

AN HISTORICAL
AND
DESCRIPTIVE ACCOUNT
OF THE
SUSPENSION BRIDGE

CONSTRUCTED OVER THE

MENAI STRAIT,

In North Wales:

WITH A BRIEF NOTICE OF CONWAY BRIDGE.

FROM DESIGNS BY, AND UNDER THE DIRECTION OF

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MENAI BRIDGE.

IN effecting a communication between the shores of a river or strait, it often happens that from want of funds, or from some natural obstacle, a ferry-boat with well constructed landing-places is the best means that can be adopted: but wherever circumstances admit of a bridge, there can be no doubt of its superiority.

In a poor country a ferry is perhaps all that can be afforded, and may for a time be sufficient for the purposes of its inhabitants; but as they increase in wealth, and intercourse is extended, the removal of impediments to safe and expeditious travelling, becomes of proportionate importance. If in addition to the growing prosperity of the neighbourhood, the ferry happens to be situated on a line of great thoroughfare, the substitution of an embankment or bridge, where practicable, is required not only for local convenience, but also for general accommodation.

Such were the circumstances connected with Bangor Ferry across the Menai Strait, and consequently much attention had been given to the question, whether it were possible to establish a permanent roadway over it.

The Menai runs nearly SW. and NE. and separates the Island of Anglesey from the opposite county of Carnarvon, and the rest of the Principality of Wales. Its SW. extremity is in the Bay of Carnarvon; the other in the Bay of Beaumaris. Within Carnarvon Bar, it suddenly expands to about two miles in width, it then gradually diminishes to a little south of Bangor Ferry, where it is only about 200 yards across, and afterwards again increases in breadth to about a mile at the Bay of Beaumaris.

Description of
the Menai Strait.

In the two miles SW. of Bangor Ferry there are numerous insulated rocks, each possessed of its particular name, but better known under the general appellation of "The Swellies." From the peculiarity and impetuosity of the tides passing these rocks, it is not safe for a stranger to attempt taking a vessel through the Strait; but at a proper time, and under the guidance of an experienced pilot, a passage can be readily effected.

The peculiarity just alluded to in the tides of the Menai are, that the first and last portions of each ebb and flow run in contrary directions. When the great tidal wave sets up the Irish Channel, a part of it is checked by the Island

Peculiarity of
the tides.

of Anglesey; of this a small portion is impelled through the Strait, whilst the great mass rolls round the west and north shores of the Island, and meets that which first entered the Strait about half way between Bangor and Beaumaris. This junction takes place about an hour and a half after flood at Carnarvon Bar; consequently when it is high water at Carnarvon Bar it is not so by an hour and half where the waters meet; and it is an hour and half ebb at Carnarvon Bar when it is high water at the place where the opposing tides come in contact. In flowing, therefore, the current at the Swellies is from Carnarvon towards Beaumaris till it is a little past high water at Carnarvon Bar; but soon after the ebb commences at the latter place, the direction of the current changes and runs towards Carnarvon, though the tide still continues rising at the Swellies in consequence of the supply it receives from the great body of water which flowed north round Anglesey. When the ebb commences at Beaumaris the water has fallen considerably at Carnarvon Bar, and of course the current at the Swellies continues running towards Carnarvon till it is checked near Plasnewydd by the succeeding flow. After this the tide continues to ebb near Beaumaris, and the direction of the current at the Swellies is again changed and runs from Carnarvon towards Beaumaris: so that at the Swellies the direction of the current of the last quarter of the ebb and first three quarters of the flow is from Carnarvon towards Beaumaris; and of the last quarter's flood and first three quarters' ebb, from Beaumaris towards Carnarvon.

At the full and change of the moon it is high water at the Swellies about half past ten o'clock, and the tide flows about five hours and ebbs seven. Neap tides rise 10 to 12 feet, ordinary springs 20 to 24, and extreme equinoctials very nearly 30.

The navigation
important to the
coasting trade.

From its situation, the navigation of the Strait is of considerable importance to the coasting trade between Liverpool and the southward; for by passing through it, instead of doubling the north-west extremity of Anglesey, much distance and time are saved; and it frequently happens that vessels can sail quietly through the Menai, when, from the state of the wind, it would be impossible to get round Holyhead.

Though principally used by vessels of from 16 to 100 tons burthen, (upwards of 800 of which have passed through in a year,) others of a larger description occasionally go through, and there is one instance of the passage having been made by a sloop of war.

Ferries across
the Strait.

Bangor Ferry.

The connexion of Anglesey with the opposite mainland of the Principality was kept up by six Ferries, the most important of which was that about a mile north of the Swellies, called Bangor Ferry, from its proximity to the city of that name, which is situated about a mile to the north-east.

1818.

Strait would be most essentially improved; and a memorial to that effect was submitted to the Lords of the Treasury.

Progress at the
quarries.

By the end of September there were eighty men at work at the quarries, the barracks had been completed, but still a great difficulty was experienced in getting masons, though notices of their being in request had been sent to several parts both of England and Scotland. A loading-quay of about thirty yards in length had been completed, and a length of pier sufficient for two vessels to lay at, had been founded and built up two yards in height. Much delay had resulted from continued tempests, and a good deal of injury had been repeatedly sustained, by heavy seas breaking upon the unfinished and unprotected pier.

Continued tem-
pests and heavy
seas.

The Sally arrived

The vessel which had been purchased for bringing stones from the quarry was a flat (the Sally), of about 70 tons, and having arrived before our quays were ready to receive her, she was dispatched to the Bristol Channel for a cargo of Aberddaw limestone; but the weather proving very stormy, she was obliged to put back when off Bardsey Island, with her main and foresails split. It was not considered advisable to send her out again, as her build and fittings up, though very proper for bringing stone from the quarry, made her rather unmanageable in a heavy sea.

The Sally sent
to Aberddaw for
limestone. Put
back with sails
split.

The Swansea ar-
rived.

A second vessel, a clinker-built schooner, of 60 tons, called the Swansea, had been purchased and fitted up for the same purposes as the Sally, and shortly after her arrival at the Bridge, was also sent off for Aberddaw limestone. In consequence of the change of owners, and the alterations she had undergone, a new register and licence ought to have been taken out. This however was not known at the time, and on the vessel attempting to pass Carnarvon, on her third trip to Aberddaw, she was seized by the officers of that port, and detained, till by a petition to the Board of Customs, and representations to the Treasury, an order was sent down for her release. After these experiments, though registers and licences were obtained, the Commissioners' vessels were seldom sent out of port.

Sent to Aberd-
daw for limestone.

Seized by the
Custom-house
officers off Car-
narvon.
Released by an
order of the
Board.

State of works at
the close of 1818.

At the close of 1818 the works at the quarry had assumed an important appearance. Upwards of thirty masons and a hundred quarrymen and labourers were then employed, and about ten thousand cubic feet of stone had been dressed ready for shipping. The barracks had been completed, and were a source of much comfort to the men, on so exposed a coast, and in such a severe season. The pier however advanced but slowly, for a succession of storms had attacked it, and frequently knocked down in an hour what it had taken a week to build. It became indeed a question whether any complete protecting pier could be constructed, without going to such an expense that the object in view would not justify. An endeavour was then

made to secure the quay of 40 yards in length, and the pier of 70 yards in length, that had been constructed, instead of attempting any further extension. 1818.

At the site of the Bridge the landing-places on the Anglesey shore and at Ynys-y-moch had been completed. The rock had been levelled ready for building the main pier and one of the small ones on the Anglesey side, and workmen were employed in the yard and shops constructing cranes, railroad waggons, and other machinery and utensils, and in getting materials for commencing the masonry.

In the early part of the ensuing Session the new bill was brought before Parliament. Besides powers for building the Bridge, levying tolls, and purchasing Bangor Ferry; it was also proposed to obtain the means for making a new Road from the Bridge, across the Island of Anglesey, to Holyhead. 1819.
New bill brought before Parliament.
Proposed powers.

True to his promise, Mr. Asheton Smith stood forward as the firm opponent of the bill; but it is only justice to add, that he fought as honourably as boldly. Mr. A. Smith's opposition.

Mr. Telford's evidence respecting the Bridge was explanatory of the principles and leading features of his design, and though somewhat modified by further consideration, differed but little from what he had given on previous Committees. Mr. Rennie was of the same opinion as Mr. Telford respecting the propriety and practicability of the proposed Bridge, but he recommended some increase of strength in the main suspending chains. Mr. Telford's evidence before the Committee.
Mr. Rennie's.

Mr. Bryan Donkin, an eminent practical as well as civil engineer, considered that sufficient strength had been provided, and had not a doubt, that the Bridge might easily be built, and that it would be secure and permanent when completed. Mr. B. Donkin.

On the 19th of May there was a very numerous meeting at the Thatched House Tavern, London, of Irish Peers and Members of Parliament; when Sir Henry Parnell, Bart. having been called to the Chair, a resolution was passed and signed by fifty-eight Peers and Members, that the "Chairman be requested to communicate to Lord Liverpool (then first Lord of His Majesty's Treasury) the unanimous opinion of this meeting, that it is of the greatest public importance that the bill now before the House of Commons for building a Bridge over the Menai Strait, and making a new Road across the Island of Anglesey, should pass into a law, and to request the support of Government to this measure." Meeting at the Thatched House Tavern.
See Appendix, No. 2.

Accordingly, Sir Henry Parnell, Bart. and a deputation from the meeting waited upon the Earl of Liverpool, and explained to his Lordship the nature and clauses of the bill then before the House of Commons. The Committee Deputation waited on the Earl of Liverpool.

No. 7.

STATEMENT of the number of pieces, and the weight of iron, timber, &c. suspended between the points of support of the main opening. Made out by Mr. Rhodes.

	tons.	cwt.	qrs.	lbs.
4520 10 feet main chain bars	245	3	1	20
5520 connecting plates to do.	79	12	2	17
1872 screw-pins 3 inches diameter	45	1	3	5
160 adjusting bars	6	14	2	12
192 do. plates	4	5	1	19
64 cotter-pins to do.	0	14	1	4
64 wedges to do.	0	9	0	16
1332 short rods for connecting the several heights of main chains	3	18	1	11
1332 screw-pins 12 inches long and $1\frac{1}{4}$ inch diameter for do.	3	7	3	10
8000 superficial feet of patent felt in joints of chains	2	7	2	14
White lead for saturating do.	2	10	0	0
Total weight of 16 main chains	394	5	0	16
111 roadway bars, truss-rods, and king-posts complete	25	5	1	1
444 8 feet suspending rods next the roadway	7	4	0	21
888 pins and plates to connect do.	3	12	3	0
128 8 ft. 5 in. suspending rods attached to the lower chains	1	19	2	21
392 9 ft. 8 in. do. attached to the lowest chain but one, so as to bring the joints of the rods to a regular range	6	15	0	18
400 suspending rods of sundry lengths	4	18	0	0
496 pairs of plates and screw-pins for suspending rods	2	7	1	2
6666 cube feet of Dantzic and Memel fir timber in roadway, at 37 lbs. per foot	110	2	0	18
1379 do. American pine in top planking, at 32 lbs. per foot	19	14	0	0
916 do. African oak in wheel guides, at 64 lbs. per foot	26	3	1	20
444 screw-pins for fixing the guides to the roadway, at 6 lbs. each	1	3	3	4
12432 $\frac{1}{2}$ inch screw-pins for fixing roadway plank to the iron bearers	4	8	0	0
6700 5 inch spikes for fixing the upper planking of the roadway	0	12	0	0
24795 superficial feet of patent felt, saturated with pitch and tar, between the courses of the roadway planking	7	7	2	0
222 pieces or frames of side railing, at 89 lbs. each	8	16	1	18
107 $\frac{1}{2}$ cube feet of African oak for top rails	3	1	1	20
153 $\frac{1}{2}$ do. do. for middle rail and skirting	4	7	2	24
55 cross planks screwed between the iron bearers under the roadway, including bolts, &c.	6	10	0	0
2664 small screw-pins for fixing handrails, skirting, &c.	0	12	0	0
222 shoes and stirrups for roadway bearers	0	13	0	0
	639	18	3	15
4 sets of transverse stay-pipes, bolts, laces, &c. complete, introduced between the main chains	3	16	2	20
Total suspended weight of main opening	643	15	2	7

*Transverse Section through one of the Stone Arches and
Elevation of the Pyramid on the Carnarvonshire side.*

Fig. 2.

