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

# 4.
# STONE QUARRIES AND MILLS ASSOCIATED WITH THE CONSTRUCTION OF THE C & O CANAL

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CONTENTS

# I. STONE QUARRIES

## A. U. S. BOARD OF ENGINEERS SURVEY: 1824–1826

When the U.S. Board of Engineers made their examination of the proposed route for the Chesapeake & Ohio Canal, they made a cursory survey of the surrounding lands to locate building materials. While their efforts to find building stone were negligible, they indicated that "along the whole line of the canal, good building stone will be easily procured." On the eastern section from Cumberland to Hancock, the banks of the Potomac were "formed of a variety of rocks, chiefly sandstone, schists, slates." On the Virginia side between these two towns, limestone was "found above the mouth of the South Branch." From Hancock down to Georgetown, the banks of the river presented "masses of limestone, sandstone and slate rocks." Although there was an abundant quantity of good building stone, the engineers reported that in some cases the stone would have to be transported to construction sites that were a distance away from the quarries, because there were some stretches along the route that contained almost no stone. The means of transportation would vary according to local circumstances. Among the modes of transportation they envisioned were boating, land carriage and inclined planes.

Concerning hydraulic lime, the engineers reported that lime abounded from Hancock to Great Falls, but it was "of a doubtful quality." In fact, it was their opinion that there was "very little hope" of finding "water lime of any kind" from Georgetown to Pittsburgh. Accordingly, they recommended the importation of the best hydraulic lime available. Considering the importance of the durability of the work, they urged, "that the distance of transportation and the expense attending it, ought not, in this case, to be taken too much into consideration."[1]

## B. GEDDES AND ROBERTS SURVEY: 1827

During their survey of the canal route between Cumberland and tidewater in 1827, the two civil engineers, Geddes and Roberts, noted the location of the principal sources of available building materials along the line of the waterway. While they did not make an exhaustive survey of these sources, they did point out where the best stone quarries could be found and where there was lime for hydraulic mortar.

On the route between Cumberland and South Branch, Geddes and Roberts found that "stone for building locks, and for culverts and other necessary purposes, is very good, and found, generally, convenient to each place where it may be wanted." However, good cutting stone suitable for lock sills, hollow quoins, and face work was not so abundant. Lime and other materials for the locks could be obtained at reasonable prices in Cumberland. A cement mill some 4 ½ miles from the Potomac produced lime at a cost of 10 cents per barrel and delivered it for 2 ½ cents per bushel.

The engineers made very little comment on the availability of good building stone on the portion of the waterway between South Branch and Licking Creek. The only such references made were that there was an abundance of limestone about one-third mile above the mouth of the Cacapon River and about four miles west of Hancock. At the latter point, there were lime kilns producing water cement.

From Licking Creek to Conococheague Creek, the engineers observed that the "locks and other stone work can be built very reasonably" because "lime and stone, and other materials, are

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[1] U.S., Congress, House, *Message from the President of the United States, Transmitting a Report from the Secretary of War with that of the Board of Engineers for Internal Improvement, Concerning the Proposed Chesapeake & Ohio Canal*, Exec. Doc. 10, 19th Cong., 2nd sess., 1826, 26–28.

in abundance, and convenient." Among the best locations of prospective limestone quarries were those about one mile west of North Mountain, near Charles Mill, and about three miles west of Williamsport.

Between Conococheague and Antietam Creeks, the engineers reported that there was a large quantity of good building limestone near Galoway's Mill and just below Shepherdstown. Over the distance from Antietam Creek to the Monocacy River, the engineers apparently found no prospective sources for building materials for none were reported.

Passing down the Monocacy River, Geddes and Roberts noted that there was a large quantity of limestone some four miles east of its mouth. Within another mile, there was a marble quarry where stone for the columns of the U. S. Capitol was obtained. Just above the mouth of Seneca Creek was the Seneca Red Sandstone Quarries, which had been in operation for more than 50 years. Some four miles below Great Falls was a stone quarry that would be of use to the canal. About one mile above the head of the old locks on the Little Falls Skirting Canal, there was a granite quarry.[2]

## C. STONE QUARRIES USED TO BUILD CANAL STRUCTURES

During the period of construction, numerous stone quarries were opened throughout the Potomac Valley for the masonry works on the canal. In some cases, the quarries were already in existence prior to 1828. An effort has been made in this section to list the various quarries from which stone was obtained to build the individual masonry structures.

1. Tidelock and Locks Nos. 1–4: These five structures were built of Aquia Creek freestone. The backing of the walls of the tidelock, as well as that of Locks Nos. 1–4, was composed of granite, probably boated down the river from a quarry one-half mile from Lock No. 7.[3]
2. Georgetown Stone Bridges: The five stone bridges carrying streets across the canal in Georgetown were built of Aquia Creek freestone.[4]
3. Locks Nos. 5–6: The hammer dressed stone for the lower six feet of these two locks was obtained from a quarry less than one mile away. The cut stone, which comprised the rest of the locks, was from Aquia Creek.[5]
4. Lock No. 7: This lock was built of granite, except the coping, which was of Aquia Creek freestone. The granite was obtained from a quarry near Section No. 4 within one-eighth of a mile of the lock. This was the quarry referred to in the Geddes and Roberts report, indicating that it was in existence prior to the construction of the canal.[6]
5. Lock No. 8: This structure was built of Seneca Creek Red Sandstone, boated down the Potomac from the quarries just above the mouth of Seneca creek, some 14 ½ miles upstream.[7]
6. Lock No. 9: This lock was built of granite, except the coping, which was of Aquia Creek freestone and a few feet of ashlar, which were of Seneca Creek Red Sandstone. The granite,

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[2] U.S., Congress, House, *Letter from the Secretary of War, Transmitting Estimates of the Cost of Making a Canal from Cumberland to Georgetown*, H. Doc. 192, 20th Cong., 1st sess., 1828, 15, 30, 46, 58, 64, 87, 94 and 99.

[3] *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"* (Washington, 1831), in U.S., Congress, House, Committee on Roads and Canal, *Chesapeake & Ohio Canal*, H. Rept. 414, 23rd Cong., 1st sess., 1834, 89–91; and *Ibid*, 158.

[4] *Abert and Kearney Report*, in *House Report 414*, 90–91.

[5] *House Report 414*, 158.

[6] *Ibid*, and Diary and Account Book, 1828–29, W. Robert Leckie Papers, Duke University Library.

[7] *House Report 414*, 158.

obtained from the quarry near Lock No. 7, was transported by wagon approximately 1¾ mile.[8]

7. Lock No. 10: This lock was built entirely of granite. Approximately one-half of the stone was obtained from the quarry near Lock No. 7, while the remaining portion was transported overland from a quarry four miles inland.[9]
8. Lock No. 11: The front ranges of this lock were Seneca Creek Red Sandstone, boated down the Potomac River some 14 miles. Its backing of rubble granite was probably obtained from the quarry near Lock No. 7.[10]
9. Lock No. 12: This lock was built entirely of granite obtained from the quarry near Lock No. 7. The stone was transported overland some 2 1/3 miles.[11]
10. Lock No. 13: This lock was built of granite from the country quarry referred to at Lock No. 10. The stone was transported overland some 4 1/3 miles. The coping and hollow quoins were of Seneca Creek Red Sandstone.[12]
11. Lock No. 14: This lock was built entirely of granite of which one-half was transported overland from the country quarry referred to at Lock No. 10 and the remainder was boated down the Potomac from a quarry near Great Falls some five miles upstream.[13]
12. Locks Nos. 15–20: These locks were all built of Seneca Creek Red Sandstone boated down the Potomac River some nine miles.[14]
13. Locks Nos. 21–24 and Guard Lock No. 2: These locks were all built of Seneca Creek Red Sandstone. The stone for Lock No. 21 was boated down the Potomac some 6 1/3 miles. The stone for Lock No. 22 was partially boated down the Potomac 3 ¼ miles. The stone for the other structures was hauled overland.[15]
14. Aqueduct No. 1: This aqueduct was built entirely of Seneca Creek Red Sandstone obtained from the nearby quarries some 200 yards away.[16]
15. Lock No. 25: This lock was built of Seneca Creek red sandstone and boated up the Potomac River some 8 ½ miles.[17]
16. Lock No. 26: This lock was built of Seneca Creek red sandstone boated up the Potomac some 16 2/3 miles and transported overland 1/3 mile.[18]
17. Lock No. 27: This lock was built primarily of red sandstone boated some five miles down the Potomac from a quarry near the river about 2 ½ miles below Point of Rocks. Stone for the coping was taken from Lee's quarry near Seneca. A few feet of ashlar were transported overland by railroad from the white granite quarry at Sugarloaf Mountain some 2½ miles away.[19]
18. Lock No. 28: One-seventh of the stone for this lock was brought 46 miles over the Baltimore & Ohio Railroad (at six cents per ton per mile) from the granite quarries on the Patapsco River near Ellicott City to Point of Rocks. From there, it was transported by wagon nearly

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[8] *Ibid*.
[9] *Ibid*.
[10] *Abert and Kearney Report*, in *House Report 414*, 95; and *Ibid*, p.159.
[11] *House Report 414*, 159.
[12] *Ibid*.
[13] *Ibid*.
[14] *Ibid*.
[15] *Ibid*.
[16] *Abert and Kearney Report*, in *House Report 414*, 98–99.
[17] *House Report 414*, 159.
[18] *Ibid*.
[19] *Ibid*.

one mile to the lock. The remaining six-sevenths of the stone was transported in wagons from a quarry of hard white flint stone in Virginia, four miles distant.[20]

19. Aqueduct No. 2: This aqueduct was built of white granite obtained from the quarries on Sugarloaf Mountain less than three miles away. Having a dull white color, the stone split and hammered well, was fine grained, and considered to be very durable. A temporary railroad was constructed to the quarry.[21]
20. Lock No. 29: Two-thirds of the stone for this lock was obtained from the granite quarries on the Patapsco River near Ellicott City. The stone was transported over the Baltimore & Ohio Railroad to Point of Rocks from where it was taken by wagon some 2 2/3 miles to the lock. The remaining third of the face stone was obtained from the hard white flint stone quarry in Virginia referred to at Lock No. 28.[22]
21. Aqueduct No. 3: The face stone above the tops of the piers of this structure was obtained from the granite quarries on the Patapsco River near Ellicott City and transported 46 miles over the Baltimore & Ohio Railroad to Point of Rocks. From there, stone was taken by wagon to the aqueduct three miles distant. The masonry below the tops of the piers was of stone boated down the Potomac some seven miles from a quarry opposite Short Hill near Lock No. 31. This quarry was on the land of Casper Wever, a former employee of the federal government and the Baltimore & Ohio Railroad, who had purchased 500 acres on the site of what is now Weverton to establish a manufacturing town patterned after the plan of Lowell, Massachusetts.[23]
22. Lock No. 30: One-seventh of the stone for this lock was obtained from the granite quarries on the Patapsco River near Ellicott City and transported over the Baltimore & Ohio Railroad. One-seventh of the stone was found in various small quarries in the vicinity of the lock. The remaining five-sevenths of the stone was boated up the Potomac River some 32 ½ miles from the Seneca Creek red sandstone quarries.[24]
23. Lock No. 31: Stone for this lock was obtained from three sources. Some stone was obtained from the hard white flint stone quarry in Virginia referred to at Locks Nos. 28 and 29. Some stone was quarried within one-half mile of the lock on land owned by Casper Wever. The remaining stone was obtained from a granite quarry in Virginia. The latter was transported one mile overland and 1½ miles by water.[25]
24. Lock No. 32: One-fifth of the stone for this lock was obtained from the granite quarry in Virginia referred to at Lock No. 31. The transportation of this stone was by wagon for a distance of two miles, which included the crossing of the Shenandoah and Potomac Rivers. Four-fifths of the stone was obtained from different limestone quarries up the Potomac, varying in distance from two to 12 miles. The of the quarries that were most likely used were Knotts Quarry on the Virginia shore about 1/3 mile above Lock No. 37, a limestone quarry near the canal 1 ¾ mile below Lock No. 37, a quarry one-half mile from Lock No. 37 in Maryland, and a limestone quarry on the Virginia shore opposite Lock No. 38. The stone from these

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[20] *Ibid*.
[21] *Abert and Kearney Report*, in *House Report 414*, 101–102.
[22] *House Report 414I, 160.*
[23] *Report of Captain Wm. G. McNeill on the Condition of the Chesapeake & Ohio Canal*, Dec. 1, 1833, in *House Report 414*, 149; John Thomas Scharf, *A History of Western Maryland* (3 Vols., Philadelphia, 1882), Vol. II, 1285;John R. Miele, *The Chesapeake & Ohio Canal: A Physical History* (NPS Mss., 1968), 133–135; Thomas F. Hahn, *Towpath Guide to the Chesapeake & Ohio Canal, Section Two* (York, 1972), 56–57; and Langley to Mercer, Oct. 28, 1828, Ltrs. Recd., C&O Co.
[24] *House Report 414*, 160.
[25] *Ibid*.

three quarries was boated down the river to Harpers Ferry and then taken by wagon the last mile to the lock.[26]

25. Lock No. 33: this lock was built mostly of granite from the Virginia quarry referred to at Locks Nos. 31 and 32. The stone was transported in wagons for a distance of 1½ miles, which included the crossing of the Shenandoah and Potomac Rivers. A small portion of the stone was from a quarry in Maryland one mile away.[27]
26. Lock No. 34: This lock was built of limestone from Knotts Quarry on the Virginia side of the Potomac River about 1/3 mile above Lock No. 37. The stone was boated down the river some five miles to Dam No. 3 and then wagoned about ¾ mile to the lock.[28]
27. Locks Nos. 35–36: These two locks were built of limestone from Knotts Quarry on the Virginia side of the Potomac about 1/3 mile above lock No. 37. The stone was boated down the river some five miles to the lock.[29]
28. Lock No. 37: This lock was built of limestone obtained from a quarry in Maryland about one-half mile away and transported by wagon to the site.[30]
29. Aqueduct No. 4: This aqueduct was built of limestone obtained from a quarry neat Antietam Village about ¾ of a mile distant. It is probable that the quarry was located on the Virginia side of the river.[31]
30. Lock No. 38: This lock was built of limestone obtained from a quarry directly opposite on the Virginia shore of the Potomac just below Shepherdstown.[32]
31. Lock No. 39: This lock was built of limestone obtained from a quarry in Virginia one mile distant. It could not be determined from the available records if this quarry was the same as that referred to at Lock No. 38.[33]
32. Lock No. 40: This lock was built of limestone obtained from a quarry about one-half mile distant.[34]
33. Dam No. 4, Guard Lock No. 4 and Locks Nos. 41–41: Available documentation does not indicate the precise location of the quarries from which stone was obtained for the rubble masonry of the Maryland abutment of the dam and guard lock or for the hammered masonry of the lock. Since these works are located in a heavy limestone area, it can be assumed that such stone was procured from nearby quarries or boated across the Potomac from quarries on Opequon Creek in Virginia.[35]
34. Lock No. 43: This lock was built of limestone from a quarry three miles distant on the Maryland side of the river. The stone was carried overland by wagon to the site.[36]
35. Lock No. 44 and Aqueduct No. 5: The lock and aqueduct were built of a "compact blue lime stone, of excellent quality, transported from almost exhaustless quarries within three miles" of the aqueduct. The quarry, then known as High Rock Quarry, was located 2 ½ miles west

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[26] *Ibid*, and Thomas F. Hahn, *Towpath Guide to the Chesapeake & Ohio Canal, Section three* (York, 1972), 13, 16, and 28.
[27] *House Report 414*
[28] *Ibid*.
[29] *Ibid*.
[30] *Ibid*.
[31] *Report of McNeill*, in *House Report 414*, 149–150; and Purcell to president and Directors, Jun. 8, 1832, Ltrs. Recd., C&O Co.
[32] *House Report 414*, 161.
[33] *Ibid*.
[34] *Ibid*.
[35] *Ibid*.
[36] *Ibid*.

of the aqueduct on the berm side of the canal. Still in active operation, the quarry is now called Pinesburg Quarry.[37]

36. Dam No. 5, Guard Lock No. 5 and Locks Nos. 45–50: The dam abutments and the seven lock structures were built of Conococheague limestone obtained from a quarry within 200 feet of the pool behind the dam known as Prathers Neck quarry. The stone was taken by wagon to the individual construction sites, all of which were within two miles.[38]
37. Aqueduct No. 6: This aqueduct was built of Tonoloway gray limestone obtained from a quarry one-half mile north on the banks of Licking Creek. Stone for the sheeting was boated up the Potomac River some 7 ½ miles from the limestone quarry at Prathers Neck.[39]
38. Locks Nos. 51–52 and Aqueduct No. 7: These three structures were built of limestone obtained from Hart's Quarry on the Little Tonoloway "in the rear of Hancock" about two miles from the aqueduct. The stone was transported most of the distance over the Cumberland Road (National Road).[40]
39. Lock No. 53: This lock was built of sandstone taken from quarries about three miles distant and transported overland by wagon.[41]
40. Locks Nos. 54–55: These locks were constructed of limestone, portions of which were probably obtained from a Virginia quarry within one mile of Dam No. 6 and from Hart's Quarry on the Little Tonoloway near Hancock.[42]
41. Dam No. 6: The Virginia abutment of the dam was constructed of limestone from a Virginia quarry about one mile distant. The Maryland abutment was built of sandstone from several quarries in Maryland within the distance of one mile.[43]
42. Guard Lock No. 6: This lock was built of sandstone obtained from the Maryland quarries referred to at Dam No. 6.[44]
43. Lock No. 56: This lock was built of limestone, portions of which were obtained from the Virginia quarries about one mile from Dam No. 6 and from Hart's Quarry on the Little Tonoloway near Hancock.[45]
44. Aqueduct No. 8: The cut stone for the arch, the inside of the parapets, the coping, and the water table of the aqueduct were obtained from the limestone quarry in Virginia about one mile from Dam No. 6. The remainder of the stone was procured from several sandstone quarries a short distance across the Potomac on Sideling Hill Mountain.[46]
45. Lock No. 57: This lock was built of limestone obtained from a quarry in Virginia about one mile from Dam No. 6 and Hart's Quarry on the Little Tonoloway near Hancock.[47]
46. Aqueduct No. 9: This aqueduct was built chiefly of hard sandstone obtained from three quarries on Sideling Hill Mountain on the Virginia side of the Potomac, some 2 1/3 to 3 1/8 miles distant. The stone was hauled down to the river by wagon, boated across the Potomac to the "river road," and then carried overland for one mile by wagon.[48]

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[37] *Ibid; Report of McNeill*, in *House Report 414*, 150–151; and Hahn, *Towpath Guide, Section Three*, 51, 54.
[38] Fisk to Board of Directors, June 16, 1835, Ltrs. Recd., C&O Co.
[39] *Ibid;* and Thomas F. Hahn, *Towpath Guide to the Chesapeake & Ohio Canal, Section Four* (York), 9
[40] *Report of the General Committee of the Stockholders of the Chesapeake & Ohio Canal Company* (Washington, 1839), 9; and Fisk to Board of Directors, June 16, 1835, Ltrs. Recd., C&O Co.
[41] *Report of the General Committee of the Stockholders*, 1839, 10.
[42] *Ibid*, 11–13.
[43] *Ibid*, 11.
[44] *Ibid*.
[45] *Ibid*, 12–13.
[46] *Ibid*, 13; and Harlan D. Unrau, *Single-Span Aqueducts, Historic Structures Report* (NPS Mss., 1974), 52, 54–55.
[47] *Ibid*.
[48] Byers to Fisk, Dec. 10, 1838, Ltrs Recd., Chief Engineer.

47. Locks Nos. 58–66: Stone for these composite locks was quarried in at least four different locations. The cut stone was quarried at Hart's Quarry on the Little Tonoloway near Hancock and boated up the Potomac over distances ranging between 19 ½ and 30 ½ miles. The remainder of the stone for the locks was quarried at (1) Twiggs Hollow just above Lock No. 61; (2) Purslane Mountain, about three miles from a point on the Virginia shore opposite Tunnel Hollow; and (3) Sideling Hill, some four miles from the mouth of Tunnel Hollow.[49]
48. Locks Nos. 67–68 and Aqueduct No. 10: These structures were built principally of limestone obtained from quarries on Town Hill on the Virginia side of the Potomac opposite the aqueduct, and from Hatch's Quarry at the mouth of South Branch.[50]
49. Locks Nos. 69–71: These three composite locks were built of limestone obtained from quarries on Warrior Mountain near the banks of the Potomac on the Virginia side of the river. Located just below and opposite to Oldtown, the quarries were about 1 ½ miles distant from Alum Hill.[51]
50. Locks Nos. 72–75 and Aqueduct No. 11: these five structures were built of limestone obtained principally from a quarry located some 1½ miles up Evitts Creek from the aqueduct. The stone was "a compact limestone, or rather marble, in some parts densely filled with marine shells." When polished, the limestone presented "a very interesting object" and was "admirably adapted for ornamental work." The limestone was brought from the quarry to the aqueduct by a temporary wooden railroad and was taken by wagon from the aqueduct to the four locks below, all of which were between five to six miles distant.[52]

[49] Lambie to Fisk, Feb. 28, 1839, Ltrs. Recd., Prin. Asst. Eng.; Fisk to President and Directors, May 27, 1839, Ltrs Sent, Chief Engineer; McFarland to Fisk, Sep. 11, 1839, Ltrs. Recd., Chief Engineer; and Fisk to Board of Directors, Sep. 25, 1839, Ltrs. Recd., C&O Co.
[50] McFarland to Bender, Jan. 2, 1836, Ltrs. Recd., Commissioner; and Morris to Fisk, Apr. 18, 1838, Ltrs. Recd., Chief Engineer.
[51] Purcell to Ingle, May 26, 1835, Ltrs. Recd., C&O Co.; Fisk to Sheriff of Hampshire County, Sep. 20, 1838, Ltrs. Sent, Chief Engineer; and McFarland to Fisk, Sep. 21, 1838, Ltrs. Recd., Chief Engineer.
[52] *Report of the General Committee of the Stockholders*, 1839, 19–20.

# II. MILLS

## A. STONE CUTTING MILLS

### SENECA RED SANDSTONE QUARRIES AND THE SENECA STONE MILL

The Seneca Red Sandstone quarries, located on the high bluffs on the berm side of the canal turning basin just west of the mouth of Seneca Creek, were a widely used source of building stone from the late-eighteenth century until the mid-nineteenth century. This deposit, which underlies most of western Montgomery County, is Triassic Age and is part of a larger formation that runs erratically from Connecticut to the Carolinas. The stone, having a color that varied from a light reddish brown to a deep chocolate brown, was known in the building trade as "Seneca Red Stone."[53]

The texture of the Seneca Red Stone was exceptionally good. It was very fine grained and uniform and held up very well when exposed to the weather. One of its unique and valuable features was the ease with which it was carved and chiseled when it was first quarried. It was then quite soft and could be easily cut. Its fine and uniform texture made it very suitable for delicate carving. After exposure to the weather, the stone became hard, and as a result, remained well preserved over the years.[54]

The first use of Seneca Red Stone is not known, but it is known that it was used prior to the American Revolution.[55] The Seneca quarries supplied stone for the locks of the Potomac Company around Great Falls and for Aqueduct No. 1 and Locks Nos. 8, 9, 11, and 15–27 of the Chesapeake & Ohio Canal.[56] The stone was used in the construction of many houses and government buildings in Baltimore and Washington, among the most famous of which is the original Smithsonian Institution building on the Mall built in 1847.[57]

On the berm side of the canal turning basin just below the quarries was a stone mill that was built about 1837 to cut and dress the Seneca Red Stone for shipment by the Seneca Sandstone Company. Saws and polishers were powered by a water turbine fed by canal water diverted into a mill race. Gondolas pulled by mules and pushed by men carried the large stone blocks along narrow gauge rails to the mill. The large blocks were shaped by hammer and stone chisels before they were cut by tempered steel saws, six feet long, eight inches wide and 3/8 inch thick. An overhead pipe dripped water on the saws to keep the toothless blades cool. Progress was considered good if a saw cut one inch in a three-foot square block one foot thick per hour. For stone polishing, the cut stone was placed on a circular disk, which revolved from a belt attached to the water-driven shaft. Barriers around the disk kept the stone from being ejected by centrifugal force. By 1900,

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[53] Department of Geology, Mines and Water Resources, State of Maryland, *Geography and Geology of Maryland* (Baltimore, 1957), 122; and Nancy Rosselli, Robert Roselli, and Edwin F. Wesely, *Seneca Sandstone Biking Trail*, Sugarloaf Regional Trails, 1976.
[54] *Maryland Geological Survey* (Baltimore, 1906), Vol. VI, 186; and Miele, *Physical History*, 124–125.
[55] *Maryland Geological Survey*, 185.
[56] *Geology of Maryland*, 123; and *House Report 414*, 158–159.
[57] Miele, *Physical History*, 125.

the better quality Seneca Red Stone had been cut, the lower quality stone tending to flake and shatter.

As on of the major stone-cutting mills in the lower Potomac Valley, the mill cut red and gray sandstone boated from as far away as Goose Creek and Whites Ferry. In addition to the red sandstone used in the original Smithsonian building, stone cut at the Seneca mill was used in the construction of the old Congressional Library, the U. S. Capitol, and the Washington Monument.[58]

## B. CEMENT MILLS

### 1. POTOMAC MILL, SHEPHERDSTOWN

As events were leading to the commencement of construction operations on the canal, Henry Boteler of Shepherdstown informed the waterway's chief supporter, Congressman Charles F. Mercer, in January 1828 that he had found large quantities of gray limestone that produced water lime near his flour mill on the banks of the Potomac some 240 yards upstream from Pack Horse Ford. The stone was visible on the surface of the ground as well as to a considerable depth below the surface. The hill where the stone had been found was some "200 feet high, and near half a mile around its base." The stone was easily accessible and could "be quarried with more facility than the common limestone."

Based on his experience, Boteler reported that he had prepared a mortar from the stone, which had hardened in water in a short time and had become "impervious." In preparing the stone for use, it required "only one-third of the time allotted to the burning of lime." Consequently, it needed "only a third of the wood necessary for calcining lime." He had found the stone to be harder than plaster of Paris, and, therefore, it could not be broken and ground to a powder as easily as gypsum. Accordingly, he was sending three specimens of the water lime, one in its natural state, one after burning, and one after calcining, together with "a small ball of the water lime, hardened to its present consistency in water, for a period of 48 hours."[59]

During the years 1828–29, Boteler and his associate, George F. Reynolds, were persuaded by canal company officials to convert a part of their prosperous flour mill to the manufacture of hydraulic cement.[60] By 1829, the flour mill was describe as "one of the finest manufacturing mills in America," producing 100 barrels of flour per day.

The mill was known as the Potomac Mill, later becoming the Potomac Cement Company.[61] The kiln, which Boteler and Reynolds built, was composed of 500 perches of stone and 26,000 bricks, and its total capacity was 1,625 bushels. Because the mill was able to grind about 2,000 bushels of lime per week, the canal company authorized the construction of a cement warehouse nearby to store the cement, until it was called for by the contractors.[62]

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[58] Thomas F. Hahn, *Towpath Guide to the C&O Canal, Section Two* (York, 1971), 5–9.

[59] Boteler to Mercer, Jan 14 and 22, 1828, in U.S., Congress, House, Committee on Roads and Canals, *Chesapeake & Ohio Canal*, H. Rept. 141, 20th Cong. 1st sess., 1828, 38–39.

[60] *Proceedings of the President and Board of Directors*, A. 195–196; and Leckie to President and Directors, Mar. 9, 10, 29, 1829, Ltrs. Recd., C&O Co. Available documentation does not indicate the date of the construction of the flour mill. By 1829, the flour mill was described as "one of the finest manufacturing mills in America," producing 100 barrels of flour per day. Leckie to President and Directors, Mar. 10, 1829, Ltrs. Recd., C&O Co.

[61] Millard K. Bushong, *Historic Jefferson County* (Boyce, 1972), 4.

[62] *Proceedings of the President and Board of Directors*, A, 276; and Diary and Account Book, 1828–29, W. Robert Leckie Papers, Duke University Library.

Throughout the early period of construction, the company engineers experimented with the Shepherdstown lime and with limestone from other points in the Potomac Valley to find a high quality hydraulic mortar. More than 85 experiments were conducted with the Shepherdstown lime under the direction of Superintendent of Masonry Alexander B. McFarland for this purpose, using various hydrates, mixtures and burning times. Experiments were also made with limestone from Goose Creek, the Leesburg vicinity and Tuscarora Creek. It was finally determined during the spring of 1829 that the Shepherdstown cement was best because there would "be no danger whatever of its slaking or loosing its adhesion or bond."[63] In the course of their surveys, canal officials discovered a better grade blue lime some 500 feet from the kiln and adapted it for use on the waterway.[64] Accordingly, Boteler and Reynolds built two kilns near the blue stone deposit for its manufacture into lime.[65] By June 27, McFarland reported that one kiln was producing "extremely well" while the other was still being used for experimentation.[66]

By the summer of 1829, Boteler and Reynolds had their cement operations in full gear. On August 7th the canal company signed a contract purchasing 80,000 bushels of cement at 19 cents per bushel, the whole of which was to be delivered by May 15, 1830.[67]

Later in the fall, the company signed four separate contracts with Henry Strider, Joseph Hollman, Jacob Fouke and John Strider to transport the cement from Shepherdstown to the various construction sites below Seneca Creek at one-third cent per bushel per mile.[68] On January 28, 1830, a second contract was signed with Boteler and Reynolds to supply the line of the canal with 60,000 bushels of cement by September 1.[69] When work on the line above Point of Rocks began in 1832 following the resolution of the legal conflict with the Baltimore and Ohio Railroad, an agreement was made in May whereby Boteler and Reynolds would supply an unspecified quantity of cement to the contractors beyond the limits of the existing contracts at 20 cents per bushel.[70] The Potomac Mill was superseded by Shafer's Cement Mill at Round Top Hill as the principal supplier of cement to the canal company in the fall of 1838. By that time, it had provided more than 150,000 bushels of cement for use in the construction of the waterway at a cost of $32,909.42.[71]

The mill continued to play a significant role in the economic activity of the Shepherdstown vicinity. By 1861, it was owned by Alexander Boteler, a former Whig congressman who had recently been elected to serve in the Confederate Congress and who had recently entered the Confederate Army as an officer.[72] During the military activity that occurred in and around Shepherdstown in September 1861, Boteler's home as well as the mill and the bridge across the Poto-

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[63] McFarland to Leckie, Mar. 31 and Apr. 18, 1829, Leckie Papers; and *Proceedings of the President and Board of Directors*, A, 184.

[64] Leckie to President and Directors, May 11, 1829, Ltrs. Recd., C&O Co.; and *Proceedings of the President and Board of Directors*, A, 195–196.

[65] Diary and Account Book, 1828–29, Leckie Papers. A diagram showing the location of the mill, the kilns and the lime supply was prepared on March 19, by Inspector of Masonry W. Robert Leckie.

[66] McFarland to President and Directors, Jun 27, 1829, Ltrs. Recd., C&O Co.

[67] *Contracts for Furnishing Hydraulic Cement*, Leckie Papers; and *Proceedings of the President and Board of Directors*, A, 320.

[68] *Contracts of Transporting Cement*, and *Contract [between] Chesapeake & Ohio Canal Company and Jacob Fouke, October 22, 1829*, Leckie Papers. Generally the canal company supplied the bags, boxes and boat covers for the cement, but the transporting contractors were allowed two cents per bushel if they supplied these items on their own.

[69] *Contracts for Furnishing Hydraulic Cement*, Leckie Papers.

[70] *Proceedings of the President and Board of Directors*, C, 140.

[71] Ledger A, C&O Co. 157–175. From November 1835 to June 1828, George F. Reynolds was the sole owner and operator of the Potomac Mill. *Ibid*, 157; and *Proceedings of the President and Board of Directors*, D, 407.

[72] Shepherdstown *Register*, July 16, 1914; and Aug. 21, 1924, in Scrapbook I, Alexander Robinson Boteler papers, Duke University.

mac, were destroyed by Federal troops. The mill was rebuilt after the Civil War and continued to operate until the end of the nineteenth century.[73]

Closely associated with the Potomac Mill was the dam, popularly called Boteler's Dam, across the Potomac that provided power for its operation. The impounded water formed a slackwater that occasioned the construction of a river lock to provide access to the canal from the river, thereby making it possible for the canal company to tap a lucrative Virginia trade. When the dam was destroyed, apparently by the 1889 flood, the slackwater was eliminated and the value of the river lock was negated. Its reason for existence gone, the lock was filled in and incorporated into the towpath bank of the canal prism.[74]

## 2. TUSCARORA MILL

During the spring of 1829, Inspector of Masonry, W. Robert Leckie and his associate, James Alcott on New York, discovered a large quantity of stone "exactly like hydrate of lime about one-third of a mile" above the Tuscarora Mill on the creek of that name running through the estate of Charles Carroll of Carrollton in Frederick County.[75] Within a week, Leckie and Alcott were conducting experiments with the lime to test its binding qualities under water. Although the lime slaked in the early experiments, the two men continued making various mixtures until June when they made a cement that would set in water. Leckie was convinced that the Tuscarora Cement was equal to the blue hydrate of lime at Shepherdstown and was better than the general run of Parker Roman Cement.[76]

In June 1829, Leckie and Alcott agreed to take out a patent for the discovery and the manufacture of the hydraulic lime, the profits from its sale to be equally divided.[77] A draft of the letter that was sent to Secretary of State Martin Van Buren requesting the patent described the mineral content of the lime and the formula for preparing the cement. The letter read as follows:

> The mineral from which the cement is made is of several varieties and is an argillaceous ferruginous limestone found in the county of Frederick and state of Maryland; and in the county of Loudoun and state of Virginia. Our variety is a Camelottie meaguse limestone with alternate streaks of light blue and yellow gray: the other is a laminated light blue meaguse limestone with small chimney specks. Both effervesce slightly with acids, and the color where calcined is of a cream colored yellow, but not always the same, some parts being of a lighter and some of a darker color, it is found in ledges and in some places at the surface of the ground….
>
> It contains carbonic acid, lime, water, sibix, aluminum and oxide of iron.
>
> Preparation of the cement—the stone is first calcined 40 or 54 hours, then ground to a powder, and mixed with clean sand in the preparations of from one-third to one-half—adding as much water as will make it into a proper consistency for use.[78]

Apparently the patent was approved by August, for in that month Leckie informed Chief Engineer Benjamin Wright that his Tuscarora Cement was as good as the Shepherdstown blue lime. Accordingly, he requested that the canal company make arrangements to manufacture the Tus-

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[73] John F. Luzader, *Historic Sites, Shepherdstown, W. Va.* (NPS Mss., 1962) 21.
[74] *Ibid.*
[75] Apr. 12, 1829, Diary and Account Book, 1828-29, Leckie Papers
[76] McFarland to Leckie, Apr. 18, 1829, and June 25, 1829, Diary and Account Book, 1828-29, Leckie Papers.
[77] *Agreement, James Alcott and Robert Leckie, June 26, 1829,* Leckie Papers
[78] Draft, Leckie and Alcott to Sec. Of St. [Van Buren], June 25, 1829, Leckie Papers

carora Cement on a large scale by constructing a draw kiln near the Tuscarora Mill that would contain 700 bushels.[79]

Although there is no documentary evidence as to the structures that were built near the Tuscarora Mill, the cement was soon being manufactured in large quantities. On February 3, 1830, the canal company signed a contract with Messrs. Brackett and Guy, the mill operators, to supply the line of the canal with 40,000 bushels of cement at 20 cents per 70 pound bushel. The cement was to be delivered by June 1, 1830.[80]

Despite the opposition of some canal officials to the use of the Tuscarora Cement on the canal, it began to be widely used as a supplement to the Shepherdstown lime, because there was frequently a shortage of the latter.

In June 1830, it was found that the quality of the Tuscarora Cement was too poor to be used on the canal. Accordingly, the board ordered the mill to be closed until the quality of the water lime could be improved by the use of coal in place of wood in the calcining process. No further use of the cement already manufactured was to be made on those parts of the masonry works that would be exposed to injury.[81]

At the recommendation of Engineer Alfred Cruger and Leckie, the board ordered the reactivatation of the mill in July. Henceforth, each kiln of lime that was burned would be tested before being shipped to the contractors.[82]

The canal company determined to contract for the unexpired seven-year lease of the mill by the Crommelin family in September 1832. At the same time. The board decided to procure by purchase or condemnation the land required for conducting a feeder from the dam and head race of the mill to the canal. While there is no record as to the final result of the negotiations leading to these two transactions, the mill continued to supply the canal with cement until the discovery of hydraulic lime at Round Top Hill.[83] During the more than six years that the Tuscarora Mill produced cement for the waterway, it supplied nearly 20,000 bushels of lime at a cost to the canal company of $4,088.17.[84]

## 3. HOOKS MILL

During the early 1830s, James Hook was associated with both Bracket and Guy at the Tuscarora Mill and Boteler and Reynolds at the Potomac Mill.[85] Sometime during the spring or summer of 1835, Hook established a mill on the Virginia side of the Potomac across from Hancock. Commencing in the fall of that year, he began supplying cement to the line of the canal. After two years of operating the mill, a period during which his business suffered because of the low level of the Potomac in the summer months, Hook died in August or September 1837. At that time, the canal company signed a contract with George Shafer, who had been operating a mill at Funkstown, paying him $300 to rent Hooks Mill and furnish cement to the contractors according to the provisions of Hooks uncompleted contract.[86] Hooks Mill continued to produce cement for the canal until the construction of Shafer's Cement Mill at Round Top Hill, some three miles west of

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[79] Leckie to Wright, Aug. 21, 1829, Leckie Papers.

[80] *Contracts for Furnishing Hydraulic Cement*, Leckie Papers. In March 1830, the canal company awarded $100 to Alcott for his services in locating the Tuscarora water lime. *Proceedings of the President and Board of Directors*, B, 37–38.

[81] *Proceedings of the President and Board of Directors*, B, 125.

[82] *Ibid*, 146

[83] *Ibid*, C, 125; E, 62.

[84] Ledger A, C&O Co., 172–173.

[85] *Proceedings of the President and Board of Directors*, B, 143; D, 407.

[86] Fisk to Byrnes, Sep. 7, 1838, Ltrs. Sent, Chief Engineer.

Hancock. Altogether, Hooks Mill supplied nearly 31,000 bushels of cement for the construction of the canal.[87]

## 4. SHAFER'S CEMENT MILL—ROUND TOP CEMENT COMPANY

In 1837, as the trunk of the canal was being excavated at Round Top Hill, it was discovered that the layers of "argillo-magnesian limestone" which cropped out in several places along the north bank of the Potomac had a "hydraulic character." The strata of rock were "exceedingly crooked and tortuous, bending up and down, and doubling upon each other in a very singular and complex manner," thus "forming a series of arches and counter-arches and concentrating a large quantity of the stone within easy and convenient reach." The aggregate thickness of the rock strata varied from eight to 12 feet. There were six distinct rock outcrops of the hydraulic stone exposed to view on the slope of the hill within a distance of about 200 yards along the canal.[88]

After the discovery of the rock, the canal company entered into a contract with George Shafer to rent Hooks Mill across the river from Hancock to grind the cement.[89] In May 1838, a contract was signed with Shafer to supply cement to the line of the canal from Dam No. 6 to the upper end of Paw Paw Tunnel.[90] At the same time, the board confirmed an agreement with Shafer authorizing him to build a mill on the berm side of the canal at Round Top Hill, some three miles west of Hancock. The canal company agreed to pay for the construction of the mills foundation and to rent the mill and the necessary water power for its operation to him for a period of 10 years. In addition, the company agreed to rent the land and stone quarries at Round Top Hill to him for the same period of time.[91]

By the spring of 1843, Shafer had supplied the canal company with some 80,000 bushels of hydraulic lime at a cost of $20,507.86.[92] Apparently, the mill was heavily damaged during the heavy spring freshet in 1843, because the board granted Shafer permission on June 6 of that year to transport toll-free upon the canal all the materials needed for its reconstruction.[93] When large-scale construction operations resumed on the canal in 1847, the contractors negotiated a contract with Shafer to deliver 120,000 bushels of cement to the line at a rate of 12,000 bushels per month if required, and the delivery began in early April 1848.[94]

Shafer continued to manufacture hydraulic lime under the brand name "Shafer Cement" until 1863. In that year, Robert Bridges and Charles W. Henderson purchased the mill and re-named the enterprise the Round Top Hydraulic Cement Company.[95] By 1882, the firm had grown

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[87] *Proceedings of the President and Board of Directors*, D, 449; E, 62, 139; and Ledger A, C&O Co., 154.

[88] Thomas J. C. Williams, *A History of Washington County, Maryland, From the Earliest Settlements to the Present Time* (2 Vols., Hagerstown, 1906), Vol. I, 372.

[89] *Proceedings of the President and Board of Directors*, E, 488. Shafer had supplied hydraulic cement to the line of the canal from a small mill at Funktown since June 1835. No documentation could be found regarding the construction or operation of this mill. *Ibid,* D, 392; E, 1, 12; and McFarland to Bender, Feb. 10, 1836, Ltrs. Recd., Commissioner.

[90] *Proceedings of the President and Board of Directors*, E, 421.

[91] *Ibid*, E, 483–485.

[92] Ledger A, C&O Co., 152–153.

[93] *Proceedings of the President and Board of Directors*, G, 45–46.

[94] Davis, Hale and Allen to President and Directors, Apr. 11, 1848, in *Twentieth Annual Report* (1848), C&O Co., 16–21.

[95] Williams, *A History of Washington County*, Vol. I, 372. Bridges, the son of a Scotch immigrant and a long-time resident of Hancock, formed a business partnership with Henderson in 1850 that lasted some 48 years. His other business interests included the Berkeley Sand Company, located near Berkeley Springs, West Virginia, which manufactured glass sand, extensive farm holdings near Hagerstown, and timber and coal lands in West Virginia. In addition to his business interests, he served as a school commissioner in Washington County for many years; and in 1890, he was appointed as one of the receiver for the bankrupt canal company. *Ibid,* Vol. II, 1064–1065. Henderson, born in Bladensburg, Maryland, and raised in Berkeley County, Virginia, was a stockholder in many local banks and devoted

into one of the most important business enterprises of Washington County, employing 75 to 100 men. An adjacent cooper shop, where the barrels were produced in which the cement was shipped, employed 16 to 20 men.

The rock from which the cement was made was mined out of five tunnels in Round Top Hill, two of the tunnels running entirely through the hill. The stone was burned at the mill in eight kilns, each 21 feet deep and 10 feet in diameter at the base. The total daily capacity of the eight kilns was about 320 barrels of cement each weighting 300 pounds, or about 2,200 barrels per week. The mill that ground the cement was driven by "an overshot water-wheel, sixteen feet in diameter and sixteen feet width of breast, with buckets thirteen inched in depth." Water for turning the wheel was supplied by the canal. The grinding of the stone was accomplished by four pairs of French burrstones, each five feet in diameter. The total capacity of these grindstones was somewhat more than 400 bushels of cement in 24 hours. After the cement was packed in barrels, it was taken across the Potomac by cable and then shipped either east or west on the Baltimore and Ohio Railroad. The firm had about 300 acres on the West Virginia shore where there were located a warehouse for the deposit of the cement prior to shipment and switches that connected with the main tracks of the railroad. The canal was also used to ship the cement and to receive coal from the Allegany County mines for the mill's operation.[96]

As the Round Top Hydraulic Cement Company prospered, agency offices were established in the principal population centers of the Potomac Valley. One of the most important of these was operated by J. G. and J. M. Waters at 26 High Street fronting immediately on the canal in Georgetown. The business was located in one of the oldest commission houses in the city, having been established just prior to the Civil War by George Waters.[97]

## 5. LEOPARD'S MILL

A mill operated by Jacob Leopard was located near Lock No. 53 some 2 ½ miles west of Round Top Hill.[98] The canal company purchased cement from Leopard on an irregular basis to supplement the company supply whenever Shafer's or Lynn's cement mills were unable to meet the needs of the canal contractors.[99] In November 1839, Leopard sued the canal company in the Washington County courts to obtain compensation for damage done to his mill and property by the construction of the canal. The case dragged through the courts for some five years before the two parties agreed to an out-of-court settlement in December 1844.[100]

## 6. LYNN MILL, CUMBERLAND

In 1836, a cement mill was built on the banks of Wills Creek in Cumberland to produce the well known cement that carried the brand "Lynn Cement" and later "Cumberland Cement." The mill was probably built by John Galloway Lynn, the son of Captain David Lynn who had located at Cumberland before the outbreak of the American Revolution. John Galloway also built the Poto-

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most of his attention to the mercantile side of business. His son, Raymond, purchased the holdings of Bridges in the Round Top Hydraulic Cement Company in 1903 after the plant burned. *Ibid,* Vol. II, 887–888.

[96] John Thomas Scharf, *A History of Western Maryland* (2 Vols., Philadelphia, 1882), Vol. II, 1256

[97] T. H. S. Boyd, *The History of Montgomery County, Maryland, From its earliest Settlement in 1650 to 1879* (Clarksburg, 1879), 153.

[98] Thomas F. Hahn, *Towpath Guide to the C&O Canal, Section Four* (York, 1973), 22.

[99] Fisk to Lynn, Sep. 18, 1838, Ltrs. Sent, C&O Co.

[100] *Proceedings of the President and Board of Directors*, F, 122; G, 214.

mac or Lynn Wharf on the Cumberland Basin above Dam No. 8 and operated it for many years for loading coal into canal boats to be transported down the waterway.[101]

As construction of the canal progressed above Dam No. 6, surveys were taken in the upper Potomac Valley to find new sources of hydraulic lime. On one of the surveys, it was discovered that "water lime" or "cement" rock cropped out in the northern part of Cumberland on the west bank of Wills Creek. Here the cement beds were folded and well exposed, allowing convenient access to the rock along the strike. The cement rock proper occurred in beds that varied in thickness from six to 17 feet. Quarrying operations were soon begun by the Lynn-owned Cumberland Hydraulic Cement and Manufacturing Company, and a mill was built on the banks of the creek near the quarries.[102]

The Lynn Mill had a peak capacity of producing 350 bushels of cement per week, a sum that was increased to 500 in 1848. After grinding 1,400 barrels of cement, the "midlings" were ground over to reduce the substance to powder form. The latter process generally required 36 hours to complete. The mill wheel was 16 feet high and was operated by water from Wills Creek.[103]

As early as September 1836, the Lynns offered to manufacture cement for the canal company.[104] Although the board took no action on this proposal, another offer by the Lynns in May 1838 to supply cement to the line between Paw Paw Tunnel and Cumberland led to an agreement the following month.[105] According to the contract, Lynn was to furnish 21,000 bushels of cement at 25 cents per bushel. Some of the cement was to be shipped to canal warehouses at Town Creek and Lock No. 67 for storage.[106] By May 1841, the Lynn Mill had supplied 50,394.14 bushels of cement to the company at a cost of $16,803.07.[107]

Charles Locker was operating the mill in the spring of 1848 when construction was resumed on the canal. A contract was signed whereby he agreed to supply the contractors with 60,000 bushels of cement at a rate of 6,000 bushels per month, if required. It was reported that the mill was full of cement and that delivery of articles to the line had begun in early April.[108]

The hydraulic cement manufactured at the mill received the commendation of noted engineers throughout the years, including Benjamin H. Latrobe, Charles P. Manning and Major Henry Brewerton. The cement was known "for the energy of its action" and for the fact that it would "bear a greater admixture of sand than any other natural cement." In the 1870s, a test comparing the relative strengths of the major cements in use in the United States revealed that "Cumberland Cement" was second only to English Portland Cement in the number of pounds it could sustain.[109] The cement mill continued to flourish into the 20th century.[110]

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[101] James W. Thomas and Thomas J. C. Williams, *History of Allegany County, Maryland* (2 Vols., Cumberland, 1923), 784.

[102] *Maryland Geological Survey, Allegany County* (Baltimore, 1900), 185–186. Later in 1839, four additional cement quarries were discovered in the vicinity of Cumberland. Two quarries were located in the Little Bedford Valley about ¾ mile and 1¼ mile back from North Mountain—both being an extension of the vein Lynn was using. A third quarry was ¼ mile above Lynn's Backingstone Quarry and ¼ mile from the river on the hill side—also an extension southward of Lynn's vein. A fourth quarry was found about 2½ miles up from the mouth of North Branch. McFarland to Fisk, Aug. 8, 1839, Ltrs. Recd., Chief Engineer.

[103] Bryan to Fisk, Nov. 10, 1848, Ltrs. Recd., Chief Engineer.

[104] *Proceedings of the President and Board of Directors,* E, 135.

[105] *Ibid,* 421, 451.

[106] Fisk to President and Directors, June 25, 1838, and Fisk to Morris, Sep. 4, 1838, Ltrs. Sent, Chief Engineer.

[107] Ledger A, C&O Co., 154.

[108] Davis, Hale and Allen to president and Directors, Apr 11, 1848, in *Twentieth Annual Report* (1848), C&O Co., 16–21.

[109] C. J. Orick, comp., *The Mineral Resources and Manufacturing Facilities of the City of Cumberland, MD* (Cumberland, 1875), 23–24.

## 7. IMPORTED CEMENT FROM NEW YORK AND ENGLAND

Most of the cement used in the construction of the canal until the establishment of Shafer's Cement Mill at Round Top Hill in 1838 was produced at the Potomac Mill. However, the presence of large deposits of limestone did not insure that sufficient quantities of high-grade cement could be supplied to the contractors to fill their needs at all times. The Potomac Mill was creating a new industry in the region, necessitating an inevitable period of experimentation as a new science was being learned the hard way. This experimentation continued throughout the early construction period, and the lime, which the contractors received, was not always the high quality that was desired.[111] Furthermore, the capacity of the kilns was limited and often insufficient to supply heavy seasonal demands, thus frequently hindering progress on the masonry works.[112]

The problem of an adequate supply of high-grade lime continued to plague the directors throughout the early construction period. To fill the gaps in the local supply, the board imported large quantities of cement from New York and England. The earliest importation of cement occurred in November 1828 when the directors purchased 500 barrels of Parker's Roman Cement.[113] During the summer of 1829, the first season of full-scale operations, the canal board ordered that until good Shepherdstown cement was produced, the contractors were to use Roman Cement with Thomaston lime for backing.[114] Because the amount of Parker's Roman Cement on hand was insufficient to meet the needs of the contractors, the board purchased 332 barrels of Watts Roman Cement from a firm in Liverpool. The cement was to be shipped on the brig *Caledonia* bound for Baltimore, the insurance the company was forced to pay amounted to $1,770.67.[115] Since the company was in desperate need of cement, the board at the same time bought 50 casks of Rosendale water cement from Ulster County, New York, already on the Georgetown wharves and placed orders for 200 more.[116]

The canal company records are filled with references to further purchases of Rosendale or New York cement until September 1833. Altogether nearly 10,000 barrels, weighing 335 to

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[110] *Maryland Geological Survey, Allegany County*, 185–186.

[111] McFarland to Ingle, May 29, 1829, and McFarland to Leckie, July 23, 1829, Ltrs. Recd., C&O Co.; and Ingle to Boteler and Reynolds, Apr. 22, 1830, Ltrs. Sent, C&O Co.

[112] Leckie to President and Directors, July 22, 1829, Wright to President and Directors, Mar 23, 1830; and Leckie to Cruger and President and Directors, July 1830, Ltrs. Recd., C&O Co.; and Ingle to McFarland, Jan 8, 1830; and Mercer to Boteler and Reynolds, May 5, 1830, Ltrs. Sent, C&O Co.

[113] *Proceedings of the President and Board of Directors*, A, 105. In 1796, Joseph Parker patented the so-called Roman Cement, the process consisting of a conversion by calcinations and pulverization of the nodules, or clay balls, found in the London clays. Henry Reid, *The Science and Art of the Manufacture of Portland Cement* (London, 1877), 29. For a description of the composition and the process of making Parker's Roman Cement see Appendix B.

[114] *Proceedings of the President and Board of Directors*, A, 278

[115] *Proceedings of the President and Board of Directors*, A, 287.

[116] *Ibid*, 283. Rock suitable for the manufacture of natural cement was first discovered in America in 1819 by Canvass White in Madison County, New York, during his service as an engineer on the Erie Canal. During the construction of the Delaware and Hudson Canal in 1825, natural cement rock was found near the Ulster County communities of High Falls and Rosendale, New York, and soon a large mill was erected at the latter town to produce Rosendale or New York water cement. Strictly speaking, natural, Roman, and Rosendale cements all belong to one class, their compositions and the process of their manufacture being similar. Natural or Rosendale cement was somewhat similar to hydraulic lime. Instead of slaking with water, however, after burning it was pulverized, exposed to the air to season, and marketed in powdered form. Instead of having a loss on ignition of 8 to 21 percent as in hydraulic limes, this loss was less than 5 percent and the resulting cement was considered to be much stronger. Richard K. Meade, *Manufacture of Cement* (Scranton, 1922), 3, 32; and Christopher Roberts, *The Middlesex Canal* (Cambridge, 1938), 99

350 pounds each, of the New York cement was purchased by the board for use on the canal at a cost of $24,307.03.[117]

## C. SAW MILLS

### GREAT FALLS SAWMILL, MATILDAVILLE

As construction on the canal commenced in the fall of 1828, the directors determined to build a sawmill near the waterway. In early September, a site was chosen at Matildaville on the Virginia side of the river near Great Falls; and Thomas Fairfax, on whose land the site was located, granted permission for the construction of the mill.[118] It was to be operated by water from the Potomac Company's skirting canal around the falls. In late September, the directors authorized the construction of the sawmill "for the purpose of supplying timber, scantling and plank, where deemed expedient, to the canal."[119] By early November, a contract had been let to William Apsey and work had begun under the direction of Superintendent of Wood Work Hezekiah Langley.[120] Because of the extended illness of the contractor, the mill was not completed until April 1830 at a cost of $2,445.92.[121]

The sawmill was built on a plan similar to that of Lewis Wernwag at Harpers Ferry with one saw and a machine for drawing the logs out of the water. At its peak capacity, the mill could cut 2,000 to 3,000 feet of "4 by 4" plank per day.[122]

During the construction of the sawmill, the canal company commissioned two surveys for the best supplies of timber in the Potomac Valley. Large quantities of good locust timber were in the Shenandoah and Opequon Valleys of Jefferson and Loudoun Counties in Virginia and the upper part of Frederick and the lower part of Washington Counties in Maryland. The Cacapon River Valley was also found to possess good stands of yellow pine, walnut, chestnut and white oak. The small locust, cedar, chestnut, white oak and black walnut trees that were in the path of the canal were considered to be sufficient for making fence posts and railing.[123]

In February 1831, the company leased the sawmill to George W. Smoot of Alexandria for five years at a yearly rental fee of $150.[124] When the Chesapeake & Ohio was opened between Georgetown and Seneca later in the year, the board solicited bids for the removal of the sawmill to an undetermined site on the new waterway. The expense of moving the mill would be repaid by allowing the mover to use the mill. Until a contract

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[117] *Proceedings of the President and Board of Directors,* A, 408, 418; B, 28, 38, 51, 67, 143, 236; and Ledger A, C&O Co., 178–180.
[118] *Proceedings of the President and Board of Directors,* A, 57.
[119] *Ibid,* 84.
[120] *Ibid,* 394–395.
[121] *Ibid,* B, 31, 54, 64; and Ledger A, C&O Co., 180.
[122] Langley to Mercer, Oct. 28, 1828, Ltrs. Recd., C&O Co.
[123] Langley to Mercer, Oct. 28, 29, 1828; and Naylor to Mercer, Sep 30, 1828, Ltrs. Recd., C&O Co.
[124] *Proceedings of the President and Board of Directors,* B, 266.

was let for the move, all detachable parts of the mill were to be stored in the company warehouse in Georgetown for safekeeping.[125]

Although there is no available documentation concerning the relocation of the sawmill, there is evidence that Smoot took the canal company to court over this change in location. After a lengthy battle, the marshal of the District of Columbia in October 1835 ruled against Smoot by confirming the right of the canal company to break its rental agreement and to dispose of its property.[126]

There is no evidence that the canal company established other sawmills along the line of the canal during the construction period. Apparently, as the work progressed up the Potomac Valley, the timber products were supplied by mills in the area such as Lewis Wernwag's mill at Harpers ferry, Jacob Miller's mill about two-thirds of a mile below Pack Horse Ford, William Naylor's mill at the junction of the Cacapon and the Potomac and Young's sawmill at Cumberland. As the construction work progressed, the company increasingly began also to contract with individuals, such as Captain William Easby of Washington, for the manufacture, delivery and installation of lock gates and other timber-related products.[127]

## D. BRICK KILNS

### PAW PAW TUNNEL BRICK MAKING

Lee Montgomery, the contractor for Paw Paw Tunnel, began making bricks for the arching of the tunnel in 1837 or 1838. He used local building materials and a portable brick-making machine obtained in Baltimore. His kiln probably was located at the upstream end of the field adjacent to the canal section superintendent's house, because recent bulldozing at that location has revealed a large quantity of cinders and coal. In the spring of 1838, it was reported that Montgomery's bricks were of poor quality, and consequently, many of them were never used.[128]

When work resumed on the canal in November 1847 under the new contract with Hunter, Harris & Co., the work on the tunnel was subcontracted to McCullough & Day. Mr. Campbell, one of the workers of the latter firm, was assigned the task of making bricks for the tunnel arch. Upon examination, it was found that the excavation material from Section No. 311 at the upper end of the tunnel could be used for brick clay. Further examination of the ground indicated that there were sufficient quantities of clay within one-half mile of the upper portal of the tunnel to produce the 5,800,000 bricks required to arch the structure.[129]

To insure against future problems in producing good brick, Chief Engineer Fisk hired James McFarland to tour Hudson River Valley and to learn the mode of making bricks, the types of machinery used to mix and mould the clay, and the process of burning the bricks. This information was given to Campbell and presumably put to use.[130]

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[125] *Ibid*, C, 21.
[126] *Ibid*, D, 415.
[127] Naylor to Mercer, Sep 30, 1828, Ltrs. Recd., C&O Co.; Miller to President and Board of Directors, May 1, 1863, Ltrs. Recd., C&O Co.; *Proceedings of the President and Board of Directors*, F, 215; Fisk to Easby, Aug 2, 15, 1838, Ltrs. Sent, C&O Co.; and Young to Fisk, Sep 28, 1848, Ltrs. Recd., Chief Engineer.
[128] Morris to Fisk, Mar 16, 1838, Ltrs. Recd., Chief Engineer, and Hahn, *Towpath Guide, Section Four*, 45.
[129] Morris to Fisk, Jun 5, 1839, and Dungan to Fisk, July 30, 1849, Ltrs. Recd., Chief Engineer.
[130] McFarland to Fisk, Feb 11, 1848, Ltrs. Recd., Chief Engineer.