



Historic Resource Study: Chesapeake & Ohio Canal

**By
Harlan D. Unrau**

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United States Department of Interior
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Chesapeake & Ohio Canal National Historical Park
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PREFACE

On January 8, 1971, President Richard M. Nixon signed into law the bill creating the Chesapeake & Ohio Canal National Historical Park. In the mid-1970s, National Park Service historian Harlan D. Unrau produced a major, handwritten, multi-volume study of the history, engineering, operation, maintenance, and other aspects of the Chesapeake & Ohio canal. A rough, unedited typed version was produced in the early 1980s for general use by park staff.

In 2006, C&O Canal NHP volunteers began the task of transcribing the Unrau work into MS Word. The present document lacks the benefit of information that has become available since the 1970s when Unrau created this work. Various imperfections will be apparent to the reader and some sources are not fully documented, but the work represents an early compilation of the canal's history and engineering that has never been surpassed and will be of incalculable value to researchers and those who simply desire to know more about this unique historic treasure.

It should be noted that the original work was developed as sixteen chapters organized in several volumes. The first four chapters are not included here and have not yet been transcribed. For the most part those early chapters contain information on the general state of canal building and engineering in the early 19th century, and background history—although there is also a section on certain C&O structures and engineering problems. Overall, however, the information is less specific to the C&O in chapters one through four than that in chapters five through sixteen treated as separate monographs in this volume.

Special appreciation for the preliminary transcription and minimal editing of the text goes to NPS volunteers William Bauman (who did the vast majority of the transcriptions), Rita Bauman, Karen Gray, Gary Petrichick, and Cecilia Thompson. Their work represents literally thousands of hours at their computers and in the C&O Canal NHP library. They, in turn, are indebted to C&O Canal NHP staff, especially William Justice and Sam Tamburro, who provided invaluable assistance in resolving many of the problems and uncertainties that the material presented; and Gary Scott from the regional office whose experience and advice in preparing the material for publication was also invaluable.

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

**1.
DESIGNERS OF
THE C & O CANAL**

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INTRODUCTION

The purpose of this document is to present the biographies of the engineers who played a prominent role in the design and construction of the Chesapeake & Ohio Canal. By studying the background of these men, one will gain a better understanding of the skills and experiences which they brought to the construction of the Chesapeake & Ohio. A look at the activities of these men after they left the canal will also enable one to place their services on the canal in the context of their professional engineering careers.

This chapter has been divided into two parts. The first section contains those individuals for whom biographical information is available to treat their entire lives. The second section includes those men for whom only limited biographical data is available. For the purpose of organization, the entries in both sections are alphabetized.

This chapter should not be considered as an exhaustive treatment of the aforementioned subjects. There are other lesser-known engineers who also played a role in the building of the canal. However, it can be argued that this chapter contains virtually all of the readily available biographical information on the lives of the most prominent engineers to be engaged in the construction of the Chesapeake & Ohio Canal.

I. QUALIFICATIONS OF AN ENGINEER

Before one studies the biographies of the principal engineers on the Chesapeake & Ohio Canal, it is imperative that he understand the qualifications for such a job as described by American canal promoters in the early nineteenth century. Civil engineering was just emerging from an infant state of development during this period. Furthermore, the canal era in the United States was just beginning to flourish when the Chesapeake & Ohio project was initially conceived and designed. Thus, one can more easily appreciate the training and expertise which the canal engineers brought to their task by understanding the qualification for such work as stated by contemporary writers active in the promotion of American canals.

Samuel Young, one of the New York canal commissioners, compiled his *A Treatise on Internal Navigation* at the request of the other commissioners in 1817 in order to familiarize New Yorkers with the standard engineering technique employed in Europe. Later, this book was widely read by canal enthusiasts throughout American. In the book, young listed seven qualifications for an engineer as follows:

1. A skillful engineer should undoubtedly possess a considerable degree of mathematical knowledge. Calculations, of which some are of the most obstruse [sic.] and laborious kind, will frequently occur; and he should therefore, be well acquainted with the principles on which all calculations are founded, and by which they are to be rightly applied in practice.
2. An engineer should also have studied the elements of most or all of the sciences, immediately connected with his profession; and he should particularly excel in an acquaintance with the various branches of mechanics, both theoretical and practical.
3. His knowledge should comprehend whatever has been written or done by other engineers, and he should have information in every department of his office from an accurate examination of the most considerable works that have been executed in all the various circumstances that are likely to occur.
4. It is necessary, that he should be a ready and correct, if not a finished, draughtsman.
5. He should also be conversant with the general principles of trade and commerce; with the various operations and improvements in agriculture; with the interests and connection of the different owners and occupiers of land, houses, mills, & c.; and with all the general laws and decisions of courts, pertaining to the objects connected with his profession.
6. By an extensive acquaintance with the disposition, inclination, and thickness of the various strata of matter, which compose the soil or land...he will be able to avoid many errors incident to those who are destitute of this knowledge, and to have the course and causes of springs, to which it leads.
7. "As the last, though not the least, of these qualifications of an engineer, which we shall enumerate, we shall add, that he should be a man of strict integrity."¹

¹ Samuel Young, compl, *A Treatise on Internal Navigation* (Ballston Spa, 1817), 9–10

II DESIGNERS WITH FULL LENGTH BIOGRAPHIES

A. JOHN JAMES ABERT (1788–1863)

SIGNIFICANT CONTRIBUTIONS TO THE CHESAPEAKE & OHIO CANAL

John J. Abert performed significant services for the Chesapeake & Ohio Canal both as a director of the company in 1833–1834 and 1836 and as a member of the U. S. Topographical Engineers. In 1824–25, he and his assistants conducted a detailed survey of the proposed route for the canal. A preliminary report submitted by Abert on February 14, 1825, supported the practicality of building an artificial waterway along the north bank of the Potomac from tidewater and of connecting the Potomac and Ohio River Valleys. Based on the results of this survey, Congress chartered the canal company in a measure signed by President James Monroe on March 3, 1825. Because his cost estimate for the canal's construction was considered extremely high, his survey was submitted to a reexamination in 1827 by James Geddes and Nathan S. Roberts, two civil engineers who confirmed the suitability of the route he had surveyed but at a lower estimated cost.

Shortly before the canal was opened to navigation between Georgetown and Seneca Falls in the summer of 1831, Abert and James Kearney, a fellow topographical engineer, were asked to inspect the canal's engineering works. In their report, they reported favorably on the quality of construction completed and described the existing conditions along the waterway.

During the late 1830s when talk was revived of an earlier project to connect Baltimore and the Chesapeake and Ohio via a crosscut canal, Abert was called to survey three possible routes for such a waterway. In his December 1838 report, he found that all three routes were impractical because of an insufficient water supply on the summit levels. Although he reported the discovery of a fourth, from Seneca to the Patapsco River via Brookeville, his projected high cost estimate for the waterway ended further speculation about the connection at that time.

BIOGRAPHICAL SKETCH

Early Years

Born probably in Shepherdstown, Virginia, (some sources place his birth at Frederick, Maryland), on September 17, 1788, John J. Abert was the son of John Abert, who is said to have emigrated to America as a soldier with Rochambeau in 1780, and Margarita Meng. On January 18, 1808, he was appointed from Virginia to the Military Academy at West Point where his scholarship soon won for him an assistantship to the professor of mathematics. In 1811 he left the Academy and for some three years he was an assistant to the chief clerk of the War Office in Washington, at the same time studying law. He was married to Ellen Matlack Stretch, granddaughter of Colonel Timothy Matlack, a Revolutionary War veteran, on January 25, 1812.²

He was admitted to the District of Columbia bar in 1813, practicing law there in 1813 and in Ohio in 1814. He served as a volunteer in the District of Columbia militia in 1814 and

² Asa M. Stackhouse, *Col. Timothy Matlack: Patriot and Soldier* (Haddonfield, 1910), 29–58. They had two daughters and four sons, three of which, James William, Silvanus Thayer, and William Stretch, served with distinction in the U.S. Army during the Civil War. *Appleton's Cyclopedia of American Biography*, I, 8–9.

fought as a private in the Battle of Bladensburg, August 24, 1814, and his services were acknowledged by a land grant of 160 acres in Wisconsin.³

Experience Prior to Service On the Chesapeake & Ohio Canal

On November 22, 1814, Abert was appointed major in the Topographical Engineers and was attached to the northern division of the army from this date until January 15, 1829. He was engaged as an assistant under Ferdinand Rudolph Hassler and Isaac Roberdeau in geodetic surveys of the Atlantic Coast (1816–1818); in topographical surveys concerning harbor and river improvements, canals, and defenses, principally in the eastern United States; and in the preparation of extensive reports covering these activities. The wide scope of his work in making important surveys during the period of America's development after the War of 1812 is indicated by the following services, which form only part of those which he rendered during this time. He was an assistant in the reconnaissance of the East River in New York in 1818. That same year he served as superintending Topographical Engineer of Surveys in the Chesapeake Bay. The following year he held the same position in surveys of Dutch Island, Mount Hope Bay, Newport Neck, and the western entrance to Narragansett Bay, and the Narragansett roads in Rhode Island; the East River in New York; the Fall River in Massachusetts; and the Louisville Canal in Kentucky. After directing a survey of Cox's Head in 1821, he superintended a survey for the proposed Chesapeake & Ohio Canal in 1824–25, during the same period heading a reconnaissance of the Patuxent River in Maryland. Later in 1826–27, he made surveys in the State of Maine. In recognition of his abilities as well as his frankness in criticizing the organization and functions of the Topographical Bureau, he was brevetted lieutenant colonel on November 22, 1824.⁴

Service on the Chesapeake & Ohio Canal

During 1824–25, Abert and his assistants conducted a detailed survey of the proposed route of the Chesapeake & Ohio Canal. The survey was ordered by Congress which had appropriated \$30,000 in response to the campaign growing out of the first Chesapeake & Ohio Canal Convention held in Washington in November 1823. The U.S. Board of Engineers made a preliminary report on February 14, 1825, supporting the practicability of building an artificial waterway along the north bank of the Potomac from tidewater and of connecting the Potomac and Ohio River Valleys.⁵

Based on the results of this survey, Congress chartered the canal company in a measure approved by President Monroe on March 3, 1825.⁶ On October 13, 1826, however, the Board of Engineers made its full report, which the President transmitted to Congress on December 7, 1826.⁷ The report reiterated the physical practicality of building the canal, but estimated the cost of the canal upon the dimensions required by the federal government at approximately

³ *Dictionary of American Biography*, XI, 1

⁴ George W. Cullum, *Biographical Register of the Officers and Graduates of the U.S. Military Academy at West Point, N.Y., from Its Establishment in 1802 to 1890* (3rd ed., Boston, 1891) I, 101–102.

⁵ U.S., Congress, House, Committee on Roads and Canals, Report of the Committee on Roads and Canals, H. Rept. 90, 19th Cong., 2d sess., 1827, Appendix 3, 37, 76.

⁶ U.S., Congress, Senate, *Documents Relating to the Chesapeake & Ohio Canal*, S. Doc. 610, 26th Cong., 1st sess., 1840, 13. The charter called for the following minimum dimensions: 40 feet wide at the surface, 28 feet wide at the bottom, and 4 feet deep.

⁷ The full report is printed in *Message of the President of the United States, Transmitting a Report from the Secretary of War with that of the Board of Engineers for Internal Improvement, on the Chesapeake & Ohio Canal*, H. Doc. 10, 19th Cong., 2d sess., 1826.

\$22,000,000 for the eastern section.⁸ The estimated cost had a devastating impact on the hopes of the canal supporters, who had been thinking in terms of a cost of \$4,000,000 to \$5,000,000. The result was the call for a second Chesapeake & Ohio Canal Convention in December 1826, which sought to discredit Abert's estimate and pressure President John Quincy Adams to submit the conflicting claims to two civil engineers, James Geddes and Nathan Roberts.⁹

Abert performed other services for the Chesapeake & Ohio Canal in subsequent years. Shortly before the line of the canal between Georgetown and Seneca Falls was opened to operation in the summer of 1831, an examination of the waterway was made by Abert and James Kearney at the request of the canal board. On June 13, the two engineers began their inspection, reporting favorably on the quality of construction completed and describing the existing condition along the waterway. The report, which is extant, is the earliest and generally most useful document that discusses in a comprehensive manner the problems encountered in the canal's construction and the engineering technology applied to their solution.¹⁰

Throughout the following decade, Abert was consulted frequently by the canal company engineers on matters of design and construction. During this period, he served as a company director in 1833–34 and 1836. When tales were revived in 1838 of an earlier project to connect Baltimore and the Chesapeake & Ohio via a cross-cut canal, he was called to examine three possible routes for such a waterway—the Westminster, the Monocacy–Lingamore, and the Seneca. In his report in December 1838, he confirmed the conclusions of earlier surveys that had found all three routes to be impractical because of an insufficient water supply of the summit levels. At the same time, he reported the discovery of a fourth, from Seneca to the Patapsco River via Brookeville. In response to a request for a further study of the Brookville route, he reported in February 1839 that for the 213/4 mile summit level, the probable cost of construction would be \$11,570,000, a figure that ended all speculation about the connection at that time.¹¹

Engineering Experience after Service On the Chesapeake & Ohio Canal

Because of his engineering skills and executive acumen, Abert was made assistant to the chief engineer in charge of the Topographical Bureau on March 19, 1829. Some two years later on June 22, 1831, he was instrumental in having the bureau separated from the Engineer Department and made a distinct branch of the War Department.¹² During most of the period 1832 through 1834, he served as U.S. Commissioner for Indian Affairs in conducting the removal of Indian tribes to lands west of the Mississippi River. His principal efforts during 1833 and 1834 were directed toward attempts to locate reservations and to certify contracts for the Creeks and Wyandottes.¹³

⁸ The detailed estimates were: \$8,177,081.05 for the eastern section, \$10,028,122.86 for the middle section, and \$4,170,223.78 for the western section, making a total of \$22,375,427.69.

⁹ *Report of the Committee on Roads and Canals*, 1827, Appendix 13, 15, 82–87, and Forest G. Hill, *Roads, Rails and Waterways: The Army Engineers and Early Transportation* (Norman, 1957), 51–54.

¹⁰ *Report of Col. John J. Abert and Col. James Kearney of the United States Topographical Engineers, Upon an Examination of the Chesapeake & Ohio Canal from Washington City to the "Point of Rocks," Made by Order of the Secretary of War, at the Request of the Canal Company* (Washington, 1831)1–24.

¹¹ *Report from J. J. Abert, In Reference to the Canal to Connect the Chesapeake & Ohio Canal with the City of Baltimore* (Washington, 1838), 1–42, the Proceedings of the President and Board of Directors, C, 400, D 119, #, 82.

¹² William H. Holcombe, "Col. John James Abert," in *Professional Memoirs, Corps of Engineers, U.S. Army and Engineer Department* (1915), VII, 204–205.

¹³ See U.S., congress, Senate, *Correspondence on the Subject of the Emigration of Indians*, S. Doc. 512, 23d Cong., 1st sess., 1833.

From 1834 to 1861, as Chief of the Topographical Bureau, he was largely responsible for initiating and directing the topographic surveys of the United States, particularly in the West. To him fell the task of planning, organizing, and integrating the voluminous textual and cartographic products of these surveys, thereby placing him in the forefront of the American geographers of his time. His work was largely responsible for making the Topographical Bureau perhaps the most valuable repository of topographic description of the United States for this period. An act of Congress, approved July 7, 1838, elevated the Topographical Engineers to a staff corps of the army, and at that time he was appointed colonel, which rank he held until he was honorably retired from active duty on September 9, 1861.¹⁴

Abert had many professional affiliations aside from his duties with the Topographical Engineers. He was one of the founders and directors of the National Institute of Science in Washington, an organization that was a forerunner of the Smithsonian Institution.¹⁵ An ardent supporter of scientific and historical associations, he was a member of the Geographical Society of Paris, the Washington National Monument Society, and the Board of Visitors to the United States Military Academy (1842). He befriended foreign scientists, such as Joseph Nicolas Nicolle and John James Audubon when they experienced difficulties in America, and occasionally enlisted their services in the Topographical Bureau. He died at his residence in Washington, D.C., on January 27, 1863, at the age of 74.¹⁶

B. CHARLES ELLET, JR. (1810–1862)

SIGNIFICANT CONTRIBUTIONS TO THE CHESAPEAKE & OHIO CANAL

During the summer of 1838, Charles Ellet, Jr., was hired as a volunteer assistant rodman by the Chesapeake & Ohio Canal Company. During the summer and fall, he aided in the surveys preparatory to the placement of the canal under contract, taking field notes, drawing maps, and making computations. Because of his initiative, Chief Engineer Benjamin Wright on November 22 appointed him Assistant Engineer of the Fifth Residency. He remained with the canal company until March 1839, when he resigned to continue his formal education in Paris.

BIOGRAPHICAL SKETCH

Early Years

Born at Penn's Manor in Bucks County, Pennsylvania, on January 1, 1810, Charles Ellet, Jr. was the sixth of the fourteen children of Charles Ellet, an eccentric Quaker farmer, and Mary Israel, the daughter of the one-time sheriff in Philadelphia. His maternal grandfather was a descendent of a family of Jewish diamond cutters originating in Holland, while his paternal ancestors were the

¹⁴ Cullum, *Biographical Register of the Officers and Graduates of the U.S. Military Academy*, 101–102, and *Dictionary of American Biography*, x1, 3.

¹⁵ *Reply of Col. Abert and Mr. Markoe to the Hon. Mr. Tappan, of the United States Senate* (Washington, 1843), 1–18.

¹⁶ *Washington Daily National Intelligencer*, January 28, 1863; Francis H. Herrick, *Audubon the Naturalist* (2 vols., New York, 1917), II, 3–4, 64, 77, 155; and *Dictionary of American Biography*, XI, 3.

descendents of Samuel Carpenter, who had been secretary to William Penn and subsequently governor of Pennsylvania.¹⁷

After attending the country grammar schools along with the other children of his family, Ellet was able to attend a day school in Philadelphia for several months. As a youth, he gave early evidence of intellectual development and mathematical talent. About the age of 14, he began his own self-education, hiding his books in his pillow and feigning sickness to gain time to read, and carrying his books with him during his farm field work. His father being opposed to his becoming an engineer, he left home at age 17 to serve for several months as a rodman on the survey then being conducted by Canvass White along the North Branch of the Susquehanna River, where he acquired the rudiments of his profession.¹⁸

Service on the Chesapeake & Ohio Canal

During the summer of 1828, Ellet traveled to Maryland to begin work as a volunteer assistant on the Chesapeake & Ohio Canal, arriving in time to witness the groundbreaking ceremonies at Little Falls on July 4.¹⁹

While the board of directors relied heavily on experienced canal engineers from the North or those of foreign origin in making engineering appointments for the project, the rodmen were the principal exception to this policy. The directors accepted inexperienced applicants such as Ellet who were seeking a career in engineering. Some were appointed as apprentices and received their board and room, while others such as Ellet were only taken on as volunteer assistants without any fixed position or salary, thus making the canal a school in practical engineering.²⁰

Throughout the summer and fall, Ellet did almost all the office work of his party, drawing the maps, making the computations, and walking from ten to twenty miles a day surveying the route. In recognition of his initiative and abilities, Chief Engineer Benjamin Wright on November 22 appointed him to the position of Assistant Engineer of the Fifth Residency at an annual salary of \$800 on the supposition that he was “t least twenty two years of age” and had had considerable experience in engineering. During the period of his work on the canal, he devoted his leisure hours to the study of foreign languages, several of which he mastered. He remained with the canal company until March 1830 when he resigned to take up formal studies in Paris.²¹

After nearly two years on the canal, Ellet left for France in the spring of 1830 to complete his education in Paris at the Ecole Polytechnique. He witnessed the July revolution, made friends with Lafayette, and traveling by foot, inspected English, French, and German engineering works.²²

¹⁷ Herbert Pickens Gambrell, ed. *Memoirs of Mary Israel Ellet* (Doylestown, 1939), 15, 19, 28, and Charles Perrin Smith, *Lineage of the Lloyd and Carpenter Family* (Camden, 1870), 16–18, 64, 69–70, 78.)

¹⁸ Charles B. Stuart, *Lives and Works of Civil and Military Engineers of America* (New York, 1871), 258.

¹⁹ Ellet’s diary, January 3, 1853, quoted in Gene D. Lewis, *Charles Ellet, Jr.: The Engineer As Individualist, 1810–1862* (Urbana, 1968), 14.

²⁰ Proceedings of the President and Board of Directors, A. 114–115, and Walter S. Sanderlin, *The Great National Project* (Baltimore, 1946), 62–63. Unless otherwise noted, all manuscript sources referred to in this chapter are located in the Chesapeake & Ohio Canal Records in the Department of the Interior files at the National Archives and are designated Record Group 79. [But such official support did not last. See Sanderlin, *The Great National Project*, 63, footnote 15: “In 1830, Judge Wright flatly vetoed President Mercer’s plan to abolish the position of volunteer rodman by making the incumbents all inspectors of masonry, a job for which they were utterly unqualified.” Wright to Mercer, February 24, 1830. –kg]

²¹ Stuart, *Lives and Works of Civil and Military Engineers*, 258–259.

²² *Dictionary of American Biography*, III, 87, and Stuart, *Lives and Works of Civil and Military Engineers*, 259

Upon his return from France in early 1832, the Chesapeake & Ohio Canal Company offered him his former position at a salary of \$1,000 a year with the opportunity for promotion the next year to superintendent of a residency.²³

In October 1832, he proposed to Congress a plan for the erection of a wire suspension bridge across the Potomac consisting of a 1,000-foot span, but the novel recommendation was rejected. The following summer, he was employed as an Assistant Engineer in the location of the western division of the Utica and Schenectady Railroad under William C. Young. In 1834 he conducted the first survey of the western division of the New York and Erie Railroad along with Benjamin Wright.²⁴

Upon the recommendation of Wright, he was appointed assistant engineer of the James River and Kanawha Canal in June 1835. When Wright left full-time service with the canal the next year, Ellet became chief engineer, a job he held for nearly three years during which time the project was completed from Richmond to Lynchburg. While supervising the construction of the waterway, he made a survey for a ship canal from Richmond to Warwick and drew up a plan for the connection of the James River and Kanawha Improvement with tidewater.²⁵

During his years with the James River and Kanawha Canal Company, he also wrote numerous pamphlets and reports on topics relative to the improvement and prosperity of the State of Virginia, especially advocating a continuous line of improvements from the Chesapeake Bay to the Ohio River.²⁶

Ellet left the James River and Kanawha Canal in 1839 and returned to Philadelphia where he completed his *An Essay on the Laws of Trade*, a 283-page work devoted to the internal improvement in the United States. In the publication, he forecast sources and lines of trade, the tonnage and cost of transportation, the sources of capital, and the causes of the failure of transportation companies.²⁷

During the next decade, Ellet was involved in a number of public improvement and private transportation projects. In 1840, he submitted to the St. Louis City Council a plan for a suspension bridge across the Mississippi River at that city.²⁸

The following year he was employed to survey the city of Philadelphia and its surrounding environs. In 1842, he designed and constructed, at a cost of \$35,000, the first important suspension bridge in the United States over the Schuylkill River at Fairmount.²⁹

²³ Mercer to Ellet, February 7, 1832, Ltrs. Sent, C&O Co. Available evidence seems to indicate that Ellet rejected the offer because of the financial plight of the canal company and the competition of the Baltimore & Ohio Railroad. Lewis, *Charles Ellet, Jr.*, 26.

²⁴ *Appleton's Cyclopedia of American Biography*, II, 326.

²⁵ Charles Ellet, Jr., *Report on the Survey for a Ship Canal from Richmond to Warwick* (Richmond, 1836), 1–16, and Wayland Fuller Dunaway, *History of the James River and Kanawha Company* (New York, 1922), 240.

²⁶ Among these works, the most notable were: *A Popular Exposition of the Incorrectness of the Tariffs of Toll in Use on the Public Improvements of the United States* (Philadelphia, 1839); *Report in Relation to the Water Power on the Line of the James River and Kanawha Canal* (Richmond, 1839); and *Report of the Chief Engineer on the Survey for the Extension of the James River and Kanawha Improvement from Lynchburg to the Ohio River* (Richmond, 1838).

²⁷ Charles Ellet, Jr., *An Essay on the Laws of Trade* (Richmond, 1839), 1–283.

²⁸ Charles Ellet, Jr., *Report and plan for a Wire Suspension Bridge: Proposed to be Constructed Across the Mississippi River at Saint Louis* (Philadelphia, 1840) 1–58.

²⁹ Charles Ellet, Jr., *A Popular Notice of Suspension Bridges, With a Brief Description of the Wire Bridge Across the Schuylkill at Fairmount* (Philadelphia, 1843), 1–18.

During 1846–47, he served as president of the Schuylkill Navigation Company, enlarging the channel of that important carrier of anthracite coal to a width of more than seventy feet and personally negotiating loans both at home and abroad for its reconstruction.³⁰

In 1847, he left the presidency of the navigation company to design and build iron cable suspension bridges over the Niagara River, two miles below the falls; and over the Ohio at Wheeling. After he had erected a temporary bridge, the Niagara project was interrupted by court litigation and he withdrew his contract. His Wheeling Bridge, which was completed in 1839, was 1,010 feet long—then the world’s longest span. While a court suit brought a decree of abatement, he saved this bridge by convincing Congress to declare it a post-route, only to witness its destruction by a heavy storm in 1854.³¹

For more than twenty-five years, he urged the improvement of Western rivers. The Smithsonian Institution published his *Contributions to the Physical Geography of the United States* in 1850. His investigations into the causes of floods undertaken for the War Department in 1850–51 resulted in several reports and the publication in 1853 of his best known work, *The Mississippi and Ohio Rivers*. His plan for improving navigation and controlling floods on the principal western rivers by impounding surplus waters in upland reservoirs was considered to be the crowning conception of his professional career, but vigorous efforts to secure the necessary legislation to affect it failed.³²

After brief service in laying out the western portion of the Baltimore & Ohio Railroad, Ellet became chief engineer for the Pennsylvania Railroad at Greensburg, in 1851. The following year he submitted to the Georgetown authorities a second plan and report for a suspension bridge across the Potomac River.³³

In 1853 he was appointed chief engineer of the Virginia Central Railroad, for which in 1854 he built across the Blue Ridge a track of unprecedented curvature and grade.³⁴

Later in 1858 he served as an engineer on the Kanawha River improvement in Virginia.³⁵

Visiting Europe during the Crimean War, Ellet urged Russia to use “ram-boats” in the relief of Sebastopol (a bold innovation in naval warfare), and later offered similar plans to the allies. Returning home, he urged his ram-boat scheme to several secretaries of the navy and widely circulated his *Coast and Harbor Defences*, or *The Substitution of Steam Battering Rams for Ships of War* (1855).³⁶

When the Merrimac demonstrated the effectiveness of a ram in 1862, he was commissioned a colonel by Secretary of War Edwin M. Stanton and assigned to protect the Mississippi

³⁰ Before becoming president of the Schuylkill Navigation Company, Ellet had written a pamphlet on the favorable possibilities for trade on the waterway. For more information on this topic, see his *The Position and Prospects on the Schuylkill Navigation Company* (Philadelphia, 1834), 1–36.

³¹ Charles Ellet, Jr., *The Wheeling Bridge* (Philadelphia, 1852), 1–6; and Charles Ellet, Jr., *Remarks Touching the Wheeling Bridge Suit, Addressed to the Hon. G. W. Thompson* (Philadelphia, 1852), 1–24.

³² *The Cyclopedia of American biography*, II; Charles Ellet, Jr., *Contributions to the Physical Geography of the United States* (Washington, 1850), 1–65; Charles Ellet, Jr., *The Mississippi & Ohio and Rivers* (Philadelphia, 1853), 17–367; and Charles Ellet, Jr., *Report on the Overflows of the Delta of the Mississippi* (Washington, 1852), 1–96.

³³ Charles Ellet, Jr., *Report on a Suspension Bridge Across the Potomac, for Rail Road and Common Travel: Addressed to the Mayor and City Council of Georgetown, D.C.* (Philadelphia, 1852), 1–36.

³⁴ *Dictionary of American Biography*, III, 87; and Charles Ellet, Jr., *The Mountain Top Track* (Philadelphia, 1856), 1–23.

³⁵ *The Twentieth Century Biographical Dictionary of Notable Americans*, III; and Charles Ellet, Jr., *Report on the Improvement of the Kanawha and Incidentally of the Ohio River By Means of Artificial Lakes* (Philadelphia, 1858), 1–125.

³⁶ Charles Ellett, Jr., *Coast and Harbour Defences, or the Substitution of Steam Battering Rams for Ships of War* (Philadelphia, 1855), 1–17.

gunboat squadron against a fleet of Confederate rams. Hastily remodeling nine river boats on the Ohio River with heavy oak and railroad iron, he, with a volunteer crew, sank four Confederate boats near Memphis on June 5 and received the surrender of that city. Ellet, the only Union man injured in the battle, died as his boat touched shore at Cairo and his brother, Lieutenant-Colonel Alfred Washington Ellet, took command of the small fleet on June 21. Following services at Independence Hall in Philadelphia, he was buried in a nearby cemetery. His wife, Elvira, daughter of Judge William Daniel of Lynchburg, whom he had married in 1837, survived him by eight days.³⁷

C. JAMES GEDDES. (1763–1838)

SIGNIFICANT CONTRIBUTIONS TO THE CHESAPEAKE & OHIO CANAL

James Geddes, an experienced engineer on the Erie, Champlain, and Ohio and Erie Canals, played a significant role in the design of the Chesapeake & Ohio Canal. In 1827, he, in association with Nathan S. Roberts, reviewed the estimates of the canal line for the secretary of War. The subsequent report, which estimated the cost of the canal to be considerably less than that proposed earlier by the U.S. Board of Engineers, enabled the project's supporters to extract from Congress a \$1,000,000 stock subscription and thereby provided impetus to the commencement of actual construction of the waterway. Later, after the formal organization of the Chesapeake & Ohio Canal, the board of directors adopted for the line of the canal the route surveyed by the U.S. Board of Engineers and by Geddes and Roberts.

BIOGRAPHICAL SKETCH

Early Years

Born of Scottish ancestry near Carlisle, Pennsylvania, on July 22, 1763, James Geddes attended the public schools. As a young man he studied mathematics under a tutor and he studied languages on his own. In 1794 he moved to the vicinity of Syracuse, Onondaga County, New York, where he became one of the pioneers in the salt industry. The township of Geddes where he settled was named for him and remained his residence until his death on August 19, 1838, at the age of 75. In 1799 he was married to Lucy Jerome, daughter of Timothy Jerome of Fabius, New York. After studying law, he was admitted to the bar. In 1800 he was made a justice of the peace, and in 1809 he was appointed judge of the county court and of the court of common pleas. Becoming interested in public affairs, he was elected to the Assembly in 1804, the Thirteenth Congress, serving 1813–15, and again to the Assembly in 1822.³⁸

Experience Prior to Service

On the Chesapeake & Ohio Canal

³⁷ Joel T. Headley, *Farragut and our Naval Commanders* (New York, 1867), 209–223; Warren D. Crandall and Isaac D. Newell, *History of the Ram Fleet and the Mississippi Marine Brigade...* (St. Louis, 1907), 1–28; and *Washington Evening Star*, June 23, 1862.

³⁸ *Biographical Dictionary of the American Congress, 1774–1971* (Washington, 1971), 993; *Dictionary of American Biography*, VII, 204–205; and Stuart, *Lives and Works of Civil and Military Engineers*, 45.

During his first term at Albany, Simon DeWitt, surveyor-general of New York, introduced Geddes to the possibility of constructing a canal from the Great Lakes to the Hudson River. Since the suggestion touched his imagination, he visited various sections of the state to secure information and launched a campaign, with the aid of DeWitt Clinton, to promote interest in the undertaking. When the state legislature appropriated \$500 for a preliminary survey of the canal, the surveyor-general assigned the task to Geddes, although he was entirely without technical training, having used a level only on one previous occasion. The surveys he made in search of the most practicable route included: Oneida Lake to Lake Ontario where Salmon Creek enters it, down to Oswego River to Lake Ontario, the line from Lewiston to the navigable waters of the Niagara River above the falls, and from Buffalo east to the Seneca River. His report to the legislature, January 20, 1809, established the fact that a canal could be constructed without major difficulty along a route essentially the same as that later adopted for the Erie Canal.

When work on the Erie began in 1816, Geddes was engaged by the New York Canal commissioners as an engineer in charge of the section from the Seneca River to within eleven miles of the mouth of Tonawanda Creek. He remained on this section until 1818 when he was directed to superintend the location of the middle division between Rome and Utica. During this period, he made a remarkable test level between Rome and the eastern end of Oneida Lake, embracing nearly 100 miles of leveling. The difference at the junction in the levels was less than 1 ½ inches. In the summer of 1818, he was appointed by the Canal Commissioners as chief engineer of the Champlain Canal, commencing the final location of the work in September and continuing in charge of its construction until 1822.³⁹

As a result of his work on the New York canals, Geddes was called by other states as well as by the federal government for assistance in promoting new waterways throughout the East. When the State of Ohio asked DeWitt Clinton in 1822 for the services of a good engineer, he recommended Geddes. Named chief engineer of the Ohio and Erie Canal that same year, he surveyed some 800 miles in less than eight months in the search for the most practicable route between the Ohio River and Lake Erie.⁴⁰

The following year he went to Main to survey the route for the Cumberland and Oxford Canal, connecting tidewater with Sebago Pond.⁴¹

Service on the Chesapeake & Ohio Canal

At the request of the Secretary of War, Geddes, along with Nathan S. Roberts, made a survey of the proposed line of the Chesapeake & Ohio Canal from Georgetown to Cumberland in 1827. As the survey and cost estimate for the waterway by the U.S. Board of Engineers two years before had received widespread criticism from the canal's supporters, Geddes and Roberts were to review and revise the conflicting claims of the opposing sides. The two civil engineers completed their surveys in 1827 and reported in the same year that the canal could be constructed as far as Cumberland for approximately \$4,500,000. This estimate was considerably less than the \$8,200,000 proposed by the Board of Engineers for the same distance, and thus it enabled the ca-

³⁹ Merwin S. Hawley, "The Erie Canal: Its Origin Considered," Buffalo Historical Society Publications II (1880), 335–349; Henry Wayland Hill, "An Historical Review of Waterways and Canal Construction in New York State," Ibid, XII (1908), 95–103; and Joshua V.H. Clark, Onondaga (2 vols., Syracuse, 1849), II, 25ff.

⁴⁰ *Canal Report, Made by James Geddes, Esq., The Engineer Employed by the State of Ohio* (Columbus, 1823), 1–14.

⁴¹ *The National Cyclopedica of American Biography*, X, 264.

nal project's supporters to extract from Congress a pledge to subscribe to \$1,000,000 of stock in the company, thereby hastening the actual commencement of construction.⁴²

After the canal company was formally organized, June 20–23, 1828, one of the first decisions of the board of directors was to adopt for the line of the canal the route surveyed by the United States Engineers and by Geddes and Roberts along the north branch of the Potomac River.⁴³

Engineering Experience after Service On the Chesapeake & Ohio Canal

Following the survey for the Chesapeake & Ohio Canal, Geddes was employed in 1828 by the State of Pennsylvania on its canal system. That same year he declined an appointment by the United States Government to investigate the feasibility of a route between the Tennessee and Alabama Rivers in the States of Tennessee, Alabama, and Georgia because of the distance from his home and ill health. In 1829 he terminated his professional career by reporting on the recently-completed Cumberland and Oxford Canal in Maine.

His death occurred on August 19, 1838, at the age of 75, and he was buried in Oakwood Cemetery in Syracuse, New York. Although urged to do so by his colleagues, he left no collection of papers, saying, "I attach no importance to what I have done, having simply performed my duty; therefore I ask no higher place in the public estimation than should be spontaneously given to me."⁴⁴

D. WILLIAM RICH HUTTON. (1826–1901)

SIGNIFICANT CONTRIBUTIONS TO THE CHESAPEAKE & OHIO CANAL

William R. Hutton played a significant role in the restoration and improvement of the Chesapeake & Ohio Canal as chief engineer in 1869–71 and consulting engineer in 1871–80. During the early 1870s when the canal enjoyed five years of unprecedented financial profits, he submitted two reports to the canal board that served as a basis for a program to recondition the waterway. As a result of his efforts, the canal regained its full prism by 1874 and the strength of its banks had been increased to withstand damage from periodic flooding. Among other improvements made on the canal at his urging were the dredging of Rock Creek Basin, an experiment in macadamizing the towpath, and the restoration of the masonry structures. One of his most noteworthy achievements was the promotion and the design of the Georgetown incline as a means of alleviating the congestion on the Georgetown level.

BIOGRAPHICAL SKETCH

⁴² James Geddes and Nathan S. Roberts, *Chesapeake & Ohio Canal: Letter from the Secretary of War, Transmitting Estimates of the Cost of Making a Canal from Cumberland to Georgetown, March 10, 1828* (Washington, 1828), 1–100.

⁴³ Proceedings of the President and Board of Directors, A, 8.

⁴⁴ Quoted in Stuart, *Lives and Works of Civil and Military Engineers*, 45; *Biographical Dictionary of the American Congress*, 993; and Desmond Fitzgerald, "Early Engineering work in the United States," *Transactions of the American Society of Civil Engineers*, XLI (1899), 611.

Early Years

Born in Washington, D.C., on March 26, 1826, William Rich Hutton was the son of James⁴⁵ Hutton, a Navy department clerk, and Salome Rich. He was a descendent of John Hutton who had emigrated from Scotland to New York in the late seventeenth century. As a youth, he attended a private school in the District of Columbia taught by Mr. Abbott. Later, he studied mathematics, surveying, and drawing at the Benjamin Hollowell School in Alexandria, Virginia. In 1847, he was appointed as paymaster clerk in California and remained in that position until he returned to the East in 1853.⁴⁶

Engineering Experience Prior to Service On the Chesapeake & Ohio Canal

Soon after his arrival in Washington, Hutton began his professional career in civil engineering by assisting General Montgomery C. Meigs in the construction of the Washington Aqueduct, carrying a large part of the water supply from the Great Falls of the Potomac to the city of Washington. This work involved not only the devising of methods to control the flow and distribution of the water, but also the design of the monumental bridge across Cabin John Branch which for some fifty years remained unsurpassed as the longest masonry arch in the world.⁴⁷

In 1862–63, he served as chief engineer of the Annapolis Water works.⁴⁸

Service on the Chesapeake & Ohio Canal

Hutton was associated with the Chesapeake & Ohio Canal during the most stable and prosperous periods of its history, serving as chief engineer in 1869–71 and consulting engineer in 1871–80. Familiar with the canal from his youth and from his work on the Washington Aqueduct, he played a significant role in the program of restoration and improvement of the waterway, particularly during the early 1870s when the canal enjoyed five years of unprecedented financial profits.⁴⁹

Despite the repairs that had been made to the canal since the Civil War, there was still much to be done. Following an extensive survey of the canal, Hutton in 1871 recommended to the board of directors a thorough overhauling of the waterway, including repairs to locks, aqueducts, and the canal prism itself, at an estimated cost of \$78,000.⁵⁰

Following another Hutton report in August 1872 on the pressing need for renovation of the canal, a reconditioning program was begun that carried to completion the restoration of the

⁴⁵ Father's name is John according to biographical information on the Baltimore Architects Foundation web site: www.baltimorearchitecture.org/bios/hutton_wr.html. According to that site during the period 1873–1880 William Hutton apparently entered into a partnership with his brother, Major N. H. Hutton, (1834–1907), a leading Baltimore architect. —kg

⁴⁶ American Society of Civil Engineers, Committee on History and Heritage of American Civil Engineering, ed., *A Biographical Dictionary of American Civil Engineers* (New York, 1972), 64–65.

⁴⁷ *Dictionary of American Biography*, VI, 507.

⁴⁸ American Society of Civil Engineers, *Biographical Dictionary of American Civil Engineers*, 64–65.

⁴⁹ *The Twentieth Century Biographical Dictionary of Notable Americans*, V.

⁵⁰ Proceedings of the President and Board of Directors, L. 439, and *Report of the Year 1870* (Annapolis, 1871) 9.

canal to its original operating condition.⁵¹ As a result of his efforts, the canal had regained its full prism by 1874, and the strength of its banks had so increased that a freshet which completely submerged the canal on the levels below Dams No. 4 and 5 in April of that year did not do appreciable damage.⁵²

Among the other improvements made on the canal at Hutton's urging were the partial macadamization of the towpath on the Monocacy Division, the dredging of the Rock Creek Basin, the tightening of the lock chambers, the installation of new lock gates, and the rebuilding of the parapets and trunks of the Seneca and Tonoloway Aqueducts.⁵³

In addition to the work of repair and improvement, provision was made to collect materials at periodic locations along the canal in anticipation of future trouble, thereby helping to expedite the actual work of repair and to reduce the interruptions to navigation.⁵⁴

Perhaps the most noteworthy project with which he was associated was the promotion of the design of the Georgetown Incline as a means of alleviating the congestion on the Georgetown level by providing canal barges with direct access to the Potomac above the Alexandria Aqueduct.⁵⁵

Engineering Experience after Service On the Chesapeake & Ohio Canal

When he terminated his duties with the canal as chief engineer in 1871, Hutton took employment as chief engineer of the Western Maryland Railway, serving in this capacity from 1871–74. It was during this period that the Chesapeake & Ohio, in an effort to promote the expansion of its coal trade, sought to facilitate the construction of this railroad from Baltimore to Big Pool on the Potomac, expecting to carry most of the railroad's coal business between Big Pool terminus and Cumberland.⁵⁶

From 1874 to 1878, he designed the first two locks and movable dams for the Kanawha River navigation in Virginia, receiving a *diplome d'Honneur* at the Paris Exposition in 1878 for his lock design.⁵⁷

Hutton moved to New York City in 1880, and after a brief respite, he became a construction engineer on the New Croton Aqueduct in 1886. During 1886–87, he held a similar position with the Colorado Midland Railroad. From 1886–1889, he was chief engineer of the Washington Bridge over the Harlem River, and in 1889–91 he was chief engineer for the English syndicate that built the Hudson River Tunnel. In 1892, he was a member of a commission under the U.S. Board of Engineers concerned with obstructions in the Columbia River. His last major work was the drafting of plans for the Secretary of War for the proposed memorial bridge over the Potomac

⁵¹ *Report of W.R. Hutton, Chief Engineer, As To Condition of Chesapeake & Ohio Canal, With Estimate of Cost of Extraordinary Repairs Required During the Current Year, August 14, 1872* (Annapolis, 1872), 4–30.

⁵² *46th Annual Report* (1874), C&O Canal, 11–12, and *Proceedings of the President and Board of Directors*, M, 154–155.

⁵³ *Report of W.R. Hutton, 1872*, 4–30, and *Forty-Second Annual Report* (1870), C&O Co. 3–4.

⁵⁴ *Report of W.R. Hutton, 1879*, 4–30, and Hutton to Clarke, August 3, 1870, Ltrs. Recd., C&O Co.

⁵⁵ Virtually the entire section of the William R. Hutton collection concerned with the Chesapeake & Ohio Canal is composed of correspondence, plans, and drawings for the Georgetown Incline. The collection is located in the Division of Mechanical and Civil Engineering, the National Museum of American History [named the National Museum of History and Technology until 1980], the Smithsonian Institution, Washington, D.C.

⁵⁶ *45th Annual Report* (1873), C&O Co., 16–17.

⁵⁷ American Society of Civil Engineers, *Biographical Dictionary of American Civil Engineers*, 64–65

River between Washington and Arlington for which he received the second award of the four plans submitted.

After a six-week illness, he died on December 11, 1901 at Woodlands in Montgomery County, Maryland, and was buried in the cemetery of the nearby St. Rose Catholic Church. His wife, Mary Ann, the daughter of Francis Clopper of Montgomery County, four daughters, and one son, survived him.⁵⁸

During his long career, he had many prestigious professional associations. In 1873, he became a member of the American Society of Civil Engineers; in 1880, of the Societe des Ingenieurs Civils de France; and in 1890, of the Institution of Civil Engineers of Great Britain. In 1891, he published his only book *The Washington Bridge over the Harlem River*, which traced the development of the design and construction of this famous structure.⁵⁹

E. CHARLES FENTON MERCER. (1778–1858)

SIGNIFICANT CONTRIBUTIONS TO THE CHESAPEAKE & OHIO CANAL

Charles Fenton Mercer was active in the movement that resulted in the building of the Chesapeake & Ohio Canal and was for five years, 1828 to 1833, president of the company. An early advocate of internal improvements in his native Virginia, Mercer was elected to Congress in 1817 and later became chairman of the House Committee on Roads and Canals. As the chairman of the central committee of the Chesapeake & Ohio Canal Convention that met in Washington in November 1823, he played a prominent role in organizing public opinion behind the proposed connection between the Potomac and the Ohio Rivers and the creation of organizations to give effect to this rising interest.

When the Chesapeake & Ohio Canal company was formally organized at a meeting of the stockholders in Washington, June 20–23, 1828, Mercer was chosen the first president of the company. Though having no technical engineering training or experience, Mercer and the board of directors reserved to themselves the final decision on every question of design and construction no matter how specialized. Mercer frequently participated actively in the discussion of engineering technicalities, thus making himself of the most influential designers of the canal project in its early years. Throughout his tenure as president of the canal company, Mercer was a persistent advocate for “perfection” in construction, urging greater care and expenditure in construction in order to reduce subsequent repair and maintenance costs.

BIOGRAPHICAL SKETCH

Early Years

Born at Fredericksburg, Virginia, on June 16, 1778, Charles Fenton Mercer was the youngest son of Eleanor Dick, daughter of Mayor Charles Dick of Fredericksburg, and James Mercer, a prominent lawyer who had risen to the position of judge on the Virginia Court of Appeals. Charles Fenton was a grandson of John Mercer of Marlborough, a wealthy Virginia lawyer who had immi-

⁵⁸ Washington *Evening Star*, December 13, 1901.

⁵⁹ *Appleton's Annual Cyclopedia and Register of Important Events of the Year 1901*, VI, 438.

grated to Stafford County from Dublin, Ireland, in 1720 at the age of 17. Prominent in colonial affairs, John Mercer had written and published the first abridgement of the laws of Virginia.⁶⁰

Left an orphan at the age of 15, Charles Fenton entered the College of New Jersey (later changed to Princeton University) in 1795 and graduated in 1797 at the head of his class. In college he began his lifelong friendship with John Henry Hobart, a prominent bishop in the Protestant Episcopal Church, and became a devout Episcopalian. From 1797 until 1802 he read law at Princeton and at Richmond. When war with France threatened in 1798, he sought commissions in the United States Army, appealing to family friend George Washington for assistance in obtaining them. However when the commissions were received—one as first lieutenant of the cavalry and the other as captain—he declined them since the threat had ceased.⁶¹

In 1802 he was licensed to practice law and soon afterward he went to England on business and also visited France. On his return to America, he settled on a large estate in the Bull Run Mountains at Aldie in Loudoun County, Virginia, and began the practice of his profession. He was never married.⁶²

Mercer became a member of the Virginia House of Delegates in 1810 and served until he resigned in 1817 to enter Congress. While a member of the state legislature, he took a leading part in efforts to increase the banking capital of Virginia, to found a new bank, to promote the colonization in Africa of free Negroes from the United States, and to build roads and canals. He offered a bill to provide for a complete system of public education, from common-school to state university, which was defeated in the Senate in the spring of 1817 after having passed the House.⁶³

He was also the author of the act by which a sword and pension were given to George Rogers Clark, the frontiersman and military leader who had won important victories against the British in the Old Northwest Territory during the American Revolution. During the War of 1812, Mercer was aide-de-camp to the governor and in command of the Second Virginia Brigade at Norfolk with the rank of brigadier-general.⁶⁴

His interest in internal improvements began in 1812 when he acted with Chief Justice John Marshall and others as a commissioner appointed by the legislature to examine the Greenbrier and New Rivers, both sources of the Kanawha, and the headwaters of the James for the purpose of improving them for navigation and uniting them either by a railroad or by a continuous canal.

That same year he submitted a series of resolutions to the legislature for the establishment of a general fund for the internal improvement of the rivers and roads of the State. At the close of the war, he revised the resolutions he had earlier submitted to create a Fund for Internal

⁶⁰ James Mercer Garnett, *Biographical Sketch of Hon. Charles Fenton Mercer: 1778–1858* (Richmond, 1911), 3–5.

⁶¹ This has largely been rewritten based on Robert Allen Carter, *Virginia Federalist in Dissent: A Life of Charles Fenton Mercer*, doctoral dissertation, University of Virginia, 1988, copy by UMI Dissertation Services, Ann Arbor, MI, 89–90. —kg

⁶² *Dictionary of American Biography*, VI, 539. The Charles Fenton Mercer home at Aldie is still used as a private residence. It is located on U.S. 50, marked by a state sign noting Mercer's accomplishments.

⁶³ Throughout his political career, Mercer continued to press for a public education program. One of the most prominent speeches that he gave in behalf of his active interest in public education was *A Discourse on Popular Education; Delivered in the Church at Princeton, the Evening before the Annual Commencement of the College of New Jersey, September 26, 1826* (Princeton, 1826).

⁶⁴ *The Cyclopedia of American Biography*, IV. See also his Congressional bio at bio.congress.gov, which says: "During the War of 1812 [he] was appointed lieutenant colonel of a Virginia regiment and then major in command at Norfolk, Va.; inspector general in 1814; aide-de-camp to Governor Barbour and brigadier general in command of the Second Virginia Brigade."

Improvement to consist of all the stocks of the State derived from banking operations and all future acquisitions from the same source. To administer the fund he recommended the establishment of a Board of Public Works that would be empowered to hire a civil engineer and to propose to the legislature measures of improvement that were deemed expedient to the State. When the Board of Public Works was approved in 1816, Mercer became a member along with former president Thomas Jefferson and later James Madison.⁶⁵

Mercer's enthusiasm for internal improvements, the suppression of the slave trade, and the colonization of free Negroes gave direction to his efforts when he became a member of the federal House of Representatives in 1817. He was chairman of the committees on roads and canal and on the District of Columbia.⁶⁶ Though a member of the Federalist Party until its dissolution, and then a Whig, he was never an ardent party man. He enjoyed the friendship of Presidents James Monroe and John Quincy Adams, but disliked the policies and personalities of Presidents Andrew Jackson and Martin Van Buren. One of his most famous addresses in Congress was delivered on January 26, 1819, in which he assailed Jackson's course in the Seminole War.⁶⁷

He was a strong Unionist but was alarmed at the rapidly growing power of the executive branch of government under Jackson and was opposed to the President's control over federal patronage. He was a leader in the Virginia constitutional convention of 1829–30, in which he advocated manhood suffrage, equal representation, and the popular election of important officers. One of the originators of the plan for establishing the Free State of Liberia for American blacks, he became vice president of the Virginia Colonization Society in 1836.⁶⁸

Service on the Chesapeake & Ohio Canal

As one of the leading advocates of internal improvements in Congress, Mercer became active in the movement that resulted in the construction of the Chesapeake & Ohio Canal. His second speech in the House favoring the constitutionality of the power of the federal government to appropriate funds for internal improvements received wide attention and was later published as a pamphlet. When interest in opening the Potomac Valley as a route for western trade began to increase in the early 1820s, he became a leading voice in calling for the first Chesapeake & Ohio Canal Convention to meet in Washington on November 5, 1823. Acting on behalf of a meeting he had convened earlier at Leesburg, Virginia, he invited delegates from Pennsylvania, Maryland, Virginia, and the three district cities to this convention to consider the expediency and practicality of improving the navigation of the Potomac and connecting it with the Ohio River at Pittsburgh. As chairman of the central committee, he exercised the guiding hand throughout the proceedings of the convention.⁶⁹

⁶⁵ Garnett, *Biographical Sketch of C. F. Mercer*, 7, 13–14.

⁶⁶ He was initially a member of the Committee on the District of Columbia and later a member of and then, from 1831–39 (the 22nd through 25th Congresses), he was chair of the Committee on Roads and Canals.—

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⁶⁷ *Annals of Congress*, 15 Cong., 2 Sess., 1818, Cols. 797–831. Also see, Charles Fenton Mercer, *Speech of the Hon. Mr. Mercer, in the House of Representatives, on the Seminole War* (Washington, 1829), 1–33.

⁶⁸ *Biographical Dictionary of the American Congress*, 1399; *Dictionary of American Biography*, VI, 539; and Matthew Carey, *Letters on the Colonization Society...addressed to the Hon. C. F. Mercer* (7th ed., Philadelphia, 1833) 5–32.

⁶⁹ U.S., Congress, House, Committee on Roads and Canals, *Chesapeake & Ohio Canal*, H. Rept. 414 to Accompany H.R. 94, 23d Cong., 1st sess., 1834, 4; U.S., Congress, House, Committee on Roads and Canals, *Report of the Committee on Roads and Canals*, H. Rept. 47, 20th Cong., 1st sess., 1828, 7–10, 16–23; *Proceedings of the Chesapeake & Ohio Canal Convention...1823...1826* (Washington, 1827), 1–4; and

The primary functions of the convention were the organization of public opinion behind the proposed connection between the Potomac and the Ohio and the creation of organizations to give effect to this arouse interest. The physical achievements of the convention were simply the adoption of Mercer's resolutions urging the connection with the West which read as follows:

Whereas, a connection of the Atlantic and Western waters by a canal, leading from the seat of the National Government to the river Ohio, regarded as a local object, is one of the highest importance to the states immediately interested therein, and considered in a national view, is of unestimable [sic] consequences to the future union, security, and happiness of the United States.

Resolved, that it is expedient to substitute for the present defective navigation of the Potomac River, above tide-water, a navigable canal from Cumberland to the Coal Banks at the eastern base of the Alleghany, and to extend such canal as soon thereafter as practicable to the highest constant steamboat navigation of the Monongahela or Ohio River.⁷⁰

At a second meeting of the Chesapeake & Ohio Canal Convention on December 6, 1826, Mercer reported the progress which the central committee, of which he was virtually the only acting member, had made during the preceding three years. He had procured the cooperation of the three district cities and the Potomac Company in the enlarged venture. Moreover, sixteen acts of legislation had been passed by the three states most directly involved, in a measure approved by President Monroe on March 3, 1825.

Although the U.S. Board of Engineers had hurt the prospect for a congressional subscription to stock in the proposed canal by estimating the cost at \$22,000,000, Mercer urged the delegates to support him in a two-fold course: to discredit the estimate of the Board of Engineers and to cause a new survey to be made to ascertain the true cost of the work. Through the efforts of Mercer and his supporters, the report of the government engineers was exhaustively examined and criticized by making comparisons with the actual cost of work don on the New York and Pennsylvania canals.

Later, Mercer played a leading role in the effort to have President John Quincy Adam submit the conflicting estimates made by the convention and the Board of Engineers to a review and revision by experienced civil engineers. Adams agreed and appointed James Geddes and Nathan S. Roberts, both former engineers on the Erie Canal. They completed their surveys in 1827 and reported that the canal could be constructed as far as Cumberland for approximately \$4,500,000.⁷¹

Fortified with this estimate and reassured by the inaccuracy of the U.S. engineer's report, the canal supporters led by Mercer opened subscription books on October 1, 1827. In May 1828, after a brief struggle, Mercer and his fellow protagonists in Congress secured the passage of an act subscribing \$1,000,000 of the public funds to the stock of the Chesapeake & Ohio Canal Company. The financial support of Congress triggered numerous celebrations throughout the Po-

Abner Lacock, *Great National Project: Proposed Connection of the Eastern and Western Waters, By a Communication through the Potomac Country* (Washington, 1822), 1–38.

⁷⁰ *Proceedings of the Chesapeake & Ohio Canal Convention, 1823 and 1826*, 4, and George Washington Ward, *The Early Development of the Chesapeake & Ohio Canal Project* (Baltimore, 1899), 50.

⁷¹ *Report on the Committee on Roads and Canals, 1827*, Appendix 13, 15, 82–87, and *Documents Relating to the Chesapeake & Ohio Canal*, 1840, 13.

tomac Valley, one of the most noteworthy being a banquet given at Leesburg in honor of Mercer by the citizen of Loudoun County.⁷²

The formal organization of the Chesapeake & Ohio Canal Company took place at a meeting of the stockholders in Washington, June 20–23, 1828. With the tacit approval of President Adams, Secretary of the Treasury Richard Rush, the proxy for the United States, placed Mercer's name in nomination for president of the company and Mercer was duly elected, although a small minority of stockholders favored former Secretary of the Treasury Albert Gallatin.⁷³

During the early years of canal construction, Mercer and the canal board of directors reserved to themselves the final decision on every question of design and construction despite their selection of tested engineers and their own inexperience in canal technology. One of the best examples of this meddling in the affairs of the engineers occurred in November 1828 when a detailed set of "Rules and Regulations for the Engineering Department" was issued, virtually forcing the Engineers to sublimate their own expertise to the wishes of the board.⁷⁴

In addition, President Mercer frequently participated actively in the discussion of engineering technicalities, notably in the proper dimensions of the canal prism through Georgetown and through the narrow passes near Point of Rocks and in the proper procedures to be followed in excavating the channel through rocky terrain.⁷⁵ Under such conditions, differences of opinion which arose between members of the engineering department were frequently carried over the head of Chief Engineer Benjamin Wright by appeals from ambitious underlings.

The five-year tenure of Mercer as president of the canal company was clouded by his political battles with the Jacksonian Democrats in Congress. Desperate for increased funding and denied extensions of large-scale aid by Maryland, Virginia, and the district cities, the canal company turned to congress as the last available source of aid. The prospects of assistance from the federal government, however, were slight after the victory of Andrew Jackson in 1828. The record of the administration clearly indicated its hostility toward national support for internal improvements in general and for the Chesapeake & Ohio in particular. By 1832, the administration was actively interfering in company affairs, and eventually Congress refused to accede to any of Mercer's petitions for further aid.

As president of the canal company, Mercer was a persistent advocate of "perfection" in construction. He urged greater care and expenditure in construction regardless of financial considerations in order to reduce subsequent repair and maintenance costs. This attitude was exemplified by his rejection of composite locks, slackwater navigation, and reduction of the cross-section of the canal prism in difficult terrain as temporary expedients that were not fitting for a work of national importance. Regardless of its economic and technical soundness, the policy of insisting on perfection regardless of the cost—which was generally supported by the directorate—proved to be a politically disastrous course for the company in the 1830s and 1840s, and left the future success of the canal clouded by a staggering capitalization.⁷⁶

⁷² Washington *National Intelligencer*, May 27, 1828; Charles Francis Adams, ed., *Memoirs of John Quincy Adams* (12 vols., Philadelphia, 1874–1877), VIII, 6; and Wilhelmus B. Bryan, *A History of the National Capital* (2 vols., New York, 1916), II, 111.

⁷³ *Proceedings of Stockholders*, A, 1–6; and Adams, *Memoirs of John Quincy Adams*, 8, 23–24, 26–27, 33–34, 36–37.

⁷⁴ *Proceedings of the President and Board of Directors*, A, 107, 109–110. Benjamin Wright, the well-known canal engineer who had been actively associated with the building of the Erie, had been hired as chief engineer upon the recommendation of Mercer.

⁷⁵ Mercer to Wright, February 2, 1830, and Wright to Mercer, February 2 and 3, 1830, Ltrs. Recd. C&O Co.

⁷⁶ Sanderlin, *The Great National Project*, 122–123.

In an effort to win the favor of the national administration, the canal company consented in 1833 to the replacement of Mercer by ex-Secretary of War John Eaton, a friend of Andrew Jackson, and a principal in the Peggy Eaton affair. At the annual stockholders' meeting in June of that year, the vote was 5,054 to 3,430 in favor of Eaton. However, 1,798 votes of Maryland and Georgetown were lost because of a division among the proxies. If cast for Mercer, as had been expected, they would have been sufficient to reelect him. As a final tribute to Mercer for his efforts on behalf of the canal, the stockholders later voted him a gift of \$5,000.⁷⁷

Discouraged by the obstacles to his efforts for the further development of internal improvements and for the gradual abolition of slavery and colonization of blacks, Mercer resigned from Congress on December 16, 1839.⁷⁸

After spending several years working as a bank cashier in Tallahassee Florida, he became vice president of the National Society of Agriculture in 1842. He was an original grantee, partner, and agent of the Texas Association, a company which obtained a contract to settle colonists in Texas to receive pay from the Public in land. When the convention in 1845 declared colonization contracts unconstitutional, he and his associates brought suit to force payment, but the case was decided against them in the United States courts. In 1845 he published a vindictive pamphlet entitled "An Exposition of the Weakness and Inefficiency of the Government of the United States in North America."⁷⁹

In 1847 Mercer built a house near Carrollton, Kentucky, which he made his home until 1853. Disposing of his property there in that year, he traveled for three years through Europe, working in the interest of the abolition of the slave trade. Ill with cancer of the lip, he returned to Fairfax County, Virginia, where he was nursed by relatives until his death on May 4, 1858. Initially buried in Leesburg's Episcopal Cemetery, his remains were later moved to Union Cemetery.⁸⁰

F. NATHAN S. ROBERTS (1776–1852)

SIGNIFICANT CONTRIBUTIONS TO THE CHESAPEAKE & OHIO CANAL

Nathan S. Roberts, an experienced engineer on the Erie, Chesapeake and Delaware, Pennsylvania Main Line, and Chenango Canals, played a significant role in the design and construction of the Chesapeake & Ohio Canal from 1827 to 1830. In 1827 he, in association with James Geddes, reviewed the estimates of the canal line for the Secretary of War. The subsequent report, which estimated the cost of the canal to be considerably less than that proposed by the U.S. Board of Engineers, enabled the project's supporters to elicit a \$1,000,000 stock subscription from Congress and thereby provided impetus to the commencement of actual construction of the waterway. In December 1828 he became a member of the board of engineers, and, during the winter and spring, he, along with Benjamin Wright, completed the revision and location of the projected western section of the canal to Pittsburgh. In 1828 and 1829 he readied for construction the 12-

⁷⁷ "Proceedings of the Stockholders," A, 313; *Niles' Register*, XLIV (June 22, 1833), 270–271; and Garrett, *Biographical Sketch of C. F. Mercer*, 19–20.

⁷⁸ Charles Fenton Mercer, *The Farewell Address of the Hon. C. F. Mercer to his Constituents* (Washington, 1839), 1–16.

⁷⁹ In 1863 this booklet was reprinted in London under the title *The Weakness and Inefficiency of the Government of the United States of North America; By a Late American Statesman*.

⁸⁰ *Biographical Dictionary of the American Congress*, 1899, and *Dictionary of American Biography*, VI, 539.

mile stretch of the canal between Point of Rocks and Harpers Ferry. During the autumn and winter of 1830–31, he served in Washington as superintendent of the first division of the canal.

BIOGRAPHICAL SKETCH

Early Years

Born on July 28, 1776, Nathan S. Roberts was the son of Abraham Roberts, a native of New Hampshire whose Puritan forefathers had emigrated from England to Plymouth Colony in 1640 and settled in Auburn, Massachusetts. His grandfather, John Roberts, was slain in 1764 while serving as a soldier under Sir William Pepperell during the French and Indian War. As a young man, his father had gone to the West Indies and had acquired great wealth. Returning to America during the outbreak of the Revolution, he was captured by British cruisers, lost his fortune, and was forced to serve in the Royal Navy in several engagements against American vessels. Later he escaped and established his residence at Piles Grove, New Jersey, where Nathan was born.⁸¹

During his youth, Roberts aided in the support of his parents and younger brothers. After coming of age, he purchased 100 acres of new land in Vermont, where he began the cutting of timber, but he returned to Plainfield, New Jersey, and taught school in the winter. In 1803 he visited New York to examine some wild land that he had purchased in Oneida County. The following year he settled there and taught school at Oriskany until 1806, when he was appointed principal of the academy at Whitesboro. Here, on November 4, 1816, he married Lavinia, daughter of Ansel White and grand-daughter of Judge Hugh White, a pioneer settler of the region. That same year, he bought a farm in Lenox, Madison County, which was his home during the remainder of his life.⁸²

Experience Prior to Service

On the Chesapeake & Ohio Canal

At the invitation of Benjamin Wright, Roberts began his career as a civil engineer on the Erie Canal in July 1816. His first job was to make a survey of the route of the middle section of the canal to Montezuma. He spent the winter of 1816–17 at Rome, preparing maps and profiles of the recently explored line. When the middle section was located and staked out the following spring, he was employed on it as an assistant engineer. In 1818 he was employed through the winter as a resident engineer in charge of the work from Rome to Syracuse, and in the spring was placed in charge of a party to locate the canal from Syracuse westward. Commencing on April 12, this location was completed to the Seneca River in July, and the work was contracted that summer.

In 1819 he located the canal from the Seneca River to the village of Clyde, and during the winter of 1819–20, he drafted plans for the locks between Clyde and Rochester. The following spring he located the canal down the Clyde River Valley and through the Cayuga marshes on the line he had explored the previous fall. He continued in charge of this work until near its completion in 1822, when he was directed by the Canal Commissioners to supervise the construction of the locks at Lockport and the building of the western section of the canal between Lockport and Lake Erie.

Roberts remained on the western section of the canal until its completion in 1825. He drafted the plan which was unanimously adopted for five pairs of locks at Lockport to overcome the barrier formed by a 60-foot rocky ridge—a more elaborate scheme of locks than had ever

⁸¹ Stuart, *Lives and Works of Civil and Military Leaders*, 109–110.

⁸² *Dictionary of American Biography*, XVI, 12.

been constructed in America. Construction of the locks began in July 1823, and they were opened to navigation in October 1825. Throughout his life, he took pleasure in alluding to the locks as the greatest accomplishment of his professional career.⁸³

Upon completion of the Erie, Roberts became a consulting engineer for the Chesapeake and Delaware Canal in 1826. In January, 1826, he was employed by the State of New York to survey and to report on a route for a ship canal around Niagara Falls. Then followed service as chief engineer of the western section of the Pennsylvania Main Line Canal extending between Pittsburgh and Kiskiminetas. During a visit home he made an investigation and report for the New York State Canal Board on the practicality of supplying the summit level of the projected Chenango Canal with water.

Service on the Chesapeake & Ohio Canal

At the request of the Secretary of War, Roberts and James Geddes conducted a survey of the proposed line of the Chesapeake & Ohio Canal in 1827. As the survey and estimated cost of the canal made by the U.S. board of Engineers in 1825 had aroused fierce opposition by supporters of the project, these two civil engineers were to review and revise the conflicting claims of the two parties in the dispute. They completed their surveys in 1827 and reported in the same year that the canal could be constructed as far as Cumberland for approximately \$4,500,000. This estimate was considerably less than that proposed by the Board of Engineers, and it enable the canal project's supporters to elicit a \$1,000,000 stock subscription from Congress, thereby hastening the formal organization of the company and the actual commencement of construction.⁸⁴

After the canal company was formally organized in June 1828, the board of directors adopted the route surveyed by the U.S. Board of Engineers and Roberts and Geddes along the north bank of the Potomac River for the line of the canal. Upon Wright's invitation in December 1828, Roberts became a member of the board of engineers to provide overall direction to the construction. During the winter and spring of 1828–29, he, along with Wright, completed the revision and location of the projected western section of the canal to Pittsburgh.⁸⁵

In 1828–29, he surveyed the twelve-mile stretch through the narrow passes between Point of Rocks and Harpers Ferry, the area which was the focal point of the disputed right-of-way between the canal the Baltimore & Ohio Railroad.⁸⁶

During the autumn and winter of 1830–31 as canal officials were readying the line between Little Falls and Seneca Falls for operation, he served in Washington as superintendent of the first division of the canal.⁸⁷

⁸³ Stuart, *Lives and Works of Civil and Military Engineers*, 111–114; *Dictionary of American Biography*, XVI, 12; Fitzgerald, "Early Engineering Work," 610, John A. Krout, "New York's Early Engineers," *New York History*, XXVI (1945), 272; and Noble Earl Whitford *History of the Canal System of the State of New York Together with Brief Histories of the Canals of the United States and Canada* (2 vols., Albany, 1906), I, 797–798.

⁸⁴ Geddes and Roberts, *Chesapeake & Ohio Canal: Letter from the Secretary of War, Transmitting Estimates of the Cost of Making a Canal from Cumberland to Georgetown*, 1–100.

⁸⁵ Nathan S. Roberts and Benjamin Wright, "Report and Letters from the Engineers Employed in the Revised Location of the Western Section of the Chesapeake & Ohio Canal: With Estimates of the Cost of the Same," in *First Annual Report* (1829), C&O Co.

⁸⁶ *A complete Set of Maps, Drawings, and Tabular Statements; Relating to the Location of the Canal and Railroad, from the Point of Rocks to Harper's Ferry...Done Under and Order of the Chancellor of Maryland...Nathan S. Roberts, Commissioner, on the Part of the Chesapeake & Ohio Canal Company* (Georgetown, 1830), 1–56.

⁸⁷ *Proceedings of the President and Board of Directors*, B, 1771–174.

As the legal obstructions resulting from the dispute with the B&O Railroad were continuing to hamper construction, he requested a leave of absence from his employment with the canal company.⁸⁸

Engineering Experience after Service On the Chesapeake & Ohio Canal

After several more months rest at home, Roberts was appointed by the federal government to take charge of surveys for a ship canal around Muscle Shoals in the Tennessee River, Alabama. He held this position as chief engineer for two years. During this employment he was asked to take charge of the canal connecting the Mississippi River with Lake Pontchartrain in New Orleans, but he refused because of poor health and returned home to New York.⁸⁹

In the spring of 1835, he was employed by the New York State Canal Board, along with John B. Jervis and Holmes Hutchinson, to make a series of examinations and surveys preparatory to enlarging the Erie. Four years later, he was named chief engineer of the western section and began the enlargement of the canal between Rochester and Buffalo, rebuilding one tier of the locks at Lockport and extending the dimensions of the canal prism. In 1841, while still engaged in the completion of his last great work, the Rochester Aqueduct, he was removed from office for political reasons by the new Whig administration which had risen to power in New York the previous year. He now retired to his farm in Madison County, where he died on November 24, 1852.⁹⁰

G. BENJAMIN WRIGHT (1770–1842)

SIGNIFICANT CONTRIBUTIONS TO THE CHESAPEAKE & OHIO CANAL

Benjamin Wright, sometimes called the “Father of American Civil Engineering,” served as chief engineer on the Chesapeake & Ohio Canal from June 1828 to November 1830. In this position, he played a leading role in the design and construction of the waterway during its first years of existence. At Wright’s urging, the board of directors relied heavily upon the available supply of men experienced on Northern or foreign canals to oversee the construction. During the 1828–29, he, along with Nathan S. Roberts, collaborated in an extensive survey of the projected western extension of the canal to the Ohio River.

BIOGRAPHICAL SKETCH

Early Years

Born in Wethersfield, Connecticut, on October 10, 1770, Benjamin Wright was the son of Ebenezer and Grace (Butler) Wright and a descendent of Thomas Wright, an early settler of Wethersfield. His father was a farmer of limited means and could only send his children to common

⁸⁸ Ibid, B, 295.

⁸⁹ Stuart, *Lives and Works of Civil and Military Engineers*, 116, and *Dictionary of American Biography*, XVI, 13.

⁹⁰ Alvin Fay Harlow, *Old Towpaths: The Story of the American Canal Era* (New York, 1926), 301–302; Krout, “New York’s Early Engineers,” 273–274; and Fitzgerald, “Early Engineering Work,” 610.

schools during the winter months. Throughout his youth, he took a deep interest in mathematics and surveying. At the age of 16, he went to reside with an uncle at Plymouth in Litchfield County, where he had access to the best books and instruments which could then be obtained by country surveyors. With his growing knowledge of surveying, he absorbed the spirit of westward migration that was then sweeping New England as many settlers were moving toward the fertile Mohawk and Genesee Valleys of western New York. In those areas, flattering inducements were held out to young men who were capable of surveying land and preparing title deeds.

In 1789 Wright persuaded his father to move with his family to Fort Stanwix, now Rome, New York, which was then on the western border of settlement. For a short time, he assisted his father and brothers in clearing a field and erecting a long cabin. Soon he hired out as a surveyor, a job giving him access to the maps and drawing of very extensive tracts of land around Fort Stanwix. Originally, the surrounding area had been laid out in lots of 500 acres each. These he subdivided into such smaller lots as the settler purchased, which was rarely more than one-half or one-fourth of the original lot. When not in the field, he devoted all his time to his studies, procuring from abroad the best books, maps, and instruments and patiently embodying his daily observations in topographical maps. His descriptions, estimates, and surveys became regarded as authoritative in boundary questions. Later, he would use his field notes and topographical information in locating the Erie Canal. Between 1792 and 1796, he laid out into farms more than 500,000 acres in Oneida and Oswego Counties.⁹¹

In 1798, Wright returned to Plymouth and on September 27 married Philomela Waterman, daughter of Simeon Waterman. They had nine children, eight of whom survived their parents. One son, Benjamin Hall Wright, was also a civil engineer and carried out some of the later projects on which his father had made reports.⁹²

Experience Prior to Service On the Chesapeake & Ohio Canal

As the Mohawk and Genesee Valleys developed into one of the most important agricultural sections in New York, Wright became interested in the problem of transporting surplus products to a market. Since roads were little better than trails and there seemed to be little hope of permanently improving them, he turned his attention to canals. In 1792 the Western Inland Lock Navigation Company had been formed and had completed some pioneer construction around Little Falls on the Mohawk River and thence from the river to Wood Creek at Fort Stanwix under an English engineer, William Weston. Several years after Weston's return to Britain, it was determined to improve the navigation of Wood Creek by dams and locks, there being a descent of 24 feet in some six miles of difficult navigation. Since it would be expensive to bring Weston back for the examination and the leveling, the directors of the company turned to Wright to make a map and profile of Wood Creek. This was his first work as an engineer, and it led to further work for the company.⁹³

Philip Schuyler, a prominent general during the American Revolution and the president of the company, was especially pleased with Wright's work and in 1803 directed him to make a survey of Wood Creek from the point where the improvements ended down to Oneida Lake. Soon Schuyler had him survey some 100 miles of the Mohawk River from Fort Stanwix to

⁹¹ Stuart, *Lives and Works of Civil and Military Engineers*, 48–50, and American Society of Civil Engineers, *Biographical Dictionary of American Civil Engineers*, 132–133.

⁹² *Dictionary of American Biography*, XX, 544.

⁹³ Fitzgerald, "Early Engineering Work," 608–609, American Society of Civil Engineers, *Biographical Dictionary of American Civil Engineers*, 132–133.

Schenectady, “taking a regular traverse of the river, its windings, its breadth, the descent of each rapid, the descent between the rapids, the depth in each pool between rapids—at its lowest summer drought—the height of alluvial banks, and all other remarks and observations which he might think useful.” In addition, he was to propose his own plan for improving the Mohawk in as economical a manner as possible. Wright finished this project in 1803, recommending a series of dams, locks, short canals, and slackwater navigation pools. The financial problems of the company never permitted the construction of any portion of the work.⁹⁴

In 1811 Wright was employed by the state canal commissioners of New York to make an examination of the north side of the Mohawk River from Rome to Waterford on the Hudson. The following year he was directed to examine the country from Seneca Lake to Rome and from thence on the south side of the Mohawk to Albany. His report of this survey, accompanied by maps and profiles, was well-received and served as a preliminary examination for the future construction of the Erie Canal.⁹⁵

During this period, Wright became the agent of the land proprietors in whose serve he had made the most extensive surveys. He thus became a leading member of the community, was repeatedly elected to the state legislature, and in 1813 was appointed county judge.⁹⁶

In 1815, upon the more effective organization of the New York State Canal Board, the work of constructing the Erie project was launched. In the months just after its organization, the Canal Board was divided over the question of sending abroad for a chief engineer. But the views of Joseph Ellicott and others in western New York prevailed and the work was entrusted to Wright and James Geddes, another local surveyor-judge-engineer. Prior to the actual beginning of work, the Erie Canal project was divided into three divisions: Wright was appointed as chief engineer and was to have charge over the middle section between the Seneca River and Rome, Geddes of the western to Lake Erie, and Charles C. Broadhead of the eastern to the Hudson River. The first ground was broken July 4, 1817, at Rome. As the construction of the canal progressed, another engineer, David Thomas, took over the work on the western section, Geddes turned to the problems of the Champlain Canal, and Wright, having completed the middle section, became responsible for the difficult eastern division.⁹⁷

With his abilities as a surveyor, his practical knowledge of construction, and his capacity for leadership, Wright had a significant impact on the design of the Erie and on succeeding generations of American engineers. He singly was responsible for surveying and locating the middle section of the canal, and he collaborated with Canvass White, his able young principal assistant, in determining the location of the line on the eastern division. Although he did not draw any plans of importance, he was, according to one of his assistants John B. Jervis, “a very sagacious critic of any presented.”⁹⁸

Wright and Geddes together solved the problem of securing an adequate flow of water for the western section of the canal by keeping the summit level from Buffalo to Lockport lower than the surface of Lake Erie. Among his chief structural engineering accomplishments was his supervision of the construction of the 801-foot aqueduct across the Genesee River at Rochester.

⁹⁴ Stuart, *Lives and Works of Civil and Military Engineers*, 52–53.

⁹⁵ Whitford, *History of the Canal System of New York*, I, 789.

⁹⁶ *Dictionary of American Biography*, XX, 543, and Stuart, *Lives and Works of Civil and Military Engineers*, 54.

⁹⁷ William A. Bird, “New York State Early Transportation,” *Buffalo Historical Society Publications*, II (1880), 32; Merwin S. Hawley, “The Erie Canal: Its Origin, Its Resources, and Its Necessity,” *Ibid*, 305–349; Fitzgerald, “Early Engineering Work,” 608; and Stuart, *Lives and Works of Civil and Military Engineers*, 54–60, 68.

⁹⁸ John B. Jervis, “A Memoir of American Engineering,” *Transactions of the American Society of Civil Engineers*, VI (1878), 42.

To conciliate the critics of the canal project and to prepare the public mind to meet the vast expense of the works near the Cohoes, the Little Falls, the Genesee River, and Lockport, he successfully urged the Canal Board to begin the work on the middle section, building both east and west simultaneously through the least difficult and costly parts.⁹⁹

During his years on the Erie Canal, Wright gathered around him a remarkable group of young men, most of whom afterwards occupied important positions in the engineering field. Canvass White was assigned the duty of designing the locks and other mechanical structures and also contributed the important discovery that hydraulic cement could be produced from a deposit near the line of the canal. John B. Jervis, another assistant, later became one of the foremost American civil engineers of pre-civil war days. David Stanhope Bates had charge of the difficult crossing at the Irondequoit Valley and Nathan S. Roberts supervised the construction of the elaborate set of double locks at Lockport. The Erie Canal was thus the great American engineering school of the early nineteenth century, and Wright, as the presiding genius of the undertaking, has fairly been called the “Father of American Engineering.”¹⁰⁰

The success of the Erie Canal awakened a spirit of internal improvement throughout the developing nation. Wright acted as consulting engineer on a number of canal projects during the last years of the Erie work—the Northampton and New Haven Canal in 1821, the Blackstone Canal in 1822, and the Chesapeake and Delaware Canal in 1823. On the Chesapeake and Delaware project, he was associated with Colonel Joseph D. Totten and General Simon Bernard of the U.S. Board of Engineers, and Canvass White in determining the line of the canal. In 1825, he became consulting engineer for the Delaware and Hudson Canal, an undertaking completed by his associate Jervis.¹⁰¹

Service on the Chesapeake & Ohio Canal

Resigning as chief engineer of the Erie in 1827 and the Chesapeake and Delaware in 1828, Wright accepted the invitation of Charles F. Mercer to become chief engineer of the Chesapeake & Ohio Canal in the latter year. At Wright’s urging, the board of directors relied almost exclusively upon the available supply of men experienced on Northern or foreign canals. Among his former associates on other canal projects that were employed to fill key engineering positions on

⁹⁹ Krout, “New York’s Early Engineers,” 273–275, and Stuart, *Lives and Works of Civil and Military Engineers*, 54–60.

¹⁰⁰ Richard Shelton Kirby and Philip Gustave Lawson, *The Early Years of Modern Civil Engineering* (New Haven, 1932), 46–47, and Harlow, *Old Towpaths*, 295–307. Some years later in 1870, Benjamin Hall Wright, the son of Benjamin Wright, wrote a 13–page booklet entitled *Origin of the Erie Canal Services of Benjamin Wright* in which he outlined the prominent role his father had played in the conception, design, and construction of the Erie and the significant impact of his father’s work on subsequent American engineering.

¹⁰¹ Henry D. Gilpin to Joshua Gilpin, May 28–29, 1823, Henry Dilworth Gilpin Papers, Historical Society of the Delaware, Wilmington; William Meredith to John C. Calhoun, May 19, 1823, quoted in Hill, *Roads, Rails, & Waterways*, 30; *The Act of Incorporation of the Farmington Canal Company, with the Reports of the Hon. Benjamin Wright and Andrew A. Bartow, esq., and of the Committee of the Legislature of Connecticut, on that Subject* (New Haven, 1822) 10–15; *Account of the Proposed canal from Worcester to Providence, Containing the Report of the Engineer, Together with Some Remarks Upon Inland Navigation* (Providence, 1825), 1–16; and *Report of Messrs. Benj. Wright and J.L. Sullivan, Engineers, Engaged in the Survey of the Route of the Proposed Canal from the Hudson, to the Headwaters of the Lackawaxen River* (Philadelphia, 1824), 1–70.

the Chesapeake & Ohio were John Martineau and Nathan S. Roberts, both of whom were appointed to the board of engineers to provide overall direction to the construction on the canal.¹⁰²

During the first year of construction, Wright and Roberts collaborated in an extensive survey of the projected western section of the canal to Pittsburgh, revising the location and cost estimates that had been made by the U.S. Board of Engineers in 1825.¹⁰³

After 2½ years as chief engineer, Wright resigned in November 1830 and refused several offers to return to the canal. While it is difficult to state the precise reasons for his separation from the company, his correspondence and other available documentation indicate several probable causes. His correspondence reveals that he often resented the frequent participation of President Mercer and other members of the board of directors in the discussion of engineering technicalities despite their inexperience in such matters. Under such conditions, differences of opinion which arose between members of the engineering department were frequently carried over the head of the chief engineer by appeals to the board from disgruntled underlings. Thus, the design and construction of the canal was often hampered by fractious infighting.¹⁰⁴

The legal dispute between the Chesapeake & Ohio Canal Company and the Baltimore & Ohio Railroad over the right-of-way through the narrow passes above Point of Rocks may also have been a factor in Wright's decision to resign. Court injunctions prevented construction of the canal above Point of Rocks until 1832 by which time it was becoming apparent that the railroad would soon provide stiff competition to the financially hard-pressed canal company for the Potomac Valley trade.¹⁰⁵

Engineering Experience after Service On the Chesapeake & Ohio Canal

When Wright terminated his association with the Chesapeake & Ohio Canal, he desired to retire and be with his family which had already been removed to New York City. In 1832, he took an appointment as Street Commissioner in New York City, but he resigned at the end of the year because the work was confining and not suited to his interests. Soon he was appointed chief engineer of the Harlem Railroad Company, but he obtained leave of absence in the autumn of 1833 to become the consulting engineer on the St. Lawrence Ship Canal at Montreal. The following year he returned to Canada as the chief engineer on this canal and the consulting engineer on the Welland Canal between Lakes Erie and Ontario. During that year, he also was appointed by Governor Marcy of New York to survey the route for the New York and Erie Railroad under an appropriation from the State which duties occupied him intermittently for two years.¹⁰⁶

During the years 1835 to 1839, Wright was engaged on several canal and railroad plans, but he remained principally in Virginia where he had been invited after the completion of the

¹⁰² Proceedings of the President and Board of Directors, A, 2, 114–115; Proceedings of Stockholders, A, 16016; 1st Annual Report (1829), C&O Co., in *ibid*, A, 33, 48; and *Documents relating to the Chesapeake & Ohio Canal*, 1840, 126–127.

¹⁰³ Roberts and Wright, "Reports and Letters from the Engineers Employed in the Revised Location of the Section of the Chesapeake & Ohio Canal," in *First Annual Report*, (1829), C&O Co.

¹⁰⁴ Proceedings of the President and Board of Directors, A, 107, 109–110, and Wright to Mercer, February 9 and 24, 1830, and Van Slyke to Mercer, February 27, 1830, Ltrs. Recd., C&O Co. For example, in 1830 Wright vetoed Mercer's plan to abolish the position of volunteer rodman by making the incumbents all inspectors of masonry, a job for which they were unqualified.

¹⁰⁵ Sanderlin, *The Great National Project*, 122.

¹⁰⁶ Whitford, *History of the Canal System of New York*, II, 1171–1172; Hugh G. J. Aitken, *The Welland Canal Company: A Study in Canadian Enterprise* (Cambridge, 1954), 100; Fitzgerald, "Early Engineering Work," 611; and Stuart, *Lives and Works of Civil and Military Engineers*, 70–71.

New York and Erie Railroad survey. Earlier in 1824, he had briefly served as a special commissioner in Virginia to expand the James River Canal and make an examination for a connection between the James and the Ohio Rivers via the Kanawha. With the establishment of the James River and Kanawha Company in 1835, he became chief engineer of the project.¹⁰⁷

Following a short period in this position, Wright had his duties reduced to that of a consultant so that he could participate in other ventures. In 1835, he was called by the Cuban authorities to visit Havana and advise on a railroad from that city to the interior of the island. The preliminary surveys of this work were examined and approved by him, and its subsequent execution was carried out under the superintendence of his son, Benjamin Hall Wright, and Alfred Cruger, an experienced engineer who had been an assistant of Wright on the Chesapeake & Ohio. In 36, he became chief engineer of the Tioga and Chemung Railroad, and in 1837 a consultant on the Illinois and Michigan Canal. He spent his last days in New York City, dying there on August 24, 1842, at the age of 72.¹⁰⁸

¹⁰⁷ *First Annual Report of the President to the Stockholders of the James River and Kanawha Company* (Richmond, 1836), 11

¹⁰⁸ *Informe Sobre El Camino do Hierro de Puerto—Principe a Nuevitas, par D. Benjamin H. Wright* (Puerto Principe, 1827), 1–12; Fitzgerald, “Early Engineering Work,” 611; Stuart, *Lives and Works of Civil and Military Engineers*, 71–72; and *New York Tribune*, August 25, 1842.

III. DESIGNERS WITH PARTIAL BIOGRAPHIES

A. ALFRED CRUGER

BIOGRAPHICAL SKETCH

Early Years and Experience Prior to Service On the Chesapeake & Ohio Canal

There is little biographical information on the early life or experience of Alfred Cruger. All that is known is that his residence was in New York and that he surveyed and reported on the proposed route for the Saugatuck and New Milford Canal in Connecticut in 1827. It is likely that he gained some experience on civil engineering on the Erie Canal, although his role would have been minor as no sources on that canal mention his name.¹⁰⁹

Service on the Chesapeake & Ohio Canal

Cruger was appointed a resident engineer on the fifth residency (Monocacy River to Point of Rocks) of the Chesapeake & Ohio Canal in November 1828.¹¹⁰ Because of the dispute between the canal and the Baltimore & Ohio over the right-of-way above Point of Rocks, he was commissioned to assist Nathan S. Roberts in surveying the narrow passes from that point to Harpers Ferry.¹¹¹ After leaving the employment of the canal company for a short period in 1831 to make surveys for the Leesburg and Snicker's Gap Turnpike Company, he prepared plans and specifications for the Alexandria Aqueduct.¹¹² During the spring of 1834, he made an extensive survey for the location of the canal between Dams Nos. 5–6, but because of the mounting obstacles to the construction of the waterway he soon resigned to pursue engineering opportunities elsewhere.¹¹³

Engineering Experience after Service On the Chesapeake & Ohio Canal

There is little available data on the later engineering career of Cruger except for his activities in Cuba which extended at least from 1835–1842. Shortly after he left the canal, he traveled to Cuba where he convinced the local authorities that their island would receive great financial benefit from building a railroad connecting Havana with the interior of the island.¹¹⁴ In 1835 Benjamin Wright was called by the Cuban leaders to visit Havana and advise on the construction of such a railroad. After examining and approving the preliminary surveys for the work, he entrusted the superintendence of the project to his son, Benjamin Hall Wright, and Cruger, who remained on the project until at least 1842.¹¹⁵

¹⁰⁹ Alfred Cruger, *A Report of the Proposed Saugatuck and New Milford Canal* (New York, 1827), 1–11, and Proceedings of the President and Board of Directors, A, 114–115.

¹¹⁰ Proceedings of the President and Board of Directors, A, 114–115.

¹¹¹ Sanderlin, *The Great National Project*, 88

¹¹² Proceedings of the President and Board of Directors, C. 176.

¹¹³ *Chesapeake & Ohio Canal to Accompany H.R. No. 94*, 1834, 200–220, and Proceedings of the President and Board of Directors, D, 72.

¹¹⁴ Stuart, *Lives and Works of Civil and Military Engineers*, 72.

¹¹⁵ *Informe Presentado a la Comision Directiva del Camino de Hierro de Guines, por el Ingeniero Principal Director del Mismo D. Alfredo Cruger, Sobre el Projects de Construccion y Presupuesto del Ramal de*

B. CHARLES B. FISK

BIOGRAPHICAL SKETCH

Early Years and Experience Prior To Service
On the Chesapeake & Ohio Canal

Despite his substantial contribution to the engineering design of the Chesapeake & Ohio Canal, Charles B. Fisk is a relative unknown among nineteenth century American civil engineers. An extensive survey of biographical sources, including the files of the Biographical Archive of American Civil Engineers at the Smithsonian Institution, failed to turn up any information concerning Fisk. Thus the available biographical data on this man is limited to the records of the Chesapeake & Ohio and the James River & Kanawha, the two canal companies by which he is known to have been employed.

Service on the Chesapeake & Ohio Canal

In November 1828, Fisk was appointed as an assistant engineer on the fourth residency (Seneca Creek to Monocacy River) of the Chesapeake & Ohio Canal. The only data on his background found in the canal company records is that his residence was located in Connecticut. It is likely that he was young and relatively inexperienced in civil engineering since the canal directors generally selected for assistant engineers promising youths who were seeking careers in that field. The intention of the directors in adopting such a policy was to promote interest in internal improvements in the South and to follow the example of the Erie Canal in using the construction of the waterway as a "school of engineering."¹¹⁶

During the fall of 1833 when the financial plight of the company slowed construction operations on the canal, Fisk became the Superintendent of Repairs for the waterway between Dams Nos. 2 and 3. In April 1835, his duties as superintendent ceased, and he was advanced to equal rank with Thomas F. Purcell as resident engineer and given charge of the important third residency (the line between Dams Nos. 4 and 5) upon which all construction was then concentrated. He soon began to assume a prominent position among the canal company engineers, raising high the banner of perfection which former president Charles F. Mercer had carried so persistently, revising Alfred Cruger's earlier survey and cost estimate for building the 27-mile line between Dams Nos. 5 and 6, and participating on a survey team to locate the final fifty miles of the waterway between Dam No. 5 and Cumberland.¹¹⁷

Dicho Camino, desde Onivican al Batalano, Impreso por Acuerdo do la Real Juata de Formento, de Agricultura y Comercio de la Isla de Cuba (Habana, 1836), 1–36, and *Informe General del Ingeniero Director del Ferro-Carril de la Sabanilla, D. Alfredo Cruger, Presentado a la Junta Directors de la Empresa el 14 de Febrero do 1842*.

¹¹⁶ Proceedings of the President and Board of Directors, A, 114–115, and First Annual Report (1829), C&O Co., in Proceedings of Stockholders, A, 33, 48. Further evidence of his lack of experience before entering service on the C&O Canal was his employment as a rodman on the early survey teams locating he canal in October 1828.

¹¹⁷ See the first interrogatory and answer on1 of Maryland, General Assembly, Joint Committee on Expenditures for Internal Improvements, *Report of the Joint Committee Appointed to Inquire into the Expenditures of the State, in Works of Internal Improvement* (Annapolis, 1836); *Eighth Annual Report* (1836), C&O Co., 2–4; *Thirteenth Annual Report* (1841), C&O Co., 84–85; Proceedings of the President and Board of Directors, D, 311, 319; Fisk to Board of Directors, March 30, 1835, Ltrs. Recd., C&O Co.; and

When talk revived of connecting Baltimore with the Chesapeake & Ohio via a cross-cut canal, Fisk, with George W. Hughes, a state engineer, surveyed three possible routes for such an undertaking in March 1837. After examining the Westminster, the Monocacy–Linganore, and the Seneca routes, they reported that all three were impracticable because of an insufficient water supply on the summit levels.¹¹⁸

Because of his initiative and engineering abilities, Fisk was appointed on April 12, 1837, as chief engineer, a position he held until September 1852 with the exception of a six-month period in 1840–41. Thus, he performed a significant role in directing the design and construction of the canal from Dam No. 5 to Cumberland. Throughout his employment on the canal, his efforts were repeatedly complicated by the financial plight of the canal company and the meddling of the Maryland legislature in the affairs of the canal company.

His separation from the canal between October 1840 and April 1841 was partly the result of a disagreement with the canal directors over the policy of continuing construction on the basis of the unrestricted issuance of script and partly the result of the application of the spoils system in the operation of the canal. When the state authorities reorganized the canal board and launched a sweeping revival of the spoils system in June 1852, he resigned from his position three months later.¹¹⁹

Engineering Experience after Service On the Chesapeake & Ohio Canal

There is little documentation concerning the later career of Fisk but a reference was found relating to his employment as an engineer for the James River and Kanawha Company in the fall of 1854. On October 21 of that year, he made a report to the directors of the company recommending sluice navigation as the best method in the improvement of the Kanawha River.¹²⁰

At some point Fisk went to work for the Chesapeake & Ohio Railroad, as indicated in a important overview of his career on the C&O and his final years as an engineer. Written by James Worrall, a Pennsylvania engineer who worked briefly on the C&O as a young man, this account tell us that:

Fisk came after Mr. Purcell on the C&O. He was a Connecticut man and a good engineer. He had a splendid corps—Elwood Morris, Gore, John A Byers, and others—but the canal was never finished and they had no great career. ...Fisk struggled along with the company, got poor with them, always respected but never adequately paid. The work was grand and his talents were worthy of it, but money was lacking. At length came up the Virginia railroad from Richmond to Ohio, afterwards called the Chesapeake & Ohio Railroad. Fisk was made Chief Engineer. He planned the mountain crossings via White Sulphur Springs—masterly work, great location, and all that; but in the midst came 1861, all was thrown into *pi*. It broke Fisk's heart; a fine intellect went down in disappointment.

Report of the Committee on the Location of the Canal from Dam No. 6 to Cumberland, October 9, 1835, Recd., C&O Co.

¹¹⁸ Charles B. Fisk and George W. Hughes, *Report on the Examination of Canal Routes from the Potomac River to the City of Baltimore* (Annapolis, 1837), 1–56.

¹¹⁹ *Thirteenth Annual Report* (1841), C&O Co., 67; *Twentieth Annual Report* (1848), C&O Co., 9; *Communication from the President of the Chesapeake & Ohio Canal Company to the Governor of Maryland* (Annapolis, 1842), 40–41; and Fisk to the Board of Directors, October 1, 1840, June 3, 1841, and September 27, 1852, Ltrs. Recd., C&O Co.

¹²⁰ *Twentieth Annual Report of the President of the Stockholders of the James River and Kanawha Company* (Richmond, 1854), 746–748.

Had he remained at home amongst the Yankees where he was born he would have been a distinguished man and to some purpose. But he starved down there in an abnormal environment. The great storm was brewing. It had to come, and Fisk sunk before it. The Chesapeake & Ohio Railroad was not finished until after the war.¹²¹

C. JOHN MARTINEAU

BIOGRAPHICAL SKETCH

Early Years and Experience Prior to Service On the Chesapeake & Ohio Canal

An examination of available source material failed to turn up significant biographical material on the background of John Martineau. The only information that could be found indicated that he had been a pupil of Chief Engineer Benjamin Wright during the construction of the Erie Canal. The available evidence indicates that he played a minor role in the construction of the Erie, because no sources on that canal mention his name. However, he must have impressed Wright for in early September 1828, he was named to the Board of Engineers of the Chesapeake & Ohio at the recommendation of his former mentor.¹²²

Service on the Chesapeake & Ohio Canal

It is apparent that Martineau was considered to be the junior member of the Board of Engineers because his salary was less than that of Benjamin Wright and Nathan S. Roberts. Throughout the summer and early fall, Martineau assisted his senior partners on the board in making the final location of the waterway from Little Falls to Seneca Falls preparatory to the initial letting of contracts. Later, he took a more direct role in the design of the canal, determining the final specification for Dams Nos. 1 and 2 and submitting the plan which was adopted for the construction of the early lockhouses. After survey the Monocacy River for the purpose of determining its utility as a feeder for the canal, he left the service of the company in June 1829 when the directors were forced to eliminate some engineering positions because of the continuing controversy with the Baltimore & Ohio.¹²³

Engineering Experience after Service On the Chesapeake & Ohio Canal

No readily-available information could be found relative to the subsequent engineering career of Martineau.

¹²¹ *Memoirs of Colonel James Worrall, Civil Engineer.*, American Society of Civil Engineers, New York, 1887; 57–58.

¹²² *The Alexandria Gazette*, September 13, 1828.

¹²³ Mercer to Bryant, August 27, 1828, Ltrs. Sent, C&O Co.; Martineau to Board of Directors, October 1, 1828, Ltrs. Recd., C&O Co.; and Proceedings of the President and Board of Directors, A, 48, 204–205, 294.

D. ELWOOD MORRIS

BIOGRAPHICAL SKETCH

Early Years and Experience Prior To Service On the Chesapeake & Ohio Canal

Little is known about the early life or engineering experience of Ellwood Morris prior to his employment on the Chesapeake & Ohio Canal. The only data that could be found for this period was that he was involved in making engineering surveys for the Winchester and Potomac Railroad in Virginia prior to obtaining a job on the canal.¹²⁴

Service on the Chesapeake & Ohio Canal

In 1835 Morris was employed as an assistant engineer by the canal company upon the recommendation of Fisk. It is apparent that Morris rose rapidly through the ranks of the canal engineers because he was promoted to Principal Assistant Engineer in 1838. During the next two years, he supervised the construction above Dam No. 6 until October 1840 when he was named chief engineer to replace Fisk who left the company following a dispute with the new canal board. Following another reorganization of the canal company management in April 1841, Morris terminated his duties with the company and was replaced by Fisk.¹²⁵

Engineering Experience after Service On the Chesapeake & Ohio Canal

There is little documentation for the later career of Morris except for the period 1851–61. In 1851–52 he, along with Benjamin Henry Latrobe, made preliminary surveys for the Cincinnati, Hillsborough, and Parkersburg Railroad, the Ohio River Valley line that would ultimately form a key section of the route between Baltimore and St. Louis.¹²⁶ Three years later in 1855, he surveyed the location for the Auburn, Pt. Clinton, and Allenton Railroad in northeastern Pennsylvania.¹²⁷ In 1857 he witnessed and published an article on the new method recently invented by Colonel Franklin Hewson for constructing temporary railroad bridges.¹²⁸ During the spring of 1857, he made surveys for the proposed improvement of the Ohio River.¹²⁹ In the spring of 1861 just prior to the firing of Fort Sumter, he made surveys for the U.S. Army for the fortification of the North Carolina coast.¹³⁰

¹²⁴ *Proceedings of the Stockholders of the Chesapeake & Ohio Canal Company, In special General Meeting Commencing on the 8th of March, and Continuing, by Adjournment, to the 3d of April 1841* (Washington, 1841), 13

¹²⁵ *Ibid.*; Proceedings of the President and Board of Directors, F, 254, 257, 301–302, 308, 315; and Morris to Sprigg, April 7, 1841, and Fisk to President and Directors, April 29, 1841, Ltrs. Recd., C&O Co.

¹²⁶ Ellwood Morris, *Reconnaissance Made for the Cincinnati, Hillsborough, and Parkersburg Railway...December 1851* (Pittsburgh, 1852), 1–12, and Ellwood Morris, *Report on the Preliminary Surveys Made for the Cincinnati, Hillsborough, and Parkersburg Railway* (Cincinnati, 1852) 1–48.

¹²⁷ Ellwood Morris, *Reconnaissance Made for the Auburn, Pt. Clinton, and Allentown Railroad...July 1855* (Pottsville, 1855), 1–22.

¹²⁸ *Railroad Bridge Drill, or Arrangements for the Speedy Erection of Temporary Bridges on Railroads by Col. Franklin Hawson, Reported from Personal Inspection by Ellwood Morris* (Philadelphia, 1857), 1–6

¹²⁹ Ellwood Morris, *Treatise on the Improvement of the Ohio River...June 1857* (Pottsville, 1857), 1–32.

¹³⁰ *The War of the Rebellion* (Washington, 1880–91), I, 51, 2.

E. THOMAS F. PURCELL

BIOGRAPHICAL SKETCH

Early Years and Experience Prior To Service
On the Chesapeake & Ohio Canal

An extensive survey of biographical sources and newspaper accounts of the early phases of the organization of the canal company failed to turn up any information concerning Thomas F. Purcell prior to his service on the Chesapeake & Ohio Canal. In the canal company records, it is noted that on November 22, 1828, he was formally appointed as a resident engineer on the first division and that his residence was in Virginia.¹³¹ As is the case for many of the resident and assistant engineers on the canal, Purcell probably had some limited surveying experience in his background.

Service on the Chesapeake & Ohio Canal

After a short leave of absence from the canal company in the late fall of 1828 when he made surveys for the Rappahannock Company in Virginia, Purcell returned to direct the operations from Rock Creek Basin to Lock No. 8. When the legal dispute with the Baltimore & Ohio Railroad was resolved in early 1832, he was placed in charge of the construction from Point of Rocks to Dam No. 4, and in the fall of 1833 he was given responsibility for the work above the latter point. During the summer of 1835, he led a survey party in revising the location of the projected waterway between Dam No. 6 and Cumberland. A series of clashes with Fisk over the plans for the canal prism, locks, and dams on this stretch of the canal led to Purcell's bitter resignation in March 1836.¹³²

Engineering Experience after Service
On the Chesapeake & Ohio Canal

Little information could be found on Purcell's career after he left the C&O Canal. The only reference that could be located concerned his activities for the Jeffersonville and New Albany Canal Company in 1837–38. During that period he surveyed and reported on the practicability and probable cost of the construction of a navigable canal for steamboats around the falls of the Ohio on the Indiana side of the river.¹³³

¹³¹ Proceedings of the President and Board of Directors, A, 114–115

¹³² Proceedings of the President and Directors, C, 191, 246, 313, 400, E, 25, and Sanderlin, *The Great National Project*, 62, 95–96, 114, 118.

¹³³ See "Report...to the President and Directors of the Jeffersonville and New Albany Canal Company [Indiana]...January 8, 1838...by Thos. F. Purcell," in *An Act to Incorporate the Jeffersonville and New Albany Canal Company (Approved February 8, 1836)*.