VIII.—ROBERT MYLNE AND TYNE BRIDGES.

By CHRISTOPHER GOTCH.

During a lifetime of prolific creation within various spheres of construction such as hospitals, castles, churches, houses, docks, canals and bridges and many others, Robert Mylne established himself as the first bi-professional, a true amalgam of architect and engineer.

It is certain that he built no less than twenty-five bridges, the most famous of which was Blackfriars Bridge, London, demolished in 1864. Mylne's authorship of the three bridges at Inverary was revealed recently,[1] and now his hand is discernible in the chain of bridges across the Tyne from Chollerford and Ridley Hall down to Newcastle.

Besides those confirmed to be by Mylne there are a further fourteen bridges for which Mylne was responsible for either supplying designs that were never executed or piloting the bill for constructing the bridge through parliament, or both. Amongst these were Shrewsbury, Montrose, Sunderland and Vauxhall (London) bridges.

Through his cathedral work at Canterbury, Rochester and St. Paul's, Mylne became known to the Bishop of Durham. In 1772, Durham castle, the cathedral and the Bishop's residence at Auckland were all in Mylne's care undergoing repair and alterations. Much of this work has been assigned to James Wyatt[2] hitherto. Besides these tasks, the Bishop employed Mylne to prepare a design for Prebend's bridge, over the river Wear. This bridge built between 1772 and 1777 is recorded by Colvin[3] as being the work of George

[1] *Mylne and Inverary*, Christopher Gotch. Arch. Rev., August 1953.
[2] *James Wyatt*, A. Dale. 1936.
[3] *Biographical Dictionary of English Architects*, 1660-1840, H. M. Colvin. John Murray, 1954.

Nicholson "architect to the Dean and Chapter of Durham". Yet Mylne made repeated visits to Durham from 1772 until 1775 and at the same time was constructing the Bishop of Durham's portion of Newcastle bridge as well as carrying out the other work mentioned above; so it seems odd that the Dean and Chapter should employ two architects simultaneously. Actually, Nicholson was a mason by trade but was employed by the Chapter either as clerk of the works or as the contractor and in this capacity he supervised the construction of Prebend's bridge designed by Mylne. In fact, Mylne has left a concise record[4] of the start of both commissions which is worth quoting in full.

"1772.

March 2nd. Set out for Newcastle.

March 4th. Arrived at Durham—inspected the fallen bridge and site of new one—arrived at Gateshead.

March 5th. Inspected the river Tyne—sounded the river. Surveyed the old bridge.

March 13th. Reported to Committee of Gateshead on the bridge, river, etc.

March 14th. Made same report to Committee of Newcastle.

March 16th. Attended meeting of Mayor and Aldermen of Newcastle; treated about removal of rubbish in the Bishop's part —for the Bishop and wrote him 3 letters.

March 17th. Attended the Common Council—made a long speech on the bridge—reports—temporary bridge etc.—delivered message from the Bishop—left Newcastle and arrived at Durham.

March 18th. Waited on Mr. Hogg—then on the Dean—and gave advice on the situation and form of the new bridge—left Durham.

April 2nd. Attended a Committee of the House of Commons on the Newcastle Petition.

April 29th. Ditto on the Newcastle Petition—for the Bishop, people of Newcastle, ditto Gateshead.

May 19th. Sworn at the House of Lords for the Bishop of Durham's bill."

On August 19th Mylne was back in Durham and at Newcastle the following day. From this time forward until the

[4] *The Mylne Journals*, 1762-1810, by permission of Miss J. M. H. Mylne.

close of the century he journeyed from London to the north, practically once every year for the first decade and then occasionally, to supervise the almost continuous bridge building under his charge.

The bridge at Durham which he inspected in that March of 1772 had fallen a victim to the unprecedented flood of the previous year, a flood that destroyed not only the Wear and the Newcastle bridge but—with the exception of Corbridge—all those over the Tyne, seven in all.

The bridge between Newcastle and Gateshead was the joint liability of the magistrates of the county of Northumberland and of the principality of Durham; hence the insistence of the Bishop in obtaining the opinion of his adviser when the Northumberland magistrates submitted various recommendations under the signatures of John Smeaton and John Wooler, engineers. The bridge had consisted of ten arches with thick piers occupying at least one third of the waterway of 539 feet; while the road at the south end had left the bridge in an ascent of 1 in 8. On January 4th, 1772, Smeaton and Wooler presented their report in which they stated that there seemed little choice "but either to rebuild the bridge upon its former principles or to choose a new situation".[5] They recommended the latter course as the most practical though more costly action.

However, Mylne in his report delivered, as already mentioned, on March 13th and 14th that year to the respective councils, disagreed with Smeaton and Wooler for, as he stated:[6]

> "The mason work of these (existing) piers are of such a bad condition internally and so very rotten in workmanship throughout that they seem to be burst into dissolution . . . in my opinion, it would be extremely imprudent and injudicious to make them part of the reconstruction of the bridge, but that . . . (if) . . . the stumps of the old bridge . . . be removed . . . it is very practicable to lay the foundation of a new one in a proper and permanent manner in the same place."

[5] *Smeaton's Report*, 1772.
[6] *Mylne's Report*, 1772.

Mylne's proposals were adopted. Most of his recommendations in fact were to be put into effect during the half century that followed, especially those concerning the communication between the higher and lower parts of Gateshead and Newcastle.

In September that year, he again went to Newcastle where he "settled all the bridge affairs (and) came to an agreement with the Corporation about the houses on Tyne bridge" and was "satisfied about the waterway under the Bishop's part of the bridge and the ruins in the river": [7] and on October 14th the foundations of the Bishop's half were laid. Ten months later the first arch of Mylne's section was closed in. Whether by arrangement or otherwise, Mylne was ahead of Wooler, his colleague in charge of the Corporation's half, for the foundation stone of the latter was not laid until April 25th, 1775, while the sixth arch, the last part of the Corporation's share in the building of the bridge, was not completed until September 13th, 1779.[8]

Immediately after the first arch had been finished Mylne spent a week supervising the progress, and a further week during September 1775; he repeated this the following year but in 1777 he stayed only one day at Gateshead. It seems certain that the Bishop's portion of the structure was fully built by the autumn of 1778 or soon after, for Mylne spent some days at that time at Gateshead; moreover, three years later he travelled north to examine the bridge so that he might report to his client that it was withstanding the powerful floods which sweep down Tyne valley periodically, uprooting all within their path.

Newcastle bridge is particularly interesting for a study of Mylne in that it provided the first instance of his association with Smeaton, who at that time was already an eminent engineer. It is significant, in view of the Hexham débacle to follow, that Mylne's recommendations were preferred to those of Smeaton and Wooler. That Mylne sensed possible

[7] *Mylne's Journals.*
[8] *History of Newcastle,* Mackenzie, 1827, p. 210.

antagonism from Wooler with whom perforce he was to have to work in conjunction as a result of this seems manifest from a reference to him in his report. Mylne wrote, "to his candid behaviour I owe much and trust that the issue of this business will feel the good effects of a mutual confidence."

As a postscript to Mylne's work at Newcastle both his and the Bishop's letters to Archdeacon Henry Egerton of Durham are interesting, especially with reference to George Nicholson.[9] Mylne's letter is dated May 10th, 1783.

> "When I got to Newcastle, I spent a morning in examining every part of the superstructure and foundations of Newcastle bridge; so far as the Bishoprick's part extends; and I have the pleasure of saying that all stands perfectly well, even in the bottom of the River, where there is no appearance of the Piers being undermined as they were by the great flood 1771. At the flood of March 1782 great damage was done up the River; but at Newcastle it made no other appearance than a great swell without force or violence. There is nothing that I can see which wants a Day's work of any consequence, but some few of the joints between High and Low water mark would be better if they were pointed with a little Tarris Mortar."

The Bishop's letter is dated May 19th, 1783.

> "The enclosed letter from Mr. Mylne. . . . I send to beg you to take the further trouble to talk with Nicholson, as I wish to know whether he will look at the work which Mylne advises to be done and will undertake to do it at a fixed price or if he will not, whether he can recommend any mason capable of doing it. I shall not chuse (*sic*) to let anyone set about it till agreement has been made specifying the work to be done and the sum to be paid. . . ."

. . . . . .

The flood referred to by Mylne in the letter above was particularly violent up-river; so much so that it smashed the new bridge at Hexham. At the time of writing his letter to

[9] Hertfordshire County Archives. Belton Letters by kind permission of Lord Brownlow.

Egerton, Mylne was on his way there to investigate the damage, at the invitation of the town council. It is also likely that Mylne's name was suggested to the town council by Smeaton and Wooler, for each had already attempted to build bridges there and, after the collaboration at Newcastle, they must have felt that Mylne might succeed where they had failed. This is possible because Smeaton's character was such that he would not have been unwilling for Mylne, his friend, admirer and senior disciple, to benefit from this failure—his only failure—in bridge building, by a display of his own engineering skill.

The want of a bridge had been long and severely felt at Hexham. Not until persistent agitation had focused attention upon the obvious disadvantage to the town and its trade, was action taken, when in 1767 a bridge was finally built, being ready for use in 1770. It stood nearly opposite to the Spital Cemetery, west of the town and was built by a Mr. Golt, and had seven arches. Less than a year later, it fell in the unparalleled flood of 1771. A contemporary letter described the flood as "far exceeding anything before experienced, handed down by tradition or even imagined . . . the river rose 7 or 8 feet on the main floor of a new and beautiful house at Bywell;[10] at Hexham it was highest, rising 6 feet above the flood of 1763 . . ."

A second bridge was attempted in 1774 by Wooler, fresh from the Newcastle bridge works, on a site fifty yards westwards, and piles were sunk to carry the piers; but below the top surface of gravel, quicksand, having "no more resistance than chaff"[11] was soon discovered and consequently the works were abandoned.

Undeterred by this costly setback, the authorities next approached Smeaton, whose fame as an engineer was quite unrivalled. A Mr. Errington had offered to finance this third attempt, and in 1777 the caissons were sunk and the founda-

[10] Designed by James Paine the Elder. Unpublished thesis by Charles Ogden, 1951.

[11] *History of Hexham*, A. B. Wright, p. 207.

tions placed downstream of the previous sites almost opposite the town, with the line of the new bridge crossing the river aslant. The piers, only half built, were washed away in the winter of 1778, but undismayed Smeaton rebuilt them and continued to work rapidly until the bridge was completed during 1780. The magistrates with Smeaton in attendance viewed the results of their labours complacently the following January when it was opened and "even the Gilligate people ceased their visits, who had come constantly to inspect the bridge after every flood, in hopes of witnessing its downfall".[12]

However, on Sunday evening of March 10th, 1782, there was a fall of snow followed by a hurricane so that incessant rain inundated the valleys of North and South Tyne rivers, which meet a few miles above Hexham. The combined waters hurtled towards Smeaton's bridge, destroying it utterly. Overnight the piers of the nine arches were overturned almost as one piece. The remains, now used as a form of weir, I believe, are visible to-day. On April 21st, 1783, Mylne left Newcastle for Hexham, calling at Bywell, some fifteen miles along the road, to discuss with Mr. Fenwick, the squire, the details of his damhead at the sharp bend in the river there. The next day, he inspected the fine old bridge at Corbridge, victor of innumerable flood battles, then he examined Dilston bridge over Devil's water, a Tyne tributary, a mile or so further on, arriving in Hexham that evening. For three days Mylne studied the reasons for the disaster to Smeaton's bridge and eventually drew up a report[13] which he presented to the county magistrates.

In this report, Mylne proclaimed it his opinion "that the bed of the river Tyne seems to shift and alter its form, extent, and situation with every flood more or less", a view which differed materially from that held by Smeaton.[14] The latter, according to Mylne, knew only of a thin layer of gravel that existed over sand; and so therefore built on "some matter

[12] *Ibid.*, 11.
[13] *Mylne's Report.* April 1783. [14] *Smeaton's Memorial* (n.d.).

more compact than gravel itself", but this very action Mylne reckoned narrowed the waterway in such a way as to increase the scouring which had worn away his "concrete" as well as the gravel, thus exposing the sandy bottom which had then shifted and brought the bridge down. On September 30th, 1783, Mylne "sent a second report on Hexham bridge for the magistrates of Northumberland"[15] and followed this by a visit to Alnwick in October where "he attended a meeting of the Justices (for) a long deliberation (during which he) advised a method of proceeding".[16] This meeting appears to have resulted in a suggestion that Smeaton's bridge might be rebuilt, for Mylne left immediately for Hexham to survey "the bridge from end to end with a view to repair". Early in March 1784, Mylne reviewed the situation in "a long report of opinions and advice, with a long estimate of a supposed repair thereof".[17]

The exact order of events now becomes confused, for Mr. Errington appears to have brought a bill in chancery in connection with Smeaton's bridge, though against whom it is not clear. Simultaneously with these events, Mylne was employed by the same magistrates to design and build bridges over Tyne at Chollerford and Ridley Hall, as well as at Dilston, not to mention the repair and maintenance of Corbridge, so he was moving around the district of which Hexham was the centre for the next five years.

A strong influence behind the employment of Mylne to design these county bridges was, of course, that of the Duke of Northumberland with whom Mylne was familiar, for he had done work at Northumberland House for the Duke's father, and was also to do further work at Syon of both an architectural as well as engineering nature for him. Colvin[18] attributes to Mylne a bridge at Alnwick, built in 1773, but I can find no confirmation of this in the journals.

The actual building of the new Hexham bridge took place between 1785 and 1788 and was accompanied throughout by

[15] *Mylne's Second Report*, September 1783. [16] *Mylne's Journals.*
[17] *Ibid.*, 16. [18] *Biographical Dictionary*, p. 402. *Ibid.*, 3.

the legal bickering over the causes of the failure of Smeaton's bridge. Mylne cryptically records various entries relating to these affairs such as "sent a copy of the second report on Hexham bridge and examined copies of interrogatorys for ditto" and against July 29th, 1788 "at Carlisle. Trial on Hexham bridge for ten hours."[19]

Mylne chose, as the site for his bid to tame Tyne waters, the area of ground slightly to the east of the town and here he built a sturdy plain bridge of nine arches, segmentally shaped, and spanning some five hundred and thirty feet, which by its very existence to-day testifies to the skill of its designer, confirming his claims as to the nature of the ground of his choice as against that chosen by his predecessors (plates XII and XIII).

In the autumn of 1785, Mylne began constructing Chollerford bridge over North Tyne; three years later he rebuilt Dilston bridge together with some repairs to the south butment arch of Corbridge. None of these, however, taxed his ingenuity or even posed a problem of engineering such as did the erection of the relatively small and unimportant bridge over South Tyne at Ridley Hall.

Beyond Haydon bridge, the main highway to Carlisle rises steeply above the river, the land on the opposite bank remaining at a considerably lower level. A mile or so short of Bardon Mill, the river Allen adds its turbulent waters collected from off the slopes of the Pennines to those of Tyne just below the extensive estate of Ridley. The previous bridge had been swept away in one of the inevitable floods and it was in the early autumn of 1785 when supervising at Chollerford that Mylne "inspected the ruins, situation, foundations and materials for a new design".[20] Dissatisfied with the state of the river bed he took borings and reported his findings to his employers. Some months later, he sent them "a design of four drawings and two long writings for rebuilding Ridley Hall bridge, (about) laying foundations and containing instructions".[21]

[19] *Mylne's Journals.* [20] *Ibid.*, 19. [21] *Ibid.*, 19.

Work began in 1788 and continued until 1791. Mylne inspected the progress at Ridley Hall in the summer of 1788 and later at Newcastle he " went over all the papers of Ridley Hall bridge . . . (and) . . . altered the drawings and schedule so as to answer the queries ", confirming these variations in a later letter of " new instructions for the pier at Ridley Hall ".[22] The fall from the road to the opposite bank is well over fifteen feet, so consequently the carriageway of the bridge slopes steeply. The difficulty in placing the abutment amongst the trees on that wooded north slope, the springing from here to the pier in the centre of the waterway, and then from this pier to the lower bank in two arches of unequal span, level and thrust was no inconsiderable task. To ensure absolute rigidity in the one pier was paramount, to obtain the necessary strength to span these widths and yet avoid any superfluous weight upon the pier was essential.

No opportunity here to provide embellishments, however delicate, in the hope of facile praise; Mylne realized this intuitively, and created a structure comparable in skill and grace to the flying buttress of Gothic cathedrals. The depth of the crown he kept to the bare minimum while the pier he built from off a broad base of solid masonry blocks cramped together, the whole retained within sheet piles of elm which in turn were strengthened by elm balks nine inches square. All these are in excellent preservation still and clearly visible during the summer months.

The vernacular was consonant with the other bridges in the district such as Haydon (plate XIV) and Corbridge, as also were Mylne's designs for Chollerford (plate XIV) and Dilston. Mylne had unerring judgment in his choice of character for each of his bridges, as demonstrated so effectively at Inveraray, where he designed three bridges entirely unalike, which all fitted unobtrusively into their settings of garden, public road and lochside. Simplicity, the basis of all good design, is evident in all Mylne's bridges. So at Ridley Hall, albeit he introduced a projecting course

[22] *Ibid.*, 19.

of narrow stone around each arch placed exactly to accentuate the leaping curve, while above the prowlike pier a flat vertical stone strip suggests a pilaster. Mylne also kept Chollerford severe and solid, relieved only by a string course at road level which emphasizes the pedestrian laybys upon each pier (plate XIV).

Not so with Hexham though. Evidently this bridge was considered the most important of the group, other than Newcastle, and so Mylne, in deference to the urban character of the bridge, provided a finish to it that seems almost to assert the superiority of this particular structure over its predecessors that had fallen, yet at the same time the deference to Smeaton is manifest in the use of the applied circular moulded panels in the spandrel of each pier (plate XIII). These false piercings are reminiscent of not far distant Coldstream bridge (plate XV) built by Smeaton in 1763, a design which Mylne regarded as his model in that he used and re-used this motif, both applied and pierced, many times as evidenced by Hexham and Glasgow bridges.

The duration of the work at Hexham must have been a painful time for Mylne, with the imputations and the implications involved and arising from Smeaton's faulty judgment. Through it all, Mylne's admiration for the older man remained unimpaired; so much so that immediately after Smeaton's death in 1792, he collected all his papers and reports and agitated in favour of their publication right up to his own death a decade later. Sir Joseph Banks, the explorer and naturalist, had intended to publish some "but by no means the whole of them"[23] at the turn of the century. As it was, two years after Mylne died, the bulk of Smeaton's written work, containing invaluable information upon innumerable subjects relevant to the embryonic science of engineering, was published in the form of tracts, an achievement primarily due to Mylne's constant advocation of their worth.

[23] *The Master Masons to the Crown of Scotland and their Works*, R. S. Mylne, 1893, p. 281.

It is ironical that where Smeaton failed, his admirer should have triumphed so completely. Mylne had indeed assumed the mantle of leadership of this, his second profession.

The past decade has been witness to a series of floods comparable to those experienced during the middle of the second half of the eighteenth century, and yet Mylne's Tyne bridges, with the exception of Newcastle bridge, which was demolished in 1873, all stand erect. They carry traffic undreamt of by their designer and, despite a longevity of a century and a half, possess a purity of design more akin to architectural and engineering design to-day than to anything in the interim.

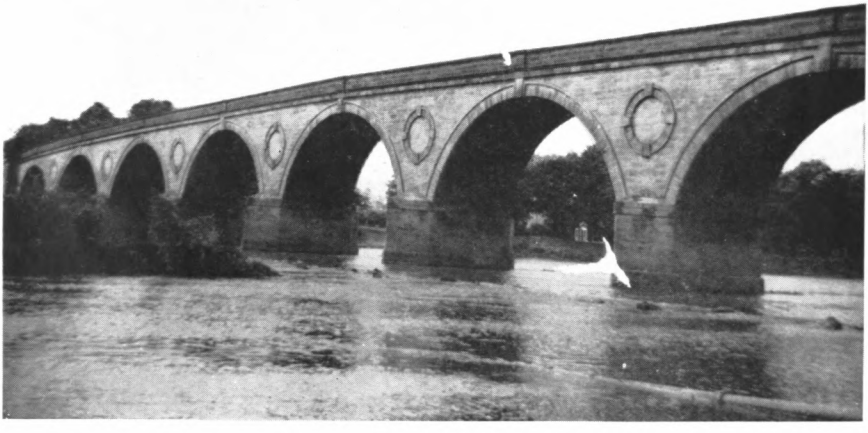
Out of the welter of the industrial revolution that stimulated a generation of creative designers in every field, certain names have achieved a monopoly of fame in their respective fields; Adam, for instance, in architecture and Rennie in engineering to take but two. Only as further information is discovered can full justice be accorded to those other designers that have hitherto remained in obscurity.

Mylne holds a particularly significant position within his epoch for his genius brought him to the forefront of two professions at a time when they had parted irrevocably on the threshold of the mechanical era. Through his journals he is revealed as a titan of his age. His very prolificity indicates an inordinate zeal for both his professions.

The Tyne bridges show his consistent quality in one medium, as Inveraray showed his many faceted abilities in a variety of building aspects. How rare it is to find extant a closely confined group of works covering a decade or more of development.

Although Telford makes a strong bid, there seems to be no other truly biprofessional artist of this or any other period to compete with Robert Mylne.

RIDLEY HALL. Photo, C. Gotch.



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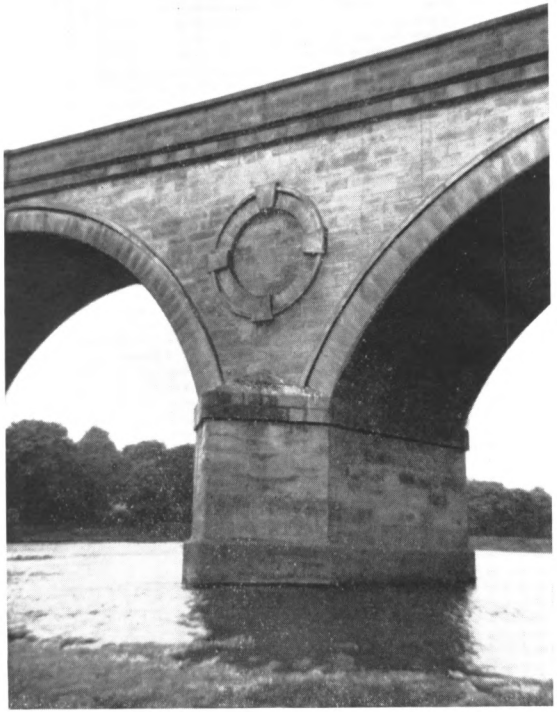

Photo, C. Gotch.

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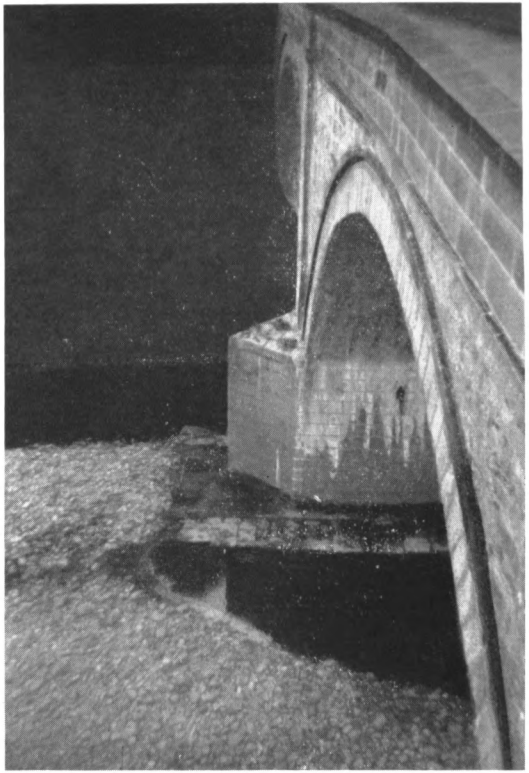

Photo, C. Gotch.

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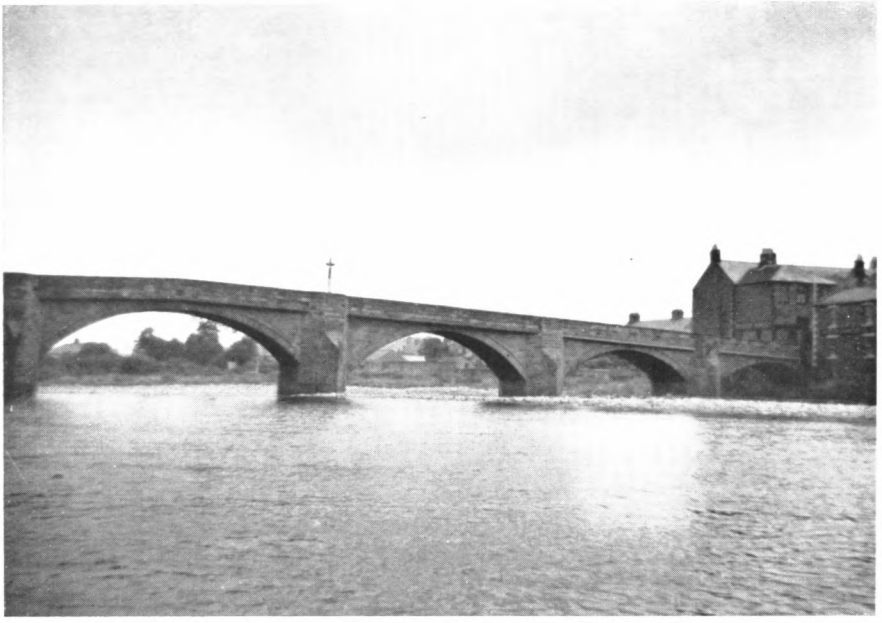
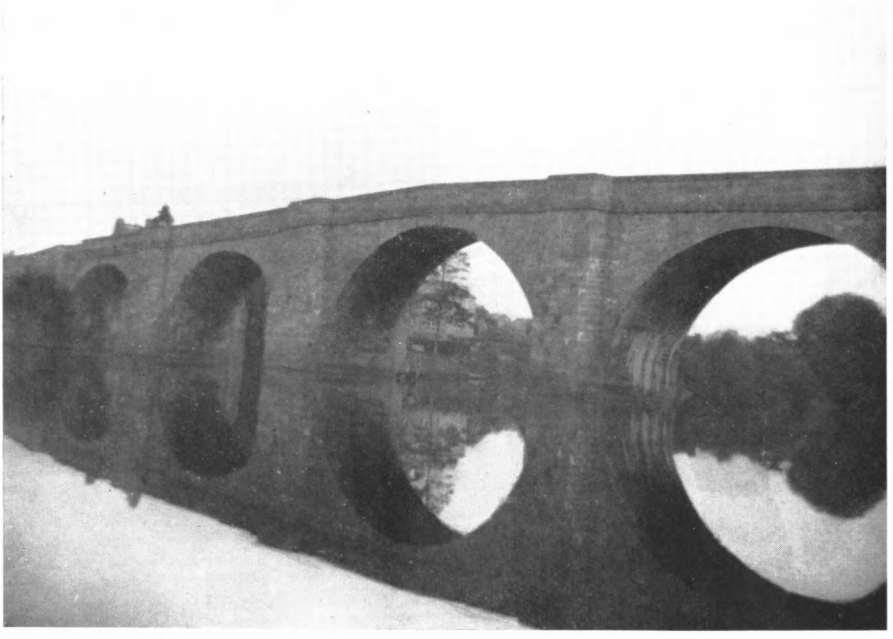
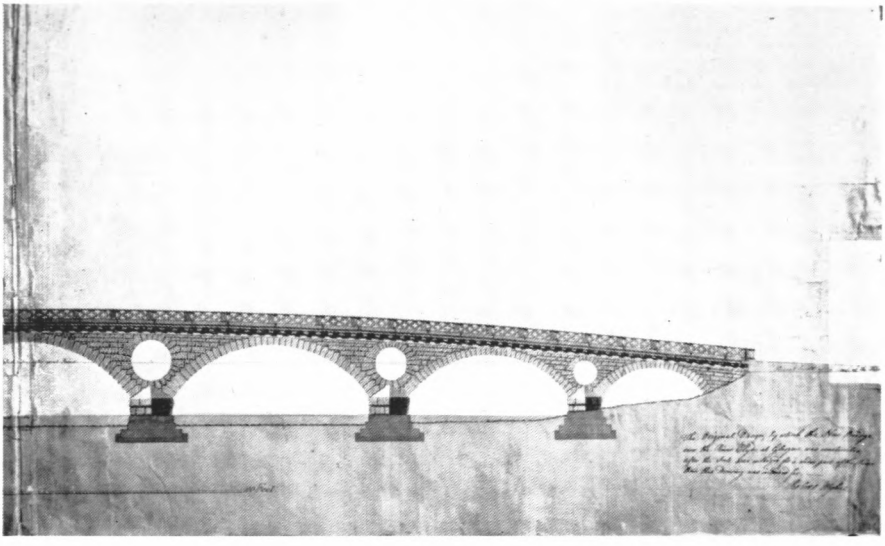


HAYDON BRIDGE (LOCAL STYLE, NOT BY MYLNE). Photo, C. Gotch.

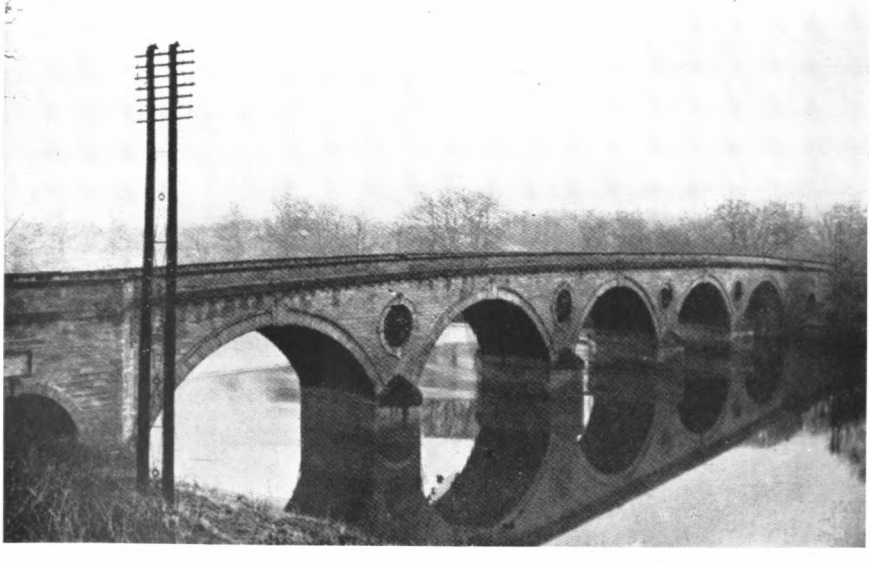


CHOLLERFORD. Photo, C. Gotch.



By courtesy of R.I.B.A.

MYLNE'S DRAWING OF GLASGOW BRIDGE.



From *British Bridges*.

SMEATON'S BRIDGE AT COLDSTREAM.