CHESAPEAKE & OHIO CANAL
THE BRIDGES

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Preface to the 2012 Electronic Edition

This edition was transcribed from the original in 2012 with some minor editorial revisions and the addition of new information where necessary to bring it up to date. In addition several photographs were replaced with better images and one additional photograph was added.

The file is formatted for printing two-sided with a gutter on the binding side. Initial pages of sections have page numbers centered at the bottom but in the upper outside corner on subsequent pages.

Karen M. Gray, Ph.D., Volunteer
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INTRODUCTION

Officials of the Chesapeake & Ohio Canal Company in 1828, the year construction started, were determined to drastically limit the number of bridges crossing the waterway. President Charles F. Mercer on November 12, 1828, outlined this policy in a letter to Resident Engineer W. M. C. Fairfax. In marking the line of the canal, the surveyors were to keep in mind that the Board of Directors, at a recent meeting, had determined that it would be detrimental to future operations if there were numerous bridges across the canal. It was hoped that there would be no need for bridges above Georgetown. Where roads now crossed the line of the canal, it was planned to utilize flat-bottomed ferryboats. Such a scheme would leave the entire canal, except the Georgetown Level, unobstructed by bridges.

Opposite the ferry sites, the surveyors were to leave sufficient ground for the excavation of basins capable of receiving and floating scows designed to hold a six-horse team and wagon. Where the elevation of the canal was sufficient, the ferries would be replaced by road culverts. [1]

It was soon apparent that because of local opposition the canal company would have to revise its thinking. Chief Engineer Benjamin Wright felt that a pivot or swivel bridge might be the answer. On February 12, 1829, he forwarded to President Mercer a sketch he had prepared of a pivot bridge. A bridge of this type could be used to cross a lock on the canal proper. If a public road were to cross a lock, like the one planned for Edwards Ferry, Wright would position the pivot bridge over the center of the lock chamber. If, however, a permanent structure were planned, he would locate the abutments below the lower gates to the lock.[2] (A thorough search of the C&O Canal Company files at the National Archives has failed to turn up a copy of Judge Wright's plan for a pivot bridge.)

Figures as to the comparative costs of the pivot and permanent bridges were studied by the Board of Directors, and Judge Wright was directed to devote additional thought to the subject. [3]

Judge Wright moved slowly. It was October 20 before he notified President Mercer that he was currently preparing a memorandum for submission to the Board on the subject of bridges, culverts, and roads. All that he had seen and heard had strengthened his view that the fewer bridges across the canal the better. Any bridges that were necessary should be movable. Since this idea was “novel” in its character, considerable thought would have to be devoted to “devising the best plan” for the proposed pivot bridges.[4] (Unfortunately,

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1 Mercer to Fairfax, Nov. 12, 1828 (Ltrs. Sent, C&O Co.). All manuscript source materials referred to in this report are deposited in the Department of the Interior files at the National Archives and Records Administration, College Park Annex, and are designated Record Group No. 75.

2 Wright to Mercer, Feb. 12, 1829 (Ltrs. Recd., C & O Co.).

3 Lee to Mercer, Feb. 15, 1829 (Ltrs. Recd., C & O Co.).

4 Wright to Mercer, Oct. 20, 1829 (Ltrs. Red., C & O Co.)

Wright's report, if made, cannot be located in the records of the C & O Canal Company on file at the National Archives.)

At this time, the Board of Directors in its search for a plan for a bridge authorized the Treasurer to pay $10 for a model of one invented by General Walter Smith. [5]

Thomas F. Purcell, who replaced Judge Wright as Chief Engineer, prepared the specifications for permanent road bridges to be constructed across the canal above the Georgetown Level. According to Purcell's specifications:

> The excavation for the abutments and wings shall be I foot at least below the bottom of the canal and of such slopes as the Engineer may direct. The foundation timbers will be flattened upon 2 sides, 12 inches thick, and placed 2 feet from centre to centre, or closer if necessary. After the timbers shall have been properly laid, they will be covered with 2-inch plank, upon this foundation the abutments and wings will be erected which shall be built of ranged, hammer dressed, rubble masonry. The stone shall be of good quality and well laid mortar or grouted, or both, to six feet above the canal bottom, from which line to the top of the masonry common lime may be used.
>
> No course will be used in the work of less than 12 inches and no stone will be permitted to be used of less than 18 inches bed and end joints of 12 inches. The coping will be cut and sloped with steps of 12 inches rise and two feet tread measured on the inner curve of the wing—the steps shall lap on to each other 1 foot.
>
> The superstructure will be built of 2-inch white pine plank, 12 inches broad, framed according to the lattice form shown upon the plan [The plans to which these specifications were keyed have not been located], 3 rows of braces 2 1/2 feet from centre to-centre, bound together with 4 sets of white oak ribs, the lower course of which shall be double: these ribs and the braces (which shall cross each other at right angles) will be connected together with Locust pins 2 inches in diameter. On the lower course of ribs will be placed cross ttmbers 6 by 14 inches deep. These timbers will project 6 inches beyond the ribs and be notched into them 4 inches and will be braced by 3 by 4 inch scantling in the manner shown on the plano Upon the cross timbers will rest the string pieces which will consist of white oak timber 3 inches broad by 12 inches deep: these timbers will be notched 2 inches upon the under side where they shall cross the supporting beam so The flooring will be 3 inch white oak and secured to the string pieces by spikes or tree nails. The top of the lattice work will be covered with 3 inch plank leveled to 1 1/2 at the outer edges—this plank will project 2 inches beyond the upper ribs and be secured to them by iron spikes. The ends of the lattice work will be finished in a like manner. The masonry and carpentry shall be done in a work man-like manner and be at all times subject to such alterations as the Engineer may direct [6]

The C&O Canal Company, as we have seen, by 1829 had been compelled to alter its policy in regard to bridges. At first, the Board of Directors gave ground grudgingly. But as

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[5] Proceedings of the President and Board of Directors, B, 38.

[6] Wright to Engineer in Chief, undated (Ltrs. Recd., C&O Co.):

				Measurements	
	Length	Width	Thickness	Running	Broad
6 sleepers	19 ft. 6 in.	16 in.	4 in.	158 ft.	632 ft.
2 sleepers	20 ft. 6 in.	16 in.	4 in.	52.08 ft.	210.08 ft.
42 sleepers	13 ft.	12 in.	3 in.	546 ft.	1,638 ft.
12 rails	74 ft.	12 in.	3 in.	884 ft.	2,652 ft.
8 ends	8 ft.	12 in.	3 in.	64 ft.	192 ft.
126 ribs	12 ft.	12 in.	2 in.	1,512 ft.	3,024 ft.
Plank for flooring			2 in.	1,369 ft.	2,738 ft.

the years passed, and the Company came increasingly into the control of the State of Maryland, it was forced by political pressure to build a number of bridges to replace ferries and culverts. In our study of the bridges on the Chesapeake and Ohio Canal, Chapters I and II will be devoted to the bridges on the Georgetown Level, which constituted, until they were raised in 1866–1867, a special problem. Chapter III is a study of bridges on the "Washington Branch". To expedite construction on a number of sections of the canal, especially in the Paw Paw Tunnel–Old Town area, contractors built temporary bridges across the Potomac to haul embankment from the Virginia side. Chapter IV is a study of these embankment bridges. Chapters, V–VIII, are devoted to a study of bridges spanning the Chesapeake and Ohio from the Georgetown Level to Cumberland. Chapter V includes the bridges from College Run, above Georgetown, to the Seneca Aqueduct; Chapter VI from the Seneca Aqueduct to the Antietam Aqueduct; Chapter VII from the Antietam Aqueduct to Dam No.6; Chapter VIII from Dam No. 6 to Cumberland. Bridges erected across the waterway above the Georgetown Level fell into several categories. These were: pivot bridges, permanent bridges, towpath bridges, and embankment bridges.

As the bridges were built by contractors very few plans and specification have survived in the papers of the C&O Canal Company which are on file at the National Archives. The best source of information regarding the appearance of the bridges is iconographic. A selection of photographs illustrating the various types of bridges crossing the Chesapeake and Ohio Canal accompanies this report.

I. THE GEORGETOWN BRIDGES 1829–1850

Commencement of construction on the Georgetown Level of the Chesapeake and Ohio Canal was not started until the late winter of 1828–1829. On December 10, 1828, the Board of Directors met at the Engineers' Office in Georgetown" and received a report from Engineer-in-Chief Benjamin Wright, accompanied by "an estimate of the probable quantities and qualities of the various species of work likely to be involved in the construction of that part of the canal between Section 1 [at Little Falls] and Rock Creek." After considering this report, and examining the various proposals of contractors to build this section of the canal, the Board let the excavation of the two half-mile Georgetown sections: Section A was contracted to Isaac McCord & Co. and Section B to John Baker.[7] McCord & Co. also was low bidder for the construction of the earthen mole across the mouth of Rock Creek, the waste weir and tide lock at that point, and the four Georgetown locks. [8]

Work on the Georgetown Level was begun late in the spring of 1829. On April 25 the canal company directed that the "buildings and other improvements on the line of the canal through Georgetown, be sold at public sale, after five days' notice given in the Georgetown Columbian…[9] By May 1 excavation was underway in Sections A and B.[10]

A contract for the construction of five stone bridges designed to carry streets across Section A was awarded to Isaac McCord & Co. 5 But before work could be started, the Company and the Georgetown Mayor and Board of Aldermen would have to reach an agreement spelling out their respective obligations. A compact was signed by Mayor John Cox and representatives of the Company on March 30, 1830. It was agreed that the Company would build in a '~8t substantial manner, with suitable rails or parapets," bridges for streets across which the canal crossed. The Company was to maintain these bridges in "good order". Where there were currently no streets in the "corporation", the Company Only would be required to bridge the canal, when formally requested by the "City Fathers).[11]

McCord & Co. ran into financial difficulties, and the head of the firm complained to the Board of Directors that the Congress Street bridge had been so altered from the plans and specifications, as to prevent him from continuing his work unless granted a change order.

He would finish the bridge for $4,000. As change orders were usually attended with considerable delay and injury ~o the contractor, McCord trusted his proposition would be approved by the Board.[12]

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7 Proceedings of the President and Board of Directors, A. 127; House Report 414, p. 178; First Annual Report, C&O Co., 5. Section A extended from Rock Creek to the Georgetown Market, while Section B extended from west to the Market to Mrs. Williams', above the foundry.

8 Proceedings of the President and Board of Directors, A, 127.

9 Ibid., 209

10 First Annual Report, C&O Co., 5.

11 Proceedings of the President and Board of Directors, B, 40.

12 McCord to Board of Directors, April 28, 1830 (Ltrs. Recd., C&O Co.).

After studying McCord's complaint, the Board directed him to continue the bridge in accordance with the project engineer's instructions. [13] McCord refused and pulled his men off the job. This brought the Georgetown "City Fathers" into the dispute. A resolution was passed by the Aldermen, requesting that McCord "be required to proceed to the completion" of the structure.[14] A compromise was now effected, and McCord agreed to finish the bridge as provided in the reviled specifications, but he would be reimbursed for added costs.

Upon completion of the Congress Street bridge, McCord & Co. abandoned its contracts for the unfinished "works of art" on Section 1. The contract for the locks and mole was awarded in August, 1830, to O. H. Diddle; while Davis would complete the four remaining stone bridges.[15]

Company Clerk John P. Ingle, having received the necessary authority from his Board of Directors, employed the local newspapers to call for proposals for lumber to be used in building the wooden bridges at the Georgetown Market House.[16] The bid submitted by Philip Boyer & Co. was low, and the Board authorized its acceptance.[17]

Shortly thereafter, Chief Engineer Wright received a note from Secretary Ingle enclosing an offer from Doyle to supply stringers for the four Georgetown wooden bridges. Needed were three 58-foot stringers and an equal number 50 foot in length. These timbers would have to be 16 or 18 inches in width and 9 to 10 inches thick.

Previously, the Company had been approached by Boyer & Co. who wanted to sell nine stringers 58 feet long by 12 by 16 inches, while a man up the Potomac had another nine stringers of similar dimensions he wanted to dispose of. If all 18 stringers could be purchased, the Company could use three of the 58 foot ones in the bridge above the Market House; six of a similar size in the bridge east of the Market House; three of 50 feet in length for the Frederick Street Bridle; three of the 58 foot pieces in the Duck Lane bridge; reserving an equal number of a similar length for the bridge west of McKay's, which it was feared the Company might have to build. The remainder of the timber for these wooden bridges could be purchased from Boyer.[18] The Board authorized Ingle to purchase the stringers.[19]

The lumber having been secured, the Company awarded the contract for construction of the two wooden bridges at the Market House, the one at Duck Lane, and the Frederick Street bridge to captain William Easby, a Washington shipbuilder. Chief Engineer Wright told Easby to get to work.

No written agreement was made, but it was understood that Easby was to be paid at "a measurement price without deductions" upon completion of the four bridges.[20]

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13 Proceedings of the President and Board of Directors, B, 59.
14 Ibid., 75.
15 Ibid., 169–170.
16 Ibid., 13.
17 Ibid., 37.
18 Wright to Ingle, April 7, 1830 (Ltrs. Recd., C&O Co.).
19 Proceedings of the President and Board of Directors, B, 49.
20 Easby to Purcell, June 22, 1831 (Ltrs. Recd. C&O Co.).

After Easby's crew had started on the bridge at the Market House, it was determined to add two waste weirs. A change order was accordingly drafted by Wright.[21]

Judie Wright resigned in 1831, before the Georgetown bridges were completed, and his replacement as Chief Engineer, Thomas F. Purcell, was troubled to learn that a member of the Board, Peter Lenox, had neglected to reduce to writing the contract with Easby for the four wooden bridges. As these structures were to be measured by the "public measure", they did not come under his supervision, nor did he know the quantity of timber in them. Board member Walter Smith, who had received the timber, might be able to list the quantity of lumber used in the bridges, he reported.[22] Iron for the bridge railings, he knew, had been supplied to Easby by Smith, so no difficulty should be encountered in determining their price.[23]

All the Georgetown bridges, except the one at Duck Lane which had been delayed because the abutments were not ready, had been completed by October, 1831. When he forwarded this information to the Board, Chief Engineer Purcell reported that the Duck Lane bridge is now open to traffic. Inspecting the bridges, Purcell observed that they had been constructed in a "workman-like manner." As yet, no bills or estimates for the Georgetown bridges or Market House had been presented by Easby.[24]

The canal Company by the spring of 1831 confidently expected to open the waterway through Georgetown to Seneca Creek. Gratified with the progress of construction, company officials in May, 1831, requested the Federal Government "to examine and report…the present condition of the Chesapeake &Ohio canal along with their judgment of the plan adopted therefor, and the execution and cost thereof."[25] Within a few days, Colonels John J. Abert and James Kearney, two "skillful engineers of the topographical corps of the army, by the order of the President of the United States", were detailed to make the first official survey of the waterway.[26] During June, 1831, these two officers made a "very critical and careful" examination of the canal. Their report provides valuable information regarding the Georgetown bridges.[27]

Abert and Kearney began their inspection at the Georgetown mole. A bridge, they reported, had been "constructed over the head of the tumbling dam connecting the Georgetown

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[21] Wright to Ingle, Oct. 9, 1830 (Ltrs. Recd., C&O Co.).

[22] Purcell to Ingle, Jan. 13, 1831 (Ltrs. Recd., C&O Co.).

[23] Proceedings of the President and Board of Directors, B, 92. By January 1, 1831, there had been repaid by the Company on the construction of the five stone-arched Georgetown bridges:

Bridge	Amount
Congress Street Bridge	$4,530.50
Bridge at Lock No. 2 (Greene Street Bridge)	$2,389.60
Bridge at Lock No. 3 (Washington Street Bridge)	$2,358.59
Bridge at Lock No. 4 (Jefferson Street Bridge.)	$2,359.00
Bridge at High Street	$ 700.00

[24] Purcell to Board of Directors, June 5, 1831, and Purcell to Easby, June 21, 1831 (Ltrso Recd., C&O Co.). Easby was due $2,266 for the Market House bridges. Ledger Book A, 328.

[25] Proceedings of the President and Board of directors, B, 311.

[26] Ibid, 318–319.

[27] "Report of Col. John J. Abert and Col. James Kearney of the United States Topographical Engineers, upon an Examination of the Chesapeake and Ohio Canal from Washington city to 'Point of Rocks'…" (Washington, 1831), reprinted in House Report 414, p. 83.

part with the city [Washington] part of the quay. This bridge is of timber on piles, a simple, but substantial structure".[28]

Between Lock No. 1 and Lock No. 2, they found "a small pool, 100 feet long by 46 feet wide, and enclosed by a stone wall. At the head of this pool, a stone bridge spanned the canal at Greene Street (now 29th Street). Immediately "adjacent to this bridge" was Lock No.2. Between Lock No. 2 and 3 was another "pool',' and at the head of this second "pool" was a stone bridge at Washington Street (now 30th Street), similar in design to the Greene Street bridge. Next to the bridge at Washington Street was Lock No.3. Above Lock No.3 was a third "pool", with another stone bridge at Jefferson Street, similar in design to those carrying Greene and Washington Street across the waterway. Next to the Jefferson Street bridge was Lock No.4, "the last of the 11 ft. locks in Georgetown…."[29]

Continuing westward through Georgetown, Abert and Kearney found that Congress Street (now 31st Street) spanned the canal on "a stone bridge, with a span of 40 feet". At High Street (today's Wisconsin Avenue) a stone bridge with a span "to be 54 feet" was under construction. This bridge, photographs of which accompany this report, was completed in 1831, according to the inscription on the Keystone.

Above High Street heavy construction was in progress in June, 1831. The colonels reported, "The next street beyond High street is the one in which the market-house is erected. The canal passed under this house, and two substantial wooden bridges are built immediately on each side of it.

"There is then a wooden bridge for the accommodation of Duck Lane [now 33rd Street] and one for Frederick Street [today's 34th Street].[30]

When the Georgetown Level was opened to navigation on September 19, 1831, the location of the towpath necessitated a towpath bridge at Frederick Street. The towpath as it approached Georgetown was on the river side of the canal. At Frederick Street a wooden towpath bridge, erected in 1831, was used to enable the drivers and mules to cross the waterway. Between Frederick and Greene Streets, the towpath followed the northern or upper side of the canal. At Greene Street the drivers used the street bridge to regain the right bank of the canal and continue on to the mole. The location of the towpath on the upper side of the canal within the Georgetown limits left the river-side bank free for shipping activities.[31]

Before the last of the ten Georgetown bridges had been completed, Mayor Thomas Turner advised the Board of Directors on July 1, 1831, that the local committee having charge of the city's streets had asked him to call to their attention the need for a towpath bridge to cross the canal at the junction of Bridge and Water Street. People residing on Water Street had been calling for the construction of the bridge for some time, as they had suffered considerable hardship as a result of their trade being cut off. Learning that

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28 bid., 88–89.
29 bid., 90.
30 bid., 91.
31 Proceedings of the President and Board of Directors, B, 226, 228; ibid., C, 1–3, 99; House Report 414, pp. 21,91.

water was about to be admitted to the Georgetown Level, the committee trusted that the Board would have the canal bridged at that point.[32]

The Board, after discussing the request, referred it to Chief Engineer Purcell, with instruction "to report on the relative propriety of constructing a bridge at the place mentioned, or at another point below the projected place of junction of the Alexandria Aqueduct, so as not to interfere with the passage of packet boats".[33]

Purcell, on making a reconnaissance of the area, reported that it would not be possible to bridge the canal at the point desired. The people living on Water Street, in his opinion, already had enough access to Bridge Street.[34]

Undaunted by this rebuff, Mayor Turner now urged the canal company to renew the K Street bridge over Rock Creek. The Board accordingly ordered the Resident Engineer for the lst Division to report "a plan and estimate the cost of a strong plain bridge of wood to compare with the estimate of the causeway at the paper mill".[35]

The desired figures were presented and discussed at the next meeting of the Board. These, along with an estimate for a causeway at the same point, were referred by the Board to a sub-committee (Peter Lenox and William Smith), which was given authority to contract.[36]

Before any action was taken by the sub-committee, another compact was entered into by the Mayor and Board of Aldermen of Georgetown with the canal company. Among the provisions of this agreement signed on February 25, 1832, were several relating to bridges. According to one of these, the Company was to construct a bridge across Rock Creek, near the paper mill, where a road now crossed that stream. This bridge was to be built in a substantial manner, and of sufficient width for the convenient passage of carriages, wagons, and pedestrians. The Company was to see that this bridge was kept in good repair. Another provision of the agreement provided for the Company to build a bridge across the canal at or near Water Street.[37]

The sub-committee failed to act, and on February 6, 1833, the Washington "city fathers" called on the canal company to repair the K Street bridge across the Rock Creek Basin between Washington and Georgetown. The Board determined to ignore this request, unless an alteration of the bridge for canal purposes was required.[38]

In their negotiation with the mayors of Washington and Georgetown, Company spokesmen argued that as the K Street bridge pre-dated the canal, they were not liable for its upkeep. But in the end the company was compelled to yield, and Captain Easby was awarded a contract to rebuild the structure.[39]

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32 Turner to Board, July 1, 1831 (Ltrs. Recd., C&O co.).
33 Proceedings of the President and Board of Directors, B, 446.
34 Ibid., 451.
35 Ibid., 454.
36 Proceedings of the President and Board of directors, C, 1.
37 Ibid., 78.
38 Ibid., 280.
39 Ledger Book A, 355.

At the meeting of the Board on August 18, 1832, a letter was read from the Keeper of the Georgetown locks, reporting on the necessity of repairing the bridge at Tide Lock A. He would make the repairs, provided he was supplied with tools and materials. The letter was referred to the superintendent, along with a directive to "cause a suitable space on the bridge to be laid over the Gondola Plank".[40]

In May, 1833, William Spaulding was awarded a contract to paint the five wooden Georgetown bridges. Unfortunately, no mention was made of the color in any of the surviving documents.[41]

The Board of Directors was informed on July 23, 1834, that the wooden bridges on either side of the Georgetown Market needed to be re-floored.[42] James O'Reilly was low bidder, and he was given the task.[43]

John Cox was re-elected mayor of Georgetown, and on December 22, 1835, he wrote the President of the Company reminding him of the promise made to his predecessor, Mayor Turner, to bridge the canal at the west end of Water Street.[44] Once again, the Company ignored this request.

Superintendent John Y. Young of the Georgetown Division on April 30, 1836, complained that the K Street bridge over the Rock Creek Basin was too low to permit the passage of unloaded boats. Young was directed by the Board of Directors to secure consent from the Georgetown and Washington authorities for raising the structure. Once permission was received, he was to undertake the project.[45] At the same meeting, a letter was read to the Board by Chief Engineer Fisk, recommending that the bridge over Tide Lock A be raised two feet.[46] The bridge at the tide lock, he explained, had to be elevated at least 18 inches to facilitate passage of boats on the Georgetown Level. Reinforcing Young's arguments, Fisk pointed out that, although the Company was financially hard-pressed, the center of the K Street bridge should be raised at the same time. The K Street bridge, as all knew, was in a "very decayed state", so a large expense would not be justified in making this change. Yet it was important that it be raised, as many of the larger boats could not pass beneath it when carrying bulky merchandise on their decks. As expected, this caused a protest from captains who had to shift cargo to get by. Captain Easby would be asked for an estimate of the cost of making such changes as the "decayed state of the bridge would justify".[47]

Young and Easby, along with Chief Engineer Fisk, visited the Rock Creek Basin. Young explained to the contractor how he believed the bridge at Tide Lock A should be raised. His plan proposed elevating the bridge directly over the lock two feet by timbers placed upon the western abutment and on the first bent next to it; then a timber would be positioned on the 2nd bent to raise the floor of the structure at that point one foot. Finally, by

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40 Proceedings of the President and board of directors, C, 206.
41 Ibid., 334.
42 Young to Board of Directors (Ltrs. Recd., C &O Co.).
43 Proceedings of the President and Board, of Directors, D, 139.
44 Cox to President and Board of directors, Dec. 22, 1835 (Ltrs. Recd., C&O Co.).
45 Proceedings of the President and Board of Directors, E, 50.
46 Ibid., 45. Fisk had replaced Purcell as chief Engineer in 1837.
47 Young to Board of directors, April 26, 1836 (Ltrs. Recd., C&O Co.).

raising the embankment behind the abutment, the roadway could be carried across the waterway without difficulty.

One of the uprights of the 1st bent to the tide lock bridge had been carried away by a passing boat. This should be replaced at the same time. To guard against future damage of this sort, a wooden fender was to be positioned to ward off boats.

Easby felt he could repair and raise the tide lock and K Street bridges for $100 each.[48] This was more money than the Company could afford, so plans to raise the bridges were deferred. Efforts would be pushed to secure funds from Washington and Georgetown sources to replace the K Street bridge.

The Company was partially successful. At its July 6, 1836, meeting a letter was read to the Board from Mayor Peter Force of Washington, asking it to contribute to the rebuilding of the K Street bridge. When this project was undertaken, provision would be made to facilitate the passage of boats under the bridge.[49] At its September meeting, the Board reported that $700 had been contributed to rebuilding the structure, while the remainder of the cost would be charged to the city government. The bridge was constructed by the city, and when Superintendent Young certified that boats could easily pass beneath, the $700 was paid to Mayor Force.[50]

For a second time, Mayor Cox on March 8, 1837, called the Board's attention to the need for a bridge across the canal at the west end of Water Street.[51] The Board for a third time refused to take action, and on doing so pointed out that all Company resources were committed to completing the “50-mile Section” of the waterway between Dam No. 6 and Cumberland.

On May 11 Superintendent Young notified the Board that the bridge at the Georgetown tide lock needed repair, as the flooring was “very much decayed, the width of the cartway”. It would be unnecessary at this time to refloor the sidewalks, as they were sufficiently sound.

To replace the bridge flooring, to a width sufficient for two carriages to pass, would require 15,000 feet of 3-inch joist costing about $200. The rotten planking would be cut out and replaced with good joists 1/2 inch apart. (At present, the bridge's planking was placed edge to edge.) Young believed that if this were done, the “dust & water would then escape in place of accumulating between the planks which causes the rapid decay.[52]

The Board on the 17th acted on Young's plea, and he was ordered to see that the bridge at Tide Lock A was repaired.[53]

It was soon apparent to Chief Engineer Fisk that the wooden bridges at points where there was heavy traffic, would last about six years. By early 1837 it was observed that the Frederick Street and Duck Lane bridges would have to be rebuilt. Bids were invited, and

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48 Fisk to Board of Directors, April 18, 1836 (Ltrs. Recd., C&O Co.).
49 Proceedings of the President and Board of Directors, E, 87.
50 Ibid., 136; Ledger Book A, 355.
51 Cox to Board of Directors, March 8, 1837 (Ltrs. Recd., C&O Co.)
52 Young to Board of Directors, May 11, 1837 (Ltrs. Recd., C&O Co.).
53 Proceedings of the President and Board of directors, E, 259.

a proposal from Captain Easby was examined on April 27, 1837. The figure submitted by Easby was too high, and it was ordered that bids be solicited by public advertisement.[54]

Proposals for rebuilding the bridges at Frederick Street and Duck Lane were opened and abstracted by Secretary Ingle on June 10. The bids were:

V. Brooks	$990.98
Matthais Duffy	$860.00
K. Lambell	$700.00
Noah Drummond	$650.00

William Easby made two propositions: (a) to build, weatherboard, and paint the bridges for $1,600; or (b) to rebuild the bridges from materials salvaged from the old structures, utilizing where needed new lumber, and to weatherboard and paint them, keeping them in repair for five years for $850.

When he had examined the structures, Easby had found that their rapid decay had been caused in part by the "want of a proper covering for the frame work, and partly to the water from the streets above, running over the bridges".

Drummond, as low bidder, was awarded the contract, but when he was unable to secure in Georgetown lumber for sills and rails, he withdrew. Lambell's proposal was then accepted.[55]

Superintendent Young of the Georgetown Division on May 27 warned the Board that the two wooden bridges at the Market House were unsafe. Besides being given authority to make repairs, Young was directed to prepare plans and specifications for new bridges at that point.[56]

Temporary repairs to the Market House bridges were made, but, in view of the Company's policy to devote all its shrinking financial resources to extending the waterway to Cumberland, no action was taken at this time to rebuild them. Two years later, on May 22, 1839, Superintendent Young cautioned the Board that the Market House bridges were again in "a decayed and dangerous condition". The one west of the Market was already impassable by heavy wagons. Within the near future, both would have to be rebuilt. They should be shored and propped to prevent a complete collapse until such time as a plan could be adopted and materials collected for the construction of new structures. A traffic count had shown that of all the Georgetown bridges crossing the canal, these particular bridges accommodated more vehicles than all others combined.

When they were rebuilt, it would be necessary to raise the roadways two feet to permit the passage of larger boats, or plans to increase the depth of the water on the Georgetown Level would have to be junked. That portion of the Market building above the canal would also have to be raised the same distance. A survey had demonstrated that timbers protected from the weather by the roof of the Market House were sound, whereas the exposed parts had rotted. This suggested to Young that a plan be evolved for covering the bridges when they were rebuilt.[57]

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54 Ibid., 245

55 "Proposals for Building Two Bridges over Canal", June 10, 1837 (Ltrs. Recd., C&O Co.).

56 Proceedings of the President and Board of Directors, F, 61.

57 Young to Board of directors, May 22, 1839 (Ltrs. Recd., C&O Co.).

The Board of Directors liked Young's ideas, and he was directed to proceed. On November 8, 1839, Young forwarded to the Board, a plan and proposal submitted by Captain Easby for rebuilding these two bridges. He had studied the plan and believed it well suited to the site, as they would have to be constructed to give "not less than 9 feet from the water surface to the bridge", with as slight alterations in the grade of the street as possible. In recommending the acceptance of this plan, Young urged that attention be given to getting the Georgetown authorities to agree to raise the Market House. Because of the shortage of liquid assets, it might be wise to rebuild at this time only one of the bridges—the one east of the Market. The one west of the Market would be closed to prevent accidents.[58]

Easby on November 1 examined the bridges, and found that they were "too much decayed to be worth repairing". Having heard that the bridges were too low to permit the passage of "large covered, unloaded" vessels, Easby had made a study to ascertain a feasible height. Bridges constructed as they were would not permit "curves in their principal supports", so if they were to be raised the plan would have to be altered. The contractor had accordingly drawn a plan which would "admit of sufficient height without altering the grade of the street". If his plan were adopted, it would be possible to utilize timbers of smaller dimensions than those used to build the original structures. The cost of the two new bridges, if built according to his plan, would be identical, while Easby would warrant that they would last 1onger.[59]

The Board of Directors on December 7 acted, and Easby's proposal to rebuild the bridge east of the Market, for $1,420 was accepted. Work began immediately. By March 11, 1840, Easby was far enough along on his contract to warrant an advance of $1,000.[60]

On January 12, 1841, there was a flood on the lower Potomac. Superintendent Young saw Rock Creek rise to a depth greater than he could recall. Flood waters sweeping over the mole carried away a section of the bridge spanning the tide lock, and washed several breaches in the mole and the embankment on the "Washington Branch". Funds earmarked for other projects had to be released to make emergency repairs.[61]

Mayor Cox was understandably disturbed, when he learned that the bridge west of the Market had been closed and there were no plans for its repair in the immediate future. When the Mayor protested, President Michael C. Sprigg pled poverty.[62] In fact, the Company was in such dire financial straits that no action could be taken on the Mayor's request for several years. Finally, in July, 1843, the Board of Aldermen took notice and passed a resolution, requesting Mayor Cox to secure from the Company "an approved plan of a bridge to be erected across the canal on the west side of the Market House on Market Space and a guarantee that should the city erect the bridge", the construction costs would be refunded whenever the Company's financial condition warranted.[63] The

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58 Young to Board of Directors, Nov. 8, 1839 (Ltrs. Recd., C&O Co.). Mayor Cox on September 18 had called the Company's attention to the condition of the bridges which crossed the canal at the Market House, as he considered them so rotten as to be dangerous.

59 Easby to Young, Nov. 1, 1839 (Ltrs. Recd., C&O Co.).

60 Ibid., F, 180; Ledger Book A, 358.

61 Young to Board of Directors, Jan. 12, 1841 (Ltrs. Recd., C&O Co.).

62 Cox to Board of Directors, Jan. 19, 1841 (Ltrs. Recd., C&O Co.).

63 Cox to Board of Directors, July 15, 1843 (Ltrs. Recd., C&O Co.).

Board, after discussing the request, ordered Chief Engineer Fisk to prepare necessary plans and specifications.[64]

The Company, however, was notoriously inefficient. It was February 15, 1845, before Fisk came up with a plan, and after studying his report, the Board determined to accept the Georgetown proposition: provided (a) Fisk's plan and specifications were followed; (b) the cost was not to exceed $895; and (c) the corporation was to credit the Company with $242.70 for interest due on its stock and to abandon its claim for $52.90. For the balance of construction costs, the city was to accept Company bonds, payable in six years from the completion of the bridge with interest. Finally, the "city fathers" were to agree to raise the floor of the section of the Market House crossing the canal to correspond with the height of the floor of the bridge to be built.[65]

As soon as the Board of Aldermen voted to accept these conditions, the Company authorized them to proceed with the rebuilding of the bridge.[66]

Meanwhi1e, Fisk had been checking to see if it would be possible to get assistance from the city to raise and rehabilitate all the Georgetown bridges. Private conversations led him to believe that the majority of the aldermen would be agreeable to advancing the Company $10,000 for this purpose, upon a pledge of the water rents received by the Company from mills on the Georgetown Level.[67]

The Board of Aldermen on August 2, 1844, passed an ordinance authorizing the issuance of $10,000 in Corporation bonds to be loaned to the Company upon terms proposed by President James M. Coale to underwrite repairs and improvements to the canal within Georgetown, provided the bridge over the canal west of the Market House was "remodeled so as to make it more easy of passage.[68]

President Coale on the 7th, notified Chief Engineer Fisk of the proposed loan. Fisk was to proceed with improvements to the bridge east of the Market as authorized by the Board. The center truss was shifted, while the grade of the approaches was reduced.[69] As the cost of these changes was slight, they were done by day labor rather than contract.[70]

The Board of Aldermen of the Common Council of Georgetown on January 6, 1845, authorized the Mayor to invite plans and proposals for building the bridge over the canal west of the Market.[71] After the Company had reviewed the proposals, the Board of Aldermen entered into a contract on February 15 with Matthias Duffy for the construction at a cost not to exceed $895.[72]

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64 Proceedings of the President and Board of directors, G, 93.
65 Ibid., 223.
66 Ibid., 255.
67 Fisk to Board of Directors, Mary 23, 1844 (Ltrs. Recd., C&O Co.).
68 Young to Board of Directors, Aug. 3, 1844 (Ltrs. Recd., C&O Co.). Coale had succeeded William G. McNeill as President of the C&O Canal Company in August, 1843.
69 Coale to Fisk, Aug. 7, 1844 (Ltrs. Recd., Chief Engineer); Proceedings of the President and Board of Directors, G, 197.
70 Coale to Fisk, Aug. 14, 1844 (Ltrs. Recd., Chief Engineer).
71 Young to Fisk, Jan. 7, 1845 (Ltrs. Recd., Chief Engineer).
72 Ibid.

John Marbury had contacted President Coale on February 13 regarding the bridge. The property owners in that area had demanded that the corporation get the bridge rebuilt on the plan prepared by Fisk. Mayor Cox was hopeful that Contractor Duffy would push his men hard, as the affected property owners were complaining that the absence of the structure involved the "loss of all wagon traffic as Potomac Street was too narrow for turning". The city had determined that a substantial bridge, similar to the one spanning Rock Creek on Bridge Street, and of the proper elevation above the towpath could be built for $815.[73]

Mayor Cox in April notified the Board of Directors that an investigation disclosed that the floor of the Market House above the canal was "sufficiently elevated to avoid any obstruction to navigation," as it was considerably higher than the bridges which had spanned the waterway at that point. If, however, the Company at any time had cause for complaint, the city would budget $300 to $400 to make the desired change.[74]

By the time Duffy was ready to begin construction, Henry Addison had replaced Cox as mayor of Georgetown. Before turning his people to, Duffy on October 25 called on Chief Engineer Fisk. Replying to the contractor's question as to the desired elevation, Fisk told him the height of the old bridge in the clear above the water would be adopted, unless the city agreed to change the grade of the streets to allow greater elevation. It seemed to him that it would be of commercial benefit to Georgetown, if the "city fathers" agreed to permit a change in the grade of the streets. Fisk suggested to Mayor Addison that the grade of the street at the north end of the bridge be increased as high as the property adjoining would permit. This would necessitate a corresponding increase of the elevation of the south abutment.[75]

It was too late to make these changes, however, and Fisk on December 20 certified that Duffy had "fully and faithfully" executed his contract, except for a hand rail. For this omission, he was willing to allow $12. In addition, the four fenders at the ends of the bridge had not been positioned. Duffy would place and secure the fenders as soon as the streets had been graded. [76]

There was a new superintendent on the Georgetown Division in 1845. Young had died, and Superintendent William L. Elgin of the Harpers Ferry Division had had his jurisdiction extended to include Young's former superintendency. By the summer of 1846, the two wooden bridges constructed nine years before had about out-lived their usefulness. Mayor Addison on August 24 protested to President Coale that the bridges at Frederick Street and Duck Lane were exceedingly dangerous, and it was "a matter for surprise that they had not long since given away". Over a year before, he had inspected the bridges with Chief Engineer Fisk, who had agreed with him that they should be attended to immediately. But the Company had done nothing. Now it was necessary to close the structures to vehicular traffic to keep people from being injured. Such action would prove annoying to citizens who resided or owned property in the area.[77]

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73 Marbury to Coale, Feb. 13, 1845 (Ltrs. Recd., Chief Engineer).
74 Cox to turner, April 5, 1845 (Ltrs. Recd., C&O Co.).
75 Fisk to Addison, Oct. 25, 1845 (Ltrs. Recd., C&O Co.)
76 Ibid., Dec. 20, 1845 (Ltrs. Recd., C&O Co.).
77 Addison to Coale, Aug. 24, 1846 (Ltrs. Recd., C&O Co.).

The Board on being advised of the situation told Fisk to take corrective action. A letter was also forwarded to the Mayor reporting that the bridges would be repaired as soon as practicable.[78]

The Frederick Street bridge was dismantled by Elgin's people. No steps, however, were taken to erect a new one, so Mayor Addison protested on October 29 that although the structure had been unsafe for vehicles it had supported pedestrian traffic. People who had used the bridge were unhappy with this situation.[79]

Floods in November and December compelled Superintendent Elgin to divert funds he had budgeted for renewing the bridges and repairing waste weirs to closing breaches in the embankments and dredging the Georgetown mole.[80]

Elgin at the end of 1846 was relieved of responsibility for the Georgetown Division, as John Lambie took charge on January 1, 1847. Reporting as to the condition of bridges in his 1st Division on March 1, Lambie informed the Board that there were six (including the Frederick Street and Duck Lane structures) that would have to be rebuilt this season.[81] On April 22 Lambie called on President Coale “for $200 to pay, for lumber” earmarked for repair of bridges.[82]

There were other problems for the Superintendent to face besides getting funds to finance repairs from a nearly bankrupt treasury. On June 2 Mayor Addison complained that several of the boat captains were in the habit of mooring their vessels under the frame bridges at the Market House, as well as the Market. While tied up, they built fires which endangered these structures. On several occasions heat from these fires had set the building and bridges afire. These blazes had been quickly extinguished, but fears were voiced that unless this practice was curbed it would lead to the destruction of the Market and bridges.[83] Superintendent Lambie accordingly called on his people to keep a close watch and report any future violations of this nature. Violators would be fined.

A June drought had caused many of the Potomac Valley sawmills to suspend operations, and the shipments of lumber for which Lambie had contracted were delayed. Despite this difficulty, Lambie's crew had rebuilt the Frederick Street bridge by June 30, and the Duck Lane bridge by September 15.[84]

On July 24, 1848, Lambie reported that all the Georgetown bridges, except the one east of the Market House, were in good condition. This structure would be satisfactory as soon as the flooring was replaced.[85]

On October 17, 1849, Mayor Seaton of Washington notified President Coale that the city had signed a contract for the erection of an iron bridge over Rock Creek at K Street, just

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78 Coale to turner, August 30, 1846 (Ltrs. Recd., C&O Co.).

79 Addison to Coale, Oct. 29, 1846 (Ltrs. Recd., C&O Co.).

80 Elgin to Board of directors, Dec. 14, 1846 (Ltrs. Recd., C&O Co.).

81 Lambie to Board of Directors, March 1, 1847 (Ltrs. Recd., C&O Co.). Two of these bridges were over the "Washington Branch" and two over feeders.

82 Lambie to Coale, April 22, 1847 (Ltrs. Recd., 0&0 Co.).

83 Addison to Coale, June 2, 1847 (Ltrs. Recd., C&O Co.).

84 Lambie to Board of Directors, June 28, and Lambie to Coale, September, 1847 (Ltrs. Recd., C&O Co.).

85 Lambie to Coale, July 24, 1848 (Ltrs. Recd., C&O CO.).

above the Canal Basin. This would replace the wooden bridge connecting Washington and Georgetown. It would facilitate construction if Superintendent Lambie would permit the water to be drawn off for several days to permit Contractor Nathaniel Rider to cut off the piles on which the abutments were to be built.[86] This request was cheerfully granted by the Board.

Chief Engineer Fisk on October 29 inspected the specifications for the iron bridge Rider was building at K Street. The width of the carriageway would be 24 feet and that of the footways 10-foot, giving a total width of 34 feet. Rider explained to Fisk that the old bridge at the current stage of the stream had a clearance of 8 3/4 feet. The new iron bridge would be elevated in the clear 10 feet above the creek when it was at a similar stage. [87]

It was reported to Fisk on March I, 1850, that measurements had been made of the K Street bridge. According to these, the elevation of the Georgetown end of the iron bridge above the mean level of Rock Creek was 7 1/2 feet, while at the centre it was 11 7/12 feet. As the bridge was too far advanced to correct this situation, Fisk decided not to protest. [88]

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86 Seaton to Coale, Oct. 17, 1849 (Ltrs. Recd., C&O Co.).
87 Fisk to Board of Directors, Oct. 29, 1849 (Ltrs. Recd., 0&0 Co.).
88 Elgin to Fisk, March 1, 1850 (Ltrs. Recd., Chief Engineer).

II. THE GEORGETOWN BRIDGES 1850–1889

Construction on the "50-mile Section" above Dam No. 6 was pushed hard. By the autumn of 1849, the early completion of the waterway to Cumberland was the chief topic under consideration in many Georgetown circles. Extended discussions ensued among Georgetown business and civic leaders concerning the necessity of improving its canal and river-front shipping facilities to insure that the town could handle adequately and profitably the extensive coal trade which was anticipated as soon as the canal was opened to Cumberland. An elaborate program of joint action by Georgetown and the Company for such an improvement of canal and waterfront was outlined by Chief Engineer Fisk in a lengthy letter to Mayor Addison on October 29, 1849.

Prefacing his program, Fisk stated that "in compliance with your [Addison's] request, I have the honor to submit the following views upon the Improvements that may, in my opinion, be advantageously made in Georgetown for the accommodation of the Canal trade." He then summarized Georgetown's interest in the subject by observing that "one of the Main objects, as I understand, of Georgetown, — in taking 27 up the subject of affording additional accommodations to the canal trade, at this time, is to have in readiness upon the completion of the canal to Cumberland, such facilities as will accommodate a large coal trade."

Enumerating the improvements necessary in Georgetown, Fisk wrote:

> Several of the Canal bridges in Town, are entirely too low. Above Georgetown, the established height of bridges…is seventeen feet, in the clear, above water surface. (There are same, it is true, that are as near to the water, as ten and twelve feet, but they are regarded as of temporary character, and may be easily raised to a greater height, whenever occasion requires.) While in Georgetown, some of the bridges are not more than 7, 8, 8 1/4 and 9 feet, above the water, and the Market house over the canal, with the full depth of water in the Canal, would not be more than 7 1/4 feet. Even now, with less than 5 feet water in the level above Lock No.4, there are boats on the Canal, that cannot, when unloaded, pass under same of the bridges in Georgetown. This evil should be remedied. No bridge in Town should have a less height, in the clear, above Canal water surface, than 10 feet, and the one over the Rock Creek basin [at K Street] that the City of Washington is now rebuilding, should have at least one foot greater height, viz. 11 fret, to allow for the occasional rise of water in the Creek.[89]

Next, he observed that the width of the Canal through Georgetown is… too little for the convenient loading and unloading of boats…and the free passage of boats up and down the line of the Canal, —and there is no place in Town where boats that unload above Lock No. 4 can turn."[90]

Summarizing the improvements which he felt were urgently needed, Fisk listed:

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89 Fisk to Addison, Oct. 29, 1849 (Ltrs. Recd., C&O Co.).

90 Ibid.

> 1st. The raising of the bridges, in Town.
> 2nd. The moving of the towpath bridge up to a point above the [Alexandria] Aqueduct.
> 3rd. The widening of the Canal from the Aqueduct to Frederick street.
> 4th. The making of the [boat turning] basin between Frederick and Market streets.
> 5th. The widening of the Canal between Market and Potomac streets.
> 6th. The making of the basin between locks No. 3 and 4, and
> 7th. The making of the branch canal east of Greene street, and of the basin between that and Washington streets.[91]

No estimate was made at this time of the cost of raising the bridges. Fisk, however, believed the sum would be "comparatively inconsiderable, and in most cases may be effected without any material or injurious change in the grade of the streets.[92]

Georgetown's willingness to embark with the canal company upon such an extensive program of improvements took definite form about one month later. On November 17, 1849, it was:

> Resolved by the Board of Alderman and Board of Common Council of the Corporation of Georgetown, That the Mayor be and he is hereby requested to enter into negotiations with the holders of property bounding on the canal, at such points as are embraced by the improvements contemplated in the report of Charles B. Fisk…with a view to ascertain the terms upon which the said property can be purchased should the corporation decide to make any of the improvements referred to; and the Mayor is hereby further requested to enter into correspondence with the President of the C&O Canal Company, and to ascertain from him upon what terms and to what extent, the said Company will unite with and aid this town in making the improvements in question, in the completion of which both Corporations are mutually interested. [93]

Mayor Walter Lenox and the Washington Board of Aldermen likewise took action designed to secure the improvement of the Canal. On May 1, 1850, they petitioned the Company to raise the Georgetown bridges, as these structures are a "most serious obstruction to navigation of the eastern portion" of the canal and "particularly to the passage of boats to and from the city."[94]

Taking cognizance of the promised support, the Board of Directors on June 2, 1851, called on Fisk (who had been promoted to General Superintendent on completion of the waterway to Cumberland) to submit plans and estimates for raising the Georgetown bridges to permit boats of the largest class to pass.[95]

Fisk, during the summer of 1850, had investigated the cost of bridges such as needed on the Georgetown Level. A. Bowers, a highly regarded contractor, told Fisk that the cost per lineal foot of a "trussed & arched bridge of wood uncovered, l2-foot in height" would

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91 Ibid.
92 Ibid.
93 "A RESOLUTION in relation to accommodations for the canal Trade," approved Nov. 17, 1849, in Ordinances of the Corporation of Georgetown, passed from March 17, 1849, to February 23, 1850... (Georgetown, 1850), 32.
94 Lenox to Board of Directors, May 1, 1850 (Ltrs. Recd., C&O Co.).
95 Proceedings of the President and Board of Directors, H, 453.

be $12 per foot for a single track and two walkways. The cost of a double track bridge of similar dimensions would be $15.50 per lineal foot. An iron bridge, double tracked, with two walkways would cost about $6,500.

With this information in hand, Fisk on March 30, 1852, reported that in Georgetown there were nine bridges across the canal, "having an aggregate span of 354 1/2 feet" Of these, only the High Street Bridge had sufficient elevation not to interfere with the passage of boats. As for the other eight, four, having an aggregate span of 84 1/2 feet, were of stone, while the others of wood had an aggregate span of 216 feet. When the height of these bridges had been established in 1828, the elevation of the bridges on the Erie Canal had been eight feet in the clear. This elevation, however, was soon discovered to be insufficient, so the height of the bridges had been increased to 12 feet above water surface. This height, experience on the Chesapeake and Ohio Canal had demonstrated was satisfactory. Although 17 feet in the clear was the established elevation of all permanent bridges on the Canal above Georgetown, there were a few that had been "temporarily placed at 12 feet." So far, these had not been found to be in the way of boat traffic. On the other hand, Fisk argued, they were not too high, as there was scant room to spare, when boats of the class recently put in service on the canal passed beneath unloaded.

Fisk argued that the Georgetown bridges should have a clearance of 12 feet, but three of them (the Greene, Washington, and Jefferson Street Bridges) might be established at 10 1/2 feet, because they spanned livery short levels, which may occasionally be lowered without serious inconveniences." In addition, these structures could "easily be raised to the height named without much, if any, interference with the grades of the streets, and at no great cost, by removing the stone arches, raising the abutments, and substituting a wooden or iron superstructure." The Congress Street bridge, which was of stone, could also be raised without "requiring any objectionable change of grade, by substituting in like manner a wooden or iron superstructure for the stone arch."

It would be impossible to provide an elevation of 12 feet for the wooden bridges at the Market House "without doing much injury to private property." A height could be given to these bridges that "would be sufficient to pass under them loaded boats, and a large portion of the unloaded boats. And with a view to the passage of such boats as could not pass a part of these bridges may be made movable."

The cost of raising eight of the Georgetown bridges would be about $10,000, Fisk estimated, or $6,000 if structures of a temporary character were used.

If these bridges were raised, it would be necessary for the portion of the market House above the canal be raised two feet, as it was currently only ten feet above water surface. Fisk presumed the Corporation of Georgetown would be willing to underwrite that project.[96]

After listening to Fisk's report, the Board determined that it was expedient "to raise in a permanent manner" the canal ~ridges in Georgetown. East of Congress Street the bridges would be raised to provide an elevation in the clear above the Hater surface of at least 10 1/2 feet. West of Congress Street the bridges would be elevated to provide a clearance of

[96] Bowers to Fisk, Aug. 2, 1850 (Ltrs. Recd., Chief Engineer); Fisk to Board of Directors, March 30, 1852 (Ltrs. Recd., C&O Co.); 24th Annual Report, June 7, 1852, pp. 4–6.

12 feet. This project, however, would be dependent on Georgetown providing either a loan or an exchange of corporate bonds for the Company's repair bonds. In addition, the "city fathers" would have to agree to raise the sections of the Market House above the canal to an elevation of at least 12 feet above water surface on the Georgetown Level.

If any bridges west of Congress Street could not be raised to provide the desired l2-foot clearance, without interfering with the grade of the street or with private property, a pivot bridge could be substituted with the consent of the corporation.[97] It was determined by the Board to name a committee to solicit funds from the Georgetown and Washington authorities to raise the bridges.[98]

General Superintendent Fisk on June 5, 1852, reported that a –plan for elevating the Georgetown bridges would have been submitted, but the need to oversee repair of damages caused by the recent disastrous flood had taken too much of his time, as well as all available Company resources.[99]

Not having heard anything further from Georgetown about financing the raising of the bridges, the Company abandoned this plan as hopeless and turned elsewhere for help. On February 19, 1853, the Company again approached Georgetown for a definite answer in regard to the 1852 application for aid in raising the bridges.[100] Early in April, 1853, the Georgetown City Council notified the Company that it was withholding authority for the elevation of the bridges on the grounds that the 1852 plan for raising the bridges was contingent upon Georgetown making "an advance of money…for the purpose." Realizing that Georgetown did not intend to make such an advance, the Company then asked the city simply "for authority to raise the bridges," explaining that when this authority was granted efforts would be made "to obtain the means requisite from other parties."[101]

Not until six months later, on October 29, did Georgetown pass an ordinance granting this authority.[102] The Company then named a committee which was empowered to borrow $12,000 to $12,500 to implement the plan. This sum was to be secured by bonds which were to mature in not less than five years.[103] Once again, a Company spokesman reminded the people of Georgetown that, if the bridges above Congress Street were to be raised, the grade of the streets would have to be altered. [104] Agitation for the elevation of the bridges was resumed during 1854. The committee named to borrow $12,500 for the undertaking encountered a tight money market, and by early summer reported that "a much larger sum would be necessary, and the work might interfere with private property, and consequently subject the Company to heavy damage."[105]

Meanwhile, the citizens of Georgetown and Washington were memorializing Congress "for an appropriation for the purpose of raising the bridges over the Canal in

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97 Proceedings of the President and Board of Directors, H, 516–517.
98 Ibid., 566.
99 Fisk to Board of Directors, June 5, 1852 (Ltrs. Recd., C&O Co.).
100 Letter Book K, 1851–1854, p. 224.
101 Ibid., 232.
102 Proceedings of the President and Board of Directors, I, 52, 54.
103 Ibid., 54.
104 26th Annual Report, 8–9.
105 Proceedings of the Stockholders, 1847–1855, p. 480.

Georgetown, [and] Washington and for cleaning out the [Rock Creek] basin of the canal."[106]

Thereupon, on June 5 the Company rather indifferently observed that it was determined "to leave the bridges in their present state till the attempt to open the trade of the canal to the citizens of the District was more likely to be attended with success."[107] The Company's frank declaration thus shifted the responsibility for future action on raising the bridges to Georgetown and Washington.

The cities accepted the responsibility and exerted pressure on Congress during the autumn of 1854. On November 8 the House and Senate Committees on the District of Columbia called on the War Department for an estimate of the cost of these improvements. Secretary of War Jefferson Davis, however, had no funds to undertake the survey. When the Company learned of this situation, the Board placed $500 at the disposal of the War Department.[108]

Having secured the necessary funds, Secretary Davis designated Lieutenant B. S. Alexander of the Corps of Engineers to make the survey and prepare estimates for raising the bridges and dredging the basin.[109]

On June 4, 1855, the canal company reported that during the preceding winter and spring Alexander had made his report. His plans and estimates had been forwarded to Congress. An appropriation had passed the Senate but had failed in the House.[110] (Unfortunately, a diligent search of pertinent record groups at the National Archives has failed to locate Alexander's survey and estimates.)

Fisk on July 29, 1852, had informed the Board that the bridge east of the Market House was unsafe, and to avoid accidents for which the Company would be liable, he had directed Superintendent Lambie to close it to traffic. Because of limited resources, the Board asked the city of Georgetown to rebuild the structure "on such plan and at such elevation" as Fisk might decree. The Company would reimburse the corporation out of its future income, provided the sum expended did not exceed Fisk's estimate.[111] The "city fathers" were agreeable, and the bridge was rebuilt.

June 1856 saw the successful completion of a project designed to improve shipping facilities on the Georgetown Level. After four years of agitation by certain Georgetown merchants and negotiations with property owners, the towpath between Frederick and Warren streets was shifted from the south to the north side of the waterway.

The campaign to effect this change had taken form in March, 1852, when the Company received "a memorial from Thomas Brown, Boyce, Taylor & Co & Wm. A. Bradley…asking that the towpath of the canal between Warren & Frederick Streets…be changed from the South to the North side of the canal."[112]

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106 Proceedings of the President and Board of Directors, I, 121.
107 Proceedings of the Stockholders, 1847–1855, p. 480.
108 Proceedings of the President and Board of Directors, I, 121.
109 Ibid., 128.
110 26th Annual Report, 8–9; Proceedings of the Stockholders, 1847–1855, pp. 501–502.
111 Fisk Proceedings to Board of of the President and Board of Directors, H, 544; Directors, July 28, 1852 (Ltrs. Recd., C&O Co.).
112 Proceedings of the President and Board of Directors, H, 512–514.

General Superintendent Fisk was ordered to make a study of the proposal. On June 7 he reported that the suggested change would be of advantage to the Company, as it would avoid the interruption to free use of the towpath and canal occasioned by the loading and unloading of boats at Davis' Mill. The Board, however, was unable to budget more than $1,000 for the cost of the towpath bridge that would be required in making this change.[113] No further action, however, was taken on this subject until July, 1853, when the Georgetown leaders again brought the problem to the Company's attention, “stating that a large coal business can be acquired, if this change is made.”[114]

Considerable difficulty was experienced by the group named by the city in acquiring the necessary property. Finally, in the spring of 1854, the canal company was called on to use its chartered privilege of condemnation, and by mid-summer all the land needed had been secured. Work on relocating the towpath was commenced in the spring of 1855. But it was not until October that the Board of Directors of the Alexandria canal company agreed to give its consent to the erection of a bridge across the Chesapeake and Ohio canal by Dodge and Brown “on or near a 1ine with the towpath upon the Potomac Aqueduct. This bridge would have to be built to the satisfaction of the Company engineer.

It was the final week of April, 1856, before the improvements were completed. By that date a new towpath had been built westward from Frederick Street, along the north side of the canal, and a new towpath bridge constructed across the canal, above the Potomac Aqueduct, over which the mules and drivers could pass from the upper to the lower towpath.[115]

On June 30 it was reported that the change of the towpath from the south to the north side of the canal above the aqueduct had been very beneficial, and made the crossing of the canal easier than was formerly the case at the bridge below. The Company had contributed $1,000 to this improvement for a towpath bridge over the canal.[116]

In the summer of 1853, General Superintendent Fisk and a number of the division superintendent had resigned. To L. Patterson replaced Fisk.

Progress of the drive to raise the Georgetown bridges was not encouraging in 1856. In May, Congress notified the Company that $100 would be needed to revise the original survey of the enterprise made by Lieutenant Alexander, and during the month the Company supplied the requested funds. In November the Board authorized Alfred Spates, who had replaced Patterson as General Superintendent, to meet with the Georgetown “city fathers” and secure their consent to raising such of the bridges as might be essential to the passage of boats. In addition, he was to report to the Board at its next meeting the condition of the bridges, and the most expedient and economical way of raising them.[117] The only result of this action was the appointment by the Mayor of Georgetown of a committee authorized to confer with Spates on this problem.[118]

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113 Fisk to Board, June 7, 1852 (Ltrs. Recd., C&O Co.).
114 Proceedings of the President and Board of Directors, I, 47.
115 Proceeding of the Stockholders, 1856–1889, pp. 11–12.
116 Ibid.; 28th Annual Report, 6–7.
117 Proceedings of the President and Board of Directors, J, 313.
118 "A Resolution in relation to the Bridges over the canal," approved Dec. 2, 1856, in Ordinances of the Corporation of Georgetown .... from March, 1856, to March, 1857 (Georgetown, 1857) , 45–46.

The perennial problem of renewing the wooden bridges crossing the canal at the Market House was again raised on November 3, 1857, when Georgetown asked "that the Company rebuild a bridge over the Canal, west of, and adjoining the Market." Three days later, the Company replied that it was "unable at this time to appropriate any money for rebuilding said bridge," and requested "that if said bridge be reconstructed by the Corporation of Georgetown [as the one east of the Market had been], that it be elevated two feet higher than the former bridge, to facilitate the trade of the Canal at Georgetown.[119]

While the "city fathers" agreed to advance money for rebuilding the bridge, records on file at the National Archives fail to disclose whether the structure was raised.

Company Clerk W. S. Ringgold on October 19, 1859, complained to Mayor James G. Barrett of Washington that:

> one of the chief obstacles to the coal trade to Washington arises from the low bridges (chiefly of masonry) over the canal at Georgetown—Loaded boats may pass under them, but the boats now used in the canal trade when empty are too high to return, and are carried to Alexandria to return through that Canal.[120]

Trade on the canal was seriously crippled in 1861 by floods and the outbreak of the Civil War. The Government as a war measure seized the Potomac Aqueduct, which was planked over and used as a bridge. With the Aqueduct closed to shipping, trade on the waterway was seriously inconvenienced, as the Company lacked capital with which to raise the Georgetown and "Washington Branch" bridges. In 1862 Congress finally came to the aid of the hard-pressed Company. An appropriation of $13,000 was voted for "reconstructing the bridges and market-house in Georgetown…, and for raising the same so as to give a convenient outlet to the trade of the canal to the Potomac River, in place of that which has been interrupted by the occupation of the aqueduct." This appropriation was to be "expended under the direction of the President of the C&O Canal Company."[121]

The Board of Directors, to take advantage of this legislation on March 12, 1863, authorized President Alfred Spates (Spates had been elected to the Presidency in January, 1861) to confer with the Georgetown authorities relative to raising the bridges and the Market House.[122] 34 Because of the war, no action was taken at this time.

A letter signed by 1-1. C. Smith, dated April 10, 1865, was received by the Board. (This was the day after General Robert E. Lee had surrendered at Appomattox Court House to Lieutenant General Ulysses S. Grant.) Smith stated that the Corporation of Georgetown had agreed that the bridges over the canal east and west of the Market House were to be raised to a height of 11 feet above the water line. As authorized by President Spates, he had contracted with C. C. Carman for the raising and repair of the bridge west of the Market and the reconstruction of the bridge east of the Market for $1,700. The Board voted its approval of the agreement.[123]

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119 Proceedings of the President and Board of Directors, J, 394, 396.
120 Letter Book L, 1855–1861, p. 328.
121 U.S. Statutes at Large, Vol. XII, 37th Congress, Sess. III, Chapter 79, pp. 753–754.
122 Proceedings of the President and Board of Directors, K, 325.
123 Ibid., 442; Smith to Spates, April 10, 1865 (Ltrs. Recd., C&O Co.). Smith was the Georgetown clerk. The "city fathers" on the 8th had resolved that "the consent of this Corporation is hereby given—that the

Before this work could be undertaken, it was necessary to have the streets on the south side of the canal and those leading to the structures graded and paved. By July 12 this work had been completed for the west bridge. To finish the project would require another $200 to $400. This was agreeable to the Board, provided it did not cost more than the figure stated.[124] Carman by early fall had completed his contract, and the Market House bridges had been raised and rebuilt.

The Georgetown "city fathers" on June 26, 1866, satisfied with the work on the Market House bridges, passed an ordinance authorizing the Company:

> to substitute permanent Iron Bridges in lieu of the present Stone Bridges over the Canal at Congress, Jefferson, Washington & Greene Streets…, provided that the said changes shall be made without unnecessary delay, and at the sole expense of the said…Company, and further that the said Bridges shall at all times be maintained & kept in the same good order, and condition now required in regard to the said Stone Bridges.[125]

The following week, the Georgetown authorities amended the ordinance to permit the canal company to "substitute Draw or Pivot Bridges…across the Canal at Washington and Jefferson Streets, for the present Stone Bridges."[126]

At its July 12 meeting the Board of Directors instructed the treasurer to ascertain if the appropriation made by Congress for raising the Georgetown bridges was still available. If it were, the President was to take steps to replace the present bridges by "such as will be suitable" to navigation. Plans and estimates for the bridges would have to be approved by the Board before bids were accepted. [127]

Dewalt & Co. on August 9 appeared before the Board and submitted plans and specifications for iron bridges. After an executive meeting, the Board agreed to award the contract for raising and constructing iron bridges over the canal on Congress, Jefferson, Washington, and Greene Streets to Dewalt & Co. for $22,000, the additional $9,000 to be drawn from Company funds. The work was to be completed by November 1.[128]

The contractor began work immediately. Progress was rapid, and by October 10 W. Von Essen was able to ask the Board to extend and complete the wall north of the canal, east of Congress Street. Cut stone and iron railing made available by the demolition at the old

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Bridge next west of the Market House may be raised by the C&O Canal Company one foot five inches, at its highest point above its present elevation; and that the grade of the Street may be changed as to suit the increased elevation of the bridge—And also that the Bridge east of the Market House may be rebuilt at a clear height above the water of eleven feet, and the grade of the street accommodated to that elevation, provided that the whole work be done under the supervision of the Surveyor of the Town…and at the expense of said Canal Company." Resolution of the Board of Aldermen and Common Council, April 8, 1865. (Ltrs. Recd., C&O Co.).

124 Proceedings of the President and Board of Directors, K, 433.

125 "An Ordinance authorizing the C&O Canal Company to erect certain Iron Bridges across the canal," June 26, 1866 (Ltrs. Recd., C&O Co.).

126 "An Ordinance amendatory of an Ordinance entitled 'An Ordinance authorizing the C&O Canal Company to erect certain Iron Bridges across the Canal'" July 6, 1866 (Ltrs. Recd., C&O Co.).

127 Proceedings of the President and Board of Directors, K, 501.

128 Ibid., 508; 39th Annual Report…(Washington, 1867), 5.

Congress Street bridge could be used.[129] Superintendent John Cameron of the Georgetown Division reported on the 11th that one abutment for the Congress Street bridge had been finished, while the contractors were ready to start on the other. The abutments for the Greene Street bridge had been completed and were ready to receive the superstructure.[130]

Delwalt & Co. had completed and turned over to the Company by early 1867 the four iron bridges. On April 4, 1867, Mr. Addison was instructed by the Board to make a contract to have the iron bridges painted.[131]

The wooden bridges, especially those at the Market, continued to plague the Company. Maintenance costs were high. In December, 1870, the Superintendent of the Georgetown Division reported that repairs were needed on the "bridges above and below the Market House." He was directed to take corrective action.[132]

Chief Engineer Hutton informed President James Co Clarke in September, 1871, that the Market House bridges had been repaired. An investigation had disclosed that the first Market House bridges had been erected 40 years before, and he supposed that the Company would have "to continue them." It would be useless, he reported, to rebuild one of them in a permanent manner without supports in the canal, unless the other was handled in a similar manner.[133]

In the l880s the Company rebuilt the wooden bridges at the Market and Duck Lane. Unlike the wooden bridges, maintenance costs for the iron bridges were slight. All that was needed was an occasional coat of paint, and about every 15 years they had to be refloored.[134] At the time of the disastrous 1889 flood, there were 12 Georgetown bridges for which the Company was responsible. These included the four iron bridges at Greene, Washington, Jefferson, and Congress Streets; a stone bridge at High Street dating back to 1831; four wooden bridges (two at the Market House and those at Duck Lane and Frederick Street; the towpath bridge near Warren Street; and the wooden bridge across the tide lock. In addition, the Company had some degree of responsibility for the iron bridge crossing the Rock Creek basin at K Street.

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129 Von Essen to Board, Oct. 10, 1866 (Ltrs. Recd., C&O Co.).
130 Cameron to Board, Oct". 11, 1866 (Ltrs. Recd., C&O Co.).
131 Proceedings of the President and Board of Directors, L, 18; 39th Annual Report, 5.
132 Letter book M, 336.
133 Hutton to Clarke, Sept., 1871 (Ltrs. Recd., C&O Co.).
134 Proceedings of the President and Board of Directors, 1877–889, pp. 199, 200, 204, 241.

III: BRIDGES ON THE "WASHINGTON BRANCH"

Through the influence of the powerful group of Chesapeake and Ohio Canal stockholders living in Washington City, the canal company in July, 1831, was "instructed to commence that part of the said Canal extending from the Basin at Rock Creek to the mouth of the Tiber [Creek] and to prosecute the same simultaneously, with the work on said basin."[135] A connection was to be made at the Tiber and the foot of 17th Street, Northwest, with the old Washington Canal, and during the summer and autumn of 1831, steps "to survey and locate the extension of the Chesapeake and Ohio Canal, from the Basin at Rock Creek, to Tyber [sic] Creek" were carried out.[136]

Dissatisfied with progress on the "Washington Branch" of the Chesapeake and Ohio Canal, the city of Washington intimated during the fall that it might withhold the full payment of its one million dollar stock subscription unless the work was expedited.[137]

Contracts for the construction of the "Washington Branch" were finally let in January, 1832, and the work was finished in 1833.[138] The route of the "Washington Branch" was:

> From 27th street to 26th street through square south of 12; from the West side of 26th street to the east side of 23d street, in the Potomac River—with little exception—from the east side of 23d street to the west side of 21st street through squares Nos. 63 and 89; from the west side of 21st street [Northwest], on the river, and along the bed of B street [now Constitution Avenue].[139]

Several bridges were required on the "Washington Branch" of the canal. Captain Easby on March 30, 1832, petitioned the Board to consider the construction of a bridge across the waterway at D Street. A bridge was needed at that point to facilitate communications with his shipyard, because the detour now necessary to reach the yard was causing work to drag.[140] The Board was agreeable, and the Resident Engineer was directed to prepare plans and specifications which were turned over to Easby. By August 18 the bridge had been completed and the contractor paid $752.20 for his work.[141]

The committee in charge of Sections J and K presented a plan to the August meeting of the Board for a bridge and stop lock at G Street. The Board, after studying the estimates, accepted the plan and bid submitted by Michael Corcoran for the masonry and Gideon Davis for the iron railing.[142]

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135 Stockholders Proceedings) 1828–835, pp. 186–87.
136 Ibid., 14–6, 23–8, 186–87.
137 Proceedings of the President and Board of Directors, B, 25–6
138 Ibid,. 56, 62–65, 130–302, 353–355, 384, 386.
139 Proceedings of the President and Board of directors, 1877–1890, p. 407; "Topographical Map of the District of Columbia, surveyed in the years 1856–1859 by A. Beschke…" (Washington, 1861).
140 Easby to Board of Directors, March 30, 1832 (Ltrs. Recd., C&O Co.).
141 Proceedings of the President and Board of Directors, C, 177; Ledger Book A, 355.
142 Proceedings of the President and Board of Directors, C, 209. Corcoran was paid $223 for his work on the bridge. Ledger Book A, 355.

The contractor for Tide Lock H, Philbert I. Rodier, complained to the Board that after his men had dug the pit for the lock, it was discovered that the soil at the upper end was defective; it was now necessary to extend the pit some 70 feet. The relocation of the lock would necessitate a new bridge, as the former structure would intrude on the trunk of the lock. A pivot bridge was required. Although the pivot bridge would cost more, a considerable amount would be saved on masonry.[143]

Rodier on November 20 reported that his men excavating Section K had reached a point on 27th Street, where a wooden bridge was to be built. According to the plans, the bridge, which was to be erected by Easby, was to be identical to the one spanning the canal at Duck Lane.[144]

On the 25th Rodier forwarded to Ingle an answer from Easby to the circular inviting proposals for the 27th Street Bridge. Easby felt it would be necessary to have the sides of the bridge planked, because of the length of the stringers. It was likewise recommended that the ends of the timbers that were to rest on the ground should be capped with lead and a "little oil" inserted through an auger hole at each end.[145] He believed these measures would prolong the life of the bridge. Easby would build the 27th Street Bridge for $1,050, using the same plans as those for the D Street structure. If the sides of the 64-foot long structure were planked like the Market House bridges, it would cost $200 more. Chief Engineer Purcell believed this was necessary as it would "add greatly to the strength of the bridge."[146]

In April, 1836, Chief Engineer Fisk, after making an inspection of the "Washington Branch," recommended that the abutments of the 27th Street bridge be repaired. This expense would be slight, so Superintendent Young was authorized to proceed.[147]

Evidently, the contractor had botched the abutments for the 27th Street bridge, because Superintendent Young and Captain Easby, who was to build the bridge, agreed, it would be useless to do anything to the woodwork unless the abutment nearest the river was removed. This abutment had thin, dry walls, and was badly put together. To rebuild the abutment, Young was to see that some large flat stones were boated down from the quarry. After the stone work had been rebuilt, it should be grouted with gravel, and only then would Easby proceed with the woodwork.[148]

Captain Easby on May 27, 1846, complained that the D Street bridge, which gave access to his shipyard, was so "decayed" that it would require immediate attention. This structure had been built in 1832, and very little had been spent on its upkeep. As the bridge was quite low, Easby argued that if a new one were erected it should have at least 18 inches additional clearance.

He was willing to dismantle the old bridge, salvage the best oak, and build a new one for $450. The plan he proposed to follow called for "two framed trussles [sic] in the barrel

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143 Rodier to the Board of directors, June 22, 1832 (Ltrs. Recd., C&O Co.). Lock B was near the mouth of the Tiber, with its mid-section crossed by 17th Street.

144 Rodier to Ingle, Nov. 20, 1832 (Ltrs. Recd., C&O Co.).

145 Rodier to Ingle, Nov. 25, 1832 (Ltrs. Recd., C&O Co.).

146 Ibid.

147 Proceedings of the President and Board of Directors, E, 45.

148 Fisk to Board of Directors, April 18, 1836 (Ltrs. Recd., C&O Co.).

leaving a passage in the middle of the barrel of 17 feet." As the towpath changed at the bridge, this type of trestle would be no obstacle to the passage of boats.

The 27th Street bridge was in almost as bad condition, Easby concluded.[149]

On investigating Easby's complaint, Fisk found that the bridges should be "renewed." The plan recommended by Easby for rebuilding the D Street bridge, Fisk notified the Board, would be satisfactory and economical. He believed, however, that Superintendent Elgin could build the structure for less than the sum quoted by the contractor.[150]

Floods and lack of capital compelled the Company to defer action. Consequently, on February 4, 1847, Easby was forced to remind President Coale of the continued failure to take action to repair the Washington bridges. At the moment, the 27th Street bridge was unsafe for pedestrians, and if this situation remained unattended to, the Company could find itself liable for damages. As he was dependent on it, Easby at his own expense had contrived to keep the D Street bridge open to traffic.[151]

Easby on June 7 for a third time called to President Coale's attention the condition of bridges on the "Washington Branch." The one on 27th Street had been impassable for weeks, while the D Street structure was "in such a State of decay as to render it unsafe for travel and if not soon rebuilt the Company may sustain a loss for damages." Unless these bridges were rebuilt, Easby would ask the Washington "city fathers" to declare them a public nuisance.[152]

Duff Green, who had been a power during President Andrew Jackson's administration, had been interested in the Chesapeake and Ohio Canal from its inception. Secretary Ingle in October, 1846, had discussed with Green plans to raise the Georgetown bridges.[153] Green believed that iron bridges were the answer to the Company's problem. On October 18 he notified Chief Engineer Fisk that he had been authorized by Nathaniel Rider of New York to contract with the Company for iron bridges. Green reasoned the iron bridges would have proven superior to wooden bridges with their high upkeep costs.[154]

Rider, when informed that Green had broached the subject, wrote President Coale that he had recently completed an iron bridge across the Washington Canal on Maryland Avenue, and he would be delighted to drive him over to inspect it. After Coale had seen the bridge, Rider felt certain that he would authorize the purchase of similar structures to replace the two bridges about which Easby had complained. Already, the Mayor and City Council of the city of Washington had pronounced the iron bridge satisfactory.[155] Rider's letter was referred by the Board to Chief Engineer Fisk for study and comment. [156]

Fisk made his report on September 15, 1847. As yet, he was not satisfied that iron bridges were the answer. In addition, all Company resources were being devoted to completing

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149 Easby to Ingle, May 27, 1846 (Ltrs. Recd., C&O Co.).
150 Fisk to Board of Directors, July 14, 1846 (Ltrs. Recd., C&O Co.).
151 Easby to Coale, Feb. 4, 1847, and Easby to Board of directors, April 7, 1848 (Ltrs. Recd., C&O Co.). Easby's bill for repairing the D Street Bridge was $30.10.
152 Easby to Coale, June 7, 1847 (Ltrs. Recd., C&O Co.).
153 Green to Fisk, Oct. 6, 1846 (Ltrs. Recd., Chief Engineer).
154 Green to Fisk, Oct.18, 1846 (Ltrs. Recd., Chief Engineer).
155 Rider to Coale, June 15, and Rider to Fisk, June 23, 1847 (Ltrs. Recd., Chief Engineer).
156 Proceedings of the President and Board of Directors, H, 50.

the "50-mile Section," and arrangements having been perfected and materials procured for the repair and renewing of bridges on the line between Georgetown and Dam No.6, he was not prepared to make any recommendations that might interfere with these plans.

By the time the Board had occasion to decide upon a plan for bridges to be built in the 1850's, the iron bridge built by Rider & Sons would have been thoroughly tested.[157]

In view of this decision, Superintendent Lambie, during the summer of 1847, had his people reconstruct the D Street bridge. No effort was made at this time to rebuild the 27th Street bridge. Not wanting to chance a law suit for possible injuries, Lambie had the bridge dismantled.[158]

Lambie on July 24, 1848, advised President Coale that nothing had been done toward rebuilding the 27th Street bridge, while the bridge across Tide Lock B would have to be replaced in the near future.[159]

Mayor Seaton of Washington on October 23 complained that the 17th Street bridge was impassable. As the Company was obligated to keep the bridge open, Seaton had been directed by the City Council to ask that this situation be corrected. [160]

When asked for an explanation by his superiors, Superintendent Lambie reported that he had contracted for timber for the 27th Street Bridge in the summer of 1847. Before he could put a crew to work on the bridge, the October flood had occurred, and H. Resley & Co. of Hancock (the firm that had agreed to provide the timber) had asked to be released from their bargain. The existence of a nearby stone bridge across the Washington Canal had then caused Lambie to forget about rebuilding the bridge, as he had concluded that the absence of the 17th Street bridge would not be an inconvenience to the public.

It would cost about $225 to renew the structure, so President Coale told Lambie to proceed.[161]

Three years elapsed before official notice was taken of Lambie's failure to rebuild the 27th Street bridge. On December 27, 1849, the Company was petitioned to reconstruct this structure, as its absence was causing a great deal of loss and inconvenience. During periods of muddy weather, in view of the work currently underway on G Street, it was impossible for wagons and carts to reach the canal basin or the Georgetown wharf.[162] Once again, the Company procrastinated, and the petition was ignored.

Mayor Lenox and the Board of Aldermen of Washington on July 20, 1850, called on the Company to "make such alterations in the bridges" over the "Washington Branch" and to rebuild those that are down within the city limits, as will permit free passage of boats from the Rock Creek Basin into the Washington City cana1.[163] It was March, 1852, before General Superintendent Fisk got around to making a report on the raising of bridges on the "Washington Branch." When he did, he observed that there were two structures

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157 Fisk to Coale, Sept. 15, 1847 (Ltrs. Recd., Chief Engineer).
158 Lambie to Board, June 28, and Lambie to Coale, Sept. 6, 1847 (Ltrs. Recd., C&O Co.).
159 Lambie to Coale, July 24, 1848 (Ltrs. Recd., C&O Co.).
160 Seaton to Board of Directors, Oct. 10, 1848 (Ltrs. Recd., C&O Co.).
161 Lambie to Board of Directors, Oct. 23, 1848 (Ltrs. Recd., C&O CO.).
162 Petition to C&O Canal Co., Dec. 17, 1849 (Ltrs. Recd., C&O Co.).
163 Lenox to Board, July 20, 1850 (Ltrs. Recd., C&O Co.).

(one of stone [at G Street] and the other of wood) that should be raised, along with the iron K Street Bridge across the Rock Creek Basin. He estimated that these three bridges could be raised for between $2,000 and $2,500.[164]

Alderman Thomas P. Morgan on December 20 complained to Mayor Lenox that the canal people had ignored the joint-resolution of October 5, 1850, urging that the 27th Street bridge be rebuilt.[165] When the Company took no action, Morgan went to see President William Grason on March 31, 1853.[166] Orders were accordingly issued for Superintendent Lambie to have his people rebuild the structure.

Morgan was back with another complaint in October. He reported that there was trouble at the stone bridge spanning the "Washington Branch" at G Street. Because of the sharp bend in the canal at that point, the waterway tended to become clogged with mud. In addition, a number of coping stones had tumbled into the canal, and it was almost impossible for large boats to pass.[167] A crew was turned out, and this difficulty was corrected.

The "Washington Branch" and the Washington Canal were all but abandoned during the Civil War. By 1865 these canals were reportedly impassable because of bars and refuse in the waterway.[168] The restoration of the "Washington Branch" was discussed by the Board of Directors in the period 1866–1871, but no agreement was reached for either its improvement or abandonment. Inasmuch as few boats had navigated it for over 15 years and none since 1860, nothing was done.[169] Yet the canal could not be abandoned without the consent of the city of Washington, but the bridges across the "Washington Branch" were allowed to deteriorate. The only time repairs were made was when the city authorities goaded the Company into taking action.

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164 Proceedings of the Stockholders, 1847–1855, pp. 430–431.
165 Morgan to Board of Directors, Dec. 20, 1850 (Ltrs. Recd., C&O Co.).
166 Proceedings of the President and Board of Directors, I, 8.
167 Morgan to Board of Directors, Oct. 24, 1853 (Ltrs. Recd., C&O Co.).
168 Proceedings of the President and Board of Directors, K, 489.
169 Proceedings of the President and Board of Directors, L, 463; Dodge to Ringgold, April 11, 1866 (Ltrs. Recd., C&O Co.).

IV: EMBANKMENT BRIDGES

At a number of points, especially in Alleghany County, it was ascertained by Company engineers that it would be cheaper and easier to haul embankment for the construction of the canal from the Virginia side of the Potomac River. Contractors for the sections on which embankment would be secured in this fashion would be required to bridge the Potomac with temporary structures. For building these bridges, they would be reimbursed by the C&O Canal Company.

The first embankment bridges to be constructed on the canal were in 1833 at High Rocks, above Williamsport, to enable contractors to haul earth for the embankments on Sections 193–195. As justification for this added expense to the Company, Chief Engineer Purcell pointed out that all earth suitable for embankment on the Maryland side had been exhausted to a distance of one-fourth mile from the ditch, and it would be more economical to build the bridges and haul from across the river.[170] Purcell was duly authorized by his Board of Directors to purchase 12,000-foot of plank for the construction of the bridges and to call upon the clerk for the necessary funds. [171]

On July 22, 1833, Purcell contracted with Joshua Board for the bridges and embankment,[172] and three weeks later, written agreements for the erection of two embankment bridges on Section 194 were mailed to Company offices. Contractor Board's people quickly bridged the Potomac. By October his wagons were hauling embankment for Sections 193–195.[173] These embankment bridges had been in operation only three months, when there was a flood. On January 14, 1834, a 16-foot rise on the Potomac swept away these two bridges.[174] Work on Sections 193–195 had progressed to a point, where it would not be economically feasible to replace these two bridges.

Five years were to pass before the C&O Canal Company again had any experience with embankment bridges. When contracts were let in 1837 for the "50-mile Section" between Dam No. 6 and Cumberland, it was discovered that at a number of points the only nearby source of embankment was on the Virginia side of the Potomac. By this time, Fisk had replaced Purcell as Chief Engineer, so a new man and a different staff would have to grapple with this problem.

Fisk delegated to one of his capable Assistant Engineers, Ellwood Morris, the task of drafting plans and specifications for the embankment bridges. Morris' plan, which he divulged on June 2, 1838, called for the contractor in building these structures to employ "rough timber of almost any kind with the Bark on & merely flatted on two sides." Planks could be almost any timber, while only such iron as needed to afford stability was

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170 Purcell to Board of Directors, May 4, 1833 (Ltrs. Recd., C&O Co.).
171 Proceedings of the President and Board of Directors, C, 334.
172 Purcell to Board of Directors, July 22, 1833 (Ltrs. Recd., C&O Co.).
173 Purcell to Ingle, Aug. 15, 1833 (Ltrs. Recd., C&O Co.). Board was paid $3,000 for these two bridges. Ledger Book A, 548.
174 Ibid., Jan. 15, 1834 (Ltrs. Recd., C&O Co.).

to go into the construction.[175] Morris at this time estimated the cost of the embankment bridge for Section 320 as:

14,000 running feet of timber at 10¢.	$1400
56 thousand feet of plank at $15 per 1,000	840
486 running feet of workmanship at $4	1944
3,000 pounds of iron at l5¢	450
Filling abutments with 400 perch of stone at $1.25	500
Contingencies	866
Total	$6,000[176]

Besides cost there were other factors favoring the use of hewn timber rather than sawed lumber: (a) The available supply of sawed lumber on the "50-mile Section" was so limited that if the Company entered the market, the price would be driven up to at least $20 per thousand or more. (b) Questions had been raised as to the advantages of permanent bridges opposed to ones of a temporary nature: Morris feared that ones of a temporary nature would be certain to be swept away in the first "moderate freshet." (c) Under the Company's charter, navigation on the "old Potomac route must not be interrupted." With temporary bridges, he feared that because of the small amount of clearance, the structures would put a stop to boating whenever there was a moderate rise. (d) Finally, if the uppermost temporary embankment bridge was swept away by a flood, the ones below would inevitably be carried away as debris built up against them.[177]

Morris on June 8 wrote Fisk from Oldtown that he had recently made a study to determine whether it was possible to design a cheaper embankment bridge than the one previously projected. On doing so, it had occurred to him that by using sawed lumber (notwithstanding its higher market price) on a bridge constructed along "Town's Plan" might lessen the cost. By reducing the size of the scantlings to the smallest possible dimension consistent with security, he had concluded:

For a 60-foot span built on "Town's Plan"

22,000 feet of timber at $15 per 1000	$330.00
225 pounds of iron at l5¢ per pound	33.75
Workmanship per foot at $6, including false work, &c	360
Total	$723.75

The probability is that eight spans of 60 feet will answer the purpose desired.

$724 X 8 spans	5792
400 perches of stone at $1.25 for filling the abutments.	500
Contingencies	800
Total	$7092

[175] Morris to Fisk, June 2, 1838 (Ltrs. Sent, Morris).
[176] Ibid.
[177] Morris to Fisk, June 8, 1838 (Ltrs. Sent, Morris).

Fisk was asked to recall that the estimate Morris had prepared for a bridge of hewn timber was $6,000, or $1,092 less than a structure built on Town's plan.[178]

On June 16 Morris forwarded to Demarst, the contractor for the embankment bridge on Section 320, the plans and specifications he was to follow. According to the specifications, Demarst was to use both sawed and hewn timbers in the structure. The specifications read:

Bill of Timber and Iron for 8 spans of 60 feet

Hewn Timbers

Timbers flattened on two sides and of such size that if squared they would make the dimensions marked down:

Reference to Plan	Number	To Square Length		Lineal Feet
(1)	48 Rafters	10 x 12 at butt 10 x 12 at head	34 feet	1,632
(2)	6 Chords	Each 490 lineal feet in length Lengths of 48' x 12"		2,940
(3)	21 Fish pieces	10" x 12"	each 22 feet	462
(4)	18 Keel pieces	12 x 12	each 24 feet	432
(5)	18 Sill pieces	12 x 12	each 40 feet	720
(6)	Joists	8 x 10	480 lineal feet To each spar of 60 feet Or in all 480 feet x 8 spars	3,840
(7)	33 girders	12 x 12	each 24 feet	792
(8)	Bents	Cap 1 = 24 feet of 12" x 12") Posts 5 = 28 feet of 12" x 12")	9 Bents	1,476
(9)	24 King Posts	16" x 16") (7 x 30 = 210)	each 15' long	360
(10)	Ice Guards	(7 x 10 = 70) (7 x 15 = 105)	385 feet of 12" x 12"	385
(11)		4 x 35 = 140)		
(12)		4 x 15 = 60)		
(13)		4 x 10 = 40)		
(14)	Extra timber in	20 x 24 = 480)	1,444 feet running of	
(15)	abutment bents	10 x 30 = 300)	12" x 12" =	1,144
(16)		Side brace to (13)) 18 x 8 = 124)		
	Additional length of sill of abutments		34 x4 of 12″ x 12″ =	136
		Contingencies		181
		Total Lineal feet		14,500

[178] Ibid.

Sawed Lumber

		Board Feet
Bents and abutment planks 2 inches thick, and in lengths of 9 and 13 feet		22,000
Flooring of 2-inch white oak plank in lengths of 8 and 12 feet.		20,000
Bent braces	18 of 30’ x 12” x 4”	2,160
Coop ties,	24 feet in length 9 of 6” x 6” x 18” for top braces	486
Railway tracks		
	4 8” x 3” x 490 lineal feet	3,920
	4 9” x 6” x 490 lineal feet	5,880
	Contingencies	464
Total feet Board Measure		56,000

Total Lumber	
Hewed	14,500 Lineal feet
Sawed	56,000 Board feet

Bill of Iron	Pounds
45 Keel bolts (through heel pieces) 3’ long	365
27 Sill bolts (through heel pieces) 3’ long	219
27 Rafter bolts (through heel pieces) 4 1/2’ long	329
81 Chord bolts (through heel pieces 2 2/3’ long	584
14 Brace bolts 3 1/2’ long	133
7 Ice Fenders of 211 x 1/2”, iron with countersink holes to receive, ragged spikes, each fender 24’ long	560
56 pounds of spikes to plank each bent, the spikes to be used only one at each end of each plank and 9 bents	540
Spiking on the ice fenders and contingencies.	306
Total iron	3,026

Floor joists were to be cut in lengths of 34, 17 1/4, 33 1/2, 16 3/4, 19 3/4,31, and 31 1/2 feet. Rafters and ring posts were to be of white oak, the chords of pine, and the remainder of “hewn stuff” could be of any wood, except sycamore. The sawed lumber used for the flooring and the railroad tracks was to be white oak. The gauge of the tracks was to be determined by the width of the car used to haul the embankment.[179]

A plan and an explanation of how he wished the joists to be framed was forwarded by Morris to his assistant, W.A. Pratt.[180] (For a copy of this plan see Appendix A.)

Plans and specifications having been formulated, Chief Engineer Fisk notified the Board that in drawing contracts for the sections between Dam No. 6 and Cumberland, it had been specified that the Company was to pay the cost and upkeep of the bridges erected for hauling earth from the Virginia side. Now the contractor for Section 367 had asked how permanent these bridges should be, for upon this depended the cost, as well as the risk of the structure being swept away. In addition, problems would arise because these bridges were temporary.

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179 Morris to Demarst, June 16, 1838 (Ltrs. Sent, Morris).
180 Morris to Pratt, Oct. 26, 1838 (Ltrs. Sent, Morris).

Permanent bridges were out of the question, however, because of the cost. The other extreme should also be guarded against. For guidance, Fisk had determined that the contractor should erect the same type of bridge as the Company would, if it were doing the work itself. Several contractors were dissatisfied with this guideline, and the Company was being asked to pay for bridges four or five times more costly than those erected by contractors "where they were at cost".[181]

Fisk was told by the Board to let his inspectors use their judgment in making their estimates on what was to be allowed for the construction of the embankment bridges.

On July 2, 1838, Fisk wrote Ho Devine, the contractor for Section 367, that there were two types of embankment bridges which he could approve: (a) a bridge sustained on bents, at least 30 feet apart from center to centre of the bent, with an elevation of 18 feet above low water; and (b) a floating bridge, resting on boats 40 feet in length by ten-foot wide, anchored lengthwise to the stream and moored ten or 15 feet apart. These boats would support stringers on which would be placed a roadway 18 feet in width.

It was presumed that the contractor would be capable of building either or both of these bridges. On doing so, it was expected that he would employ the "same care & economy in the construction" and upkeep of the structure as he would if he had to pay for it out of his own pocket.[182]

Demarst failed to execute his agreement to construct the bridge on Section 320. When the contract was declared abandoned, Dickson and Dull on October 6, 1838, proposed to build the bridge from Malcolm's Island to Section 320 in conformity with plans and specifications shown them by Assistant Engineer Morris. If they could get the planks sawed at Ellis' Mill (which was currently not operating because of the low stage of the river) they promised to complete the bridge by January 1, 1839, for a price of $12 per running foot of flooring. This figure was to cover materials of all kinds, as well as labor, necessary to complete the structure.[183] 14 Dickson and Dull were given the contract with the requested stipulation.

Dickson and Dull, however, were no more successful than their predecessor. When they failed to meet their obligations, the contract was given to G. M. the embankment bridge on Watkins, who was to be paid $5,000 to build Section 320.[184]

The problem of estimating the amount to which the contractors were entitled for building embankment bridges continued to be vexing. Fisk on February 9, 1839, informed Morris that as for the embankment bridges, he would not be justified "in giving any instructions" except that contractors who needed bridges would be paid for such materials as they might secure and place on Company land. Cheap temporary bridges were contemplated. Plans would vary to conform to various situations. A bridge such as Devine had erected near Cumberland (costing about $4 per foot) would be "considered sufficiently permanent for any situation." A similar bridge with bents instead of pins would answer in some

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181 Fisk to Board of Directors, June 22, 1838 (Ltrs. Recd., C&O Co.).
182 Fisk to Devine, July 2, 1838 (Ltrs. Recd., (C&O Co.).
183 Proposal of Dickson & Dull, and Dixon to Morris, October 6, 1838 (Ltrs. Recd., C&O Co.).
184 Watkins to Board of Directors, June 4, 1839 (Ltrs. Recd., C&O Co.).

circumstances. In others, cheap bridges like those thrown up by Gorman on Section 317 would suffice.[185]

J. B. Thompson on February 11 contracted with the company to build a bridge across the Potomac to transport embankment for Section 297. The bridge was to be finished by July 1, 1839. Thompson's bridge would require:

Ironwork

46	key bolts, 3/4″ round iron, 24″ long	138
23	key bolts, 3/4″1 round iron, 14'.1ong	44
1,680	spikes 6″ long and 3/8″ square with good heads and weighing 3 to the pound	560
	Keys and washers for the bolts	18
	Iron	760

Lumber

Running Feet of Round Lumber		
23	caps of 14″ diameter (round) & 20' long	460
126	stringers, 10″ to 12″ (round) & 24' long	3,024
42	clamps, 8″ by 8″ (square) & 22' long	
138	trestle legs, 9" diameter (round) & 12' long	1,656
42	braces, 6″ in diameter (round) & 12' long	924
63	cross ties, 6″ diameter (round) & 5' long	315
30	pieces to make cleats 6″ by 3″ square &10' long	225
7,650	square feet of 2″ oak plank, all to be of 18' length	15,300
27	centre pieces, 8″ by 8″ (square) and 22' long	2,414
	Total lineal feet of round timber	6,379
	Total board of sawed timber	22,917

The 2-1nch planks were to be of oak, while the rest could be of any type hardwood.

Thompson's people began work on May 1 and completed the structure on July 18. Besides Thompson, the crew included 30 others. Two teams were used to haul timber to the site. For the bridge, the Company allowed the contractor $1,355.25.[186]

Several contracts for addition embankment bridges were awarded by the Company in June. George Holbitzell on the 15th agreed to supply for $1,500 all the materials and to construct one embankment bridge across the Potomac on Section 344. The contractor reserved the right to erect the bridge along any lines he wished, provided he did not interrupt navigation on the river. If the bridge should be carried away by a freshet before all the required embankment was hauled over, Holbitzell could secure the additional embankment from the Maryland side.[187]

George Gratton at the same time contracted with the Company to "furnish all the materials for, to construct, to keep in repair, and rebuild as often as may be necessary one bridge over the Potomac for the hauling of earth over from Virginia for the embankment

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185 Fisk to Morris, Feb. 9, 1839 (Ltrs. Recd., Morris)
186 Thompson's Aug. 1, 1839 Return (Ltrs. Recd., Morris).
187 Holbitzell to Board of Directors, June 15, 1839 (Ltrs. Recd., C&O Co.).

of Section No. 294 for $2,000. “If Assistant Engineer Morris should require more than one bridge, Gratton would build and keep in repair both bridges for $4,000.

Gratton reserved the right to construct the bridge or bridges “upon such plan as I might prefer, with the understanding” that the structures would not interfere with navigation on the Potomac.[188]

On August 12 Thomas M. McCubbins, as low bidder, was awarded the contract for building the embankment bridge on Section 293. His price was $2,000.[189]

Assistant Engineer Morris on September 5 notified Fisk that between Dam No. 6 and Town Creek there were built or building five embankment bridges. It therefore might be good business to let the Cumberland boatmen know that all these bridges, except Thompson’s (which would be carried away by the first freshet), were laid so that there was a clearance of 14 1/2 feet in low water. If a 10-foot rise occurred, boats should be able to “scrape clear”.[190]

Heavy rains during the second week of September caused a 7-foot rise along the “50-mile Section.” Gorman’s bridge at the junction of Sections 317 and 318 and connecting the Maryland shore with Coxes Island was carried away by the booming Potomac. As this bridge was indispensable to the construction of these sections, Morris advanced Gorman funds to begin rebuilding. On Section 297 the embankment bridge, Thompson’s, although the water touched the stringers, held.

A large amount of drift had lodged against the abutments of the bridge on Section 321. Before checking Thompson’s bridge on the 19th, Morris sent orders to cut the drift clear. When he returned to his Malcolm’s Island headquarters that evening, Morris was disappointed to learn that his orders had not been satisfactorily complied with. Whereupon, he reiterated his instructions.[191]

Morris on September 18 advised Gorman that as soon as the Potomac crested and fell, it would be necessary to rebuild the bridge to Coxes Island. For this purpose, Morris requested the contractor secure: 7 stringers, each of 40 feet in length and “flatted on two sides to 12 inches thick; 750 superficial feet of 2-inch plank, 12 feet in length; and 200 6-inch spikes.” When he relaid the flooring, Gorman was to see that it was higher than heretofore. Two sets of plans and specifications for the bridge were prepared by Morris—one set was for the contractor and the other for his chief carpenter. (See Appendix B for copies of these plans.)[192]

By December, 1839, the bridge had been rebuilt, and Morris estimated its cost as:

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188 Gratton to Board. of Directors, June 15, 1839 (Ltrs. Recd., C&O Co.); Fisk to Morris, July 22, 1839 (Ltrs. Recd., Morris).

189 Fisk to Morris, Aug. 12, 1839 (Ltrs. Recd., Morris).

190 Morris to Fisk, Sept. 5, 1839 (Ltrs. Recd., Chief Engineer).

191 Ibid., Sept. 19, 1839 (Ltrs. Recd., Chief Engineer). The drift, which was proving such a problem, consisted of trees and underbrush cut by the construction crews clearing a right-of-way for the Baltimore & Ohio Railroad. Some of the trees washed into the Potomac by the flood still had their branches and were several feet across the butt. Ibid.

192 Morris to Merehant, Oct. 3 and 8, and Nov. 9, 1839 (Ltrs. Sent, Morris).

Stringers, 3,814 feet running, at 12 1/2¢	$351.75
Bent timber, 1,944 feet running	174.96
Crib and track timbers, delivered	100.00
Iron, 600 pounds at 12 1/2¢	75.00
Planks, 16,000 at $17.50 per thousand	280.00
Labor, framing and building	450.00
Contractor's profit	286.34
	$1,718.05[193]

As winter approached, Chief Engineer Fisk began to fret about ice on the Potomac carrying away the embankment bridges. In December he bargained with Washington Merchant to matchmark, dismantle, and store during the winter, the bridge near the head of Section No. 321. In the spring the bridge would be reassembled. If because of the relocation, a longer structure were required, Merchant was to be equitably compensated.[194] On the 15th Fisk authorized Merchant to begin dismantling the bridge. Bright, the contractor for Sections 321 and 322, protested that he wished to keep hauling earth for another fortnight, before he closed down the projects for the winter. Fisk was agreeable, and a stop order was issued by Morris to Merchant.[195]

This extension proved disastrous, because before Merchant could begin dismantling the bridge, a warm front swept into the region and the ice which had formed on the upper Potomac broke up. On the night of January 12, 1840, the ice floes swept away Bright's bridge. Watkins' bridge on Section 320 leading to Malcolm's Island was also carried away, the stone-filled cribs having been sheared off at the water's surface.[196] Three days later, McCubbins' bridge on Section 293 collapsed.[197] Swept downstream, along with the ice floe, was a tremendous quantity of debris (wreckage from the bridges and felled timber and underbrush left by the railroad and canal grubbing crews). Mann's boat-bridge and Gorman's embankment bridge on Sections 268 and 269 were wrecked. Debris began backing up behind Dam No.6, and the surface of the pool looked like a "giant forest."[198]

Assistant Engineer Morris was thunderstruck by this disaster, because his studies had shown that the ice had "moved more or less by January 7 every year since 1835," and he had alerted the contractors to the impending danger. Fisk, however, had listened to the arguments advanced by Bright and had countermanded Morris' orders that the bridges be dismantled and stored.[199]

The situation worsened, when heavy rains at the end of January caused a l4-foot rise on the upper Potomac. The embankment bridge at Coxes Island servicing Section 318 (the

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193 Morris to Gorman, Sept. 18, 1839, and Morris to Fisk, December, 1839 (Ltrs. Sent, Morris).

194 Morris to Fisk, Dec. 17, 1839, and Jan. 9, 1840 (Ltrs. Recd., Chief Engineer). The bridge was to be stored by Merchant near the western tip of Malcolm's Island, where the parts would be placed above the high-water mark. For this work, Merchant was to be paid $500. Morris to Merchant, Jan. 9, 1840 (Ltrs. Sent, Morris).

195 Fisk to Morris, Dec. 15 and 19, 1839 (Ltrs. Recd., Morris).

196 Morris to Fisk, Jan. 13, 1840 (Ltrs. Sent, Morris).

197 Ibid., Jan. 15, 1840.

198 Byers to Fisk, Jan. 25, 1840 (Ltrs. Recd., Chief Engineer).

199 Morris to Fisk, Jan. 13, 1840 (Ltrs. Sent, Morris).

last one remaining on the "50-mile Section") was swept away. When he relayed news of this latest disaster to Chief Engineer Fisk, Morris wrote, "As it would be equivalent to stopping this section in an unprotected state if we were to delay rebuilding the bridge, I have ventured to take the necessary steps to have it reconstructed."[200]

Morris accordingly on February 3 notified Gorman that it was important that his bridge to Coxes Island be rebuilt at once. To do this, stringers "flatted on both sides to 12 inches thick and each 45 feet long," as well as a "sufficient quantity of round timber to build two cribs 24 feet long and 12 complete feet wide," were required.[201]

Because of lack of capital, the financially destitute Company dragged its feet on Morris' request. On June 5 Morris complained that if Section 318 "is to progress, we ought by all means to take a hand and build the Embankment Bridge, so as to commence hauling the Virginia Embankment, on or before August 1." By that date all would be accomplished that could be done on the section without a bridge. Morris believed Merchant would be willing to build the bridge at a fair price.[202]

Chief Engineer Fisk, in view of Morris' plea, was able to get the Board to make available a small sum for the completion of Section 318. A contract for building the bridge was let to Merchant, and by August 12, 1840, the structure had been completed and accepted by the Company. The project superintendent estimated the cost of the bridge at:

	Items, Work, &c.		
2337	lineal feet of stringers	at 10¢	$233.70
2750	lineal feet round timbers for cribs and railing	at 8¢	220.00
957	lineal feet round (vents) for legs, braces & blocks	at 9¢	86.13
232	lineal feet flattened timbers for caps vents	at 11¢	25.52
25	lineal feet of crane timber	at 15¢	11.25
15,398	superficial feet of plank, at an average price Per 1000 of	$1.47	226.35
475	pounds of cut spikes	08 1/2¢	40.37 ½
42	pounds of cut nails	at 10¢	4.20
171	pounds of iron, bolts	at 15¢	26.65
115	days of labor	at $1.06	121.90
47 ½	days of work by carpenters	at $1.56	73.71
22	days of work by a superintendent	$2.00	45.32
17 ¼	days of labor with a four-horse team	at $5.00	86.25
8 ¾	days of labor with a two-horse dray team	at $3.00	26.25
5 ¼	days of labor with horse and cart	at $1.56	8.90
	One rope for crane		72.00
			$1,310.79 ½[203]

During the autumn of 1840 at least one other embankment bridge, the one on Section 321, was rebuilt.

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200 Ibid., Feb. 6, 1840.
201 Morris to Gorman, Feb. 6, 1840 (Ltrs. Sent, Morris).
202 Morris to Fisk, June 5, 1840 (Ltrs. Sent, Morris).
203 Gore to Fisk, Aug. 12, 1840 (Ltrs. Recd., Chief Engineer).

The Board of Directors of the C&O Canal Company in September, 1839, in an effort to keep from abandoning construction of the "50-mile Section" had authorized the issuance of $300,000 in canal scrip. This was at best a stopgap measure. Changes in the Board of Directors in 1841 brought about a reversal of this policy, and in 1842 work on the "50-mile Section" was halted. [204]

Arrangements having been made for financing the completion of the "50-mile Section," a contract was signed by the Board of Directors with Messrs. Gwynn and Company on January 5, 1846. At least one of the embankment bridges was still standing at this time. But before Gwynn and Company could take any action to resume construction, the bridge on Section 321 was carried away by an ice floe on the evening of January 8. Several of the bents and most of the planking, however, were salvaged by a crew headed by Assistant Engineer Dungan.[205] It was the spring of 1848 before the bridge was rebuilt, and on July 10 Dungan was watching as a freshet carried away 2/3 of the bridge.[206]

[204] Fisk to President and Directors, Dec. I, 1842 (Ltrs. Recd. C&O Co.); Walter S. Sanderlin, *The Great National Project, A History of the Chesapeake and Ohio Canal* (Baltimore, 1946), 135–137.,)

[205] Dungan to Fisk, Jan. 8, 1846 (Ltrs. Recd., Chief Engineer). Morris had resigned on April 7, 1841, shortly before work was suspended, and Dungan had been named to replace him as the assistant engineer in charge of construction between Dam 6 and the tunnel.

[206] Ibid., July 10, 1848.

V: BRIDGES FROM COLLEGE RUN TO SENECA AQUEDUCT

I. The Little Falls Bridge and the Bridge at Lock No.5

As successor to the Potomac Company, the C&O Canal Company inherited its assets as well a. its responsibilities. The Little Falls Bridge Company had previously constructed a bridge and roadway over the Potomac Canal at Little Falls. When the C&O Canal Company took, over problems developed as to the type of bridge to be constructed over the canal at Little Falls. Chief Engineer Wright devoted considerable thought to the proposed bridge, but he had difficulty reaching a decision. Especially troublesome in this respect was the realization that pressure groups were being organized to compel the Company to construct bridges at all places where roads crossed the line of the canal. Judge Wright was concerned that if these groups could make their influence felt in the Maryland General Assembly, the Company would be compelled to abandon the position taken by President Mercer and the Board that there would be no bridges for farm roads across the waterway. If the Company could hold its ground, thus reducing the number of road bridges to a minimum, the engineers could prepare plans for fairly substantial structures. But if the Company were forced to build bridges for farm roads, Wright, in the interest of economy, would have to design a cheap bridge.

As the situation at Little Falls had to be resolved, Judge Wright advised the Company to build two abutments 40 feet apart, and 20 feet wide, at a site a little east of the .bridge scheduled to be razed. These abutments were to be "14 feet high above bottom," very strong, and firmly laid. On these, the Company would erect a "common wooden bridge." Later, if the situation warranted, the bridge could be dismantled, the arch turned, and the height adjusted without any interruption to navigation.[207]

Six months passed before the Board of Directors authorized Judge Wright to proceed with the construction of a bridge at Lock No. 5.[208] When built the bridge was to be capable of passing both pedestrians and horsemen across Lock No. 5 from the towpath to the lock tender's house in such a manner as not to obstruct navigation. At the same time, steps would be taken to elevate and repair the road bridge across the canal leading to the Little Falls Bridge.[209]

Joel Crittenden of the Little Falls Bridge Company on October 5, 1830, wrote President Mercer that he had learned that the canal company planned to raise the bridge over the canal leading to the Little Falls Bridge. If this were done, certain steps would have to be taken to protect his company's interest: (a) a culvert to carry off water was needed; while (b) the "railing to the bridge" should be raised to a height to insure the traveling public's safety.[210] President Mercer promised to pass along Crittenden's comments to Chief Engineer Wright. In the meantime, the contract for raising the bridge leading to the Little Falls

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207 Wright to Mercer, Sept. 16, 1829 (Ltrs. Recd., C&O Co.).
208 Proceedings of the President and Board of Directors, B, 68.
209 Ibid., 189.
210 Crittenden to Mercer, Oct. 5, 1830 (Ltrs. Recd., C&O Co.).

Bridge was awarded to Thomas McCubbins, while a Mr. Acklen was low bidder for building the bridge over the canal at Lock No.5.[211] This work was completed by the spring of 1831, when Colonels Abert and Kearney made their inspection. They reported:

> A short distance below lock No. 5 is a wooden bridge, thrown over the canal-for the accommodation of the public road to the Little Falls bridge. This is sufficiently elevated above the level of the canal to admit of the passing of the packet boat without inconvenience to passengers upon its upper deck. The structure is simple but substantial, and the towing-path is extended under it by means of a small bridge, so that there is no necessity of freeing the horse from the towrope in passing it.[212]

In February, 1832, there was an ice gorge at Little Falls. When the gorge broke, there was a flood. As the ice was swept downstream, the towpath from Lock No. 5 to the Little Falls Bridge was submerged in places to a depth of six feet. Debris built up rapidly against the bridge spanning the canal. Unable to withstand the strain, the bridge collapsed and was swept downstream.[213]

Superintendent J. C. Lackland of the Georgetown Division notified President Mercer on February 25 that the Little Falls Bridge Company had commenced rebuilding its bridge across the canal. Progress was rapid, and it was soon reopened to traffic.[214]

By 1837 the bridge had seen its best days. In response to the complaints of his constituents, Mayor Cox of Georgetown asked the Board of Directors to have the bridge spanning the canal on the road giving access to the Little Falls Bridge repaired. The Board voted against honoring this request, as the bridge in question belonged to the Little Falls Bridge Company.[215]

Three years passed and the Company continued to drag its feet, while waiting for the bridge company to act. On August 24 and again on November 9, 1840, the Georgetown "city fathers" lodged complaints with the Board regarding the bridge's condition. Finally, the Board acted, and Superintendent Young was instructed to see that the necessary repairs were undertaken.[216]

The bridge across the canal at Little Falls was washed away by the October, 1847, flood. No steps were taken to replace the structure, so D. L. Grove, who owned a mill at that point, complained to the Board on December 18. Loss of the bridge had caused his business to slump and he trusted that the Board would direct Superintendent Lambie to correct this situation as speedily as possible.[217] The financial situation of the Company, while not rosy, had improved, and Lambie was advanced sufficient funds to enable his crew to rebuild the bridge.

In the early l870s a new bridge across the Potomac at Little Falls was built by the Federal Government. This new structure made the road bridge across the canal at that point superfluous. Company President Clarke sought unsuccessfully to locate persons connected

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211 Proceedings of the President and Board of Directors, B, 142; Ledger Book A, 343.
212 House Report 414, p. 93.
213 Lackland to Ingle, undated (Ltrs. Recd., C&O Co.).
214 Lackland to Mercer, Feb. 25, 1832 (Ltrs. Recd C&O Co.).
215 Proceedings of the President and Board of Directors, E, 326.
216 Proceedings of the President and Board of Directors. F, 274.
217 Grove to Fisk, Dec. 18, 1847 (Ltrs. Recd., Chief Engineer).

with the Little Falls Bridge Company to prevail on them to remove their bridge. Satisfied that the bridge company was defunct, General Superintendent Hutton tried to get the Corps of Engineers to remove the structure. General Nathaniel Michler poured cold water on this suggestion by reporting that the government had no money to disburse for the removal of the bridge, and he was unwilling to permit the Company to retain the materials as compensation for dismantling the structure. Hutton countered with the proposition that the Company would take down the bridge, retain so much material as to cover the cost, and deposit what was left in a bank. Michler was agreeable.[218]

The great flood of 1889 wrecked the bridge crossing the canal feeder at Lock No.5. To replace this structure would cost $100.[219]

II. Pivot Bridge at Lock No. 13

The Board of Directors on May 27, 1831, authorized a pivot bridge designed to pass wagons and carriages to be constructed over Lock No. 13.[220] This bridge was built by O. H. Dibble as directed. No trouble was experienced with the bridge at this point until the Civil War, when it was destroyed. The structure was rebuilt to be swept away in the flood of 1889. To replace the wrecked bridge, the Company planned a structure 100 feet long and costing $500.[221]

III. Pivot Bridge at Great Falls

A drawbridge was constructed across the canal at Lock No. 20 by William Easby in 1832.[222] The Board of Directors on December 7, 1836, determined to build a new bridge at Great Falls, and asked Easby to submit a plan and to formulate a proposal for a pivot bridge across Lock No. 20.[223] Easby's plan was approved by Chief Engineer Fisk on January 4, 1837, and his bid for $430 was accepted by the company.[224]

This pivot bridge lasted until the Civil War, when it was destroyed and rebuilt. In March, 1874, the people living at Great Falls asked the Company to replace the old structure with a new pivot bridge. The Board of Directors, after reviewing the petition, authorized President Arthur P. Gorman to see that the desired bridge was built.[225]

IV. Pivot Bridge at Lock No. 23

The Board of Directors on December 7, 1836, directed Superintendent Young of the Georgetown Division to see that a bridge was erected over Lock No. 23, suitable for lead-

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218 Hutton to Clarke, and Clarke to Hutton, Feb. 7, 1871 (Ltrs Recd., C&O Co.).
219 "Survey of Flood Damage, 1889" (Ltrs. Recd., C&O Co.).
220 Proceedings of the President and Board of Directors, B, 324.
221 "Survey of Flood Damage, 1889" (Ltrs. Recd. C&O Co.).
222 Ledger Book A, 343; Proceedings of the President and Board of Directors, B, 328.
223 Proceedings of the President and Board of Directors, E, 179.
224 Ibid., 180, 188.
225 Proceedings of the President and Board of Directors, 1872–l877 p. 153.

ing horses across the waterway.[226] Young built a bridge, but by 1851 it had rotted away. Superintendent Elgin of the Monocacy Division on July 1, 1851, complained to Chief Engineer Fisk that several persons, particularly R. P. Dodge, had asked him to build a bridge over Lock No. 23, because, as they explained, there was no way for them to get their horses across the canal without swimming them, unless they went to Great Falls or Edwards Ferry. Elgin recommended that the farmers of the area be permitted to build a bridge over the lock. This structure, he believed, would not cost over $160.[227]

Fisk, after studying the correspondence and discussing the problem with the Board of Directors, notified Elgin that he was to put a pivot bridge over Lock No. 23.[228]

In 1863 Major General J. E. B. Stuart's hard-riding Confederate cavalry had been assigned the mission of screening the Army of Northern Virginia as it marched northward on its second invasion of the North. On the night of June 27, 1863, Stuart's troopers crossed the Potomac at Rowsers Ford, a short distance below Dam No.2. Stuart's raiders seized possession of the canal from Lock No. 23 to the Seneca Aqueduct. The Confederates were delighted to discover that the Federals, prior to pulling out of the area, had failed to destroy the pivot bridge at Lock No. 23. After taking possession of the bridge and posting sentries, Stuart permitted his troopers to get a few hours rest.

A number of canal boats were intercepted by the Confederates and scuttled. In an effort to cripple the canal, Rebel demolition teams were turned out. One of the captured vessels was burned in the trunk of the Seneca Aqueduct, and the fire damaged the wooden railing. The gates to Lock No. 23 were wrecked, and the towpath embankment breached.

The sun had been up for several hours on June 28, when Stuart gave the order to remount. Covered by Colonel Williams Wickham' s 4th Virginia Cavalry, the long column crossed the pivot bridge and headed up the road to Darnestown on its way to a date with destiny at Gettysburg. Before pushing on, Wickham's troopers captured severa1 more boats.[229]

As soon as Stuart's troopers had pushed into Pennsylvania, President Spates rounded up his repair crews. The gutted hulks were removed, the lock gates replaced, and the embankment resodded. In addition to repairing the damage inflicted by the Rebels, Spates' people had to replace the gates at Locks Nos. 13 and 16, and the pivot bridges at Lock No. 13 and the Great Falls, which had been destroyed by the Federals charged with guarding the line of the Potomac.[230]

To renew the pivot bridge at Lock No. 23, which had been damaged $40 in the flood of 1889, would, it was estimated, cost $40.[231]

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226 Proceedings of the President and Board of Directors, D, 178.

227 Elgin to Fisk, July 1, 1851 (Ltrs. Recd., 0&0 Co.).

228 Fisk to Elgin, July 15, 1851 (Ltrs. Sent, Chief Engineer); Proceedings of the President and Board of Directors, H, 458.

229 The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies, Series I, Vol. XXII, pt. II, 693–694. H. B. McClellan, *I Rode with Jeb Stuart*…(Bloomington, 1958), 323–324.

230 Spates to Ringgold, June 30, 1863 (Ltrs. Recd., C&O Co.)

231 "Survey of Flood Damage, 1889" (Ltrs. Recd., C&O Co.).

VI: BRIDGES FROM SENECA AQUEDUCT TO ANTIETAM AQUEDUCT

I. The Edwards Ferry Bridges— The Pivot Bridge across Lock No. 25 and the Towpath Bridge

The first bridge built across the Chesapeake and Ohio Canal at Lock No. 25 and giving access to Edwards Ferry was a pivot bridge constructed by William Easby in 1831. For this work, the Washington contractor was paid $214 by the Company Treasurer.[232]

About this time, William Darne and several other landowners petitioned the Board of Directors to have a bridge erected across the canal to enable them to gain access to their property on Sheldon's Island. The petitioners claimed that water backed up by Dam No. 2 made the ford heretofore used to reach the island impassable. This memorial was referred to Chief Engineer Purcell, along with a request that he report on the feasibility of erecting a bridge to meet the landowners' demand.[233]

Purcell, in his report, pointed out that by utilizing the recently completed bridge at Lock No. 2S the landowners could, with little inconvenience, reach Sheldon's Island. The Board sustained their Chief Engineer, and the petition was rejected.

Construction in 1837 of outlet and inlet locks and a basin at Edwards Ferry to tap the Goose Creek trade made a towpath bridge at that point mandatory. Charles Fisk, who bad replaced Purcell as Chief Engineer, discussed plans for the proposed bridge with Easby. The contractor proposed to have the bridge flooring rest on five 14 x 8s, instead of three 16 x l2s as suggested by Fisk. In defense of his position, Easby observed that timbers of the size he had recommended would "last longer." He would build the structure for $4 per lineal foot.

The plan as proposed by Fisk called for a bridge of "38 feet level & 30 feet at each end, making 98 feet, which at $4" per lineal foot would cost the Company $392. Easby for his part would build the bridge of the best North Carolina yellow pine. The floor was to rest on common joisting; there would be rails on both sides. His price included a coat of paint for the structure.[234] A copy of Fisk's plan accompanies this report.

Fisk on August 9 reported to the Board that the towpath bridge which Easby was willing to build at Edwards Ferry was similar to the one over the waste weir above the old locks at Little Falls, except it would be longer. The bridge was to consist of a 36-foot span, supported on two bents, with a clearance of nine feet, and with two inclined planes down to the towpath. Each plane would be nearly as long as the bridge.[235]

When he talked with Easby, Fisk discussed the proposed bridge in detail. Before parting, Fisk asked Easby to put into writing what he would do, the character of the work, and his

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232 Proceedings of the President and Board of Directors, B, 280.
233 Ibid., 444.
234 Bryan to Fisk, July 17, 1837 (Ltrs. Recd., C&O Co.).
235 Fisk to Board of Directors, Aug. 9, 1837 Ltrs. Recd., C&O Co.).

price. These, along with a plan prepared by the contractor, were forwarded to the Board on the 23d. When he transmitted the offer, Fisk noted that the length of the bridge was somewhat less than mentioned in his letter of the 9th, and that the price was higher. Fisk recommended the Board offer the bridge to Easby for $400.[236]

The Board voted to accept Easby' s offer, and within one month Fisk was able to report that the contractor had completed the towpath bridge in accordance with the plans and specifications. As soon as the structure was painted with three coats of paint, Easby would be paid.[237]

Superintendent Young of the Georgetown Division notified the Board on March 20, 1839, that the pivot bridge over Lock No. 25 was so decayed as to be unfit for use. This bridge, he continued, was vital to the canal neighbors, because travelers on an important county road connecting Maryland and Virginia crossed at Edwards Ferry.[238]

Captain Easby would rebuild the bridge for $500, on the same plan as the old. To facilitate traffic pending the construction of a new bridge, Young had had his people build a "small horse bridge." Wagons, however, were compelled to make a detour of six miles to cross the canal at Conrads Ferry.

The Board, after inviting and receiving several proposals, voted to accept Easby's bid for rebuilding the pivot bridge. As was customary, Easby proceeded to carry out the project. [239]

No additional difficulty was experienced with the Edwards Ferry bridges until 1850. On July 31 of that year, Superintendent Elgin of the Harpers Ferry Division wrote Chief Engineer Fisk about the abutments for the towpath bridge. Abutments strong enough to guarantee the security of the bridge, in view of the anticipated heavy traffic expected to develop as soon as the "50-Mile Section" was opened, would cost from $100 to $150. He would like to know if he could be authorized to write a change order for Thomas Dawson, who had contracted to repair the bridge, to carry out this work. After checking with President Coale, Fisk told Elgin to go ahead.[240]

The Civil War was hard on the Edwards Ferry bridges, as they were located at one of the principal crossings of the Potomac. Many units of the Army of the Potomac as they marched northward toward Gettysburg, crossed the Lock No. 25 pivot bridge. This unusually heavy traffic seriously damaged the structure, and it was rebuilt in a "good and substantial manner."[241]

On the return to Virginia from the raid that had carried his corps to the approaches to Washington, Lieutenant General Jubel Early in July, 1864, crossed his infantry and artillery at Conrads Ferry and his cavalry at Edwards Ferry. The Confederate rear guard to

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236 Ibid., Aug. 23, 1837.

237 Proceedings of the President and Board of Directors, E, 306. At the next meeting of the Board, Fisk certified that the bridge had been painted, and an order was issued directing that Easby be paid.

238 Young to Board of Directors, March 20, 1839 (Ltrs. Recd., C&O Co.).

239 Proceedings of the President and Board of Directors, F, 29.

240 Elgin to Fisk, July 31, 1850 (Ltrs. Recd., Chief Engineer).

241 Spates to Ringgold, June 30, 1863, and Spates to Board of Directors, Jan. 1, 1864, (Ltrs. Recd., C&O Co.).

delay pursuit burned the towpath bridge across the Edwards Ferry outlet locks.[242] Visiting the area on July 25 President Spates saw that debris from the burned structure had been pushed into the canal. The foreman of the working party told Spates that be expected to have the bridge reopened to traffic by August 1.[243]

II. Bridge at Whites Ferry

Until after the Civil War, access to Conrads Ferry vas provided by a culvert. A year before the end of the war, General Superintendent Spates estimated on April 9, 1864, that it would cost $700 to construct a bridge at Conrads Ferry to replace the culvert which was "very much filled up so that carriages and wagons could not pass through it." A bridge should be more economical.

The cost of the bridge, he estimated, would be:

Quarrying stone for masonry	$250
Carpenter work and timber	200
Lime and concrete	180
Labor and board for hands	250
Ironwork, etc.	100
	$980 [244]

In either 1865 or 1866 a bridge to replace the Conrads Ferry culvert was erected at Whites Ferry. This structure was about one mile upstream from the culvert. It soon proved unsatisfactory. E. V. White complained to President Clarke that the new bridge at Whites Ferry was very dangerous, because the grade was so steep that it was impossible for heavily loaded wagons to ascend.[245] Upon checking the structure, Engineer Hutton found it on the point of falling down, the footings of the braces having given away, just as had happened to the Williamsport ,bridge. The structural timbers, however, were sound, and necessary instructions for the bridge's repair had been issued. While he did not like the bridge's design, as it was supported by trestles, he felt these changes would add strength. In accordance with his instructions to have the approach grades reduced, Hutton ordered the west abutment dismantled and reconstructed. At the same time, additional "trestles" would be positioned under the bridge. A space 20 feet in width would be left for the passage of boats.[246]

Hutton on May 31 reported that the minimum clearance of the bridges above Georgetown had been established at 12 feet. The bridge at Whites Ferry, however, had a clearance of 11 feet 6 inches. When the bridge was repaired steps were taken to correct the situation.[247]

By February, 1876, it was apparent that a new bridge was needed at Whites Ferry. Engineer Hutton, on making an on the spot study, notified President Gorman that he could

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242 Ibid., July 16, 1864 (Ltrs. Recd., C&O Co.).
243 Ibid., July 25, 1864 (Ltrs. Recd., C0 Co.).
244 Spates to Board of Directors, April 9, 1864 (Ltrs. Recd., C&O Co.).
245 White to Clarke, March 21, 1871 (Ltrs. Recd., coo Co.).
246 Hutton to Clarke, May 4, 1871 (Ltrs. Recd., C&O Co.).
247 Ibid., May 31, 1871.

"build a suitable iron bridge…for $2,000 while a substantial bridge of timber would cost about $1,100".[248] Gorman favored an iron bridge, and the contract was awarded.

The new bridge was opened for traffic in June, 1876. Construction had been started in mid-May, but it had taken longer than planned, because extra work at the site had been made necessary by the discovery that the manufacturer had failed to drill sufficient holes in the girders, stringers, and sleepers.[249]

III. Pivot Bridge at Lock. Nos. 26 and 27

The Board of Directors on June 10, 1831, voted to authorize the construction of pivot bridges over Locks No. 26 and 27.[250] Apparently, only the bridge at Lock No. 27 were built because Trimble on September 25, 1834, requested authority from the Board to erect a pivot bridge over Lock No. 26, "in lieu of the ferry way" to which he was entitled. Chief Engineer Fisk could think of no reason to deny this request, provided the abutment for the bridge was on the berm side of the waterway, and that the Company should at all times have "complete control over the bridge so as to prevent any interference with use of the lock for navigation." This might be accomplished by a stipulation placing the bridge under the supervision of the lock keeper. Trimble, not the lock tender, however, would turn the bridge, which should never be across the lock except when in use.[251]

Superintendent Elgin, when he, at the Board's request, investigated Trimble's plea, reported that he did not know if a bridge at Lock No. 26 "would be of any aid to the canal company or to the neighbourhood, as it would intrude upon the property" of the company by necessitating a road across the lockhouse lot. Elgin felt that the bridge would be useful to only one individual—Trimble—as there was a road culvert about 300 yards above the lock with a "tolerable" road leading to it. This road afforded Trimble's neighbors access to the ferry.[252]

Taking cognizance of Elgin's findings, the Board refused Trimble's request for a bridge at Lock No. 26.

IV. The Nolands Ferry Bridge

The Board of Directors on November 23, 1832, authorized President Mercer to contract with the executor of Samuel Noland for the keeping of a ferry or pivot bridge across the canal at Nolands Ferry.[253] An agreement was reached providing for a ferry.

Several years later, Chief Engineer Fisk made a study and reported that it would be unnecessary at this time to construct a stop lock and pivot bridge at Nolands Ferry, if a waste weir were put in at the foot of Lock No. 28, and a double set of plank provided for

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248 Hutton to Gorman, Feb. 10, 1876 (Ltrs. Recd., C&Co.).
249 Moore to Gorman, Jun. 12, 1876 (Ltrs. Recd., C&O Co.).
250 Proceedings of the President and Board of Directors, B, 384.
251 Fisk to Board of Directors, Sept. 25, 1834 (Ltrs. Recd., C&O Co.).
252 Elgin to Board of Directors, Nov. 21, 1835 (Ltrs. Recd., C&O Co.).
253 Proceedings of the President and Board of Directors, C, 242.

the Monocacy Aqueduct. The Board accepted Fisk's judgment, and Superintendent Elgin was ordered to proceed.[254]

Evidently, the ferry did not prove satisfactory. In 1839 a memorial signed by Meredith Davis and others was read by the Board. This petition requesting the Company to replace the ferry with a bridge was referred to Chief Engineer Fisk.[255] The Chief Engineer asked Superintendent Elgin to investigate the complaint.

On November 26, 1839, Elgin submitted a report recommending that the Company build a permanent bridge over the canal at Nolands Ferry to replace the ferry. To reinforce his position, Elgin reported that the wages paid the attendant would equal the amortization charges against a bridge. In addition, a bridge would benefit the local people, who complained about the ferry boat and its attendant.[256]

The Board, after determining to authorize the erection of the bridge, awarded the contract to Louis Wernwag. By July, 1840, the stone and cement for the construction of the Nolands Ferry Bridge were on hand. Before work was commenced, Elgin asked to see a copy of the contract the Company had signed with Wernwag, along with the specifications for the bridge. Wernwag had told the Superintendent that he wished to begin work immediately, and it would be a big help in putting in the foundations if the water on the Monacacy Level were drawn off.

In addition, it had not yet been resolved whether the bridge should be permanent or pivot. Elgin, on studying the site, reported that there was sufficient room for a permanent bridge of l2-foot clearance, when there was six-foot of water in the canal. This would be sufficient for ordinary purposes, but Elgin hesitated to act, because the rest of the permanent bridges in his division had a clearance of 17 feet, when there was 6-foot of water in the canal.[257]

Fisk, in reply to his subordinate's question, determined it would be feasible to build a permanent bridge. The width between the abutments was to be 70 feet, the height of the span above water surface 17 feet, and the superstructure was to be similar to the viaduct at Harpers Ferry. The superstructure was to be weatherboarded and painted. For this work contractor Wernwag was to be paid $14 1/2 per lineal foot.[258] (See Appendix C for a plan of the Nolands Ferry Bridge.)

About this time, Wernwag was advised by Davis and his friend that the towpath abutment should be about 40 feet east of the point indicated by Fisk. If this change was made, it would increase the length of the span from 70 to 140 feet.

Wernwag replied that he could not make this change, because: (a) the bridge would then be too long for the planned width, causing it to buckle; and (b) the additional timber would make the structure too expensive.

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254 Ibid., E, 188–189.
255 Ibid., F, 117, 251–252.
256 Elgin to Board of Directors, Nov. 26, 1839 (Ltrs. Recd., C&O Co.).
257 Elgin to Thomas, July 21, 1840 (Ltrs. Recd., C&O Co.).
258 Fisk to Board of Directors, Aug. 13, 1840 (Ltrs. recd., C&O Co.).

Mr. Davis then suggested a compromise. It would be agreeable to the local people, if the Company would build the bridge at the ferry site, below Davis's warehouse.[259]

After checking with President Thomas, Wernwag told Davis that he would have to erect the bridal at the site Fisk had indicated. Such action, he observed, would require leveling the approaches and the construction of inclined planes. To protect the road on the berm side, a slope wall would be built, extending as far as the wing wall next to Davis's warehouse. This would be necessary to keep the road open to wagons as they backed up to the warehouse.

"Go ahead," Davis replied.[260]

Funds earmarked for the construction of bridges were exhausted before Wernwag did much more than get started on the abutments the contract was cancelled, and the contractor was paid $465.95 for work done prior to the issuance of the stop order.[261]

No further work on the construction of a bridge at this point was done until 1848. During the first week of March in that year, the craft used to ferry vehicles across the canal at Nolands Ferry went to the bottom with a wagon loaded with wheat. Superintendent Elgin suggested that instead of repairing the boat that steps be taken to complete the bridge.[262] Given the go ahead, Elgin quickly completed the embankment, but he ran into trouble when lumber dealers refused to sell to the Company on credit. Unless he received the wherewithal, Elgin complained on April 18, he would be unable to finish the bridge.[263] Some funds were released, and he reported on May 25 that the bridge would be finished by Saturday night. As he had promised the carpenters their money when the project was finished, Elgin trusted that Treasurer Ringgold would send him $500. Ringgold was able to dig up $200 which was sufficient to enable Elgin to meet his obligations to the men who had worked on the Nolands Ferry bridge.[264]

A wooden bridge, if it were subjected to heavy traffic, usually needed extensive repairs within five years. The Nolands Ferry bridge was no exception. On May 25, 1854, Meredith Davis complained that the structure was in such foul condition as to endanger wagons as they crossed. He felt it could be repaired at a moderate cost. The Board ordered the Superintendent of the Monocacy Division to attend to this matter.[265] The Superintendent, however, failed to take action, and this order had to be repeated. Finally, in October, 35 1856, the necessary repairs were made.[266]

Confederate raiders led by Major John S. Mosby in late October, 1864, raided into Montgomery and Frederick Counties. Some of the greyclads wreaked havoc on the Nolands Ferry bridge. The superstructure was torn loose, and the debris thrown into the waterway.

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259 Wernwag to Thomas, Sept. 30, 1840 (Ltrs. Recd., 0&0 Co.).
260 Ibid.
261 Ledger Book A, 287.
262 Elgin to Coale, March 4, 1848 (Ltrs. Recd., C&O Co.).
263 Elgin to Coale, April 18, 1848 (Ltrs. Recd., C&O Co.).
264 Elgin to Coale, May 25, 1848, and Elgin to Ringgold, June 5, 1848 (Ltrs. Recd., C&O Co.).
265 Proceedings of the President and Board of Directors, H, 121.
266 Ibid., 309.

President Spates ordered the timber collected and stored in a secure spot, until the Potomac ferry at that point was again operating and a bridge required.[267]

After the war was over, the bridge was rebuilt. On October 11, 1866, President Spates announced that "a good and efficient bridge has been built at Nolands Ferry."[268]

V. Bridge at Point of Rocks

A pivot bridge was constructed across the canal at Point of Rocks in 1834. A. J. Douglas supplied the stone and did the masonry, while Louis Wernwag furnished the timber and built the bridge.[269]

Captain William G. McNeill on December 1, 1833, reported that this bridge was nearly finished. He was impressed with the pivot bridges, because he foresaw that they would enable the Company to do away with the permanent bridges, which constitute such a source of annoyance on canals generally." The under part of this bridge was 11 feet above the water's surface, and the pivot rested on a square pier 15 feet in thickness, leaving a breadth of canal 22 1/2 feet on each side of it. Five pivot bridges had either been built or were currently being constructed, he reported, between Little Falls and Shepherdstown.[270]

Superintendent Elgin on the last day of l844 reported that there was "need of a great quantity of lumber on this division for various needed repairs." One of the projects requiring attention was the "renewal of the bridge at Point of Rocks". To repair the structure he needed 1,680 feet of lumber at 1 1/2¢ per lineal foot.[271]

The bridge was rebuilt as a permanent structure. Apparently, the bridge had insufficient clearance, because W. R. S. Ward wrote Fisk on March 17, 1852, that many boatmen had comp1ained that the bridge across the canal at Point of rocks was so low it endangered their boats. That very day one of Ward's vessels had tied up at Georgetown, and the captain had protested that he was compelled to tie-up and take aboard stone, before he could pass under the bride. Even so, his vessel had been ''badly raked".[272]

The bridge was accordingly raised so that there would be a clearance of 17 feet.

VI. Pivot Bridge at Lock No. 30

Louis Wernwag built the first pivot bridge across the waterway at Berlin [Brunswick] for which he was paid $401 by the Company.[273] In October, 1839, Superintendent Elgin's crew repaired the pivot bridge spanning Lock No. 30 at Berlin.[274] 43 By September, 1841, the bridge had deteriorated to a stage where Elgin recommended that it be replaced.

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267 Spates to Ringgold, Oct. 30, 1864 (Ltrs. Recd., C&O Co.).
268 Spates to Board of Directors, Oct. 11, 1866 (Ltrs. Recd., C&O Co.).
269 Ledger Book A, 361; Proceedings of the President and Board of Directors, D, 50
270 McNeill's Report, Dec. 1, 1833, found in House Report No. 414, p. 148.
271 Elgin to Fisk, Dec. 31, 1844, and Jan. 18, 1845 (Ltrs. recd., Chief Engineer).
272 Ward to Fisk, March 17, 1852 (Ltrs. recd., Chief Engineer).
273 Ledger Book A, 376, 386.
274 Elgin to Board of Directors, Nov. 16, 1839 (Ltrs. recd., C&O Co.).

Elgin was given the necessary authority by the Board of Directors, and turned his people to rebuilding the pivot bridge.[275] In the l870s this pivot bridge was again rebuilt.

VII. Bridges at Weverton

A pivot bridge in the mid-83Os was erected across Lock No. 31. This bridge soon caused difficulties between the C&O Canal Company and the Frederick and Harpers Ferry Turnpike Company. The Turnpike Company complained that persons traveling between Weverton and Harpers Ferry were taking advantage of the bridge at Lock No. 31 to use the towpath, thus avoiding the road. Superintendent Elgin, when he made an investigation, reported that it was "almost out of the question" to keep persons intent on defrauding the Turnpike Company of tolls from traveling the towpath in going from Weverton to Harpers Ferry. To stop these people it would be necessary for the Board to pass a bylaw authorizing the imposition of a fine for unlawful use of the towpath. In all unsuccessful effort to curb this traffic, Elgin had ordered that when not in use the pivot bridge over Lock No. 31 be turned and locked. Per sons intent on beating the Turnpike Company were not to be denied, however. Bypassing the bridge, they used the culverts to gain the towpath.[276]

A Weverton industrialist, George Rothery, on October 17, 1850, asked the Company for permission to erect a footbridge over the canal. The distance between his factories and the boarding houses via the bridge at Lock No. 31 was so great that it was a great inconvenience to the workers. If the proposed bridge were elevated to a height of 14 feet above the water and extended on both side, not to interfere with the towpath, it would cause no disruption to navigation.[277]

President Coale and the Board were agreeable, provided the bridge was constructed without cost to the Company, and if its elevation in the clear were increased to 17 feet. Rothery was willing.

VIII. Harpers Ferry Bridges

A bridge, known as the Wager Bridge, spanned the Potomac at Harpers Ferry before the canal reached this point. The cornerstone for the Wager Bridge had been laid on October 22, 1824, and the structure, "a handsome wooden bridge," was in use by 1829.

The Baltimore & Ohio Railroad reached the Maryland Shore opposite Harpers Ferry on December 1, 1834. Before a bridge could be built to carry the tracks across the river, officials of the canal company and the Baltimore & Ohio would have to reach an agreement, because the railroad would also span the canal at this point. Chief Engineer Fisk and Mr. Knight of the Baltimore & Ohio accordingly visited Harpers Ferry to .elect a site for the proposed bridge. Besides locating a site, they discussed certain guidelines. They agreed that the towpath "ought to pass under the bridge, & that it ought to be of such

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[275] Ibid., Sept. 16, 1841.

[276] Thomas to Board of Directors, Dec. IS, 1837, and Elgin to Board of Director., July 26, 1839 (Ltrs. recd., C&O Co.).

[277] Rothery to Coale, Oct. 17, 1850 (Ltrs. Recd., C&O Co.).

width as will allow of a sufficient width of puddling between the abutment pier (that is proposed to be placed in the towpath) and the water of the Canal." This would allow a towpath width under the bridge of not less than ten feet. In addition, Fisk argued successfully that the canal's waterway should not be narrowed, and that "the height, in the clear above water surface, ought not to be less than 17 feet...." To facilitate the replacement of the planned permanent bridge with a pivot bridge, Fisk urged Knight to see that an abutment pier was "placed in the towpath."[278]

The agreement reached by Fisk and Knight was ratified by their respective Board of Directors and the Baltimore & Ohio let the contract for building the bridge to Wernwag. Construction was begun in the fall of 1835. By January 1837, the first locomotive crossed the structure. In April the Virginia Legislature passed an act authorizing the transfer of travel from the old Wager Bridge to the new Baltimore & Ohio Bridge.

Meanwhile, the Board of Directors of the Chesapeake and Ohio Canal had on November 25, 1835, called for plan and specifications for a towpath bridge "to be connected with the bridge being built by the Baltimore & Ohio Railroad across the Potomac at Harpers Ferry. A proposal from Wernwag to erect a structure, according to plans and specifications prepared by Chief Engineer Fisk, for $1.61 1/2 per lineal foot was accepted.[279]

This towpath bridge would enable vehicles to reach the towpath, and it was similar to the one previously erected at the Wager Bridge.

A towpath bridge was built across the feeder at Dam No. 3 in the 1830s. By May 24, 1844, this structure was in such bad condition that the Board of Directors of the C&O Canal Company ordered Superintendent Elgin to see that it was rebuilt.[280]

Louis Wernwag in April, 1836, completed a bridge over the Shenandoah Outlet Lock for which he was paid $461.58.[281]

This bridge lasted almost nine years. On January 18, 1845, Superintendent Ellis reported that to renew this bridge he required 4,077 feet of lumber to cost $61.15.[282]

Harpers Ferry changed bands a number of times during the Civil War, and as to be expected, the bridges were destroyed. On March 11, 1866, President Spates signed a contract with C. P. Manning and John Savain of Sandy Hook for the erection of two bridges, one over the Shenandoah Outlet Lock and the other over the feeder at Dam No.3. By the end of the month, Spates reported that the bridges were nearly ready for traffic. The cost of these two, as well as the one at No1ands Ferry, was $1,850.[283]

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278 Fisk to President & Board of Directors, Dec. 12, 1834 (Ltrs. Recd., C&O Co.).
279 Proceeding of the President and Board of Directors, D, 3, 134.
280 Ibid., G, 160.
281 Ledger Book A, 410.
282 Elgin to Fisk, Jan. 18, 1845 (Ltrs. Recd., Chief Engineer).
283 Spates to Board of Directors, March 11, 1866 (Ltrs. Recd., C&O Co.).

VII: BRIDGES FROM ANTIETAM AQUEDUCT TO DAM NO. 6

I. Bridge at Antietam Furnace

The owner of the Antietam Furnace, Brien, in 1839 claimed that the road culvert built by the canal company to facilitate traffic to and from the furnace was unsatisfactory. To cope with this problem he, at his own expense, had built a bridge consisting of a pier, two masonry abutments, and a superstructure. The bridge's superstructure was damaged when a boat collided with it. Brien notified Chief Engineer Fisk that to repair the bridge would cost him $220.[284]

The Board of Directors on May 29 agreed to assume responaibi1ity for the repair and upkeep of Brien's pivot bridge. In addition, Brien would be paid $1,000 to surrender his c1a1m for a road culvert on hi. property.

II. Shepherdstown Bridges

Two bridges were built by the canal company at Shepherdstown in the l830s. One of these structures was a pivot bridge across Lock No. 38 and the other spanned the Shepherdstown Outlet Lock. The pivot bridge was constructed by William Easby at a cost to the company of $348.43.[285] By 1844 these two bridges needed to be replaced, as the structural timbers were being eaten up by rot. Superintendent Elgin on January 18, 1845, estimated that to renew the pivot bridge over Lock No. 38, 2,500 feet of lumber would be needed, while 3,262 feet of timber were required for the bridge over the Shepherdstown Outlet Lock.[286]

Edward Lee notified President Coale on April 16, 1849, that the Virginia and Maryland Bridge Company was about to begin construction of a "Potomac River bridge at Shepherdstown." Before letting the contract, the bridge people wished to know if the canal company would agree to relocate their pivot bridge. Chief Engineer Fisk recommended that if the Board agreed to the request that a permanent bridge of suitable elevation be erected. The pivot bridge in any case would soon have to be rebuilt. A permanent structure, Fisk argued, would be more convenient and less expensive.[287]

No action was taken on this request until the next year. On April 23, 1850, the Washington County Commissioners, after meeting with Fisk, notified the Board of Directors that the pivot bridge at Lock No. 38 was "insufficient for public accommodations," and the

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[284] Fisk to Board of Directors, March 17, 1839 (Ltrs. Recd., C&O Co.). Brien's pivot bridge was in operation as late as June 15, 1852. Benton to Fisk, June 15, 1852 (Ltrs. Recd., Chief Engineer).

[285] Ledger Book A, 456.

[286] Elgin to Fisk, Dec. 31, 1844, and Jan. 18, 1845 (Ltrs. Recd., Chief Engineer).

[287] Lee to Coale, April 16, 1849 (Ltrs. Recd., C&O Co.).

company must construct another bridge of greater width. The new structure could not be less than 20 feet wide. In addition, the new bridge, because of the safety factor" was not to cross the lift lock. When the Company built the new bridge it was to place it close to the northern approach of the Potomac Bridge currently under construction at Shepherdstown.[288]

Learning of the attitude of the Commissioners, Superintendent Elgin inquired of Fisk, "What arrangements have been made for bridging the canal opposite Shepherdstown?" It would be helpful to know, so that the bridge could be erected over the lock, while water was out of the waterway. As a guide to when this work could be done, Elgin warned that the people of the Shenandoah Valley wished the water to be left in the canal below Harpers Ferry one week longer to enable them to get their flour to market.[289]

Taking a cue from the County Commissioners, officials of the bridge company on May 31 again asked President Coale to agree to a new site for the bridge at Lock No. 38.The relocation of the bridge would involve an expenditure of from $1,000 to $1,200.[290]

Not receiving a reply to this letter, President Lee of the bridge company on September 25, 1850, wrote President Coale a sharp letter. Lee pointed out that the pivot bridge at Lock Mo. 38 had never been "entirely suitable to the public convenience," and it bad been the subject of "constant complaints." Now that the Potomac Bridqe had been completed, the pivot bridge constituted a bottleneck to travelers. It was mandatory for President Coale and Chief Engineer Fisk to meet with the County Commissioners and officials of the bridge company and determine the proper location of a permanent bridge.[291]

President Coale now gave in, and a permanent bridge with a clearance of 17 feet was erected adjacent to the new Potomac bridge.

In the first week of July, 1864, the bridge at Lock No. 38 was burned by troops under the command of Major General Franz Sigel, as they retreated before Lieutenant General Jubal A. Early's Confederates. The bridge was rebuilt, but on December 1, 1866, Superintendent L. Benton of the Antietam Division reported that it was too low to pass the largest boats, when they were not loaded. To correct this situation, the bridge was raised.[292]

The bridge at Lock No. 38 was rebuilt in 1884 at a cost to the company of nearly $1,500.[293]

III. Pivot Bridge at Dam No.4

Chief Engineer Purcell on December 19, 1834, called for the construction of a pivot bridge across the Guard Lock at Dam No. 4. This bridge was built the following year.[294]

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288 Commissioners to Board, April 23, 1850 (Ltrs. Recd., C&O Co.).
289 Elgin to Fisk, May 3, 1850 (Ltrs. Recd., Chief Engineer).
290 Stake to Board of Directors, May 31, 1850 (Ltrs. Recd., C&O Co.).
291 Lee to Coale, Sept. 25, 1850 (Ltrs. Recd., C&O Co.).
292 Benton to Board of Directors, Dec. 1, 1866 (Ltrs. Recd., C&O Co.).
293 56th Annual Report, 16.
294 Purcell to Board of directors, Dec. 19, 1834 (Ltrs. Recd., C&O Co.).

IV. Bridge at Falling Waters

In reply to a request by the Board of Directors, Eli Stake on November 17, 1835, agreed to bridge the canal at a point opposite Falling Waters. This permanent bridge was to be constructed on the lattice plan, and to be finished in the same fashion as the Williamsport bridge, with one additional thickness of stringers. The structure was to be given three coats of white lead. When the bridge was finished in a good workmanlike manner, Stake was to receive $100 from the Company. Stake completed the project, and the bridge was opened to traffic in the autumn of 1836.[295]

Repairs were made to the berm abutment of the bridge in 1869. The masonry having cracked, the structure was condemned. Funds were made available, and the abutment was "taken down and rebuilt at a lower level, and a new superstructure erected, the old one being found rotten." The cost of rebuilding the bridge was $1,280.[296]

In 1886 the Falling Waters Bridge, having again fallen into disrepair, was rebuilt.[297]

V. Williamsport Bridge

Byrne &. Company on January 31, 1838, was paid $662 for the permanent bridge constructed across Lock No. 44 at Williamsport.[298] . In October, 1848, Superintendent John G. Stone had his people re-floor the structure.[299]

The Williamsport Bridge was destroyed during the Civil War and was rebuilt in 1866.[300] In 1886 extensive repairs were required to keep the structure open to traffic.[301]

VI. Bridges at Dam No.5

Colonel Colton on May 9, 1836, made a formal request that the C&O Canal Company erect a bridge across the Dam No. 5 Stop Lock. It was claimed that the Company agreed to this stipulation at the time land for the right-of-way had been purchased. When he checked with Superintendent Randolph, Chief Engineer Fisk learned that a bridge was projected. If this were the case, it should be constructed before winter, so the public could again patronize Colton's Mill. The Board was agreeable, provided Colton and his neighbors constructed the approach roadways.[302]

The Board, however, was compelled to yield on one point. When orders for the construction of the bridge were issued, it was agreed that the Company would see to the grading

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295 Stake to Board of Directors, Nov. 11, 1835 (Ltrs. recd., C&O Co.); Ledger Book A, 513.
296 41st Annual Report, 35; 42nd Annual Report, 16.
297 58th Annual Report, 24.
298 Ledger Book A, 534.
299 Stone to Ringgold, Oct. 30, 1848 (Ltrs. Recd., C&O Co.).
300 Proceedings of the President and Board of Directors, K, 502.
301 58th Annual Report, 24.
302 Fisk to Bender, May 9, 1836 (Ltrs. Recd., C&O Co.); Proceedings of the President and Board of directors, E, 271.

of the road on the Maryland side between the canal and the river, while Colton and Darby would be responsible for road work on the Virginia shore.[303]

Two years passed, however, before the Company moved to implement this decision. Chief Engineer Fisk on April 30, 1838. suggested that the Board agree to permit the construction of a permanent bridge at the head of the Dam No. 5 Stop Lock with an elevation of 17 feet in the clear. This height at times would be subject to "a reduction equal to the height of water running over the drain but not exceeding five feet," because boats would not be able to pass through the Guard Lock when the water exceeded that depth behind the dam. It would be desirable to have from 12 to 17 feet in the clear when boats were entering the canal.

If in the future there should be difficulty with the permanent bridge, a pivot bridge could be substituted. Work on the structure should be commenced in the near future, because the Company, as soon as the 27 l/2 mile section was open to navigation, would require a towpath bridge at this point.[304]

Two bids were received by the Company for erecting the bridge. William Easby, who was given the contract, proposed to erect a pivot bridge over the Dam No. 5 Stop Lock for $450. He would charge an additional $50 for transportation and painting. A footbridge at the same point would cost the canal company $240.[305]

Easby on September 28, 1838, put in a claim for $235 for building a road bridge at Dam No.5. According to the contractor's itemized breakdown his charges were:

For constructing a structure 39 feet long and 12 feet in width at $4.50 per foot	$175.00
One trestle	18.00
Two coats of paint	22.00
Transportation	20.00
	$235.00[306]

In April, 1839, Easby handed Fisk a report of work done by his people in recent months. Among the projects were:

One road bridge at Dam No.5	$235
One pivot bridge over Dam No. 5 Stop Lock	$500
One footbridge	$200
One pivot bridge on Section 213	$240[307]

Superintendent John Stone on May 15, 1839, complained to Fisk, "1 would like to know who is to keep the bridge upon Section 213 in order." A local landowner (Malon) had complained that it was the company's responsibility. If this were true, it would be necessary for Stone's people to provide buffers to "prevent the wagons from injuring [sic] the

303 Proceedings of the President and Board of Directors, E. 451.
304 Fisk to Bender, May 9, 1836 (Ltrs. Rec., C&O Co.). Proceedings of the President and Board of Directors, I, 271.
305 Easby to Fisk, Sept. 27, 1838 (Ltrs. Recd., Chief Engineer).
306 Ibid., Sept. 28, 1838.
307 Ibid., April 1839

corners." In addition, steps would have to be taken to prevent the wagoners from leaving the pivot bridge in position across the canal after they had crossed.[308]

High winds in April, 1840, buffeted the area about Dam No. 5. The footbridge on Section 213 was blown down, but fortunately the only permanent damage done to the structure was to the railing. Superintendent Stone had to turn out a large force, however, to right the bridge.[309] Superintendent Lewis Stanhope on June 28, 1856, reported a footbridge had been thrown across "the cut in the pier head at Dam No. 5 which is a great convenience to boatmen."[310]

VII. Bridge at Lock No. 46

Samuel Middlekauff in July, 1836, wrote the Board that he believed he had a claim on the Company for a bridge across the canal at Lock No. 46. His reasons were: (a) the waterway had cut off his intercourse with Virginia; and (b) it had destroyed the road from the landing to his mill.[311]

The Board of Directors agreed, and on November 29, 1837, Fisk presented plans and specifications for a pivot bridge over Lock No. 46. After reviewing the drawings, the Board asked for bids.[312]

William Easby on September 27, 1838, agreed to build the bridge for $245. Included in this figure were $200 for construction, $25 for painting, and $20 for transportation. [313]

VIII. Bridges at Big Pool and Four Locks

Two bridges, one of which was a pivot bridge, were constructed in the late 1830s across the waterway in the Big Pool area. Easby built a permanent bridge on Section 213, while Moore erected a pivot bridge on Section 215.[314] In February, 1840, the ice flooded below Big Pool, and water backed up by the ice flooded the towpath along the slackwater. When the gorge broke in mid-February, the bridges were severely damaged.[315]

Basil Prather, who owned the farm near Fort Frederick upon which the pivot bridge was located, asked Superintendent Stone in July 1849, to repair the structure. When he examined the bridge, Stone saw that it was so rotten that it needed to be renewed. According to the "inquisition", the bridge was to have limited access, and the owner of the farm was to keep it locked to prevent its use by others. As the bridge bad been a nuisance to boatmen, who claimed that it was frequently left in position, Stone wanted instructions as to

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308 Stone to Fisk, May 15, 1839 (Ltrs. Recd., Chief Engineer).
309 Ibid., April 15, 1840.
310 Stake to Ringgold, June 28, 1856 (Ltrs. Recd., C&O Co.).
311 Middlekauff to Board of Directors, July, 1836 (Ltrs. Recd., C&O Co.).
312 Proceedings of the President and Board of Directors, E, 339.
313 Easby to Fisk, Sept. 27, 1838 (Ltrs. Recd., Chief Engineer); Ledger Book A, 565.
314 Ledger Book A, 578, 580. Easby was paid $802 for his bridge, while Moore received $319.25 for the pivot bridge.
315 Rogers to Board of Directors, Feb. 13, 1840 (Ltrs. Recd., C&O Co.).

whether it should be rebuilt. To take out their spite, certain boatmen had rammed the bridge, thus shortening its life.[316]

The bridge was repaired, but the next year it was burned by irate boatmen. Prather complained to the Board that the destruction of the bridge left him no way to cross the canal. In view of this difficulty, he trusted the Company would either provide him with a new bridge or a ferry. If he had any choice in the matter, he would prefer a ferry.[317] The Board, however, decided differently and the bridge was rebuilt.

The small bridge at Four Locks was burned by Brigadier General John McCausland's Confederate horse soldiers in mid-July, 1864. By July 21 Superintendent Masters had a crew at work erecting a new bridge.[318]

IX. The Hancock Bridge

A mass meeting was held in Hancock on January 10, 1839, and a petition drafted and signed. The people of Hancock protested that when the canal had been opened, their direct route to and from the Potomac ford had been cut off, "preventing the usua1 communication and trade between them" and the citizens of Virginia. Prior to the construction of the waterway, there had been a good road running from the center of Hancock to the ford. But at this time they complained, the only means of communication with the river was by culverts at either end of the town, and they were not adapted to the "wants of the public." The President and Board of Directors were asked to see that a "good and efficient bridge" was erected over the canal at or near "the old crossing place).[319]

After reading the petition and questioning Chief Engineer Fisk, the Board ordered the construction of a permanent bridge at the point requested.

316 Stone to Ringgold, July 10, 1849 (Ltrs. Recd., C&O Co.).
317 Prather to Board of Directors, Nov. 11, 1850 (Ltrs. Recd., C&O Co.).
318 Masters to Spates, July 21, 1864 (Ltrs. Recd., C&O Co.).
319 Petition to President and Board of Directors, Jan. 10, 1839 (Ltrs. Recd., C&O Co.).

VIII: BRIDGES FROM DAM NO.6 TO CUMBERLAND

I. Cresap's Bridge

Commissioner Bender in January, 1836, offered Mrs. Cresap and her son $1,000 for a right-of-way across their property. In addition, the Company would build a bridge over the proposed Deep Cut, two miles west of Oldtown, to provide access to Cresap's Mill. Besides handling wagon traffic, the bridge would be designed to support a wooden trunk for a race to carry water to the Mill.[320]

Mrs. Cresap refused to sell, and an inquisition was held. To secure the right-of-way across Mrs. Cresap's, the Company agreed:

> 1st: To build & maintain for ever a "Permanent Bridge" over the Deep Cut at Cresap's Mill; to have 14 feet width or roadway, and to carry clear of the road, a sufficient Forebay of a proper level 3 feet wide & 3 1/2 feet deep, to be also kept up forever.
>
> 2nd In lieu of the former Mill Pond (destroyed by their works) to form upon the Berm side of the Canal, a water tight reservoir or Pond, containing a surface of 16,500 sq. ft. and a depth of 3 feet.
>
> 3rd To form a new Tail Race along the Towpath side of the canal, to be kept open by the Cresap's.
>
> 4th To make a channel giving a free outlet on the Berm side of the Canal, to the surplus water of the stream which feeds the Mill.
>
> 5th In changing the Road passing the Mill to Oldtown, to make the new road along the Berm side of the Canal.
>
> 6th To make a road along the Towpath side of the Canal from the ford at the upper end of the Deep Cut; to the Towpath end of the "Permanent Bridge" mentioned in stipulation 1st.
>
> 7th In altering the old road above the Deep Cut as far as James Kelly's (some 3 miles) to keep open at all times uninterrupted by their works a road as good as the old one' from a ford near Kelly's to the Mill of the Cresap's.[321]

William Woodburn, the contractor for Sections 333–335, was given the task of seeing that the 3rd, 4th, and 6th conditions of the inquisition were carried out. By the-summer of 1839 these projects had been successfully concluded.[322]

On April 22, 1839, Superintendent C. H. Randolph bad spent the morning at Oldtown. While there, he succeeded in making agreements to secure land through which the new

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320 Bender to Board of Directors, Jan. 23, 1836 (Ltrs. Recd., C&O Co.).
321 Morris to Board of Directors, Dec. 4, 1839 (Ltrs. Sent, Morris).
322 Ibid.

road would pass. Several changes were made at this time in the projected alignment. When bids were invited, Randolph would ask for a package deal.

As now planned the road would begin about 200 feet below James Kelly's barn, and, after passing along the hillside for about one-half mile, it would strike the alignment as previously surveyed. The land across which the road would pass had belonged to James Kelly, James Black, B. L. Pigman, Hugh McAlleer, and Mrs. Cresap. About three and two-fifths mile in length, the new road would turn into the old opposite Mrs. Cresap's Mill.[323]

Seven proposals were received in mid-August to the Company's request for bids for the construction of a road 16 feet wide and two bridges on Sections Nos. 335–339. When he abstracted the proposals, Randolph found:

	Length of Road, 980 Rods
Name of Bidder	Price per Rod
Wm. Woodburn	$2.50
J. Humbard	$2.50
R. Quay	$2.74
A. Garber	$2.75
Hugh McAlleer	$3.00
James Watts	$3.00

A. Woodburn was the contractor for the Deep Cut Sections, his bid was accepted by the Board of Directors. By December he had completed the road. Meanwhile, Joseph Dilley bad been awarded the contract to open the road along the berm side of the canal from the mill to Oldtown.[324] This only left two of the stipulations warranted to the Cresap's unfulfilled. Luther Cresap in the.meantime had erected a the Deep Cut to afford convenient access to his mill. To help defray the cost, the Company paid Cresap $100. On November 23, 1839. a wagon, en route to Cumberland, loaded with kegs of beer and drawn by a four-horse team started across the bridge. The wagon was too heavy, and the bridge collapsed, pitching the vehicle, its passengers and load into the cut. One man and a horse were killed. while the wagon was damaged and several kegs of beer stove in.

The owner of the wagon and its contents filed a claim against the Company for damages. He listed his losses as: one horse killed, $100; one horse injured, $30; beer lost, $7; damage to the wagon, $24.25; loss of time and inconvenience, $38.25. Total, $199.50.[325]

A claim for the damages was received and discussed by the Board of Directors on December 4, 1840. The Board ordered the claim paid, but at the same time it refused to accept any legal responsibility for the bridge. Chief Engineer Fisk was instructed to make arrangements for the erection of a permanent bridge to replace the one that had fallen into Deep Cut.[326]

In accordance with a directive from Fisk, Assistant Engineer Morris on the 30th employed the Cumberland newspaper to invite proposals for constructing a "permanent

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323 Randolph to Fisk, April 22, 1839 (Ltrs. Recd., Chief Engineer).
324 Morris to Board of Directors, Dec. 4, 1839 (Ltrs. Sent, Morris).
325 Ibid.
326 Proceedings of the President and Board of Directors, F, 276.

bridge" and forebay over the deep cut at Cresap's Mill. Bids would be opened on February 15, 1841. [327]

Because of a shortage of capital, the Board in February, 1841, was compelled to defer its plan to award a contract for the bridge, forebay, and pond at deep cut.[328]

Luther Cresap, in v1ew of this decision, rebuilt a bridge. On January 4, 1848, be billed the Company for 'services and materials used in repairing the bridge over Deep Cut. The failure of the Company to maintain the bridge, which was the only way one could reach his farm and mill, had compelled Cresap to take this action. This structure had been intended as a substitute until such time as the Company could arrange for the construction of a permanent bridge. But with the interruption of the county road by the canal, it bad been used as a highway bridge for the past three years. This bridge was 100 feet in length, 15 feet in width, and was elevated 16 feet above the canal. The price charged the Company by Cresap for timber was identical to what he had been in the habit of charging his neighbors.[329]

After the Company had paid him for the repairs, Cresap proposed to construct a "permanent bridge and forebay across the deep cut, the pond, and waste weir for $5,500. Moreover, he would bind himself to keep these improvements in repair forever. Cresap's price for the forebay and bridge would be $4,500; for the pond, waste weir, and ditch, $1,000.[330]

The Board referred Cresap's proposal to Fisk for study and comment. When he investigated the subject, the Chief Engineer found that the sum asked by Cresap for releasing the Company from its obligations was larger "in cash than Hunter & Co. had agreed to do the work for in bonds." At the same time, however, Cresap's proposal would release the Company from the cost of upkeep. Because of the shortage of liquid assets, Fisk felt it would be unwise for the Company to accede to Cresap's proposition. He urged the Board to reach some arrangement with Cresap, through Hunter & Co., that would not require the issuance of additional bonds.[331]

Later, Fisk reported that the improvements the canal company was under obligation to build for the Cresaps in 1845 had been estimated to cost $4,475. Prices for labor and materials had increased rapidly because of the Mexican War, so $559 should be added to this figure. Thus, Hunter & Co. would receive $5,034 in bonds if they should undertake these project. Fisk now recommended that the Company accept Cresap's proposal, provided he would keep the bridge open for public convenience. In addition, Cresap should submit his plan to the Company for its approval. Under no circumstances was the bridge and forebay to interfere with or obstruct navigation on the canal.[332]

After discussing the subject, the Board agreed to accept Cresap's proposition, subject to the conditions listed by Fisk.[333]

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327 Morris to Board of Directors, Dec. 30, 1840 (Ltrs. Sent, Morris).
328 Proceedings of the President and Board of Directors, F, 292.
329 Cresap to Board of Directors, Jan. 4, 1848 (Ltrs. Recd., C&O Co.).
330 Ibid., May 2, 1848.
331 Fisk to Board of Directors, June 3, 1848 (Ltrs. Recd., C&O Co.).
332 Ibid., Oct. 10, 1848.
333 Ibid.

Both the Company and Cresap were satisfied with this arrangement. After Cresap had built the improvements, the Board notified the stockholders that the Company had rid itself of the "expense of keeping up the bridge and forebay, which being of wood would require occasional renewals as well as repairs from time to time".[334]

Cresap's bridge in the summer of 1864 was the scene of a sharp skirmish between Confederate cavalry and Union infantry. In compliance with instructions from Confederate Lieutenant General Jubal A. Early, Brigadier General Bradley T. Johnson reported with his brigade to Brigadier General John McCausland on July 28. McCausland told him to cross the Potomac at daylight at McCoys Ferry. The brigade forded the river as directed and marched to Clear Spring. Here a Union mounted force was encountered and driven back toward Hagerstown. Pushing on, the Rebel column entered Mercersburg at 5 p.m. The horsesoldiers, after halting to eat, remounted at 9 p.m. and headed for Chambersburg. Throughout the night as the greyclads forged ahead, the vanguard was in contact with Union cavalry. Chambersburg was occupied by the Confederates early on the 30th. After setting fire to the town, the butternuts moved on McConnellsburg, where they spent the night.

McCausland had the column in motion by sunrise for Hancock. Before proceeding very far a brief halt was called, while McCausland sent orders for General Johnson, whose brigade was bringing up the rear, to send Lieutenant Colonel Ambrose C. Dunn with the 37th Virginia Cavalry Battalion to Cumberland by way of Bedford to seize hostages. As Dunn was turning his battalion about, the main column resumed its march toward Hancock. Dunn, discovering that a strong mounted force of bluecoats had occupied McConnellsburg, retraced his route and rejoined the brigade.

The Confederates entered Hancock at noon and halted to feed their horses. While the men were taking a well-deserved break, General McCausland demanded of the town authorities a ransom of $30,000 and 5,000 cooked rations. The "city fathers" asked General Johnson, with whom they were acquainted, to intercede in their behalf. Johnson accordingly explained to McCausland that they were good "Southern men," and that the entire population of the town totaled only 700 and they were without large financial resource. He doubted that it would be possible to extract such a sum. At the same time, Johnson asked the citizens to collect all the money they could raise and deliver it to McCausland.

Before this could be done, McCausland was warned by his scouts that a strong Union column—Brigadier General William. W. Averell's—was closing in. The Rebels, on evacuating Hancock, took the National Road. Pushing their men hard, McCausland and Johnson didn't permit a prolonged halt until they reached Bevansville at 3 a.m. on August 1. Here the men unsaddled and fed their mounts. After guards were detailed, the troopers were permitted to sleep for two hours. Reveille sounded at dawn, and the Confederates started for Cumberland, McCausland's brigade in the lead.[335]

Reports had reached Cumberland on Sunday evening, July 31, that a formidable Confederate force bad occupied Hancock. According to these stories, the Rebel column, which was a mile in length, was headed westward. Shortly thereafter, a message was received that another Confederate force had passed through Bedford. Major General Benjamin F.

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334 21st Annual Report, 26.

335 Official Records, Series I, Vol. XXXVII, Pt. I, 354–355.

Kelley and his staff, on evaluating this information concluded that these two columns were converging on Cumberland. Strong Union commands were said to be advancing and harassing the Rebels' rear.

A mass meeting was held by the citizens to organize for the defense of the city and to co-operate with General Kelley and the military. The mayor urged his people to defend their homes and factories from destruction by a ruthless foe. Danger was imminent, so a committee was named to call on General Kelley. The General informed the group that he feared the Rebels planned to force their way into the city, and he advised the citizen. to "prepare themselves for the emergency." Returning, the committee made its report. An attempt was then made to organize a local defense force to assist Kelley and the military. Although several thousand were present, only 300 were willing to risk their lives. These volunteers were organized into three companies.

Excitement mounted on the morning of August 1. Riders raced into Cumberland with news that the Rebels were west of Bevansville. Captain Peter B. Petrie with his ironclad cars came up from No. 12 Water Tank and reported his scouts had been watching as the Rebel raiders passed Mr. Beall's. Tavern Stand on the National Road, 25 miles east of Cumberland.

At noon a scout reported the Confederates near Flintstone and advancing, instead of turning off and making for the Potomac crossing at Green Spring Run as some had predicted. Word reached the city at 3 p.m., pinpointing the Confederate vanguard at 6-Mile House and Coming fast.[336]

When news reached him on July 28 that the Confederates had crossed the Potomac, General Kelley had three Ohio Infantry Regiments, a battalion of the 11th West Virginia, a company of the 6th West Virginia, three sections of artillery, and several hundred casuals available for the defense of Cumberland, the Baltimore & Ohio Railroad, and the Chesapeake and Ohio Canal. The 153d Ohio was ordered to Oldtown to establish a roadblock and to guard the river crossing. in that area in event McCausland attempted to return to Virginia via that route without attacking Cumberland.

On the 1st, when informed that the Rebels were approaching via the National Road, the General sent Lieutenant T. W. Kelley with a squad of cavalry to watch their movements and slow their advance. Kelley at noon reported the Confederate vanguard 12 miles out and advancing. After ordering the "long roll" beaten, General Kelley deployed one-half of his infantry and a section of guns two mi1es east of the city on the heights west of Folck's Mill, overlooking the valley of Evitts Creek. Union officers posted their footsoldiers and unlimbered their guns in the woods. The rest of the footsoldiers and the civilian volunteers, supported by four guns, occupied the fortifications guarding the approaches to Cumberland from the east.[337]

All the while the excitement continued to mount. The merchants packed and sent off their most valuable goods. Railroad cars rumbled west at a rapid rate. Citizens raced to and fro. The more adventuresome climbed the hills to secure vantage points from which to watch

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336 Cumberland *Civilian & Telegraph*, Aug. 4, 1864.
337 Official Records, Series I, Vol. XXXVII, pt. I, 188.

the expected battle. There were cheers as General Kelley and his staff left their headquarters in the Allegany County Bank and rode toward the scene of action.[338]

A squadron of Rebel cavalry was sighted near Folck's Mill at 3 o'clock. These Rebels rode across the bridge and closed to within small-arms range. The Union artillery emplaced on the heights roared. Recoiling, the Southerners scrambled for cover behind the bridge, Folck's Mill, and Folck's house and barn. Being veterans, the Rebels did not panic, and their sharpshooters promptly opened fire on the Union redlegs. Union skirmishers came to the aid of the cannoneers.

General McCausland called up and deployed the remainder of his brigade, while a staff-officer galloped to the rear with a message for General Johnson to bring his brigade forward. While McCausland's skirmishers took position, a Rebel battery advanced and unlimbered four guns.[339]

As Johnson rode up, McCausland asked if he should order an attack. The two generals, after reconnoitering the Union position, decided it would be unwise to assail a force as strong as that marshaled to their front in an area with which they were unfamiliar. They, however, would hold their ground until dark. Throughout the remaining hours of light, the artillery dueled and the sharpshooters banged away. Projectiles from the Federal field pieces wrecked Folck's barns. Smoke ascending from the engagement was visible in Cumberland. At dark, the cannons ceased fire.

Under the cover of darkness, McCausland and Johnson withdrew their brigades. The Federals, satisfied with their efforts, did not follow. The next morning when Kelley sent out patrols, it was discovered that that the Rebels were gone. In abandoning the field, they had left behind eight dead, 30 wounded, two caissons, several wagons, and a large quantity of ammunition.[340]

Johnson's brigade took the lead as the Confederates turned into the Oldtown road. The Rebel vanguard approached Oldtown at daylight, August 2. Johnson's scouts reported that the bluecoats of the l53d Ohio, after destroying Cresap's bridge, bad taken position on Alum Hill. Johnson would attack immediately. Two guns were unlimbered and advanced by the cannoneers. While the artillerists softened the Union position, the 8th Virginia regiment and 27th Virginia Battalion moved forward. Covered by this demonstration, Colonel William E. Peters led the 21st Virginia Regiment, and the 37th and 36th Virginia Battalions toward a section of the canal that had been left unguarded by the bluecoats. Wrecking a nearby building, the greyclads used the timbers to quickly bridge the waterway. Crossing the canal, Peters command turned the Ohioans' flank. Hastily abandoning their position along the canal, the bluecoats fled across the Potomac. On reaching the south bank, Colonel Israel Stough tried to rally his regiment.. His men, however, were so demoralized that he could collect only five officers and 77 men. The rest boarded the cars which had brought them down from Cumberland. As soon as they were aboard, the trainmen put the locomotive in motion. Colonel Stough posted his hardcore behind the railroad embankment; his right was anchored on the blockhouse. Captain Pe-

338 Cumberland *Civilian & Telegraph,* Aug. 4, 1864.
339 Official Records, Series I, Vol. XXXVII, pt. I, 188.
340 Ibid., 188–189, 355; *Cumberland Civilian & Telegraph,* Aug. 4, 1864.

trie's ironclad train consisting of four armored cars, three guns on each, was stopped on the tracks.

Before they could ford the Potomac, the Confederates would have to knockout the blockhouse and the armored train. Johnson's artillerists advanced their guns and opened fire. The first projectile penetrated the boiler of the armored train's locomotive, another ripped through a port, dismounting a gun, while a third burst behind the embankment, scattering the Ohioans. With the engine out of order, Captain Petrie and his men deserted the cars end scattered into the woods. Colonel Stough and his remaining soldiers sought shelter in the blockhouse. After shelling this strongpoint for several minutes, General Johnson sent forward an officer with a white flag, with a call to surrender.

Colonel Stough agreed to give up, provided his men were paroled; that they be permitted to retain their accouterments and private property; that he be provided with a hand car to transport his wounded to Cumberland. General Johnson was agreeable, and Stough surrendered himself and 80 officers and men, along with the colors of his regiment, the l53d Ohio. While the prisoners were being paroled, a demolition team destroyed the blockhouse and armored cars. By this time, McCausland's brigade had forded the Potomac, and Johnson, as soon as he could re-form his brigade, had his men remount. The Confederates pushed on to Springfield, where they encamped on the South Branch and rested until the 3d.[341]

Cresap, as soon as the Civil War was over, rebuilt the bridge and forebay.[342]

II. Pivot Bridges at Locks 68 and 70

Assistant Engineer T. L. Patterson reported on May 1, 1841, that on his division the value of bridges authorized but not Commenced as of January 1, 1841, was:

Pivot Bridge at Lock No. 68	$1,000
Pivot Bridge at Lock No. 70	$1,000
	$2,000[343]

On July 14, 1850, Superintendent Dungan notified Chief Engineer Fisk that to complete certain pivot bridges on his division would require:

At Lock No. 68

3,240	superficial feet of white oak for flooring	$48.60
375	locust pins	5.00
84	lineal feet of l2-inch timbers for coping	16.80
54	pounds of iron bolts for coping	6.75
483	pounds of iron bolts for chords	63.12
	workmanship and contingencies	$100.00
		$240.27

[341] Official Records, Series I, Vol. XXXVII, pt. I, 189, 190, 355–356; Cumberland *Civilian & Telegraph*, Aug. 4, 1864; Lowe to Ringgold, Aug. 25, 1864 (Ltrs. Recd., C&O Co.).
[342] Lowe to Ringgold, August 25, 1864 (Ltrs. Recd., C&O Co.).
[343] Patterson to Board of Directors, May 1, 1841 (Ltrs. Recd., C&O Co.).

At Lock No. 70

800	cubic yards of embankment at 20¢ per cubic yard	$160.00
483	pounds of iron bolts at 12 1/2¢ per pound	63.12
96	lineal feet of l2-inch square timbers at 20¢ per foot	19.20
64	pounds of iron bolts for coping at 12¢ per	8.00
		$250.32[344]

These two bridges had been completed by the time the "50-Mile Section" was opened to navigation in October, 1850. During the Civil War the pivot bridge across Lock No. 68 was destroyed by Rebel raiders.

On Sunday Morning, July 3, 1864, information reached General Kelley's Cumberland headquarters that Lieutenant General Jubal A. Early and Major General John C. Breckinridge were sweeping up the Shenandoah Valley with 30,000 soldiers. When this news was released, the people in and around Cumberland figured that the "Baltimore & Ohio Railroad would soon 'go up the spout', and Maryland and Pennsylvania would again feel the heel of the invaders. By noon it was known that the Rebels were in possession of Martinsburg and that Major General Franz Sigel and his bluecoats had fled across the Potomac.

The next morning the word was out that the Rebels were in possession of the south bank of the Potomac from Martinsburg to Sir John Run, "giving the railroad bridges and everything else 'particular fits'. The citizens felt that Cumberland "would go up too, and so it might…, but for the fact that our rebel friends would be the greater losers by the operation", as they kept their Confederate cohorts well informed, the Cumberland *Civilian & Telegraph* reported.[345]

A strong force of Confederates (800 horsesoldiers, supported by three guns) under Brigadier General John D. Imboden at 6 a.m. on July 4, closed in on the small force (a company of the 153d Ohio) guarding the railroad bridge across the South Branch. Alerted to the Rebels' approach, the bluecoats took cover in the blockhouse and were able to beat off Imboden's initial thrust. Regrouping, the greyclads mounted a second assault, which was no more successful than the first. Just as the Federals were despairing of holding out much longer, Captain Petrie's. armored train puffed into view. By the time the engineer had braked his locomotive to a stop, Petrie's gunners bad opened fire. The dismounted Rebel troopers took cover, while Imboden brought up his artillery. For the next several hours, the Federals were able to hold their own. Finally, however, a projectile from one of McClanahan's guns entered a port, exploded, and set the armored car afire. Petrie and his men were compelled to flee the car, which enabled the Rebels to advance and apply the torch to the bridge.

Meanwhile, Imboden had sent several detachments across the river to wreak havoc on the canal. Besides burning the pivot bridge across Lock Mo. 68, the Rebels captured 14 boats. After unhitching and appropriating the boat and mules, they set fire to the craft,

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344 Dungan to Fisk, July 14, 1850 (Ltrs. Recd., Chief Engineer).
345 Cumberland *Civilian & Telegraph*, July 7, 1864.

most of which were loaded with coal. Hearing the bugles sound "recall," they then re-crossed the Potomac and reported to Imboden[346].

Imboden at noon ordered his men to remount. After collecting all the horses and grain they could find at South Branch, Imboden retired up the road to Bloomery.[347]

Two of the boats burned belonged to a resident of Cumberland of pronounced Confederate sympathies. On Tuesday morning he was heard endeavoring to convince the bystanders that "it was alright and a needful retaliation for General [David] Hunter's devastation in the Valley of Virginia, though he thought they ought not to have burned his *boats*; yet he consoled himself with the hope that the National Government would pay him for his boats and stock."[348]

A force of Confederates under John McNeill about the same time swept down and set the Patterson Creek railroad bridge afire. Seven of McNeill's people fired the temporary bridge that Superintendent Lowe had thrown across the canal at this point. Twenty bluecoats watched from a neighboring hill, as the Rebels carried out their mission.

The alarm having been raised, General Kelley ordered the force guarding the North Branch bridge into action. Colonel Francis W. Thompson turned out a mounted detachment and was ready to receive McNeill and his partisans. Finding that the Federals were on the alert, McNeill abandoned his plans to destroy the North Branch bridge and fell back to Frankfort. Before retiring, the Rebels visited Conklin's store, and relieved him of between $300 and $400 in pen knives, money, and other "light but needed scarce articles in the Confederacy".

The Confederate raids by Imboden and NcNeill caused a "tolerable scare" in Cumberland. Personnel at the Quartermaster and Commissary depot packed the stores, which got "an airing by being rusticated".[349]

Kelley was delighted to discover on visiting the railroad bridges that the damage was not as extensive as had been feared. The Patterson Creek bridge, which had been a temporary one on trestles, was "tolerably badly burned". At South Branch the damage was less. Crews were quickly turned to, and by the 7th the bridges were again ready for traffic.[350]

Superintendent Lowe likewise reported rapid progress by his crews in reopening the canal. On July 25 he announced that damage done by the Rebels on his division would not interrupt navigation more than two additional days. The bridge on the county road spanning Lock No. 68 had been burnt, and the fire as it spread had damaged the lock gates. Eight boats had been burned in the level below the lock.[351]

Apparently, the Patterson Creek and Lock No. 68 bridges were not replaced until after the conclusion of the war. 0n June 26, 1865, Lowe notified Secretary Ringgold that local citizens were demanding that the bridges burnt by the Rebels at Lock No. 68 and at Patter-

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346 Official Records, Series I, Vol. XXXVII, pt. I, 186, 190; Cumberland *Civilian & Telegraph*, July 7, 1864.
347 Official Records, Series I, Vol. XXXVII, pt. II, 42.
348 Cumberland *Civilian & Telegraph*, July 7, 1864.
349 Ibid.; Official Records, Series I, Vol. XXXVII, pt. I, 186–187, 190.
350 Official Records, Series I, Vol. XXXVII, pt. I. 187.
351 Lowe to Ringgold, July 25, 1864 (Ltrs. Recd., C&O Co.).

son Creek be rebuilt. Because of the "high price of lumber, etc.", Lowe had been dragging his feet. Now that the war was over, action was necessary. Lowe had accordingly prepared a plan for a simple but substantial bridge on which he had received proposals, ranging from $1,000 to $1,200 for each. The spans would be 72 and 84 feet respectively.[352]

The Board of Directors on July 13, after studying Lowe's report, directed the Superintendent of the Cumberland division to have the bridges at Lock No. 68 and at Patterson Creek rebuilt in a suitable fashion.[353]

Lowe accordingly on July 21 closed contracts to have the bridges rebuilt. Both contractors promised to have the bridges open to traffic in September.[354]

In 1886 the bridge at Lock No. 70 was rebuilt.[355]

III. Patterson Creek Bridge

A permanent bridge crossing the canal was completed in the summer of 1850 at a point opposite the mouth of Patterson Creek. At this point an important road crossed the North Branch at Frankforts Ford and gave access to the fertile Patterson Creek Valley. This bridge was located on section 346, a short distance below Lock No. 72. As there were two important Baltimore & Ohio Railroad bridges nearby, this structure became, during the Civil War, a target for Rebel raiders.

Major General Jubal A. Early had been sent by General Robert E. Lee during the winter of 1863–64 to command operations in the Shenandoah Valley. On January 28, Early left New Market via the Moorefield road with a strong column of infantry, artillery, and cavalry.[356] As the Confederates moved across the rugged mountain ridges, the infantry lagged and was unable to keep pace. Early reached Moorefield with the cavalry and artillery late on the afternoon of the 29th. The Confederates were disappointed to discover that the North and South Forks of the South Branch were running bank full, and as the bridges had been destroyed, Brigadier General Thomas L. Rosser organized his cavalry brigade into fatigue details and rebuilt the bridges.

Meanwhile, General Early had learned from his scouts that a large Union supply train was en route from New Creek to Petersburg. Calling for Rosser, Early told him to have his horsesoldiers on the road at an early hour in the morning and see if he could surprise the train. This train consisting of 80 wagons loaded with commissary stores destined for the Petersburg garrision had rolled out of New Creek on the 27th. Colonel Joseph Thorburn of the 1st West Virginia Infantry was in charge of the train. On the 28th, a refugee from Petersburg reached Cumberland and asked to see the commander of the Department of West Virginia, Brigadier General Benjamin F. Kelley. He told the General that a

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352 Lowe to Board of Directors, June 26, 1865 (Ltrs. recd., C&O Co.).
353 Board of Directors to Lowe, July 13, 1865 (Ltrs. Recd. C&O Co.).
354 Lowe to Ringgold, July 26, 1865 (Ltrs. Recd., C&O Co.)
355 58th Annual Report, 24.
356 Official Records, Series. 1. Vol. XXXIII. 43. Included in Early's column were: Thomas' Infantry Brigade, Rosser's Cavalry Brigade, the 2d Maryland Cavalry Battalion, McNeill's Company of Virginia Partisans, and McClanahan's Virginia Battery.

strong Rebel column was advancing on Moorefield. Kelley accordingly issued orders for the train to stop at Burlington and for Colonel Thorburn to retire from Petersburg "upon ascertaining that the enemy threatened him in force.[357]

To check out this report, General Kelley during the day visited New Creek, and on questioning the inhabitants discovered that the stories told by the recently arrived refugees were vague and so full of generalities that they were open to suspicion. In addition, he learned that scouts sent out by Colonel Thorburn from Petersburg had returned and had reported no Rebels. Satisfied that the citizens had been frightened by "some prowling bands of guerrillas", General Kelley ordered Colonel Thorburn to see that the supply train moved out. Colonel Joseph Snider with his 4th West Virginia Cavalry was given the task of guarding the train as it rolled out of Burlington on the morning of January 29. At the same time, General Kelley telegraphed his subordinates at Harpers Ferry and Martinsburg, to have their horsesoldiers ready to take the field on an instant's notice.[358]

About daybreak on the 30th, a patrol from the 1st West Virginia encountered Confederates two miles south of Moorefield and captured one of them. When they questioned the butternut, he said that he belonged to Rosser's brigade, and that his unit and several others were at Moorefield. Colonel Thoburn, on learning of the occupation of Moorefield, dispatched couriers to alert Colonel Snider and the commander of the 23d Illinois to the danger. The 23d Illinois at this time was busy blockading with felled timber the Patterson Creek Valley–Moorefield Road.[359]

Throughout the day, Colonel Snider's people continued to push ahead with the train. The march was uninterrupted until the head of the train reached Medley, two and one-half miles north of Moorefield Junction. Here Colonel Snider encountered the 23d Illinois, falling back before the Confederates.

General Rosser' s butternuts, as they had ridden out of Moorefield and started up over Patterson Creek Mountain had encountered fatigue parties of the 23d Illinois obstructing the road. Rosser dismounted part of his brigade and chased the bluecoats through the gap. Next, Rosser tuned out his pioneers to clear the timber off the road and to reconstruct it where it had been dug away. As soon as the road was passable, the Confederates swung back into their saddles and pressed on after the fore, who had retreated down the valley toward Williamsport to meet the train.[360]

As senior officer present, Colonel Snider took charge. While the teamsters parked their wagons, Snider formed his men to the right of the road.[361] Rosser rode up with his vanguard. A g1ance showed the Confederate general that he was outnumbered. Undaunted,

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357 Ibid., 30, 43, 45.

358 Ibid., 30, 40. The Union at Harpers Ferry at this stage of the war was Brigadier General Jeremiah Sullivan, while Colonel John K. Oley commanded at Martinsburg.

359 Ibid., 38, 40.

360 Ibid., 40, 45.

361 Ibid. The 23d Illinois Infantry held the left, a detachment of the 2nd Marylan4 cavalry the center, and four companies of the 4th West Virginia Cavalry the right. Two companies of the 4th Wes Virginia and a detachment of the Ringgold Battalion were posted en echelon to the right to keep the Rebels from turning that flank; two companies of the 4th West Virginia watched the ground to the left of the Illinois footsoldiers; while the two remaining companies of the 4th West Virginia constituted Snider's tactical reserve. Ibid., 40–1.

he called for half of his brigade to dismount. Covered by the fire of these men, Rosser charged the Federals with all his men who remained in the saddle. This attack was quickly repulsed. One of McClanahan's guns now arrived on the field and was placed in battery. Covered by the fire of this piece, Rosser charged again. As luck would have it, Colonel Snider had just ordered the train tuned about. Nothing happened, as both wagonmasters and most of the teamsters had already fled. If he were to save his command, the train must be abandoned, so orders were given for the Federals to retreat and rally on New Creek Mountain. The onrushing Confederates were closing in, when the bluecoats suddenly gave way and fell back toward the high ground west of the road. Rosser's pursuit was halfhearted, and Snider's command was able to escape across the mountain.

Ninety-three loaded wagons fell into the Confederates ' hands, but the teams of 42 had been cut loose and run off by the panics stricken drivers during the fight. These wagons were burned. Fifty wagons with their six-mule teams were brought off. An inspection showed that the wagons were heavily laden with commissary stores—bacon, rice, coffee, sugar, etc. The wagons were turned over to General Early and started back over Patterson Creek Mountain. It was soon dark, and as the wagons rolled along, a number of them were plundered by Confederates, before steps were taken to control the situation.

On checking with his unit commanders, Rosser listed his losses in the clash at Medley as 24 killed and wounded. Union casualties in the action were: 5 killed, 35 wounded, and 36 missing or captured.[362]

After policing the field, Rosser turned his brigade toward Petersburg and secured the road from Petersburg down Patterson Creek and passing through Greenland Gap. Brigadier General Edward L Thomas' infantry brigade, having finally reached Moorefield, crossed the South Branch and camped within tn miles of Petersburg.[363]

General Kelley, on learning of the capture of the train, telegraphed his subordinates at Harpers Ferry and Martinsburg to send a mounted column to Moorefield by way of Winchester and Wardensville. This force would have the mission of cutting the Confederates' line of retreat and thus preventing their escape with their spoils.[364]

January 39 was a bad day for Colonel Thorburn. First, he learned that Early's columns were advancing rapidly toward his base at Petersburg. As supplies were nearly exhausted, he was thunderstruck when he learned that the Rebels had captured the provision train. Soon afterwards a report arrived that the Confederates had established a roadblock at the Moorefield and Alleghany Junction. Tborburn accordingly pulled his brigade out of Petersburg at midnight, and retiring via Reels and Greenland Gaps reached New Creek at noon on February1. This withdrawal was carried out with efficiency, and the only losses were a few stragglers who had secured sufficient whiskey to get gloriously drunk and were picked up by the Rebels[365]

General Early, not knowing that the Yankees had pulled out of Petersburg, had his troops on the road at daybreak on the 31st. Rosser's horsesoldiers and Thomas' infantry on clos-

362 Ibid., 30, 41, 43, 45, 1133.
363 Ibid., 43.
364 Ibid.,30.
365 Ibid., 30–31, 39.

ing in on the town were disappointed to discover that the Federals had fled, taking a mountain road to the head of New Creek. A thick ground fog caused Early to call off a pursuit. Before pulling his men out of the area, Early saw that fatigue parties were turned out to destroy as far as possible the Union works covering the approaches to Petersburg.

On the morning of the 1st, Early led Thomas' brigade back to Moorefield, while Rosser and the cavalry rode down Patterson Creek to collect cattle and break the Baltimore & Ohio Railroad.[366]

Rosser's troopers entered Burlington on the morning of February 1. The small force of Union cavalry posted in the village retreated toward New Creek, obstructing the road as they went. On the advance from Petersburg, patrols had been throw out to round up cattle and sheep. Captain McNeill with his own and Gilmore's commands had been detached and sent westward into the Alleghany to Mountains to collect livestock. Having heard that a Union mounted column was advancing westward out of Martinsburg to cut off his retreat, Rosser placed one regiment in Mechanicsville Gap. He then resumed his march toward the Potomac, with foraging parties sweeping the valley to the east and west of the road.[367]

Meanwhile, Colonel Thorburn's brigade had been reinforced and had taken position at Piano Fort on the mountain east of New Creek.[368] At noon on the 1st, Captain Andrew J. Greenfield with a strong combat patrol (100 troopers of the Ringgold Battalion and four companies of infantry) marched toward Ridgeville, which had been occupied by McNeill's column. The partisans were gone by the time Greenfield's slow moving column arrived at 7 p.m. It was the next morning, February 2, before Greenfield reached Burlington only to discover that Rosser's butternuts had left the village the previous evening and were headed down Patterson Creek toward the railroad and the Chesapeake and Ohio Canal. Thorburn on receiving this information put his reinforced brigade in motion for Burlington. Because of bad roads and a dark night, it was 3 a.m. on the 3d before the brigade reached that point.[369]

Rosser's movements had confused General Kelley as to his ultimate goal. While he began to apprehend that the Rebel's design was to effect the destruction of the railroad and canal, they could be planning an attack on the New Creek post or a dash into Cumberland. He therefore held Colonel James A. Mulligan's division, reinforced by Thorburn's brigade, ready for defensive or offensive operations as circumstances dictated. The mounted column at Wardensville was ordered to move to Romney and to be prepared to strike the Confederates in the flank and rear. Two infantry regiments, the 12th West Virginia and the 34th Massachusetts, which had been rushed by rail from Harpers Ferry took position at Cumberland.[370]

Company F, 54th Pennsylvania Infantry was charged with guarding the Baltimore & Ohio Railroad bridge across Patterson Creek and the North Breach. Captain John W.

366 Ibid., 43–44, 45, 1134.
367 Ibid., 46, 1139.
368 Ibid., 39. Thorburn had been reinforced by the 3d and 4th Pennsylvania reserves, the 4th West Virginia cavalry, and the 6th Battery, West Virginia Artillery.
369 Ibid.
370 Ibid., 31.

Hibler with 57 men was stationed at the Patterson Creek bridge, while a smaller detachment watched the North Branch bridge. Hibler had been alerted to the possible danger and warned to keep scouts out. This he failed to do.

About noon on the 2d, the Federals' pickets on the Patterson road sighted a number of blueclad horsemen riding toward them. When challenged, the the newcomers identified themselves as members of the Ringgold Battalion. Not until it was too late did they reveal themselves as Confederates. The pickets were disarmed before they were able to utter an outcry. Rosser and his troopers then. Charged into the Union camp just as the Federals were sitting down to enjoy their noon meal. Consequently, resistance was light and Captain Hibler and 36 of his men were captured. [371]

After setting fire to the Patterson Creek railroad bridge, the Confederates pushed on to the Baltimore & Ohio bridge across the North Brach. The guards having fled, the Rebels also put the torch to this structure and wrecked a locomotive. Meanwhile, a patrol had forded the North Branch and destroyed the bridge across the canal opposite the mouth of Patterson Creek and damaged the lock gates. At Lock No. 72. Rosser, learning that a Union column had occupied Romney and was attempting to force its way through Mechanicsville Gap, abandoned the plan he had matured for a dash into Cumberland. Recalling the patrol that had crossed the river to wreck havoc on the canal, Rosser headed back up the valley toward Moorefield.[372]

The telegraph wire connecting General Kelley's Cumberland headquarters with the east went dead at 1 p.m. Not long afterwards it was learned from people who had fled the area that the bridges a Patterson Creek and across the North Branch were afire. As to be expected, this news caused the "greatest excitement". General Kelley and his staff turned out all the troops posted in Cumberland. The soldiers were marched out of town about one mile and posted on the hills overlooking the town from the east. While the troops took position, scouts were advanced and soon returned with news that "the rebels had done their work in a hurry and retreated."[373]

Rosser reported to General Early at Moorefield on the 3rd. In their sweep through the Patterson Creek Valley, the Rebels collected and brought off 800 cattle and 400 sheep. McNeill's people at the same time had seized over 300 cattle. The next morning, the 4th, Early started back to the Shenandoah Valley. Thomas' infantry had not proceeded very far before Early learned from; his scouts that a large force of Union cavalry with artillery had been sighted advancing via the Romney–Moorefield road. Early recalled Thomas' brigade and ordered Rosser's horsesoldiers to take position on the South Fork. The Union cavalry was led by Lieutenant Colonel Charles F. Simmons and had left Charles Town on January 31. Since then they had ridden many miles in a futile effort to intercept Rosser's column. On discovering the Rebels in Moorefield, Simmons sent a party to contact Colonel Mulligan and report that he had found the Confederates. Mulligan on the 3d had started in pursuit, utilizing the new road west of the south Branch. At the time that Simmons established contact with Early's scouts, Mulligan's vanguard was five miles from Moorefield. The Federals were unable to coordinate their movements, and the Confederates

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371 Ibid., 37. Two Federals were killed and three slightly wounded in the attack on the camp.
372 Ibid., 31, 37, 46, 1142.
373 Cumberland *Civilian & Telegraph*, Feb. 5, 1864.

were able to retire from the area and carry off 50 captured wagons with their teams, 1,200 cattle, 500 sheep, and 78 prisoners.[374]

The two railroad bridges fired by the Confederate raiders were trestle-works and therefore easily repaired. By February 5 they had been repaired, and the Baltimore & Ohio between Cumberland and-Martinsburg reopened to traffic.[375] When Superintendent Lloyd Lowe of the C&O Canal Company inspected the damage to the waterway on the 3rd, he reported that it would cost from $1,200 to $1,800 to replace the Patterson Creek Bridge. As a stopgap measure, a causeway was substituted for the bridge.[376]

IV. Towpath Bridge at Lock No. 54

The towpath bridge at Lock No. 54 was completed and opened for traffic in the late summer of 1850. On July 14, 1850, the project engineer had notified Chief Engineer Fisk that before the bridge could be framed and set up, 2,700 superficial feet of 3-inch yellow pine for planking for the flooring would have to be secured by the contractor.[377]

V. Bridge at Lock No. 73

A pivot bridge, completed in 1850, spanned Lock No. 73.[378]

VI. Permanent Road Bridge on Section 364

An important road linking Cumberland and the New Creek settlements crossed the North Branch at Wiley's ford. To keep open this route, the canal company was compelled to build a permanent bridge. This structure was completed in the summer of 1850.[379]

VII. Towpath Bridge to the Lynn Wharf

The Board of Directors on December 9, 1858, directed the General Superintendent to contract with the owners of the Lynn Wharf at Cumberland for the construction of a towpath bridge across Willis (sic.) Creek. To assist with this work, the Company was willing to issue $2,000 in bonds payable in five years with interest from the date of the bridge's completion.[380]

No action was taken at this time, however, and at a meeting of the Board on December 9, 1859, a letter was read from A. C. Greene, an important Cumberland coal shipper, pointing out the importance of the proposed bridge over Wills Creek. He urged the Board to contribute to the building of the bridge. After a lively discussion, the Board directed the Chief Engineer to contract with the owners of the Lynn Wharf for the "construction of a

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374 Official Record, Series I, Vol. XXXIII, 31–32, 34, 35–36, 44.
375 Ibid., 517.
376 Lowe to Ringgold, Feb. 3, 1864 (Ltrs. Recd., C&O Co.).
377 Dungan to Fisk, July 1, and July 14, 1850 (Ltrs. Recd., Chief Engineer).
378 Dungan to Fisk, July 14, 1850 (Ltrs. Recd., Chief Engineer).
379 Ibid.
380 Proceedings of the President and Board of Directors, K, 75.

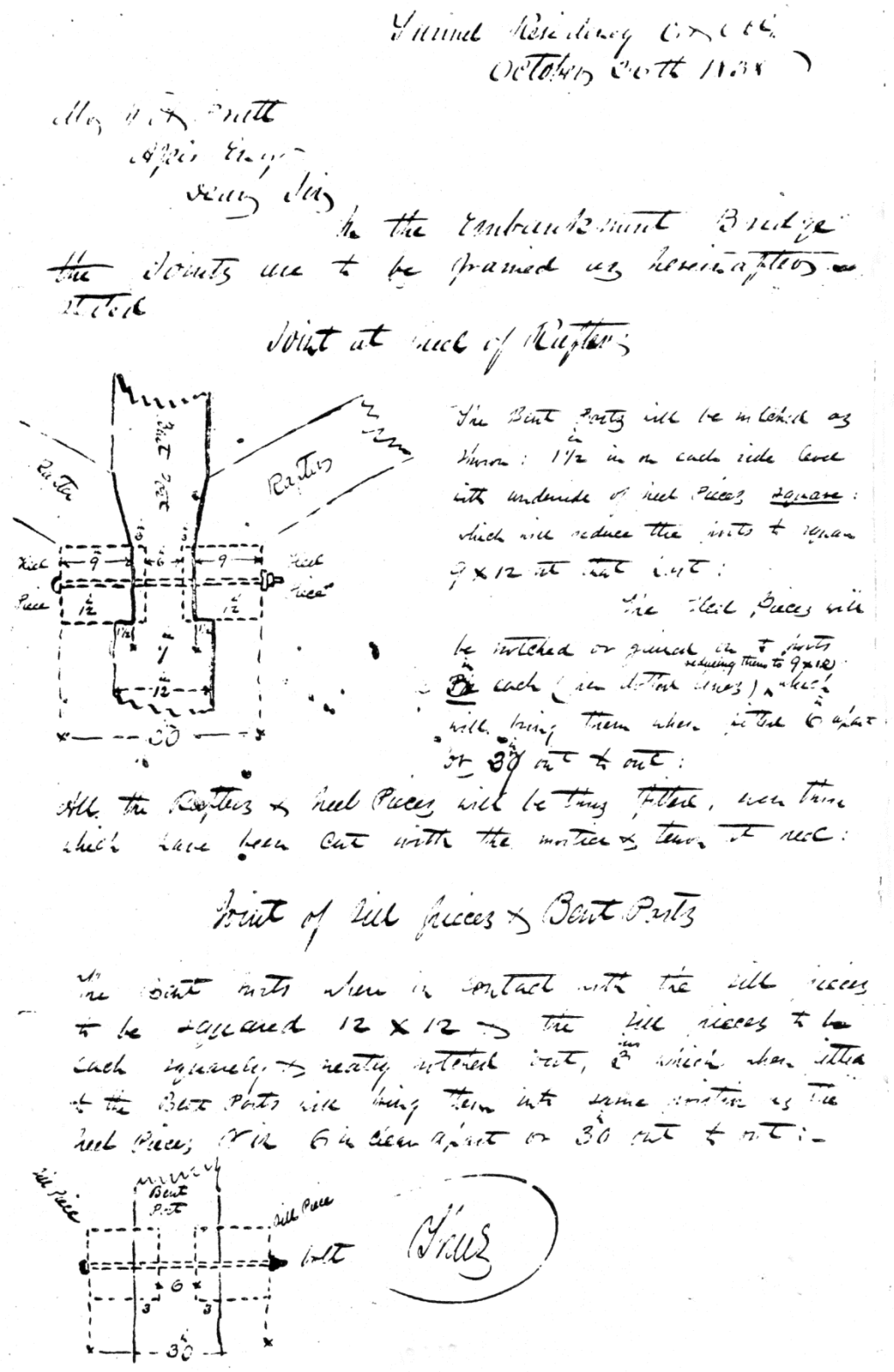
substantial tow-path bridge over the mouth of Wills creek to be built" under his directions.[381]

The Civil War caused this project to be deferred, and in March, 1864, the Board rescinded its resolution of December 9, l859[382] With the war over, it was represented to the Board that trade on the canal would be "greatly facilitated by the construction of a towpath bridge over and at the mouth of Wills Creek, to connect with the canal and a towpath from said bridge to Lynn's Wharf, for the passage of boat." The Board, before adjourning, granted permission to "connect said bridge with the berm of the lock".[383] This time, the project was carried through.

381 Ibid., 72.
382 Ibid., 422.
383 Ibid., 471.

APPENDIXES

Appendix A. Elwood Morris instructions for an embankment bridge.
Page 1 of 3



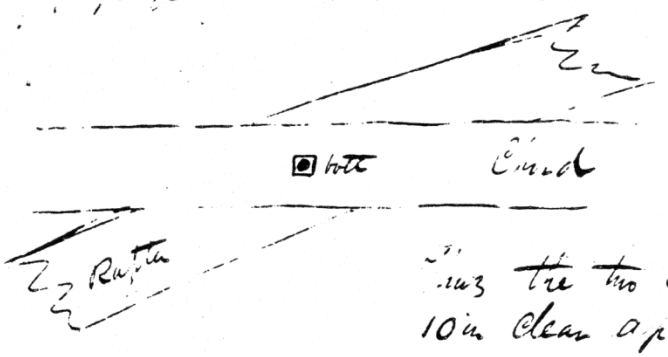
Joint at Back of Rafter

Joint of Sill Pieces & Bent Parts

Aappendix A. Elwood Morris instructions for an embankment bridge.
Page 2 of 3

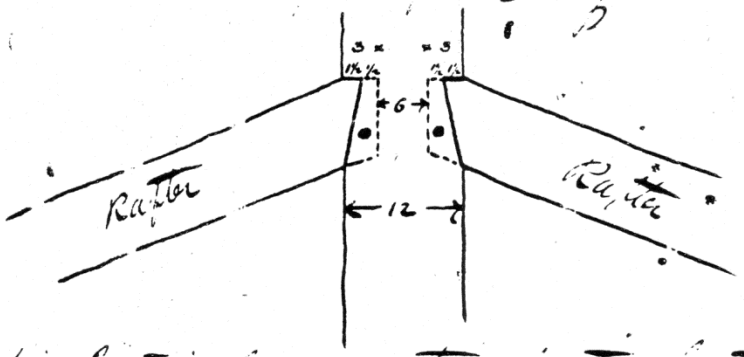
Joint of the Rafters & Chord

Here the Chords are merely to be squared & their full size of 10 x 12, while the Rafters will be notched equally each side (i) to a depth at the place of bearing of the chord 10 thick across the bridge:



thus the two Chords will run 10 in clear apart:

Joint of Rafter & King Post



This Joint is formed of two opposite faces let a general notch across the whole King Post, upper side square to 1½ in, other part sloping cut (see sketch)

And in addition to this a tenon on the head of Rafter & mortise to receive it in King Post (see sketch) to come in here side of K P. 3 to each notice: the mortice & tenon the tenon to be 4 thick & pinned through at a inch in 1 Oak Pin: this Brings the Planes of the tenons on the Rafter heads when fitted exactly 6 inches clear apart:

Appendix A. Elwood Morris instructions for an embankment bridge.
Page 3 of 3

The Chords.
Every where retain the size of the light 10×12 square & never where of that size uniformly 10 clear apart: where they cross the heel of the King Post the K P is notched as has been already shown in detail on one of the drawings:

The Girders
when they rest upon the Chords

The Joists
Where the rest upon the Girders & in fact every timber where it touches any other shall there be squared:

As I find it will be necessary I shall decide on the details of every point in the Bridge: And I shall expect of you to see that every part of the work shall hereafter be conducted in strict conformity to my plans: I am sorry to see it has not been so carried on in all respects heretofore:

I am with Respect
Your Obedt Servt
Elwood Morris

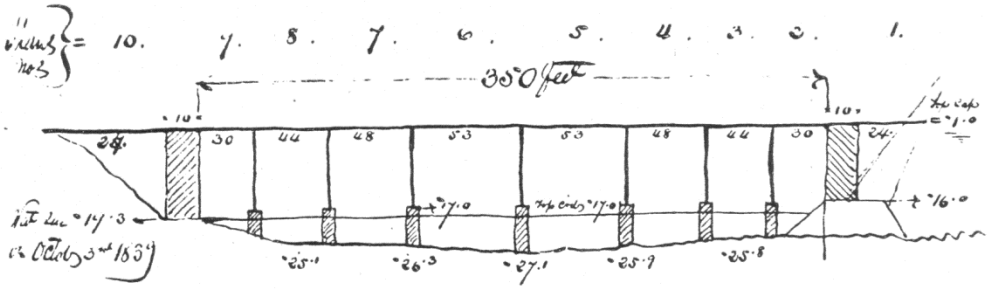
Joints of the Bent Posts with their Caps
To be by mortice & tenon pinned with 1 inch oak Pins the tenon to be 3 in thick & 6 in long:
all the Joints must be neatly & closely fitted up:

151

Appendix B: Specifications for the Bridge on Section 318

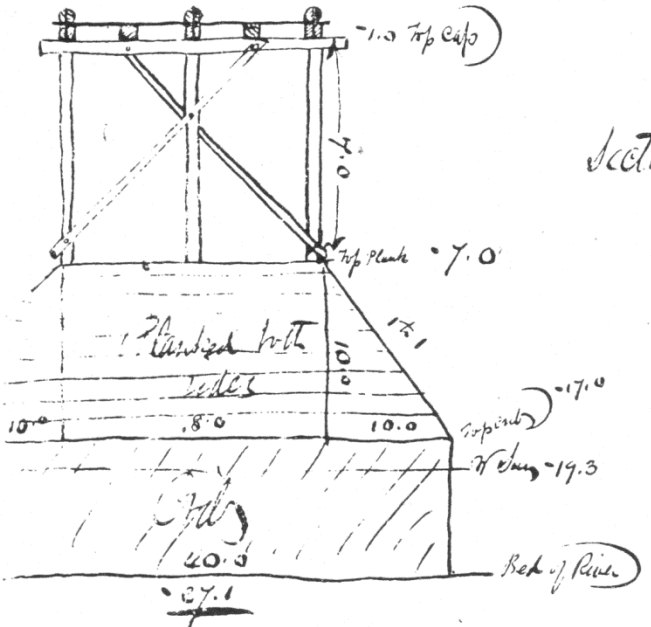
Page 1 of 3

Bridge on 318:



7 short Cribs tops 9 feet above Low Water width 8 feet out to out:)
length out to out = 40 feet.

2 high Cribs tops 1.0 or 18.3 above L.W. width 10 ft out to out:)
length out to out = 24 feet.



Section of the Bridge:

Cribs filled with Rock from the Section at Section Piers, Transom Cut Nothing as regards Bridge:

Planks 0 = 32000

Over

Appendix B: Specifications for the Bridge on Section 318
Page 2 of 3

Bill of Timber

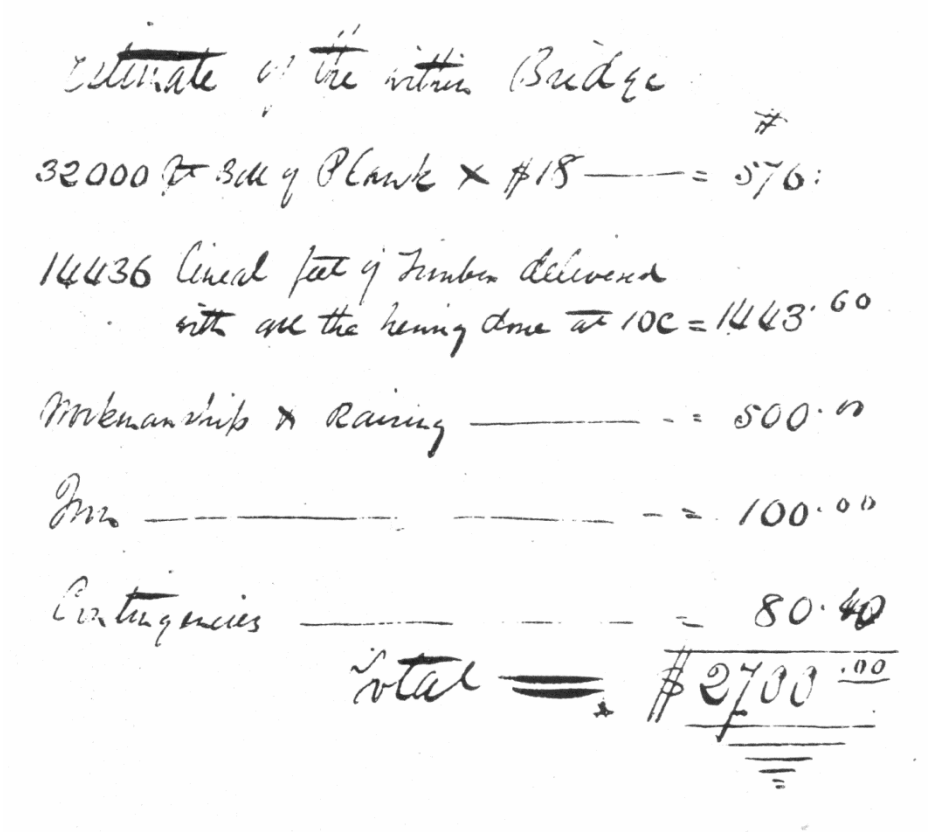
						Ft Linear:
Abut Cribs	64 sticks	9 diameter	25 feet long		=	1600
	64 "	9 "	12 "		=	768
Pier Cribs	112 sticks	9 diam	40 "	———	=	4480
	112 "	9 "	10 "	———	=	1120
Bents	7 Sills	15 diam	40 "	flatten ½	=	280
	14 Side Braces	15 diam	16 "	" ½	=	224
	21 Butt Posts	15 diam	16 "	" ½	=	336
	14 Butt Braces	9 diam	15 "	" ½	=	210
	7 Caps	15 diam	20 "	" ½	=	140
	4 do	15 diam	24 "	" ½	=	96
Stringer Pieces	10 Stringers	15 diam	27 "	" ½	=	270
	10 do	15 "	42 "	"	=	420
	10 "	15 "	47 "	"	=	470
	10 "	15 "	51 "	"	=	510
	10 "	15 "	56 "	"	=	560
Floor Pieces	6 sticks	15 "	33 "	"	=	198
	6 "	15 "	37 "	"	=	222
	6 "	15 "	47 "	"	=	282
	6 "	15 "	52 "	"	=	312
	3 "	15 "	54 "	"	=	162
Ties for Cribs	64 "	9 "	12 "	Cut to Lgth	=	768
	112 "	9 "	10 "	———	=	1008

Total Timber in feet Linear = 14436

Planks

			Ft Bdl:
Bents & Floor	For Bents 9000 feet Bdl of 2 Planks in Lengths of 12 feet	=	9000
	For Floor ~~6800~~ 17000 feet Bdl in Lengths of 12 feet	=	17000
			26000
Planks for Cribs add 6000 ft Bdl		=	+600

Appendix B: Specifications for the Bridge on Section 318
Page 3 of 3



Estimate of the within Bridge

32000 ft Bill of Plank × #18 —— = 576:

14436 Cubical feet of Timber delivered with all the hewing done at 10c = 1443.60

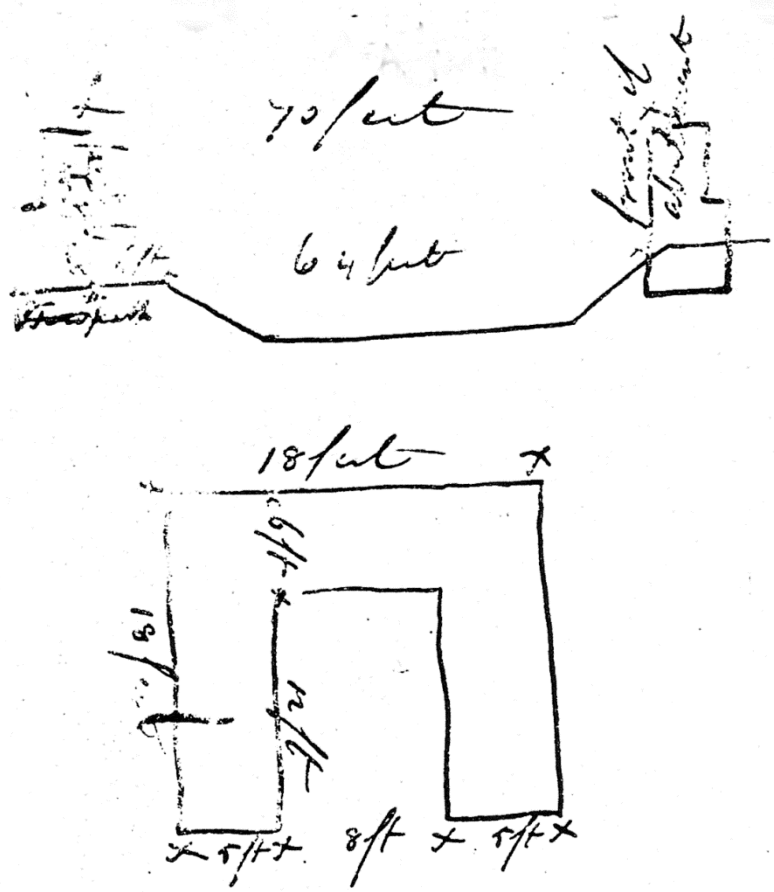
Workmanship & Raising —— = 500.00

Iron —— = 100.00

Contingencies —— = 80.40

Total = #2700.00

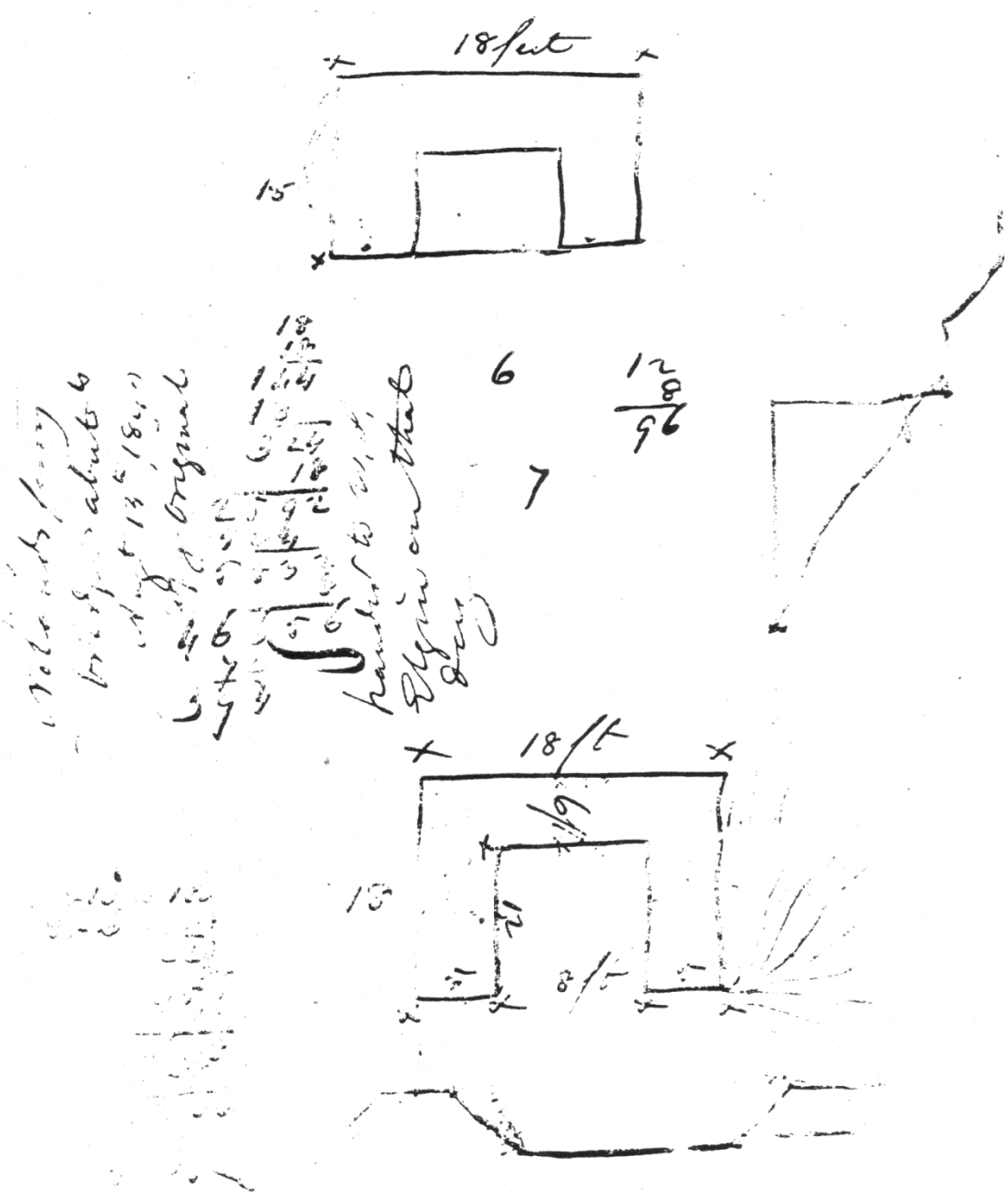
Appendix C. Nolands Ferry Bridge
Page 1 of 2



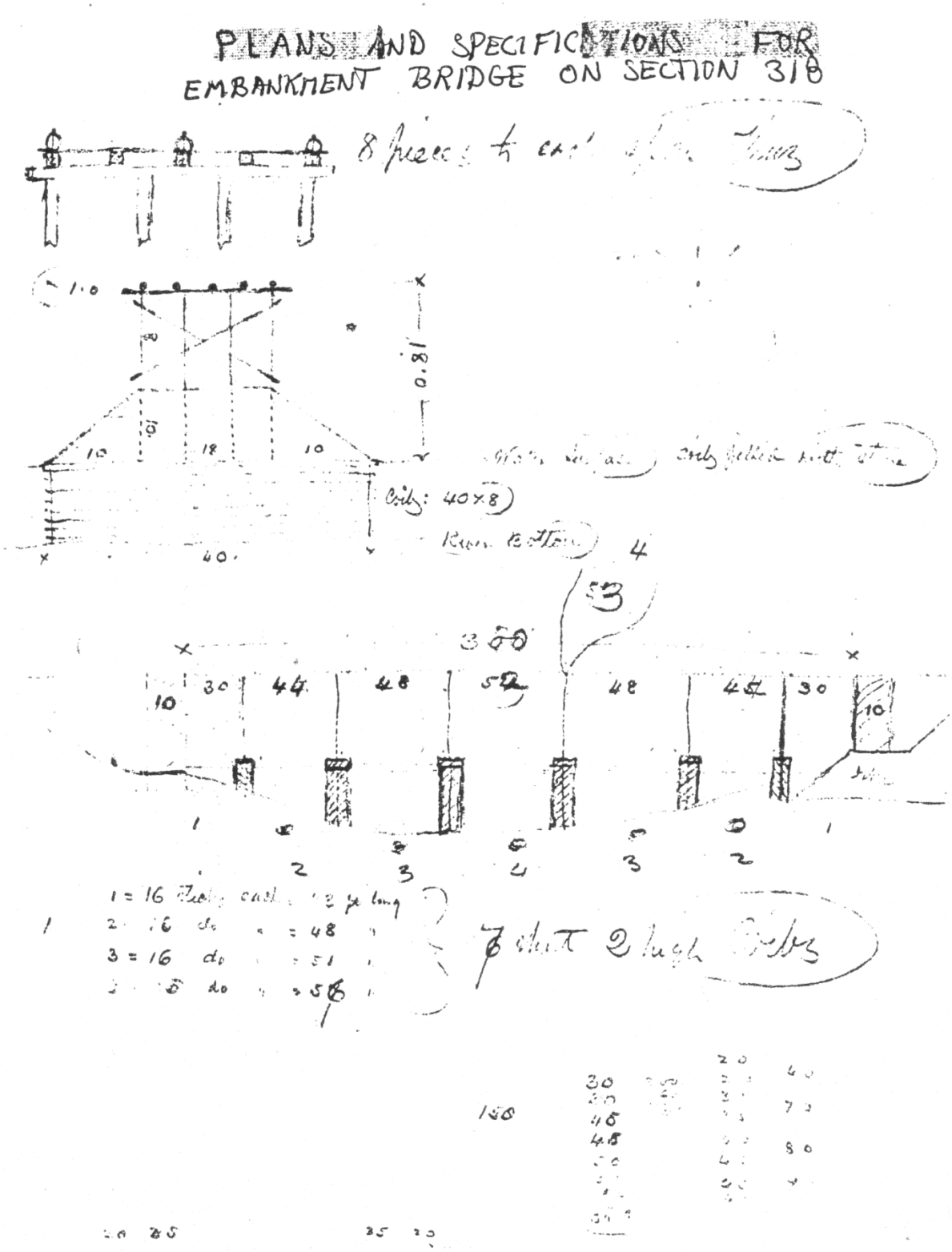
The above are the average [illegible]
the walls should be one foot thicker
at [illegible] and one foot [illegible]
[illegible] putting [illegible]

The [illegible] abutments [illegible]
[illegible] founded [illegible]
5 feet above bottom [illegible]
[illegible]
[illegible]

Appendix C. Nolands Ferry Bridge
Page 2 of 2



Appendix D. Plans and Specifications for the Embankment Bridge on Section 318
Page 1 of 6



Appendix D. Plans and Specifications for the Embankment Bridge on Section 318
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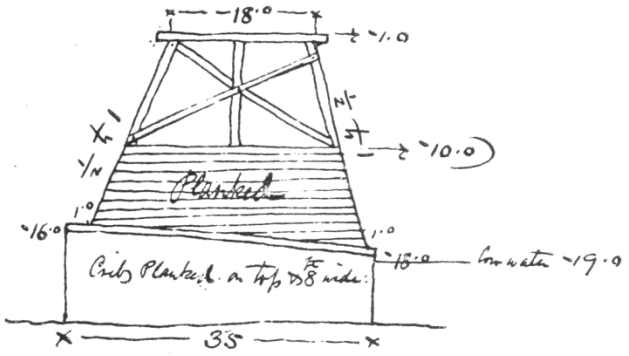
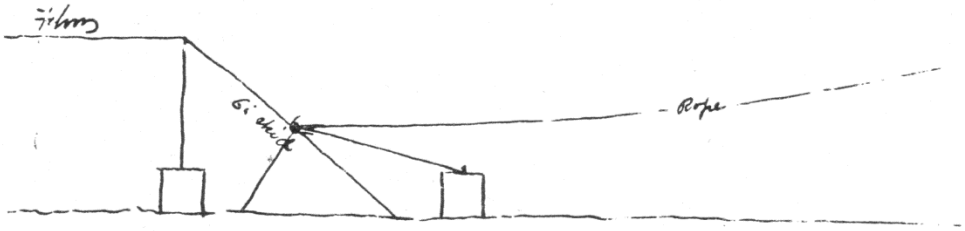
Plan for Cribs & Bents of Bridge on 318





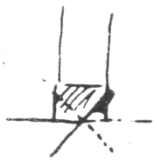
Mode of Raising: From the 1st Bent set up, lay out skids & upon them draw up the Bent until its sills rests in the proper place on the cribs: drive 3, 2 inch rake pins behind the sill to keep it there: and the slip down all the string pieces over the cap of the bent (suspended by two ropes) & Each their ends with ropes to the standing me:

Then bearing on the windlass raise all at once:-

Edd

Octob 8th 1839

Bent sill when fixed to be firmly bolted down to the cribs thus



Appendix D. Plans and Specifications for the Embankment Bridge on Section 318
Page 3 of 6

The floor to be of 2 inch Plank, 18 feet wide from out to out to be level across the River as well as up & down stream: tracks to be laid on the floor & a short piece of railing at each end as at Brights Bridge:

The whole Bridge to be put together in the same manner as the Bridge lately built on Brights Section, except that the up & down stream legs of the Bents will be splayed 6 in. to the foot: and the Abutment Cribs may be only 10 X 20:

The stone filling of the Cribs will be put in by Contract at the expence of the Canal Company:

This Bridge will be required to be finished by the 1st day of June 1840:— or earlier if the River admits: Ellis

Over

Appendix D. Plans and Specifications for the Embankment Bridge on Section 318
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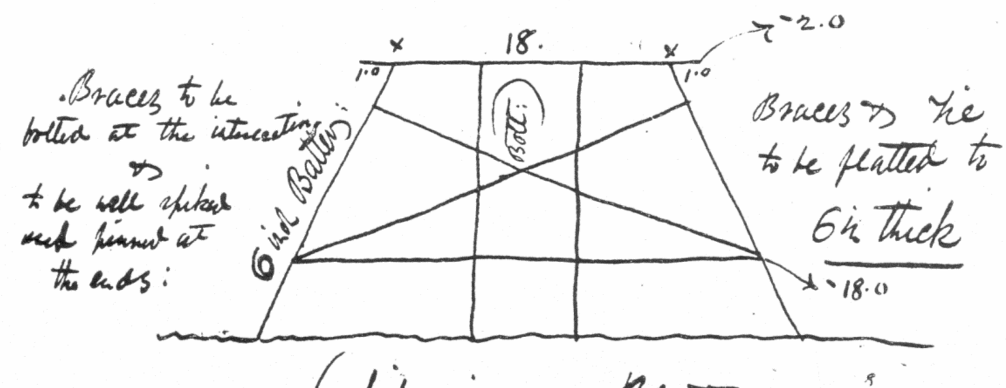
Mr. Merchant
Please let me know for how much in a gross sum he will contract to build a Bridge on Gorman's Section similar to that of Brights, with the variations as to length of spans &c as described: Mr. M: to find all materials & workmanship & the contract to be finally made with Gorman, who will be the paymaster:

Please return this

Ell

Nov 9th 1839:



(Side view of Bent)

Appendix D. Plans and Specifications for the Embankment Bridge on Section 318
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Bridge On 318

Bill of Timber

								Ft lineal
Stringers	30 ft Spans	12	Sticks	each	43 ft long	—	=	516
	35 do	12	"	"	40 "	—	=	480
	40 do	12	"	"	45 "	—	=	540
	45 do	12	"	"	50 "	—	=	600
	50 do	6	"	"	55 "	—	=	330
	24 do	12	"	"	29 "	—	=	348
		in all = 66						

Say 12½c per ft run when hewed & delivered

Total Ft run of Stringers = 2814

Bents	caps	14	Sticks	each	20 ft long	—	= 280
	Posts	32	"	"	28 "	—	= 896
	Ties	8	"	"	36 "	—	= 288
	Braces	16	"	"	30 "	—	= 480

Total Bent Timber — = 1944

Say 9c per ft run when hewed & delivered

Plank Floor

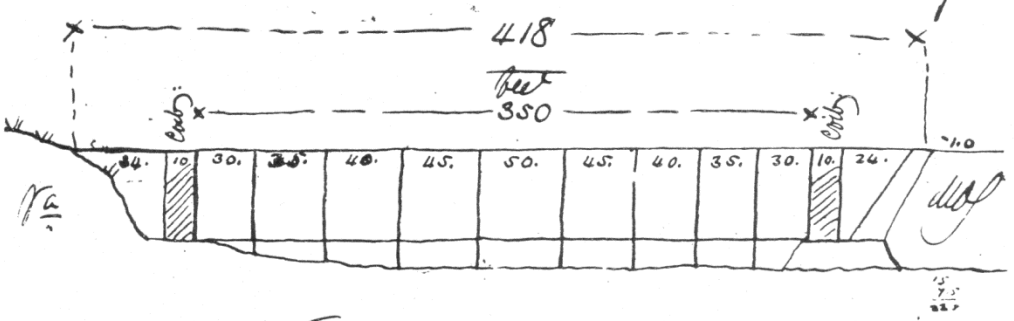
Say 420 × 18 × 2 ——— = 15120 ft B.M.

Say 16000.

Cribs of Rock timber valued by Merchants at $100.

Appendix D. Plans and Specifications for the Embankment Bridge on Section 318
Page 6 of 6

Bridge to be built on Sec 318
Opposite to the Ravine at Sowards Shanty:



6 Sticks in each Span:

2 Spans of 24 ft. Strings flatted to 10" thick
2 " 30 " " " + 11 "
2 " 35 " " " + 12 "
2 " 40 " " " + 13 "
2 " 45 " " " + 14 "
2 " 50 " " " + 15 "

Length of floor to be not over 418 feet:—

The Tops of the caps to be 2 feet below the bottom of the canal or about 17 ⅓ ft above Low water:—

At low water the depths of the River are

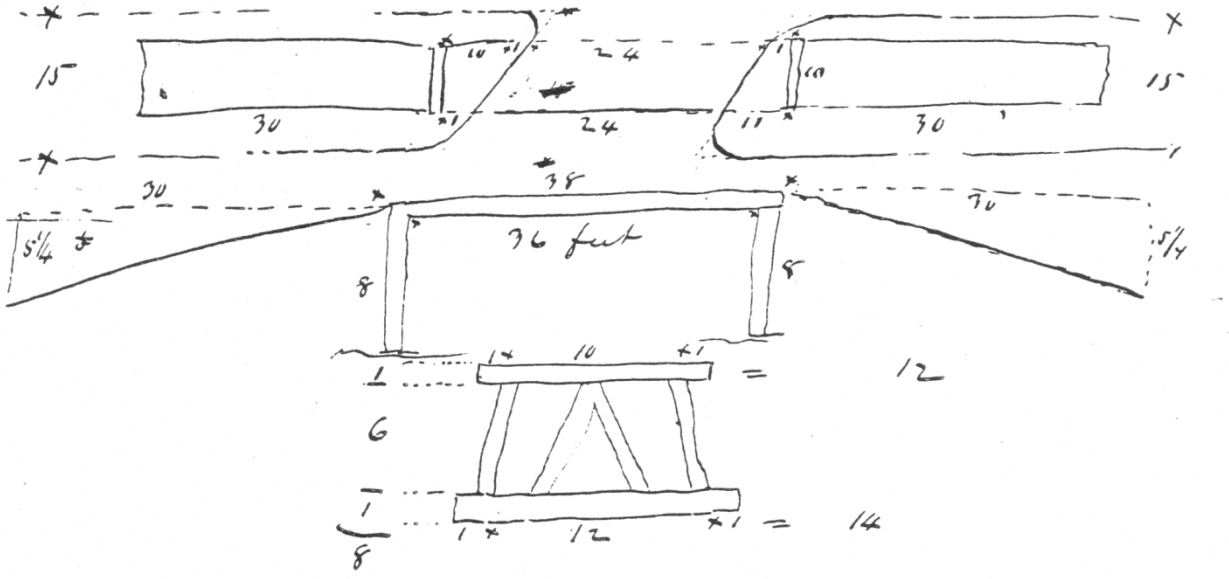
at	60 ft from old Shore	= 6 ½ ft:
"	120 " "	= 6 ¾
"	180 or near Middle	= 7.9 or nearly 8 feet.
"	240 ft from old Shore	= 6 7/8
"	300	= 6.0
"	350	= 0.0 being Va. Shore

The Bottom is of gravel (quite smooth)

Appendix E. Towpath Bridge at Edwards Ferry Outlet Locks

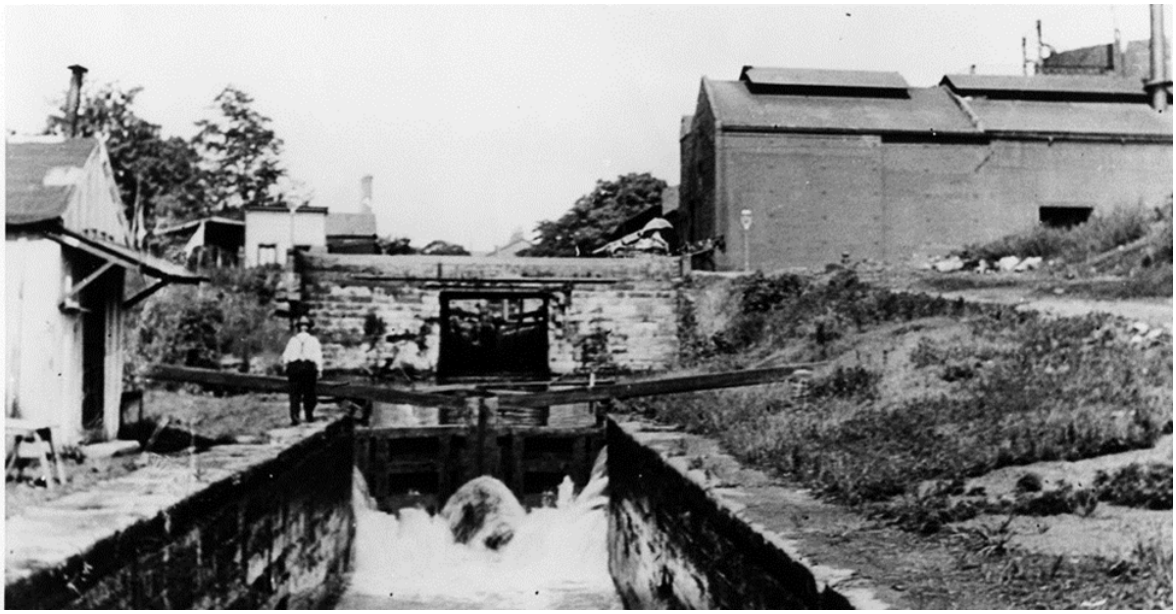
I propose to finish the Bridge in the best manner and to build it of the best materials - Yellow N.C. pine: the floor to be the common joisting - to have rails on both sides and to be painted, and put up at the same time with the gates, 10 days notice being given.

I annex a copy of the plan after you left with me, and an approximate estimate of the amount of timber & plank in it.



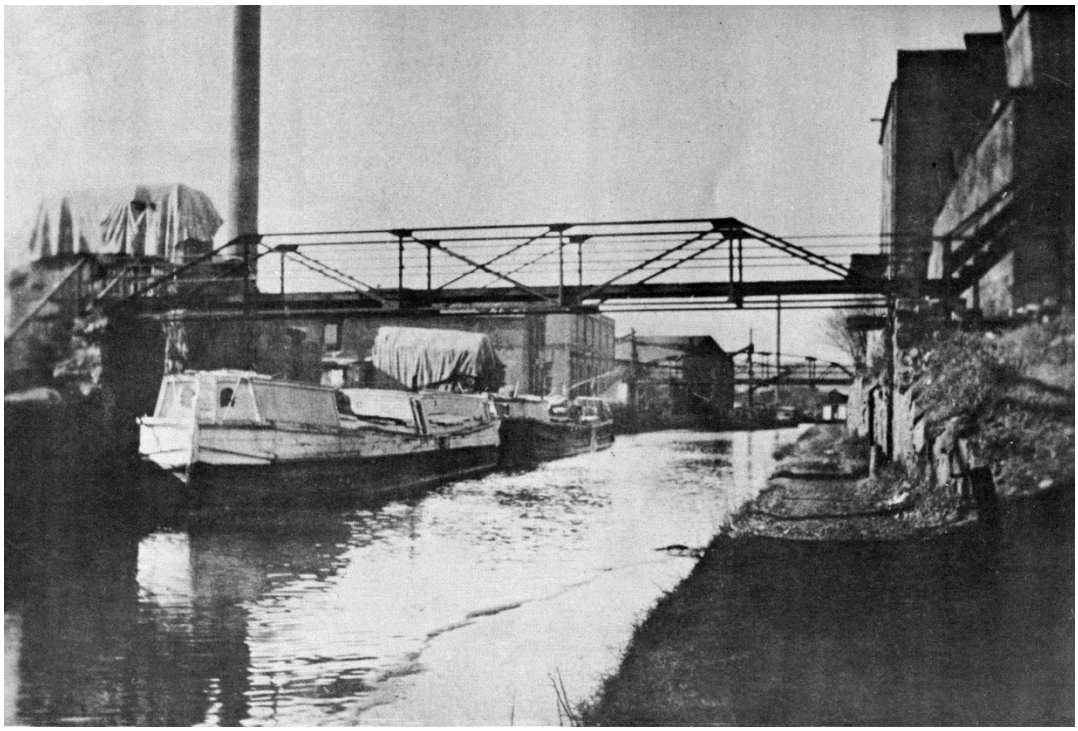
PHOTOGRAPHS and DIAGRAMS

1. K Street Bridge across Rock Creek above the Rock Creek Basin. Early 20th C.

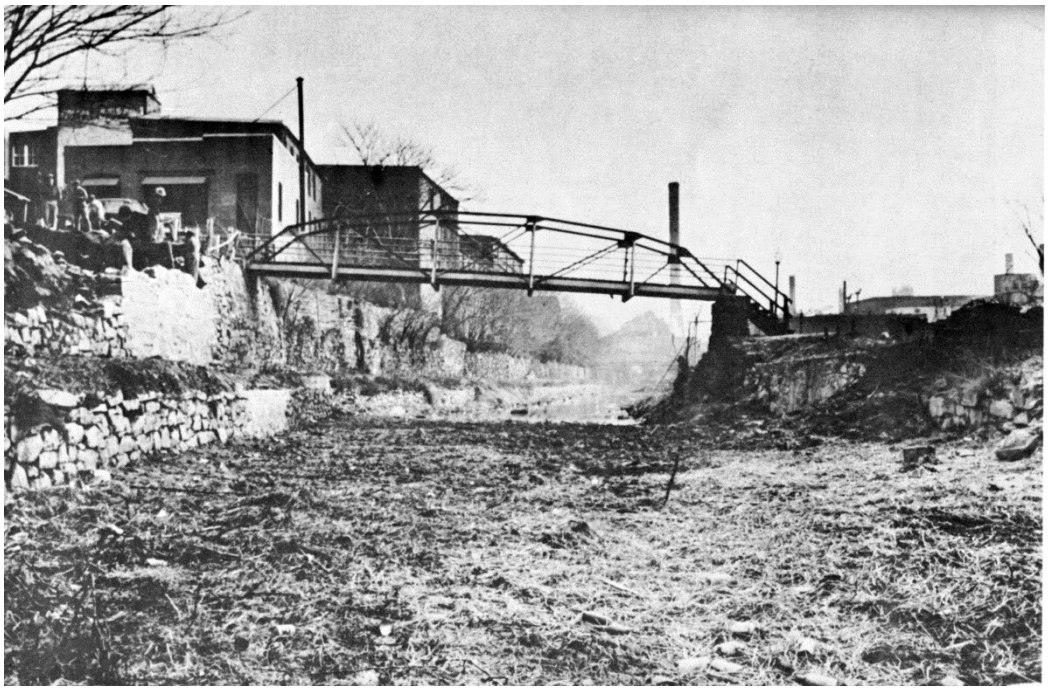


2. Bridge across the Basin above Lock No. 1. Early 20th C.

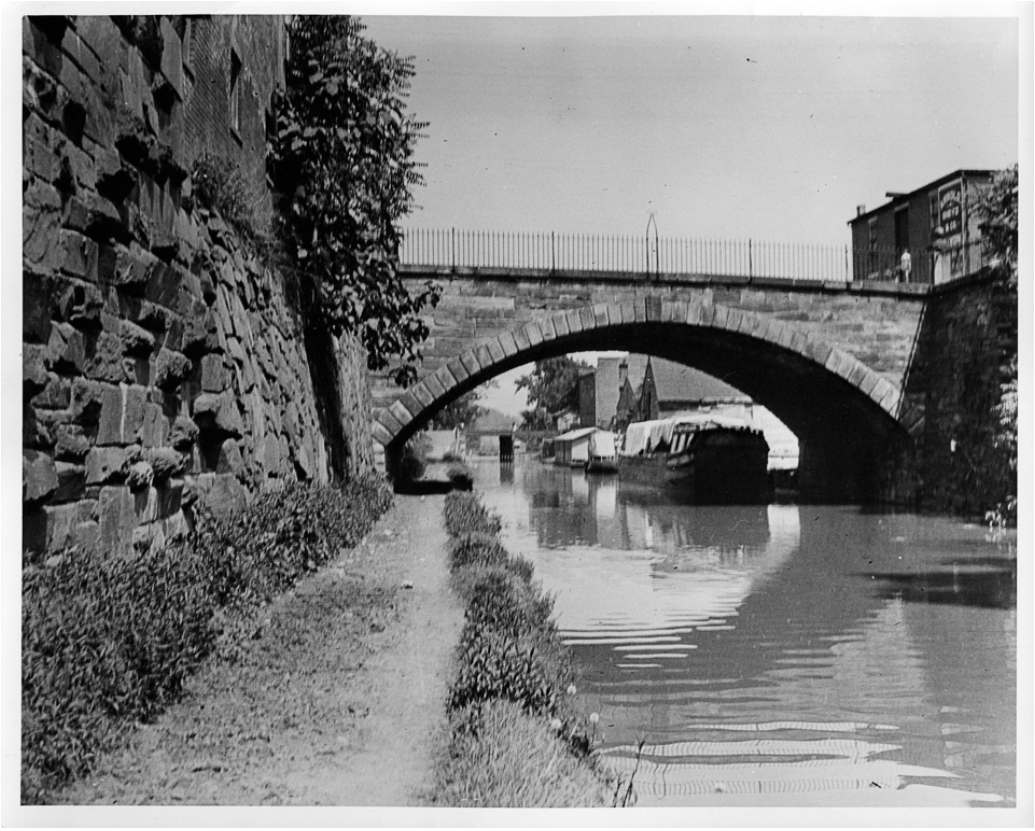
3. Bridge upstream from Lock No. 4.



4. Pedestrian Bridge East of the Georgetown Market at Potomac Street, looking West. This photograph was made about the turn of the century, after the wooden bridges were replaced by a steel structure.



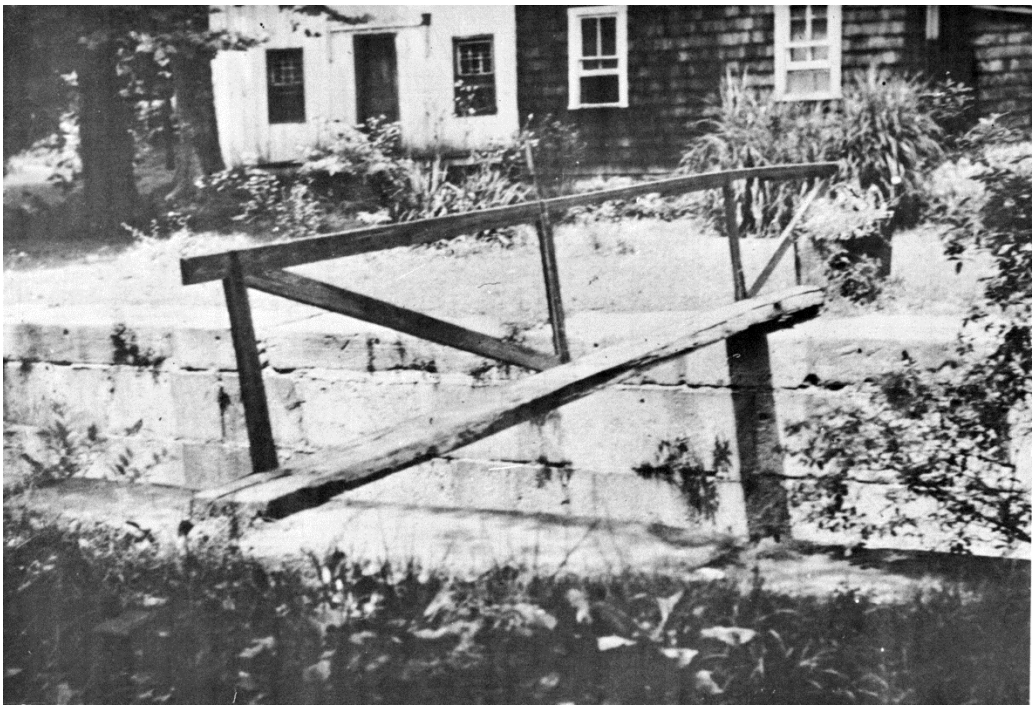
5. Towpath Bridge at 34th St., looking East.
This photograph was made in the mid-1930s.



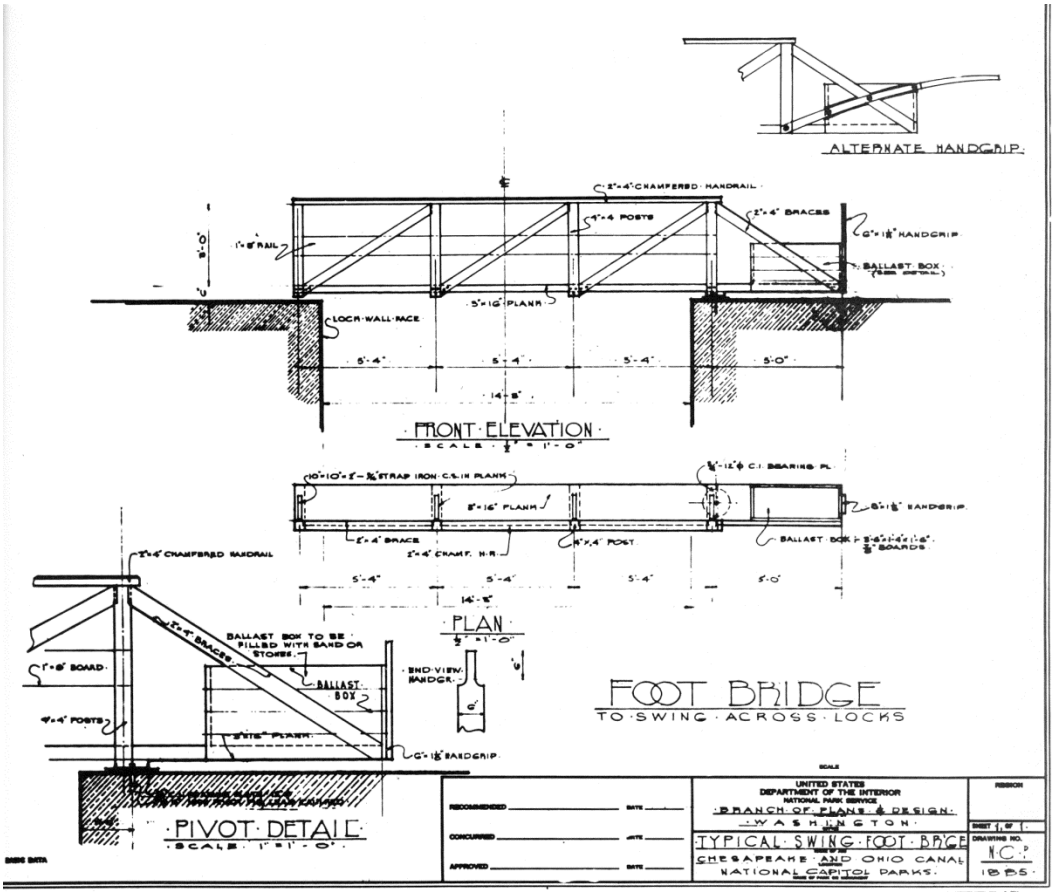
6. Stone Bridge in Georgetown at Wisconsin Avenue (High Street).
This bridge was completed in 1831.

7. Towpath bridge across canal above the Alexandria Aqueduct, circa 1862–1865.
Brady-Handy Photograph, Library of Congress Collection

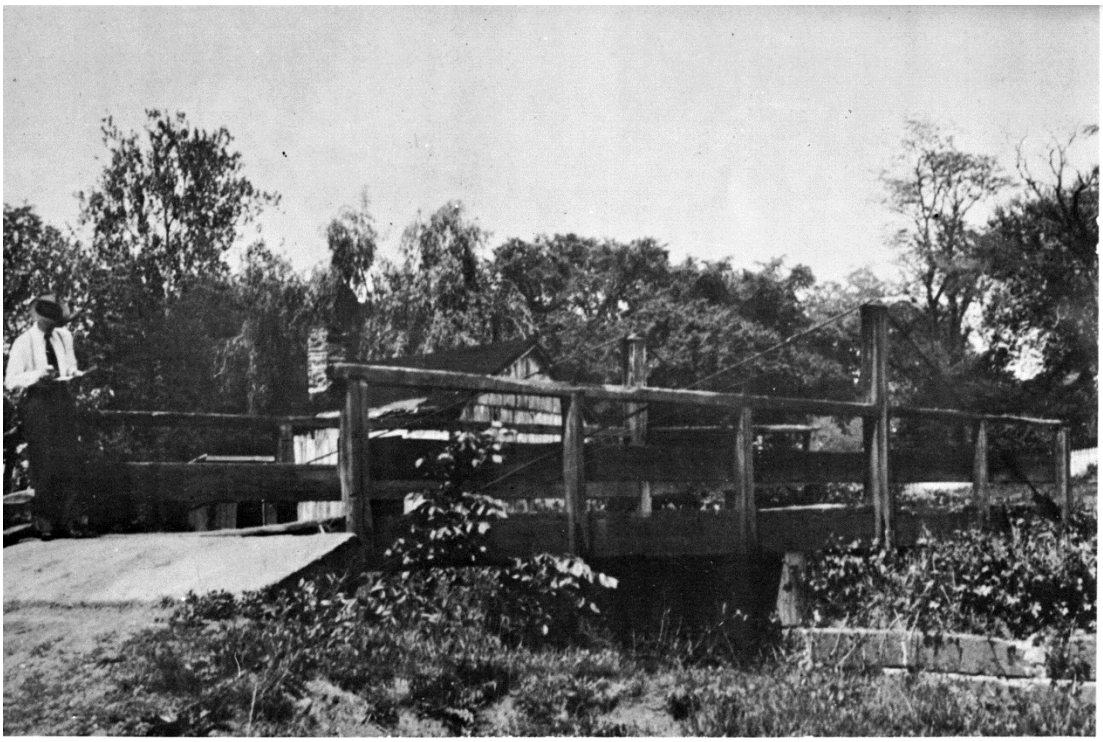
8. The Chain Bridge at Little Falls, circa 1861–1865.
Brady-Handy photograph, Library of Congress collection.



9. Photograph of pivot foot bridge at Lock No. 9, circa 1935.

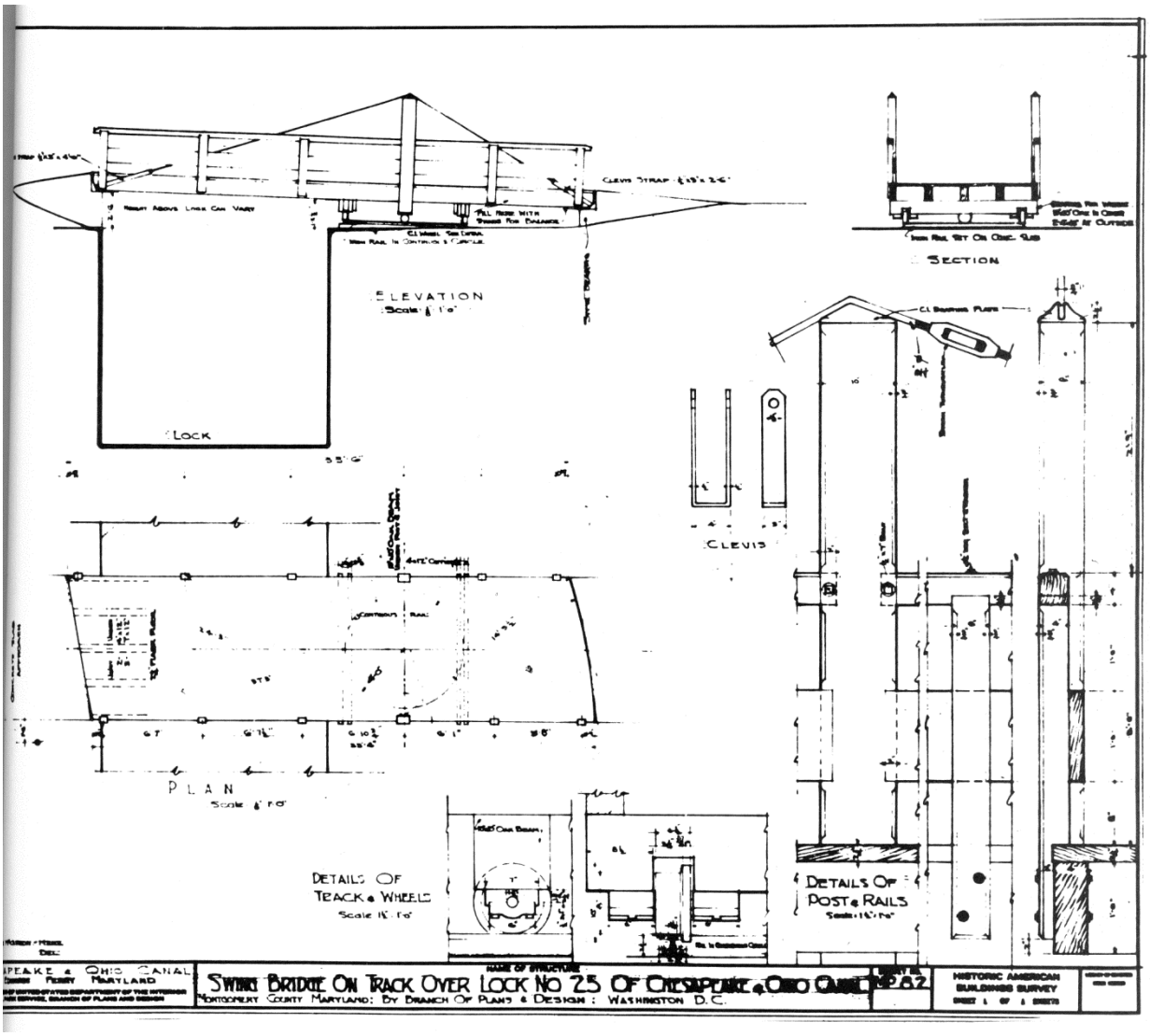


10. Plan of pivot foot bridge at Lock No. 9.



11. Photograph of pivot bridge at Lock No. 25, circa 1935.

12. Photograph from Pivot Bridge at Lock No. 25.

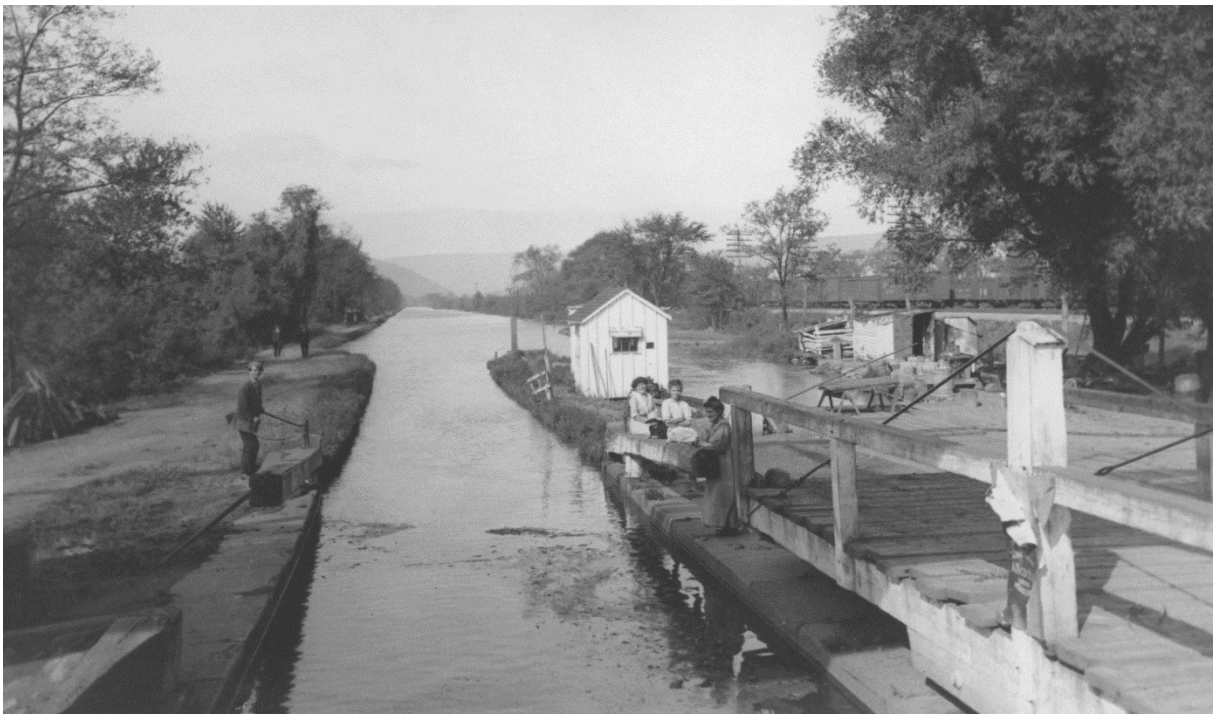


13. Plan of pivot bridge at Lock No. 25.

14. Iron Bridge abutment at Whites Ferry, built in 1876.

15. Iron bridge at Whites Ferry, built in 1876. Photograph September 1959.

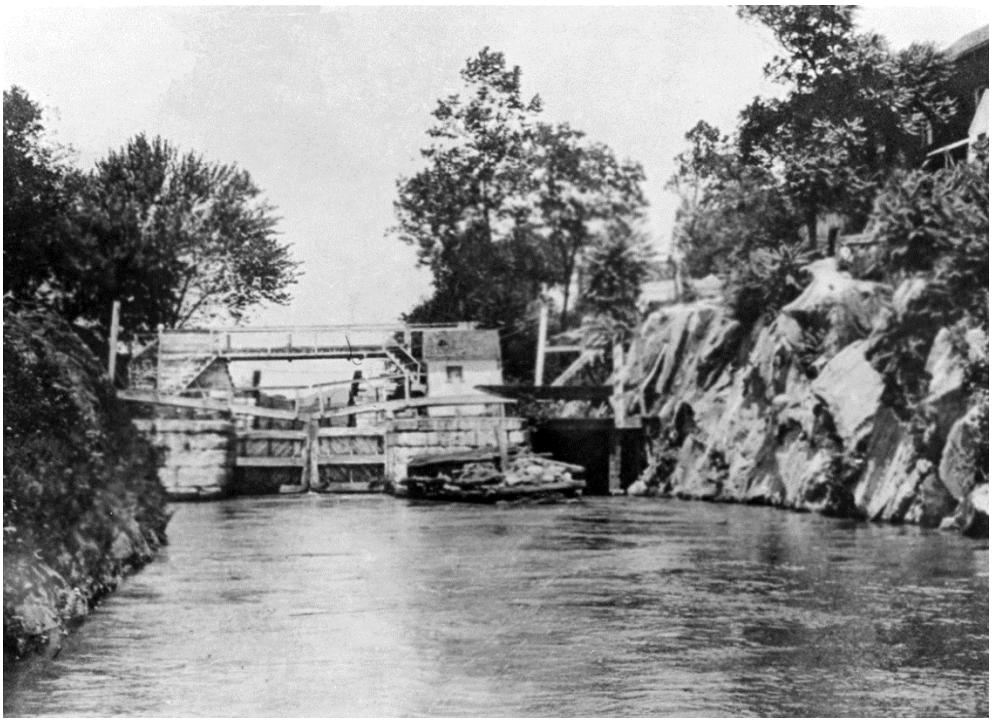
16. Iron bridge at Whites Ferry, built in 1876. Photograph September 1959.



17. Pivot bridge (on right) at Lock No. 29, Brunswick.

18. Road bridge across Lock No. 33 across from Harpers Ferry, circa 1890.

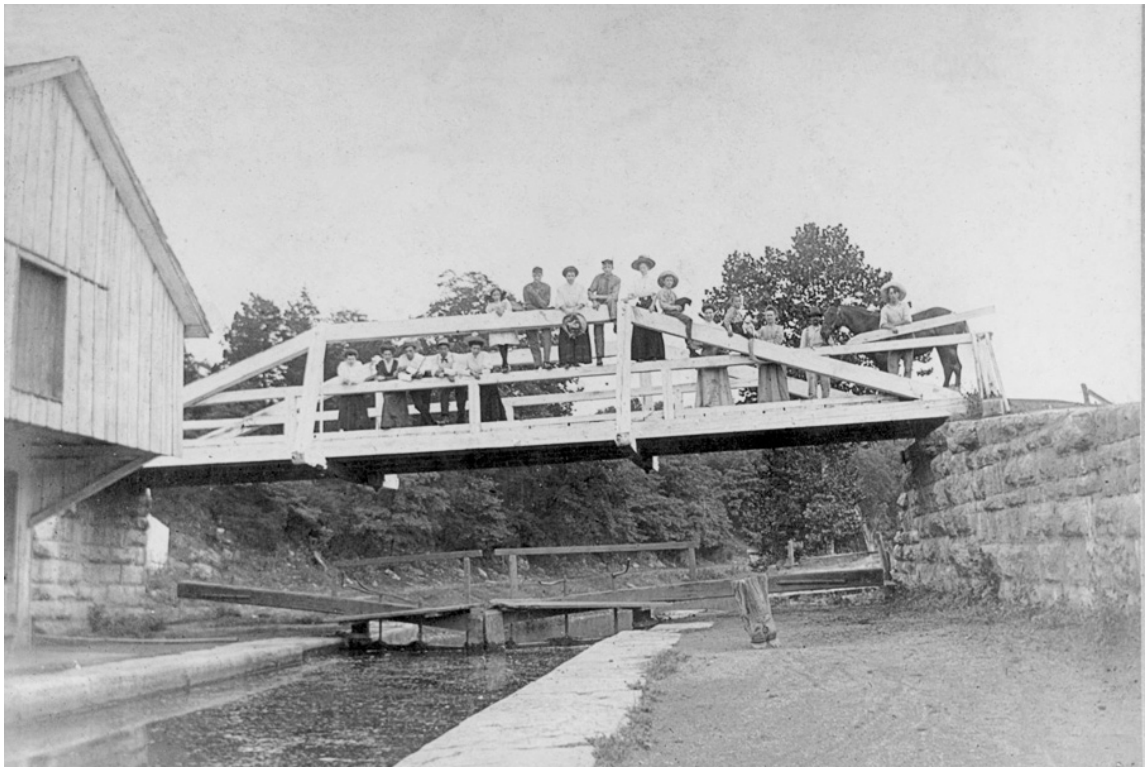
19. Towpath bridge crossing the inlet from Dam No. 3 just below Lock No. 35.



20. Towpath bridge across the upper end of the Inlet/Guard Lock at Dam No. 5. The bridge transferred the towpath from the river-side of the canal (on the right) across the inlet lock to the river shore (beyond the lock on the right) for the Little Slackwater section where the boats are in the river behind Dam No. 5.

21. Towpath bridge across the upper end of the Inlet/Guard Lock at Dam No. 5. This view is from the Little Slackwater approach into the canal. The canal with the towpath on the river side of the canal resume beyond the lock. Photograph is from September 1904.

22. Pedestrian and pivot bridges over the stop gate at the lower end of Big Pool, circa 1900.



23. Mule crossover bridge at Lock No. 46 above Little Slackwater.
Lock No. 45 is at the upper end of Little Slackwater and No. 46 just above it. The tow-path is on the river bank through the slackwater section and on the berm between Lock 45 and 46. It is transferred back to the river side of the canal by this bridge over Lock No. 46.

24. Steel and wood bridge at Lock No. 68.
This bridge and a 1865 pivot bridge that preceded it, served the road to a ford and ferry that crossed the river to South Branch Depot, later French Station, on the B&O RR.

25. Covered lattice bridge at Wileys Ford, circa 1890.