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**The Construction of the Floating Harbour in Bristol, 1804-9**

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The Construction of the Floating Harbour in Bristol: 1804-1809

By R. A. BUCHANAN

The Floating Harbour is the salient feature of the landscape of central Bristol. This serpentine stretch of water winds for a couple of miles from the vicinity of Temple Meads Station to Hotwells. It marks the original course of the River Avon and its tributary the River Frome through the city and includes the wharves of the ancient port of Bristol. The part of the Harbour around the junction of the two rivers has, indeed, been the traditional focus of the commercial activity of the city since the Middle Ages, and it is only in the last hundred years that the development of deep-water docks around the mouth of the Avon has diverted the bulk of the trade from the Floating Harbour. This development has now reached a stage at which it has become possible to foresee a complete closure of the commercial facilities of the City Docks of the Floating Harbour, and when this happens the city will have a large scale industrial archaeological monument on its hands which will call for sympathetic and imaginative treatment. Meanwhile, the Floating Harbour is important for its distinguished contribution to the history of Bristol, and the story of its construction at the beginning of the nineteenth century is one which is well worth putting on record.¹

The construction of the Floating Harbour came after forty years of argument about the need to improve the port of Bristol. The inadequacies of the wharves around the Avon and the Frome were widely recognized. With the steady increase in the size of ships during the eighteenth century, the tidal nature of the traditional waterways meant that vessels were more and more inconvenient and even damaged by the twice-daily ebbing of the water. For a generation the City Fathers of Bristol had argued and taken

¹ I am immensely grateful to the officers of the Port of Bristol Authority for the freedom with which they have made available to me the splendid set of records in the archives of the Authority. I would also like to thank Miss Elizabeth Ralph for many helpful suggestions on an early draft of this paper. For a discussion of the industrial archaeological aspects of the Floating Harbour, see: R. A. Buchanan and Neil Conson, The Industrial Archaeology of the Bristol Region, Newton Abbot, 1969.
advice from a series of engineers about the best way of overcoming this difficulty, which was hampering the expansion of the port and allowing the rival port of Liverpool to make dramatic gains at the expense of Bristol. The course of these arguments has already been admirably chronicled in a previous paper in these Transactions: it is sufficient for our purposes to note that by the 1790s a consensus of opinion was emerging about the need to maintain high-water level over all or part of the area of the central wharves, and that had it not been for the outbreak of the French Revolutionary Wars the project would probably have been started a decade before it actually materialized. A committee was formed in the autumn of 1791 at the instigation of the Society of Merchant Venturers—a powerful commercial pressure group in the city—consisting of the Mayor, Aldermen, and Common Council (or any seven of them). Its object was:

> to investigate the said Reports, Resolution, Statement of Facts and Plans and all other papers that may be laid before it by the said Society . . .

This committee met weekly to discuss the proposals presented by the Society of Merchants and various objections to the proposals. It agreed in turn to each clause in the Merchants' "Statement of Facts" including one for:

> the Plan and Design, improved by Mr. Jessop, with the Approbation and under the sanction of Mr. Smeaton, for the erection of a Dam at the bottom of Rownham Mead, with Locks and other constructions . . .

By December, the committee was ready to present its conclusions, which included:

> First that the state of the Harbour of Bristol is by nature so inferior to the natural or improved state of many other of the Ports of Great Britain that the ship-holders of Bristol are not on an equal Footing with the ship-holders of such other Ports, either in respect of the security of their ships whilst in Port, or to the ease and expedition with which they may be discharged, loaded, and proceed again to sea . . .

and furthermore:

> that the great inconveniences under which the Port of Bristol labours may be remedied without impediment to the trade or injury to the Health or Prosperity

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3 This is the first entry, dated 22 Oct., 1791, in the complete set of *Minute Books* covering the proceedings of the Bristol Dock Company, the committees which preceded it (1791-1803), and the Docks Committee which succeeded it (after 1848). They are referred to hereafter as *Minutes*.

4 *Minutes* 29 Oct., 1791.
CONSTRUCTION OF THE FLOATING HARBOUR IN BRISTOL

of the Citizens, by erecting a Dam across the River Avon, at the Redcliff, and by cutting a Canal, with Locks and Sluices thereon, in Rowanham Meads . . .

On the strength of this report, a further committee was appointed to act in conjunction with a committee of the Society of Merchants in order to proceed to more detailed negotiations. This body became known as the "Joint Committee" and met sporadically until July, 1792. It then appears to have lapsed until the end of that year, when it was stirred into action again by an advertisement in the Bristol newspapers signed "Ames Hellicar and Sons" putting forward a project for the construction of floating docks in Canon's Marsh. The Joint Committee expressed its opposition to "any scheme which has private interest for its object" and appears to have dissuaded the projectors of this scheme from going ahead with it. The following year it considered the compensation costs likely to be incurred in the course of dock improvement, and came to the conclusion that, with compensation included, "$100,000 will be sufficient to defray all Expenses attending the proposed Improvement of the Harbour." After this the Joint Committee faded into oblivion for several years, the next substantial entry in the Minutes being in 1800. It seems likely that the unsettled international situation prevented any further progress on the improvement schemes, and it is possible that a general rise in prices acted as a disincentive to positive action.

There were signs that conditions were changing in 1800, and the Joint Committee met to consider the need to apply for notice in the London Gazette of the intention to seek an Act of Parliament for Harbour Improvement. Nothing followed immediately, but in 1802 there began a spate of activity which at last saw the projected improvements through to completion. Preliminary peace talks had begun with France in October 1801, and Addington's ministry concluded the Treaty of Amiens on 27th March, 1802. Encouraged by these brighter international prospects, the Joint Committee appointed

5 Minutes 6 Dec., 1791. The reference to "the Redcliff" is to the house, sometimes "Redcliff" and later "Cliff House" on the south side of the Avon opposite Rowanham Meads. Its only connection with the district of Redcliff a mile to the east is the similarity of the sandstone strata from which both names are derived.

6 Minutes 14 Dec., 1791.

7 Felix Farley's Bristol Journal 15 Dec., 1792. As in "Floating Harbour" the use of "floating docks" meant that they were designed to maintain high-water level at all states of the tides.

8 Minutes 19 Dec., 1792, and FFBJ 22 Dec., 1792.

9 Minutes 10 Sept., 1793.

10 Minutes 10 Sept., 1800.

187
ten years previously at last submitted its report. This was an important document, for it included Jessop's detailed estimate of the costs of the project, as he then envisaged it. His scheme of February 1802 provided for a new course for the tidal water of the Avon from the point of its junction with the Frome, and for a dam at Rownham which would have made a floating dock covering roughly half the extent of the eventual Floating Harbour. Jessop calculated that the total cost of this scheme, allowing for contingencies but not including costs for land and compensation, would amount to £150,840. The Joint Committee approved the scheme and estimate and worked out that a capital sum of £200,000 would be adequate to complete the improvement works. It hoped to raise £150,000 of this in the form of share capital, and to borrow the other £50,000 with the Corporation and Society of Merchants acting as guarantors for the loan. In the event, both the parent bodies declined to guarantee a loan and the Bristol Dock Company formed under the Act of 1803 found itself unable to borrow money so that it had to resort to calls on its shareholders in order to raise fresh capital. It is possible to interpret the formation of the company as a clever device on the part of the old and corrupt corporate bodies to achieve power without financial responsibility: to get the improvements done without involving themselves in any financial risks. They were certainly careful to preserve for themselves a dominant voice in the affairs of the company, for the Joint Committee resolved:

... that the improvement of the Harbour shall be conducted by a Board of Directors consisting of the Mayor for the time being and eight members of the Corporation ... The Master of the Society of Merchant Venturers ... and eight members, and nine subscribers holding ten shares each or upwards to be elected by the Subscribers at large.

Other constitutional provisions included one for the Directors remaining unchanged (except for the Mayor and Master, who changed annually) until the completion of the improvement works. These provisions were incorporated in the Act of 1803.

The following months witnessed a mounting crescendo of activity on the part of the Joint Committee. Modifications to the scheme were considered. Solicitors were engaged on the submission

11 Minutes to March, 1802.
12 This has been argued recently by W. G. Neale, At the Port of Bristol, vol. 1—“Members and Problems 1848-1899,” Bristol 1968. He refers to the Bristol Dock Company as “that extortionary body” and to the Bristol Dock Act of 1803 as “an early masterpiece of legal and financial manipulation” (pp. 2-3).
13 Minutes to March, 1802.
TRANSACTIONS FOR THE YEAR 1969

Exclusive of the purchase of 70 Acres of Land to be cut, and about 100 Acres to be covered, and exclusive of the purchase or removal of Hanham Mills, the Engine Mill Wheel and 5 small Houses at Bedminster, etc.

In the letter which accompanied this estimate Jessop said that the revised scheme:

will leave about two miles and a half of the Old River as a floating Dock and nearly half a Mile of the River Frome, comprehending together about seventy acres of Water exclusive of six acres in the Entrance Bason.\textsuperscript{15}

After long discussion of the ways and means of raising the additional funds required for the revised scheme, the Common Council of the Corporation approved the new estimate.\textsuperscript{16} In this form the plan was incorporated in the draft Bill which was then drawn up and submitted to Parliament. Despite opposition from an influential body of Bristol merchants, who objected to the provision that all users of the port would be subject to the charges of the Dock Company even if they did not need to use its facilities, the Bill received the Royal assent on 11th August, 1803.\textsuperscript{17} It is worth quoting the provisions of the Act for the actual improvement works at length, because they constitute the only precise engineering instructions which survive for the enterprise. The directors of the Bristol Dock Company were thereby:

authorized and required, by themselves or their Deputies, Agents, Workmen, and Servants, to make, complete, and maintain a Canal or Entrance Bason in Rowham Mead . . . to contain Six Acres at the least, to be provided with Two Locks at the Westward End thereof, the Gates of One Lock to be Forty-five feet wide, and of the other Thirty-three Feet wide, and the Thresholds of the Tails thereof to be laid at least Three Feet below Low Water Mark at Rowham Ferry, such Entrance Canal or Bason to communicate by sufficient Gates and Locks with the Floating Harbour, and also the Merchants Floating Dock, and the Gates and Locks to be so constructed as to exclude the Spring Tides from communicating with the said Floating Harbour . . . also to make, complete, and maintain a Dam and Overfall across the River Avon, at or near the Red cliff . . . to keep up the Water in the River Avon and Froome above the said Dam to the Level of the Sixteen-Feet-Gauge Mark at the lower End of the Quay of Bristol, such Dam to be furnished with pointing Gates for the Purpose of excluding the Tide Water from the said Floating Harbour, and permitting the Waste Water to run down the Overfall and to be also provided with Culverts, Sluices, and Ground Hatches, for the purpose of scouring the Floating Harbour, and laying the same dry whenever necessary for the Purpose of Repairs, and for suddenly lowering and again raising the Water within the

\textsuperscript{15} Minutes 26 Aug., 1802.

\textsuperscript{16} Minutes 8 Dec., 1802.

\textsuperscript{17} It was a local Act: 43 Geo III Ch. 140—"An Act for Improving and rendering more Commodious the Port and Harbour of Bristol." The opposition group, led by Richard Bright, remained a thorn in the flesh of the Dock Company throughout the improvement works.
CONSTRUCTION OF THE FLOATING HARBOUR IN BRISTOL

said Harbour, and thereby breaking the Ice and passing the same over the said Dam, and also to make, complete, and maintain a Dam across the River Avon at Temple Mead . . . and another Dam, and Overfall, with Gates and Sluices therein, across the River Avon at or near the Engine Mills . . . the same not to exceed the Height of the Sixteen-Feet Level on the Quay Gauge-Post aforesaid, and also to make, complete, and maintain a new Course or Channel for the River Avon . . . the same to be of equal Depth and Breadth at the Bottom, and with equal Inclination of the Sides, as the present River Course now has in those parts thereof, which have not been excavated or embanked by Quay Walls or other Buildings, or as near as Circumstances will admit, and except only in such parts of the said new Course as shall be cut through Rock or Stone; and also to make, complete, and maintain an Entrance Bason with Locks and Gates, between the present Course of the River Avon and the said intended Course or Channel at a Place called Trim Mills . . . the same to be so constructed as to admit Ships of the largest Burden usually frequenting the Port of Bristol, and to exclude the Tides from the Floating Harbour; and also to make, complete, and maintain a Barge Lock near the said intended Dam at Totterdown, at least Seventeen Feet in Width, and One Hundred and Six Feet in Length . . . the same to be at least One Hundred Yards to the Westward of such Dam; and also Two other Locks at the Engine Mills, of the same Dimensions, the One to lock down from the River at High Tides into the Canal or Feeder, and to be at least One Hundred Yards from the Mouth of the said Feeder, and the other to lock down from the Canal or Feeder to the old River, the Tail of such last-mentioned Lock to be Two Hundred Yards below the Dam across the River there; and also to make, complete, and maintain, navigable and passable for Boats, Barges, and other Vessels, a Canal or Cut at least Fifty-four Feet wide at the Water Surface, and Thirty-four Feet wide at Six Feet Depth of Water, with a proper Towing Path on the South Side thereof from the River Avon . . . and also to make a proper Towing Path along the Floating Harbour, from such Cut, and through Temple Meads to the West End thereof, and a Towing Path Bridge to cross the said Canal or Cut at or near the Engine Mills aforesaid, and to make and render the Towing Path from thence to Hanham Mills as commodious and convenient as the same can possibly be made . . . and the said Company are also directed and required to make, complete, and maintain such other Works and Improvements within the Limits after mentioned as they the said Company shall consider necessary for and which will completely answer and effect the Purposes aforesaid.18

The first General Meeting of the Bristol Dock Company formed by the passage of the Act was held in Bristol on 8th September, 1803, and shortly afterwards William Jessop was officially appointed Engineer to the Company.19 Although he was a member of the first generation of great civil engineers, along with such giants as John Smeaton, Thomas Telford, and the elder John Rennie, Jessop is a curiously shadowy figure. He came from a Derbyshire family, but

18 From the clause in the Act entitled: "Company empowered to make Canal and other Works"—pp. 20-22 in the 94 pp. printed version (the clauses were not numbered).
19 Minutes 21 Sept., 1803.
was born in 1745 in Devonport, where his father was a foreman shipwright in the Naval Dockyard. His father later became involved with Smeaton in the construction of the Eddystone Lighthouse, and through this connection William Jessop began his career as Smeaton's pupil on the Aire and Calder Canal. He served as engineer to many canal and dock projects between 1770 and his death in 1814. From 1774 to 1790 he was Secretary to the Society of Civil Engineers, the predecessor to the Institution of Civil Engineers, founded in 1818. Jessop's reputation is said to have suffered from "excessive modesty," but still "he charged higher fees for his services than most other engineers."20 No indication has been found in the Minutes of the Company as to what fee Jessop required for his services, but his son Josias Jessop was appointed Deputy Engineer and Superintendent of Works at a salary of £500 p.a.21 It was Jessop Junior who bore the brunt of the day-to-day duties in supervising the construction of the Floating Harbour.22

War with France had been resumed in May 1803 and there were indications of sharp rises in prices about that time. The price of a wheaten loaf in Bristol rose from 7½d. to 13½d. between May and December 1804, immediately after the start of the improvement works, and although there does not appear to have been a consistent upward trend in prices during the subsequent years there can be no doubt that the general level of prices was higher than it was when the estimates of costs were made.23 Nevertheless, everything had been prepared for the great engineering works and no further postponement of harbour improvement could be tolerated. In February 1804 Jessop was instructed to advertise "for undertakers to perform the cutting of the high ground in the parish of Bedminster" and given authority to order "six proper steam engines."24 A little later he was advising the Board to take up the "corn-mould Earth" (i.e. the top-soil) where the spoil bank was about to be laid "in order to cover and make good such spoil bank,"25 but the Board rejected

20 C. M. Norrie: Bridging the Years—A Short History of British Civil Engineering, 1956, p. 212. Also L. T. C. Rolt: Great Engineers, 1962, has a useful brief biography of Jessop—"No engineer of his stature was ever more modest and self-effacing" (p. 45).
21 Minutes 5 Dec., 1803.
22 Minutes 25 Feb., 1813, for an interesting summary of Jessop's method of supervising work and a statement of the Board's confidence in him. Josias Jessop succeeded his father as consultant engineer to the BDC until his death in 1827.
23 Felix Farley's Bristol Journal published regularly the cost of a quarterm (i.e. four pounds) loaf in Bristol: the figures are as given on 28 April, 1804 and 8 Dec., 1804.
24 Minutes 24 Feb., 1804: the engines were for pumping.
25 Minutes 5 April, 1804.
CONSTRUCTION OF THE FLOATING HARBOUR IN BRISTOL

this idea on grounds of expense. On the last day in April, Josias Jessop was authorized to give every workman attending "tomorrow to commence ye cutting one shilling to drink success to the undertaking." The following day, 1st May, at 5 o'clock in the morning, the first sod was ceremonially cut in a field at Wapping by Mr. G. Webb Hall, Clerk to the Company, and the works began. The local newspapers welcomed it as "the greatest undertaking, we believe, that Bristol has ever known," and this was no exaggeration. They continued:

It is impossible to witness the progress of so grand an undertaking without emotions of pleasure, a pleasure heightened by no illaudible pride, when we regard it as likely to become a monument of the public spirit of our fellow-citizens and an instrument of the increasing reputation and grandeur of their posterity... Bristol alone has raised more money for the improvement of the Harbour than Bonaparte for such purposes has been able to wring from the meagre purses of 30,000,000 of slaves.

The language is understandably fulsome for such an auspicious occasion, but the Floating Harbour has indeed become a monument to the enterprise of Bristol at the beginning of the nineteenth century. It survives today, with only minor modifications, as it was completed in 1809 and as it was specified in the Act of 1803. Remarkably little information survives, however, about the course of the actual engineering work in these years between the passage of the Act and the completion of the improvements. We know little about the problems encountered and the methods used to overcome them. The story which is reconstructed here is based largely on hints occurring in the Minutes of the Dock Company, but the Directors were not usually interested in engineering details and rarely gave them much attention. The other main source of contemporary information is that of the local newspapers, but little of this has any bearing on the engineering works proceeding in the city between 1804 and 1809. None of the Jessops' papers on their work in Bristol have survived except the copies of the improvement scheme published at the outset and the parts of reports given occasionally in the Minutes. Both Latimer and Wells sketch in the general outline of the events of

26 Minutes 23 April, 1804.
27 Minutes 30 April, 1804.
28 FFB 5 May, 1804. Napoleon loomed large in the local newspapers of this period, when a high proportion of the available space was devoted to international intelligence, and particularly to news of battles and campaigns.
30 C. Wells: A Short History of the Port of Bristol, Bristol, 1909, chap. III.
these years, derived from the parliamentary papers and local newspapers, but neither had access to the Minutes. The following account is thus just about as full a version of the engineering aspects of the improvement works as it is possible to give, with enough of the general story of the enterprise grafted in to give it coherence.

The Directors went about their business at the outset with a bustle of activity. At their first meeting after the start of the works they issued instructions for the completion of the New Cut survey and for the purchase of necessary land and houses with "all possible dispatch." Urgency was also expressed regarding the delivery of the six steam engines previously ordered, and there is a hint of annoyance in the entry: "this Board must impute ye delay if any arises to want of zeal in Mr. Jessop." The first contractors were Messrs. Thatcher and Sharp, who had the arduous task of excavating the New Cut, the successful completion of which would be the key to the whole enterprise. Jessop was required to give a monthly abstract of work done under this contract. As part of the work of the Cut it became necessary to think very early about the new bridges which would be required at Bedminster and Totterdown. Jessop advised advertising for contracts "to make the Iron Bridges" and a month later it was noted that the Coalbrookdale Company had agreed "to deliver ye castings at £9 18s. od. per ton, to superintend the erection of ye Bridges at £50 each and to warrant ye Iron Works for a year and a day after ye same shall be set up." Meanwhile, Josias Jessop had been sent to Cardiff to procure a steam engine, and in July his father advised the Board that two steam engines should be set up, "one at the East End and the other at the West End of the rock." On the same occasion, the elder Jessop recommended starting on the buttresses for the two bridges and suggested that it was time "to apply for ye Iron for railways for removing the excavated Earth," and timber for the inclined planes. He followed this up with a written report on these and other points. About the same time, the

31 Minutes 7 May, 1804.
32 Minutes 14 May, 1804.
33 Minutes 15 May, 1804: at this meeting also a Mr. Bruce "laid before the Board a plan for an intended railway from Coalpit Heath to ye River Avon." The Board let the plan lie on the table and nothing more was heard of it.
34 Minutes 18 June, 1804.
35 Minutes 21 May, 1804.
36 Minutes 16 July, 1804: the "rock" here would be a reference to the sandstone ridge through which the New Cut was being excavated.
37 Minutes 20 July, 1804: this is one of Jessop's few reports to appear in full.
CONSTRUCTION OF THE FLOATING HARBOUR IN BRISTOL

Board dealt with its first major compensation item. The work on the Cut had deprived Trim Mills, on the site of the present Bathurst Basin, of its water supply, and the proprietor Daniel Crabtree offered the property to the Dock Company for 200 guineas. The Directors declared this sum to be exorbitant and made a counter-offer of 100 guineas. Crabtree settled for this, but "humbly hoped the Directors would permit him to have his millstones in addition to the 100 guineas." Pressing the bargain, the Board valued the stones at £21 and resolved that "he be permitted to take them at that sum if he chooses." If the owner had not accepted the prices, the Board could proceed to a jury under the terms of the Bristol Docks Act to determine a price for compulsory purchase. The Company did rather better on this occasion than it did against other more tenacious claims for compensation later on.

After barely four months of work, the Directors felt able to give a highly optimistic Report to the shareholders in September 1804, expressing their confidence of finishing on time within the four years stipulated in the Act of 1803 and within the estimated costs. Jessop reported towards the end of the month:

As there are about 650 men now upon the Work and from the rapid progress which they are making they will soon be ready for further Employment . . .

and recommended that a start be made at Rownham and on the Feeder Canal as possible alternatives if flooding should make work impossible on the Cut. He also recommended purchasing a further steam engine for use at Rownham, and reported:

As from the appearance of the Sand Rock, I have reason to believe it will answer for all the purposes of building except for the quoin stones; as much of it should be saved as possible.

He suggested moving it quickly to the sites where it would be needed to save re-loading and storage problems. The following day the Directors gave instructions to mark out the line of the Feeder Canal and to "procure possession of Rownham Meads." They also sent an enquiry to Coalbrookdale about an additional steam engine of about 10 h.p. By November, Josias Jessop was suggesting building 20 ton

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38 Minutes 23 July, 1804.
39 Minutes 6 Aug., 1804.
40 Minutes 10 Sept., 1804.
41 Minutes 23 Sept., 1804: the hard labour of quarrying this pennant sandstone thus paid a bonus, as it was used for lining the lock pits and basins. Similarly, the clay removed by the contractors digging the Feeder Canal was used to make a million bricks for the Works—Minutes 4 Nov., 1805 and 25 Nov., 1805.
42 Minutes 24 Sept., 1804.
lighters for the Company to deliver 80,000 to 100,000 tons of lime and stone required by the Works. At the end of the year, Jessop reported a collapse in the ground near Trim Mills, estimating the cost of making it good as £400, and recommending laying a railway to move stone to the Bath Road and Totterdown. Some months later, at the end of the first complete year on the Works, Jessop Junior presented a summary of progress reporting that 780,625 cubic yards of earth and rock had been removed, “which I believe is considerably more than has been done upon any single work in the same time.” The total cost had been £120,138 12s. 1d. All in all, it had been a busy year.

Early in the second year of operations the Board accepted an increase of ten shillings per ton in the price of iron rails, and shortly afterwards tried to resolve a dispute between Thatcher and Sharp, the major contractors. The Board was anxious for them to dissolve their partnership in order to prevent a stoppage. It appears to have been successful because only Thatcher is referred to as the contractor thereafter. Despite these premonitions of trouble, “Mr. Jessop Senior attended this Board and reported that the progress of the works since he was before in Bristol had fully equalled his expectations.” And in their autumnal report to the shareholders the Directors were equally optimistic, claiming “That they have made great progress in the works authorised by the Act.” This is an interesting report because it gives a summary of work done up to that time. It notes that the Company had commenced the collection of “rates and Duties imposed on ships and merchandise” on 1st May. On the Works themselves it reports “that they have contracted for the whole new course of the River Avon from Totterdown to the Redcliff and that more than half of the Excavation thereof is already completed,” and that the work was also contracted and far advanced on the entrance basin and lock pits at Trim Mills, the Feeder Canal and the buttresses, wing walls, and iron bridges at Bedminster and Totterdown. The work not so far contracted is listed as: the dam and overfall at Rownham, the masonry in the locks at Rown-

43 Minutes 5 Nov., 1804.
44 Minutes 31 Dec., 1804.
45 Minutes 29 and 30 April, 1805.
46 Minutes 20 May, 1805.
47 Minutes 10 June, 1805.
48 Ibid.
49 Minutes 18 Sept., 1805.
CONSTRUCTION OF THE FLOATING HARBOUR IN BRISTOL

ham, the masonry in the locks at Netham, and the dams at Temple Meads and Netham. Jessop’s proposal for modification to the Rownham dam and overfall is mentioned as requiring an amending Act from Parliament.\(^50\) Furthermore, the Directors “state it as their confident opinion the works will be finished within 4 years from the commencement thereof,” and that “they have no reason to doubt that the sum of £300,000 . . . will cover the Expenditure.”

Things began to go seriously wrong early in 1806. A special meeting of the Directors was called in February “in consequence of the Accident at the Bath Bridge by which the Iron Work has been almost entirely destroyed.”\(^51\) Cast-iron bridge work was still something of a novelty, but the Coalbrookdale Company had established a reputation for itself in this field. There had already been a disagreement between the Dock Company and the bridge makers. The previous October Josias Jessop had told the Board “that notwithstanding the objections made by Mr. Thomas the person sent by the Coalbrookdale Company, he is satisfied with the principle of the Bridge and that the buttresses are sufficiently strong.”\(^52\) There is no indication of the particular objections made by the Shropshire firm. However, when the accident occurred it does not appear to have been caused by a failure in the buttresses. The Directors exonerated the masons and declared of the accident that:

> this Meeting are of the opinion that it must have arisen from some neglect or inattention in the Superintendent of the Coalbrookdale Company and the Clerks are to write to the said company to prepare new castings at their own expense.\(^53\)

The local newspapers found some consolation in this statement:

> On Thursday morning the iron work of the bridge erected by the Coalbrookdale Company for the Bristol Dock Company, on the Bath road fell with a tremendous crash . . . The only reason to which we can attribute this accident is the cross-ties not having been fastened in . . . Upon enquiry we find, that the damage will not be considerable, that it will not fall on the Dock Company and that the work will not be retarded.\(^54\)

Rightly or wrongly the blame appears to have been fastened on the Coalbrookdale Company, for when Abraham Darby wrote asking the

\(^{50}\) “. . . the Engineer . . . has given it as his Opinion that it would be a very considerable saving in Expense to make a solid Dam across the River Avon at the Redcliff and to make an Overfall Dam and sluices between the present and the new Courses of the River”—Jessop does not appear to have received parliamentary sanction for this separation of the two parts of the dam.

\(^{51}\) Minutes 21 Feb., 1806.

\(^{52}\) Minutes 9 Oct., 1805.

\(^{53}\) Minutes 21 Feb., 1806.

\(^{54}\) FFBJ 22 Feb., 1806.
Dock Company to make a contribution to his expenses as a result of the accident he met a firm refusal. The bridge—later known as Hill's Bridge—was thus rebuilt on what Wells calls "the original imperfect design." It certainly does not appear to have been a very robust structure. Its movements under traffic gave cause for concern on several occasions before it was swept away in 1855 when a barge collided with it. The sister bridge—Harford's Bridge in Bedminster—was more fortunate, surviving without serious incident until increasing traffic made its replacement necessary in 1884.

This set-back was followed by difficulties with the Corporation of Bristol about some clauses in the draft Bill to raise fresh capital, and by the ominous prospect of further financial embarrassment in the near future. The objections of the Corporation were overcome, at least for the time being, so that the Bill received the Royal Assent on 23rd May, 1866. The new Act provided for an increase in the share subscription from £100 to £135 to cover sums which the Company had been unable to borrow. But this was only making good deficiencies in the original capital and did not take into account the fact that the costs of the enterprise were rising dangerously and that by 1866 it must have been clear that they could not be kept within Jessop’s revised estimates of 1802. The Act did provide for one economy—the reduction in the size of the entrance basin in Rownham Meads from six to four acres. This, however, was more than offset by the need, not allowed for in the estimate, to line the whole basin. Jessop told a Committee of the House of Commons, investigating the escalation of the costs of the improvement works in 1807, that he reckoned the extra cost of this measure alone as £12,340. He is reported as having told the Committee:

The Basin at Rownham was first intended to be an open Basin, like that which had been made at the West India Docks; but there having been found a great quantity of spring water, in the stratum of sand below the clay which he found could not be drained by a well... Large slips took place which made it absolutely necessary to secure it by a wall.

Nevertheless, the Directors entered the third year of operation

55 Minutes, 18 Jan., 1808.
56 Wells, op. cit., p. 50.
57 46 Geo. III Ch. 35: "An Act To alter and amend an Act... for improving and rendering more commodious the Port and Harbour of Bristol; and for extending the Powers and Provisions of the said Act."
58 Abstract from William Jessop's evidence before a Committee of the House of Commons 25 April, 1807. Jessop maintained that the total additional expense at this time amounted to about £65,000, which included measures to deal with land-slips at Trim Mills and parts of the New Cut.
CONSTRUCTION OF THE FLOATING HARBOUR IN BRISTOL

in May 1806 with at least an outer appearance of optimism, and in their autumn report to the shareholders they announced their success in securing the amending Act and a dividend of 6%:

The Directors have very confident hopes that the works will be fit for the reception of vessels by the expiration of the ensuing year.\(^{59}\)

By the following March, however, they were obliged to issue a further report couched in different terms, explaining as best they could that more capital was needed because of unexpected costs, and announcing fresh amending legislation.\(^{60}\) The Directors were understandably reticent about the precise nature of their proposals, because they planned to impose dues on the coasting trade and on imported articles of provision (corn, flour, rice, etc.), both of which had previously been exempt from duty. When news of these proposals leaked out it triggered off an explosion of vehement discontent with the conduct of the Dock Company. The indignation is well represented in the correspondence columns of the local papers during March and April.\(^{61}\) A long ironical letter signed "Thomas Thrifty," for example, begged the Docks Directors to contradict the scandalous rumours which were circulating:

The public mind is already much agitated, and unless you take some immediate measures to satisfy the Citizens, that their alarms are groundless, and that you never had any idea of bringing forward, or supporting a measure so repugnant to their feelings and interests, I dread the consequences. Their fury may know no bounds; and in some unguarded moment, whilst superintending your engineers and surveyors—you may chance to get a ducking, in that stagnant lake, to which your own enlightened conceptions have given birth.\(^{62}\)

A meeting at the Guildhall of the disaffected citizens heard an eloquent speech by Richard Bright and resulted in the formation of a "Committee of Merchants and Traders" which resolved, amongst other things "That a Petition be presented to Parliament against the said Bill."\(^{63}\) The opposition to the Bill proved unnecessary, however, for it was lost by the prorogation and subsequent dissolution of Parliament. In the circumstances, the Directors of the Dock Company considered themselves fortunate in managing to borrow

\(^{59}\) Minutes, 18 Sept., 1806.

\(^{60}\) Minutes, 4 March, 1807.

\(^{61}\) FFBJ, for 14 March, 1807 and subsequent issues.

\(^{62}\) FFBJ, 21 March, 1807.

\(^{63}\) FFBJ, 4 April, 1807: Bright was the father of the "Free Port" advocate who led the successful campaign to take the assets of the Dock Company into municipal ownership in 1848. The papers of Bright Snr. are preserved in Bristol City Archives and provide an interesting sidelight on the disputes in 1807.
£60,000 for twelve months from the Bank of England, as all possible calls upon their subscribers had already been made.64

One result of the delay was that the opponents of the Bill had more time in which to organize their campaign, so that during much of the fourth year of the enterprise the Directors found themselves engaged in "the Breach unhappily existing between Us and our fellow citizens."65 They seem to have thought that they had satisfied their opponents, so that they expressed naïve surprise when their Bill was defeated in Parliament in the autumn.66 However, negotiations with the "opposition" continued and agreement was eventually reached, the Company being allowed an extension of rates for an additional year to 1st May 1809 at the sum of £5,000 per annum, £500 of which was to go into a sinking fund.67 This was considerably less than it had originally hoped to achieve, and all mention of the obnoxious dues was dropped from the Bill.

The resulting Act of 1808—the third in the course of the undertaking—granted the Company more time and more money with which to complete its objectives. It also authorized the construction of two piers at Prince’s Street, with a swing bridge and floating caisson gate so that the Floating Harbour could be divided into two parts and either part could be drained without affecting the other.68 The junction lock proposed in the Act of 1803 between the Rownham entrance basin and the Merchants’ Floating Dock was omitted from the new Act,69 and Josias Jessop was instructed to make every possible economy. He had reported to the Directors in the summer of 1807, phasing the work to be done over the following winter, and distinguishing between the essential and the non-essential contracts. The former he put at £8,100 and the latter at £10,660. When he had given his report, "he was instructed, at all events, to keep his Expenditure within his report."70 A week later, Jessop was instructed to "confer with Mr. Jones the Millwright as to the best scite for a Mill

64 Minutes, 14 May, 1807.
65 Minutes, 25 June, 1807.
66 Minutes, 17 Sept., 1807.
67 Minutes, 18 Jan., 1808.
68 This represented an important improvement in the design of the Floating Harbour, although the opponents of the Dock Company in 1807 suggested that the Company was more interested in the tolls which it hoped to charge on the new bridge—'A Bristol Merchant': "A Plain Statement of Facts . . .," Bristol, 1807—pamphlet in Bristol City Archives.
69 The desirability of this measure was discussed in Minutes, 29 Sept., 1806.
70 Minutes, 3 Aug., 1807.
CONSTRUCTION OF THE FLOATING HARBOUR IN BRISTOL

at the Overfall at the Redcliff."\textsuperscript{71} In February 1808, Jessop gave a report on the costs of the enterprise, itemizing the costs of the jobs remaining to be done, offering explanations for rises in the estimates of expenditure, and giving a schedule of when jobs would be completed. He gave the total expenditure to date as £394,630.\textsuperscript{72} An accident in the Cumberland Basin, as the Rowanham entrance basin had been named, when part of the dam had collapsed, placed a further strain on the budget: Jessop "hoped that two thousand pounds, but certainly three thousand pounds, would replace the injury."\textsuperscript{73}

The fifth and last year of the enterprise seemed to be dogged by accidents. There was more trouble at Cumberland Basin in June,\textsuperscript{74} trouble at "Mr. Hilhouse's Dry Dock,"\textsuperscript{75} and trouble at Netham Dam, due both to slipping\textsuperscript{76} and, it seems, to malicious interference by persons unknown.\textsuperscript{77} In August, the Board decided to meet at breakfast every fortnight until the completion of the Works.\textsuperscript{78} Another recurrent source of trouble was with the Paving Commissioners of Redcliff, Temple, and St. Thomas parishes regarding the construction of the new sewers made necessary by the Floating Harbour scheme. The parishes concerned remained anxious even though the Directors claimed that they were doing everything which the Act of 1803 stipulated that the Company should do. In the event, their anxiety was well founded, but it was not until 1827 that the Company was compelled to deal with this problem.\textsuperscript{79} In November, Josias Jessop was urged to complete the Works "with the utmost Dispatch" so that they could be examined minutely before application was made to Quarter Sessions for a certificate of completion.\textsuperscript{80} Early in the new year, the Directors divided the Works

\textsuperscript{71} Minutes, 10 Aug., 1807: also Latimer op. cit., f.n. on p. 17 on mills at the Overfall: they had been specifically approved in the Act of 1803, but it does not seem that any were ever erected.

\textsuperscript{72} Minutes, 10 Feb., 1808.

\textsuperscript{73} Minutes, 11 April, 1808.

\textsuperscript{74} Minutes, 11 June, 1808.

\textsuperscript{75} Minutes, 28 Nov., 1808.

\textsuperscript{76} Minutes, 2 Jan., 1809.

\textsuperscript{77} Minutes, 9 Jan., 1809.

\textsuperscript{78} Minutes, 8 Aug., 1808: at the same meeting, the laying of the foundation stone "this day" and the naming of Prince's Bridge was noted.

\textsuperscript{79} Minutes, 7 Nov., 1808: William Jessop had never regarded this as a serious problem—see his notes on the revised scheme of 26 Aug., 1802: "Altho' I cannot agree with those who think the Sewers of the City will much injure the Water of the Harbour when it may be so frequently removed, I have made provision . . . for intercepting most of the sewage . . . discharged into the River above the Bridge from whence almost all the Brewers and Distillers are supplied . . .".

\textsuperscript{80} Minutes, 21 Nov., 1808.
into five areas so that they might receive more detailed supervision. The Board presented a fulsome report to an extraordinary meeting in March 1809. Three pages of flowery prose regretted the need to apply for another loan—£30,000 from the Bank of England—made necessary by ‘the accidents which have occurred in the progress of the Works . . .’ The report presented the still unresolved problem of compensation, promising to pay ‘not a shilling more than is absolutely necessary’ and lamented the lack of appreciation for the efforts of the Directors amongst their fellow-citizens:

If the Directors or Subscribers could have foreseen the Opposition the Obstacles and Expenses that have occurred in the Progress, in all probability the Works . . . would not have been undertaken.

The Directors consoled themselves, however, with the thought:

that Bristol is indebted to them for Works equal if not superior in grandeur and utility to any in the Kingdom.

The result of this meeting was a further Act of Parliament—the fourth—which was passed in 1809 and raised the capital of the Company to £580,000—virtually twice the original estimate.

The Floating Harbour was officially completed on 1st May, 1809, exactly five years after the first sod had been cut. Water had been let into the New Cut in January and the first ships passed up the new channel to enter the Bathurst Basin—so named after the Tory M.P. for Bristol from 1796 to 1811—on 2nd April. The local press greeted the official certification of completion in language as effusive as that of the Directors:

After struggling through numberless unforeseen difficulties, both local and accidental; after encountering an opposition of considerable magnitude among many of their fellow-citizens possessed of wealth, power, and respectability; after having perhaps undertaken to perform in a given time, more than it appears almost possible in the capacity of human art to execute, the Directors of this Concern, have fulfilled their engagement . . .

The ensuing feast at which the Directors treated about 1,000 labourers to a dinner in celebration of the enterprise is probably the most publicized and best known event in the whole operation, because it ended in a drunken riot between the English and Irish factions amongst the labourers. Perhaps the most significant thing about

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81 Minutes, 2 Jan., 1809.
82 Minutes, 4 March, 1809.
83 Wells, op. cit., p. 52: The Rt. Hon. Charles Bragge took the surname Bathurst on succeeding to the Lydney Estate in 1804.
84 FFBJ, 29 April, 1809.
85 FFBJ, 13 May, 1809: quoted in extenso in Latimer and Wells, op. cit.
CONSTRUCTION OF THE FLOATING HARBOUR IN BRISTOL

this incident is that it gives no credence to the popular but unfounded Bristol legend that French prisoners of war from Stapleton Prison were used in the Works.

Much remains obscure about the construction of the Floating Harbour. The people who did the manual work are, except for their final beano, an anonymous mass. As employers of the period went, the Dock Company appears to have been reasonably humane, for the Minutes of the Company show several cases of grants of money to workers injured or taken sick in the course of their employment. One gangman called Morris who “has been laid up with a fever caught in the service” received two grants of five guineas each. The widow and family of a mason killed at work had their expenses paid from the time of the accident and the cost of removal to their parish with “ten pounds to be given the widow upon her arrival at her parish.” Two men with fractured legs received six guineas and one with a fractured foot three guineas in 1807 “by way of relief.” Although so little is known about the men who did the hard labour of the enterprise, not much more can be said about the senior members of the team engaged in the construction of the Works. The shadowy nature of the Jessops has already been mentioned, and in the records of the Dock Company it is frequently impossible to distinguish between references to father and son. Of the surveyor, William White, little is recorded in the Minutes after his appointment in 1803. When William Porteous was appointed Inspector of Masonry at £105 per annum with a week’s notice, John Rennie was approached for a reference because Porteous had worked under him on the Lancaster Canal. The following year Porteous’ salary was increased to £125, but he was later reprimanded for allowing inferior mortar to be used on the buttresses of Harford’s Bridge.

The opening of the Harbour did not mark the final completion of

86 Minutes, 18 Feb., 1805 and 25 Feb., 1805.
87 Minutes, 10 June, 1805: the £10 was paid even though the woman opted to go to London instead of her parish.
88 Minutes, 10 Aug., 1807.
89 Minutes, 5 Dec., 1803: he was appointed at the same time as J. Jessop under whose direction he was placed. He had earlier assisted W. Jessop in preparing his improvement schemes: White’s name survives on some of the maps of these schemes.
90 Minutes, 8 Oct., 1804: Rennie was at this time engaged as engineer by the Keanet and Avon Canal Company.
91 Minutes, 24 June, 1805: at the same meeting of the Board “a letter from Mr. John Loudon McAdam recommending to the Company’s notice a composition of mineral tar and red earth as a paint for preserving wood was read.”
92 Minutes, 28 Oct., 1805.
the Works. Early in May 1809 the Board was still pressing Jessop to complete the walls of Cumberland Basin as soon as possible, and there were still many compensation claims to be resolved. A year after the official opening, the Directors were complaining about excessive claims for compensation, and they continued to make payments to various interested parties who were able to substantiate these claims for several years. But from 1809 the Floating Harbour was functioning effectively, and so it is convenient to conclude our account of its construction at this point in time. As an engineering achievement, the Floating Harbour ranks high amongst those of its period, and it certainly remedied the major abuses of the eighteenth century port of Bristol. Two new difficulties, however, had arisen. In the first place, the Directors of the Dock Company were obliged to charge substantial dues in order to recoup the investment of their shareholders, and as it was the latter received scarcely any dividend until 1823. In addition, the Mayor and Corporation continued to impose the Town Dues and the Society of Merchant Venturers continued to charge for various dockside services, so that Bristol became much more expensive than Liverpool or London for ships carrying a wide range of merchandise. The second difficulty was that, in some respects, the Floating Harbour came too late. The size of ships continued to grow rapidly in the nineteenth century, particularly with the advent of steam power, so that by the middle of the century it had become impossible for the larger ships to enter the Harbour, even if it had been worthwhile to risk the tortuous ascent of the Avon on each voyage. Hence the construction of the Floating Harbour, although it was a distinguished feat of engineering and enabled Bristol temporarily to arrest the relative decline in her trade, did not resolve all the difficulties of the port of Bristol. Harbour improvement continued to be a cause of anxiety, debate, and speculation in Bristol throughout the nineteenth century.

93 Minutes, 8 May, 1809.
94 Minutes, 14 March, 1810.