

**HISTORIC RESOURCE STUDY
CHESAPEAKE & OHIO CANAL NHP**

**7.
BOATS AND
NAVIGATION
REGULATIONS
ON THE C & O CANAL**

**BY HARLAN D. UNRAU
HISTORIAN, C&O CANAL RESTORATION TEAM, SENECA
DENVER SERVICE CENTER
1976**

CONTENTS

I.	BOATS ON THE CHESAPEAKE & OHIO CANAL: 1830–1924	331
	A. C&O CANAL BOATS: 1830–1850	331
	1. SEARCH FOR A SUITABLE BOAT	331
	2. TYPE OF BOATS THAT NAVIGATED THE CANAL	336
	3. FORMAL COMMENCEMENT AND OPERATION OF PACKET SERVICE	337
	4. RENEWED INTEREST IN STEAM NAVIGATION	341
	5. PROVISIONS FOR THE REPAIR OF BOATS	345
	B. C&O CANAL BOATS: 1851–1889	346
	1. GENERAL DESCRIPTIVE MATERIAL	346
	2. TOPICS OF SPECIAL CONCERN	356
	C. C&O CANAL BOATS: 1889–1924	361
	1. GENERAL DESCRIPTIVE MATERIAL	361
	2. GOVERNMENT OWNED COAL BARGES DURING WORLD WAR I	363
II.	REGULATIONS FOR NAVIGATING THE CHESAPEAKE & OHIO CANAL: 1830–1924	364
	A. REGULATIONS FOR 1830–1835	364
	B. REGULATIONS FOR 1835–1850	372
	C. REGULATIONS FOR 1851–1889	377
	D. REGULATIONS FOR 1889–1924	398
	APPENDIXES	399
	A. SIDE VIEW AND PLAN OF THE <i>SWIFT</i>	399
	B. EXPERIMENTAL RESULTS OF THE <i>SWIFT</i> , JULY 9, 1830	400
	C. SIDE VIEW AND PLAN OF THE <i>LORD DUNDAS</i> IRON TWIN BOAT	403
	D. PLAN AND DRAWING OF THE <i>CYCLOPS</i>	404
	E. DRAWINGS OF AN IRON STEAMBOAT	405
	F. DRAWINGS OF A CANAL STEAMER	406
	G. SPECIFICATION OF A LIGHT IRON PASSAGE BOAT	407
	H. JOURNAL OF EXPERIMENTS ON THE NAVIGATION OF THE CHESAPEAKE & DELAWARE CANAL BY STEAMBOAT <i>LEWIS</i> , SEPTEMBER 22, 1883	411

I.	EXTRACT FROM AN ACT OF THE GENERAL ASSEMBLY OF MARYLAND DECEMBER 1831	420
J.	ACT OF CONGRESS APPROVED JULY 14, 1882	422
K.	DRAWINGS OF CHESAPEAKE & OHIO CANAL FREIGHTER	423
L.	ACCOUNT OF LIFE ON A CHESAPEAKE & OHIO CANAL BOAT	424

I. BOATS ON THE CHESAPEAKE & OHIO CANAL: 1830–1924

A. BOATS ON THE CHESAPEAKE & OHIO CANAL: 1830–1850

1. SEARCH FOR A SUITABLE BOAT DESIGN

The first reference to boats in the canal company records occurred on June 26, 1828, about one week before the groundbreaking ceremonies. On that date, the canal board determined that a boat

be provided with suitable furniture and awnings to facilitate the survey and location of the line of the proposed canal, and for the use of the President and Directors and the Chief Engineer and his Assistants in the execution and superintendence of the said canal

Walter Smith, one of the directors, was authorized to contract for such a boat and to provide for its safekeeping and maintenance.¹

At the first annual meeting of the company stockholders in June 1829, President Mercer implied that the board had agreed upon the minimum dimensions for the canal boats. The general plan of the boats was to be similar to that used for the craft on the Erie and the Ohio and Erie Canals. They were to be at least 13½ feet wide and have a draft of 3 feet. The prow of the boats was to be rectangular, and the sides and the bottom of the boat were to conform accordingly, thus making the cross-section of the vessel 40.5 square feet. The rate of traveling speed was to be approximately 2½ miles per hour.

Beyond these practical considerations, Mercer voiced the dreams of the board that

Should the confident hope inspired by intelligence, recently received from the canals of Europe, as well as of the United States, be confirmed, and it be found practicable to substitute, on this canal, the application of steam, for animal labor, as its propelling power, its...surface will favor alike economy of transportation and the comfort of the traveler...Boats of elevated cabins and double decks, propelled by steam; well countervail, by a velocity of seven or eight miles an hour, the transient suspension of their motion by the locks; and by supplying the wants of every description of passengers, will afford at the same time, cheap accommodation to the needy and multiplied enjoyments to the rich.²

The canal company records are silent on the subject of boats until February 3, 1830, when Chief Engineer Benjamin Wright submitted his recommendations for a boat design to President Charles F. Mercer. Wright suggested that the boats should be 90 feet long and 14 ½ feet wide, as this would be the maximum size of craft that could take advantage of the canal's lock chambers (100 feet long and 15 feet wide). The boats should have a draft of 5 feet to take advantage of the 6-foot depth of the waterway. Such a boat would displace water equal to 5,460 cubic feet or 152 tons and 820 pounds. Since the boats would weigh approximately 22 tons and 820 pounds when they were empty, the design would permit the boats to carry a maximum cargo of 130 tons. When the canal was in full operation, he was certain that the draft of the boats could be increased slightly so that they could carry cargoes of up to 150 tons. Despite the fact that he submitted a sketch (no

¹ *Proceedings of the President and Board of Directors*, A, 7. It is probable that the packet *Charles F. Mercer*, completed two years later, was the boat acquired pursuant to this action of the board. On September 21, 1830, William Easby, a well-known boat builder in Washington, sent a bill for the construction of the *Charles F. Mercer* to the company the details of which may be seen on page 8. Easby to Mercer, September 21, 1830, Ltrs. Recd., C&O Co.

² *First Annual Report* (1829), C&O Co., 12–18, 16.

longer extant) to accompany his recommended boat design, Wright concluded that he did not wish to be misunderstood that he approved of this design as the most economical for use on the canal. On the contrary, he was convinced that boats carrying from 50 to 70 tons would be the best size for canal navigation, a notion no doubt emanating from his experiences on the Erie and Chesapeake and Delaware Canals.

Wright went on to discuss the design and velocity of passenger boats. Such craft would not vary much in their cross sections from that of the cargo-carrying boats. However they should be built lighter and have 6 to 8 inches more keel. They should be built so as not to draw more than 10 inches of water exclusive of the keel, and they should have sharper bows and cleaner runs in the stern. Four horses could pull these packets at a speed of 7 miles per hour, or three horses could pull them at a velocity of 6 miles per hour. Passage through a lock for such a boat should average between 2 to 3 minutes. While a small steam engine could be placed in the boats with a wheel in the stern to increase the velocity, he was certain that this was not practicable since the engine would take up considerable space and would create too much heat in warm weather for the comfort of the passengers.³

On February 5 the board ordered Clerk John P. Ingle to advertise for a boat design “suited to the navigation of the Canal both with and without steam power.” Proposals were also to be solicited for constructing the boats and a suitable steam engine.⁴

Within three weeks the Baltimore firm of Alexander Cummins and Andrew Armstrong made an offer to build boats and steam engines for the canal company. Cummins and Armstrong recently had constructed two boats having dimensions of 90 feet in length, 15 feet beam, 3 feet hold, and 8 to 10 inches draft for the Citizen’s Canal Line between Baltimore and Philadelphia. As the boats were still at their plant, they invited the company officials to make a personal inspection of their craft.⁵

Apparently, the canal officials were not interested in the offer of Cummins and Armstrong because the company records reveal no further communication relative to their proposal. Later on March 13, the directors authorized President Mercer to request Commodore John Rodgers to submit a plan for a canal boat.⁶

By early October 1830 the board was anxious to complete its search for an acceptable boat design as the canal between Little Falls and Seneca Falls was about to be opened for navigation. One boat (of undetermined description) traversed this entire distance on an experimental run on October 1.⁷ Three days later the board, having heard that a passenger boat called the *Swift* had been constructed on the Forth and Clyde Canal in Scotland which was faster and yet less injurious to the canal banks than the boats commonly in use, appointed Phineas Janney, one of the direc-

³ Wright to Mercer, February 3, 1830, Ltrs. Recd., C&O Co.

⁴ *Proceedings of the President and Board of Directors*, B, p.23.

⁵ Cummins and Armstrong to Ingle, February 25, 1830, Ltrs. Recd., C&O Co.

⁶ *Proceedings of the President and Board of Directors*, B, 43. Born at Lower Susquehanna Ferry (now Havre de Grace), Maryland in 1773, Rodgers was the son of a Scottish emigrant who served as an officer in the Maryland militia during the Revolution. After spending eleven years in the merchant service, President John Adams appointed him second lieutenant on board the *Constellation* on March 8, 1798, during the naval war with France. He participated in the wars with the Barbary pirates from 1802 to 1806, and as a result of a war-scare growing out of the affair involving the *Chesapeake* and the *Leopard*, he was placed in command of the New York flotilla and naval station in July 1807. In the War of 1812 he was the ranking officer in active service, and he took part in cruises extending to the east coast of Spain and in the defense of Washington and Baltimore. In 1815 President James Madison appointed him to head the newly created Board of Navy Commissioners, authorized by Congress to administer the navy material. Six years later he became the senior officer of the navy and in 1823 he served for a time as secretary of the navy *ad interim*. He remained a commissioner until 1837 when he resigned because of ill health, partly the result of a cholera attack. *Dictionary of American Biography*, Vol. XVI, 75–77. There is no record of whether Rodgers submitted the requested sketch. If it was sent to the board, the drawing and other pertinent material is no longer extant.

⁷ Van Slyke to Board of Directors, October 2, 1830, Ltrs. Recd., C&O Co.

tors, to determine if this were true. Should he find the rumor to be correct, he was to obtain drawings and specifications of the boat so that it could be built for use on the canal.⁸

Upon examination of the available information on the *Swift*, Janney found that the boat was 60 feet long, 8 feet 6 inches wide, twin built, and fitted to carry 50 to 60 passengers. The width of its center trough (extending longitudinally down the middle of the boat) was 2 feet 6 inches at the low, 22 inches at amidships, and 3 feet 6 inches at the stern. It was gig-built, light timbered, and weighed about 2,700 pounds.

Janney also acquired a copy of the book *Remarks on Canal Navigation* (1831) by William Fairbairn, a Scottish engineer involved with Thomas Grahame in experiments testing the seaworthiness of the *Swift* on its maiden voyage between Glasgow and Edinburgh on July 7–9, 1830. According to Fairbairn, the *Swift* averaged 6 to 12 miles per hour on its 113-mile journey. Furthermore, it appeared that

when she moved through the water, at the rate of six or seven miles per hour, there was a great swell or wave constantly in her front, and she was followed by a strong surge or wave, bearing against the bank of the canal. At these times, the hauling rope was tight, and the horses appeared to be distressed. But as the speed was increased, the wave or swelling of water in her front sunk down; and when the speed came to be about nine miles per hour, the swell entirely disappeared; the waters in her front became smooth and level; the hauling rope slackened; and the horses seemed easy, and little or no surge was to be seen on the banks behind the vessel.

There appears, therefore, no reason to fear, that the banks of canals can ever be hurt, by increasing the speed of boats to the utmost attainable height. . .⁹

The results of Janney's research on the *Swift* apparently impressed the company officials. In the *Third Annual Report* of the company in June 1831, President Mercer quoted extensively from Fairbairn's observations, and in a special report to Congress relative to the progress of the canal submitted on April 17, 1834, Mercer again devoted considerable space to the experiments made on British canals.¹⁰

While Janney was conducting his study of the Scottish experiments, the canal between Locks Nos. 5 and 23 rapidly became a busy thoroughfare. By mid-November 1830, it was reported that numerous boats had passed over this distance.¹¹ The following month it was reported that 45 boats passed through Locks Nos. 17–20 in one day.¹² While there is no available information concerning the physical description of these boats, it can be assumed that they were of various types and sizes.

During this period the directors undertook an experiment to see how quickly a boat could pass through the locks. It was found that the fastest passage through a lock took 2½ minutes, while the average time was slightly less than 3 minutes. The boat used for the experiment was 75 feet long and 11 feet 8 inches wide.¹³

⁸ *Proceedings of the President and Board of Directors*, B, 194–195.

⁹ William Fairbairn, *Remarks on Canal Navigation* (London, 1831), 25–27, 88. A copy of the side view and plan of the *Swift* may be seen in Appendix A, and a copy of the experimental results during the trip of the *Swift* may be seen in Appendix B.

¹⁰ *Third Annual Report* (1831), C&O Co., in *Proceedings of the Stockholders*, A, 152–159, and U. S., Congress, House, Committee on Roads and Canals, Chesapeake and Ohio Canal, H. Rept. 414, 23 Cong., 1st Sess., 1834, 377–378.

¹¹ *Second Annual Report* (1830), C&O Co., 32.

¹² *Frederick Town Herald*, January 15, 1831.

¹³ *Niles' Register*, Vol. XXXIX (November 27, 1830), 8.

Early in the spring of 1831 the canal navigation was opened one mile below Lock No. 5 and within two months it was further extended another mile, thus permitting navigation within several hundred yards of the boundary of Georgetown. Soon a “passage boat” was carrying United States mail daily between Georgetown and Seneca “in connection with two lines of public stages, which pass over to Leesburg, in Virginia, crossing the Potomac, at Edward’s Ferry.”¹⁴

Sometime during the spring of 1831 a packet service was begun on the canal between Little Falls and Seneca Falls. In May two articles appeared in the *National Intelligencer* and *Niles’ Register* describing the packet boat and the trip up the canal to Great Falls as follows:

It is not easy to imagine a more delightful excursion for pleasure at this season of the year, than that in the canal packet boat to the falls, or even to Seneca. The boat is very handsomely fitted and furnished for the service it is employed in....The hands at some of the locks are not as dexterous in the management of them, perhaps, as longer practice will make them. The passenger who is not on his guard, may chance thus to get a jolt or two; but as this involves no danger he will not regard it. The bridges over the canal are few; and a moderate inclination of the body enables those who stand on the roof, (or deck), of the boat to pass under them; whilst those who remain in the cabin are as much at ease and as comfortable as if they were in their parlors or drawing rooms at home. The packet-boat is drawn by three horses, at the rate of six miles an hour whilst in motion. The passage of the locks of course causes some detention, but we made the whole passage to the falls, with about seventy persons on board, in less than four hours.¹⁵

At the third annual meeting of the stockholders in June 1831 the General Committee was authorized to “enquire into the practicability and expediency of introducing a steam boat navigation” on the canal and on the Potomac River.¹⁶ While the canal company records do not indicate the reasons that this decision was made, similar experiments were already underway on other American canals and Fairbairn’s book on canal navigation probably was a factor as he described four experimental steam-powered canal boats either already operating or under construction for use on the Forth and Clyde Canal. His descriptions of the four models were as follows:

TWIN STEAM BOAT

Whole length—68 feet

Breadth on beam—11 feet, 6 inches

Depth—4 feet, 6 inches

Width of tunnel or wheel-trough—3 feet, 10 inches. This wheel-trough extends longitudinally down the middle of the boat;—it is made wider at each end, in order to facilitate the supply and escapement of water from the paddle wheel.

Depth of tunnel—3 feet, 6 inches

Steam engine—10 horses’ power, which it is intended shall give from 50 to 60 strokes, or thereabouts, per minute.

Diameter of paddle wheel—9 feet

Whole weight, including engine, paddle-wheel, & c.—7 tons, 16 cwt.

Draft of water—16 inches.

¹⁴ *Third Annual Report* (1831), C&O Co., 5.

¹⁵ Washington *National Intelligencer* quoted in *Niles’ Register*, Vol. XL (May 21, 1831), 206.

¹⁶ *Third Annual Report* (1831), in *Proceedings of the Stockholders*, A, 179.

CYCLOPS

Whole length—68 feet
Breadth on beam—15 feet, 6 inches
Depth—about 7 feet, 3 inches from the keel to the deck
Weight, including engine, boiler, fittings, & c.—about 38 tons
Steam engine—14 horses' power
Plan—American, based on steam boat plying Mississippi River at New Orleans
Draft of water—4 feet, 6 inches aft and 1 ½ inches forward (when lightly loaded)

IRON STEAM BOAT

Whole length—68 feet
Breadth on beam—15 feet
Depth from keel to deck—8 feet
Steam engine—24 horses' power, having two cylinders on the locomotive principle: paddle wheels, each 11 feet diameter, and 3 feet wide
Weight, including paddle wheels, engine, & c.—22 tons, 12 cwt., 9 lbs.
Carrying cargo—50 tons
Draft of water—3 feet, 9 inches
Material—strong iron ribs and plate sheeting about 1/4 inch thick

CANAL STEAMER

Whole length—88 feet
Breadth of beam—20 feet
Depth from keel to deck—9 feet
Steam engine (high pressure)—60 horses' power, having two cylinders as per plan
Paddle-wheels—12 feet diameter each and 4 feet wide
Whole weight, including steam engine, paddle wheels, rigging, stores, & c.—46 tons, 4 cwt., 3 qrs.
Carrying cargo—116 tons
Draft of water—4 feet, 6 inches.¹⁷

Although the stockholders' General Committee investigated the possibilities of introducing steam navigation on the waterway, the directors disapproved of the idea. On July 16, 1831, the board adopted regulations for the navigation of the canal which specifically excluded the use of steam boats on the waterway by stating that "every boat or float, navigating the Canal after the 15th day of August next, shall be propelled by a towing line drawn by men or horses."¹⁸

BILL FOR CONSTRUCTING THE *CHARLES F. MERCER*

Labor, 588 days work	\$747.30
Lumber, knees, etc.	441.00
Hardware	125.00
Painting	219.00
Smiths bills	48.94
Freight of timber in from Alexandria	12.00

¹⁷ Fairbairn, *Remarks on Canal Navigation*, 31, 89–93. Copies of drawings of the four boats may be seen in Appendices C, D, E, and E-1 respectively.

¹⁸ *Proceedings of the President and Board of Directors*, B, 410.

Sundries	12.45
Superintendence	<u>147.00</u>
	\$1,752.69

The *Charles F. Mercer* was later leased to W. W. Fenlon to use as a packet. Fenlon was appointed lock tender at Locks Nos. 19–20, and he later operated Crommelin House as a tavern-hotel for tourists.¹⁹

2. TYPE OF BOATS THAT NAVIGATED CANAL

There are no drawings, specifications, or detailed descriptions of the early boats that plied the canal. However, a general picture of the various craft can be gathered from the regulations established by the board, numerous complaints of violations of those rules, and, in a few cases, brief newspaper and periodical account.

According to the regulations for navigating the canal adopted by the board on July 16, 1831, all boats or floats were to be propelled by a towing line drawn by men or horses. They were to be furnished with strapping or snubbing lines for passage through the locks without damaging them. Iron shod or sharp-pointed setting poles were not to be used in navigation. Boats traveling at night were required to have a light on the bow and rafts, gondolas, or scows were to have the light at the forward end of the bow. Square-headed or sharp-covered boats, such as scows and gondolas, were to have a semicircular platform firmly fastened upon each end so as to save other craft and the canal prism and masonry from injury by contact with the corners. The rudders on the boat were to be constructed in such a manner that they would not interfere with or cut the towing rope of a passing boat. No raft or tow of timber was to consist of more than eight cribs; if they were comprised of more than one crib, they were to be joined so that they could conform to the curvatures of the canal banks and could glide past them without rubbing.²⁰

In addition to the by-laws concerning the design and operation of the boats on the canal, the directors classified the craft into four general categories. These boat classifications were as follows:

1. Packet boats—designed for passenger transportation only
2. Freight boats—designed for passage and freight
3. Scows—large, flat-bottomed boats having broad square ends
4. Gondolas—long, narrow, flat-bottomed boats with a high prow and stern.²¹

Despite the passage of the regulations and the lengthy search of the board to find suitable designs for boats, the quality of the boats operating on the canal quickly became a point of particular grievance to the company officials. No one appeared to be willing or able to undertake to fulfill the directors' dreams of steamers and double-decked packets plying the waterway at speeds up to 8 miles per hour.²² In fact, the boatmen were reluctant to meet even the minimum requirements of the regulations. Complaints were frequently made of iron-shod boats, leaky scows, drifting rafts, and sunken wrecks obstructing navigation.²³ By the enforcement of the regulations, the provision of drydocks, the assessment of fines, and by other devices the company sought to drive undesir-

¹⁹ *Proceedings of the President and Board of Directors*, B, 455; C, p.7.

²⁰ *Ibid.*, B, 410–419.

²¹ *Ibid.*

²² *First Annual Report* (1829), 16.

²³ *Proceedings of the President and Board of Directors*, C, 30, and Young to Ingle, October 25, 1838, and Stone to Ringgold, June 6, 1847.

able craft off the waterway and to encourage the construction of new and larger boats. In this they were partly successful, assisted by the growing demands of the trade, as the size of the boats increased steadily. The directors also levied a rate discrimination of 100 percent against rafts in April 1835.²⁴

By the spring of 1835 larger and better-built boats were plying the canal. On April 11, 1835, the Williamsport *Banner* reported that the “first regularly formed boat, which has entered the canal at its head (Dam No. 5),” had arrived in the basin there. Named the *Lady Washington*, it had a capacity of some 800 barrels of flour. The boat was a “handsomely decorated and ‘trim built’ craft, with a cabin roof of white with red hangings painted upon it.”²⁵

In May 1835 the canal company determined to solicit plans for building boats and scows that were needed on the canal. One of the results of this effort was a specification for scows, which appears in the company records of 1836.²⁶ Nevertheless, the lumber trade and the incidental trade of the farmers, who built their own craft designed to last for only one trip (usually to be sold at Georgetown for firewood), made the struggle for better boats a never ending one.²⁷

SPECIFICATION FOR A SCOW

Length 80 ft., breadth at bottom 13 ½, at top 14 ft., depth 40 inches from out to out sides 7 ½ inches thick at bottom 4 ½ at top and not exceeding two pieces in depth or two in length of yellow heart pine.

18 floor timbers, 4 x 6 inches white oak
2 head pieces 10 by 10 inches white oak
3 Kelsons 6 x 8 inches white oak
3 deck stringers 6 by 8 inches white oak supported by stanchions
18 knees on each side 6 inches by 8 of white oak
Deck and bottom of 2 inch yellow pine

Plates of iron 4 in. by 3/8 on the rakes each plate 9 feet in length
The rake 6 feet measured horizontally
The deck to raise in the center 3 inches
5 inch spikes—3 to be used at each end of each plank
and 2 at each intermediate support
The four angles of the boat to be well braced
A sufficient pump.”

The whole to be done in a workmanlike manner and to be completed and delivered in the basin of Rock Creek on or before the day of 1836.

3. FORMAL COMMENCEMENT AND OPERATION OF PACKET SERVICE

Although packet service had been commenced on the canal in the spring of 1831, it was not until July of that year that formal authority was granted for such an operation. On July 1, 1831, permis-

²⁴ *Proceedings of the President and Board of Directors*, D. 284–285.

²⁵ Williamsport *Banner*, April 11, 1835.

²⁶ *Proceedings of the President and Board of Directors*, D. 307–308, 320–321. A copy of this specification may be seen on the following page.

²⁷ Walter S. Sanderlin, *The Great National Project: A History of the Chesapeake and Ohio Canal* (Baltimore 1946), 187–188.

sion was granted to the proprietors of the packet boats, *George Washington* and *Tyber*, to navigate the canal subject to the charges and regulations of the company.²⁸ As part of the regulations for navigating the canal passed by the board on July 16 Rule 27 made the following stipulations for packet service:

No boat shall be used as a Packet Boat on said Canal, unless specially licensed therefore, which license shall give to the said Boat the privilege of carrying passengers to and from any point on said Canal, between the Basin at Georgetown (water was not admitted into the canal through Georgetown to Rock Creek Basin until September 19) and Rushville: and the owner or master of said Packet Boat shall pay for every trip up or down between said Basin and Rushville, or any intermediate points, the sum of one dollar and fifty cents, which sum shall be paid weekly to such Collector as may be authorized to receive the same, and on any failure to pay the said sum, or fraudulent return by the owner, master, or other person having charge of the said Boat, of the number of voyages made in the week by said Boat, its license shall be forfeited.²⁹

Ten days later the board authorized Clerk Ingle to grant licenses to W. W. Fenlon, L. M. Offutt, and Charles Embrey, the owners or operators of the packet boats *Charles Fenton Mercer*, *George Washington* and *Lafayette*, respectively. At the same time, the Collector of Tolls at Little Falls was authorized to collect tolls from all packets plying the waterway.³⁰

Advertisements in Georgetown newspapers indicate that great efforts were made by the packet proprietors to commence an active excursion business. One such advertisement inserted in the *Columbian Gazette* by L. M. Offutt noted that the *George Washington* made daily runs from Frederick Street Bridge in Georgetown to Great Falls, leaving the former at 8:00 a. m. and returning “at, or before sunset.” The fare was 50 cents per passenger for a round trip, and the excursion included dinner at Crommelin House.

An advertisement inserted in the same newspaper by Thomas Thorpe the agent for the *Lafayette*, informed the readers that the packet would accommodate 100 people without crowding and afforded room for twenty couples “in a cotillion at a time.” The boat made runs between Georgetown and Great Falls for the fare of \$1.00 per passenger. Dinner could be purchased on board, the excursion parties could provide their own food, or dinner could be eaten at Crommelin House.³¹

Although there are few eye-witness accounts of the packet trips to Great Falls by passengers or crew, one such glimpse does appear in the writings of Edward Thomas Cole, an Englishman who visited the Potomac Valley during the summer of 1832. Describing his excursion up the canal on one of the daily packets, he wrote that

the traveling was most delightful. I was the only passenger, and there was a neat, well-furnished cabin about 50 feet long by 14 broad. We were drawn by three horses at the rate of five miles an hour, a huge negro riding on the beast, and driving the other horses before him with a long whip, which he flourished and cracked most adroitly.³²

²⁸ *Proceedings of the President and Board of Directors*, B, 402.

²⁹ *Ibid*, B, 416–417.

³⁰ *Ibid*, B, 434.

³¹ *Georgetown Columbian Gazette*, July 3, 21, 1832.

³² Edward Thomas Cole, *A Subaltern's Furlough: Descriptive of Scenes in Various Parts of the United States, Upper and Lower Canada, New Brunswick, and Nova Scotia, During the Summer and Autumn of 1832* (London, 1833), 115–116.

There are no records indicating the number of passengers actually carried on the packets, but there is evidence that the packet trade was generally unprofitable. On September 16, 1831, the toll on packet boats was reduced to \$1.00 per trip as a means of encouraging the languishing service.³³ The following summer on July 3, the *Columbian Gazette* reported that the *Lafayette* would be sold at public auction after July 4.³⁴ On July 21 the last advertisement, which was greatly reduced in size compared to earlier entries, appeared in the *Columbian Gazette* for the *George Washington*.³⁵ Only the *Charles F. Mercer* appears to have continued operating as a packet, but as there is no available documentation on its service it is impossible to assess its profitability.³⁶

After a period of time in which the packet service on the canal nearly came to an end, William Easby on April 27, 1833, sent a proposal to the company for the construction of a sheet-iron packet. The proposal was referred to Directors John J. Abert and William Gunton, and they promptly requested information from the Chesapeake and Delaware Canal Company, which was experimenting with such a boat on its waterway.³⁷ Apparently, the directors were satisfied with the experimental results on the Chesapeake and Delaware, because, when Easby submitted a second proposal to the board on September 13 to build a sheet-iron packet, Gunton and Walter Smith, a fellow director, were authorized to negotiate a contract for its construction.³⁸ Another reason for their acceptance of Easby's proposal at this time was the fact that water would be admitted to the canal between Dams Nos. 2 and 3 by November 1, and they were anxious to have a packet service established between Georgetown and Harpers Ferry by the spring of 1834.³⁹

While Easby was building the packet at his boatyard in Washington, company officials made the necessary arrangements for the passenger service. On November 22 Gunton and Smith were authorized to purchase the furnishing for the boat, and President John H. Eaton was requested to engage the necessary drivers and horses to propel the craft.⁴⁰ In March 1834 the packet, which was named *The President*, was delivered to the company at a cost of \$1,400.⁴¹

Although there are no extant drawings or plans of this packet, it is possible that Easby was influenced by the design of a light iron passage boat used for experiments on the Forth and Clyde Canal by Sir John Benjamin MacNeill in the spring of 1833.⁴² While the assertion cannot be proved, it can be documented that MacNeill's work was widely-read by canal men in America and that the Chesapeake and Ohio officials gave great prominence to his observations on the most effective design and velocity of canal boats.⁴³

After several months of operation, the canal company, which was rapidly approaching bankruptcy, determined to sell the packet and six horses to James B. Wager for \$1,600 and to grant him toll-free privileges on the canal until December.⁴⁴ Apparently, the sale was never made because on June 16, 1835, the directors ordered that the "Iron Boat belonging to the Company be

³³ *Proceedings of the President and Board of Directors*.

³⁴ Georgetown *Columbian Gazette*, July 3, 1832. On January 12, 1833, the canal company purchased the *Lafayette* for \$300 and fitted it for the accommodation of hands employed under the Superintendent of the Canal. *Proceedings of the President and Board of Directors*, C, 263, 264, 278.

³⁵ Georgetown *Columbian Gazette*, July 21, 1832.

³⁶ Ingle to Offutt, March 22, 1834, Ltrs. Sent, C&O Co.

³⁷ *Proceedings of the President and Board of Directors*, C, 331, 336.

³⁸ *Ibid*, C, 426.

³⁹ *Ibid*, D, 3.

⁴⁰ *Ibid*, D, 20.

⁴¹ *Ibid*, D, 55, and Ingle to Offutt, March 22, 1834, Ltrs. Sent, C&O Co. Approximately 2 ½ tons of iron were used in the construction of the packet.

⁴² Sir John Benjamin MacNeill, *Canal Navigation, On the Resistance of Water to the Passage of Boats Upon Canals and Other Bodies of Water* (London, 1833). A copy of the specification used to construct the light iron boat may be seen in Appendix F.

⁴³ House Report 414, 318–378.

⁴⁴ *Proceedings of the President and Board of Directors*, D, 109.

put in order for use; and, that \$50 be advanced to William Easby on that account.”⁴⁵ After being refitted, the iron packet failed to turn a profit and on December 11, 1836, the board ordered that it be sold at a price of not less than \$200. In turn, the vessel was offered to Easby for \$300, but when he demurred, it was recommended that it be sold to Hugh Smith who would melt the sheet iron and produce lock gate castings for the company.⁴⁶

Despite the unprofitability of a regular passenger service, the canal company continued to promote such an operation by periodically taking government officials on well-publicized excursions from Georgetown to Great Falls, Seneca and Harpers Ferry. These trips were usually taken on the *Charles F. Mercer*, which apparently by this time had been reacquired from W. W. Fenlon. One such occasion took place in early August 1835 when President Andrew Jackson and a company of fifty people were the guests of the canal board. The party left Georgetown at 8:30 a.m., the U. S. Marine Band serenading the group on board. After reaching Seneca, the party ate dinner on the boat—a “sumptuous” meal consisting of “a great variety of good things, embracing an abundance of the choicest luxuries of the season, and a generous supply of capital wines and beverages. After dinner the guests retired on deck, and as they approached Georgetown the ladies honored the men “with their company in the pleasing amusements of the dance.”⁴⁷ A similar junket was taken in the spring of 1836 when the directors sponsored a trip for a number of Congressmen from Georgetown to Harpers Ferry at a cost of more than \$1,700.⁴⁸

During the summer of 1835 the canal company made another attempt to commence a packet operation on the waterway. A committee was formed to study the matter on July 2, and the following day it submitted to the directors the form of a contract which it proposed be used to enter into an agreement with a private company for the operation of a packet service. The directors adopted the recommendation and authorized the committee to negotiate such a contract for one year.⁴⁹ On September 11 an agreement was made with O. M. Linthicum, president of the recently organized Georgetown Canal Packet Company, to operate daily packets between Georgetown and Harpers Ferry for one year free of tolls.⁵⁰

The packet service appears to have prospered under the new arrangement. On October 10 a new contract was signed with the packet company extending the service to Shepherdstown.⁵¹ With the coming of cooler weather, Linthicum on October 30 requested and received permission to reduce the number of trips from one per day to three per week until March 1, 1836.⁵² Despite its success, the packet company reported that it was forced to operate on a “strict economy” in order to turn a profit.⁵³

During the summer of 1836 packet service was extended from Shepherdstown to Williamsport by a new packet company operated by Joseph Hollman, the contractor for Dam No. 4. On June 20 an agreement was signed granting Hollman the same privileges that had been pro-

⁴⁵ *Ibid*, D, 339

⁴⁶ *Ibid*, E, 180, and Ingle to Smith, December 16, 1836, Ltrs. Sent, C&O Co.

⁴⁷ *Niles' Register*, Vol. XLVIII (August 15, 1835), 431.

⁴⁸ *Proceedings of the President and Board of Directors*, E, 43, 63, 181.

⁴⁹ *Ibid*, D, 358.

⁵⁰ *Ibid*, D, 398.

⁵¹ *Ibid*, D, 410–411.

⁵² *Ibid*, D, 419.

⁵³ Linthicum to Board of Directors, June 29, 1836, Ltrs. Recd., C & O Co. The profit margin was so stringent that even the officers of the packet company were denied free passage. Thus, when the lockkeepers of the canal company began to abuse their privileges and demand free passage on the packets while on private business, Linthicum complained to the directors that his profits were strained severely by such practices. Accordingly, the board on July 6 ordered that the lockkeepers could not obtain free passage on the packets unless they had papers from their divisional superintendent that they were on official company business. *Proceedings of the President and Board of Directors*, E, 87.

vided in the contract with the Georgetown Packet Company. The agreement was to extend until the end of the calendar year.⁵⁴

The canal company became dissatisfied with the quality of the boats employed by the Georgetown Packet Company during the summer of 1836. On October 14 when the packet company applied to the board for an extension of its one-year contract the request was referred to a special committee consisting of President George C. Washington and Directors Thomas Carbery and Phineas Janney. These men were authorized “to make arrangements for the employment of boats better suited for the purposes of packets, than those heretofore used by this Packet Company are.”⁵⁵

When negotiations broke down over the matter of improving the quality of the packet boats, the Georgetown Packet Company on January 14, 1837, requested an extension of its privilege to navigate the canal free of tolls until another company could be formed to operate the packet service on the waterway, but there is no record of any response from the company.⁵⁶ More than two years later on November 2, 1839, the board granted permission to A. Himrickhouse to navigate the canal free of toll for the period of one year with a passenger boat carrying the U. S. Mail.⁵⁷

4. RENEWED INTEREST IN STEAM NAVIGATION

Although the canal board earlier had rejected the use of steamboats on the waterway, the widespread publicity given to experiments with steam navigation on the Chesapeake and Delaware Canal in September 1833 by Alexander Dallas Bache, professor of Natural Philosophy and Chemistry at the University of Pennsylvania, brought forth renewed interest in the introduction of steam navigation on the Chesapeake and Ohio. Using a canal boat that had originally plied upon the Schuylkill and had a reputation for “quickness,” and a steam engine and accessories supplied by the firm of Rush & Muhlenburg, the Chesapeake and Delaware Canal Company carried on a series of experiments under the direction of Bache to test the validity of Fairbairn’s assertions in his *Remarks on Canal Navigation*. Bache described the dimensions of the experimental steamboat as follows:

A canal boat, which had originally plied upon the Schuylkill, and been noted as a quick boat, was altered, under the direction of the President of the Chesapeake and Delaware Canal Company, (Robt. M. Lewis, Esq.) so as to increase the length, and to give greater sharpness to the bow, as well as to reduce the bottom to a regular and gently swelling curved surface, from the stem and stern, without any internal flexures. The length of the boat was thus made eighty feet, the length of the false bow, in the direction of the axis of the boat, being seven and a half feet; the width of the boat was ten feet; the draught, when light, twelve inches, and with a load of forty tons, fourteen inches, exclusive of the keel. The alterations were made under the direction of Mr. James Rush, of the firm of Rush and Muhlenburg, and the engine, paddle wheels, & c. put in under his charge; from him I obtained the details just given, and those which follow, in relation to the boat and engine.

The engine was the result of an exchange, which enabled the experiment to be made with economy; it proved, however, to be much too small for the purposes in view. The diameter of the cylinder was eight and a half inches, and the length of stroke two and a half feet, the pressure of the steam with which it was supplied was about 140 lbs.; 150

⁵⁴ *Proceedings of the President and Board of Directors*, B, 77.

⁵⁵ *Ibid*, E, 152.

⁵⁶ *Ibid*, E, 292.

⁵⁷ *Ibid*, F, 115.

lbs. to the square inch, on the safety valve, being the maximum pressure. The steam was cut off at half stroke and the escape steam served to heat, in part, the water, which was thrown into the boiler. The nominal power of the engine was ten horses; but with a mean effective pressure, during the stroke, of 80 lbs. per square inch, an estimate probably not far from the truth if the pressure within the boiler was correctly stated, and supposing thirty-five double strokes to be made in a minute, the power would be more than double the nominal amount. The boiler was a vertical cylinder, six feet in length, and three feet in interior diameter, containing one hundred and twenty draught tubes from an inch and a half to two inches in diameter, and thirty inches in length, the tubes uniting above in a wide chimney. It appeared by the experiments that this boiler was competent to keep up a supply of steam for about thirty-five double strokes of the engine per minute. The paddle wheels were placed at the sides of the boat, and between one-third and one-half of the length of the boat from the bow; the wheels were eight feet two inches in exterior diameter, and four and a half feet wide; the buckets were six inches deep, and made of cast iron. The weight of the boiler was stated to be 2214 lbs., and of the wheels about one ton.⁵⁸

Three conditions were tested during the September trials: use of the steamboat alone, use of the steamboat in towing light passenger barges, and use of the steamboat in towing heavily laden freight vessels. While care was taken to obtain accurate figures concerning the speed and engine capabilities of the boat, the greatest interest was in observing the effects of high-speed travel on the canal banks. Bache observed that the wake from passenger barges being towed by horses was at least three times as great as that produced by the steamboat. In using the steamboat alone, the wave created by the bow was disposed of by the paddle wheels; in towing barges, the barges themselves effectively disposed of the remaining swell created by the towboat. Speeds of up to 7 and 8 miles per hour were “attained by even this imperfect model” steamboat, which used an engine too small and weak for the vessel on which it was mounted. The speeds compared favorably with those produced by the work of eight horses. Bache concluded that the experiments “go far to remove, entirely” any doubts concerning the advantageous application of steam on the larger canals and that steam power may be substituted for horse towing with great savings to the canal, particularly at high velocity.⁵⁹

Within six months after the publication of Bache’s report the Chesapeake and Ohio directors received three proposals for the building of steam packet boats to ply the canal. On June 20, 1834, the firm of Phillips and Delin submitted a model of such a vessel, but after a quick review of the proposal, the directors voted to table the matter temporarily.⁶⁰ Later on December 3, the board received two proposals to build steamboats for canal navigation from Jacob Morgan and A. H. Brown, the latter apparently having had some experience in the development of steam navigation on the Farmington Canal in Connecticut.⁶¹ After President Washington had obtained favorable information from the Farmington Canal Company concerning the results of steamboat navigation on its waterway, the board passed the following resolution on January 13, 1835:

⁵⁸ *Experiments Made on the Navigation of the Chesapeake and Delaware Canal by Steam*, Reported by A. D. Backe (Philadelphia, 1834), 2.

⁵⁹ *Ibid.*, 2–13. A copy of the text of Backe’s observations and conclusions on the various experiments may be seen in Appendix G. Also see Ralph D. Gray, *The National Waterway: A History of the Chesapeake and Delaware Canal, 1769–1965* (Urbana, 1967), 85–87.

⁶⁰ *Proceedings of the President and Board of Directors*, D, 110–112.

⁶¹ *Ibid.*, D, 198.

that for the purpose of encouraging the use of Steam as a moving power upon the Canal, the right to navigate the same for one year free of tolls will be granted to the first Steam Packet Boat which shall within twelve months from this date be placed upon the Canal and run daily at a speed not less than eight miles per hour, without injury to the Banks of the Canal, and shall in all other respects conform to the regulations for navigating the same.

The resolution was ordered to be published in the *National Intelligencer*.⁶²

Near the end of January, Asa Waters sent to the board a proposal to put a steamboat on the canal according to the terms of the published resolution. Several days later, however, Waters requested that the directors modify their propositions by designating a specific day on which they would make their choice from the various steamboats built for the canal navigation.⁶³ Accordingly, the board modified its resolution

to grant the free use of the Canal for one year, to the best Steam Packet Boat which shall be upon the Canal on the 1st day of August next, the speed of which shall not be less than 8 miles per hour, without injury to the Banks of the Canal. In deciding upon the Boat, which may be entitled to the privilege hereby granted, its capacity and suitableness for the purposes of a Packet Boat will be considered, as well as its speed.

All steamboats with a velocity of 8 miles per hour would be able to navigate the canal free of tolls until August 1 provided that they did not injure the canal banks.⁶⁴

There is no documentation in the company records to indicate subsequent developments relative to the introduction of steam power on the waterway during the remainder of 1835 and 1836. The financial difficulties of the company, the growing nationwide economic malaise, and the poor agricultural harvests in the Potomac Valley during these years undoubtedly all played a part in preventing the introduction of steam power on the canal. The next discussion of the subject occurred in February 1837 when the board considered the use of steam power to tow barges through Big Slackwater above Dam No. 4. However, the continual cost of repair, which they felt such an operation would necessitate, induced the directors to build a permanent towpath along the pool "which, in the end, it is believed, will be found decidedly the most economical improvement."⁶⁵

Experiments with the English-built iron screw-propelled steamer *Robert F. Stockton* on the Delaware and Raritan Canal in the spring of 1839 again excited the interest of the board in introducing steam navigation to their waterway. In 1836 John Ericson, a Swedish engineer living in England, had invented and patented the screw propeller, which revolutionized navigation. In 1837 he had built a steam vessel having twin screw propellers, which on trial towed the American packet-ship *Toronto* at the speed of five miles per hour on the Thames River. At the order of Robert F. Stockton, the president of the Delaware and Raritan Canal Company and the son of a signer of the Declaration of Independence, Ericson in 1838 constructed the iron screw-steamer which crossed the Atlantic under canvas in 1839 to be used on the waterway to tow 60-ton coal

⁶² *Ibid*, D, 220.

⁶³ *Ibid*, D, 228–229.

⁶⁴ *Ibid*, D, 229. Two weeks later on February 18, the board adopted new regulations for navigating the canal. The new rules, which specifically allowed the introduction of steam power on the canal. *Ibid*, D, 240.

⁶⁵ Washington to Veazey, February 4, 1837, Ltrs. Sent, C&O Co.

barges from Bordentown, New Jersey to New York City. Thus, the steamboat became “the first screw-propeller ship operated for utilitarian purposes on American waters.”⁶⁶

The board authorized the president to obtain such information on the *Robert F. Stockton* as he could relative to its dimensions, speed, and cost.⁶⁷ However, the approaching collapse of the company finances again thwarted any serious initiatives to inaugurate steam power on the canal.

During the spring of 1842 the board granted permission to William Easby to operate a “newly invented steam passenger boat, of his own construction” free from tolls until January 1, 1844. The only two conditions to the agreement were that he pay the usual tolls for the transportation of freight and that the canal banks were not to suffer from abrasion. In June the company stockholders were told that the boat was nearly completed and would soon be ready for service. President Michael C. Sprigg voiced the hope that during the summer or early fall “a safe, pleasant, and cheap mode of conveyance will be afforded to those who may desire to pass between Hancock and the District, or to the intermediate places.”⁶⁸

In December 1842 the board again consulted with Ericson as to the estimated cost of transporting coal from Cumberland to Washington on screw-propelled steamboats.⁶⁹ In reply, he stated that his repeated trials with sixteen propeller-driven steamboats (probably on the Delaware and Raritan Canal) had shown that the most economical mode of conveyance was that of towing one freight barge with a steamer, both vessels carrying approximately the same amount of goods. Accordingly, the basis for his estimate was 200 tons of coal nearly equally divided on the two boats—a safe supposition since the steam machinery and propellers weighed seven tons and the consumption of fuel for a round-trip would be twelve tons. The cost for the two vessels would be \$4,000—\$2,000 for the steam machinery and \$1,000 for each boat. The monthly expenses for such an operation would be:

Wear and tear and interest on capital	\$88
Wages and maintenance of crews	220
Fuel consumption—48 tons of coal	
(24 mooring days at 2 tons per day) at \$1 per ton	48
Oil, lamp, and tallow for machinery	<u>10</u>
	\$366

As five years’ experience had shown that the most economical speed was three miles per hour he calculated only four round-trips carrying 200 tons per trip each month. Thus, the cost of transportation would amount to less than 46 cents per ton.⁷⁰

In the spring of 1843 the board again attempted to take steps to stimulate steam navigation on the canal. On May 3 a resolution was passed

⁶⁶ Appletons’ *Cyclopedia of American Biography*, Vol. II, 364; Crawford Clark Madeira, Jr., *The Delaware and Raritan Canal* (East Orange, 1941), 40–41; and Richard F. Veit, *The Old Canals of New Jersey* (Little Falls, 1963), 71. The steamboat operated on the Delaware and Raritan Canal for 25 years.

⁶⁷ *Proceedings of the President and Board of Directors*, F, 67.

⁶⁸ *Fourteenth Annual Report* (1842), C&O Co., 5.

⁶⁹ Ericson had come to the United States in November 1839, and in 1841, he had furnished to the U. S. Navy the designs for the screw warship *Princeton*, the first vessel having its propelling machinery below the water-line out of the reach of enemy gunners. During the construction of the *Princeton*, he built and furnished numerous steam propelled vessels for carrying freight on the American Rivers and canals. Appletons’ *Cyclopedia of American Biography*, Vol. II, 364.

⁷⁰ Ericson to Board of Directors, December 30, 1842, in *Sixteenth Annual Report* (1844), C&O Co., 26–27.

That any one packet boat propelled by steam in such manner as in the opinion of the President & Ch. Engineer shall not be injurious to the Canal shall pass over the Canal free till the 1st day of January 1845.

The only condition was that the operations of the steamboats would pay the ordinary tolls on all freight with the exception of the passengers and their luggage.⁷¹

From the available documentation it does not appear that regular steam navigation was commenced on the canal until the late 1840s. On October 2 of that year Samuel W. Dewey was granted permission to run a line of steam packets for passenger service toll-free for a two-year period provided that the operation was begun within one year and that the boats would obey the designated speed limits.⁷² In December 1849 the board authorized Lemuel Williams to operate steamboats on the canal for the purpose of towing freight boats. The steam tugs and their necessary fuel were to be toll-free so long as they did not weaken the canal banks. The tugboats were to be constructed upon a plan similar to the *Virginia* on which the directors recently had taken an experimental cruise.⁷³ By May 1850 N. S. Denny & Co. was operating a fleet of steam tugboats on the canal – a development which posed problems for the company as some of the bridges over the waterway did not permit the 12 ½ foot clearance required for the passage of the tugs.⁷⁴

5. PROVISIONS FOR THE REPAIR OF BOATS

Soon after the first portion of the canal was opened to navigation between Little Falls and Seneca Falls, the canal company began to discuss ways in which it could encourage the repair of boats on the waterway. After considerable debate, the board in July 1831 submitted the question of building a drydock along the canal for this purpose to a committee headed by the noted military engineer John J. Abert.⁷⁵ The following month the committee reported its conclusion that the construction of a drydock was “inexpedient,” and the board took no further action.

While the company records indicate little about the subject, it is apparent that the problem of repairing boats continued to keep the question of building drydocks before the board. On May 30, 1833, it was determined that the resident engineers select a suitable spot on each residency for a drydock and recommend a plan for their construction.⁷⁶

While the locations of these drydocks and their construction plans could not be found, the physical remains of one on the berm side of the canal next to Lock No. 35 provides a general picture of their plan of design and method of operation. Several masonry supports in an elongated pit paralleled the lock. At the upper end, it was connected with the canal, and at its lower end there was a waste structure. When a boat floated in over the supports, the water could be drained through the waste structure.⁷⁷

No mention of drydocks was found in the canal records again until October 1847. At that time the board authorized John Moore, the lock tender at Georgetown, to build such a structure near Lock No. 1 under the direction of the chief engineer. Moore was to operate the drydock at “the pleasure of the board” with 30 days’ notice required for the abrogation of the lease.⁷⁸

⁷¹ *Proceedings of the President and Board of Directors*, G, 31.

⁷² *Ibid*, H, 83.

⁷³ *Ibid*, H, 319.

⁷⁴ *Ibid*, H, 353.

⁷⁵ *Ibid*, B, 29.

⁷⁶ *Ibid*, C, 361.

⁷⁷ John P. Miele, “*The Chesapeake and Ohio Canal: A Physical History*” (NPS Mss., 1968), 120.

⁷⁸ *Proceedings of the President and Board of Directors*, H, 81–82.

During the following month, permission was granted to Owen Ardinger to construct a drydock on the berm side of the canal near Williamsport. Accordingly, the company president was authorized henceforth to allow qualified persons to build drydocks on the berm side of the waterway. The construction of the drydocks was to be monitored by the chief engineer or the division superintendent.⁷⁹

B. BOATS ON THE CHESAPEAKE & OHIO CANAL: 1851–1889

Research on the canal boats during the period 1851–1889 has turned up much interesting information. For the purposes of clarity, the data has been divided into two sections – general descriptive material and topics of special concern to the canal company such as the promotion of steamers and packets on the waterway and the steps taken to keep the boats in repair.

1. GENERAL DESCRIPTIVE MATERIAL

a. First Boats on the Completed Waterway

Following the ceremonies at Cumberland on October 10, 1850, formally opening the canal to navigation, a procession of boats proceeded down the canal. The distinguished visitors, canal company officials, and prominent citizens embarked on the canal packet *Jenny Lind* and the canal boat *C. B. Fisk*, both of which had been fitted specially for the occasion. Behind these boats was another barge on which rode the Eckhart Light Artillery with a battery of two field pieces. At the rear of the procession were five coal boats – the *Southampton*, *Elizabeth*, *Ohio*, and *Delaware* belonging to the Merchants' Line of McKaig and Agnew of Cumberland, and the *Freeman Rawdon* belonging to Ward's Cumberland Line, a New York based company. The coal boats were loaded with some 411 tons of coal destined for Georgetown and Alexandria and some 80 tons destined for Williamsport. This towage was reported to exceed the total amount of coal carried on the Lehigh Navigation Canal during its first year of operation, and canal officials congratulated themselves for this accomplishment.⁸⁰ After stopping at a spring ten miles east of Cumberland and partaking of a large dinner on board the *Jenny Lind* and the *C. B. Fisk*, the party returned to Cumberland while the coal boats continued on their way to the East.

Of the five boats, the *Elizabeth* went only to Williamsport, the *Southampton* and the *Freeman Rawdon* reached Alexandria, and the *Delaware* and the *Ohio* got stuck above Dam No. 6, because of the low level of water in the canal. The latter drew 4 feet with their load, instead of 3½, which would have passed. The *Freeman Rawdon* won the race with the *Southampton*, reaching Washington about 6 p. m., on October 17. Horses and mules were requisitioned along the way to maintain the speed, and the boats arrived within a short time of each other.

At the same time that these boats were descending the waterway, a number of barges commenced the journey up the canal from the District cities. Ten empty boats were launched from Georgetown and two loaded vessels embarked from Alexandria and proceeded to Cumberland as quickly as the water would permit.⁸¹

⁷⁹ *Ibid.*, H, 112.

⁸⁰ *Frederick Examiner*, October 23, 1850.

⁸¹ *Georgetown Advocate*, October 15, 19, 22, 1850; *Report to the Stockholders on the Completion of the Chesapeake and Ohio Canal to Cumberland* (Frederick, 1851), 137; and Elgin to Coale, October 18, 1850, and Fisk to Coale, October 20, 1850, Ltrs. Recd., C&O Co.

b. Regulations Established Governing the Classification and Construction of Boats

Upon the completion of the canal to Cumberland, the board issued a new set of regulations to govern the classification and equipment of the boats plying the waterway. These rules were largely a confirmation of the existing regulations, modified and brought up to date by the lessons of the first revisions. The new rules went into effect on April 1, 1851.

The regulations divided the boats on the canal into seven categories:

Class A—"Decked boats of substantial build, carrying one hundred tons and upwards"

Class B—"Boats of similar construction, carrying less than one hundred tons"

Class C—"Boats not decked, of substantial build, carrying one hundred tons and upwards"

Class D—"Boats of similar construction, carrying less than one hundred tons"

Class E—"Long boats and scows, decked or not decked, of substantial build"

Class F—"Gondolas and other floats designed for temporary use"

Packets—"Boats used chiefly for the transportation of passengers"

The new set of regulations also established standards relative to the form, equipment, fixtures, and condition of the boats navigating the canal. These requirements, beginning with number 13, were as follows:⁸²

13. No boat or float of any kind, except gondolas passing along the Canal for the first time and rafts, shall navigate or be moved on the Canal, unless the bow of said boat or float be firmly and permanently constructed, and so curved, that the versed sine or depth of the curve shall not be less than one fourth of the cord or width of the boat or float. PENALTY for a violation of this regulation, *five* dollars.

14. No boat or float, strapped or faced with iron on the front part of the stern, or other prominent part or parts of the bow or sides thereof, shall navigate, or be moved on the Canal, unless there shall be suspended, and thoroughly secured in front of the stern or other prominent part or parts of the bow or on its sides,—in such manner as effectually to prevent such iron facing strap or straps thereof from striking upon or against any lock, lock gate, guard gate, bridge or other work or device appertaining to the Canal,—a good and sufficient fender or fenders, composed of rope or rope yarn, at least six inches in diameter,—PENALTY for a violation of this regulation, *five* dollars.

15. No boat shall navigate or be moved on the Canal, without a guard or plate of iron, firmly attached to the keel and extending back under the rudder, or some other permanent device, that shall cover and secure the opening between the keel or stern post and the rudder, so as effectually to prevent the tow-rope of any other boat or float from entering said opening. PENALTY for a violation of this regulation, *five* dollars.

16. No boat, except scows and gondolas shall navigate or be moved on the Canal, without a knife or sharp metallic instrument, so affixed upon its bow, as to cut apart any tow-rope, which otherwise might pass over such bow. PENALTY for a violation of this regulation, *five* dollars.

⁸² *By-Laws, Rules, and Regulations: In Force on the Chesapeake and Ohio Canal, 1st April 1851* (Baltimore, 1894), 4–9.

17. No boat or float shall navigate or be moved on the Canal, without two good and sufficient snubbing lines. PENALTY for violation of this regulation, *five* dollars.

18. No boat shall navigate or be moved on the Canal, at night, without a conspicuous light on its bow; and no raft shall navigate or be moved on the Canal, at night, without a conspicuous light on the forward end of the same; and every raft moored or tied up, shall, at all times during the night, have a conspicuous light at each end of each tow, near the outer corners thereof. PENALTY for a violation of either of the provisions of this regulation, *five* dollars.

19. No boat or float shall navigate the Canal, that shall be in a leaky condition, and that cannot safely be used for the purposes of navigation.

20. No boat, except a gondola, shall navigate the Canal, which has not its name, and its hailing place corresponding with its boat's register then in force, and the letter or name of its class and the number of the said boat's register distinctly painted, in letters and figures of at least four inches in height, on both sides of said boat,—and on some permanent part thereof, so high above the water that they may be plainly seen from either bank of the Canal. PENALTY for a violation of this regulation, *five* dollars.

21. No boat, except those belonging to class F., shall navigate the Canal, unless distinctly marked on each side—at the bow, stern and amidships—so as to show accurately the draft of such boat in feet and inches, at the bow, stern and amidships—when empty, and when partially or fully loaded—and every owner or master of such boat who shall neglect or refuse to comply with this regulation, and every owner or master of a boat that is erroneously or falsely marked at the bow, stern or amidships, shall be subject be a PENALTY of *ten* dollars.

22. No raft or tow of timber or plank, on the Canal, shall exceed in length ninety feet—and no raft or tow of timber or plank shall approach any other raft or tow of timber or plank, nearer than thirty rods, unless for the purpose of passing, or be moored nearer than thirty rods to any other raft or tow of timber or plank previously moored. The first and leading crib in every raft or tow of timber or plank shall have the outer edge of the forward end of every outside stick or plank rounded. And no transverse stick or plank shall extend within one inch of the outer edge of the outside stick or plank of such crib. Every violation, of either of the provisions of this regulation, shall subject the owner, person or persons having charge of such tow or raft, to a PENALTY of *five* dollars.

23. Each and every time, *on different days*, that any boat or float shall be found navigating the Canal in violation of any of the provisions of the 13th, 14th, 15th, 16th, 17th, 18th, 19th, 20th, 21st and 22nd regulations, or that any raft shall be found lying by and moored at night, without lights, as required by the 18th regulation, shall be considered a distinct offence.

24. Each Superintendent, Collector, acting Collector, Inspector, or Lock-keeper, on the Canal, is hereby authorized to determine whether the requirements of the 13th, 14th, 15th, 16th, 17th, 18th, 19th, 20th, 21st and 22nd regulations, are fully complied with, in the case of any boat or float, the owner or master of which is applying for a way-bill for the said boat or float, or for a permit for it to navigate the Canal, or having obtained a way-

bill or a permit, is proceeding with the said boat or float on its voyage;—and each and every of them, if such requirements are not fully complied with, are hereby authorized and required not to issue such way-bill or permit, or, if the boat or float, having obtained a way-bill or permit is on its voyage, to detain the said boat or float and stop its further progress, until all the requirements aforesaid are complied with, and all penalties incurred in consequence of their not having been, are satisfied and paid. Provided however, that the owner or master of any boat, considered unsafe and unfit for use, under the 19th regulation, by either of the above mentioned officers of the Company, shall have the right to call upon an experienced boat builder or master, who with another to be appointed by the said officer,—and a third to be selected by the two thus appointed, in case of a disagreement,—may make a survey of the boat or float aforesaid,—and upon the decision of a majority of the three being made and communicated in writing to the said officer, if adverse to his opinion, a way-bill or permit, as the case may be, shall be granted, or the boat or float allowed to proceed on its voyage, but otherwise not.⁸³

c. First Registration of Boats under the New Regulations

Throughout the first year of operation on the completed waterway, a total of 223 boats were registered under the new regulations.⁸⁴ The breakdown of this total by classification was as follows:

Class A	9
Class B	49
Class C	108
Class D	41
Class E	10
Class F	6
Packets	1

Although it has been generally assumed that the canal boats for this period had fairly standard dimensions, the 1851 registration books detailing the dimensions of the vessels into classes of craft on the canal were as follows:

Class A—length (minimum of 76 feet, 9 inches; maximum of 92 feet); width (minimum of 14 feet; maximum of 14 feet, 6 inches); draft when empty (minimum of 10 inches; maximum of 14 inches); draft when loaded (minimum of 4 feet; maximum of 6 feet).

Class B—length (minimum of 70 feet; maximum of 90 feet); width (minimum of 11 feet, 9 inches; maximum of 14 feet, 7 inches); draft when empty (minimum of 10 inches; maximum of 18 inches); draft when loaded (minimum of 3 feet; maximum of 4 feet, 6 inches).

Class C—length (minimum of 86 feet; maximum of 92 feet); width (minimum of 13 feet, 6 inches; maximum of 14 feet, 7 inches); draft when empty (minimum of 8 inches; maximum of 18 inches); draft when loaded (minimum of 4 feet; maximum of 6 feet).

⁸³ By-Laws, Rules and Regulations; In Force on the Chesapeake and Ohio Canal, 1st April 1851 (Baltimore, 1894), 4–9.

⁸⁴ This total includes the cancellation and reregistration of 16 boats for various reasons, thus making the actual number of boats plying the canal at 207. It is estimated that about 140 of these boats were new, the majority of which were Class A or C involved in the carrying of coal.

Class D—length (minimum of 66 feet, 7 inches; maximum of 90 feet); width (minimum of 10 feet, 8 inches; maximum of 14 feet, 6 inches); draft when empty (minimum of 6 inches; maximum of 4 feet, 2 inches).

Class E—length (minimum of 58 feet, 10 inches; maximum of 85 feet, 4 inches); width (minimum of 13 feet, 4 inches; maximum of 14 feet, 6 inches); draft when empty (minimum of 10 inches; maximum of 12 inches); draft when loaded (minimum of 2 feet, 9 inches; maximum of 4 feet, 6 inches).

Class F—length (minimum of 71 feet, 4 inches; maximum of 85 feet); width (minimum of 9 feet, 1 inch; maximum of 14 feet, 6 inches); draft when empty (minimum of 1½ inches; maximum of 6 inches); draft when loaded (minimum of 10 inches; maximum of 3 feet, 6 inches).⁸⁵

d. Capacity of Early Boats on the Completed Waterway

In April 1851 the first general descriptions of the boats on the canal appears in the company records. As some of the levels only had a depth of five feet of water, the boats were drawing an average of 4 feet, thereby permitting the largest boats to carry from 100 to 110 tons (of 2,240 pounds) of coal. Within a month the draft of the boats was to be increased to 4 feet, 3 inches, and by 1852 the average draft was expected to be 4 feet, 6 inches, thus allowing the largest boats to carry cargoes of up to 120 tons. The average cost of the canal boats was estimated at \$1,200.⁸⁶

At the end of the first boating season following the completion of the canal to Cumberland, the company reported to the Maryland Secretary of State concerning the state of the navigation. Among other items, the company clerk noted that the number of boats navigating the canal was 205 of which about 140 were engaged in the coal trade. The majority of these boats were “new and built expressly for coal transportation.” They were generally capable of transporting upwards of 100 tons, and when the level of the water in the canal would permit the average tonnage of the boats would increase to more than 120.⁸⁷

e. Increase of Boats on the Canal

Trade began on the completed waterway with a severe shortage of boats. During the boating season of 1851 the company reported that the inadequate number of boats was hurting the prospects of an extended coal business. The board observed wistfully that

we cannot but repeat the hope, that from the high rates of transportation paid, and the constant occupation which may be given, strong inducements will exist with capitalists to engage in boating; and that before the close of the present year, a much larger number may be added.⁸⁸

In the succeeding years, the number of boats navigating the canal continued to increase. By the end of the 1852 boating season, 237 boats were registered for transportation on the waterway. Of this total, about 61 were new and 160 were engaged in the coal trade and the majority were capa-

⁸⁵ Record of Boat Registrations, 1851–74, C&O Co.

⁸⁶ Ringgold to Barnes, April 23, 1851, Ltrs. Sent, C&O Co., and *Twenty-Third Annual Report* (1851), C&O Co., 5, 8.

⁸⁷ Ringgold to O’Neal, December 26, 1851, Ltrs. Sent, C&O Co.

⁸⁸ *Twenty-Third Annual Report* (1851), 8.

ble of carrying between 100 and 130 tons. The coal boats averaged two full round trips on the waterway per month.⁸⁹

In May 1854 it was reported that 290 boats were registered for navigation on the canal, of which about 200 were engaged in the coal trade. Although few boats had been added on the canal during the previous year, the board reported that the prospects for boat-building during the present boating season were encouraging.⁹⁰

The following year in June the company stockholders were informed that 323 boats were registered for service on the canal. About 200 were engaged in the coal trade with capacities ranging from 110 to 125 tons each.⁹¹

During the next year 20 new boats were put into service on the canal, thus bringing the total registered to 343. However, it was observed by company officials that this figure did not represent the actual number of boats in “active and efficient service.” Many boats had decayed or had become otherwise unserviceable and had been withdrawn from the canal. Others, which had required repairs, had not been put into active service because the severe winter had prevented their refitting. Thus, only about 250 boats were in active service. Since the board asserted that it was powerless to increase the number of boats, it depended on “individual enterprise” to supply “these means of transportation.”⁹²

There was a tremendous increase in boat-building along the canal beginning in the winter of 1856–57 and continuing through the summer of 1858. The surge was primarily the result of the company’s decision to replace with substantial masonry structures Dams Nos. 4 and 5, which had been unable to supply adequate amounts of water to the canal for years because of chronic leaking. More than 100 new boats were ready for the spring boating season in 1857. During the next twelve months the board observed that new boats were “multiplying daily, one single gentleman having already invested in building boats near \$100,000, and intending to build at his own yard 5 new boats monthly” throughout the summer of 1858. Furthermore, others were operating on a smaller scale all along the canal “actively engaged in building new boats.” Optimistically the directors noted that

steady, enterprising, and valuable men of small means along the entire line, who could procure horses and equipments for the boats,—a class of men of the highest value to the successful development of the energies which have too long lain hidden in the bosom of this work, but which were and are beginning to be aroused,—were in anxious inquiry for Boats, by the conduct of which they would enrich themselves, and the builders, with unerring certainty, the navigation being regular and uninterrupted.⁹³

In the spirit of expansion, the board purchased a number of boats from the recently-enlarged Erie Canal during the winter of 1857–58 to engage in the Cumberland coal trade.⁹⁴

f. Description of Ante-Bellum Canal Boats

Few descriptions of the physical make-up of the boats plying the canal after 1850 have survived. However, there is one account written by an unemployed New England man who, during the

⁸⁹ Ringgold to Eachus, April 22 and November 9, 1852, and Ringgold to O’Neal, December 16, 1852, Ltrs. Sent, C&O Co., and *Twenty-Fourth Annual Report* (1852), C&O Co., 12.

⁹⁰ Ringgold to Eachus, May 10, 1854, Ltrs. Sent, C&O Co.

⁹¹ *Twenty-Seventh Annual Report* (1855), C&O Co., 14.

⁹² *Twenty-Eighth Annual Report* (1856), C&O Co. 8–9

⁹³ *Twenty-Ninth Annual Report* (1857), C&O Co, 12, 19.

⁹⁴ Ringgold to Shaw, May 29, 1858, Ltrs. Sent, C&O Co.

summer of 1850, made a round-trip voyage on the canal from Cumberland to Georgetown and on to Alexandria and return. In an anonymous manuscript, which has been edited by Ella E. Clark and Thomas F. Hahn and printed under the title *Life On The Chesapeake & Ohio Canal 1859* (1975), the writer made some interesting observations on the canal boats [See Appendix K].

g. Canal Boats during the Civil War

During the Civil War, great destruction was wrought upon the canal and its trade. The boats received their share of damage as the federal government seized about 100 for the defense of Washington and boat-burning and mule-stealing became regular practices along the canal.

In March and April 1862, during the panic accompanying the specter of the Merrimac running wild on the Potomac and bombarding Washington, the government seized the boats and took some 60 of them to Georgetown where they were held for use in case of emergency. About 36 of these vessels were moved down the river for possible use in heading off a Southern attack coming up the Potomac, and 8 of them were filled with stone and sunk to block the channel of the river. The remaining 40 boats were used by officers of the Union army to transport government stores from various points on the canal to Alexandria.⁹⁵

When the shipment of the government stores to Alexandria was completed in April, the 40 canal boats were released to their owners. The remaining 60 boats that were held in Georgetown and those taken down the river remained in government hands for a longer period, and many of them were never returned to the canal. Thus, the board announced in June that the number of boats “now serviceable for the coal trade, inclusive of some recently built, and others now building was about 150.”⁹⁶ Later, however, in October 1862 and in June and July 1863 more of the boats were seized by the government for briefer periods during General Robert E. Lee’s two invasions of Maryland.⁹⁷

Boat-burning and mule-stealing became regular occurrences by June 1863. A number of boats were destroyed on the Williamsport and Hancock Divisions during Lee’s second invasion of Maryland during that summer.⁹⁸ In 1864, other raids by Early, Mosby, and White, in July, August, and September, respectively, caused widespread damage to the canal and its boats, some 60 of which were burned during Early’s raid alone.⁹⁹ By this time, even the threat or rumor of a raid was sufficient to send the boatmen scurrying for shelter.¹⁰⁰

h. Resurgence of Navigation on the Canal

In the years following the Civil War, the canal was gradually restored and commerce, sparked by the heavy demand for the Cumberland coal, soon improved over pre-war levels. By June 1870, 395 boats were engaged in the coal trade.¹⁰¹ In fact the commerce on the canal prospered to such a degree in the early 1870s that one of the officers of the Maryland Free Stone Company, the firm that operated the Seneca Quarries, complained in June 1871 that the Georgetown level was so clogged with boats as to stop “navigation almost entirely.” On the morning of June 14 he had counted ten tiers of boats three abreast, twenty tiers two abreast, and two tiers four abreast.¹⁰²

⁹⁵ Greene to Ringgold, March 24, April 11 and 16, 1862, Ltrs. Recd., C&O Co.

⁹⁶ *Thirty-Fourth Annual Report* (1864), C&O Co., 3–6.

⁹⁷ *Washington Evening Star*, July 15, 1863.

⁹⁸ *Proceedings of the President and Board of Directors*, K, 366.

⁹⁹ *Ibid*, K, 385, 398, 429, and Walter S. Sanderlin, “*The Vicissitudes of the Chesapeake and Ohio Canal During the Civil War*,” *Journal of Southern History*, Vol. XI (February, 1945).

¹⁰⁰ Greene to Spates, September 29, 1864, and Spates to Ringgold, October 16, 1864, Ltrs. Recd., C&O Co.

¹⁰¹ Clarke to Weber, June 20, 1870, Ltrs. Sent, C&O Co.

¹⁰² Hayden to Clark, June 14, 1871, Ltrs. Recd., C&O Co.

During the winter of 1871–72, 60 new boats were built along the canal, thus bringing the carrying capacity of the boats plying the waterway to 1,000,000 tons of coal in an 8-month boating season of uninterrupted navigation.¹⁰³ The great increase of the coal trade was demonstrated in an October 1872 *Cumberland News* article comparing the volume of traffic on the waterway for the current boating season up to October 16 with that of the corresponding period of the 1867 season as follows:

	Boats Cleared	Tons Shipped	Ave. Tonnage of ()
1872	6,351	697,036.15	109.24
1867	<u>3,346</u>	<u>361,501.08</u>	108.10 ½
Increase	3,005	335,535.07	1.13 ½ ¹⁰⁴

The following winter in February 1873 the *Williamsport Pilot* reported that there were 400 boats in constant operation on the canal during the boating season, requiring employment of 2,000 mules.¹⁰⁵ In 1873 canal officials reported that the coal companies built 91 new boats at Cumberland and put them into service, increasing the number of vessels navigating the canal to about 500 with an average capacity of 112 tons.¹⁰⁶ One boat passed over the entire line in 1873 carrying 131 tons of coal.¹⁰⁷ The following year the stockholders were informed that 79 boats were built in Cumberland alone and that the average annual tonnage of the vessels plying the waterway had risen to 113½ as a result of the continuing improvements along the line.¹⁰⁸

During the years 1873–74, the canal company surveyed the condition of the boats on the waterway and reregistered them on a new list. As this reregistration coincides with the peak years of the canal trade, it is interesting to look at its listings closely. Its value is enhanced by the fact that it is the last register of boats extant in the company records that indicates the classification and dimensions of each vessel.

According to the 1873–74 register, there were 539 boats operating on the canal. The boats were divided into the following classifications as established by the 1851 regulations:

Class A	110
Class B	56
Class C	358
Class D	14
Class E	1

The register listed the dimensions of the boats, which indicated the great disparity in the sizes of the vessels. The dimensions of the various classes of craft were as follows:

Class A—length (minimum of 89 feet; maximum of 92 feet); width (minimum of 14 feet; maximum of 14 feet, 6 inches); draft when empty (minimum of 11 inches; maximum of 18 inches); draft when loaded (minimum of 4 feet, 6 inches; maximum of 4 feet, 9 inches).

¹⁰³ *Forty-Fourth Annual Report* (1872), C&O Co., 8.

¹⁰⁴ *Cumberland News*, October 18, 1872, in Arthur P. Gorman Collection, University of North Carolina, Chapel Hill.

¹⁰⁵ *Williamsport Pilot*, February 8, 1873. The mules consumed some 25,000 barrels of corn, 3,840 bushels of oats, and several thousands tons of hay that year at a cost of nearly \$60,000.

¹⁰⁶ *Forty-Sixth Annual Report* (1874), C&O Co., 14.

¹⁰⁷ *Proceedings of the President and Board of Directors*, M, 114.

¹⁰⁸ *Forty-Seventh Annual Report* (1875), C&O Co., 9–37.

Class B—length (minimum of 50 feet; maximum of 90 feet); width (minimum of 13 feet, 4 inches; maximum of 14 feet, 6 inches); draft when empty (minimum of 10 inches; maximum of 18 inches); draft when loaded (minimum of 2 feet, 6 inches; maximum of 4 feet, 9 inches).

Class C—length (minimum of 88 feet; maximum of 96 feet); width (minimum of 14 feet; maximum of 14 feet, 6 inches); draft when empty (minimum of 10 inches; maximum of 18 inches); draft when loaded (minimum of 4 feet, 6 inches; maximum of 4 feet, 9 inches).

Class D—length (minimum of 75 feet; maximum of 90 feet); width (minimum of 14 feet; maximum of 14 feet, 6 inches); draft when empty (minimum of 8 inches; maximum of 14 inches); draft when loaded (minimum of 3 feet; maximum of 4 feet, 6 inches).

The one boat in Class E was 90 feet in length, 14 feet, 2 inches in width, and had a draft of 1 foot when empty and 2 feet, 6 inches when loaded.

Two boats in Class C were described as scows, one of which was 59 feet in length and the other 65 feet. Both were 14 feet wide and had a draft of 9 inches when empty. One had a draft of 2 feet, 6 inches when loaded and the other 3 feet, 6 inches.

The ownership of the boat demonstrates the tremendous influence of the coal trade on the canal commerce. While almost all the boats registered in 1851 had been owned by individual owners, nearly one-fourth of the boats on the 1873–74 list were owned by the coal companies. The companies who owned boats were as follows:

	Class A	Class B	Class C	Class D	Scows
American Coal Co.	24	8	46		
Consolidated Coal Co.	18	10	27		
Borden Mining Co.	1				
Maryland Free Stone Co.				9	
Washington Blue Stone Co.			1		2
Potomac Cement Co.			1		109

i. Declining Years of the Canal Trade

In the latter 1870s trade on the canal declined appreciably. From a peak of 973,805 tons carried on the waterway in 1875, the total tonnage was reduced to 662,508 three years later. Thus, it is not surprising to find that the register of boats for that year listed a total of only 391 vessels as operating on the waterway. Reflecting the fact that about 95 percent of the trade consisted of the movement of coal was the register's listing 283 boats as employed by the coal companies. The breakdown of this figure was as follows:

CUMBERLAND COAL COMPANIES

American Coal Company	62 boats
Borden Company	49 boats

109 Record of Boat Registrations, 1851 – 74, C & O Co. Many of the remaining boats that were individually owned were employed by the coal companies.

Consolidated Coal Company	39 boats
Maryland Coal Company	38 boats
New Central Coal Company	44 boats
Hampshire Coal Company	28 boats
Blaen Avon Coal Company	14 boats

WILLIAMSPORT COAL COMPANIES

Steffy & Findlay Company	5 boats
Embrey & Cushwa Company	4 boats

Of the remaining 108 boats on the canal, 8 were listed as grain boats, 1 as a brick boat, and 1 as a limestone boat. The other 91 were classified as “outside boats” presumably for the use of general trade.

The 1878 register of boats is a valuable document as it is the only extant list that gives the name of the firm that built the boats and the year in which they were built. The names of the boat builders, almost all of which were based in Cumberland, were as follows:

Doener and Bender	76 boats
Weld and Sheridan	52 boats
William Young	62 boats
Frederick Mertens	141 boats
B. Mitchell	2 boats
Consolidation Coal Company	39 boats
R. & M. Coulehan	11 boats
Issac Gruber	7 boats
Unnamed (Built at Tidewater)	1 boat

The breakdown of the boats by the year in which they were built is as follows:

1868	6 boats
1869	23 boats
1870	32 boats
1871	82 boats (including 4 rebuilt)
1872	67 boats (including 5 rebuilt)
1873	58 boats (including 2 rebuilt)
1874	80 boats (including 1 rebuilt)
1875	25 boats (including 2 rebuilt)
1876	13 boats
1877	5 boats

Sixteen of the boats were listed as steamers.¹¹⁰

The years between 1878 and 1889 were a time of declining trade and financial stress for the canal company. Although the average tonnage carried per boat rose to 114 during the 1880 boating season as a result of improvements to the waterway after the 1877 flood, the total amount of goods passing up and down the waterway continued to decline. The series of heavy floods in

¹¹⁰ Register of Boats Employed on the Canal, January 1, 1878, C&O Co.

the 1880s climaxed by the titanic freshet in 1889 marked the final phase of canal operations before it went into a receivership.¹¹¹

2. TOPICS OF SPECIAL CONCERN

a. Promotion of Steam Packet Service

The promotion of steam packet service became a topic of special concern to the canal company after the completion of the waterway to Cumberland. On July 9, 1851, the directors granted permission to W. R. L. Ward, the operator of the New York-based Cumberland Line, to run a steam packet boat on the canal free of tolls. The conditions that Ward accepted as his part of the bargain were: (1) the General Superintendent would monitor the craft for signs of damage to the canal resulting from the speed of the boat and would accordingly prescribe the rate of speed of the vessel; (2) all articles carried on the boat, other than its fixtures and furniture, would be subject to the established toll rates; and (3) company packages and officers would be transported on the regular trips of the vessel free of charge.¹¹²

Some two months later on September 22 the board authorized the firm of Reeside and Lynn to run two or three packets on the canal between Georgetown and Harpers Ferry free of toll for a period of two years. If the firm desired, the board determined to extend the privilege to Williamsport. Although Ward strenuously objected to the agreement with Reeside and Lynn, the directors were convinced that competing packets would reduce the cost of passenger service and thus promote the packet business.¹¹³

The packet service provided by Reeside and Lynn apparently did not survive because there is no information on their subsequent affairs. Accordingly, the board restored competition to the Ward passenger service on June 4, 1853, by granting permission to Volney Pursell to run the steam packet *Congress* on the canal free of toll subject to the same terms that had been given to Ward.¹¹⁴

In 1855 the canal board created some controversy by attempting to regulate the sale of liquor on the *Congress*. On April 5 the sale of all intoxicating beverages was prohibited. The following month the prohibition was modified "to extend only to persons employed on the canal." In September a complaint from Captain Montgomery C. Meigs stating that "disorder was frequently produced among (his) laborers employed on the Washington Aqueduct in consequence of their obtaining liquor from the packet boat *Congress*" led the directors to ban entirely the sale of liquor on the vessel. If the order was not complied with immediately, the *Congress* would be refused permission to navigate the canal.¹¹⁵

The company records reveal little about the status of the steam packet service between 1855 and 1858. The only two references to packet that could be found reported serious accidents. On July 14, 1855, a packet collided with a freight boat and sunk.¹¹⁶ Some three years later on June 4, 1858, two packets owned by John Moore and W. H. Ritter collided causing extensive damage to both vessels.¹¹⁷

Other than these two references the company records reveal little about the operation of packet service on the canal until March 1859. At that time W. H. Ritter and B. F. Wells were

¹¹¹ *Fifty-Second Annual Report* (1880), C&O Co., 14–15.

¹¹² *Proceedings of the President and Board of Directors*, H, 466.

¹¹³ *Ibid*, H, 476–477.

¹¹⁴ *Ibid*, I, 27.

¹¹⁵ *Ibid*, I, 169, 204.

¹¹⁶ *Ibid*, I, 193.

¹¹⁷ *Ibid*, K, 32.

given permission to run steam packets on the canal between Georgetown and Harpers Ferry free of toll. The boats were to operate on alternate days, and they were to yield the right-of-way to passing freight boats.¹¹⁸

The board permitted the licensing of a steamboat for the transportation of both passengers and freight for the first time in April 1860. The boat *Flying Cloud*, owned by John Moore, was to operate subject to the conditions “heretofore imposed on packet boats.” Later in June 1862 Moore received a new license for the *Flying Cloud* to transport passengers and light freight, provided the boat did not exceed a speed of five miles per hour and that it paid the regular tolls.¹¹⁹

Disturbed by the findings that the propelling of the steam packets were causing damage to the canal banks, the board revised its policies relative to packet boats on several occasions in 1860. On August 15 the directors determined to prohibit the passage of steam packets on the canal after September 1. However, a petition signed by numerous parties in Georgetown and all along the canal caused them to modify their stand. On September 6, the directors agreed to the continuation of steam packet service provided that “such boats shall not draw more than three feet of water, shall not be propelled at a greater speed than four miles per hour, shall have no preference over freight boats in passing the locks, and shall be subject to the payment of tolls provided by the existing toll rates.” In October an exception was made for the *Antelope* which was permitted to travel at a rate of 5 miles per hour.¹²⁰

During the months immediately following the end of the Civil War, there was renewed interest in the establishment of steam packet service on the canal. In July John Moore received permission to operate the *George Washington* for the conveyance of passengers and light freight at the rate of 4 cents per mile for the boat and the regular tolls on the freight. The boat was not to receive any other privileges, and its maximum speed was not to exceed 5 miles per hour. Similar authorization was given to Charles H. Merrill and W. H. Ritter to operate the steam packet *Minnesota* between Georgetown and Harpers Ferry in April 1866. A third packet, operated by John Weinrod for the transportation of freight and passengers, was authorized by the board in September 1865, but as it was propeller-driven its speed was limited to a maximum of 4 miles per hour.¹²¹ In the winter of 1865–66, the company commissioned the construction of a steam excursion board, called the *Washington*, for the use of the president and directors. The expense of such an undertaking appears to have triggered some controversy because one company official wrote that “from my experience in Canal traveling, I incline to think, after the novelty is over, there will be no great desire for many excursions by the Prest. & directors. In this fast age canal travel has in a measure become obsolete.”¹²² Such a forecast was fulfilled in the case of the regular steam packets because there was no passenger service on the canal by the spring of 1867.¹²³ Evidence that the packet service was losing out to the Baltimore & Ohio could be seen in the company decision in August 1871 to refit a former passenger steamer lying “idle and decaying” at Cumberland as a boarding boat for the canal repair crews.¹²⁴

From a cursory review of the canal company records, it appears that there was no further regular packet service on the canal after this period. In the 1870s Howard A. Garrett, the operator

¹¹⁸ *Ibid*, K, 90–91, 93. Ritter operated a horse-drawn packet for more than a month before his new steam packet was ready, thus causing irritation to Wells who had his steam packet *Antelope* ready for operation when the contracts were signed.

¹¹⁹ *Ibid*, K, pp.167–168, 299.

¹²⁰ *Ibid*, K, 208–209, 213–214, 216, and Ringgold to Soper, August 25, 1860, and Ringgold to Dodge, August 27, 1860, Ltrs. Sent, C&O Co.

¹²¹ *Proceedings of the President and Board of Directors*, K, 434, 448, 483.

¹²² Greene to Ringgold, December 1, 1865, Ltrs. Recd., C&O Co., and *Proceedings of the President and Board of Directors*, K, 461, 520.

¹²³ Ringgold to Newson, May 21, 1867, Ltrs. Sent, C&O Co.

¹²⁴ *Proceedings of the President and Board of Directors*, L, 435–436.

of Great Falls Tavern, took “pleasure parties” from Georgetown to his hotel several times a week, but he borrowed the canal paymaster’s boat to do so.¹²⁵ In August 1878 Edwin Reeside contracted to carry the U. S. Mail from Washington to Point of Rocks on a steam packet for a period of three years, but there is no evidence that passenger service was connected with his operation.¹²⁶

b. Steam-Operated Freight Boats

One of the dreams of the canal’s founders was the introduction of steam-operated freight boats on the waterway that would not injure its banks. In October 1857 J. L. Cathcart of Washington informed the board that he had constructed a steam propeller for the transportation of coal which would not cause abrasion to the canal prism. Although the board refused his request to let the boat operate at half-toll, it did encourage him to experiment with the vessel on the canal.¹²⁷ Again in April 1862 the directors granted permission to J. E. Reeside to use steam-propelled boats for the transportation of coal at the established toll rates provided the experiment would not damage the canal banks.¹²⁸ Apparent from the company records that neither of these two experiments was successful.

In April 1871 Chief Engineer William R. Hutton submitted to the board a new scheme for steam navigation on the canal devised by John W. Duval, a blacksmith and wheelwright in Georgetown. Under this plan, the boat would carry “two wheels which can be raised & lowered.” The one near the stern would serve as a guide wheel to keep the boat on a wooden rail which would run along the side of the canal on short posts. The other wheel would serve as a driving wheel, “working on a cranked axle” and “revolved by a small steam engine.” To avoid being lifted off the track and to procure the required degree of traction, the wheels would be kept down “by the pressure of steam in a piston working in a cylinder connection with the boiler.”¹²⁹

During the 1870s the number of steamers plying the canal increased slowly. In 1873 one steamer was built to navigate the canal, and three more were constructed the following year. The 1875 boating season saw at least five new steam-driven coal boats were introduced on the canal. Among the most successful of these was the *Ludlow Patten* built by William Young and employed by the Borden Coal Company. It was the first coal boat to leave Cumberland for Georgetown at the commencement of the canal navigation that year. At the end of the season the company officials recommended it as the most efficient and seaworthy steam-propelled coal boat to navigate the canal to date.¹³⁰

In the winter and spring of 1875–76 the canal board took further steps to encourage the use of steamboats in the canal trade. H. Ashton Ramsay, a builder of iron ships and marine engines and boilers in Baltimore, was commissioned to build a model “iron screw steamer” which the directors chose to name the *Maryland*. The boat, which entered service on the canal some time in June, had an iron hull, two decks, and a skylight.¹³¹

The number of steamers on the canal continued to mount as four were built in 1876 and three more in 1877, making a total of sixteen by 1878. The register of boats in the latter year listed the owners, builders, and employers of the steamers as follows:

¹²⁵ Garrett to Gorman, April 22, 1874, Ltrs. Recd., C&O Co.

¹²⁶ Reeside to President and Board of Directors, August 11, 1878, Ltrs. Recd., C&O Co.

¹²⁷ *Proceedings of the President and Board of Directors*, I, 385–386.

¹²⁸ *Ibid.*, K, 287–288.

¹²⁹ Hutton to Clarke, April 20, 1871, Ltrs. Recd., C&O Co.

¹³⁰ Webber to Fawcett, April 1, 1875, and Pearce to Fawcett, February 26, 1876, Ltrs. Recd., C&O Co.

¹³¹ Hutton to Gorman, January 26, March 29, May 24, 26, June 28, July 11, August 24, 30, 1876, Ltrs. Recd., C&O Co.

Owners	Cowden and Sons	1
	John Gorman	1
	William G. Hassett & Bro.	2
	Weld & Sheridan	5
	Benjamin Mitchell	1
	Patrick Ganly	1
	Paul & Sinclair	1
Builders	Doener & Bender	4
	William Young	4
	Weld & Sheridan	6
	R. & M. Coulehan	2
Employers	Doener & Bender	4
	Borden Coal Company	4
	Maryland Coal Company	7
	New Central Coal Company	1
	General Trade	4 ¹³²

The number of steamboats carrying coal on the canal increased to 19 by 1879. In that year the steamers made a total of 272 trips on the waterway transporting 26,428.19 tons. Thus, the average number of trips for each steamer during the boating season was about 14 while the average tonnage carried per trip was 97.16.¹³³ Regular steamboat operation continued thereafter until 1889.

STEAMERS—1879

	<u>TONS</u>	<u>CWT</u>	<u>TRIPS</u>
Star 1	1,678	4	17
Star 2	1,515	16	16
Star 3	1,958	17	20
Star 4	1,642	11	17
Star 5	1,793	19	18
Star 6	1,427	9	15
Star 7	788	6	8
H. G. Wagner	815	15	8
Arcturus	2,058	14	22
A. Lovell	1,897	11	19
New Era 1,	469	14	15
Regulus	1,839	0	19
Antares	669	18	7
F. L. Moore	1,554	18	16
L. Patton	1,048	6	11
T. Venners	1,086	6	11
Hancock	693	14	7
H. J. Weld	662	2	7
T. H. Paul	<u>1,827</u>	<u>19</u>	<u>19</u>
	26,428	219	272

¹³² Register of Boats Employed On the Canal, January 1, 1878, C&O Co.

¹³³ *Fifty-Second Annual Report* (1880), C&O Co., 28. A summary of the number of trips and total tonnage carried by each steamer may be seen on the following page. During the same year, the total number of trips, the total tonnage, and the average tonnage per trip for coal boats pulled by animal-power was 4,425; 496,475.03; and 112.17 respectively.

c. Double Boats

Faced with the growing competition of the Baltimore & Ohio Railroad, the canal company began a series of improvements to the waterway to increase its carrying capacity. In 1875 the board announced its intention of doubling the length of the locks so that “double boats” transporting up to 250 tons could ply the waterway. The “double boats,” which in reality were two canal boats fastened together, would reduce the cost of freight by nearly 50 percent at little increase of power. Thus, the boat owners and operators would receive a better margin of profit, the cost of transportation would favorably compete with that of the railroad, and the company could charge tolls that would produce enough revenue to cancel its debts. Various experiments were undertaken, including one by the Maryland Coal Company, to test the ability of the mules to pull two boats, but the dreams of the company were soon dashed by the major floods of 1877, 1886, and 1889, and the accompanying financial reverses.¹³⁴

d. Provisions for Repair of Canal Boats

During the period 1851 to 1889 the canal company made greater provision for the repair of the craft plying the waterway than it had in earlier years. At various times the board established committees to examine all the boats being loaded to see if they were fit for navigation.¹³⁵ At other times the directors ordered the re-registration of all the boats on the canal, a process which meant that the boats would have to be examined and their dimensions taken before receiving a new license to navigate the canal.¹³⁶ If the boats did not meet the standards established by the company regulations they had to be repaired in the drydocks along the canal or in the small boat yards along the canal such as those at Georgetown, Weverton, and Hancock.¹³⁷ When the boats required a major refitting the task of rebuilding was usually done at the larger boat yards in Cumberland. In addition, vessels that were damaged in accidents on the canal were generally taken to the nearest drydock for repairs.

After the completion of the canal to Cumberland, the board made provision for the construction and lease of drydocks along the waterway. The forms were to be executed by the parties then holding grants from the company as well as for those who would apply for such privileges in the future. The authority to grant permission for the building of such structures was given to the chief engineer subject to the approval of the directors.¹³⁸

During the 1851–89 period, there were at least six drydocks built along the line of the canal. Their locations and dates were as follows:

1. Locks Nos. 45–46—On September 14, 1854, Lewis G. Stanhope was granted permission to construct a drydock at Locks Nos. 45–46.¹³⁹

2. Lock No. 30—Thomas Hassett was given permission on September 7, 1855, to build a drydock near Lock No. 47. Later in March 1864, the board granted him a 10-year “privilege” to continue the operation of this drydock.¹⁴⁰

¹³⁴ *Forty-Seventh Annual Report* (1875), C&O Co., 16–17; *Fifty-Second Annual Report* (1880), C&O Co., 15–16; and Grason to Gorman, June 12, 1877, Ltrs. Recd., C&O Co.

¹³⁵ Mulvany to Gorman, June 28, 1872, and Resley to Gorman, March 7, 1873, Ltrs. Recd., C&O Co.

¹³⁶ The registration process was ordered by the board on at least five occasions during the period from 1851 to 1889.

¹³⁷ Mitchell to President and Directors, October 29, 1875, and Moore to Gorman, August 31, 1878, Ltrs. Recd., C&O Co.

¹³⁸ *Proceedings of the President and Board of Directors*, H, 434.

¹³⁹ *Proceedings of the President and Board of Directors*, K, 480.

¹⁴⁰ *Ibid.*, K, 375.

3. Lock No. 44—On May 5, 1862, Charles Embrey & Son were granted the right to build a drydock above Lock No. 44 under the direction of the Superintendent of the Williamsport Division. The drydock was located on private property at the mouth of a ravine which had been depositing sediment into the canal for years. Accordingly, they were permitted to run a trunk under the canal to carry off the water from the ravine as well as the drydock.¹⁴¹

4. Lock No. 14—On April 29, 1864, John Ellis was given permission to construct a drydock above Lock No. 14 under the supervision of the Superintendent of the Georgetown Division.¹⁴²

5. Edward's Ferry Basin—In November 1872 the board directed the Superintendent of the Monocacy Division to build a drydock at Edward's Ferry for a sum not to exceed \$100. After its construction, the drydock was rented to Colonel E. V. White of White's Ferry.¹⁴³

6. Lock No. 10—A letter from Richard M. Minnis to the canal president on November 10, 1875, refers to the operation of a drydock "in the rear" of Lock No. 10. There is no other information in the company records relative to its construction.¹⁴⁴

C. BOATS ON THE CHESAPEAKE & OHIO CANAL 1889–1924

1. GENERAL DESCRIPTIVE MATERIAL

There is little documentary information on the boats plying the canal during the receivership period. In 1902 the Canal Towage Company was organized to provide economy and regularity in the runs of the waterway. Sponsored by the Consolidation Coal Company and the canal receivers, this company supplied the boats, teams, and equipment, and established a regular schedule for the boatmen to follow. It also cut freight rates and controlled the distribution of cargoes. Boats were numbered instead of named, and they became more uniform and utilitarian. Traffic on the canal became regularized on a time-table basis.¹⁴⁵

In a National Park Service report prepared in 1939–40 by Thomas C. Vint, Chief of Planning of the Branch of Plans and Design, the methods used to build the boats for the Canal Towage Company were described. All of the barges

were built in Cumberland by local boatwrights who were so familiar through experience with the job that they used no plans or drawings. Their only guides were a set of sheet-metal templates for the big uprights at the end of the boats. These timbers established the curves at bow and stern and the planking at these points was 1½" oak, steamed and bent to fit. The rest of the structure was of straight lumber, generally Georgia pine. The seven longitudinal heels were three 6" by 6" members and 4" x 6" members. The bottom plank-

¹⁴¹ *Ibid.*, K, 291–292.

¹⁴² *Ibid.*, K, 391.

¹⁴³ White to President and Directors, November 21, 1872, Ltrs. Recd., C&O Co.

¹⁴⁴ Minnis to Gorman, November 10, 1875, Ltrs. Recd., C&O Co.

¹⁴⁵ *Washington Evening Star*, July 11, 1905.

ing nailed transversely under the keels was of 3" lumber, dressed to an even thickness, and the inner planking which constituted the floor of the cargo holds, was of 2" stuff.¹⁴⁶

In an interview with National Park Service officials in January 1939, George L. Nicholson, the general manager of the canal from 1891 to 1938, elaborated on the average dimensions of the boats during the receivership period. The barges were 14 feet, 6 inches in the beam and 93 feet in total length. The straight sides of the boats were 85 feet long to the points where they tapered to the bow and stern. Their hulls were 7 feet deep and their draft when fully loaded was 5 feet, 3 inches.

The boats had a cabin, 12 feet by 14 feet, on the stern, under which was a 3-foot space which was filled with coal. In the center of the boat there was another cabin, about 6 feet by 6 feet, called the hay house, where the hay was kept and where the crew slept. The mules, usually 4 or 5 (2 large and 3 smaller ones), were kept in the bow of the boat. The tow rope was 9/16-inch Plymouth rope and generally about 225 feet long. The boats usually carried some 115 gross tons. After the 1889 flood no packet or passenger boats operated on the canal, and there were few motorboats most of which were privately-owned pleasure craft.¹⁴⁷

One other source, that of a field survey made by the *Monthly Labor Review* in 1921, gives some general details relative to the physical make-up of the canal boats during the receivership period and the procedures used to operate them. While the dimensions given in this report differ somewhat from those provided by Nicholson, the report nevertheless provides a clearer picture of the compartments on deck. The report states:

The average size of the cabins on the boats of the Chesapeake & Ohio Canal was 10 by 12 feet. All cabins had two bunks, one set into the inner wall of the main cabin and the other located in the so-called stateroom, which was partitioned off from the main cabin by a diagonal wall. These bunks were 36 inches wide, sufficient space for one person but ordinarily occupied by two. In addition to the cabin bunks, the feed box extending across the deck at the center of the boat was ordinarily used for sleeping purposes. This box was 4 feet wide and 4 feet high....

Relative to the operation of the canal boats, it was noted that two procedures were involved—driving the mules and steering the boat. The mules were harnessed tandem to two long ropes or “lines” attached to the bow of the boat. From two to five mules were used in “spells,” two or three mules being stabled in the fore cabin at rest while the other pulled the boat. The boat hands took turns at driving, either walking beside the mules or riding the leader.

Steering the boat was accomplished by means of the “stick.” This controlled the rudder and could be guided by the pilot sitting or standing against it. As there was virtually no current to change the direction of the boat, the operation was simple unless the boat was heavily loaded.¹⁴⁸

¹⁴⁶ Thomas O. Vint, *Outline Report of Architectural Work on the Restoration of the Chesapeake and Ohio Canal for Recreational Use, Georgetown D. C. To Seneca, Md.* (NPS Mss., (1939–40)), 13–14. Much of Vint’s research on the boat was gathered from measurements he made in the late 1930s of the only surviving canal boat then stuck in the mud near Hancock. A copy of the drawings of this boat from Vint’s report may be seen in Appendix J.

¹⁴⁷ Statement of George L. Nicholson, January 25, 1939, Misc. NPS Mss. An account of a trip down the canal in a privately-owned motorboat may be seen in John P. Cowan, *Sometub’s Cruise on the C&O Canal* (Pittsburgh, 1916), 5–44.

¹⁴⁸ Ethel M. Springer, “Canal Boat Children,” Children’s Bureau, U. S. Department of Agriculture, reprinted from *Monthly Labor Review* (Washington, 1923), 5–9.

2. GOVERNMENT-OWNED COAL BARGES DURING WORLD WAR I

During the spring of 1918 the Washington *Evening Star* and several citizens' groups in the Potomac Valley advocated government control of the canal as a means of increasing coal shipments to Washington and thereby relieving congestion on the railroads. The proposal was endorsed by an Inland Waterways Commission survey ordered by William Gibbs McAdoo, who had been appointed as director general of the railroads and coastwise and intercoastal shipping when they were temporarily nationalized on January 1, 1918. The commission entered into an agreement with the Canal Towage Company to increase the delivery of coal to the boats and to facilitate the unloading of the coal at Washington and at government stations along the Potomac River. Later the government entered into a contract with the company guaranteeing it against loss in operation. It was determined that the government would supply ten new coal barges to supplement the 80 vessels then employed by the company in the coal trade.

The ten government coal barges were constructed at Elizabeth City, North Carolina. The vessels were towed from that place by way of Albemarle Sound to Norfolk and from thence up Chesapeake Bay and the Potomac. Five of the boats arrived in Washington in late September and the remaining five in early October. There is no information on the dimensions, capacity, or physical description of these boats.¹⁴⁹

¹⁴⁹ Washington *Evening Star*, September 26, 1918

II. REGULATIONS FOR NAVIGATING THE CHESAPEAKE & OHIO CANAL: 1830–1924

A. REGULATIONS 1830–1835

Just prior to the opening of the canal between Little Falls and Seneca Falls in November 1830, the board determined to adopt a “system of rules for the government of toll collectors and the protection of their works, as well as for the regulation of boats.” Accordingly, the directors authorized Clerk Ingle to write to Silas Conduct, president of the Morris Canal and Banking Company that operated the Morris Canal, Edward Everett, a Massachusetts legislator active in the promotion of his state’s canals, Gideon Tomlinson, Governor of the State of Connecticut, Horatio Seymour, a New York State Canal Commissioner, and Samuel Fleuding, treasurer of the Delaware and Hudson Canal Company. Ingle was to request from these men copies of laws passed by their States relative to police powers on their canals and of regulations passed by the various canal companies under their jurisdiction.¹⁵⁰

After receiving the replies to these inquiries, the board immediately noticed that its company charter contained “no express provision” giving it the authority to establish by-laws, rules and regulations for the preservation of the works on the canal, and the policing of its navigation. Apparently, the framers of the company charter had overlooked this important item as all the other canal companies had such a provision in their charters authorizing them to pass and enforce regulations “in subordination to the Constitution and laws of the United States, and of the several States in which they exist, and are required to act.”¹⁵¹ Thus, the directors on October 19 authorized President Mercer to present memorials to the Maryland General Assembly and the U. S. Congress requesting the enactment of such laws “as shall be calculated to establish a suitable police on the Chesapeake & Ohio Canal, and to protect from injury the rights and interests of the Company in their works and other property.”¹⁵² Despite the entreaties of Mercer neither legislative body enacted the proposed legislation that year.

Through the winter months of 1830–31, President Mercer drafted several regulations “for registering all the boats as they may enter the Canal at Seneca” and “for prohibiting the use of poles pointed with iron, in navigating the Canal.” On March 25, 1831, the board adopted these rules with some modifications and ordered them to be printed.¹⁵³

On April 2, 1831, Daniel Van Slyke, the newly-appointed Superintendent of the Canal, reported to President Mercer that the canal had been thronged with boats since it was opened to navigation on March 19. Canal officials had experienced great difficulty in preserving order among the boatmen “who in striving to push forward for a preference in passing the several locks are sometimes disposed to injure each others boats as a means of carrying their point.” Such an incident had taken place at one of the locks on Section

¹⁵⁰ Ingle to Conduct, *Ibid.* to Everett, *Ibid.* to Tomlinson, *Ibid.* to Seymour, and *Ibid.* to Fleuding, October 5, 1830, Ltrs. Sent, C&O Co.

¹⁵¹ *Third Annual Report* (1831), in *Proceedings of the Stockholders*, A, 173.

¹⁵² *Proceedings of the President and Board of Directors*, B, 206.

¹⁵³ *Ibid.*, B, 290.

No. 9 (Locks Nos. 12, 13, or 14) the previous week when a “strongly constructed boat ran her bow against a gondola loaded with flour, and so much injured her as to render it necessary to transship the load.” Since fifteen or twenty boats frequently arrived at a lock within thirty minutes, it was important that the board, formulate and publish regulations governing the lock tender and the order in which boats would be permitted to pass the locks.¹⁵⁴

The board responded to this request on May 6 by authorizing Mercer “to prepare and cause to be published, a code of, regulations for the government of the lock keepers, boat-men, packet owners, and others having business on the canal.”¹⁵⁵ On July 16 he submitted a draft of the regulations for navigating the canal, and after making some amendments, the board adopted them and ordered them to be printed for distribution.¹⁵⁶

Included in the regulations was a stipulation that all craft on the waterway must be propelled by a towing line drawn by men and horses. Other provisions required that care be taken at all times to prevent injury to the canal and to those navigating it. The regulations prohibited the use of iron-tipped poles and forbade the operation of pointed boats and craft with iron-shod corners. Traffic was to keep to the right in passing, and a system of preference was established to facilitate navigation boats had the right of way over rafts, descending boats over ascending craft, packets over freight boats at all times, and packets carrying the mail over all others. Vessels traveling at night were required to have a light on the bow. Due notice must be given upon approaching a lock to permit the tender to open the gates, and only if the latter failed to do his duty was the boatmen to lock his own craft through. Boats were to tie up only on the berm side of the canal to prevent interference with traffic on the towpath. All craft must be registered and plainly marked on both sides with name, number, and marks denoting the draft of the vessel.¹⁵⁷

The text of the “Regulations for Navigating the Chesapeake & Ohio Canal” was as follows:¹⁵⁸

July 16, 1831

REGULATIONS FOR NAVIGATING THE CHESAPEAKE & OHIO CANAL

- 1st Every Boat or Float, navigating the Canal after the 15th day of August next, shall be propelled by a towing line drawn by men or horses, and shall be moreover furnished with strapping or snubbing lines for passing through the locks of the Canal without injury to the same.
- 2nd No Boat or Float shall, under any circumstances, use any iron shod or sharp pointed setting pole on the Canal.
- 3rd No Boat or Float shall forcibly strike, or violently rub against any other boat, or against the banks, locks, aqueducts, inside walls, or wastes, or bridges of the Canal.

¹⁵⁴ Van Slyke to Mercer, April 2, 1831, Ltrs. Recd., C&O Co.

¹⁵⁵ *Proceedings of the President and Board of Directors*, B, 314.

¹⁵⁶ *Ibid.*, B, 410

¹⁵⁷ *Ibid.*, B, 410–419.

¹⁵⁸ *Ibid.*

- 4th No Boat or Float shall be permitted to pass along the Canal at night, unless with a conspicuous light on its bow; in case of rafts, gondolas, or scows, such light shall be at the forward end thereof.
- 5th No Boat or Float shall unnecessarily lie by, or be moored opposite to any waste, or within 150 yards of any Lock, or in any short basin or pool between two locks
- 6th When any owner, master, or other person having charge of any boat or float, designs to leave the same, for any time, in any other part of the Canal, he shall give notice of such intention to the Lock-keeper, in whose district the boat or float is to remain, and before he leaves his boat or float, he shall moor it along the berm, or side of the Canal opposite the towing path; and there, so secure it, as that it may, under no circumstances, lie across the Canal so as to obstruct, impede, or delay the passage of any other boat or float, along the same. And so, in like manner, when a boat or float, shall stop for the night, or lie by on account of high winds, or for any other transient or accidental cause, the owner, master, or other person having charge thereof, shall moor it securely against the berm of the Canal, or side opposite the towing path. Under no circumstances whatever, shall any boat or other floating thing, lie fastened to, or moored along the tow path of the Canal; nor shall the owner, master, or other person or persons, having charge thereof, encamp upon the towpath, or drive stakes into the top or slopes thereof, or place stones thereon, or kindle fires upon the same; or in any way or manner, obstruct or incommode the free and common use of the Canal by day or night.
- 7th Any boat or float left unmoored in the Canal, without any information thereof having been given by its owner or master, or other person having charge thereof, to the Lock-keeper of the District, in which such boat or float may be found, shall be considered as abandoned by the owner, master, or other person having had charge of the same; and if sunk in the Canal, or found floating loosely thereon, shall, by the Lock-keeper aforesaid, or some person duly authorized by him, be removed from the Canal as a nuisance, and the cost of removing the same, shall be chargeable to the owner of such boat or float; and in no case, shall the Lock-keeper be required to make sale thereof, or be held accountable for preserving the same, from farther injury by reason of the neglect of the owner.
- 8th No carcass, or dead animal, or putrid substance of any kind, be thrown into the Canal, or into any basin or feeder connected therewith.
- 9th Square headed or sharp covered boats, such as scows and gondolas, shall each have a semicircular platform, firmly fastened upon each end thereof, so as to save other boats or floats, and the banks and locks of the Canal, from injury by contact with either of the corners thereof; and no such boat, without such provision, shall, after the first day of October next, be allowed to enter the Canal, or to pass through any lock upon the same.
- 10th Every Boat or Float shall have its rudder so constructed, as not to catch, interfere with, or cut the tow-rope of a passing boat.
- 11th No raft or tow of timber passing on the Canal, shall consist of more than eight cribs, and when consisting of more than one, they shall be so united, as to conform readily to the curvatures of the Canal banks, and to glide by the same without rubbing against them.

- 12th All Boats or Floats descending the Canal, shall have a right to keep the towpath side thereof.
- 13th When any Boat or Float ascending the Canal, shall be about to meet another, it shall be the duty of the owner, master, or other person navigating or having charge thereof, to turn from the towing-path, so as to allow room for the descending boat to pass with ease; provided, however, that Packets or Boats, constructed exclusively for the conveyance of passengers, shall, until otherwise ordered, have the right to keep the towing-path side, both in ascending and descending the Canal. A boat authorized to carry the United States Mail, shall have preference of all others. All boats shall have preference to rafts.
- 14th When the owner, master, or other person having charge of any Boat or Float, shall perceive, or be told, or apprised by sounding a horn or by any other signal, that a packet boat, following him can, from its speed, pass him, and is desirous to do so, he shall turn his boat from the tow-path side of the Canal, and give way to the swifter moving boat to pass by, unless he be at such time within 150 yards of some Lock, in which case, if entitled to no preference, on any other score, the hinder shall wait, till the other shall pass the Lock: and all rafts shall, in like manner, give place to freight boats.
- 15th The passing of one boat by another, shall be effected by checking the boat bound by the preceding rules, to give way, as soon as she has opened a passage for the other, so as that the tow-line may sink to the bottom of the Canal, the boat entitled to pass shall float over the tow-line.
- 16th No Boat or Float, unless specially licensed to travel with greater speed, shall move on the Canal where its banks are not of rock on both sides, or not paved or walled on both sides, so as to guard them from abrasion, with a velocity exceeding four miles an hour.
- 17th In case of any breach or leak through the Canal banks, or of the apprehension of one, the several boats or floats, which may be near the place of danger, shall take such position in the Canal, as the Superintendent, or Officer, or Engineer, or Lock-keeper of the Company, or other person charged to repair or guard against such breach or leak may direct.
- 18th In all cases, boats engaged in repairing the Canal, shall have preference of all other boats, if their use at the time require it.
- 19th In approaching a Lock, the boat which first arrives within 150 yards thereof, not being in any lock shall have a preference, and if several boats arrive at or near the same time, within that distance of any lock, they shall have a right to pass in the order of their arrival within that distance; provided, that if two boats, at or very near the same moment, approach from above, and below, within such distance of any lock, the descending boat shall have the preference if the lock be at such time, full of water; if empty, the ascending boat; and one boat having passed from above through a lock, another boat from below shall have liberty to pass up, before another boat be admitted from above, and vice versa, except, that packet boats shall have preference of freight boats, and a boat carrying the United States Mail, of all others.
- 20th The preference granted to packet boats, by the preceding regulations, shall not extend to such as are less than 60 feet long.

- 21st All boats arriving within 150 yards of any lock, shall have preference of such parts of rafts as shall remain, after one or more cribs or parts of the same raft shall have already passed through any lock.
- 22nd Every owner, master, or other person having charge of any boat, in approaching a lock, by night, shall, for ten minutes, if necessary, give signal of his approach, by blowing a horn or knocking at the Lock-keeper's door, and if in that time, or after such knocking, the Lock-keeper shall not appear or answer, such owner, master, or other person, may proceed to let himself through the Lock, taking care to close the head-gates of the lock after passing, and to leave the paddle gates of the culverts as he found them: and no person, other than the Lock-keeper, or one acting under his authority, or with his consent shall open or shut any guard or lock gate, or handle or turn any paddle gate, but under the circumstances above stated; and at all times, for any damage to the Canal or its works, resulting from the violation of this rule, the offender shall be held personally responsible.
- 23rd Every Boat or Float which shall not avail itself of the first title it acquires to pass through any lock, shall lose its preference, thereat, till all the boats awaiting a passage through the same, in the same direction, shall have passed.
- 24th In approaching a Lock, the owner, master, or other person having charge of any boat or float, shall slacken his speed, at such distance therefrom as the Lock-tender or any person, acting by his authority, shall direct; and take care to enter the Lock without injury thereto.
- 25th In passing the Lock he shall fasten the bow and stern snubbing lines of his boat, to the strapping posts, on the proper side of the lock, until the lock is filled or emptied as the case may be, and in all other respects, he shall use his strapping ropes according to the instructions of the Lock-keeper, and tow his boat into or out of the lock, at such time, and in such manner as the Lock-keeper may direct. He shall especially make use of all possible diligence to go out of the lock, when the gates shall have been opened for his departure, so as to occasion no unnecessary delay to other boats, waiting to pass the same lock, or any other lock in charge of the same Lock-keeper.
- 26th Every breach or violation of any of the preceding regulations, by the owner, master, or other person having charge of any Boat or Float, shall be reported by the Lock-keeper, or any other person having cognizance thereof, to the Register at Rushville, or to the Collector at or near Georgetown, or to the Superintendent of the Canal, or to some other Officer of the Company, together with the number of the Boat, and the name of the owner, master, or person having charge of the same for the time being; and from the occurrence of such breach or violation of any of the said Rules, such boat shall be excluded from the navigation of the Canal, until it otherwise be adjudged and ordered by the President and Directors of the Chesapeake & Ohio Canal Company.
- 27th No Boat shall be used as a Packet Boat on said Canal, unless specially licensed therefore, which license shall give to the said Boat the privilege of carrying passengers to and from any point on said Canal, between the Basin at Georgetown and Rushville: and the owner or master of said Packet Boat shall pay for every trip up or down between said Basin and Rushville: or any intermediate points, the sum of one dollar and fifty cents, which sum shall be paid weekly to such Collector as may be authorized to receive the same, and on any failure to pay the said sum, or fraudulent return by the owner, master, or other person having charge of

- the said Boat, of the number of voyages made in the week by said Boat, its license shall be forfeited.
- 28th The tolls upon laden boats shall remain as heretofore, until otherwise ordered.
- 29th After the 1st day of August next, there shall be charged, for every empty freight boat, passing the Guard lock at Rushville, with a view of descending the Canal, the sum of one dollar, and, the same for every empty boat entering the Canal at the old locks below the Little Falls, or passing by the same up the new Canal. The same sum shall be paid for every boat having cargo, the toll upon which shall not amount to one dollar.
- 30th There shall be a book kept by the Register at Rushville, in which shall be entered the number, owner's name, and place of abode, length, breadth, and draft of water, of every Boat or Float navigating the Canal, except such Boat or Float as shall enter the Canal from above Seneca, without designing to return.
- 31st Preparatory to numbering the boats, a classification of them shall be made under the following denominations: Packet Boats, or Boats designed for passengers exclusively, Freight boats, Boats for passage and freight, Scows and Gondolas. The boats of each class or denomination, shall be numbered as they arrive at the Guard Lock, from 1 upwards.
- 32nd The number of each boat shall correspond with the number by which it is entered in the Register, and be inscribed on both sides of the boat, in figures not less than three inches long, near the stern thereof, so high above water that, as the boat navigates the Canal, the number may at all times be plainly discerned from either bank.
- 33rd On numbering and entering each boat, the Register shall issue, according to such printed form as may be prescribed, to the owner, master, or other person having charge thereof, a certificate, to be called the Boat's Register, which shall contain the number and description of the boat, and shall correspond with the entry thereof.
- 34th After the 15th day of August next, no Boat required to be numbered by the preceding regulations, shall be permitted to enter the Canal, or to pass through any Lock thereof, which has not been duly numbered and registered, or of which the owner, master, or other person having charge thereof, shall refuse to show the Boat's Register to any District Lock-keeper who may demand sight thereof: Provided, That any boat ascending the Canal for the first time, need not be so numbered until it shall have reached Rushville; but in lieu of a register, such boat shall be provided with a certificate from the Collector at or near Georgetown, or from the first District Lock-keeper, by whose lock it may pass, that it is on its first voyage up or down the Canal.
- 35th No owner, master, or other person shall alter the number of any boat, without the express permission in writing of the Register; and, on the sale or transfer of any boat from one owner to another, notice thereof shall be given when the boat next enters the Guard Lock at Rushville, to the Register, by whom a Record of such sale or transfer shall be made in the Register opposite to the number and description of the boat.
- 36th On the destruction or accidental loss of any Boat which has been numbered and registered, the number of such boat may be given to any boat not hitherto numbered and registered, and a new certificate issued to the owner thereof, if requested.

- 37th On satisfactory proof to the Register, that the certificate of any boat's register has been unintentionally destroyed, or accidentally lost, he shall renew the name, on application of the owner, master, or other person having charge of such boat.
- 38th Every Boat or Float duly registered, which, in descending the Potomac to Rushville, is not provided with wooden pointed setting poles, shall be entitled to receive of the Register, in exchange for its iron shod poles, an equal number of wooden pointed setting poles, for its voyage down and up the Canal, and shall have its iron shod poles returned, on delivering up those which it had received in exchange therefore; and for any poles so supplied, and which may have been lost, the Register shall demand and receive the cost thereof. No Boat or Float shall be permitted to enter the Canal, until she shall have delivered up all iron shod poles which she may have on board.¹⁵⁹

At the same time the Board adopted a set of rules to govern the toll collectors along the canal in the execution of their duties. These regulations were as follows:

Whenever a descending Boat or Float applies for admission into the Canal, through the Guard Lock at Rushville, the Register and Lock-keeper thereat shall see that such boat or float is equipped as the general regulations respecting the navigation of the Canal require, and if not registered, shall see that such boat or float, if designed for a regular trader, is duly numbered and registered before it proceeds on its voyage. Having discharged this duty, the Register shall next inspect the cargo, and make out and sign a faithful list thereof, to be called a way bill, according to such printed form as may be supplied to him. This way bill he shall deliver to the owner, master, or other person having charge of such boat or float, before he enters the Guard Lock. The several way bills shall be numbered in the order in which they are issued. Of every such way bill, he shall at the same time make a brief entry in a book to be kept by him for that purpose, and ruled in columns, according to such stated forms as he may be instructed to use; which columns shall comprehend the number and date of the way bill, the number and class of the boat or float, the contents of her cargo, her destination, and the name of the owner, master or other person having charge thereof.

The owner, master or other person, in proceeding to his destination, shall deliver up this way bill to the Collector at or near Georgetown, if the destination of the boat or float be to or below the same; if to a point above, to the District Lock-keeper next above the part of the Canal to which his cargo is destined; and shall pay to the Collector, or to such District Lock-keeper, as the case may be, the toll chargeable on such boat.

Every such way bill shall be forwarded to the Company's Office in Washington, at the end of the month in which it is received, accompanied by an account of the tolls received thereon, the amount of which shall be forthwith deposited in Bank to the credit of the Company.

If any boat within this Canal shall proceed from one place to another thereon, above the Collector's office in Georgetown, and below Rushville, this owner, master or other person having charge thereof, shall receive a permit to proceed to his destination, from the first District Lock-keeper by whose lock he first passes, and shall pay his toll to the District Lock-keeper by whose house he last passes. Forms of such permits shall be supplied the Lock-keepers, and shall be filled up with the supposed tonnage of the boat,

¹⁵⁹ *Ibid.*

and the distance between its place of departure and destination, and the amount of toll chargeable thereon.

Every owner, master or other person having charge of any boat or float which may offer to pass any lock, may be required by the District Lock-keeper, or his assistant, to produce the boat's register and way bill or permit, or if his boat shall have commenced her voyage below Rushville, to state the place or places at which he took in his cargo, if he has any, and his destination, and shall pay a toll thereon according to the distance he has navigated the Canal.

Every owner, master or person having charge of any boat or float, who shall refuse either to show any Lock-keeper demanding sight thereof, his register, bill of lading, or permit, or being without either to state from whence he began his voyage, or took in, or increased his cargo, shall be refused a passage through the Lock at which such demand is made.

Each Lock-keeper shall monthly report the date of passage, number or description, owner's name, destination and cargo, of every boat or float which shall pass through his Lock without the bill of lading, and shall render in his monthly accounts and deposit in Bank to the credit of the Company, such sums as he may collect as tolls thereon.¹⁶⁰

Less than one week later on July 22 the board ordered that the canal "between the Seneca feeder and the wooden lock next above the foundry and the bridges and road ways within that distance" be officially "declared open and free for trade and passing, subject to the Regulations of the Company."¹⁶¹

It is apparent from a perusal of the canal company records that there was widespread disregard of the new regulations on the canal by the boatmen. By November the directors had received numerous reports that the trunk was obstructed in various places by sunken or broken gondolas, boats, and lumber and that many of the boatmen were still propelling their boats with poles. Accordingly, the board directed Superintendent Van Slyke to require that the lock-keepers strictly enforce the regulations governing the use of poles and the design of the boats. The company engineers were authorized also to report any infringement of the company's navigation rules. Henceforth, the use of poles, except for passing the locks, would be prohibited entirely.¹⁶²

As the company was experiencing great difficulty in enforcing its navigation by-laws, the board in early December reported the matter to the General Committee of the Stockholders. After some deliberation, the committee on December 6 determined to repeat the earlier attempt to obtain authority to establish a system of police for the preservation of the canal. Accordingly, memorials were sent to the Maryland General Assembly and the U. S. Congress requesting that the charter be amended to provide for such a police authority.¹⁶³

This time the canal company was successful in obtaining from these two bodies laws amending the canal charter to provide for the desired police authority. During the 1831 December session, the Maryland General Assembly passed a bill providing for the following: (1) any person found guilty of injuring, impairing, or destroying any of the property or works of the company was to be taken before a local justice of the peace and was to be made subject to a fine not exceeding \$50 payable to the company or he was to be indicted by a county court and, upon conviction, punished by incarceration or fine or both; (2) the company was empowered to pass by-laws for the exercise of the powers vested in it by its charter provided the regulations did not prevent

¹⁶⁰ *Ibid.*, B, 419–421.

¹⁶¹ *Ibid.*, B, 432.

¹⁶² *Ibid.*, C, 30.

¹⁶³ *Proceedings of the Stockholders*, A, 194.

the proprietors through whose land the canal passed from having convenient access to the canal or from crossing the waterway according to agreements already made with the company (violations of the by-laws were to be punished by \$5 fines); and (3) the company was given authority to prescribe the physical dimensions and equipment of the boats using the canal and to order offending boats to leave the waterway through any of the outlet locks.¹⁶⁴ An Act of Congress passed on July 14, 1832, gave the assent of the United States to the Maryland act.¹⁶⁵

During the years 1832–33, the canal board passed various resolutions relative to the navigation rules on the canal. While they all consisted of changes in the regulations adopted earlier, their general intent was to promote the efficiency of navigation and the preservation of the canal. On March 24, 1832, it was determined that no boat cargoes could be deposited nearer than eight feet to the margin of the Rock Creek Basin and that no sand could be deposited on either side of the basin below Lock No. 1. It was decided also to discourage the accumulation of commodities on the margin of the basin by requiring that the same rate of toll, which was paid on the goods for admission into the basin, be paid each day after the first day of unloading.¹⁶⁶

On June 4, 1833, the board took steps to force the lock tenders to enforce the company regulations more stringently. After this date, they would be held responsible for any damage done to the locks under their care by boats “violently” entering the chambers or by boatmen using iron-pointed poles, unless in each case of damage the number, description, and captain of the boat was reported to the Collector in Georgetown before the craft returned through the lock. The lock-keepers would be held responsible for any injury done to the lock gates or masonry unless they made a similar report. If the lock tenders failed to provide such information, the cost of repairing the damage would be deducted from their wages the following month. To make this provision effective, the canal superintendent was to certify that the locks were in good order each month before the salaries of the lock keepers were paid.¹⁶⁷

In late June 1833 the board decided to have the lock tenders enforce its earlier prohibition from navigation of all square-headed or sharp-covered scows that did not have a semicircular platform firmly fastened upon each end. For an undetermined reason, gondolas were excepted from this rule, although they had been included under it since 1831.¹⁶⁸

B. REGULATIONS FOR 1835–1850

As the canal was about to be opened to navigation as far west as Dam No. 5, the directors felt that a revised code of regulations should be adopted to govern navigation on the waterway. Accordingly, an updated set of by-laws was approved on February 18, 1835, to supersede the regulations approved in July 1831 and their subsequent amendments. The only significant change was in Rule 1, which now made provision for the operation of steam boats on the canal. These revised by-laws were to continue in effect until 1851 when a new code was drawn up after the canal was completed to Cumberland.

The 1835 rules for navigation were as follows:

February 18, 1835

¹⁶⁴ *Laws Made and Passed by the General Assembly of the State of Maryland* (Annapolis, 1831), Ch. 297. A copy of excerpts from this law may be seen in Appendix H.

¹⁶⁵ Act of Congress, July 14, 1832. A copy of this act may be seen in Appendix I.

¹⁶⁶ *Proceedings of the President and Board of Directors*, C, 112.

¹⁶⁷ *Ibid*, C, 368–369.

¹⁶⁸ *Ibid*, C, 392.

BY-LAWS, RULES, AND REGULATIONS FOR NAVIGATING THE CHESAPEAKE & OHIO CANAL

- 1st Every boat or float navigating the Canal, and not specially licensed to move by paddle wheels, shall be propelled by a towing line, drawn by men or horses, and all boats and floats shall be moreover, furnished with strapping or snubbing lines for passing through the locks of the Canal, without injury to the same.
- 2nd No boat or float shall, under any circumstance, use any iron-shod or sharp pointed settling pole on the Canal; nor shall they be allowed to pass any lock till all such have been deposited with the lock keeper, whose duty it shall be safely to keep the same, and return them to the master of such boat upon her return.
- 3rd Square headed or sharp cornered boats, such as scows and gondolas, shall each have a semicircular platform, firmly fastened upon each end thereof, so as to save other boats or floats, and the banks and locks of the Canal, from injury by contact with either of the corners thereof; and every boat or float shall have its rudder so constructed as not to catch, interfere with, or cut the tow-rope of a passing boat. All boats or floats not conforming to these three rules, shall be proceeded against as provided for by the act of Maryland, hereto annexed. (Appended act—Extract from an act of the General Assembly of Maryland, entitled “An act further to amend the act incorporating the Chesapeake & Ohio Canal Company,” passed at the December session, 1831.)
- 4th Every boat, gondola, and scow, navigating the Canal, must be named or numbered, and such name or number must be inscribed, by the direction and at the expense of those who are interested in her, with oil paint, in letters or figures, not less than three inches long, on both sides of such boat, gondola, or scow, and on some permanent part thereof, so high above water that it may be plainly seen from either bank of the Canal; and such name, together with the description of boat, (i.e. whether packet boat, freight boat, gondola, or scow,) must be inserted in her register, or license, and way-bills, or permit, and be entered in the records and returns of the collectors: provided, however that, in the first voyage down, if the owners or master shall have found it inconvenient to have had such name inscribed, the boat may be permitted to pass, designating her in her way-bill, &c. as a new boat; but after arriving at her destination, she shall not be permitted to return until her name has been inscribed as above directed; and provided, also, that, where the same name or number shall have been given to two or more boats of the same description, the one which has been most recently so named or brought on to the Canal shall be required to have the name so altered, or a number added thereto, as to easily distinguish it from the previous one.
- 5th No raft or tow of timber passing on the Canal shall consist of more than eight cribs, and when consisting of more than one, they shall be so united as to conform readily to the curvatures of the Canal banks, and to glide by the same without rubbing against them.
- 6th No boat or float shall forcibly strike or violently rub against any other boat, or against the banks, locks, aqueducts, inside walls, or wastes, or bridges of the Canal.

- 7th No boat or float shall be permitted to pass along the Canal at night, unless with a conspicuous light on its bow; in case of rafts, gondolas, or scows, such lights shall be at the forward end thereof.
- 8th No boat or float shall unnecessarily lie by or be moored opposite to any waste, or within one hundred and fifty yards of any lock, or in any short basin or pool between two locks.
- 9th When any owner, master, or other person having charge of any boat or float, designs to leave the same for any time in any other part of the Canal, he shall give notice of such intention to the nearest lock-keeper; and, before he leaves his boat or float, he shall moor it along the berm or side of the Canal opposite the towing-path, and there so secure it that no part of it shall be more than one-third of the width of the Canal from the berm-bank; and, in like manner, when a boat or float shall stop for the night, or lie by on account of high winds, or for any other transient or accidental cause, the owner, master, or other person having charge thereof, shall moor it securely along the berm side of the Canal.
- 10th Under no circumstances whatever shall any boat, or other floating thing, lie fastened to or moored along the tow-path of the Canal; nor shall the owner, master, or other person or persons having charge thereof, encamp upon the tow-path, or drive stakes into the top or slopes thereof, or place stones thereon, or kindle fires upon the same, or in any way or manner obstruct or incommode the free and common use of the Canal by day or night
- 11th No carcass, or dead animal, or putrid substance of any kind, shall be thrown into the Canal, or into any basin or feeder connected therewith, or be put upon or left on either bank of the Canal, or upon any part of the Canal property, so as to be offensive to travelers or others; and in the event of such being left, it shall be the duty of the lock-keeper nearest thereto to have it forthwith removed, and to endeavor to obtain such evidence as may lead to the conviction of the offender.
- 12th Whenever any superintendent or lock-keeper shall find any boat or float moored or fastened in any manner to the tow-path side of the Canal, or so moored or fastened in the Canal, or to the berm side thereof, that any part of such boat or float shall be more than one-third of the width of the then water surface of the Canal from the berm-bank, he shall forthwith direct the person or persons in charge of it to prevent its continuing so to lie. And if the person or persons in charge of such boat or float shall refuse or neglect to remove the same, he or they shall be proceeded against according to law; but if no person be found on board, or near at hand, in charge of such boat or float, the superintendent or lock-keeper shall cause it to be removed, and secured as near to the nearest lock-house as conveniently may be; and when the person claiming to be the master or owner thereof, or to be acting in behalf of the master or owner, shall apply for the repossession of it, it shall be delivered to him; but if he do not at the same time pay the expense of so removing and securing it, a prosecution shall ensue for the violation of these by-laws.
- 13th Whenever a superintendent or lock-keeper shall find any boat, float, or other substance, floating loose upon, or sunk in the Canal, or any of its basins, ponds, or feeders, the owner of which is unknown, or, if known, neglects or refuses, after reasonable notice, to remove the same, such superintendent or lock-keeper shall cause it to be broken up and removed from the Canal.
- 14th All boats and floats descending the Canal shall have the right to keep the tow-path side thereof; and when any ascending boat or float is about to meet a de-

- scending one, it shall be the duty of the owner, master, or other person navigating or having charge thereof, to turn from the towing-path, so as to allow room for the descending boat to pass with ease; provided, however, that licensed packet boats shall, until otherwise ordered, have the right to keep the towing-path side, both in ascending and descending the Canal, with this exception: that when two such licensed packet boats meet, the ascending one shall lose its right to the towing-path side for the time occupied in passing such other packet boat.
- 15th Rafts shall, in all cases, give place for boats of all descriptions to pass between them and the towing-path; and in like manner all boats moved by steam power, or any other means than by a towing line, whether they be packet boats or not, shall in all cases give place for boats or floats moved by a towing line to pass between them and the tow-path
- 16th When the owner, master, or other person having charge of any boat or float, shall perceive, or be told, or apprized by sounding a horn, or by any other signal, that a packet or other boat following him can, from its speed, pass him, and is desirous to do so, he shall turn his boat from the tow-path side of the Canal, and give way to the swifter moving boat to pass by, unless at the time of such signal he be within three hundred yards of the next lock ahead of him.
- 17th The passing of one boat by another shall be effected by checking the boat bound by the preceding rules to give way, as soon as she has opened a passage for the other, so as that the tow-line may sink to the bottom of the Canal, and boat entitled to pass may float over it.
- 18th In case of any breach or leak through the Canal banks, or of the apprehension of one, the several boats or floats, which may be near the place of danger, shall take such position in the Canal, as the superintendent, or officer, or engineer, or lock-keeper of the company, or other person charged to repair or guard against such breach or leak, may direct.
- 19th In all cases, boats engaged in repairing the Canal shall have preference of all other boats, if their use at the time require it.
- 20th If several boats are approaching a lock at the same time, from the same direction, the one which first arrives within one hundred and fifty yards thereof shall be entitled to pass through it first, and the others in the order of their arrival, within said distance of one hundred and fifty yards; provided, however, that if there be one or more packet boats among them, such packet boats shall be passed in preference to all others, except the one that may be in the lock at the time when such packet or packets arrive within the one hundred and fifty yards; and after such packet or packets shall have passed, the others will resume the order of their passing as before. In like manner, freight boats, gondolas, and scows, shall have a preference over rafts, and such parts of rafts, as remain after one or more cribs of the same raft shall have passed.
- 21st In all the short levels, to wit, between locks 1 and 4, between locks 9 and 14, between locks 15 and 20, between locks 35 and 36, and between locks 41 and 43, all freight boats, gondolas, scows, or rafts, passing in the same direction with a packet boat or boats, shall give way for such packet or packets to enter the lock at the end of such level, except the freight boat or other craft that may be in such lock at the time when the gates of the lock at the other end of the level are opening to pass such packet out; in which case such freight boat or other craft shall be passed through the lock it may have so entered, and wait in the next level (if it be

- one of the short ones above referred to) till such packet or packets shall have passed her.
- 22nd The preference granted to packet boats by any of the preceding rules shall not extend to such as are less than sixty feet long; and no boat shall be deemed to be a packet, within the meaning of these rules, until she shall have obtained a license as such, signed by the President and Clerk of the Company, nor after such license shall have been annulled by a vote of the President and Directors, at some legal meeting of the Board.
- 23rd If two or more licensed packets approach a lock at the same time, from the same direction, the one which first arrives within one hundred and fifty yards of the same shall pass first, and the other or others in the order of their arrival within that distance. And in this and the three preceding rules, no distinction shall be made whether the boats be moved by a towing line, steam power, or other means.
- 24th If boats or other craft are approaching a lock from above and below at the same time, the descending one, which, by the foregoing rules, would have the right to pass, were they all bound in the same direction, shall be passed first, whatever may be the distance at which she is first discovered, if the lock be full of water, and it is the opinion of the lock-keeper, judging from her speed, that the water cannot be drawn off before she will have reached the lock, and, in like manner, the ascending one shall be passed first, if the lock be empty, and it is the opinion of the lock-keeper that it cannot be filled before such ascending one will have reached it.
- 25th No boat or float shall pass in any degree the walls of a lock, above or below its gates, until directed by the lock-keeper so to do; nor shall it take or keep a position, contrary to the orders of the lock-keeper, so as to prevent another from freely passing out or in. The Seneca aqueduct must be considered as forming part of the walls of the lock with which its connected, so far as relates to this rule.
- 26th In all questions as to a boat or float being in a lock, it shall be held that if any part of it shall have passed the extreme end of the walls of such lock, in its regular turn, and with the consent of the lock-keeper, then it is in the lock, within the meaning of the foregoing rules, but not otherwise. In like manner, a boat or float shall be considered as within one hundred and fifty yards of a lock, if the bow of it shall have passed the mark indicating that distance, but not otherwise.
- 27th In all cases when there are several boats, or other craft, waiting near a lock to pass in both directions, so soon as one of them shall have been passed down, agreeable to the foregoing rules, the ascending one, entitled to enter, shall be passed up, if ready, and if not, then the next in order that is ready, before another from above shall be passed down; and in like manner, if an ascending boat, or other craft, shall have passed first, a descending one, if ready, shall be passed down before another shall pass up.
- 28th Every boat or float which shall not avail itself of the first title it acquires to pass through any lock, shall lose its preference thereat, till all those have passed which were, at the time of such neglect, awaiting a passage through the same, in the same direction.
- 29th It is made the duty of every lock-keeper to remove into his lock-house before going to bed, the cranks, or handles, by which the paddle gates of every lock in his charge are turned, so that no person but himself, or one acting under his authority, can turn any such gates. And it is further hereby made the duty of every lock-keeper, at any hour of the night, upon being apprized of the wish of any boat or

- boats to pass, either by the blowing of a horn, knocking at his door, or other signal, to rise and pass such boat or boats, or have it done by some one acting under his authority.
- 30th Every owner, master, or other person having charge of any boat or float which may offer to pass any lock, by night or by day, may be required by the lock-keeper or his assistant to produce the boat's register and way-bill or permit; and if such owner, master, or other person having charge, shall refuse either to show to the lock-keeper demanding sight thereof his register, bill of lading, or permit, or, being without either, to state from whence he began his voyage, or took in or increased his cargo, he shall be refused a passage through the lock at which such demand is made.
- 31st In approaching a lock, the owner, master, or other person having charge of any boat or float, shall slacken his speed, at such distance therefrom as the lock-keeper, or any person acting by his authority, shall direct; and take care to enter the lock without injury thereto.
- 32nd In passing the lock he shall fasten the bow and stern snubbing lines of his boat, to the strapping posts, on the proper side of the lock, until the lock is filled or emptied, as the case may be; and in all other respects he shall use his strapping ropes according to the instructions of the lock-keeper, and tow his boat into or out of the lock, at such time, and in such manner, as the lock-keeper may direct. He shall especially make use of all possible diligence to go out of the lock, when the gates shall have been opened for his departure, so as to occasion no unnecessary delay to other boats waiting to pass the same lock, or any other lock in charge of the same lock-keeper.
- 33rd No cart, wagon, or wheel carriage of any description, shall travel upon, or be permitted to use, the towpath bank, or berm-bank of the Canal, except in crossing them, in the shortest convenient direction, at some authorized ferry.
- 34th It is hereby made the duty of every lock-keeper to note, or bear in mind, every breach or violation of any of the preceding rules, so as to be able to give testimony in the case, whenever legally required to do so; and also to report all such breaches and violations to the superintendent.
- 35th All rules and regulations heretofore made, so far as they conflict with the foregoing rules, regulations, or by-laws, are hereby repealed.

Enacted by the President and Directors of the Chesapeake & Ohio Canal Company, at a meeting of the Board, this 18th day of February 1835.¹⁶⁹

Between 1835 and 1850 the company records show virtually no changes in these regulations. However, a federal law passed in February 1839 did affect the boats on the canal. From that time all boats weighing in excess of five tons were to be licensed by the Collector of the Port of Georgetown.¹⁷⁰

C. REGULATIONS FOR 1851–1889

After the completion of the waterway to Cumberland in 1850, the company prepared to

¹⁶⁹ *Ibid*, D, 240–252.

¹⁷⁰ *Ibid*, F, 25.

enter a new phase of its existence. Among other activities, the directors issued a new set of resolutions to govern navigation on the canal.¹⁷¹ These rules were largely a confirmation of the existing regulations, modified and brought up to date by the lessons of the first revisions. The regulations were printed on sheet paper to be posted in all of the offices of the collectors and lock-keepers along the line. They were also published in pamphlet form with other regulations concerning the administration of the company for the canal officials located on the line of the canal.¹⁷²

The new regulations, which went into effect on April 1, 1851, were as follows:

DEFINITIONS and EXPLANATIONS

of certain terms and words used in these regulations.

1. The term "float" as used in these regulations, shall be construed to embrace every boat, vessel, scow, gondola, raft or floating thing, navigated or moved on the Canal, by, or under the direction and charge of any person or persons; and the term "master," as so used, shall be construed to apply to every person having for the time, the charge, control, or direction of any such float.

2. The term "manifest," as used in these regulations, shall be construed to mean a just and true statement and account or bill of all the property constituting the lading of any boat or float, at the time of its clearance, made out in such form, and containing such information in relation to the said lading, as shall from time to time be prescribed and required by the Company,—signed by the consignor or consignors of said lading, and by the master of the said boat or float, and also verified by the oath of the said master.

3. The term "way-bill," as used in these regulations, shall be construed to mean a certificate made out and signed by someone of the Collectors or acting Collectors on the Canal, that the boat or float named therein, has been duly and properly CLEARED for a voyage on the Canal, and containing a statement and account of the property on board of such boat or float at the time and place of clearance,—and the term "permit," as so used, shall be construed to mean a certificate, given in certain cases, under these regulations,—signed by a Collector, acting Collector or Lock-keeper, stating that the boat or float named therein, has permission to pass on the Canal for the distance specified therein, without a way-bill.

4. The term "boat's register," as used in these regulations, shall be construed to mean a register signed by the Clerk of the Company, containing the name or names of the owner or owners of the boat or float; and his or their respective places of abode; its class and hailing place; and also, its length, breadth, light draft, and draft with a maximum load,—and authorizing the said boat or float to navigate the Canal, under and in conformity with the rules and regulations of the Company.

5. The words "first offence," "second offence," and "subsequent offence," in the 48th and 58th regulations, shall be construed as meaning the first, second, or subsequent, as the case may be, like offence, of the person, at the time, master of the boat or float referred to in those regulations, respectively, during the whole period, *he may have been employed as a master of a boat or float navigating the Canal*—although during that period, he may, at different times, have been master of several different boats or floats: and the said words, in the 73rd, 74th, 80th, 81st, 82nd, 83rd, 84th and 86th regulations, shall be

¹⁷¹ *Proceedings of the President and Board of Directors*, H, 407–414, 431–434.

¹⁷² Ringgold to Bryan, February 21, 1851, Ltrs. Sent, C&O Co.

construed as meaning the first, second, or subsequent, as the case may be, like offence, of the owner or owners, or of the master of the boat or float referred to in these regulations, respectively, during the period that the said boat or float may have been the property of the said owner or owners, and been commanded by the said master.

In regard to the DRAFT and SPEED of Boats and Floats.

25. No boat drawing more water, than shall from time to time be prescribed by the Canal Board or by the General Superintendent, shall navigate the Canal; and it shall be the duty of every Collector, acting Collector, Superintendent and Inspector, to cause every boat found, at any point on the Canal, violating this regulation, to be forthwith so far unloaded as to bring it within the prescribed limit: and in every case where a boat is so unloaded, the fact shall be entered on its way-bill or permit by the said Collector, acting Collector, Superintendent or Inspector, with a statement of the portion of its cargo taken off, and if by reason of any subsequent addition to its cargo the draft of such boat shall be found to exceed that prescribed as aforesaid, its master or owner shall be subject to a PENALTY of *ten* dollars, to be imposed and collected by any and every Superintendent, Collector, acting Collector and Inspector, who shall at different times and places detect such overdraft;—and it shall be the duty of every such officer, to gauge any boat or float, whose draft, he has reason to believe, is not correctly shown by the marks on its bow, stern and amidships, required by the 21st regulation. If the owner or master of any boat or float, shall refuse or not permit the said boat or float to be thus gauged, he shall be subject to a PENALTY of *twenty* dollars.

26. No boat or float, except Packet boats, licensed as such, shall move on the Canal faster than at the rate of four miles an hour. PENALTY for a violation of this regulation, *five* dollars.

27. No Packet boat shall move on the Canal faster than at the rate prescribed in its license. PENALTY for a violation of this regulation, *five* dollars.

*PASSING of one Boat or Float, by another,
whether moving in the same or in opposite directions.*

28. Whenever any boat or float shall approach within the distance of fifty feet of any other boat or float, which shall, at the time, be moving in the same direction and at a less speed than at the rate of four miles per hour, it shall be the duty of the forward boat or float, except at points where there is not sufficient width for boats to pass, or within one hundred and fifty yards of a lock or of the tunnel, to turn from the towing path and give to the rear boat or float every practicable facility for passing; and to stop whenever it shall be necessary, until the rear boat or float shall have passed. *PENALTY* for a violation of this regulation, *five* dollars.

29. Whenever any boat or float shall meet with any other boat or float, it shall be the duty of the master of the descending boat or float to turn out to the tow-path side, and of the ascending boat or float to turn out to the berm side, so that the former, where the Canal does not exceed fifty feet in width on its surface, shall be wholly on the tow-path side, and the latter, wholly on the berm side of the center of the Canal; and along those parts of the Canal that exceed fifty feet in width on its surface, and in the slack water above Guard locks No. 4 and 5, the ascending boat or float shall turn out sufficiently from the tow-path to allow the descending boat or float to pass with ease and safety between it and the tow-path; *Provided*, however, that licensed packet boats, ascending the

Canal, meeting descending boats or floats *that are not licensed packet boats*, shall have the right to keep the towing path side, in passing;—and *provided*, also, that rafts shall, in all cases, whether descending or ascending, the Canal, give place for boats and every other description of floats to pass, between them and the tow-path. PENALTY for a violation of either of the provisions of this regulation, *five* dollars.

30. Whenever any boats or floats moving in opposite directions, approach a place in the Canal which is less than thirty feet wide on its surface, or which will not safely permit their passing, it shall be the duty of the master of the boat or float ascending the Canal, to stop at such distance from such narrow place as may be convenient for the descending boat or float to pass through such narrow place, and there to wait until such passage is effected: *Provided*, however that a descending boat or float, *that is not a licensed packet boat* which is about thus to meet an ascending licensed packet boat, shall stop and give place for the said licensed packet boat, first to pass through the said narrow place;—and, *provided*, also, that descending rafts shall, in all such cases, stop and give place for boats and every other description of ascending floats first to pass through the same. PENALTY for a violation of either of the above provisions of this regulation, *five* dollars. *Regulations in regard to the order in which boats or floats, moving in opposite directions, shall pass through the Tunnel, will be, from time to time, presented by the Canal Board or General Superintendent, and shall be complied with, under a PENALTY of ten dollars, for each violation of either of their provisions.*

31. Whenever two boats or floats moving in opposite directions, approach each other, in the vicinity of a raft, in such manner that they would, if both should continue their headway, meet by the side of such raft, the boat or float which is going in the same direction as the raft, shall stop until the boat or float going in the opposite direction shall pass such raft. PENALTY for a violation of this regulation, *five* dollars.

32. The passing of one boat or float by another, whether moving in the same or in opposite directions, shall be effected in the manner usual upon Canals,—and so that the boat or float entitled by these regulations to a passage next the tow-path, and the horses or mules by which it is towed, shall pass, with ease and safety and without detention, over the tow line of the other. PENALTY for a violation of this regulation, *five* dollars.

Order in which Boats and Floats
SHALL PASS THROUGH *Locks*.

33. Any descending boat or float which has arrived within one hundred and fifty yards of a lock, the upper gates of which are open,—or any ascending boat or float which has arrived within one hundred and fifty yards of a lock, the lower gates of which are open, shall be permitted to pass such lock before any boat or float not on the same level; *Provided*, however, that no ascending raft, the upper end of which has not already passed the lower gates of the lock, shall thus be permitted to pass, while a licensed packet boat is awaiting a passage in the opposite direction.

34. If two or more boats or floats are awaiting a passage in the same direction through any lock, they shall be permitted to pass such lock in the order in which they arrived within one hundred and fifty yards of it; *Provided*, however, that no boat or float that is not a licensed packet boat, the bow of which has not already passed the extreme end of the walls of the lock, shall thus be permitted to pass, while a licensed packet boat is awaiting a passage in the same direction.

35. In all the short levels; to wit, between locks 1 and 4, between locks 9 and 11, between locks 12 and 14, between locks 15 and 20, between locks 35 and 36, between

locks 41 and 42, between locks 45 and 46, between locks 47 and 50, between locks 54 and 55, between locks 63 1/3 and 66, and between locks 73 and 75, all freight boats or other craft, passing in the same direction with a packet boat or boats, shall give way for such packet or packets to enter the lock at the end of such level, except the freight boat or other craft, the bow of which has already passed the extreme end of the walls of such lock, at the time when the gates of the lock at the other end of the level are opening to pass such packet out; in which case, such freight boat or other craft shall be passed through the said lock, and wait in the next level, (if it be one of the short ones above referred to,) till such packet or packets shall have passed it.

36. Every boat or float which shall not promptly avail itself of the preference it may have over other boats or floats to pass through any lock, shall lose such preference, till all those have passed which were, at the time of such neglect, awaiting a passage through the lock, in the same direction.

37. The General Superintendent of the Canal may, however, whenever and for such length of time, as in his opinion it may be advisable and necessary, with a view to the saving of water upon any part of the Canal, suspend the four preceding regulations and temporarily prescribe such other, in lieu thereof, during such period of suspension, as he may deem necessary.

38. All questions that shall arise among the masters or persons in charge of two or more boats or floats, at any lock, as to which, under these regulations, shall be first entitled to pass, shall be determined by the lock-keeper, or any other agent having at the time charge of such lock, and such boats or floats shall be passed in the order in which such lock-keeper or other agent shall direct.

RELATIVE TO the PASSING OF BOATS AND FLOATS THROUGH LOCKS

39. No boat or float shall enter any lock without the permission of the lock-keeper, or other agent at the time having charge of such lock, nor take or keep a position contrary to the orders of the lock-keeper, or said agent, so as to prevent another boat or float from freely passing out or in. The Seneca aqueduct will be considered as forming part of the walls of the lock with which it is connected, so far as relates to this rule. And no master of any such boat or float, or person assisting him in the management thereof, shall open either of the large gates of a lock, or either of its paddle gates, without the permission of the lock-keeper. PENALTY for a violation of either of the provisions of this regulation, *five* dollars.

40. It shall be the duty of every lock-keeper, at any hour of the day or night, upon being apprized of the wish of the master of any boat or float to pass such boat or float through the lock of which he has charge, either by the blowing of a horn, knocking at his door, or other signal, to pass such boat or float, if entitled to a passage under these regulations, or have it done by some one acting under his authority.

41. Every master of any boat or float who may desire a passage, for such boat or float, through any lock, may be required by the lock-keeper, or his assistant, to produce the boat's register and way-bill or permit; and if such master shall refuse to show to the lock-keeper, demanding sight thereof, said register and way-bill, or permit, or either of them, a passage, for such boat or float, through the lock shall be refused. PENALTY for every such refusal, although the register and way-bill, or permit, may be subsequently shown to the lock-keeper or his assistant, and the boat passed, *five* dollars.

42. Every master of any boat or float who may desire with such boat or float to pass any lock, who shall be without a register and way-bill or permit, or without either, shall be refused a passage for such boat or float through the said lock, until such register and way-bill or permit, or either, as the case may be, shall have been obtained at the place or places prescribed by these regulations.

43. In approaching a lock, the master of any boat or float, shall slacken its speed, at such distance therefrom as the lock-keeper, or any person acting by his authority, shall direct; and, if such boat or float is ascending the Canal, it shall enter the lock, without striking or running against the upper gates of the lock,—or if descending the Canal, without striking or running against the lower gates. PENALTY for a violation of either of the provisions of this regulation, *five* dollars.

44. The snubbing lines of every boat or float, while passing a lock, shall be secured to the snubbing post alongside of the lock, and be used in such manner as the lock-keeper or his assistant may direct; and the boat shall be towed into and out of the lock, at such times, and in such manner, as the lock-keeper may direct;—*Provided*, however, that the use of the snubbing lines while passing a lock, may be dispensed with, if there is attached to the boat or float any device or contrivance that will, in the opinion of the lock-keeper, if properly used, prevent the lock, its gates and fixtures from being injured,—in which case the said device or contrivance shall be used as the lock-keeper or his assistant may direct. PENALTY for a violation of either of the provisions of this regulation, *five* dollars.

45. There shall be no unreasonable or unnecessary delay of a boat or float in a lock, or in entering or leaving a lock; and every boat or float which shall not be towed into a lock or out of it, when other boats or floats are in waiting to pass said lock, shall be considered as having violated this regulation. PENALTY for a violation of this regulation, *five* dollars.

46. Any master, or person for the time, in charge of any boat or float, who shall enter, or permit any other person or persons to enter, any lock, with such boat or float, when *forbid* by the lock-keeper or his assistant; or if such boat or float has entered any lock, who shall pass, or permit any other person or persons to pass, with the same, through such lock, when *forbid* by the lock-keeper or his assistant; or of which is thus forbidden, to be immediately withdrawn from the lock, shall be subject to a PENALTY of *twenty* dollars.

AT WHAT PLACES *Boats and Floats* may
STOP, LIE BY OR BE MOORED.

47. No boat or float shall unnecessarily stop, lie by, or be moored, within twenty rods of any waste or waste-weir, except in a basin,—or in the Tunnel, or in any aqueduct, or in any lock, or in any part of the Canal where the width of water surface, when the Canal is full, is less than forty feet,—or within twenty rods of any lock, except in a basin,—or in either of the short levels between locks No. 1 and 4, between locks No. 9 and 10, between locks No. 12 and 14, between locks No. 15 and 20, between locks No. 35 and 36, between locks No. 41 and 42, between locks No. 45 and 46, between locks No. 47 and 50, between locks No. 51 and 52, between locks No. 54 and 55, between locks No. 63 1/3 and 66, and between locks No. 73 and 75. PENALTY for violating this regulation, by stopping, lying by or mooring in the Tunnel or in any lock or aqueduct, *twenty* dollars,—or if at any of the other places above enumerated, *five* dollars.

48. Under no circumstances whatever shall any boat or float, or other floating thing, lie fastened to or be moored along the tow-path of the Canal, nor shall the owner, master, or other person or persons having charge thereof, encamp upon the tow-path, or drive stakes into the top or slopes thereof, or place stones or kindle fires thereon, feed their horses or mules upon the tow-path, or in any way or manner obstruct or incommode the free and common use of the Canal and its tow-path by day or night. PENALTY for a violation of this regulation—for the first offence *five* dollars, and for any subsequent offence, *twenty* dollars.

49. No person or persons shall, without the permission in writing, of a Superintendent, Collector, acting Collector or Inspector, moor a boat or float in the Canal for a longer period than four days, unless in a basin, or where the Canal has a width at water surface, when full, of not less than sixty feet: In Georgetown no boat or float shall be moored in the Canal except in a basin, for a longer period than is reasonable for discharging or taking in the load of such boat or float, without a written permission from the Superintendent, or in his absence of the Collector or Inspector:—And in all cases, when moored for the purpose of loading or unloading, or of stopping for the night, or for feeding their horses or mules or for any cause whatever,—every boat and float shall be so secured along the berm side of the Canal, in places permitted by the preceding regulations—that no part of them shall be more than one-third of the width of the Canal from the berm bank. PENALTY for a violation of either of the provisions of this regulation, *ten* dollars.

50. It shall be the duty of every Collector, acting Collector or Inspector, and if there be no Collector, acting Collector or Inspector present, of every Superintendent, wherever in the opinion of such officer it shall be necessary, to assign berths as far as practicable to all boats when loading, unloading or stopping at any landing place on the Canal and in its basins. And every master, owner or person having charge of a boat, who shall refuse or neglect promptly to comply with directions given by a Collector, Inspector or Superintendent, in this regard, or any person or persons other than those in charge of said boat, who shall forcibly remove or attempt to remove the same from the berth assigned it by either of said officers, without his permission, shall be subject to a PENALTY of not less than *five* nor more than *twenty* dollars,—at the discretion of the Collector, acting Collector, Inspector or Superintendent aforesaid.

*Relative to Boats and Floats, when there is a BREACH or LEAK,
or SUSPENSION OF THE NAVIGATION, &c, or where REPAIRS are making.*

51. In case of any breach or leak through the Canal banks, or of the apprehension of a breach, or in case of a suspension of the navigation, upon any part of the Canal, from any cause,—or when the Canal is filling with water,—the Superintendent, Collector or lock-keeper, or other person charged to repair or guard against such breach or leak,—or to restore the navigation,—or to attend to such filling of the Canal with water,—shall have the right to direct the boats or floats which may be near such breach, leak or place of suspension of navigation,—or which in his opinion may obstruct the filling of the Canal with water, to lie in such places and to be moved backward or forward on the Canal as he shall think most advisable and proper, and a refusal or neglect to comply promptly with his directions in this respect, shall be considered a violation of this regulation. PENALTY for a violation of this regulation, *ten* dollars.

52. In all cases, boats engaged in repairing the Canal shall have preference of all other boats or floats in passing along the line of the Canal, or through its guard and lift locks, if in the opinion of the person or persons in charge of those boats, their use, at the

time, require such preference,—and any person or persons who shall prevent, in any case, any such boat, from having such preference, shall be considered as having violated this regulation. PENALTY for a violation of this regulation, *five* dollars.

MISCELLANEOUS PROVISIONS *in relation to Boats and Floats.*

53. No boat or float shall, under any circumstances, except in the Rock Creek, Wills Creek and North Branch basins, and along the slack water above Dams No. 4 and 5,—use any iron or metallic-shod or sharp-pointed setting pole on the Canal,—and except at the places above named, no such pole shall be kept on deck or within convenient reach of those managing the said boat or float. PENALTY for a violation of either of the provisions of this regulation, *five* dollars.

54. No boat or float shall forcibly strike or violently rub against the banks, inside walls, wastes, waste-weirs, bridges, stop-locks, aqueducts, or tunnel of the Canal, or against any of its stop, guard or lift locks; and every boat or float shall be conducted into, through and out of every guard or lift lock on the Canal, in a careful manner, so as to do no injury to such lock, its gates or any of its fixtures. PENALTY for a violation of either of the provisions of this regulation, *five* dollars.

55. The master of any boat or float who shall, at any time, with such boat or float, either carelessly or by design, strike, rub, or run against any other boat or float, in such manner as to sink, disable or injure such boat or float, or force it with violence against the bank or side of the Canal, shall,—if such other boat or float is, at the time, moving on the Canal or lying by, as the case may be, in strict conformity with these regulations,—be subject to a PENALTY of not less than *five*, nor more than *twenty* dollars, at the discretion of the Superintendent in charge of the portion of the Canal on which the offence is committed.

56. Whenever a boat or float, or several boats or floats, are stopped at any place on the Canal, awaiting a passage through a lock, or in consequence of a breach or leak in the Canal, or any interruption to the navigation from any cause, no boat or float, subsequently arriving at such place, shall pass by, or shall lie alongside of any one of those that previously arrived. The master of any boat or float, who shall violate either of the provisions of this regulation, shall be subject to a PENALTY of *five* dollars.

57. The horse or horses, mule or mules, of any boat or float navigating the Canal, shall not pass over a tow-path bridge faster than in a walk,—nor shall they be passed into or out of any boat or float over or upon the walls or sides of any lock or aqueduct. PENALTY for a violation of this regulation, *three* dollars.

58. No hay, straw, manure or litter of any kind shall be discharged or thrown, from any boat or float, into the Canal, or upon either of its banks or any of its works.—PENALTY for a violation of this regulation, for the first offence, *five* dollars, and for any subsequent offence, *ten* dollars.

Miscellaneous Provisions to

GUARD AGAINST INTERRUPTION TO THE NAVIGATION *and* INJURY TO THE CANAL.

59. The FERRY BOAT, at an authorized ferry on the Canal, when not in actual use, shall be secured, at each end, in either the tow-path or berm ferry recess, in such manner, that no part or either end of it, shall project into the Canal, outside of such re-

cess; and such boat shall not be used for the purpose of crossing the Canal at any other place, or lie by or be moored, except in one of the said recesses. For each violation of either of the above provisions of this regulation, the owner or owners of such ferry boat,—if the offence is committed by him or them, or by a person or persons in his or their employ, or with his or their consent and permission,—shall be subject to a PENALTY of *five* dollars; but if any other person or persons without the authority of the said owner or owners, shall use the said ferry boat, at any place not permitted by this regulation, or shall cause any part or either end of it, to project outside of the recess in the manner above prohibited, he or they shall be subject to a PENALTY of *ten* dollars.

60. The PIVOT OR MOVEABLE BRIDGES that have been constructed at several of the locks on the Canal, shall be under the charge and control of the lock-keepers, respectively, at those locks, and shall be attended to and kept by the said lock-keepers, in such manner as will best promote public convenience, in the case of bridges constructed for the accommodation of public roads,—or the convenience of the person or persons for whose use they were intended, in the case of bridges constructed for the accommodation of individuals,—and, at the same time, in each case, to prevent interruption to the navigation of the Canal,—and any person or persons, who shall move or turn either one of the aforesaid bridges, when forbid by the lock-keeper in charge thereof,—or any person or persons, not entitled to use the same, who shall move or turn either one of the said bridges intended for the use of individuals, shall be subject to a PENALTY *five* dollars.

61. Whenever a Superintendent, Collector or Lock-keeper shall find any boat, float, raft, timber or other substance floating loose upon or sunk in the Canal or any of its basins, ponds, feeders or other works,—the owner of which is unknown, or if known, does not reside within the County in which the said boat, float, raft, timber or other substance is floating or sunk, or if known and a resident of the County, shall neglect, after notice, forthwith to remove the same,—such Superintendent, Collector or Lock-keeper shall cause the same to be broken up and removed from the said Canal, its basins, ponds, feeders or other works—and the materials of the broken boat, float, raft, timber or other substance so broken up and removed, shall be forfeited to and become the property of the Canal Company.

62. No persons, or persons shall place on the towing path or berm bank, or in the Canal or any of its feeders or basins, or on any of the banks of its feeders or basins, logs, timber or other materials, without the permission in writing of a Superintendent; and every violation of this regulation shall subject such person or persons to a PENALTY of *ten* dollars.

63. No person or persons shall, without the permission in writing of a Superintendent, roll or draw, from or into the Canal, its feeders or basins, over the side of any lock or aqueduct, or over any structure of masonry or timber, or over the side of any embankment,—except at regularly established landing places or wharves, any log, timber or other material; and every violation of this regulation shall subject every such person or persons to a PENALTY of *ten* dollars.

64. No person or persons shall drive a cart, wagon or wheel carriage of any description, nor lead or drive any horse, mule, ox or other animal, except for the purpose of towing boats or floats, upon the tow-path or berm bank of the Canal, except in crossing them, in the shortest convenient direction, at some authorized ferry nor shall any person or persons, except an officer or agent of the Company, ride any horse or mule, along or upon the tow-path in the Tunnel, or along or upon the tow-path in the Deep Cuts adjoining the Tunnel, that is not, at the time, employed in towing some boat or float. PEN-

ALTY for a violation of this regulation, for the first offence, *five* dollars,—and for any subsequent offence, *ten* dollars.

65. Any person who shall put or leave, or cause to be put or left, any disabled animal or any carcass, dead animal, or putrid substance of any kind, into the Canal, or into any basin or feeder connected therewith, or upon either bank of the Canal, or upon any part of the Canal property, shall pay the expense of removing the same and, in addition, be subject to a PENALTY of *ten* dollars.

66. Any person or persons, who shall throw or place, or cause to be thrown or placed, stones, gravel, earth, or any other substance or materials whatever, into the Canal, its feeders, basins, or other works, or upon the tow-path of the Canal, shall pay the expense of removing the same and, in addition, be subject to a PENALTY of not less than *five*, nor more than *twenty* dollars, at the discretion of the Superintendent in charge of the portion of the Canal on which the offence is committed.

67. Any person or persons, who shall *carelessly or neglectfully*, by any means whatever, injure, impair, break or destroy any part of the Canal or any part of its feeders, dams, locks, aqueducts, wastes, waste-weirs, culverts, walls, embankments, bridges, buildings or other works of the said Canal, such person or persons shall each of them pay a FINE of *five* dollars,—and any one or more of them shall also be liable to pay a sum *equal to the damage sustained by said Company by such injury*.

68. Any person or persons, who shall *willfully or maliciously*, open or close any waste gate, or any gate or wicket of any lock on the Canal or on any of its feeders, or shall, willfully or maliciously, by any means whatever, injure, impair, break or destroy any part of the Canal, or any part of its feeders, dams, locks, aqueducts, wastes, waste-weirs, culverts, walls, embankments, bridges, buildings or other works, of the said Canal, such person or persons, so offending, shall for every such offence, forfeit and pay to the said Canal Company at FINE of *twenty* dollars,—and any one or more of them shall also be liable to pay a sum equal to the damage sustained by said Company by such injury;—*and as, by law, every such offender will be subject to indictment in the Court of the County in which the offence shall be committed, and upon conviction, to imprisonment for a term not exceeding six months, in the discretion of the Court*,—it is hereby made the duty of any Superintendent or Collector on the Canal, who shall know from his own observation, or have good cause to believe, that such offence has been committed, to do whatever may be necessary to bring the same to the notice of the Grand Jury of the County.

INSPECTORS *to be regarded as* ASSISTANTS OF THE COLLECTORS

69. The Inspector or Inspectors at any place on the Canal, will be considered, under these regulations, as an assistant or as assistants of the Collector at that place, and every act done by such Inspector or Inspectors,—under special or general directions from such Collector, given for the purpose of carrying into effect and enforcing these regulations, so far as it is the duty of the said Collector to carry into effect and to enforce the same,—shall be considered and regarded, under these regulations, as the act of the said Collector.

Which Lock-keepers are also ACTING COLLECTORS.

70. The Lock-keepers at tide lock B., at locks No. 5, No. 21, No. 23, and the Se-

neca guard lock adjoining, at lock No. 25, and Edward's Ferry outlet lock, at locks No. 26, No. 28 and No. 30, at lock No. 36 and Guard lock adjoining, at lock No. 37, at lock No. 38 and Shepherdstown outlet lock, at locks No. 40, No. 42, No. 46, No. 51, No. 54 and Guard lock No. 6, at locks No. 57, No. 60, No. 66, No. 70, and No. 75, shall also be acting Collectors, under these regulations, and as such shall perform the duties required of acting Collectors by these regulations; and in the performance of these duties, they shall have all the right, control and authority, that they would have, and may do all the acts, that they might do, were they Collectors.

ARRANGEMENT of *Cargoes consisting of*
ARTICLES PAYING DIFFERENT RATES OF TOLL

71. Where any boat, scow or other craft, navigating the Canal, shall be laden with articles paying different rates of toll, or with articles some of which shall be chargeable with toll by weight, and others by measure or count, it shall be the duty of the master or owner, so to arrange the said lading that the several Collectors, acting Collectors, and Inspectors on the Canal, can conveniently examine and inspect the same. And if not so arranged, the master or owner shall, at his own expense, on the request of any Collector, acting Collector, or Inspector, unload in whole or in part the said cargo, so as to furnish all the necessary information for the purposes of imposing tolls or detecting or preventing frauds. And in case of the neglect or refusal of any master or owner to comply with this regulation, the whole cargo of such boat, scow or craft, shall be charged with toll at the rate of those articles on board paying the highest rate of toll.

In regard to WAY-BILLS, PERMITS AND MANIFESTS.

72. No boat or float shall be permitted to pass on the Canal, unless the master thereof shall first have obtained a way-bill therefore, for the voyage then making or about to be made, from the proper Collector or acting Collector of tolls on said Canal, except in the cases hereinafter particularly specified.

73. The way-bill for each voyage shall be obtained from the Collector or acting Collector, whose office is kept nearest to the place at which the voyage is commenced, provided there be such an office within one mile of such place. If there be no such office within one mile of the place at which the voyage is commenced, the way-bill for such voyage shall be obtained from the Collector or acting Collector at whose office the boat or float shall first arrive in the course of the voyage; and such boat or float shall be permitted to proceed from the place where the voyage was commenced to such office, and no further, without a way-bill; *provided*, however, that if there be any lock or locks through which such boat or float must pass on its way to the said office, a permit must be obtained from the keeper of the lock first arrived at, allowing the boat or float to proceed, as above without a way-bill; which permit must be delivered over and surrendered to the Collector or acting Collector from whom the way-bill is obtained,—and unless such permit shall have been obtained, or, if obtained, unless it is delivered as above, such Collector or acting Collector shall refuse to make out a way-bill for the said boat or float, and shall stop the further passage of the same, until a PENALTY of *five* dollars for the first offence, or *twenty* dollars for any subsequent offence, shall have been paid by the owner or master for the violation of this regulation.

74. If there be no Collector or acting Collector, whose office is within one mile of the place where the voyage is commenced,—nor within one mile of the place where the

same shall terminate,—nor at any intermediate place,—the master of the boat or float shall, within ten days after the termination of such voyage, exhibit a manifest, verified by his oath, of the lading transported on board of such boat or float, at any time during such voyage, to the Collector or acting Collector whose office shall be nearest to the place where such voyage terminated, or, if more convenient, to the one whose office shall be nearest to the place where the voyage commenced, and shall pay to such Collector or acting Collector the tolls due on such boat or float and lading; *provided*, however, that if there be any lock or locks through which the said boat or float shall pass on its voyage, a manifest shall be exhibited to the keeper of the first lock passed through, by the master, of the lading then on board of his boat or float, and a permit be obtained from the said Lock-keeper allowing the boat to proceed on such voyage; which permit shall be delivered to the Collector or acting Collector aforesaid, at the time of delivering the manifest and paying the tolls as above required, and every master who shall neglect to obtain such permit, or, if obtained to deliver over the same to the said Collector or acting Collector, shall be liable to a PENALTY for a *first* offence of *five* dollars, and of *twenty* dollars for any subsequent offence, or if he shall neglect to exhibit such manifest, under oath, to the Collector or acting Collector and to pay such tolls, within the period above limited,—he shall be liable to a PENALTY of *twenty-five* dollars.

75. Every master of a boat or float applying to any Collector or acting Collector for a way-bill, shall exhibit to him a manifest of the cargo on board of such boat or float,—containing first the name of each place on the Canal where any portion of such property was shipped, and the place for which it is intended to be cleared, specifying the portion shipped at each of such places, and the portion intended to be cleared to each place, second a statement of the weight of all articles of such property on which toll is to be charged by weight, of the number of articles on which toll is to be charged by number, and of the feet of each article on which toll is to be charged by the foot; and third, a specification of the weight, number or quantity of each article or of the articles on which one rate of toll is to be charged, and which is to be transported to one place; separately from other articles on which a different rate of toll is to be charged or which is to be transported to a different place.

76. If any property or lading shall be received on board of any boat or float, during any voyage, after such boat or float shall have proceeded one mile from the place at which the way-bill was obtained, or shall have proceeded one mile from the place at which, as hereinafter provided,—an addition or endorsement shall have been made to, or upon the said way-bill by any Collector or acting Collector, a manifest thereof, to be called manifest No. 2, or No. 3, &c., as the case may be, conforming in all respects to the requirements hereinbefore stated, in regard to the making out of manifests, shall be exhibited to the Collector or acting Collector, whose office shall be next in order, in the course of the voyage, to the place where such property or lading was received on board,—and until the said manifest No. 2 or No. 3, &c., as the case may be, shall have been thus exhibited, and a statement of the property or lading taken on board of the boat or float, since its way-bill was obtained, or the last preceding addition, made thereto by some Collector or acting Collector, shall have been added to the said way-bill by such Collector or acting Collector,—the said boat or float shall not proceed on its voyage, under a PENALTY of *twenty-five* dollars.

77. Every master of a boat or float navigating the Canal, who shall deliver any article mentioned in its manifest or way-bill at a place beyond that to which such article shall have been cleared, and shall not promptly report the fact to the Collector or acting

Collector, whose office is nearest to the place where such article is delivered, and pay the toll thereon, shall be subject to a PENALTY of *twenty-five* dollars.

78. If in unloading any boat or float, it shall be discovered that the cargo, in consequence of any unintentional error, exceeds the quantity stated in its manifest or manifests, it shall be the duty of the master of such boat or float, immediately to report such excess, and pay the lawful toll thereon, to the Collector or acting Collector at the place where such error may be discovered, if there be any such at the place; and if there be no Collector or acting Collector at such place, to the next Collector or acting Collector, at or near whose office the boat shall arrive after the discovery of such error, under a PENALTY of *twenty-five* dollars.

79. Every master of any boat or float shall exhibit its way-bill and manifest or manifests, *first*, to the Collector or acting Collector, whose office shall be next in order, in the course of the voyage to the place where the way-bill was obtained; *second*, to the Collector or acting Collector at the place where an portion of the cargo shall be unloaded, or any additional cargo received; and if there be no Collector or acting Collector at such place, to the Collector or acting Collector whose office shall be next in order in the course of the voyage; and *third*, to every other Collector or acting Collector who shall demand that said way-bill and manifest or manifests shall be exhibited to him. PENALTY for a violation of either of the provisions of this regulation for which a penalty is not provided by some other of these regulations, *twenty-five* dollars.

80. No boat or float shall proceed, upon the Chesapeake & Ohio Canal, beyond the place to which it shall be cleared, named in its way-bill or permit, under a PENALTY of *five* dollars for the first offence, and *twenty* dollars for any subsequent offence.

81. Upon the arrival of any boat or float, in the course of its voyage, at a place where a portion only of its cargo is to be unloaded, such portion of the cargo shall not be unloaded, until the master of the said boat or float shall have exhibited its way-bill and manifest or manifests to the Collector or acting Collector, at or within one mile of such place, and shall have paid the toll that may then be due thereon, *nor* after such portion of the cargo is unloaded, shall the said boat or boat proceed on its voyage until the said Collector or acting Collector shall have endorsed on the way-bill, what portion of the cargo has thus been unloaded *but* if there be no Collector or acting Collector at or within one mile of the place, such portion of the cargo may be unloaded, if the toll thereon shall have been previously paid, *but* in that case, the master of the boat or float shall report the fact to the Collector or acting Collector whose office shall be next in order in the course of the voyage, and exhibit to him such evidence as shall satisfy him, that such portion of the cargo has been unloaded, *and* until this shall have been done, and the said Collector or acting Collector shall have endorsed upon the way-bill what portion of the cargo has been thus unloaded, the said boat or float shall not proceed on its voyage. PENALTY for a violation of either of the provisions of this regulation, for the first offence, *five* dollars, and for any subsequent offence, *twenty* dollars.

82. Upon the arrival of any boat or float at its destination, or at a place where its master desires with such boat or float to leave the Chesapeake & Ohio Canal and enter upon any other Canal or the Potomac river, *the* said master shall exhibit his manifest or manifests, and shall deliver his way-bill, to the Collector or acting Collector, if there be one, whose office is at or within one mile of such place, *and* shall pay to him the toll that may then be due on the said boat or float and its cargo, before any portion of the cargo shall be unloaded, or before the said boat or float shall thus leave the Chesapeake & Ohio Canal and enter upon any other Canal or the Potomac river. PENALTY for a violation of

this regulation, for the first offence, *five* dollars, for the second offence, *twenty-five* dollars, and for any subsequent offence, *fifty* dollars.

83. If there be no Collector or acting Collector, whose office is at or within one mile of the place to which a boat or float is cleared, or at which its master desires, with it, to leave the Chesapeake & Ohio Canal and enter upon any other Canal or the Potomac river, the said master shall exhibit his manifest or manifests, and deliver his way-bill,—and shall pay the tolls that may then be due on his boat or float and its cargo, for the voyage then making, to the last Collector or acting Collector whose office shall be passed by the boat or float, in the order of the voyage,—and shall thereupon receive a permit from such Collector or acting Collector, to proceed to the place to which the boat or float is cleared,—and until such permit is given, the boat or float shall not proceed on its voyage under a PENALTY of *twenty-five* dollars for the first offence, and of *fifty* dollars for any subsequent offence. And the said permit shall be returned and delivered, by the said master, to the Collector or acting Collector from whom it was obtained, within ten days after the said boat or float arrives at its destination, upon the Chesapeake & Ohio Canal, or leaves the said Canal as aforesaid; or whenever the said boat or float shall next again pass the office of the said Collector or acting Collector, if within the said ten days,—under a PENALTY, for the first offence, of *five* and of *ten* dollars for any subsequent offence.

84. A permit, instead of a way-bill, shall be issued by a Collector or acting Collector to any boat or float, provided the voyage for which such permit is issued, shall not extend to, nor within a mile of any place on the Canal where there is a Collector's or acting Collector's office,—but not until a manifest shall have been exhibited to him of the cargo then on board of the said boat or float, nor until all the tolls chargeable on the said boat or float for such voyage shall have been paid,—and the said permit shall be returned and delivered, by the master, to the Collector or acting Collector from whom it was obtained, within ten days after the said boat or float shall have arrived at its destination upon the Chesapeake & Ohio Canal, or shall have left the said Canal as aforesaid,—or whenever the said boat or float shall next again pass the office of the said Collector or acting Collector, if within the said ten days,—under a PENALTY, for the first offence, of *five* dollars, and of *ten* dollars for every subsequent offence.

85. In all cases in which permits are given, by any Collector or acting Collector, for a boat or float to proceed beyond the office of such Collector or acting Collector, the master of such boat or float shall, whenever any addition is made to its cargo after the permit is obtained, note the same upon the permit, in such manner and with such particularity, that the toll chargeable thereon can be accurately ascertained, and shall pay the toll on such addition, to the Collector or acting Collector from whom the permit was obtained, upon returning and delivering to him the said permit, as above required—which endorsement by him upon the permit he shall verify by his oath—under a PENALTY of *twenty-five* dollars for a violation of either of the provisions of this regulation.

86. Boats and floats, regularly and constantly employed in the transportation, upon the Canal, of articles or property of but one description, in each direction, between two points or places not exceeding ten miles apart,—and between which points or places there is not more than one Collector's or acting Collector's office, may, at the discretion of the Collector or acting Collector, be allowed thus to navigate the Canal without a permit for each voyage,—but, in lieu thereof, with a permit for such period, not exceeding one month, as the Collector or acting Collector may think most advisable;—and in such case each cargo of the said boat or float shall be subject to inspection, the same as though a permit for each voyage, were given;—and at the expiration of the period for which the permit was obtained, the owner or master of the said boat or float shall deliver, to the said

Collector or acting Collector, a statement of the number of voyages made during such period, and a manifest of the cargo of the said boat or float carried each voyage, both of which shall be verified by the oath of the said owner or master,—and shall pay the tolls that may then be due on the said boat, and its cargoes,—and until such permit, statement, and manifest shall have been delivered and the said tolls paid,—the said boat or float shall not be permitted to navigate the Canal,—and unless such delivery and payment shall be made within two days after the expiration of the said period, the said owner or master shall be subject to a PENALTY of *twenty-five* dollars, for the first offence, and of *fifty* dollars for every subsequent offence.

87. In every case in which the manifest or manifests and the way-bill of any boat or float shall, under these regulations, be exhibited, or the way bill delivered to any Collector or acting Collector;—the said Collector or acting Collector, shall make such examinations and comparisons of the said manifest or manifests, way-bill and cargo as may be sufficient to satisfy him whether the said cargo has been accurately entered in the said way-bill,—and if it has not been, he shall make the necessary corrections in the way-bill; and if such boat or float, not having arrived at its destination, shall proceed on its voyage, or unload any portion of its cargo,—or having arrived at its destination, shall unload the whole or any portion of its cargo, before such examinations and comparisons are made, the owner or master of the boat or float shall be subject to the same penalty as if the said manifest or manifests and way-bill had never been exhibited or delivered to the aforesaid Collector or acting Collector.

88. Whenever a difference shall arise between a Collector or acting Collector and the master of any boat or float, as to the amount of tolls chargeable on the lading of such boat or float, the Collector or acting Collector shall detain the boat or float, and the articles in regard to which the difference has arisen, and shall weigh, count or measure the said articles, as the case may require;—and if it shall be ascertained that the weight, number or quantity of the said articles exceeds the amount stated in the manifest or manifests of the boat or float, the Collector or acting Collector shall charge toll according to the weight, number or quantity thus ascertained, and the master shall pay to the Collector or acting Collector the expense of such weighing, counting or measuring,—and for such expense the said articles, and the boat or float containing them, as well as the master and the owner of the said boat or float shall severally be liable.

89. If the master of any boat or float shall, upon any voyage of such boat or float, use, or attempt to use for that voyage, a way-bill or permit given for any preceding voyage, or the way-bill or permit of any other boat or float,—or a false way-bill or permit,—or shall exhibit to any Collector or acting Collector a false manifest, he shall be subject to a PENALTY of FIFTY dollars.

In regard to the PAYMENT OF TOLLS, PENALTIES, &c.

90. The full amount of toll chargeable on any boat or float, and on each and every article of property which shall be on board thereof, or constitute any float, at the time application is made to any Collector or acting Collector for a way-bill, and on each and every article which would enter into the way-bill, shall be paid to such Collector or acting Collector, before he shall issue a way-bill for such boat or float, in all cases in which he shall know, or have reason to believe, that the owner or owners, or the master of the said boat or float,—has or have, either as the owner or owners of the said boat or float, or of any other boat or float,—or as the master of the said boat or float, or any other boat or float,—within one year immediately preceding, rendered himself or themselves liable for

any penalty under these regulations, exceeding five dollars, in amount, for any single offence,—but otherwise the said Collector or acting Collector may, at his discretion, issue a way-bill and allow the said boat or float to proceed to its destination and pay the tolls, at the place or places, in such cases, designated and required by these regulations:—*provided*, however, that in no case, shall a new way-bill be issued, by any Collector or acting Collector, for any boat or float,—until all arrearages of tolls and all penalties and expenses of the kind mentioned in the 88th regulation, so far as known to him, for which such boat or float is liable, shall be paid.

91. And, in like manner, shall no endorsement on the way-bill of any boat or float be made by any Collector or acting Collector, of the addition to the cargo of any boat or float, while on its voyage, until the tolls thereon have been paid,—unless in such cases, as the Collector or acting Collector would be permitted, by the last regulation, to issue a way-bill,—if a way-bill was applied for, instead of an endorsement upon the way-bill, by the owner or master of such boat or float.

92. Upon the arrival of any boat or float at the place where the toll, upon the said boat or float and its cargo, or any part of its cargo, must, under these regulations, be paid, when not paid in advance; or where any balance, due on the said toll, arising from an error in any previous calculation of it or from any other cause, must be paid,—if such payment be refused or not promptly made, any Collector or acting Collector of tolls, in the employment of the Company, may seize such boat or float, or the produce or other articles composing or which had composed, in whole or in part, the cargo of said boat or float, wherever found, and sell the same, or so much thereof as he may deem expedient, at auction, for cash; and the proceeds, of such sale or sales, shall be applied to the payment of the amount due the Company, as aforesaid, and all the expenses of seizure and sale; and the balance, if any, shall be paid over to the person or persons who had charge or possession of the property that may be thus sold, at the time of the seizure thereof.

LIABILITY OF PERSONS AND PROPERTY FOR THE PAYMENT OF TOLLS, PENALTIES, &c.

93. The person or persons specified in the boat's register of any boat or float, as the owner or owners thereof, shall in all cases be deemed in law the true owner or owners thereof, and to all intents and purposes he or they shall be liable as such, and the said boat or float be subject to execution, as his or their property, as regards the collection and enforcement of tolls and penalties, under these regulations.

94. The master, and the owner or part owner of any boat or float, on the Canal, and likewise the boat or float itself, shall severally be liable for the payment of all penalties and forfeitures incurred, and all damages which may accrue, in consequence of the violation of any of the provisions of these regulations, by the master or the owner or part owner thereof, or by any boatman, or other person assisting in the navigation or management of such boat or float at the time of such violation; and also for the payment of tolls chargeable on the said boat or float or chargeable on any property transported on boat thereof; and every such boat or float may, at the discretion of the General Superintendent, or any Collector or acting Collector of tolls or Superintendent, be prevented from navigating said Canal until such penalty, forfeiture, damages, toll, and costs accrued in prosecuting therefore, shall be duly paid.

CANAL OFFICERS MUST ENFORCE THESE REGULATIONS

95. Superintendents, Collectors, acting Collectors, Inspectors and Lock-keepers, are hereby required on every violation of the above regulations, known to them, or brought to their notice, to make an entry of the nature of every offence, the names of the offenders, the time and place where the offence was committed, and the names of witnesses: And it is further strictly enjoined on each of the above officers, to carry these regulations into full effect.

AUTHORITY OF CANAL OFFICERS TO SUE FOR PENALTIES

1st—SUPERINTENDENTS.

96. Each Superintendent of repairs upon the Canal, is hereby authorized, to prosecute in the name of the Chesapeake & Ohio Canal Company, for any penalty incurred by the violation of any or either of the following regulations,—to wit— Nos. 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 25, 26, 27, 28, 29, 30, 31, 32, 39, 41, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 62, 63, 64, 65, 66, 67, 68, 80 and 89; and shall prosecute for all such penalties whenever such Superintendent shall know from his own observation, or have good cause to believe, that any of the said penalties have been incurred.

2nd—COLLECTORS.

97. Each Collector upon the Canal, is hereby authorized, to prosecute in the name of the Chesapeake & Ohio Canal Company, for any penalty incurred by the violation of any or either of the following regulations,—to wit—Nos. 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 25, 47, 48, 49, 50, 51, 53, 54, 55, 56, 57, 58, 64, 65, 73, 74, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88 and 89; and shall prosecute for all such penalties whenever such Collector shall know from his own observation, or have good cause to believe, that any of the said penalties have been incurred.

3rd—ACTING COLLECTORS.

98. Each acting Collector upon the Canal is hereby authorized, to prosecute in the name of the Chesapeake & Ohio Canal Company, for any penalty incurred by the violation of any or either of the following regulations,—to wit— Nos. 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 25, 49, 50, 73, 74, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88 and 89; and shall prosecute for all such penalties whenever such acting Collector shall know from his own observation, or have good cause to believe, that any of the said penalties have been incurred.

4th—LOCK-KEEPERS

99. Each Lock-keeper upon the Canal, is hereby authorized, to prosecute in the name of the Chesapeake & Ohio Canal Company, for any penalty incurred by the violation of any or either of the following regulations,—to wit—Nos. 10, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 26, 27, 28, 29, 30, 31, 32, 39, 41, 43, 44, 45, 46, 47, 48, 49, 51, 52, 53, 54, 55, 56, 57, 58, 60 and 89; and shall prosecute for all such penalties whenever such Lock-keeper shall

know from his own observation, or have good cause to believe, that any of the said penalties have been incurred.

100. These by-laws, rules, and regulations, shall take effect and be in full force and operation, from and after the 1st day of April 1851 inclusive; and all existing by-laws, rules, and regulations, so far as they conflict therewith, shall, from and after said time, be held and considered as, and are hereby, repealed.

101. These by-laws, rules, and regulations, certified to by the Clerk of the Chesapeake & Ohio Canal Company, shall be printed, and a copy thereof shall be set up for public inspection, for at least ten days prior to the 1st day of April 1851, at some one of the Collector's offices, or some one of the lock-houses, on the said Canal, in each County in the State of Maryland, through which the Canal passes,—and also at the Collector's office, at Georgetown, in the District of Columbia.¹⁷³

In June 1851 President Samuel Sprigg reported satisfaction with the operation of the new regulations in spite of the opposition of some of the unruly boatmen. The rules already had brought “beneficial results” in the preservation of the works of the company,” thus “producing a degree of order and regularity on the part of those navigating the canal, which has heretofore not existed.” Company officials were certain that

all well-disposed persons engaged in navigating the canal, regard these regulations as wholesome and necessary, acting both as a protection to the works of the company, insuring more regularity, and less frequent interruptions to the navigation of the canal, and, at the same time, preventing collisions with some of the boatmen, who have hitherto been disorderly.¹⁷⁴

The regulations established in 1851 remained in effect until 1889 with some periodic modifications or additions. The changes were made whenever the board felt that circumstances warranted a revision. Among the most significant changes in the regulations were the following:

1. April 3, 1856—The privileges granted to packet boats in Regulations Nos. 30 and 34 were revised insofar as they applied to descending boats loaded and under headway. All such boats were henceforth to be upon an equal footing with packets relative to all cases referred to in the aforementioned rules.¹⁷⁵

2. April 15, 1858—The board adopted an order directing that when passing, all ascending freight boats take the towpath side of the canal and all descending boats take the berm side. After only three weeks, this new directive was rescinded on May 5.¹⁷⁶

2A. May 7, 1858—The board directed that all boats ascending and descending the canal between Georgetown and Cumberland be required to prepay

¹⁷³ *By-Laws, Rules, and Regulations; In Force on the Chesapeake & Ohio Canal, 1st April 1851* 3–4, 9–33.

¹⁷⁴ *Twenty-Third Annual Report* (1851), C&O Co., 3–4. During the first three months in which the rules were in effect, the amount of fines had totaled \$60.

¹⁷⁵ *Proceedings of the President and Board of Directors*, I, 251–252.

¹⁷⁶ *Ibid*, K, 14, 19.

their boat tolls.¹⁷⁷

3. May 3, 1859—Approximately one year before this date the board had ordered that boats could not operate on the canal on Sundays. Under considerable pressure by the boatmen and other company officials, the order was repealed on this date, thereby re-opening the canal to traffic seven days a week.¹⁷⁸

4. November 4, 1860—The board determined to suspend that portion of Regulation No. 47 that applied to the short levels between Locks Nos. 1–4 in Georgetown. Boats were to be permitted to load or to unload cargoes in those levels provided that they did not interfere with the free navigation of the canal.¹⁷⁹

5. November 14, 1860—A new rule was passed regulating the payment of tolls when a boat did not pass any locks. The rule, which was to take effect immediately, was as follows:

Any boat or float navigating the Canal where there is no lock to pass to its destination, and the owner or other person having charge of the same, shall refuse to pay the toll, when such payment shall be demanded by the proper officers, shall on the requisition of said officer tie up the same at such place as said officer shall direct, and so remain until the tolls due thereon shall be paid, and on refusal of such owner, or other person having charge of the boat or float, or the removal of said boat or float after being tied up until the tolls and fines thereon be paid, shall be subject to a penalty for the first offence of \$20, and for each subsequent offence by the same party of \$50.¹⁸⁰

6. October 12, 1869—April 15, 1873—During this period, the canal company again experimented with a Sabbath law—adopting and repealing the order prohibiting Sunday runs on several occasions. In October 1866 the board received a memorial from Charles Embrey and other boatmen from the vicinity of Williamsport asking that the Sunday trade be suspended on the waterway. The board rejected the request because the Sunday law passed in 1858 had proven to be a failure. After a one-year trial, the directors had repealed that law “at the instance both of parties navigating the Canal and of residents near the Canal, complaining of riots and depredations committed by boatmen congregating together.”¹⁸¹

Nothing more was done about the question of Sunday navigation until September 8, 1869, when representatives of the Sabbath Association of Maryland appeared before the board and submitted a number of petitions favoring the suspension of the Sabbath trade. The board appointed a committee headed by President Josiah Gordon to study the matter and to make a recommendation. On October 12 the directors, after having received the committee’s report urging the passage of a Sunday prohibition, divided evenly by a 3 to 3 vote on a motion to table the subject. President Gordon cast a negative vote against the motion after which the following order was adopted:

¹⁷⁷ Ringgold to Hollingsworth and Shaw, May 7, 1858, Ltrs. Sent, C&O Co.

¹⁷⁸ *Proceedings of the President and Board of Directors*, K, 104.

¹⁷⁹ *Ibid.*, K, 227.

¹⁸⁰ *Ibid.*, K, 227–228.

¹⁸¹ *Ibid.*, K, 518.

that from and after the first day of November 1869 no trade or traffic will be allowed on the Chesapeake & Ohio Canal on the Sabbath day, and that the Lock-keepers be required to close their Locks at 12 o'clock on Saturday night, and open them at 12 o'clock on Sunday night.¹⁸²

Beginning in the spring of 1870 the canal board experienced great difficulty in enforcing the Sunday rule. Because of widespread disregard for the law, the board on May 6 voted to remit the fines imposed during the months of March and April "except ten dollars on each boat." Since the fine for breaking the Sabbath law was only \$5, this action by the board indicates that many of the boatmen were disobeying the law on a frequent basis. The defiant behavior on the part of some of the unruly boatmen caused the board to rescind the Sunday law on October 12, 1870. However an order prohibiting Sunday navigation was put into effect again on August 1, 1871, only to be repealed on August 16.¹⁸³

After this series of events, the stockholders took up the question of Sunday navigation at their annual meeting in June 1872. They passed a resolution to have the Sunday law strictly enforced on the canal, and the board dutifully issued such a directive in September. Following a number of incidents arising from the renewed prohibition, the problem was referred to Walter S. Cox, the company counsel. It was his opinion that the canal was "declared to be a public highway" and he could not "see why the Company would have any more control over its use on Sunday than a Turnpike Company would over the use of its road." Thereafter, the company officials "indefinitely postponed" the consideration of a Sunday prohibition on canal trade, the earlier directive was repealed, and the question was never seriously discussed again.¹⁸⁴

7. SPRING 1870—Prior to the commencement of the 1870 boating season Chief Engineer Hutton sent a circular to the superintendents on the line, urging them to enforce strictly all the regulations for the navigation of the waterway. In the circular he announced one change in the by-laws. That section of Regulation No. 57, which prohibited the changing of mule teams while a boat was in a lock chamber, was to be suspended providing that such an action did not cause delays in the navigation.¹⁸⁵

8. May 23, 1870—As the number of boats plying the canal increased, the Georgetown Level became particularly crowded. Accordingly, the board, under the authority of Regulation No. 50 of the By-Laws, drew up additional rules to govern the navigation and the loading and unloading procedures on this section of the waterway. The new regulations were as follows:

Boats consigned to points on this level will, on arriving, take position at the upper end of the line of waiting boats, and retain the same until notified by the Harbor Master to proceed to their respective places of discharge, but no boat shall lie nearer above the Alexandria Aqueduct than one hundred yards.

¹⁸² *Ibid.*, L, 193, 196, 209–210.

¹⁸³ *Ibid.*, L, 317, 369, 422, 435–436, and Anon. To Gordon, May 19, 1870, Ltrs. Recd., C&O Co.

¹⁸⁴ *Proceedings of the President and Board of Directors*, L, 57, 105–106.

¹⁸⁵ Circular to Superintendents, (Spring), 1870, Ltrs. Sent, C&O Co.

Superintendents of Coal Wharves and other Consignees shall notify the Harbor Master what boats they wish to unload, and shall promptly discharge the same on their arrival at the wharf.

Boats shall not lie two or more abreast, at any point on this level, without express permission of the Harbor Master or Superintendent. When in position they must be moored close to the bank or wall, both head and stern.

No boat shall attempt to pass another moving in the same direction, below the upper end of the line of waiting boats.

When boats moving in opposite directions approach the wharf next above Frederick street bridge, while a boat is lying at that wharf, it shall be the duty of the Master of the ascending boat to stop below the bridge until the descending boat shall have passed.¹⁸⁶

9. April 10, 1872– The great increase in canal trade during the early 1870s resulted in frequent and lengthy delays at the Paw Paw Tunnel while the boats awaited their turn to enter the narrow passage. There were two proposals, for the solution of this problem one for a system of signals to show when the boats might enter and the other for the assignment of a watchman to direct traffic.¹⁸⁷ On March 22, 1871, Chief Engineer Hutton submitted to the board recommendations for regulations to govern the navigation through the tunnel, and the directors adopted these proposed rules with little modification on April 10, 1872.¹⁸⁸ The new regulations were as follows:

- 1st A watchman will be stationed at the west end of the tunnel, both night and day.
- 2nd No ascending boat shall enter the tunnel at the East end when a flag is shown at the west end in daytime, or a light at night.
- 3rd When there are no signals shows at the west end of the tunnel, ascending boats have the right to enter at the east end and pass through.
- 4th All descending boats shall enter the tunnel at the west end and pass through or stop, as the watchman shall direct.
- 5th It shall be the duty of the Watchman, when ascending boats have been waiting at the east end of the tunnel two hours, to stop the descending boats at the west end and remove his signal and give the ascending boat or boats the right to pass through.
- 6th When the descending boats have been waiting at the west end of the tunnel, one and a half hours, it shall be the duty of the Watchman to show his signals and give the descending boats the right to pass through.
- 7th When from any cause of detention a large number of boats may have collected at the tunnel, they shall pass through in sections, as the watchman shall direct.
- 8th If from any cause boats meet in the tunnel or create a jam, they shall move or pull, as the watchman shall direct.

¹⁸⁶ "Regulations for the Georgetown Level," May 23, 1870, broadside in Ltrs. Recd., C&O Co.

¹⁸⁷ Report for the Year 1870 (Frederick, 1871), 7–8.

¹⁸⁸ Hutton to Clarke, March 22, 1871, Ltrs. Recd., C&O Co.

Penalty for a violation of either of the provisions of these regulations, Ten Dollars.¹⁸⁹

D. REGULATIONS FOR 1889–1924

There is no available information regarding the regulations for navigating the canal during the receivership period. It is presumed that most or all of the regulations of the 1851–1889 period remained in effect.

¹⁸⁹ *Proceedings of the President and Board of Directors*, M, 9.

APPENDIX A

SIDE VIEW AND PLAN OF THE *SWIFT*.¹

Is a side view and plan of the experimental Boat "*Swift*;" her dimensions are as under:

Whole length, 60 feet.

Breadth on beam, 8 feet 6 inches.

Width of centre trough (extending longitudinally down the middle of the boat) 2 feet 6 inches at the bow, 22 inches at midship, and 3 feet 6 inches at the stern.

The *Swift* is gig-built, light timbered, and weighs about 27 cwt.

[IMAGE NOT INCLUDED]

¹ William Fairbain, *Remarks on canal navigation, illustrative of the advantages of the use of steam, as a moving power on canal: etc.* (Longman, Rees, Orme, Brown and Green, 1831), 88 and Plate I.

APPENDIX B

EXPERIMENTAL RESULTS OF THE *SWIFT*, JULY 9, 18302

Note of a series of experiments, made on the Forth of Clyde Canal,
with Mr. Graham's Twin Boat *Swift*, Friday, July 9, 1830

All trips:

One mile in length; canal's average width 63 feet and average depth 9 ft. 9 in.

No. of experiments	Weight of boat and cargo	Draught of water, in inches			No. of horses	Time		Miles per hour	Force of traction in lbs	Remarks
		Bow	Stern	Mean		Min	Sec			
1	116 1 14	14½	16½	15½	2	14	28	4.14	54.40	Against the wind, light breeze
2	116 1 14	14½	16½	15½	2	14	15	4.21	34.00	With the wind
3	116 1 14	14½	16½	15½	2	9	45	6.15	128.70	Against the wind; a ripple was observed rising at the bows and extending to the banks on each side of the canal.
4	116 1 14	14½	16½	15½	2	9	35	6.26	93.80	With the wind, ripple the same.
5	116 1 14	14½	16½	15½	2	8	35	7.50	207.50	Against the wind, with a slight surge at stern.
6	116 1 14	15½	16½	16	2	7	50	7.65	202.35	With the wind, surge the same.
7	116 1 14	16	16	16	2	7	29	8.01	264.30	Against the wind, the surge a little increased.
8	116 1 14	16	16	16	2	6	28	9.27	272.20	With the wind, surge the same.
9	116 1 14	14½	15½	15	2	7	22	8.14	266.50	No sensible difference in surge.
10	116 1 14	14½	15½	15	2	7	35	7.91	243.20	Wind nearly subsided, surge the same.
11	116 1 14	14½	15½	15	2	7	6	8.45	328.00	Rather more surge at stern.
12	116 1 14	14½	15½	15	2	7	17	8.23	298.00	Rather more surge at stern.
13*	116 1 14	14½	15½	15	4	4	52	12.32	410.00	Surge decreased.
14	61 2 7	7	9	8	4	4	16	14.06	352.06	In this experiment the surge was greatly diminished, a rippling wave only seen at the stern, and not the least surge in front of the boat.

Temperature 50°

*The mercury stood fixed in this experiment at 410 pounds

Note of experiments, made with the Twin Boat
on the Monkland Canal, on the 12th of July, 1830

All trips: ¼ mile in length; canal's average width 40 ft. and average depth 5 ft. 4 in.

No. of experiments	Weight of boat and cargo	Draught of water, in inches			No. of horses	Time		Miles per hour	Force of traction in lbs	Remarks
		Bow	Stern	Mean		Min	Sec			
1	108 2 21	14½	16	15½	3	3	5	4.86	72.0	With the wind and no surge
2	108 2 24	14½	16	15¼	3	3	7	4.81	92.0	Against the wind, no surge.
3	108 2 24	14½	16	15¼	3	2	23	6.29	191.3	With the wind, a slight surge.
4	108 2 24	14½	16	15¼	3	2	26	6.16	219.3	Rather more wind ahead, with a slight surge at stern.
5	108 2 21	14½	16	15¼	3	2	11	6.87	389.0	With the wind, same swell.
6	108 2 24	14½	16	15¼	3	1	57	7.69	368.1	Against the wind, a swell in front and stern, rolling over the banks of the canal.
7	108 2 24	14½	16	15¼	3	1	21	11.11	420.0	With the wind, no surge.

8	108 2 24	14½	16	15¼	3	1	14	12.16	446.9	No surge, wind subsided.
9	108 2 24	14½	16	15¼	3	1	12	12.50	439.3	No wind and no surge.
10	57 2 9	The draught not measured			3	1	9	13.04	390.0	Light breeze ahead, no surge; a part of the cargo removed from the boat.

APPENDIX C

SIDE VIEW AND PLAN OF THE *LORD DUNDAS* IRON TWIN BOAT.

Represents a side view and plan of the “*Lord Dundas*” Iron Twin Boat; it will not be necessary here to give the dimensions, as a detached account of her length, breadth, weight, &c. is given in the 6th page of this work: suffice it to observe, that she is constructed of exceedingly light material, the plates or sheeting of the iron ribs being under 1/16 of an inch in thickness, and her whole weight, exclusive of the steam engine, paddle-wheel, &c. not exceeding two and a half tons.³

[IMAGE NOT INCLUDED]

³ William Fairbain, *Remarks on canal navigation, illustrative of the advantages of the use of steam, as a moving power on canal: etc.* (Longman, Rees, Orme, Brown and Green, 1831), 88 and Plate I.

APPENDIX D

PLAN AND DRAWING OF THE *CYCLOPS*⁴

Conveys nearly a correct representation of the *Cyclops* now plying on the Forth and Clyde Canal, to Alloa, on the Firth of Forth: this vessel has a fourteen horses' power steam engine, placed in the position A, near the stern; it gives motion to the paddle-wheel, by the connecting rod B: the boiler C is fixed on the opposite side of the engine, and is so arranged as to give room for the man to fire, and space for a sufficient quantity of coal to last the voyage. This boat is built on the American plan, and works, with great steadiness in the canal, at four miles an hour; her dimensions are as follow:

Whole length, 68 feet.

Breadth on beam, 15 feet 6 inches.

Depth, about 7 feet 3 inches from the keel to the deck.

Weight, including engine, boiler, fittings, &c. about 38 tons.

On examining the side view of the *Cyclops*, it will be seen that her water lines are shown,

First, as represented by the line *a*, when light; that is, with no cargo except a sufficient quantity of water in the boiler, and two tons of coals on board, when her draught was 4 feet 6 inches, aft, and 1 ½ inch forward.

Second, by the line *b*, with a cargo of 20 tons 3 qrs. 17lbs. her draught being, in this instance, 4 feet aft, and 2 feet 6 inches forward. The loading on this occasion was improperly disposed.

Third, by the line *c*, with a cargo of 29 tons 3 cwt. 3 qrs. 17 lbs. her draught, in this case, being 3 feet 9 inches aft, and 3 feet 6 inches forward.

It has already been remarked by Mr. Grahame, that a cargo, or not a cargo, makes little difference to the *Cyclops*, as her speed is neither increased, nor much diminished by the change; this, no doubt, is owing to the weight of the engine, boiler, paddle-wheel, &c. raising the bow, and bearing down the stern, when she is light, and sinking the paddle-wheel to a depth that must rather churn the water, than produce an effective impulse, as may be seen by the variation of the water lines *a*, *b*, *c*, which sufficiently illustrates this part of the subject.

[IMAGE NOT INCLUDED]

⁴ William Fairbain, *Remarks on canal navigation, illustrative of the advantages of the use of steam, as a moving power on canal: etc.* (Longman, Rees, Orme, Brown and Green, 1831), 89-90 and Plate III.

APPENDIX E

DRAWINGS OF AN IRON STEAMBOAT⁵

Represents a side view and plan of the improved iron steam boat, now building for the Forth and Clyde Canal Company: this vessel is intended for the double purpose, of navigating the canal, and the adjoining coasts; the following are her dimensions:

Whole length, 68 feet.

Breadth on beam, 15 feet

Depth from the keel to the deck, 8 feet.

Steam engine 24 horses' power, having two cylinders on the locomotive principle: paddle wheels, each 11 feet diameter, and 3 feet wide.

Computed weight of boat, paddle-wheels, engine, &c.

	<u>Tons.</u>	<u>Cwt.</u>	<u>Qrs.</u>	<u>Lbs.</u>
Boat,	10	5	2	0
Engine,	6	2	0	0
Machinery,	2	18	2	9
Rigging; stores, &c.	<u>3</u>	<u>6</u>	<u>0</u>	<u>0</u>
Total weight,	22	12	0	9

This vessel will contain a cargo of 50 tons, on a draught of water of about 3 feet 9 inches; she will be constructed of the best material, with strong iron ribs, and plate sheeting about $\frac{1}{4}$ inch thick. The same objection may be urged against this boat as the *Cyclops*, so far as respects her water lines, which, from the position of the steam engine, paddle-wheels, &c. must cause her to hang much by the stern; this objection is of no moment, as vessels of this description seldom sail without some loading; and, at all times, there is the power to trim the cargo, so as to give her the proper bearing in the water. I therefore deem the weight of machinery at the stern of less consequence, than the loss of power and inconvenience of conveying the motion from the engine (if placed nearer the bows) to the wheels, in that position: besides, placing the engine nearer the middle of the hold, would in a great measure destroy valuable stowage, and materially limit her carrying capacity.

⁵ William Fairbain, *Remarks on canal navigation, illustrative of the advantages of the use of steam, as a moving power on canal: etc.* (Longman, Rees, Orme, Brown and Green, 1831), 90-91 and Plate IV.

APPENDIX F

DRAWINGS OF CANAL STEAMER⁶

Is a side view and plan of a Canal Steamer, calculated for sea voyages, and a direct communication with the internal parts of the country, through canals constructed for the admission of such vessels: it will be seen, that a part of the side of the boat is supposed to be cut out, for the purpose of representing a sectional view of her steam engine, paddle-wheels, boiler, &c. A slight glance at the plate will show, that the wheels are advanced nearer midship; that considerable care is taken to occupy as little space as possible in the vessel; that the whole machinery is exceedingly compact, and takes up no more of the vessel's stowage than 21 feet in length, including space for firing, and room to stop and start the engine. The paddle-wheels are placed in the position H, to obviate the apprehended danger and difficulty of working them advantageously at sea, and also, to retain them as near the stern as possible, on account of saving the vessel's bearings, and allowing a free discharge from the wheels when her portcullises are down, which would always be the case in passing through the canal.

The dimensions are as under, viz:

Whole length, 88 feet

Breadth on beam, 20 feet

Depth from the keel to the deck, 9 feet.

Steam engine (high pressure) 60 horses' power, having two cylinders as per plan.

Paddle-wheels, 12 feet diameter each, and 4 feet wide.

Computed Weight.

	<u>Tons.</u>	<u>Cwt.</u>	<u>Qrs.</u>	<u>Lbs.</u>
Boat, composed of strong-ribbed iron and plates, 1/16 inch thick	21	14	3	0
Steam-engine, boiler, &c.	12	10	0	0
Paddle-wheels, &c.	3	10	0	0
Riggs, stores, &c.	<u>8</u>	<u>10</u>	<u>0</u>	<u>0</u>
Total weight Tons.	46	4	3	0

Carrying power, draught of water, &c. will be:

	Burthen Drought of Water,		
	Tons.	Feet.	In.
When light, including engines and coals under forecastle, equal to cargo of	10	2	0
With a cargo of	48	3	0
With a cargo of	92	4	0
With a cargo of	116	4	6

So that a full cargo of 116 tons would give a draught of water, four feet six inches, which I apprehend is not too much for most canals communicating with the different sea ports on the coast.

⁶ William Fairbain, *Remarks on canal navigation, illustrative of the advantages of the use of steam, as a moving power on canal: etc.* (Longman, Rees, Orme, Brown and Green, 1831), 92–93 and Plate V.

APPENDIX G

SPECIFICATIONS OF A LIGHT IRON PASSAGE BOAT

Specification of a light iron passage boat, such as ply on the summit level of the Forth and Clyde Canal, between Port Dundas and Windford, and such as was used in the experiments detailed in the foregoing paper.

	Feet
Extreme length,	70
Extreme breadth	5 ½

The iron of the very best manufacture.

The body plates, in particular, must be free from rust, cracks, blisters, and roughness of every description. The whole of the iron must be coated with linseed oil, previous to its being used. And the boat must be built under cover, so that the work may be kept dry until the boat is finished.

Although not shown on the plan, the said boat (plate IV.) has a hollow keel, so as to prevent the lodgement of water beneath the floor, between the ribs. The stem and stern shall consist of bars of iron, six inches in breadth and a quarter of an inch thick, which are hammered flat at the lower part to the breadth and thickness of the keel-plate, to which they are scarfed and secured with clench rivets.

As stated above, the keel-plates are formed hollow, and consist of hoop iron, six inches in breadth, and one-eighth of an inch in thickness. To which a wood keel, of Memel plank, fifty feet in length, nine inches in depth, three inches in thickness next the bottom of the boat, and an inch and a half at the lower edge, tapered off to nothing at each end, must be secured to the keel-plates with glands an inch and a half in breadth, and a quarter of an inch thick, sunk flush into the keel, and screwed inside at the distance of three and a half inches apart.

The ribs shall consist of T and angle iron, and placed alternately at the distance of twelve inches from each other, and extending from gunwale to gunwale, after being bent to suit the curved form of the vessel, two rows of holes are punched on the flat side of the angle and T ribs to secure the body plate, and holes at convenient distances are punched through the upright flange to secure the false ribs for the inside lining.

The body plates must consist of the best double-rolled No. 16 sheet-iron, two and a half lbs. per superficial foot, and these sheets are in lengths of eight and ten feet. The first range of bottom plates, which join the hollow keel, eight feet in length and twenty-four inches in breadth; the next two ranges on each side, which form the bilge, ten feet in length by twelve inches in breadth; and the range next gunwale, ten feet in length by eighteen inches in breadth. Particular attention is requisite, both with the view to the strength and appearance of the boat, that the whole of the body plates be run in fair sheer lines from stem to stern, and that the lower edge of each succeeding length or range of plates cover the upper edge of their accompanying ones three quarters of an inch, so that the boat in every respect may have the appearance of being clench built.

The butts, or end joints of the plates, must be kept smooth, and meet on the centre of the T rib, and the joints of each succeeding plate be so shifted as to meet on the T rib nearest the centre of its accompanying ones. It must, however, be expressly understood, that, previous to any of the plates being riveted, thin stripe of cotton cloth, dipped in white-lead paint, be put in between the overlaps of the edge joint, and between the ribs and the end joints, so as to prevent leakage and corrosion. The whole end and edge joints must be secured with countersunk rivets, made from a three-sixteenth of an inch bore, placed at the distance of three-fourths of an inch

from centre to centre, and made from the best charcoal rivet iron; the rivets, except those for securing the end joints, must be placed two inches distant from each other; and the whole, as stated above, be countersunk, and kept as smooth as possible.

Plates, six inches in breadth and one-eighth of an inch in thickness, to be placed on each side along the bilge, over the body plates, where they are most exposed to injury when taking on board and landing passengers, which will extend from the round of the entry, at the bow, to the commencement of the run or exit, at the stern; and is secured to the ribs and body plates with countersunk rivets, placed at the distance of three inches apart; but before they are secured, both the bilge plates and body plates must be properly coated with white-lead paint, and a ply of sheathing, dipped in the same, put in between.

One and a quarter inch of angle bars extend from stem to stern, to form the gunwale, to which welts or wood mouldings are secured; and another, of the same dimensions, to be placed seven inches below the gunwale, to which the wood belting, three inches thick, and four inches deep round off, is to be secured.

The boat is framed and moulded, and in every respect formed exactly and agreeably to the plan, and the work must be done in a substantial and workmanlike manner.

*Specification of the Carpenter and Joiner Work
of such a Light Iron Canal Passage Boat*

The length of the boat, as specified, at seventy feet in length, five feet six inches in breadth, and two feet six inches in depth. It is divided in the following manner, viz

Fore deck	4 feet in length.
Fore sheets	According to the number of the travellers intended
Space for steerage cabin and principal cabin, &c.	
After sheets for.[?]	
After deck	4 feet.

The false ribs for securing the inside lining consist of willow timber, one inch in breadth, and seven-eighths of an inch in deepness, which must be free from knots and shakes, so that they may bend easily after being stoved to the curved form of the boat, to which they are secured with nails, riveted to the upright flange of the ribs.

The sea-crofts, fore and aft, must extend from the stem and stern to the end of the cabins, and be four inches in breadth, and two inches in thickness, of the best Memel plank; which is kept flush with the gunwale inside, and secured with three-eighths of an inch rivets, one throughout each rib.

Two timber heads on each side, near the bow and stern, are laced in the most convenient situation for mooring the boat, and secured with glands fixed with clenched rivets, so that the timber heads may be taken out and replaced, when found necessary; to consist of solid oak timber, five inches in breadth, two inch thick, one foot in length below the gunwale, and seven inches above.

The beams which support the deck, fore and aft, consist of oak plank two inches thick, three inches deep in the centre, and two inches deep at each end, with a curve of half an inch to the foot in length; and they are secured with a sheet-iron plate the to gunwale, angle iron, and sea-croft.

The gunwale or covering boards should consist of the best Memel fir plank, one inch in thickness, which extends from stem to stern; the cover is secured to the gunwale flange and wele, that forms a moulding round the same.

The ends and divisions of the cabins should consist of Memel plank, two and a half inches in breadth, and one inch and three-fourths thick, which will form diagonal frames, for the purpose of strengthening the boat, so as to resist external pressures. The said frames must be lined at the ends of the cabins outside, with the best half-inch American yellow pine plank. The framing in the inside of the cabins may be lined as may be approved of.

The sleepers, for support of the flooring, should be two inches deep, by one inch and a quarter thick, placed and fitted to each alternate rib, and fixed to the upright flange with rivet nails. The flooring should consist of the best yellow pine plank, one inch thick, and not to exceed six inches in breadth, which must be properly cleaned, ploughed, and feathered.

The height of the cabins, from the top of the floor to the lower part of the beams, six feet at the centre, and the heights of the sides above the level of the floor will be five feet under the beams; consequently, the beams will have a curve of twelve inches.

The standards or stanchions of the sides of the cabins should consist of the best white American oak, one inch thick, and one and a half broad at the gunwale, and one inch in breadth at the top of the cabin, and placed at each alternate rib, to which it is secured; the distance being twenty-four inches from centre to centre. The top gunwale, for the support of the roof, to be made of the best Memel fir or red pine, free of blemish or knots, and extend the whole length of the cabin, two and a half inches deep outside; the upper edge is bevelled to suit the curve of the beams, and two inches in thickness, mitered to fit the tenure of the standard, having a projection for a head, and thickness of outside lining.

The beams, as stated above, to have a curve of twelve inches, to consist of the best clean ash timber, an inch and a half in breadth, by one inch in depth, the lower part rounded to a half circle, and is placed at the distance of two feet from centre to centre, dove-tailed and secured to the gunwale with screw-nails; and a framing of iron wire gauze, well painted, shall be made to connect them, so that the top may form one solid connected form from end to end.

A stringer extends the whole length of the cabins, in the centre, to support the roof, which is let in, and bound to the diagonal frames, the upper edge kept flush with the top of the curve, consisting of clean solid white Quebec oak timber, three inches in depth by an inch and a half thick; into which the beams are let nearly in the whole depth, and made exactly for the top covering.

The space outside of the cabin, fore and aft, must be lined from the floor to the gunwale with five-eighths of an inch red pine boards, and seated in the usual form; the tops seven-eighths of an inch thick, with round supports and cross bearers, with two front rails, two and a half inches in breadth, beaded, and let in flush with the bottom and top of the supports or feet.

In order that the boat may be kept as light as possible in the fittings-up, there should be no inside lining of wood from the floor up; consequently, the whole seatings in the cabins must have fronts supported with brackets; these brackets to be secured to a stringer, fixed to the sides of the boat the whole lengths of the cabin, three inches in breadth, by an inch and a quarter thick, to which the brackets are let in flush, and nailed to it and the floor. The seats in the principal cabin to be sixteen inches in height, so as to allow cushions two inches thick and eighteen inches in breadth; the back to be one inch lower than the front, which is considered an improvement as a comfortable seat; the seats in the principal cabin may consist of cane, light wood, or lacing, as may be approved of; the fronts consisting of the best American yellow pine five-eighths boards. The seats in the steerage, eighteen inches in height, by fourteen inches in breadth, and fixed with brackets in the same manner as the principal cabin, and be seven-eighths of an inch in thickness.

The outside lining between the gunwale and top of the cabins should consist of the best yellow pine half-inch boards, well seasoned, free of knots, sound, and properly cleaned, ploughed, and feathered. The first board will extend the whole length of the cabins, eight inches in breadth, nearly joined to the coverings boards; thin fitters being fitted between the standards or

stauncheons, and laid in white-lead paint, so as to be water-tight, and fixed to the side standards with springs.

The space between the standards being twenty-four inches from centre to centre, it is proposed that light windows, or patent gauze wire, shall be place in every alternate space, so as the passengers may have a view of the country without being under the necessity of removing to the outside. These windows and frames should be made as light as possible, and made to slide or fold, as may be considered most convenient.

The inside lining, from the seats up, and between the windows, should consist of oil-cloth, fixed and finished with heads and facings.

The top or cover of the cabins to consist of oil-cloth, which must be perfectly water-tight, and fixed to the beams, top gunwales, and ends of the cabin, with a moulding. It will be necessary to have a thin sheet of plate-iron for the funnels, so as to prevent any danger from the heat of the stoves during the winter.

The outside doors should consist of red pine plank, one inch and a quarter thick, bound and pannelled, to be hung with neat light bats and bands, have good five-inch rimmed locks, brass mounted, to open out in two halves, and to have small brass slip bolts at top and bottom. The doors in the divisions to have check locks, and hung with five inch edge hinges.

The inside doors should consist of the best yellow pine plank, one and one-eighth inch thick, and twenty-two inches in breadth, and finished with facings.

That the whole of the inside, previous to the joiner work being commenced should have two coats of good lead-color paint; and the whole of the iron-work on the outside, as well as the wood-work in the outside and inside, should have three coats of paint of different colors, and finished in a sufficient and workmanlike manner.

APPENDIX H

Journal of the Experiments on the Navigation of the Chesapeake and Delaware Canal by the Steam-boat Lewis, September 22nd, 1853.

FIRST EXPERIMENT

The steam-boat towing one of the barges, for passengers, used upon the canal.

Length of barge 90 feet, breadth of beam 19 feet, draught, when light 23 inches, including the keel, which is 11 inches; draught, with the ordinary number of passengers, 55 inches.* Awning of the barge up.

The barge 15 feet in rear of the steam-boat.

Twenty-eight persons in the steam-boat; seven in the barge.

Points at which the observations were made	Time of passing the points			RPM	Remarks	Width Waterway	Dist. Bet. Sta.	Time bet. Stations		Rate/ Hr.	Ratio*
	Hr	Min	Sec		Barge in tow	Yds	Yds	Min	Sec	Miles	
Post 300 yds. east of Delaware bridge	8	14	45	37½	Wind strong in favor	26 2/3					
Middle of Delaware bridge	8	16	35		Steam shut off, in part, 30 sec. in order to pass the bridge.		302				
Post 330 yds. west of Delaware bridge							302				
Mile post No. 1	8	20	30	34½		59	385	2	08	6.16	.61
About the half mile	8			36							
Mile post No. 2	8	30	40		1 min. 30 seconds lost.	26 2/3	1770	8	40	6.96	.65
					Mean					6.56	.63
					Return trip with barge						

Mile post No. 2	8	40	38	39	Wind brisk, adverse	26 2/3					
				35½	Wind on bow for about half a mile						
				31½	and directly ahead the other half						
Mile post No. 1	8	53	00	31½	Close to bank, no wash	59	1770	12	22	4.88	.48
Post 300 yds. west of Delaware bridge	8	56	05	33	30 feet from bank	56	385	3	05	4.26	.44
Middle of Delaware bridge	8	58	32		Steam, in part, shut off for 20 sec.		302	2	27		
Post 300 yds. east of Delaware bridge	9	00	57	31½		26 2/3	302	2	25		
Post 300 yds. west of Delaware bridge	9	04	20	33		26 2/3	471	3	23	4.74	.49
					Mean					4.63	.47

- Ratio of velocity of boat to velocity of wheel.

Mean rate of boats, wind in favour	6.56 miles	Relative rates
Mean rate of boats, wind adverse	<u>4.63 miles</u>	1.417 to 1
Mean	5.59 miles	
Greatest rate of boats, wind in favour	6.96 miles.	Relative rates
Greatest rate of boats, wind adverse	4.88 miles.	1.426 to 1
Mean ratio of velocity of boat to velocity of wheel, wind in favour,	.63	
Mean ratio of velocity of boat to velocity of wheel, wind adverse	<u>.46</u>	
Mean	.55	

SECOND EXPERIMENT

The steam-boat, with thirteen persons on board.

Points at which the observations were made	Time of Observation			RPM	Remarks	Width of Waterway Yds	Dist. Bet. Sta Yds	Time bet. Stations		Rate/ Hr. Miles	Ratio*
	H.	M.	S.					M.	S.		
Post 300 yds W of Del. Lock	9	12	35	39	Wind as in 1 st exp't						
Post 300 yds E of Del. Bridge	9	14	35	39	Faster than boat and in favour	26 2/3	471	2	00	8.03	.71
Middle of Delaware bridge	9	16	00		Steam shut off, in part, for 20 seconds	26 2/3	302				
Post 300 yds W of Del bridge	9	17	32	37½	More wash than in first exp't but still harmless	56	302				
Mile post No. 1	9	19	20	37½		59	385	1	48	7.29	.67
Mile post No. 2	9	26	30	39		59	1770	7	10	8.42	.77
Mile post No. 3	9	34	09	37½		55	1768	7	39	7.88	.72
Mile post No. 4	9	41	50	37½		176	1755	7	41	7.79	.71
Post 300 yds E of Penna. lock	9	43	30		Pass Penna lock, wind slower than boat just at a point opposite the bow	44		1	40		
Post 300 yds W of Penna. lock	9	58	08			275		15	22		
Mile post No. 5	10	00	50	39		190		2	42		

Mile post No. 6	10	08	13	37½	was measured upon a stick, and found to be about 1 inch. Canal 9 to 10 feet deep; pond 800 ft. wide. Exp't not precise.	132	1764	7	23	8.14	.73
--------------------	----	----	----	-----	----------------------------------------------------------------------------------------------------------------------------------------------------------------	-----	------	---	----	------	-----

After passing mile post No. 6 a sloop was attached by tow lines to the steam-boat; the burthen of the sloop was forty-four tons, the actual load being fifty tons of anthracite, and the draught sixty-two inches exclusive of the keel. The helmsman of both the steam-boat and the sloop, not understanding the management of their respective vessels, in the new circumstances in which they were placed, there was so much sheering in one direction and another, that it was deemed expedient to cast off the tow lines, on the approach of the passenger barge which appeared in sight. The speed was estimated differently at from three to four miles per hour, but the checks, which it constantly met with, rendered any accuracy of estimate out of the question. The passenger barge, towed by *eleven* horses, now passed, and the steam-boat followed; part of the experiment, which follows, was made in the shallower end of a former mill-pond, and the other through about one quarter of a mile of the deep cut.

Points at which observations were made	Time of observation			RPM	Remarks	Width Waterway	Dist. Bet. Sta.	Time bet. Stations		Rate/ Hr.	Ratio*
	H.	M.	S.					M.	S.		
Mile post No. 7	10	34	52	37	From the bottom of the	210					
Mile post No. 8	10	42	57	36	Depression to the top of the swell created by the barge, was, at the lowest, 3.5 feet; the same height for the swell of the boat was 1 foot, at the most.	26 2/3	1736	8	05	7.41	.70
					Mean					7.85	.71

Points at which observations were made	Time of observation			RPM	Remarks	Width Waterway	Dist. Bet. Sta.	Time bet. Stations		Rate/ Hr.	Ratio*
	H.	M.	S.		Steam-boat alone	Yds	Yds	M.	S.	Miles	
Mile post No. 7	11	23	30	37½	Light wind ahead	270					
Mile post No. 6	11	31	42	35	Wind strengthens	132	1769	8	12	7.36	.70
Mile post No. 5	11	39	53	37½		190	1764	8	11	7.35	.68
Post 300 yds W of Penna lock	11	43	52	37½		275		3	59		
Pennsylvania lock	11	50	20		In lock and going 300 yds			6	28		
Post 307 yds E of Penna. Lock	11	52	18	33		44		1	58		
Mile post No. 4	11	54	10	34½		176		1	52		
Mile post No. 3	12	02	20			55	1755	8	10	7.33	.3
Mile post No. 2	12	10	18	35½		59	1768	7	58	7.56	.74
Mile post No. 1	12	17	55			59	1770	7	35	7.92	.77
Post 300 yds W of Del bridge	12	19	40			56	385	1	45	7.50	
Middle of Delaware bridge	12	21	05		Steam slack	26 2/3	302	1	24		
Post 300 yds E of Del bridge	12	22	57	34½		26 2/3	302	1	52		
Post 300 yds W of Del bridge	12	25	15	33			471	2	18	6.98	.70
					Mean					7.43	.72

Mean velocity of steam-boat, wind in favour 7.85 miles per hour Relative rates
Mean velocity of steam-boat, wind adverse 7.43 miles per hour 1.055 to 1
Mean 7.64

Greatest vel. of steam-boat, wind in favor 8.42 miles per hour Relative rates
Greatest vel. of steam-boat, wind adverse 7.92 miles per hour 1.068 to 1
Mean ratio of velocity of boat to velocity of wheel, wind in favour, .71
Mean ratio of velocity of boat to velocity of wheel, wind adverse, .72

THIRD EXPERIMENT

Steam-boat towing a freight barge of twenty-five tons burthen, loaded with from fifteen to eighteen tons of merchandise, and drawing two and a half feet of water.

Wind very light, in favour of the boat.

Points at which observations were made	Time of observation			RPM	Remarks	Width Waterway	Dist. Bet. Sta.	Time bet. Stations		Rate/Hr.	Ratio*
	H.	M.	S.			Yds	Yds	M.	S.	Miles	
Post 300 yds W of Delaware lock	12	40	34	34	Towing a freight barge						
Post 300 yds E of Delaware bridge	12	43	31	34		26 2/3	471	2	57	5.44	.55
Middle of Delaware bridge	12	45	25		Steam slacked for 20 sec	26 2/3					
Post 300 yds W of Delaware bridge	12	47	18	34½		56					
Mile post No. 1	12	49	22	35		59	385	2	04	6.36	.62
					Mean					5.95	.58

The passenger barge from the west appearing in sight, the freight barge was disengaged, and the boat put about. At the first part of this experiment there was a difficulty encountered similar to that noticed in the case of the attempt to tow the sloop, but less in degree; it resulted from the inexperience of the helmsman of the barge, and as soon as he had been directed how to steer, and followed the directions, there was no further trouble from this source.

FOURTH EXPERIMENT

Steam-boat alone, returning in rear of the passenger barge drawn by seven horses.

Light wind ahead.

Points at which observations were made	Time of observation			RPM	Remarks	Width Waterway	Dist. Bet. Sta.	Time bet. Stations		Rate/Hr.	Ratio*
	H.	M.	S.			Yds	Yds	M.	S.	Miles	
Mile post No. 1	12	58	45		Steam-boat alone	59					

Post 300 yds W of Delaware bridge	1	00	40			56	385	1	55	6.84	
Delaware bridge	1	02	00			26 2/3	302	1	20	7.74	
Post 300 yds E of Delaware bridge	1	03	32			26 2/3	302	1	32	6.63	

The barge had seven horses, which of course were fatigued, for which circumstance allowance must be made; there was, however, no point of time in which the steam-boat could not have passed the barge after it had come up to it and, in fact, during part of the last 500 yards, and after passing the 500 yards post the steam was slackened occasionally, to keep from running too close to the barge.

Summary of the Average Results

Mean velocity	Mile per Hour	Mean Ratio*	Remarks	Avg. RPM
Steam boat alone	7.64	.71	A mile in 7 min and 7/8	36.9
With passenger barge in tow	5.59	.55		34.7
With freight barge in tow	5.95	.58	No exp't against the wind	35.1

*Mean Ratio of velocity of boat to velocity of water.

In these experiments, at the highest rate of motion obtained, there was no swell produced in the straight parts of the canal, which would have been likely to injure the banks although not specially protected. The wave from the bow of the boat, owing to the peculiar form of that part, fell in with the wheels, and was disposed of by them; while the lean form of the stern brought together the waves produced by the wheels, which, therefore, spread very little, if at all, in a lateral direction, that is, towards the banks, being directed towards the tow-path only in parts of the curved portions of the canal. When the barge was in tow, and with the more rapid rate then assumed, nearly seven miles per hour, there was no perceptible swell behind the barge, the swell from the wheels not appearing after meeting the bow of the barge. There was no obvious change in the character of the swell at low and high velocities, but the experiments did not permit numerical accuracy upon this point.

At the time when the heights of the wave from the barge and from the steam-boat are noted in the remarks, the barge was so far before the boat that the latter was free from any effect produced by the swell of the former. It was in the deep cut, and the bow of the barge was elevated, and the stern depressed, mounting an inclined plane, while, besides the wave which preceded the bow, a destructive surge followed sweeping above the stoning of the banks of the tow-path. The wave from the steam-boat was included within the limits comprising only a portion of the cover of the banks, and did not break with the violence necessary to carry away the soil and pebbles from behind the stones.

The boat suffered no sensible retardation in passing into the deep cut, for, in the latter part of the second experiment, with thirty-six and thirty-seven revolutions, the speed was about seven and a half miles per hour, while in the wider portions, with thirty-seven and a half, the speed was about seven miles and three-quarters. The same conclusion is to be drawn by comparing these results with those obtained in the Schuylkill; in fact, the average speed with a

given number of revolutions upon the canal, rather exceeds that with the same number upon the river.

he want in power of the engine prevented the experiments from being conclusive in relation to towing, with high rates of motion, though they seem to indicate greater advantages from towing, at rapid rates, than in moving with the boat alone. That the speeds attained by even this imperfect model, compare with those which the labour of eight horses is capable of producing, appears by the annexed memorandum received from the captain of one of the passenger barges which passes daily through the canal on the line from Philadelphia to Baltimore.

	Min	Sec		MPH
From the 11 th to the 10 th mile post	9	40		6.02
10 th 9 th	10	00		6.00
9 th 8 th	9	00		6.67
8 th 7 th	8	40		6.92
7 th 6 th	7	55		7.58
6 th 5 th	7	20		8.18
5 th 4 th	13	50	Includes lockage	
4 th 3 rd	8	38		7.02
3 rd 2 nd	8	20		7.20
2 nd 1 st	7	20		8.18
1 st 0 th	8	58		6.69

The average speed is about nine minutes to the mile, and two hours are required to pass the canal.”

While then it would seem to be an easy matter to exceed the average speed, which is attainable in towing by horses, the swell produced by one and by the other mode of conveyance are not comparable with each other.

A review of the experiments leads me to the conclusion indicated in the commencement of this article, namely, that steam power may be substituted for the present method of towing by horses on large canals, with great advantage to the canal, particularly at high velocities.

There was no opportunity on this occasion to examine into the cost of this mode of transportation, by ascertaining the amount of fuel consumed in the different trips; this point was investigated, and a further trial in towing heavy vessels was made by Caleb Newbold, Esq. As the results will serve to render my statements more full, I subjoin them.

	Hrs	Min	MPH
1 st Expt Steamboat alone, St. Georges to Delaware City (4.25 miles)	0	33	7.75
2 nd Exp't Steamboat alone, Delaware City to Chesapeake	1	55	6.91
3 rd Exp't Steamboat alone, Chesapeake to Delaware City	1	50	7.23

“In both of the last experiments the steam was slackened off repeatedly to accommodate vessels; the time given is exclusive of six minutes for lockage. The most rapid rates of motion were one mile in six minutes and twenty seconds, (9.48 miles per hour,) and one mile in six minutes and thirty seconds (9.23 miles per hour.) The greatest number of revolutions made in one minute by the wheels was forty-two. 575 lbs of *pine wood*, of fair good quality, (about one-fifth of a cord,) were consumed in keeping up the steam for one hour and fifty minutes.

“4th. Experiment.” Delaware City to St. Georges, towing the schooner *William and George*, of 45½ tons burthen, empty, fifty-six minutes, (rate 4.5 miles per hour.)

“5th. Experiment. St. Georges to Delaware City, towing the sloop *Martha and Elizabeth*, of 59 tons, clump built, heavily laden; drawing six feet of water; one hour and two minutes, (rate 4.1 miles per hour.) Part of the way there was a fair wind, and part of the way a strong side wind, which, owing to the want of keel of the steam-boat, pressed it somewhat on the tow path. The vessel is one of the heaviest *towers* of her class. No difficulty in steering, nor any embarrassment from *sheering*.”

Experiments Made On the Navigation of the Chesapeake and Delaware Canal By Steam,
Reported by A. D. Bache (Philadelphia, 1834), 4-13.

APPENDIX I

EXTRACT FROM AN ACT OF THE GENERAL ASSEMBLY
OF MARYLAND, DECEMBER 1831

Extract from an act of the General Assembly of Maryland, entitled "An act further to amend the act incorporating the Chesapeake & Ohio Canal Company," passed at the December session, 1831.

Be it enacted by the General Assembly of Maryland, That if any person or persons shall willfully, by any means whatever, injure, impair, or destroy, any part of the Chesapeake & Ohio Canal, or any part of its feeders, dams, locks, aqueducts, culverts, walls, embankments, bridges, buildings, or other works now constructed, or which may hereafter be constructed, by the Chesapeake & Ohio Canal Company, under the several acts incorporating the said Canal Company, or amendatory thereof, or supplementary thereto, such person or persons so offending shall each of them, for every such offence, forfeit and pay to the said Canal Company a sum not *exceeding* fifty dollars, *recoverable* by action of debt before any justice of the peace in and for the county wherein the offence shall be committed, reserving to the parties the right of appeal from the decision of the said justice of the peace to the county court in the county in which judgment may be had; or every such offender shall be subject to indictment in the court of the county in which the offence shall be committed, and, upon conviction of such offence, shall be punished by fine or imprisonment, or both, in the discretion of the court.

2. *And be it enacted*, That the President and Directors of the Chesapeake & Ohio Canal Company, or a majority of them, acting in behalf of the said Company, shall be, and they are hereby, authorized and empowered, from time to time, to pass all by-laws which may be necessary for the exercise of the powers vested in said Company by the several acts incorporating the same, or amendatory thereof, or supplementary thereto: *Provided, always*, That such by-laws shall not be contrary to the laws of this State, or of the United States, or of the States in which they operate, and that the said Company shall not be authorized, by any such by-laws or regulations, to prevent the proprietor or proprietors of any lands through which the said canal, dams, basins, feeders, or other appurtenant works may be constructed, from joining or connecting with the said works any fence or wall which shall not be found to injure the work aforesaid; nor to prohibit the aforesaid proprietor or proprietors from having access to the said Canal and its appurtenant works, at the most convenient place and from crossing and recrossing the same at their discretion, in any of the modes hitherto agreed upon by the said Company; *Provided*, in doing so, they do not impede the navigation, or injure the said works. And if any person or persons shall willfully offend against any such by-laws, after a copy thereof shall have been set up for public inspection at each of the toll-houses on the canal, such person or persons, so offending, shall each of them, for every such offence, forfeit and pay to the said Company the sum of five dollars, to be recovered in the name of the said Company before any justice of the peace for the county wherein the offence may be committed.

3. *And be it enacted*, That the said President and Directors or a majority of them, acting in behalf of the Chesapeake & Ohio Canal Company, may prescribe the form, dimensions, and equipment of the boats and floats to be used upon the canal, with a view to prevent accidental injury to them, or to the works of the canal, in passing each other, or in passing by or through any of the works; and if the owner, captain, or other person, having charge of any boat or float, shall negligently violate, or refuse to comply with any such regulation, the President and Directors may require the owner, captain, or other person having charge thereof, to withdraw his said boat or float from the canal, by some one of the outlets thereof; or, in the event of his failure to do so, on

reasonable notice, may order the same to be broken up and removed from the canal, or any of its basins, ponds, feeders, or other works, and in like manner may be broken up and removed from the canal, or any of its basins, ponds, or feeders, any boat or float, or other substance, floating loose upon, or sunk therein, the owner of which is unknown, or, if known, neglects or refuses, after reasonable notice to remove the same; and the materials of the broken boat, float, or other substance, so broken up and removed, shall be the property of the Canal Company, and be applied to defray the cost of breaking up and removing such nuisance.

APPENDIX J

Act of Congress, approved July 14, 1852

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the assent of the United States be, and the same is hereby, given to an act of the General Assembly of Maryland, entitled “An act further to amend the act incorporating the Chesapeake and Ohio Canal Company,” which passed the General Assembly of Maryland at December session one thousand and eight hundred and thirty-one: *Provided,* That nothing therein contained shall be construed to impair any right possessed by the said company to the passage of said act, nor to authorize any individual to obstruct the said canal, along the berm bank, or other land for the construction and use thereof, nor to prevent Superintendent, or officers of said company, from up and down the said canal....

DRAWINGS OF CHESAPEAKE & OHIO CANAL FREIGHTER

The drawings include the following views and details:

- ELEVATIONS:**
 - FRONT ELEVATION:** Shows the front of the car with a large window and a door.
 - REAR ELEVATION:** Shows the rear of the car with a large window and a door.
 - RIGHT SIDE ELEVATION:** Shows the right side of the car with a large window and a door.
 - LEFT SIDE ELEVATION:** Shows the left side of the car with a large window and a door.
- SECTIONS:**
 - SECTION A-A:** A cross-section showing the interior of the car, including the roof, floor, and seating area.
 - SECTION B-B:** A cross-section showing the interior of the car, including the roof, floor, and seating area.
 - SECTION C-C:** A cross-section showing the interior of the car, including the roof, floor, and seating area.
 - SECTION D-D:** A cross-section showing the interior of the car, including the roof, floor, and seating area.
- PLAN:** A top-down view of the car showing the layout of the interior, including the roof, floor, and seating area.
- DETAILS:**
 - RAIL DERAIL:** A detail of the rail derail mechanism.
 - RAIL DERAIL:** A detail of the rail derail mechanism.
 - RAIL DERAIL:** A detail of the rail derail mechanism.

APPENDIX L

ACCOUNT OF LIFE ON A CHESAPEAKE & OHIO CANAL BOAT

There were two kinds of boats on the canal, one of very primitive shape, being nearly the shape of an oblong box with great square ends. These boats would carry large loads but were slow sailors, as the water made a great resistance to the flat end in front and did not leave the boat easily at the stern. There were very few of these boats left and those that were painted at all were covered with a coat of coal tar. The other boats had their ends molded and formed the same as a ship, making as fine lines as was consistent with the load they were to carry and the slow speed they sailed. All the new boats were built at Cumberland where they had a miniature ship yard employing the various mechanics as ship carpenters, smiths, painter and caulkers to be found in large shipyards.

A boat is divided into three compartments; the center was left open except for a narrow walk around the edge and formed the hold where the freight is stored. Over this were placed removable hatches making a watertight covering. At each end of the boat is a cabin with a roof raised about three feet above the deck. The front one is used for a stable and the rear one is divided into a stateroom with berths and cooking galley. The cabin was not so wide as the boat above the deck leaving foot ways, on each side. Behind the rear cabin was the tiller deck from which the cabin stairs went down, and under it a kind of cockpit, about four feet high, where Pic and his boy slept and no place could suit them better as it was the hottest and least ventilated part of the boat.

When the boat was loaded, the water came within a foot of the deck, but when it was light it just skimmed over the water not drawing more than one or two feet and would be almost unmanageable outside of the canal as it had no keel to prevent it from drifting with the wind. There were some three or four hundred boats on the canal and [they] were of all ages and in every stage of repair from those that were bright and shiny to those that you could not tell what was the color of the last coat of paint. A hundred or more of these boats were brought from the Erie Canal, when that was enlarged, by the canal companies who now own nearly all the boats, the boatmen furnishing teams and outfit, receiving so much a ton for hauling the coal, paying their own expenses and the toll on the empty boat back to Cumberland. The cost of a new boat was from twelve to fifteen hundred dollars.

I was not long on board before I was given a lesson in boat steering, Pic keeping watch with a hand ready to grasp the tiller if by some mischance the boat should get the advantage of me and try to run ashore. Boat steering is very simple; you stand with one arm over the tiller and sight across the bow of the boat; then pull or push according to the direction you wish it to go, but it requires constant attention and the steersman has to be constantly on the watch for the slightest deviation from the direct line and immediately overcome it by moving the rudder. This soon becomes instinctive, like steering a bicycle, and requires but little exertion but sometimes, by carelessness or otherwise, and you often feel that it was mere wantonness on the part of the boat, it will take a start for one side and, do the best you can it will hardly escape striking the bank, when over it will go to the other side and just miss grounding there, back and forth it will go half a dozen times before you get it calmed down to straight ahead then perhaps for miles it will not deviate a foot from the right direction. This erratic steering reduces the speed of the boat and adds to the pull of the mules, besides, there was the danger of running the boat aground or in some places of bumping a hole in the bottom on a ledge.

The connection between the mules and the boat is the tow-line, a strong rope three fourths of an inch in diameter and near a hundred feet long, which was fastened to an eye bolt on one side near the middle of the boat, and as this was near the pivot point on which the boat turned and drew nearly straight ahead, it had but little effect on the steering.

In canal language the mules were geared together and not harnessed. The mule gearing was of the simplest description possible consisting of a bridle and breastplate with a strap around the body to keep it in place. The traces were chains that hooked into rings on the mule in the rear with spread sticks between each mule and one where the chains came together at the towline. When we had all four mules hitched tandem they formed a straight line between two long chains that were nearly as rigid as wooden poles, the spread sticks keeping the chains a sufficient distance apart as not to chafe them. It took no little power to start a boat loaded with one hundred and twenty tons of coal drawing five feet of water for a standstill and get it up to speed of two miles per hour. A quick pull of a hundred horses would have little effect except to break the tow-line, yet a boy ten years old could start the boat by making a long steady pull; after awhile he would feel it yield and perhaps in three or five minutes could make a single step, then another until the boat would move at a slow but steady speed according to the strength of the boy. In the same way the well trained mule could draw the tow-line tight and make an easy pull leaning against their breastplates until the boat began to move, then step after step until the boat was up to speed and all day they seemed to be resting on their breastplates and stopping only to keep from falling forward.

At night, or when we stopped to feed, the boat was hauled up to the shore and made fast, the mules ungeared and the feed trough brought out. This was about a yard long and large enough to hold two buckets of corn in the ear and had but two legs, a tree, post or fence serving for the others, being fastened to it by a rope which passed through two holes in the back. This made the trough a fixture that could not be tipped over or run away with.

We are sailing on and on making from a mile and three fourths to two miles an hour according to the number of mules in use at a time; occasionally we meet a boat going up the canal some of whose crews saluted Capt. Coss or Pic but most of them passed silently by. Some of the boats were drawn by a single mule others had what was once a horse, still others had two or more, but none had a better team than ours. We saw very few boats going in our direction either on the down or return trip except when we tied up to the bank, for the rate of speed was so near the same in all of the boats that the time spent in passing a lock would keep them separate until they came to the next and only on long levels could one gain enough to pass another. We were tied up to no particular hours and lived in Arcadian simplicity. We rose with the early morning light, fed the mules, and when they had eaten their breakfast a pair was hitched up and we started on our day's journey driving them about four hours when they were changed for the other pair; at the end of the next four hours they were again changed, and so on making four shifts and sailing from sixteen to eighteen hours a day, the Capt. Pic and myself taking turns at the rudder while the two boys changed off from time to time and occasionally Pic and myself would drive for an hour or two, walking for exercise; the boys usually rode the rear mule.⁷

⁷ Excerpt from: Ella B. Clark and Thomas F. Hahn, eds., *Life on the Chesapeake & Ohio Canal: 1859* (New York, 1975), 12–15