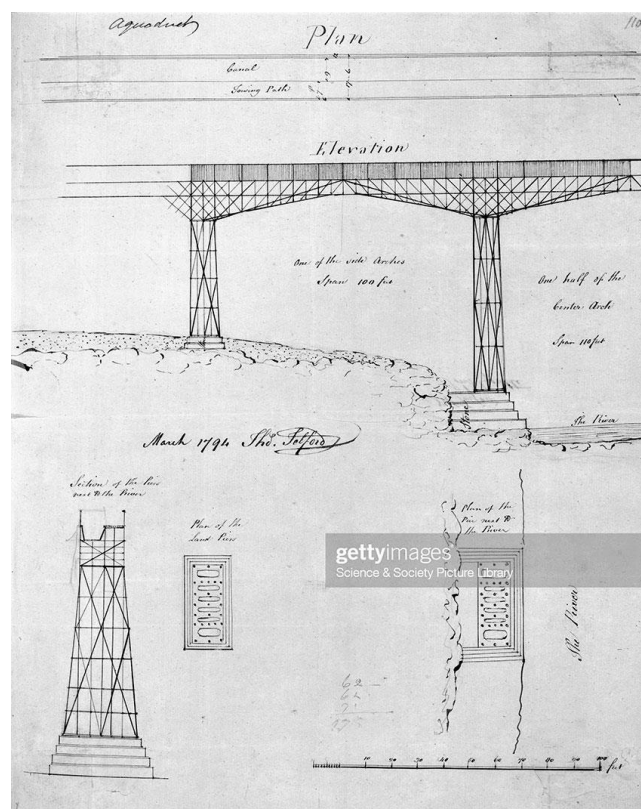
Thomas Telford had been appointed on 23rd September 1793. His job description was given in the minutes of the Ellesmere Canal Co.:-

"His engagement to extend to all architecture and engineering business to the drawing, forming and directing the making of bridges, aqueducts, tunnels, locks, buildings, reservoirs, wharfs and other works"

A stonemason, architect and engineer, Telford was the designer of numerous bridges, roads and engineering works, and would later work on the Caledonian Canal and the Menai Bridge. He was appointed as "General Agent, Surveyor, Engineer, Architect and Overlooker of the Canal" and was responsible for the work that happened on the ground.



Thomas Telford.

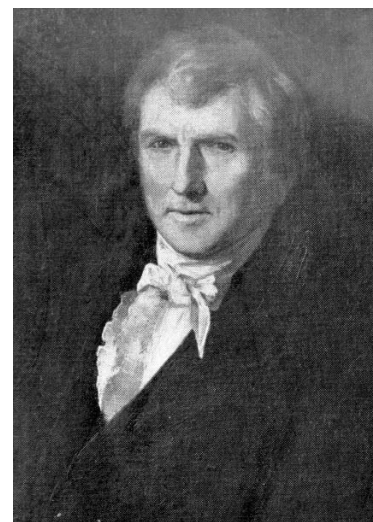


Telford's early design for iron lattice piers.

Telford's idea for the crossing of the River Dee was to use a high level aqueduct, with the trough constructed using iron instead of stone, thus making it much lighter. In fact, some of Telford's early drawings, from 1794, show a concept for an aqueduct with the piers and the supports for the trough constructed using iron latticework. In the end, though, Telford opted for stone piers, although they were hollow from 70ft up, and supported with internal cross walls, in order to lighten the loading on the foundations.

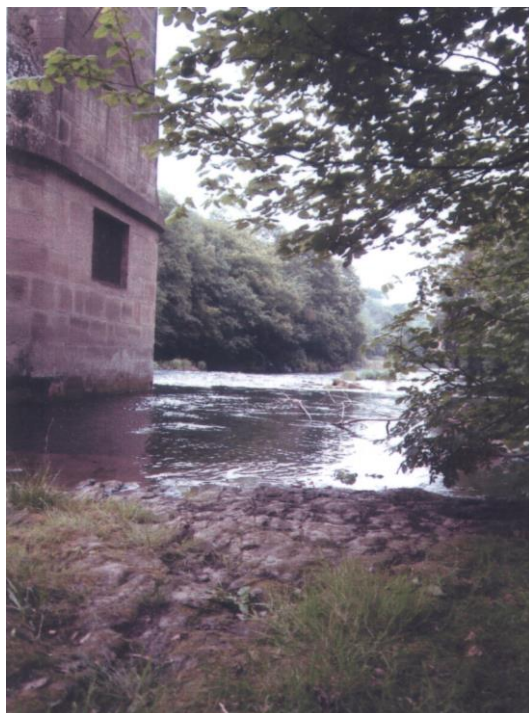
Despite all of the engineering wizardry brought by Telford to solving the crossing of the River Dee, massive earthworks were still required on the Froncysyllte side, where an earth embankment of colossal proportions had to be built to carry the canal to the aqueduct. It rose to a height of 97 feet and was the largest earthwork ever raised in Britain at that time. The work was done by a local contractor, William Davies.

William Jessop was probably the most experienced canal engineer of his age, later to be Senior Engineer on the Caledonian Canal. He was appointed Principal Engineer in 1791 for the Ellesmere Canal Co. and was, essentially, Telford's manager. Unlike many other engineers, he was not jealous of rising young engineers, but rather encouraged them. Telford had no previous experience as a designer of canals, but with Jessop's advice and guidance, Telford made a success of the project. He supported Telford, even when the Company thought that the latter's designs for aqueducts were too ambitious.



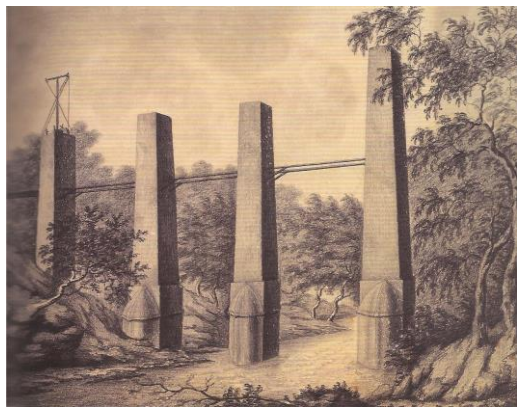
William Jessop.

The first stone for the Pontcysyllte Aqueduct was laid on 25th July 1795, the act recorded with a commemorative plaque set into the base of one of the pillars.



The commemorative plaque (above) and its location at the bottom of one of the piers (left).

The wording on the plaque states:- The nobility and gentry, the adjacent Counties having united their efforts with the great commercial interests of this country. In creating an intercourse and union between England and North Wales by a navigable communication of the three Rivers, Severne, Dee and Mersey for the mutual benefit of agriculture and trades, caused the first stone of this aqueduct of Pontcysyllty, to be laid on the 25th day of July MDCCXCV [1795]. When Richard Myddelton of Chirk, Esq, M.P. one of the original patrons of the Ellesmere Canal was Lord of this manor, and in the reign of our Sovereign George the Third. When the equity of the laws, and the security of property, promoted the general welfare of the nation. While the arts and sciences flourished by his patronage and the conduct of civil life was improved by his example.



The first task was the construction of the stone piers. In each pier a series of slots are visible in the masonry, which originally held horizontal timber beams running between the piers. Upon these beams temporary platforms or gangways were constructed from which the men could work. The

piers were thus built around and above each platform, until a new level was required, following which the lower platform would have been dismantled.



William Jessop had some concerns about the dimensions of the piers at the top, purely from a safety point of view. In a letter to Thomas Telford on 26th June 1795 he said:-

‘In looking forward to the time when we shall be laying the iron trough on the piers I foresee some difficulties that appear to me formidable. In the first place I see men giddy and terrified in laying stones with such an immense depth underneath them with only a space 6 feet wide and 10 feet long to stand on’.

‘the same want of room will hardly allow space for the beams and scaffolding while the ironwork is putting together.

...I would have piers 7 feet wide at the top, instead of 6 feet, and make them about 2 feet more in the other dimension.

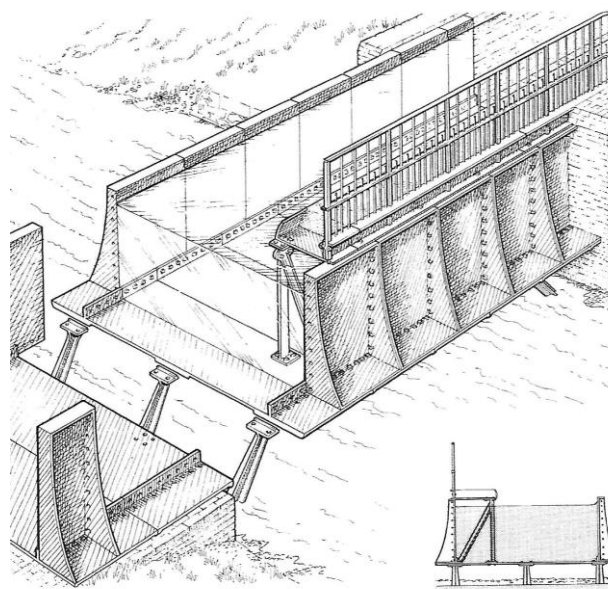


William Hazeldine.

In February 1797 William Reynolds and John Wilkinson, of Bersham Ironworks, submitted a tender for the Pontcysyllte ironwork. No contract was placed with them, mainly because William Hazeldine was just in the process of equipping his new Plas Kynaston ironworks, just a few hundred yards from the north end of the aqueduct. Plas Kynaston was up and running by 1799, as Hazeldine tendered successfully for the Chirk aqueduct bed, and in March 1802 he secured the contract for the Pontcysyllte ironwork. Using Hazeldine and Plas Kynaston was most likely a combination of ‘jobs for the boys’ and an astute move to save on the costs of transporting heavy iron?

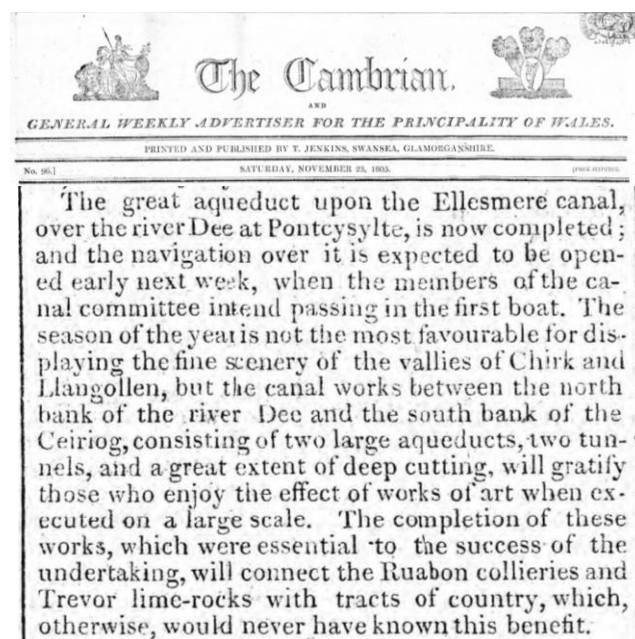
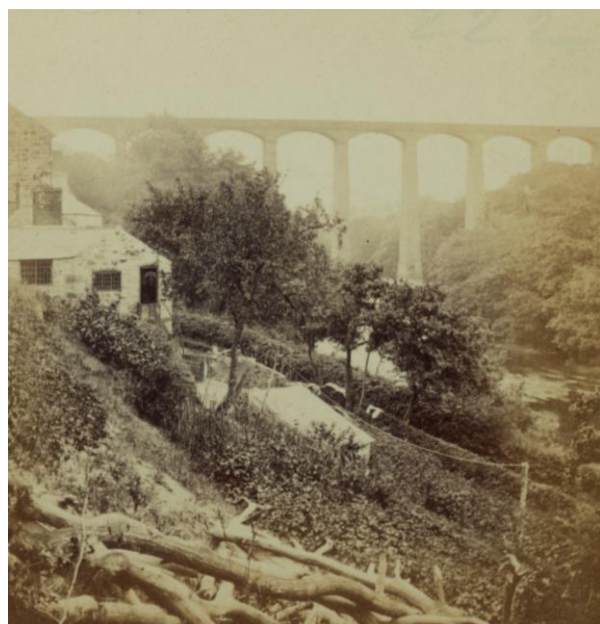
One problem with the narrow iron trough was where the water displaced by the moving boats would go. At Longdon, in 1796, Telford had designed and built a small iron channel aqueduct to carry the Shrewsbury Canal over the River Tern. It is now generally thought that he used this smaller aqueduct as a trial for Pontcysyllte.

At Longdon, there was an iron trough for the water with a separate footpath alongside, the problem being that water was trapped in the iron channel. Telford solved this at Pontcysyllte by suspending the footpath over the water on one side of a wider iron trough, giving somewhere for the water to go when a boat passed over the aqueduct.



The footpath at Pontcysyllte is suspended over the water.

The Pontcysyllte Aqueduct was opened on 26th November 1805, having taken around ten years to design and build at a total cost of £47,000 (equivalent to around £5,000,000 in 2024). The aqueduct is 1,007 ft (307m) long, 11 ft (3.4m) wide and 5.25 ft (1.60m) deep. It is 126 ft (38m) high above the river Dee. The opening was attended by 8000 people, including Eleanor Butler and Sarah Ponsonby, the Ladies of Llangollen. "Occupying the second ceremonial barge, along with Lady Williams Wynn and Miss Ormsby, Lady Eleanor Butler and Miss Ponsonby, with 'a complete sense of security', floated 126 feet above the River Dee, to the accompaniment of cheers from the 8000 onlookers and heartening salutes from the Seringapatam guns.



In spite of William Jessop's concerns, it was a matter of pride to Thomas Telford that only one man lost his life in this extraordinary enterprise.