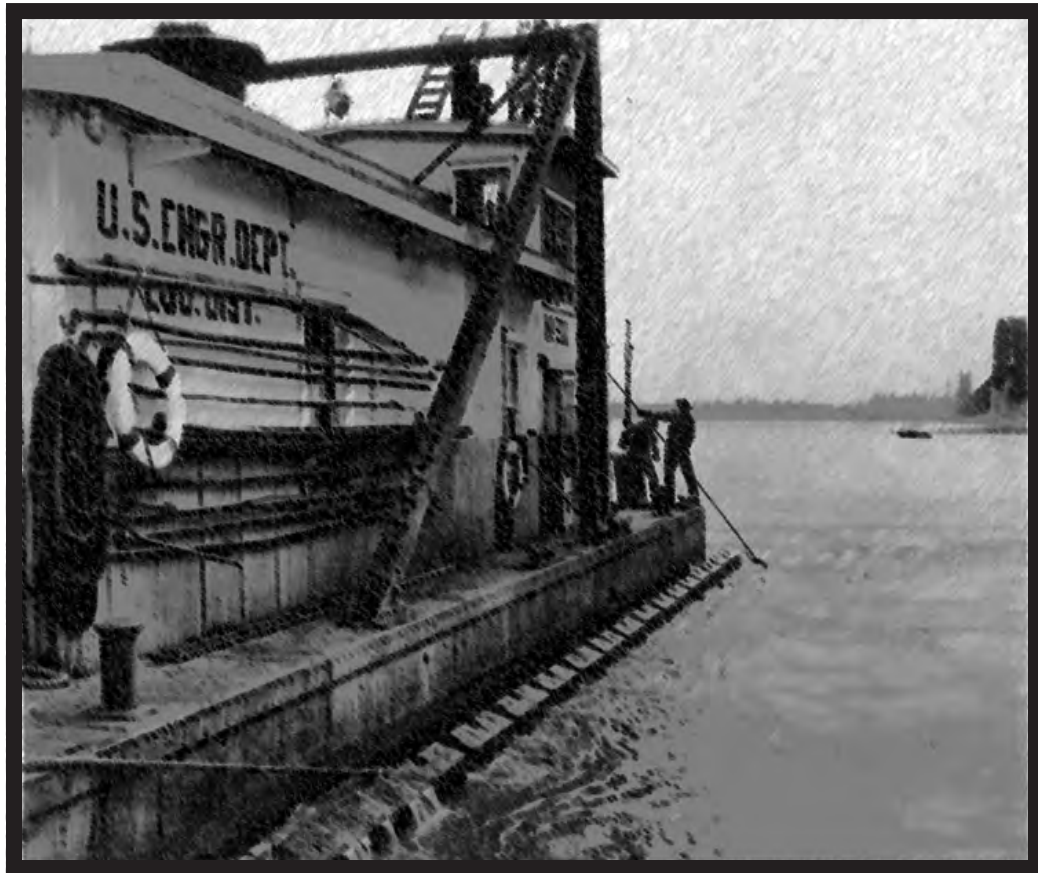


***TRIUMPH AT THE FALLS:
THE LOUISVILLE AND PORTLAND CANAL***



Leland R. Johnson and Charles E. Parrish

**Louisville District
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THE OHIO FALLS

*"To waves like those whose round and murky bulks,
Ribbed white with foam, wallow like batted swine
Along yon ridge of ragged rock o'erstrewn
With petrification of Time's earliest dawn;
Mollusks and trilobites and honey-combs
Of corals white; and here and there a mass
Of what seemed writhing reptiles there convolved,
And in one moment when the change did come,
Which made and unmade continents and seas
That teemed and groaned with dire monstrosities,
Had froze their glossy spines to sable stone."*

Captain Madison Cawein, 1886

*“So long as water runs down to the sea,
so long as there is a pursuit of commerce,
so long as value is placed on nature’s beauty,
so long as winter snows and summer skies nurture the land –
so long will our river Ohio continue as a great transportation
artery and national treasure.”*

Charles E. Parrish, 2002

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FOREWARD



Recognized as a national historic engineering landmark, the McAlpine Locks and Dam at Louisville, Kentucky, received that designation in 2003 in tribute to its fundamental role in the settlement and development of the United States especially in the Ohio River valley. This treatise traces the project's role from transporting produce to markets in pioneer times to its modern function as an artery of commerce supporting American industrial development.

The authors review historic engineering triumphs at the Falls of the Ohio River in five phases, each roughly fifty years in length. In the first phase from about 1780 to 1830, pioneers established passages across and portages around the Falls of the Ohio while planning a canal for unimpeded navigation past the obstructions. In 1830 they completed a narrow fifty-foot-wide canal with three navigation locks carrying steamboats around the Falls; this passage served commerce until 1872 when a wider canal with two navigation locks replaced the pioneer canal. The Army Corps of Engineers became responsible in 1874 for managing the Louisville and Portland canal and operated it for steamboats and small craft until 1921. Responding to the developing towboat-barge industry, the Engineers in 1921 completed a 600-foot-long lock, double the size of earlier canal locks, that became Lock No. 41 in the series of locks and dams canalizing the entire length of the Ohio River by 1929. Lock No. 41 remained the principal lock at the Falls until 1960 when the Engineers completed the 1200-foot-long McAlpine lock, doubling the available lock capacity. By the end of the 20th century the original 1200-foot lock had proven inadequate for

thriving river commerce, and the Engineers again doubled lock capacity by constructing a second 1200-foot-long lock at the McAlpine project. Thus as river commerce evolved from flatboats to steamboats to towboats, facilities at McAlpine project also changed to enlarge the capacity available to growing river traffic.

While outlining this five-phase historic engineering evolution, the authors identified and related new information about each of the phases, making this study a valuable addition to the history of the Falls area, the Ohio River valley, and national engineering history. It offers authoritative reference data for all students of these subjects and more.

George Flickner
McAlpine Project Manager
U. S. Army Corps of Engineers

ABOUT THE AUTHORS

Charles “Chuck” Parrish is former historian of the Louisville District, Army Corps of Engineers. He has authored numerous articles on navigation development of the Ohio River, and has advised many other authors on work pertaining to local and regional history in the Ohio Valley. With Leland Johnson, he co-authored “Kentucky River Development: The Commonwealth’s Waterway.” He is a frequent presenter on navigation history aboard numerous Ohio River excursion boats. He retired from the Corps in 2004 with 30 years of service.

Leland R. Johnson holds degrees from Murray State and St. Louis Universities, and the Ph. D. from Vanderbilt University. Specializing in engineering technology history, he has completed many studies and publications during five decades of research and writing, many chronicling the work of the Army Corps of Engineers in the Ohio River Valley. He resides in the Kentucky - Tennessee highlands of the upper Green and Cumberland River basins.



PREFACE

A triumph of art over nature was the description often applied to the Louisville and Portland Canal built to improve Falls of the Ohio navigation during the nineteenth century. While the indigenous natives perhaps considered the Falls a magnificent recreational resort and attractive source of nutrition, to European explorers and pioneers it appeared a rugged obstruction mystically dropped by nature into the midst of the otherwise untroubled navigation of the Ohio River. Here, the river fell twenty-six feet over jagged rocks, cascading down in impassable whitewater rapids. Here, the canoes, flatboats, ships, and steamboats came to a stop and put to shore where they awaited a flood to submerge the rocks or engaged in a laborious portage, carrying valuable cargoes around the obstruction to proceed either up or down the beautiful river. The exorbitant charges for portaging or the costs of delays while awaiting high water troubled not only the navigators, but also the consumers from Pittsburgh to New Orleans, who ultimately repaid the costs of bypassing the Falls of the Ohio River. To ameliorate this amazing estoppage to their travel and commerce, the Europeans resorted to engineering, which in the nineteenth century was as much an art as it was a science. This study reviews the pioneering navigation engineering at the Falls of the Ohio from its origins through five historic phases during two and a half centuries.

The Falls of the Ohio navigation engineering has been a preoccupation of the authors for a half century. Personally connected with the fourth and fifth historic phases of Falls engineering, they have collected the scattered scraps of information, torn and damaged photographs, and dimming memories of engineers who participated in the first through the third historic phases in order to assemble this history. During their studies they received generous help and support from too many friends to list here. They would be remiss however to omit mentioning the vital assistance offered by Corps of Engineers personnel undertaking engineering's fifth phase at the Falls: John Zimmerman of Planning, architect Douglas Pohl of Engineering, Project Manager George Flickner, Resident Engineer David Klinstiver, and Assistant Resident Engineer Charles M. Haddaway III.

In their search for historic information, the authors gratefully acknowledge the aid courteously furnished by Nathalie Andrews of the Portland Museum; Rebecca Rice, Jim Holmberg, and Robin Wallace of the Filson Historical Society; Dave Schatz of the Kentucky State Archives; Connie Mills, Nancy Baird, Jonathan Jeffrey, and David Spence of Western Kentucky University Library; the egregious steamboat historians Jack and Sandie Custer of Portland; and Captain Zurlinden's granddaughter Shirley Toomey, the last surviving resident of Shippingport, once the urban rival of Louisville at the Falls of the Ohio.

The authors especially appreciate the genial assistance offered from the Corps of Engineers' Washington headquarters by Martin Reuss, William Baldwin, John Lonnquest and Paul Walker of the History Office. Also in Washington, Wayne DeCesar of the National Archives provided critical guidance as the authors waded through massive federal records. Retired Corps surveyor William Kriesle collected, reviewed, and analyzed maps of the Falls of the Ohio found in the National Archives and many libraries.

President Herbert Hoover perceptively observed at Louisville in 1929 that "the majesty of the Ohio was born of the Ice Age, half a million years ago. Its beauty remains today undisturbed by our improvements, and will remain long after our nation and race have been replaced with some other civilization." The authors heartily concur with the President's observation and trust that his seminal thought is reflected in this review of navigation engineering at the Falls from its nineteenth-century origins to its twenty-first century culmination.

Leland R. Johnson and Charles E. Parrish

PROLOGUE

“Have you heard of the wonderful one-hoss shay that was built in such a logical way it ran a hundred years to a day?” Asked poet Oliver Wendell Holmes, before relating the story of a determined deacon who decided to build a chaise that would serve a century without major maintenance. Observing such one-horsepower buggies generally broke down at some weak point before they wore out, the deacon studied previous breakdowns, identified causes of their failures, and by strengthening the weakest parts designed a sturdy chaise that transported him and his descendants exactly one hundred years before collapsing all at once. Holmes’ deacon selected a 100-year design life for his shay, paying high prices for fine materials that might last a century. He could have built it to last ten years at reduced cost using cheaper materials. Likewise, engineers must select design life cycles for their structures, taking into account specific conditions, materials, environmental impacts, life-cycle economics, and history to identify the weakest links that may be corrected in their own designs.¹

Historical studies of waterways engineers have found the economic design life of navigation locks and dams normally has been fifty years. Within a half century, conditions at a project site will change: the commerce the project serves may grow or wane; a dynamic river will alter environmental conditions; changing public needs may dictate additional project features. Designing a structure to last a century would be wasted cost when the structure will become obsolete in fifty years. The history of engineering at the Falls of the Ohio indicates this fifty-year design life pattern has prevailed five times during two and a half centuries, and this pattern should be outlined lest it be obscured by the tumult of human struggles that accompanied each of the five engineering phases.²

This study begins with description of the Falls environment before the application of engineering. From Louisville’s founding at the Falls in 1778 until 1830, pioneer boatmen passed the obstructions to navigation at the Falls as best they could, dragging their craft up the whitewater rapids and employing skilled Falls pilots to steer them safely down, or landing

above or below the Falls to portage their boats and cargoes around the obstructions. These events are fully related to allow comparison of the natural Falls environment with conditions during the five engineering phases as follows.

- From 1781 until 1825, various plans for applying engineering to the Falls were advanced and debated, but none moved forward until formation of the Louisville and Portland Canal Company, a private corporation that obtained federal funding support and completed a fifty-foot wide canal leading to a three-flight lock to raise or lower boats twenty-six feet, thus bypassing the hazards of the Falls. At completion in 1830, this canal had the largest navigation locks in the world, representing the apex of the era’s waterways engineering described as a triumph of the engineering art. These structures served commerce at the Falls until 1872, forty-two years, then became an auxiliary to still larger navigation locks.
- When the triple-flight locks of 1830 deteriorated and became obsolete because most steamboats were larger than the locks, the second engineering phase began. During the Civil War, the canal company widened the canal and more than doubled the capacity of the 1830 locks by building double-flight locks, again the largest in the world at the time. By direction of Congress, the United States Army Corps of Engineers completed these locks in 1872 and put them into service, becoming the first navigation locks ever operated by the Corps. These second-phase locks served commerce from 1872 until 1921, forty-nine years, and then became an auxiliary to still larger locks.
- The third-phase locks merged Falls engineering into the Ohio River project designed to canalize the river from head to foot, affording a nine-foot channel. Because Ohio River locks were numbered from 1 near Pittsburgh to 53 near Cairo,

the new lock at the Falls became No. 41 of the series. Completed in 1921, Lock 41 with a single lift and the standard 600 by 110 feet chamber dimensions of Ohio River locks, again doubled the capacity the previously available at the Falls. Lock 41 served commerce from 1921 to the 1960s, only forty years, reflecting the rapid commercial growth of those years and the transition from steamboats to towboats to towboat-barge commerce. Lock 41 then became an auxiliary to still larger locks.

- Fourth-phase engineering began as part of the Ohio River modernization project, a plan to replace the 600-foot-long locks completed in the 1920s with 1200-foot locks. Completed in 1961, the 1200-foot lock doubled the capacity of Lock 41 with its 600-foot length; at the same time, the canal's width was more than doubled. Named by Congress, the new McAlpine lock served commerce past the Falls from 1961 until 2008, or until the construction of a twin 1200-foot was completed. With rehabilitation, service of the first 1200-foot McAlpine lock would continue through the early twenty-first century.
- In the fifth phase at the dawn of the twenty-first century, construction began of a twin 1200-foot lock at the McAlpine project to again redouble lockage capacity in the passage around the Falls. Like its predecessors, this fifth-phase lock was expected to serve Ohio River commerce at least fifty years to 2050 and beyond.

While tracing this five-phase historical development in detail this study offers information illuminating several nationally significant issues. First, it outlines the evolution of inland river commerce from canoes and flatboats through sailing ships and steamboats to the modern towboat-barge system. From pioneer times, the principal artery of inland river traffic has extended from Pittsburgh down the Ohio and Mississippi rivers to New Orleans, expanding in recent years via the intracoastal waterways to Houston, Texas. Because the Falls of the Ohio obstructed this commercial artery, engineering at the canal and locks was vital to national commercial and economic development.

How the changing requirements of inland river transportation modes and traffic volumes affected engineering at the Falls merits consideration.

This study also traces the evolution of federal waterways policy and its impacts on project design and funding at the Falls. Briefly during the presidency of John Quincy Adams, the federal government invested in construction of the original canal and locks at the Falls, becoming a stockholder in the canal company. President Andrew Jackson, however, stopped such investments, decrying the Louisville canal in his veto message as a threat to American Liberties. Only after the Civil War settled Constitutional issues did Congress accept the Louisville canal as federal responsibility and assign the Army Corps of Engineers its management. This involved the canal in federal civil service reform measures and eventually, during the Progressive era, made it part of comprehensive planning for the entire Ohio River and inland river systems. This study examines the issues of the federal role in historical technology as applied at the Falls of the Ohio River.

At the Falls of the Ohio the Army Corps of Engineers built and operated its first navigation locks system. At the Falls, it learned the complexity of navigation locks design, subsequently applied at Sault Ste. Marie, on the Upper Mississippi River, and elsewhere throughout the nation. It recognized that proper lock operations required an experienced staff managed by permanent command, an organization eventually labeled an Engineer District. It saw that efficient management required a measure of control over the traffic using the locks and regulatory authorities to prevent the obstruction of navigation by bridges or other environmental alterations. How and when the Corps dealt with these issues at the Falls remains a subject of national interest.

Engineering and other alterations inevitably affected the environment of the Falls as elsewhere. Engineering the canals, locks, and dams at the Falls destroyed islands and created more. The alterations in river flow patterns caused erosion, sedimentation, and deposition. Were the pioneers able to see the Falls of the Ohio today, they might not recognize them. The two-mile long expanse of whitewater rapids is

gone, largely inundated by the slackwater pool above McAlpine dam. Boats no longer cross the Falls, proceeding instead through a spacious canal to huge navigation locks, where they are hoisted or lowered to bypass the Falls. How the five engineering phases altered the Falls environment and how the rise of environmental consciousness led to major efforts to preserve the remaining natural environment for the benefit of wildlife and public recreation are subjects meriting attention.

Finally, the engineering of the Falls passed through four and into a fifth phase, each about fifty years in duration, during the nineteenth, twentieth, and twenty-first centuries. In each half century, growing and changing conditions in inland river commerce have made it necessary to double the capacity of locks and navigation facilities at the Falls of the Ohio. The successive structures built during each phase served a half century, some as long as eighty years, but by the end of their design life each had become inadequate to accommodate steadily increasing riverine commerce and the industrial-commercial developments it serves. "Logic is logic," wrote Oliver Wendell Holmes, concluding his poetic analysis of the chaise built by a deacon for a century-long design life. Does the triumph of the engineering arts at the Falls confirm the logic of the fifty-year design life applied to navigation locks at the Louisville and Portland canal? These questions and many more are addressed in this study in substantial detail and concluding observations are provided in the epilogue.



Chronology Of Navigation Improvements At The Falls Of The Ohio



-
- 1825 - 1830** Louisville and Portland Canal and 3-lift locks by company are chartered by the commonwealth of Kentucky. The canal is 50 feet wide.
- 1860s** Canal is widened to 90 feet and 2-lift locks are partially completed. Work directed by Theodore Scowden.
- 1872** The work is completed by the Corps of Engineers. The locks are the largest in the world.
- 1874** Army Corps of Engineers assumes jurisdiction at the Falls.
- 1881** The first dam across the river is complete.
- 1910** A movable dam is built to provide nine foot navigation depth to Madison, IN.
- 1921** A 600' x 110' lock is completed. The canal is widened to 200'.
- 1925-1927** New movable dam and hydroelectric station are built. Project is designated Lock and Dam No. 41.
- 1958-1961** A 1200' x 110' lock constructed. Canal is widened to 500'. The surge basin is dredged. The lift bridge over the locks is constructed.
- 1960** The project is renamed McAlpine Locks and Dam, for Wm. H. McAlpine.
- 1961-1964** A moveable dam is replaced with the new dam with 2 sections of Tainter gates and fixed weir.
- 2000-2008** A 600' lock and remains of Scowden lock are removed. A second 1200' lock is built. Bridges over the locks are removed and replaced with roadway span. The Heavy-lift crane HENRY M. SHREVE is in service.

1 FALLS PASSAGES

The primary function of McAlpine Locks and Dam and the engineering projects preceding it has been to open passages around the Falls of the Ohio, the greatest obstruction to navigation on the Ohio River. Before waterways engineering was applied to the river, pioneer boatmen counted more than a hundred sandbars, shoals, and ripples hindering their passage, and upriver from the Falls of the Ohio were Letart Falls, where the river dropped three feet in a half mile, while far downriver were the dreaded Grand Chain of Rocks, a notorious graveyard for boats. Yet, these impediments did not compare with the Falls of the Ohio, where the river cascaded down twenty-six feet in whitewater rapids generating thunderous waves and blocking passage by all but the smallest boats at lower river stages. Even before engineers in 1825 began modifying the Falls environment by building canals, locks, and dams, however, boatman had sought and found passages through the Falls. Native Americans first identified these passages, guiding early European explorers into and through the narrow chutes; and the pioneer boatmen best acquainted with these passages became Falls pilots, skilled professionals licensed to guide frontier flatboats, keelboats, and sailing ships through the hazardous barrier called the Falls.

Understanding the natural conditions at the Falls, how pioneer watercraft sought passage, and how pilots guided boats past its obstacles can illumine the developing rationale of the engineers who later designed the Louisville and Portland Canal in 1825, Scowden Locks in 1860, Lock and Dam No. 41 in 1914, and finally the McAlpine Locks and Dam.

THE NATURAL FALLS

The Falls of the Ohio River are inland, six hundred miles from seashores on the Gulf and Atlantic coasts; yet, they were formed of coral on the bottom of an ancient ocean. Laid down at the bottom of a sea during the Devonian geological epoch some three hundred million years ago, then buried by the rocky outwash of glaciers, this coral reef subsequently was exposed by the Ohio River's erosive force. As the river cut through and polished the coral reef, it revealed a subterranean magic garden of fossilized coral and shells that mystified pioneers and subsequently amazed paleontologists. Not knowing what to make of the fossils, puzzled pioneers identified them as petrified beeswax and wasp nests, as solidified goose excrement, or as buffalo and elk horns and bones.

Opening a window into prehistoric life, the coral reef at the Falls proved both a geologic treasure and an obstruction to boats seeking to navigate the Ohio.¹



The Falls of the Ohio were whitewater rapids, two miles long with eight-foot vertical drops. High water submerged the Falls, making boat passage possible. (Glenn Drummond Postcard Collection)

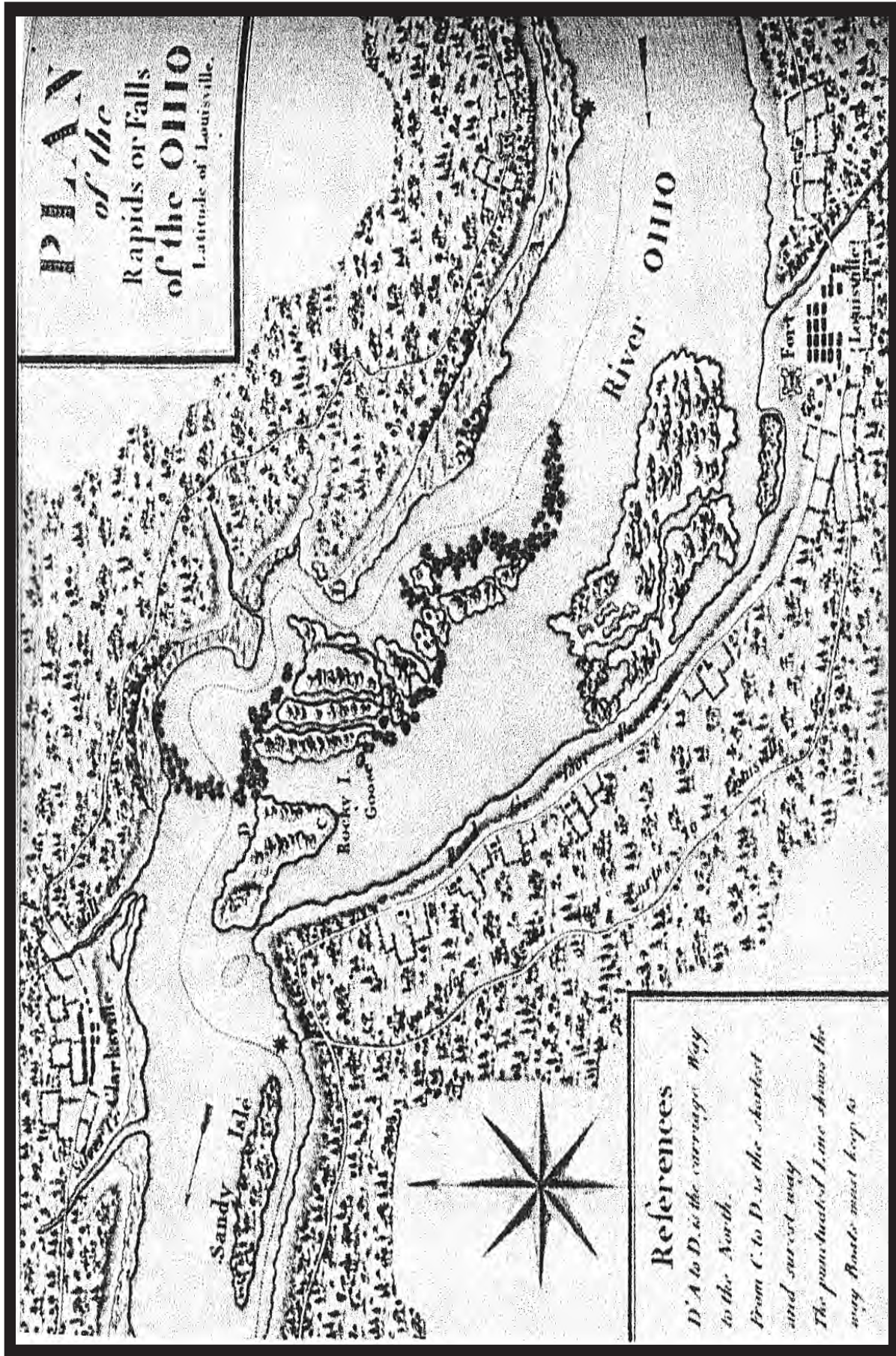
Native Americans traveling the inland rivers found at the Falls of the Ohio a delightful break in the forest stillness, the river dashing across the coral reef thundering a welcome audible for miles. Canoeing down the river or following the traces left by buffalo herds passing across the river at the reef, the natives found swarming around the Falls immense flocks of birds, abundant game, and fish and shellfish. As mementos of their visits to the Falls, the native Indians left the river banks littered with fish hooks and sinkers, projectile points, and piles of fishbones. They tossed the shells of the mussels they found and devoured at the Falls in piles mounded ten feet deep stretching a mile along the bank. Here at the Falls, the natives enjoyed an unusually varied diet, food easily taken beside the fresh water. At this bountiful coral reef amidst the wilderness, they made their recreational resort, enjoying the splashing water, wading the shallows, catching the fish and shellfish, harvesting the game until they could hold no more, or until approaching floods forced them to leave for higher ground. Because they used canoes for travel and also for recreation, the natives probably made descending the Falls a challenging sport. Testing their paddling powers and skills against the Falls' turbulence, at the same time they learned the intricacies of channels that might be used to safely pass the Falls. Thanks to this experience, these natives became the first Falls pilots, guiding European vessels attempting passage of the Falls, and pioneers subsequently dubbed the deepest passage through the Falls "the Indian chute."²

Alarmed at the rush and roar of the Falls, the first French voyageurs down the Ohio turned their boat toward shore, escaping the swift current that was sure to take their boat into the rapids and finding safe harbor in the mouth of a creek on the south bank. Perhaps because French explorers recognized that the Falls resembled the coral reefs they had encountered in the Caribbean, they called them the "barre gros," which may be translated as the great reef. They might have intended it to mean the great obstruction, however, because the Falls hampered navigation as surely as coral reefs barred the entrances to island harbors. At these island reefs, waves rolling in from the sea formed turbulent, frothy whitecaps and dangerous currents that drove ships to destruction against the reefs. So it

was at the Falls of the Ohio, when first seen by French and English explorers.³

Falls of the Ohio was a misnomer, leading strangers to visualize them as precipitous falls with vertical drops like Cumberland Falls or Niagara Falls. People with this misconception often were disappointed when they saw the Falls of the Ohio, because these were better described as rapids, not falls. Although the total descent of the river at the Falls was twenty-six feet, it dropped through a long stretch of river with no vertical fall higher than eight feet. Who originated this misnomer is no longer apparent, but they were so named in the first description of them penned in English. In 1742 John Peter Salley with four other Virginia explorers floated down the New, Kanawha, and Ohio rivers in a bullboat, a wooden frame covered with buffalo skins, reaching the Falls of the Ohio in May. "The Falls," Salley reported, "are three miles long in which is a small island, the body of the stream running on the north side through which is no passing by reason of great rocks and large whirlpools." Lacking Indian guides to pilot them over the Falls, Salley and his companions clung near the south bank for safety and descended the rapids south of Corn Island through the shallow chute later called Kentucky chute because it was nearest the south bank and located within the Commonwealth of Kentucky.⁴

When British army engineers Captain Harry Gordon and Lieutenant Thomas Hutchins descended the Ohio in 1766, mapping the river as a supply line to British garrisons in Illinois, they noted that the name Falls was a misnomer. "The Falls ought not to be called so," commented Captain Gordon, "as the Stream on the North Side has no sudden pitch, but only runs rapid over the ledge of a flat Limestone Rock, which the Author of Nature has put there, to keep up the Waters of the Ohio." Captain Gordon noted that the Indians, "who knew the channel best and were useful and willing" guides, steered the engineering party down the Falls through the deepest Indian chute. Gordon also warned that river travelers without Indian guides should always put to bank for safety and portage around the rapids, even if it meant dragging their boats over the flat limestone ledges. This good advice was not always heeded, however, and boats supplying the British forts in Illinois were wrecked while descending the Falls, and one was



PLAN
of the
Rapids or Falls
of the OHIO
Latitude of Louisville.

References
D'A to D. is the carriage Way to the North.
From C. to D. is the shortest and surest way
The punctuated Line shows the way Roads must keep to

Victor Collot's 1796 map of the Falls of the Ohio outlined the trails on both banks used to portage around the falls. (Collot, *Journey in North America*, 1826)

entirely lost, becoming the first although far from the last boat wreck recorded at this obstruction.⁵

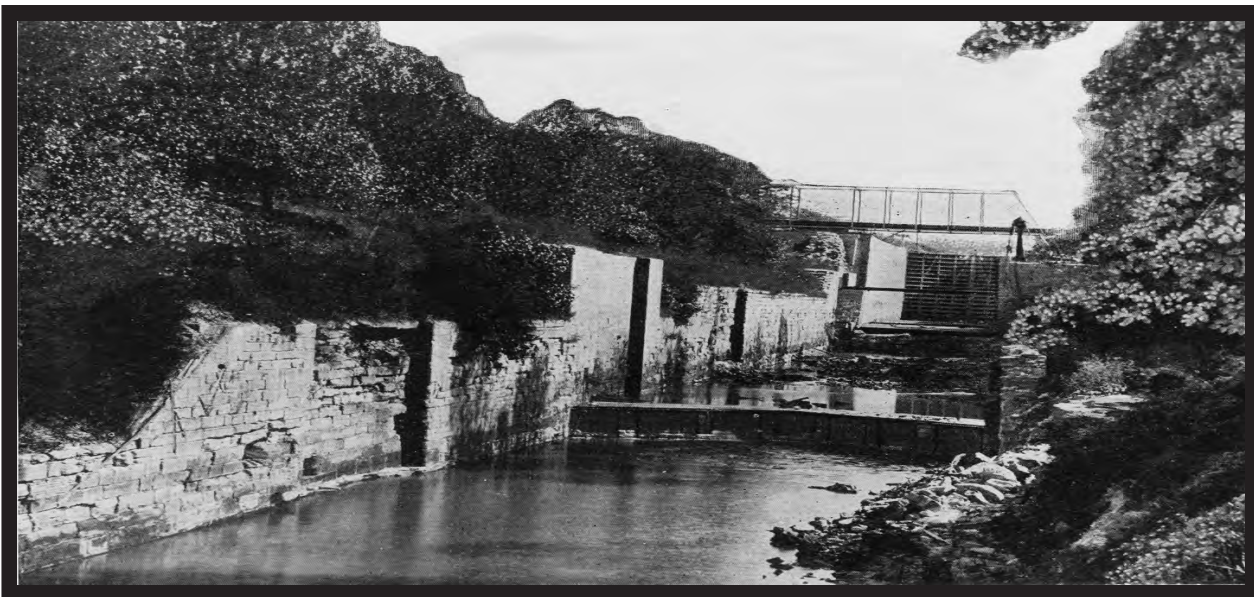
Passing the rapids at any river stage less than the highest was extremely hazardous. The limestone coral reef formed a natural dam in the river, holding a deep pool of water above it extending eighteen miles upriver. At high stages—highwater—the river below the Falls swelled up to a level just eighteen inches lower than the river above, submerging the rocky reef. Then, boats passed the Falls with reasonable safety, if their crews prevented swift currents from forcing their boats into jutting riverbanks or into trees growing on the four islands at the Falls. Although flowing generally in a southwesterly direction, the river was turned northwest by the limestone coral reef, sharply bending around the reef before returning to its southwestern course. Boatmen passing the Falls not only had to contend with rocks and turbulent currents, they had to steer around the river bend and be sure to miss four islands in the bend.⁶

The four islands in the river bend at the Falls were: Corn, Goose, Rock, and Sand islands in downstream order. At the head of the bend was rocky Corn Island next to the Kentucky bank, which at extreme low water was connected to the bank. Goose, the largest island, was a long rocky reef parallel with the northern bank; at extreme low water it also could be reached by wading the shallows from the Kentucky bank. Below it was Rock Island on the inside of the river bend and near the peninsula that eventually was dubbed Shippingport island.

At the foot of the Falls and in the center of the river was Sand Island, formed as the name implied by sand and sediment washed from the rocky Falls, its size alternately growing or decreasing as river currents eroded it away or expanded it with sandy accretions. The peninsula inside the river bend was dubbed Shippingport island after 1830 when the canal across the peninsula's base made it accessible only by bridges. These islands were part of the naturally dynamic environment of the Falls, constantly changing as the river flooded and receded, always presenting new challenges to boatmen attempting passage. No boatman ever went down the same Falls twice, for conditions changed between one trip and the next.⁷

At low stages—low water—the cascading river thundered over the rocks and boatmen had to seek one of three natural passages open through the Falls called chutes. These were also spelled schutes and shoots, and boatmen sometimes described swift trips down a chute as shooting the Falls. Indian chute, the deepest and longest, traversed a serpentine channel between the north bank and the rocky knoll known as Goose Island, making a sharp bend near its foot and forming a whirlpool called the Big Eddy; this passage was 2.6 miles long, dropping down seventeen feet in its first 2,000 yards.

In the middle of the river was the aptly named Middle Chute, passing through between Goose and Rock islands; it was 2.2 miles long with most of the entire descent concentrated in the last 500 yards. The Kentucky chute lay near



A series of three lock chambers in 1830 moved boats up and down past the Falls of the Ohio. (Glenn Drummond Postcard Collection)

the south bank, passing down between the bank and Rock Island; nearly all the descent in this chute was found in the last 185 yards, including a precipitous eight-foot drop. As the river rose to higher stages, the Indian chute near the north bank first became deep enough for boat passage, followed by the Middle chute and, last, the Kentucky chute. To descend the Falls, boatmen preferred the Indian chute, while they chose the shallow Kentucky chute to ascend, because Indian chute was deepest and in Kentucky chute, on the inside of the river bend, the current was not so swift. As a result of these and related environmental factors, the Falls afforded safe navigation only three months a year, generally during winter and spring highwater, and in the remainder of most years all but the smallest craft had to land at the riverbank to portage their cargo around the Falls. Usually they landed on the south or Kentucky side for two reasons: Beargrass creek entering the river on the south side offered an easy anchorage, safe from passing flood currents or ice; in addition, the carrying distance across the inside of the river bend was shorter and not so steep as the portage around the outside of the bend on the north bank.⁸

PIONEERS AT THE FALLS

Early explorers on the Ohio copied and used the watercraft designed by Native Americans, either bark or dugout canoes. Bark canoes were formed of bark peeled from birch and elm trees and stretched over a frame with a pointed prow and stern, shaped much like the metal and fiberglass canoes of the 21st century.

More prevalent on the Ohio River, however, were the dugouts, carved from felled trees by judicious applications of fire and repeated scraping with stone tools. A British soldier in 1761 reported that Cherokees built dugouts that were forty feet long, two feet wide, with flat bottoms and sides capable of transporting twenty warriors. Dugouts could be as large as the tree-trunk's size and energy of their builders permitted, and sometimes two dugouts were lashed together with planks laid across the tops of their gunwales, forming a deck for passengers with the two canoe hulls serving as cargo holds; these were especially useful for ferrying across rivers. George Rogers Clark and other pioneers explored the Ohio River in dugout canoes before the Revolution, and dugouts were found a century later lodged against rocks at the Falls. These narrow and shallow-draft canoes could descend the Falls at most any river stage, and native warriors handled them so skillfully that they could propel them up the Falls against very strong currents.⁹

In addition to native canoes, the early French and British explorers also used bateaux, quickly constructed wooden craft in shape similar to the long flatbottom skiffs or jonboats still used by Ohio River fishermen, although commonly fabricated of metal by the 21st century. Like canoes, these shallow-draft bateaux were maneuverable and could wend their way through the narrow passages at the Falls. Large bateaux, capable of transporting considerable freight, were also built, and Engineer Thomas Hutchins built an armed bateau to transport troops and cannon.



The Big Eddy at the Falls remained a whirlpool in this 1920 view looking upstream from the Indiana bank. (University of Louisville Photographic Archives)



This 1830 view looking upstream at the Falls from the Indiana bank shows the three chutes used by boats: from left, Indian, Middle, and Kentucky chutes. (Filson Historical Society)

Naming it the *Gage* in honor of the British commanding general, Hutchins used this armed bateaux to patrol the lower Ohio River.¹⁰

When Thomas Hutchins visited the Falls in 1768, leading the Royal American regiment to the Illinois garrisons and completing his maps of the Ohio and its Falls, he had no Indian guides and landed the regiment's boats on the bank to survey the rapids before attempting the descent. Hutchins found no safe route over the Falls, but a young ensign with experience shooting rapids on the Hudson River volunteered to attempt passage. "I jump't at the opportunity," the ensign proudly reported, "threw some baggage out of the boat to make her light in the head and went off immediately. I reconnoitered the head of the Falls well before I made the attempt and when I had found passage, went off and in 2 minutes and 5 seconds passed the Falls." Thus encouraged, Hutchins and the regiment embarked and "shot" the Falls behind the ensign, suffering only a single drowning as they proceeded to Illinois. The detailed maps of the Falls and river drawn by Hutchins subsequently guided not only British army units and supply boats traveling the river, but also George Rogers Clark, who led Virginia troops of the Revolutionary army on their way in 1778 to attack the British forts on the Mississippi and Wabash rivers.¹¹

Recognizing that all boats carrying supplies or reinforcements for the Revolutionary army would be forced to land at the Falls, where

they risked ambush by the British or their Indian allies, George Rogers Clark established a base camp there in May 1778, settling families on the island at the head of the Falls, first named Dunmore Island by surveyors after Virginia's British governor and renamed Corn Island by the pioneers because they raised their first crops on the island. Three hundred additional settlers arrived at the island the following year, and in 1779 the pioneers relocated their settlement from the island to the Kentucky bank and obtained a charter for the village named Louisville, honoring King Louis XVI of France, ally of the American Revolutionaries against Britain. It was here that George Rogers Clark built the first boat constructed at the Falls, completing in 1782 a row galley, 73 feet long propelled by 46 oars, capable of transporting 110 troops armed with small cannon. With hinged panels that could be raised to protect the crew from enemy fire, it patrolled the Ohio during the Revolution to protect against crossings into Kentucky by the British and their allies.¹²

Warfare during the Revolution and the following decade drove the original inhabitants from the Falls' vicinity, depriving boatmen of native guides to the passages through the Falls, and without guides some boats were wrecked. When General Richard Butler visited Louisville in 1785 he was shocked by the villagers' callous disregard of boat wrecks. At the Louisville landing he heard the distress cries of boatmen who had attempted to shoot the Falls, missed the channel, wrecked their boat, and were clinging



Drifting broadside to the current, this small boat appears bound for disaster. (University of Louisville Photographic Archives)

to a rock amidst the turbulence. He rushed into the village and found the townspeople playing cards, ignoring the cries of terror from the Falls. General Butler persuaded them to launch a rescue attempt, but drunken men in the rescue party missed the rock and narrowly escaped drowning themselves. A second rescue party had more success, bringing the wet and freezing victims to the bank safely, except one who fell into the current and was swept to his death.¹³

While canoes and bateaux had served exploration parties and small troop units well, the settlers moving to the Ohio River frontier during the 1780s built more stable and commodious flatboats, also called arks or broadhorns, large enough to transport families along with their household furnishings, wagons and farm implements, cattle and horses. "They are of a square form, some longer than others," commented a pioneer on the design of flatboats: "their sides are raised four feet and a half above water; their length is from fifteen to fifty feet; the two extremities are square, upon one of which is a kind of awning, under which the passengers shelter themselves when it rains." Flatboats then were merely large, sturdily-built wooden boxes, somewhat similar in shape to modern single-wide house trailers. Having no engines other than manual power, they floated with the current, the crew merely keeping them in the channel with oars or gougers. A long oar at the stern served as tiller, a shorter oar at the bow helped steer in close quarters, and two or more long oars on each side provided propulsion. Because of their box-like design, flatboats were ill suited to navigate

upstream against currents, and, therefore, on arriving at their destination they were disassembled and their timbers often used to construct cabins or barns. Pioneer immigration expanded swiftly after the Revolution, and by 1788 at least 308 flatboats, carrying over 6,000 immigrants with 3,000 head of livestock and 150 wagons were counted passing down the Ohio toward the Falls.¹⁴

As American settlers built their cabins and planted crops, the issue arose of how they could market their surplus produce. Few frontier staples the settlers produced could be transported up the Ohio and wagoned over the Appalachians to coastal markets at a profit. To explore alternative markets, Barthelemi Tardiveau, a French merchant who moved to Pennsylvania during the Revolution at Benjamin Franklin's recommendation, addressed a questionnaire about commercial prospects to leading Kentuckians; and Attorney General Walker Daniel replied that a profitable trade down the rivers to New Orleans might be developed. Captain John May, for whom Maysville, Kentucky, was named, agreed that a flatboat trade with New Orleans seemed promising. "At the Falls of Ohio is the place where all vessels both coming up and going down the river must call to unload," Captain May observed: "I am of opinion it will be one of the greatest trading towns in America. Loaded boats can at all times pass up and down the river both above and below the falls, but as it is only at certain periods that they can pass through, I am inclined to think that the vessels intended for the navigation of the river above that place will be kept above altogether; that they will unload there, take in other cargoes, and return to the places from whence they sailed, without going below, and that other vessels will bring our goods to the Falls." With this encouragement, Barthelemi Tardiveau and partners launched flatboats laden with flour and other commodities at Pittsburgh and sent them to New Orleans in 1782. They passed safely over the Falls and down the Ohio, but river pirates on the Mississippi seized the boats and they never reached New Orleans.¹⁵

A second effort to establish riverine commerce came in 1787, when General James Wilkinson of Frankfort on the Kentucky River took a flatboat cargo to New Orleans and negotiated with Spanish officials the privilege of

selling commodities at that market. Wilkinson followed this up, making subcontracts with frontiersmen to market tobacco and flour in flatboats to New Orleans, and a fleet of twenty-five flatboats went south in 1788. The Spanish then opened the New Orleans market to other entrepreneurs and during the 1790s the annual flatboat trade from the Falls to New Orleans surpassed a \$1 million value. While the Kentucky flatboats transporting immigrants had a cabin at the stern to shelter families with the open bow filled with cattle and farm equipment, the New Orleans flatboats were completely covered to protect exported commodities from the weather.¹⁶

FALLS PILOTS

The steadily growing flatboat trade with New Orleans inspired the employment of professional Falls pilots, who were familiar with the intricate chutes and who profited by steering boats across the Falls. The early Falls pilots were not licensed and their names were seldom recorded, except in the case of Moses Oliver. Major Thomas Doyle, leading troops in keelboats down the river to construct Fort Massac near the Ohio's mouth, employed Oliver in 1794 to guide the boats over the Falls, but Oliver bungled one of them on rocks, perhaps indicating why he was not on the list of licensed Falls pilots.¹⁷

The first licensed Falls pilots were James Patten and his son-in-law John Nelson. Patten was one of George Rogers Clark's troops who had settled his family on Corn Island in 1778; he acquired a home in Louisville and also, as one of Clark's veterans, a tract of land north of the river. He and his son-in-law received their Falls pilot licenses in 1797 in accordance with a Kentucky act of that year: "Whereas great inconveniences have been experienced and many boats lost in attempting to pass the rapids of the Ohio for want of a Pilot and from persons offering their services to strangers to act as Pilots, by no means qualified for this business, for remedy whereof, Be it further enacted, that the county court of Jefferson is hereby authorised and directed to appoint such person or persons during good behaviour for pilots, as to them shall seem best qualified for that purpose, taking bond and security of the person so appointed, for the due and faithful performance of his office; and the pilot so appointed shall receive for each boat he pilots through the rapids, two dollars."¹⁸

In 1797, Francis Bailey boated downriver and employed a Falls pilot during his stop at Louisville. Bailey vividly described the Falls, reporting that what made Louisville "enchanted as well as awfully grand, is the almost perpetual presence of an immense cataract of water, formed by the Ohio hurrying itself with the greatest rapidity over a ledge of limestone rocks, which extend from one side of the river to the other: I say, almost perpetual, because in time of high-water when the banks are quite full, the torrent is scarcely perceptible except in one place, and boats of any size may pass over with the greatest safety and in the darkest night; but when this supply is not kept up, and the water flow begins to lose its level, then the torrent begins to roar, and loud-sounding rocks to foam with unabated vigor, then the boat twists its unyielding sides to the force of the compelling current, and the long-accustomed pilot with dismay exerts himself, and stirs on his associates to lend a willing hand to save him from the impending destruction; till at last, escaped from all danger, the vessel, like an arrow from the bow, is propelled with great violence from this Charybdis."¹⁹

Victor Collot, a French officer who mapped the Ohio River in 1796, observed that Louisville's location at the mouth of Beargrass Creek was too close to the Falls. "This town being placed very far below the point where the current begins, and on the opposite side of the channel," Collot reported, "all the vessels which touch there to take pilots are obliged to ascend the river more than two miles above Louisville, to gain the current on the opposite side, which leads to a considerable expense and much loss of time." He meant that after boats landed at Louisville to hire Falls pilots, their crews had to row upriver two miles, close to the Kentucky bank where the river current was not so swift, then cross to the Indiana bank to get into the current floating them into Indian chute over the Falls. As a result, boats bound downriver, without cargo to land at Louisville, did not stop there; instead, they landed on the north bank and employed an Indiana pilot to take them down.²⁰

Because Indiana Territory had no licensed Falls pilots, anyone on the north bank could claim to be a pilot. Kentucky Falls pilot James Patten published a warning about this in 1802: "NOTICE. Aaron Bowman living in Indiana Territory undertakes to pilot boats through the rapids without authority and he damages many



Kentucky appointed James Patten in 1797 as the first licensed Falls Pilot. (Courier-Journal, Jan. 11, 1959)

boats. People who need pilots should land on the Kentucky side. If the Indiana Territory appoints a pilot, it should get someone more capable." The Indiana territorial government recognized the merits of Patten's warning, and in 1803 it adopted a licensing law for Falls pilots, copied nearly verbatim from the 1797 Kentucky law, except that Indiana pilots were appointed by the governor instead of by county government. Governor William Henry Harrison appointed the first Indiana pilots in 1803, selecting Davis Floyd and John Owens of Clarksville.²¹

As this licensed piloting system developed, Major Jonathan Williams, the first chief of the U. S. Army Corps of Engineers, surveyed the Falls in July 1801. Commanding the Second Regiment of Artillery and Engineers, Williams was leading his regiment downriver in three flatboats to build a cantonment overlooking the Grand Chain of Rocks near the river's mouth. He had been ordered to stop at Louisville to employ a Falls pilot, and he spent several days in company with Falls pilot John Nelson exploring the Falls. The pilot took Williams out onto the Falls, riding horseback across the Kentucky and Middle Chutes to Goose Island to examine the fossils. Like many others, Williams initially mistook the fossils as the petrified horns of animals, but when the Falls pilot pointed out that these actually had once been tree roots, Williams exclaimed in amazement that "this body of rock was once a forest."²²

Falls pilot Nelson then guided Williams and the engineer regiment in their boats down the Falls, and Williams later described the experience in a letter to his wife:

"The Ohio in point of convenience & safety is (except in this spot) the best in the world but here at the falls it is among the worst of navigable rivers at this season of the year. It is divided into 3 Chutes (this was I suppose the original word but the people here call them shoots & speak of shooting through the falls) & in a distance of 2 miles falls 22 ½ feet perpendicular but not in equal gradation. Two of the Chutes are now nearly dry. The islands that divide them, although there are some remnants of trees, are merely land banks, and in great freshes are probably overflowed. The remaining Chute becomes more rapid in proportion as the water is more confined, and when we passed with our boat we had not six inches to spare between the rocks; all three boats however passed very safely, having first by dividing our loading among the boats made them all draw alike but about 12 inches of water. In passing the most dangerous part of the falls we went with such rapidity that the distance of about a mile & ¼ was performed in 4 minutes. What would you think at seeing a floating house carried with that rapidity through such a narrow passage where the deepest water over the rocks is not 2 feet & when we had not 6 inches to spare between them?²³

The original low-water passage between rocks through Indian chute was indeed narrow. George Gretsinger, one of the early Falls pilots, reported the space between the rocks of Indian chute was initially only eleven feet and eight inches wide. This clearance was adequate for narrow canoes and bateaux, but not for flatboats, often fifteen feet or more abeam. The early Falls pilots therefore carried sledgehammers along during their passages through the chute to knock off the projecting points of rock, and in this primitive fashion they gradually widened the space between

rocks to eighteen feet. Still, Gretsinger reported, “many flatboats with their cargoes have been injured or lost, coming in contact with rocks.”²⁴

KEELBOAT COMMERCE

The narrow chutes and swift current at the Falls also hampered the developing upstream keelboat commerce from New Orleans. Evolved through improvements in bateau construction, keelboats had sleek hulls with pointed bow and stern, a rigid longitudinal timber, or keel, which bore the brunt of collisions, and ribs covered with planking from the keel to the gunwales. Keelboat dimensions varied from thirty to seventy-five feet in length and from five to ten feet wide, although the big keelboats called barges could be much larger. A keelboat navigator described their superstructure as “a covered way, a kind of cabin occupying the entire hold of the boat, excepting spaces for small decks at each end and a strip on each side the whole length of the boat, about fifteen inches wide, called the run, on which the men walked when poling the boat upstream.” These had masts and sails, and when winds blew upstream, as they generally do on the Ohio, the keelboats could sail upriver. When winds failed, crews propelled the keelboats with long iron-tipped poles, facing downstream on the side runs, setting their poles against the riverbottom, and leaning into the poles while walking the boat upriver under their feet. When the crew reached the boat’s stern, they went over the cabin back to the bow, planted their poles again, and pushed the boat upriver beneath them. Hence, keelboatmen sometimes boasted they had walked up the Ohio River backwards.²⁵

Keelboats apparently were initially developed by French mariners in Louisiana, and their crews often spoke Cajun patois, wearing red bandannas around their heads and sounding bugles when they approached landings. The keelboat *La Belle Rivere* commanded by Captain Michael Chantrille, for example, plied regularly from New Orleans past Louisville to the French settlement at Gallipolis, Ohio. The crews were famous for their fiddle playing and dancing atop the boat cabins, as well as for their hard drinking and labor. The boats carried coils of rope known as cordelles used to warp up rapids such as the Falls, by sending out crewmen in a skiff to tie one end of the rope to a tree or another anchorage, while the rest of the crew on the boat’s prow tugged on the rope, thereby dragging their craft

N O T I C E

THIS is to caution all persons who navigate the river Ohio, that a certain AARON BOMAN living in the Indiana Territory has undertaken to Pilot Boats through the Rapids without any authority and damages many Boats-and as I am authorized by the State of Kentucky, to prevent impositions on strangers, I hope every person who wishes to pass the Rapids will land on this side of the River, where every attention shall be given for their safe passage.

If the government of the Indiana Territory should deem it *lawful* or *expedient* to appoint a Pilot on that side of the River, they would undoubtedly appoint some person more capable of the business, and a man of some respectability.

JAMES PATTEN, Pilot.

Louisville, March 25th, 1802.

This warning appeared in a Pittsburgh newspaper in 1802. Indiana accepted Patten’s suggestion, licensing Falls pilots in 1803. (Tree of Liberty, May 1, 1802)

upstream. Keelboats ascending the Falls as a rule used the shallow chute near the Kentucky bank, inside the river bend where the current was least powerful. They also carried iron ring-bolts, which were long spikes with a loop at the top holding an iron ring; in the absence of trees to tie to, the crew could drive the ring-bolts into rock crevices, providing anchorage for their cordelles.²⁶

By the 1790s the construction of flatboats and keelboats had begun at Louisville, mostly on the Point, the finger of land lying between the river and the mouth of Beargrass Creek. There were no sawmills then, and the timber was cut with whipsaws. Whipsaws resembled common crosscut saws, but instead of being operated laterally like crosscuts, their movements were vertical—one sawyer on top of a log and another in a pit below, one pulling alternately up and the other down to

sever planks from the log. At Louisville were built keelboats for the New Orleans trade, some ordered by French merchants such as Antoine Cornu of Natchitoches, Louisiana, and others built for Louisville shippers. By 1803 when the Louisiana Territory was purchased from the French, Louisville had four large keelboats carrying Kentucky tobacco, flour, hemp rope, and barreled pork to New Orleans and returning with imported sugar, molasses, wines, and liquors from the West Indies. These keelboats were the *Time* and *Chance* commanded by Thomas Winn, the *Ann* under Captain James Riddle, the *Perseverance* under Matthew Gale, and the *Betsey* under Robert Buckner. In addition, Elijah Craig, the famous Baptist minister credited with building the first whiskey distillery in Kentucky, commanded the keelboat *Sophia* plying from New Orleans past Louisville to Frankfort. John Young, who then sawed lumber on the Point, later recalled: "Our produce was taken to the South in keelboats. It was generally carried directly to New Orleans by means of these river craft and there exchanged for sugar, coffee, molasses, fruit, etc. Keelboats were manned by about twenty or thirty men each. In the forward end of each craft was a sail which worked the boat when the wind blew. When the wind wasn't around the men worked the boat by a rope, which they tied to the forward end and then ran to the shore. The crew worked the boat along by pulling on this rope, having to go through mud or anything else that might be in the way. It generally took three

months to make a trip to New Orleans and back."²⁷

Shippers at Cincinnati, Wheeling, Pittsburgh and other ports also built and operated keelboats and by 1811 when the first steamboat reached Louisville there were about three hundred keelboats dragging up and down the Ohio and its tributaries. To take advantage of the economies of scale, very large keelboats called barges had come into use by 1811, and that year, the barge *Cincinnati* on its maiden voyage arrived at the Falls on May 9, sixty-eight days out of New Orleans with sixty-five tons of sugar and coffee. With sloop-rigged sails, it was 100 feet long and 16 feet wide, with a crew of eighteen who warped it up over the Falls in just a half day. After landing cargo at Louisville, it went on to Cincinnati, then returned to New Orleans, reaching the Crescent City in the record time of forty-two days.²⁸

SHIPS AT THE FALLS

Keelboats were also built and operated by Tarascon Brothers and Berthoud at Shippingport, the town they founded at the foot on the Falls in 1803. John and Louis Tarascon and James Berthoud were wealthy Frenchmen who fled the revolutionary reign in 1794 and moved to Philadelphia, where they became shipping merchants. Hearing of the growing river commerce, they sent James Berthoud to explore



Skilled Falls pilots could thread large boats at high water between projecting rocks in the chutes. (University of Louisville Photographic Archives)

the Ohio and Mississippi rivers, and he returned with favorable report: the trade was growing and sailing ships were being built along the Ohio to sail directly into foreign trade, as far away as Trieste, Italy. The Tarascons and Berthoud opened a ship-building yard at Pittsburgh together with warehouses, rigging and sail lofts, anchor-smith shop, and all facilities needed to build sailing vessels. They built keelboats to operate from Pittsburgh to St. Louis and New Orleans, and they also built at least five sailing ships, filling them with frontier staples and sailing them down the rivers to New Orleans, then around the coast to Philadelphia where their business partners put them into coastal trades. Their sailing ships were too large and drew too much water, however, to pass through the narrow Indian chute across the Falls, suffering great delays awaiting highwater over the Falls and damages when descending.²⁹

In 1803 the Tarascons decided to relocate their shipyard and related businesses from Pittsburgh to below the Falls, and in December James Berthoud bought for them forty-five acres at the point of the peninsula extending into the riverbend just below the Falls. There, they built their shipping yard, warehouses, and a mill, surveying and platting the town into lots for sale. They built homes, and James Berthoud and his son Nicholas erected a mansion that also served as a community hotel.³⁰

The Tarascons and Berthoud, along with the Ohio River shipping entrepreneurs generally, suffered a series of setbacks at the Falls, notably in 1807. That April four new sailing ships, the *John Atkinson*, *Tuscaroa*, *Rufus King*, and *Penrose*, drawing from eleven to thirteen feet of water, were lying at Louisville awaiting a rise. When the river rise came, high winds prevented their departure, and when the winds abated the river quickly began to recede. The ship captains determined to force the passage anyway, and suffered the consequences. Passing down Indian chute the *Atkinson* hit the rocks and was damaged, floating below to ground on Sand Island. Following, the *Tuscaroa* and *King* also struck the rocks and began filling as the wrecks rolled from one side of the chute to the other in torrential currents. They collided, tearing off the *King's* bow and killing one crewman, and both wrecks sank on the Falls. Seeing what happened to its sister ships, the *Penrose* abandoned the effort and returned to Louisville, where it awaited another rise for more than a year.³¹

Crossing the Falls was just one of several obstacles met by Ohio River shippers in 1807. Ship merchants John Jordan of Lexington and John Mullanphy and John Instone of Frankfort, who built sailing ships on the Kentucky River, put their ships over the Falls with only minor damages, but lost them at sea after they had passed New Orleans. One ship foundered off the coast of France, and the British navy seized and confiscated another. Because the British navy blockaded trade with Napoleon's France and the two belligerents confiscated American shipping, President Jefferson in 1807 signed an embargo act forbidding American trade with either nation, curtailing the efforts by Ohio River shippers to sail directly to foreign markets. The Ohio River shipbuilding industry then ceased ship construction, except of the Navy gunboats ordered by the Jefferson administration for defense of the seacoasts and New Orleans.³²

The United State Navy contracted in 1805 and 1806 for the construction of eight gunboats with John Smith of Cincinnati, Edward Tupper of Marietta, Matthew Lyon of Eddyville, and John Jordan of Lexington. The Navy specified that these gunboats be sixty-feet long and eighteen feet abeam, equipped with masts and sloop-rigged sails and armored with cannon on deck. To avoid the troubles experienced when floating ships down the Kentucky River, John Jordan elected to build his two gunboats at Louisville and established his shipyard a short distance up Beargrass Creek. Jordan and the other gunboat contractors enjoyed visits from former Vice President Aaron Burr in 1805 and 1806, however, and Burr involved them in his nefarious schemes. With Burr's arrest for treason in 1807, Navy gunboat construction along the Ohio River ended abruptly, and although Jordan's gunboats eventually sailed from Beargrass Creek to New Orleans, Jordan lost \$40,000 on his venture with Burr.³³

The joint venture of Tarascons and Berthoud at Shippingport collapsed in 1807. They had financed their shipbuilding and development of Shippingport through loans from Philadelphia investors, and their company debts by 1807 totaled more than \$70,000. James Berthoud paid his share of the debt and ended his partnership with Louis and John Tarascon. In the property division James and his son Nicholas kept their home plus the shipyard and warehouse, while the Tarascons kept their homes and the flour mill

they had built at the foot of the Falls. Although their ship construction ceased, the Berthouds continued building flatboats and keelboats, operating a commission warehouse to hold commodities transferred by drays and wagons between Louisville and Shippingport, and Nicholas also headed a turnpike company that built a road paved with rock between the two ports, profiting from the tolls collected on the turnpike. In addition to operating their flour mill, grinding wheat into flour for shipment to New Orleans, the Tarascons cleared the Shippingport riverfront of snags and obstructions, developed the landing, and, like Louisville authorities, profited by collecting wharfage fees of twenty-five cents per day from boats landing at the port.³⁴

Overcoming their losses in the sailing ship venture, the two families prospered, building fine brick mansions on the boulevard, enjoying a genteel life, and welcoming visitors to their port, especially French refugees. Among these were John Colmesnil and John James Audubon, both of families driven from Haiti by revolution against its French masters. Colmesnil was related to John Tarascon's wife, and his family had escaped Haiti with some wealth, enabling Colmesnil to join in the river trade to New Orleans and, moreover, lend funds to the Tarascons. Audubon had married Lucy Bakewell, whose sister married Nicholas Berthoud, and, although he had few funds to lend, Audubon enjoyed Shippingport and the Falls where bird life was abundant. At Shippingport, he launched his studies of birds and his amazing paintings of birds and other wildlife. He and his brother-in-law Nicholas Berthoud also enjoyed fishing at the Falls, stringing and running trotlines below the Tarascon mill's tailrace and catching enormous catfish. Audubon bragged that one catfish was so large that when they cleaned it they found a small pig in its stomach. Although this might seem a fisherman's tale, nineteenth-century fishermen often caught immense catfish at the Falls, the record being 180 pounds, which, even allowing for exaggeration, was a monstrous catfish.³⁵

The mansions of the French residents and their recreation along the shady boulevard through Shippingport amazed their visitors and the working-class families they employed. Visitors the town had aplenty, because when the river receded the Falls blocked boat passage and all ascending boats stopped at Shippingport to discharge cargo and passengers, from whence

wagons and drays carried them to Louisville for sale or reshipping on boats bound farther upriver. Conversely, passengers and cargo landed at Louisville during low water were portaged overland to Shippingport to resume their river travel. Even when highwater made descent of the Falls possible, most boats still landed their Falls pilots at Shippingport before continuing downriver. As a result, the Berthouds and Tarascons hosted many famous visitors, among whom were several Presidents of the United States and Vice President Aaron Burr. While lodging with John Tarascon, Burr in 1806 recruited Falls pilot Davis Floyd of Indiana for his nefarious expedition to New Orleans, and Floyd later suffered ignominy as the sole sailor of Burr's expedition convicted for high misdemeanor.³⁶

The flood of January 1809 disrupted Shippingport's idyllic life, climbing to a fifty-five-foot level there, fifteen feet higher than any previous flood known at the Falls except perhaps the dimly remembered, unrecorded flood of 1793. It drowned cattle and hogs and lifted small frame buildings off their foundations and floated them away. Abandoning their flooded homes in Shippingport, the refugees found protection from the freezing weather in a schooner anchored at the riverfront. Despite the immense property damages, Shippingport residents ignored this warning that floods would inundate the peninsula where they lived, and they repaired and rebuilt their homes. John and Louis Tarascon even decided to expand their milling business, borrowing \$20,000 from the Joseph Donath financial house in Philadelphia to initiate construction of the monumental six-story Tarascon Mill. They built it to last of brick on a staunch stone foundation, excavated a mill race alongside the mill, and installed a large waterwheel to power the machinery. They also constructed a rock wingdam extending from the head of the mill race into the Kentucky chute of the Falls, thereby funneling more water into the millrace. This later wrecked boats trying to use the chute, but the wingdam remained to trouble Falls pilots until the mill burned in 1892.³⁷

Although the 1807 embargo act and subsequent war with Britain eroded their profit from piloting seagoing ships, the Falls pilots kept busy moving flatboats and keelboats through the chutes. During six months of highwater in early 1811, the Kentucky Falls pilots took 743 boats and their cargo down the Falls, while Indiana pilots took down 106. This number did not include boats whose captains assumed the risk of going over the Falls without a pilot. Marine insurance agents refused to insure boats that attempted passing the Falls without licensed pilots, and boat owners who wrecked on the Falls without pilots paid all damages. Having Falls pilots available at all times therefore was vital to riverine commerce, so important that the pilots were exempted from military service during the War of 1812.³⁸

SHOOTING THE FALLS

Falls piloting was largely an informal business, relying chiefly on oral contracts with the boat owners. Deckhand Tom Collins, aboard Captain Silas Dibble's flatboat loaded with pork, whiskey, and flour out of Patriot, Indiana, reported when their boat landed at Jeffersonville a Falls pilot came to the bank and shouted back and forth to Captain Dibble: "Do you want to go over the Falls." "Yes, Sir." "My name is Evans; I will take you over." "How much do you charge?" "Seven dollars, Sir, and furnish 4 hands." "All right, Sir. Come on board."³⁹

It was Tom Collins' first trip down the Falls, and the passage left an indelible impression on his memory:

I thought when we plunged in and could see the water so rough and the rocks so close under us and channel so crooked, that it would be impossible to get down through that crooked, narrow chute without wrecking the boat. I watched Evans to see if he acted scared, but he only smiled when the boat was whirring around first one way and then another, like a top. Evans cried out, "Go ahead on the labboard and go ahead on the stabboard." Then, "Easy on our side; go ahead on the other." It seemed to me he just twisted the boat through that crooked channel where it seemed impossible for the boat to get

through, but we made it and did not touch a rock. We could see the great black rocks in the bottom of the river as we pitched over them. When we got over, the Captain paid Evans off and put them all on shore on the Indiana side and they walked back to Jeffersonville to get another job.⁴⁰

Falls piloting was also a seasonal profession, possible only when the river rose enough to float flatboats down the rivers. Far up tributary streams, flatboats were built, filled with barreled produce, and then waited for weeks, sometimes months, until winter and spring rains filled the channels to a depth sufficient to float them down the tributaries, then down the Ohio to the Falls. They arrived at the Falls in a rush, too numerous for the pilots to pass down at once, and so they waited again. When John Stuart landed his flatboat in 1806, he spent spare time touring Louisville and Shippingport. At Louisville he saw John Jordan's gunboats under construction for the navy on Beargrass Creek; at Shippingport he visited Berthoud's warehouse and the ship *Western Trader*, lying at anchor waiting for a river rise to proceed to New Orleans. Exploring the Falls and its fossils, he was shocked to find a fresh human jawbone lying at the edge, a relic of a wreck and drowning. After Falls pilot John Nelson took Stuart's flatboat down Indian chute, it went south in company with eight other flatboats and a keelboat, leaving thirty boats above the Falls still waiting.⁴¹

The arrival of the flatboat fleet at the Falls marked exciting times at Louisville and across the river at Jeffersonville. Pilots and hands hustled the flatboats for trips; skiffs plied back and forth carrying the pilots and hands between the wharves and the flatboats. Horses, wagons, and buggies were driven from Jeffersonville down to Clarksville and later to New Albany, or from Louisville to Shippingport, to bring the pilots and hands back for their next trip. The participants and onlookers vigorously debated conditions on the Falls, the depth of water, the varying skills of the Falls pilots, the treacherous currents and eddies, and such dread obstructions as Ruble Rock, Aleck Rock, Backbone Reef, Wave Rock, Willow Point Rock, and Enoch Rock. Ruble Rock, smack in the middle of Indian chute, was the most hazardous; it got its name from a boat owner named Ruble who wrecked his boat on

this submerged rock that could not be seen at certain river stages. Aleck and Enoch rocks got their names in similar fashion. Backbone Reef divided Indian chute from Middle chute and curved at its foot into Wave Rock, which sent the river flow recoiling into the whirlpool called the Big Eddy around Willow Point.⁴²

When a Falls pilot reached an oral agreement with a boat captain, he went aboard with extra hands to reinforce the regular boat crew. The pilot stood on the flatboat roof, or atop the cabin of a keelboat, to obtain the best possible view of the Falls and its obstructions. A steersman or two handled the tiller at the stern, while other hands manned the propelling oars at the sides. Watching the whitewater Falls ahead of the boat, the pilot signaled with his right or left hands to the steersmen behind him, or to the oarsmen at each side to turn the boat. The boat entered the chute speeding along with swift currents of up to thirteen miles per hour; and in those days, before steamboats and steam locomotives, no one ever traveled faster than in a boat going over the Falls, unless they jumped off a cliff.⁴³

As the boat entered Indian chute, between Backbone Reef and the rocky Indiana bank, the pilot directed it a little to the left and with lively oars got it past Ruble Rock, then he pointed it to the right to avoid Aleck Rock, then back to the left to bypass the Little Eddy. The boat swooshed down to Wave Rock on the left which forced the river flow toward the right. The river recoiling from Wave Rock formed a cushion off which the boat could bounce to the right, but at some river stages this cushion was missing and boats could smash into the rock; only the most experienced pilots knew the difference. Passing the point of Wave Rock, the pilot directed the crew to drive oars hard toward the left until the boat reached Willow Point rocks extending out from the Indiana bank, then hard right again to splash down into the Big Eddy and from thence into serene water at the foot of the Falls. Once below the Falls, the boat put in at Clarksville or New Albany to land Indiana pilots and hands, or into Shippingport and later Portland to land Kentucky pilots. The boating distance through Indian chute was roughly two miles, but this distance was reduced at higher river stages.⁴⁴

To repeat, however, no pilots ever descended the same Falls twice. River conditions changed; wind and weather changed; ice and floods came;

the Falls environment itself changed, constantly acquiring drift and accretions, constantly washing them away. Although warned by a Falls pilot not to take the chance, a boat owner in 1806 insisted on descending Indian chute during a thunderstorm. The pilot refused, the boat owner recalled, until the owner accepted responsibility for any damages, and then:

He agreed and repaired to my boat with six additional hands, and I shortly followed him, accompanied by two ladies and a gentleman, who had courage to take the falls out of mere curiosity, notwithstanding the great peril with which the act was allied. We all embarked. The oars were manned with four men each. The pilot and I governed the helm, and my passengers sat on the roof of the boat. A profound silence reigned. A sentiment of awe and terror occupied every mind, and urged the necessity of a fixed and resolute duty. In a few minutes we worked across the eddy and reached the current of the north fall, which hurried us on with an awful swiftness, and made impressions vain to describe. The water soon rushed with a more horrid fury, and seemed to threaten destruction even to the solid rock which opposed its passages in the centre of the river, and the terrific and incessant din with which this was accompanied almost overcome and unnerved the heart. At the distance of half a mile a thick mist, like volumes of smoke, rose to the skies, and as we advanced we heard a more sullen noise, which soon after almost stunned our ears. Making as we proceeded the north side, we were struck with the most terrific event and awful scene. The expected thunder burst at once in heavy peals over our heads, and the gusts with which it was accompanied raged up the river, and held our boat in agitated suspense on the verge of the precipitating flood. The lightning,



Kentucky chute over the Falls between Shippingsport and Rock Island. (Corps of Engineers)

too, glanced and flashed on the furious cataract, which rushed down with tremendous fury within sight of the eye. We doubled the most fatal rock, and though the storm increased to a dreadful degree, we held the boat in the channel, took the chute, and following with skillful helm its narrow and winding bed, filled with rocks, and confined by a vortex which appears the residence of death, we floated in uninterrupted water of one calm continued sheet. The instant of taking the fall was certainly sublime and awful. The organs of perception were hurried along, and partook of the turbulence of the roaring water. The powers of recollection were even suspended by the sudden shock; and it was not till after a

considerable time that I was enabled to look back and contemplate the sublime horrors of the scene from which I had made so fortunate an escape.⁴⁵

The owner declared that from eight to twelve boats were wrecked and lost every year while crossing the Falls, and he was grateful that his was not added to that annual destruction. Reasoning from this fragmentary evidence, it appeared that about one-percent of the boats crossing the Falls before 1811 were totally wrecked while a larger percentage suffered significant damages. The exact number can never be known because no records of the wrecks were kept; indeed, most were not mentioned in local newspapers until the 1840s when newspapers began employing river reporters. As late as 1874, after some improvements to the Falls chutes had been completed, insurance agents added one percent surcharge for any boat attempting to shoot the Falls after dark.⁴⁶

OBSERVATIONS

In its natural condition, the Falls environment, turbulent water charging over a limestone coral reef, offered amusing recreation and water supply and supported abundant bird and wildlife. These magnets made the natural Falls a resort, attractive to both the native Americans and the European pioneers. Repeated and devastating floods, however, made permanent residence near the Falls a risky business for both Indians and pioneers alike.

Significant hazards at the Falls made them a major barrier to navigation, from prehistoric into modern times. Even with native guides or professional Falls pilots, the dangers of passage through the Falls remained, and wrecked boats littered its chutes. These losses had a role in the developing efforts of the nineteenth century to build a canal bypassing commerce around the Falls barrier. Costly delays suffered by boatmen while awaiting highwater passage and the costs of transshipping cargo and passengers in drays and wagons around the Falls also provided economic incentives. And the advent of thriving steamboat commerce on the Ohio River in 1811 proved an additional impetus for engineering new passages around the Falls. These catalyzed the 19th century campaign to build the Louisville and Portland Canal, the subject of the next chapter.



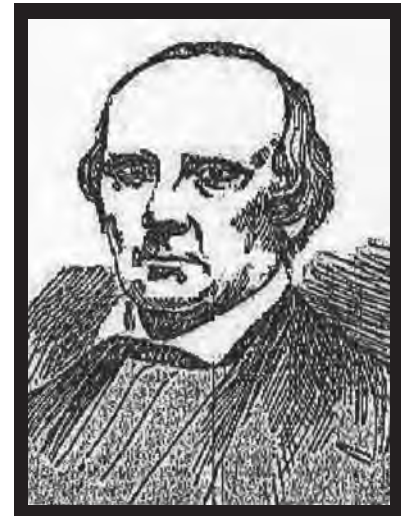
2 PASSAGEWAYS PLANNED

A natural delight, a gourmet food source, an aquatic sports opportunity. This was how natives perceived the Falls. John James Audubon and a few others agreed with the natives, but most European settlers saw the Falls as a barrier to their commercial navigation and economic development, not as a recreational resort. This image of the Falls soon produced plans for opening passageways through or around the obstacle, and the Falls pilots first modified the Falls environment, hammering open a wider passage through Indian chute. Other pioneers urged that canals should be excavated to pass their boats around the Falls, and they organized companies to fund the engineering of such canals in 1805 and again in 1818. Yet, they strongly disagreed on which route a canal should follow. Kentucky opted for a route south of the Falls; Indiana preferred a north side route. Both sides employed engineers to survey the Falls and prepare canal plans, but these initial plans met obstacles as great as the Falls itself. None attracted sufficient private capital to fund construction, nor did they obtain assistance from government.

While Kentucky and Indiana debated the merits of passageways, another acrid debate deferred federal action. Federal powers under the Constitution to participate in transportation improvements like canal construction and navigation projects were questioned, and Secretary of Treasury Albert Gallatin's proposal of 1808 to build a Falls canal as part of a broad federal transportation program wrecked on the constitutional rock. The War of 1812, however, highlighted the logistic role the Ohio River might fill in military emergencies; and the proponents of a Falls canal and of river navigation projects used this defense role as a fundamental rationale for federal project planning. When Constitutional scruples waned during the postwar "Era of Good Feeling," President James Monroe in 1824 approved the first navigation improvement projects for the Ohio and Mississippi rivers under United States Army Corps of Engineers management. The Falls canal promoters also

found a more receptive atmosphere in the nation's capital, especially for canal construction in connection with water-power development for a national armory.

The campaigns for building a Falls canal with state or federal funding assistance found vital support from real estate speculators who hoped to profit from its construction. Cincinnati investors secured title to the Indiana canal route and urged a canal should be built there, while William Lytle and John Rowan purchased lands along the Kentucky route and supported funding for a canal on their lands. Kentuckians at last achieved partial success, in part because of the influence of John Rowan and his law partner James Guthrie. They and their allies obtained a state charter for the Louisville and Portland Canal Company that proposed to build the canal with private investments. Still hoping for state or federal assistance, the company in July 1825 invited DeWitt Clinton, the famous Erie canal promoter, to a ceremonial groundbreaking at Louisville for a new passageway around the Falls.



James Guthrie, law partner of John Rowan, arranged the formation and chartering of the Louisville and Portland Canal Company during the 1820s. (Courier-Journal, May 8, 1892)

PORTAGING PASSAGES

Historians agreed that the founders of Jeffersonville, Clarksville, and New Albany on the north, and Louisville, Shippingport, and Portland on the south side, chose these town sites to take advantage of the economic prospects presented by the Falls, especially those conveyed when boats landed at the towns to transship

cargo around the barrier. Early explorers and pioneers had removed cargo from their boats, or lightened them, to portage the cargo overland while the lightened boats found passage, then returned the cargo to their boats on the other side of the barrier. By 1800 draymen and teamsters with carts and wagons prospered by transporting cargo from Beargrass Creek harbor to Shippingport, or the reverse for cargo bound upstream; and a similar portage developed from above the Falls at Jeffersonville, established in 1802, to Clarksville below. The rugged portage around the outside of the river bend at the Falls was less convenient than the shorter portage across the inside bend on the Kentucky side, however, and this differential stimulated Louisville's rapid economic development and accompanying population growth compared with the other Falls cities.¹

Louisville and Shippingport encouraged shippers to use the southern route by improving their wharves and transshipment facilities. Louisville graded a road leading down to its wharf and built a bridge over Beargrass Creek to the wharf, initially located on the finger of land between the river and the creek called the Point. In 1797 the town appointed Evan Williams, a pioneer whiskey distiller, as its first wharfmaster. Williams and his successors regulated use of the wharf, collecting taxes called wharfage from landing boats to pay for grading and wharf maintenance. At this portage's downstream end, the Tarascons and Berthoud improved Shippingport's wharf, removing snags—fallen trees—obstructing access to the landing, building warehouses for cargo storage, and leading a campaign to build the Shippingport turnpike paved with rock that permitted portaging to and from Louisville in all weather.²

The labor, costs, and delays of transshipping cargo over the portages stimulated support for engineering other means of bypassing the barrier. Building a canal between Louisville and Shippingport, or between Jeffersonville and Clarksville, to pass loaded boats around the barrier, seemed an obvious solution, and as early as 1781 Louisville's trustees had recognized the value of building a canal bypassing the Falls. Across the Falls at Clarksville, George Rogers Clark reserved the slip of land along the town's riverfront for the use of his cousin, William Clark, to build facilities such as "the erection of gates, locks, &c., for the passage of boats,

vessels, &c." The need for a Falls canal was evident to laymen and engineers alike, and Christopher Colles in 1783 became the first professional engineer to advocate building the canal. An early promoter of New York's Erie Canal, Colles studied Thomas Hutchins' map of the Falls, concluded a canal should be built to open an all-water passage, and petitioned Congress for a land grant to fund it. Selling public lands could raise the capital needed for construction, and Colles expected to profit by charging tolls on boats traveling the canal. Colles never received a land grant, nor did other early initiatives find sufficient capital to start construction; still, canal concepts blossomed, stimulated by the high costs of portaging, the damages suffered when boats wrecked on the Falls, and the high rates charged for insurance on riverine commerce passing the obstruction.³

As pioneers settled the Ohio valley, new states were added to the Union, Ohio in 1803 and Indiana in 1816, and these along with Kentucky, Virginia, and Pennsylvania perceived the value of a Falls canal to their riverine commerce. Lacking improved roads, Kentucky, southern Ohio and Indiana, and western Pennsylvania and Virginia depended largely on the Ohio and Mississippi rivers as their outlet to markets, and a canal at the Falls could not only provide safer passage, it also could open year-round market access. State and territorial legislatures therefore chartered companies during the early 19th century that proposed to build Falls canals. The State of Ohio was especially active, supporting canal companies in both Kentucky and Indiana, and therein lay the complication: no agreement could be reached on whether a canal should be built around the north or the south side of the Falls.⁴

Indiana Territory incorporated a company to build a canal on its side of the Falls in 1805. This company's distinguished directors included George Rogers Clark, Senator Jonathan Dayton, General James Wilkinson, General Benjamin Hovey, and former Vice President Aaron Burr, and these sought federal aid for their canal. They, like Colles earlier, requested immense grants of public lands to sell and thereby fund construction, but their motives were questioned. Suspicion arose that the canal company might function as a bank, backing Burr's famous conspiracy which rumor said intended to seize control of New Orleans and part of Mexico.

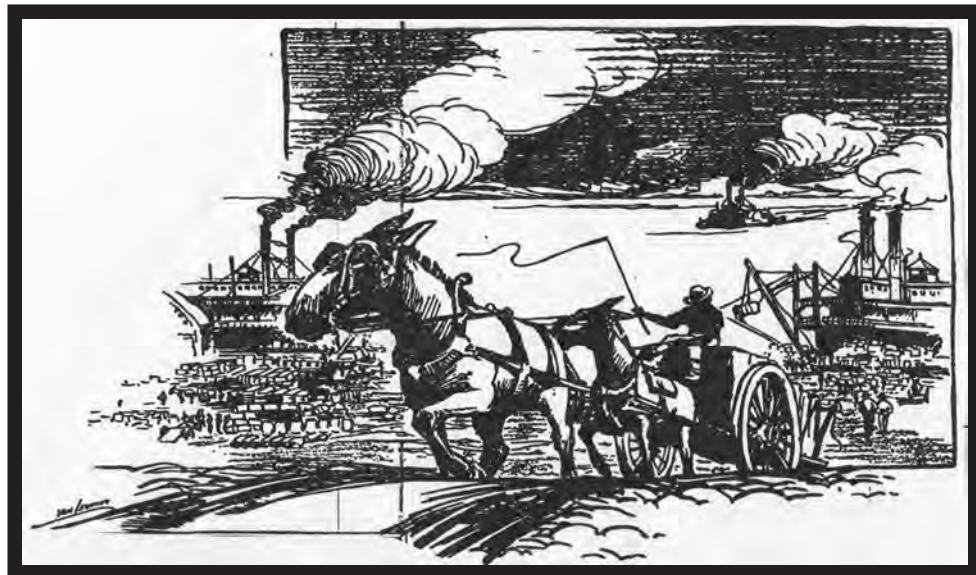
Whatever its motives, the Indiana canal company never received the federal grant it requested.⁵

Kentucky followed Indiana's lead, chartering a canal company in 1805 that included among its directors the shipping merchants James Berthoud of Shippingport and John Jordan of Lexington, who both had suffered delays and damages to their ships while attempting passage at the Falls. During his 1806 visit to Kentucky, Burr stopped to visit the French settlement at Shippingport, rooming with John Tarascon, and he also lodged at John Jordan's Lexington home. He saw the Navy gunboats that Jordan had under construction on Beargrass Creek at Louisville, along with the gunboats other contractors were building at Marietta and Cincinnati, Ohio, and Eddyville on the Cumberland River. Kentucky then had no official banks, and John Jordan, director of the Kentucky Insurance Company which functioned as a bank, became involved in Burr's schemes, loaning Burr \$40,000. It was at Jordan's home in Lexington where Burr first learned that state militias had mobilized to stop his planned expedition down the rivers to empire or infamy.⁶

Like Indiana's canal company, Kentucky's accomplished little other than funding the first field engineering survey of the southern canal route, employing Jared Brooks to study and map the Falls and passageway. Brooks had resigned from the United States Army Corps of Engineers in 1802 to settle at Louisville, where he edited one of its first newspapers and became Jefferson County's surveyor.

Brooks studied the Falls hydrology in 1805, completed a detailed survey, sank shafts exposing the subsoil and rock to be excavated, and prepared a map delineating a canal route that eventually was followed by the Louisville and Portland Canal. The Kentucky legislature sent Brooks' map to Congress, asking federal aid for constructing a canal with three navigation locks capable of lifting four-hundred-ton ships the twenty-six feet from below to above the Falls. When Brooks estimated canal construction costs at \$200,000, the Kentucky company sold stock to acquire the funds; and when stock sales fell short at \$70,000 the company appealed for state and federal contributions to supply the balance. In 1806 a congressional committee took up this request, examining Brooks' plans. It reported the canal seemed a feasible project, and it would have recommended a construction appropriation, if only federal revenues had not been "already pledged" for other purposes.⁷

Congressmen from the Ohio valley requested further consideration of Falls canals as a feature of the comprehensive study of American transportation needs conducted by Secretary of Treasury Albert Gallatin in 1807. Gallatin and the Jefferson administration balanced the federal budget, obtaining a \$20 million surplus, which Gallatin proposed spending on roads and canals to foster American commerce. Gallatin studied Jared Brooks' map of the Falls and a lengthy report in which Brooks contended that a canal could not only free commerce from the costs of transshipment, it could also create water-power development sites for manufacturing.



Drays pulled by mules portaged most cargoes between Louisville and Shippingport/Portland. (Courier-Journal, July 16, 1916)

Brooks' plans impressed Gallatin, who included the Kentucky canal in his recommended national transportation projects. Yet, when Gallatin completed his transportation study in 1808, he and the Jefferson administration left office. The constitutional issue of federal powers to improve transportation was left unsettled; moreover, the federal budget surplus evaporated when Jefferson's embargo against trade with Britain and France suspended the commerce that paid taxes, also taking the nation down the path toward war with Britain in 1812.⁸

STEAMBOAT ADVENT

The year of miracles was how people living around the Falls remembered 1811. A comet slashed the night sky; an earthquake rent the Mississippi and Ohio River valley; and General William Henry Harrison checked indigenous resistance to European advance at the Battle of Tippecanoe. And on the night of October 28, people around the Falls of the Ohio were awakened by the first steamboat's hissing and roaring arrival.⁹

The advent of steamboats culminated years of efforts to devise a means of ascending rivers without the manual rowing, poling, and warping required to force flatboats and keelboats upriver against the current. George Rogers Clark in 1790 invented a mechanical means of rowing boats with oars and built a model testing his design; and many pioneers experimented with boats using horses to turn paddlewheels. Early steamboat inventors James Rumsey and John Fitch lived in Kentucky, and in 1805 Louis Valcourt and Captain William McKeever of Shippingport built the *Mary* and floated its hull down the rivers to receive a steam engine sent from Philadelphia to New Orleans. These experimental steamboats did not succeed commercially, and the honor of building the first steamboat on the inland rivers went instead to Robert Fulton and his New York associates who successfully operated a steamer on the Hudson River in 1807. In 1811 Fulton's associates built the steamboat *New Orleans* at the old Tarascon and Berthoud shipyard near Pittsburgh. Resembling a ship with long bowsprit and portholes in the side, it passed down the Ohio in October 1811 to Louisville. A witness to its passage reported: "I well remember the alarm created by its sudden appearance. Few had heard of the boat, and none

expected it. With its lever beam moving up and down, it looked like a floating sawmill, for the cabin was below and no upper works on the deck. With our townspeople, it was a source of marvelous relation."¹⁰

When low water blocked its passage over the Falls, the *New Orleans* returned upriver to Cincinnati, demonstrating its ability to stem the current, then back to Louisville where it ran excursions until the river rose in late November and it passed the Falls without incident. Anchored below the Falls at Shippingport, however, it experienced the first shocks of the 1811 earthquakes centered at New Madrid on the Mississippi. The shocks cracked walls and tumbled chimneys in the Falls cities, also forming waves that violently rocked the *New Orleans* and made its passengers seasick. Passing the new obstructions and channels created by the earthquakes on the Mississippi River, the first inland river steamboat reached New Orleans and operated there until it sank in 1814. Seeking a legislated monopoly on steamboat commerce between Louisville and New Orleans, the Fulton company built four more ship-like steamboats near Pittsburgh, but its monopoly was challenged by Captain Henry Shreve, a former keelboat captain who took the small steamboat *Enterprise* to New Orleans in 1814.¹¹

Shreve and his *Enterprise* set new marks in steamboating. Arriving at New Orleans while General Andrew Jackson was preparing to meet the British threat to the city, the *Enterprise* took keelboats with ordnance to Jackson's forces—the first towing recorded on the inland rivers. During the subsequent battle, Shreve armored his steamer with cotton bales and ran it past British batteries to resupply American forces—the first steamboat used in military service. When Fulton's company obtained an injunction against the *Enterprise* for violating the company's monopoly, Shreve took the boat back upriver—the first steamboat to ascend the rivers, reaching Shippingport in twenty-five days. Although it could not stem the Falls current, like he had his keelboats before, Shreve warped it up Kentucky chute to the mouth of Beargrass Creek, where Louisville gave him and his steamboat a royal welcome. The next year, Shreve took the steamboat *Washington* to New Orleans and participated in litigation that broke the Fulton company's monopoly.¹²

Like the earlier shipbuilding industry, steamboat building began near Pittsburgh on the Monongahela River and spread downriver, and the early steamboats resembled sea-going ships and, indeed, often had the same builders and captains. Captain William McKeever, for example, had piloted Tarascon and Berthoud ships to New Orleans, and when the Berthoud shipyard at Shippingport converted to steamboat construction McKeever also piloted the steamboats built there for Nicholas Berthoud and John Colmesnil. Steamboat construction thrived at the towns around the Falls soon after the end of the War of 1812, contributing to area economic expansion and attracting people to the new towns.¹³

The defensive value of river transport became apparent during the War of 1812. Troops and supplies often descended the Ohio in keelboats, landing at Cincinnati and marching overland to reinforce General William Henry Harrison on the northern frontier, or floating down the Ohio and poling up the Mississippi to reinforce Chicago and Detroit. To arm these troops, in 1813 the War Department built Allegheny Arsenal at Pittsburgh to supply ordnance and ammunition. Shipments from this arsenal were managed by Major William Foster, the father of song-writer Stephen Foster; and keelboats to transport the munitions were built by Army quartermaster James Morrison, the Kentucky merchant who later funded Transylvania University in Lexington. These sent the munitions aboard keelboats and the steamboat *Enterprise* downriver in late 1814 to supply General Andrew Jackson's army defending New Orleans, and near the end of that conflict Secretary of War James Monroe contracted with Robert Fulton's company to build steamboats for military service. Monroe also dispatched orders to Army quartermaster James Morrison: "You will be so good as to make yourself acquainted with, and report to this department immediately, how far the steamboats may be made useful in transporting both up and down the river, troops and military stores. I wish to know what number of troops they can carry, and how long it takes them to make a trip from Pittsburgh to Orleans and return." Jackson's victory at New Orleans and the peace treaty with the British ended Fulton's boat-building contract, but the potential contributions of steamboats and the rivers for national defense continued to interest the War Department.¹⁴

With the Ohio valley's commercial outlet saved from British attack in 1815, towns growing around the Falls enjoyed renewed prosperity on the economic base of boat-building, shipping, and portaging commodities around the Falls, and two more towns were created below the Falls to profit from this economic base. William Lytle of Cincinnati acquired title to the lands around and between Louisville and Shippingport originally granted in 1773 by Virginia to John Connelly and John Campbell as reward for their military services. Connelly's title was clouded by his loyalty to Britain, and Virginia's revolutionary council had ignored his claim when it approved establishing Louisville on his land. Campbell moved to Kentucky, however, building a log warehouse and attempting to form a riverside town, which Berthoud and the Tarascons subsequently purchased and named Shippingport. Fortunatus Cosby of Louisville and his attorney Henry Clay obtained the Connelly-Campbell lands in 1809, and sold them to William Lytle. Local tradition holds that when Henry Clay decided to run for Congress in 1811, to qualify as candidate he had to be a property holder, so he bought a house in Lexington from William Lytle and gave Lytle in exchange his share of the 3,000 acres of Connelly-Campbell lands. Lytle then platted Portland at a site affording convenient harbor downstream of Shippingport. He sold lots in Portland at public sales in 1814 and 1817, and among the purchasers was Captain Henry Shreve who developed the riverfront with a wharf, warehouse and ferry. Recognizing that a canal from Louisville to Portland would greatly enhance his real estate's value, Lytle became a principal promoter of the canal's construction during the postwar years.¹⁵

Across the river from Portland, the Scribner brothers, with proceeds from shipping sugar from the West Indies to New Orleans, in 1812 purchased land from the grant made to George Rogers Clark and his troops. The Scribners moved from New York in 1813, settled and platted New Albany, and advertised that their town was "immediately below all the dangers which boats and ships are subject to in passing over the Falls." The hazards of New Albany's location below the Falls, however, became apparent when Charles Paxon moved to New Albany to become its first merchant: he wrecked his boat on the Falls, drowning his companions. Because of its location, the town also became notorious as the "resort of sailors, boatmen, and

travelers, who go down the river in their own boats." It became a boat-building center in 1818, when Peter Tallon and Martin Himes finished building the steamboat *Fayette* at Portland and relocated across the river to open a New Albany yard that produced many early river steamboats.¹⁶

With the Ohio valley's commercial outlet saved from British attack, the Falls cities again took up the problem of passing boats around the Falls without transshipment. It remained a contentious issue, with Louisville, Shippingport, and Portland supporting construction of a canal on the south side and Jeffersonville, Clarksville, and New Albany preferring the north side. Indeed, one of the first acts of Indiana when it became a state in 1816 was to charter a new canal company.

The first Indiana legislature gave the Jeffersonville Ohio Canal Company the authority to sell company stock worth \$1 million and also to conduct a lottery to raise additional funding for a north-side canal. Without proper engineering studies and estimates, this company proceeded with its project, celebrating a groundbreaking with Vevay wine in May 1819 and awarding an excavation contract to Michael Myers, who grubbed out about a mile of shallow ditch from Jeffersonville toward Clarksville before stopping work for lack of funding.¹⁷

Similar events troubled the Kentucky canal on the south side. William Lytle and the Kentucky canal proponents employed Laommi Baldwin of New England, who had visited Britain to learn canal engineering, to review the canal plans made by Jared Brooks in 1806. Baldwin reported that Brooks' plans, although underestimating costs by fifty percent, were satisfactory, and a Kentucky canal company organized in 1818 to build the canal. William Lytle said he would like to fund the canal's construction personally, because it offered such opportunity for "accumulating a vast and inexhaustible source of wealth." Yet, when the economic panic of 1819 struck, investment capital vanished, and even William Lytle bankrupted. His brother-in-law, attorney John Rowan of Bardstown, had acquired part of Lytle's land in payment for legal services fighting off John Connelly's title claims, and Rowan bought the remainder of Lytle's lands when the Jefferson County sheriff auctioned it to satisfy Lytle's creditors.¹⁸

By 1819 the political division that troubled canal planners for a half century had coalesced. Indiana sought canal construction on its side of the Falls and found backing from Cincinnati investors who acquired title to the riverfront where a canal might be constructed. Kentuckians urged that the canal should be built on their side of the Falls, where the route across the inner bend would be shorter and more cost efficient. Cincinnati, the Queen City, accused Louisville of covertly opposing a canal, because "the moment a canal is constructed sufficient to convey boats up and down the Falls, that moment Louisville sinks to a level with other towns on the river." Louisville, the Falls City, retorted that Cincinnati supported a canal on the Indiana side chiefly because it would damage Louisville's share of river trade, and because Cincinnati wanted a canal built on the free side, rather than the slavery side, of the river.¹⁹

Louisville historian Henry McMurtrie in 1819 urged the Falls, that "formidable and intimidating spot, whose terrors have paralyzed the arm of enterprise," should be bypassed by a canal that would benefit Louisville's commerce as well as the entire Ohio valley. He argued that the federal government should provide funding for building a canal that might contribute to the defense of New Orleans and the Gulf coast by speeding the transport of munitions down the rivers via steamboats. The canal would never be built, McMurtrie concluded, without funding from the federal government "whose aid and countenance in this undertaking every inhabitant of this section of the Union sincerely prays for."²⁰

The collapse of the opposing canal projects in 1819 resulted from an economic disruption, attributed in part to the extended drought afflicting the Ohio valley that year. Lack of precipitation so reduced river flow that it not only blocked Falls passage, it also left boats and cargoes languishing in ports from Pittsburgh to the Ohio's mouth; at Shippingport, for example, a dozen steamboats lay stranded on the wharf for more than six months. A state commission surveying the Ohio River's navigation saw above Louisville some thirty boats representing millions in invested capital "worse than dead, ruinously expensive to their owners, lying in all directions, chiefly high and dry, some half in and half out of water, all sustaining incalculable injury from an exposure of six or eight months, waiting the returning flood."²¹

Despairing of federal aid for improved river navigation, Ohio valley state governments in 1818 formed a joint state commission to survey and report on obstructions in the river above the Falls. Employing Magnus Murray of Pittsburgh as surveyor, the state commissioners examined the river during the 1819 drought, identifying and mapping 102 shoals, ripples, and other obstructions blocking its low-water navigation. As directed by the states, the commissioners carefully examined the Falls to compare the proposed Indiana and Kentucky canal projects. After reviewing earlier engineer studies, resurveying the Falls, and comparing project cost estimates, the state commissioners reported a canal built on the Kentucky side might cost \$400,000 while one on the Indiana side would cost at least double that figure. The commissioners submitted their report and maps to their respective state governments, expecting that a confederacy of states might undertake navigation improvements without federal assistance. Although such a confederacy never organized, Pennsylvania's state government acted alone, funding the first project for improving the Ohio's navigation from Pittsburgh downstream to Wheeling. Aimed at keeping Pittsburgh's river commerce competitive with that at Wheeling and other ports, Pennsylvania expended \$15,000 excavating passages through obstructions. Working parties waded the shallow river, drilling rocks with sledgehammers and rods, then blasting the rocks away with gunpowder, while others drove horses pulling drags back and forth over sand and gravel bars to dredge open wider channels. Although these were primitive methods, they maintained Pittsburgh's role at the head of Ohio River commerce.²²

FOURTH PILLAR OF DEFENSE

With hammers and rods, Falls pilots whittled away the rocks restricting entrance to the Indian chute, opening low-water passage for boats up to eighteen feet wide, but most steamboats could not enter this narrow chute. The *United States*, the first steamboat built at Jeffersonville and launched in 1819, was thirty-seven feet wide and drew eleven feet of water; it could cross the Falls only when the river submerged the rocks by at least eleven feet, a depth generally available no more than a month each year. This was a motive behind Major Stephen H. Long's design of the steamboat *Western Engineer* with a thirteen-foot

hull width and draft of merely nineteen inches. A Dartmouth graduate who had joined the Army Engineers during the War of 1812, Major Long was selected by the Secretary of War in 1818 to lead a military and scientific expedition down the Ohio and up the Mississippi and Missouri rivers aboard keelboats and four steamboats. Army contractors James and Richard Johnson of Lexington were to build three steamboats, one on the Kentucky River at Frankfort, for the expedition, while Long built the *Western Engineer* at Allegheny Arsenal in Pittsburgh.²³

For his steamboat, Long adopted novel designs. He invented a cam cutoff that permitted more economical application of steam to the engine, and he installed the paddlewheel at its stern instead of at its sides so it could have a narrow width. Expecting to encounter hostile natives up the Missouri, Long armed his steamboat and concealed its engine and paddlewheel, running the steam-escape line to blow through the head of a serpent with forked tongue serving as bowsprit. He launched the *Western Engineer* in early 1819 with a crew of six plus nine enlisted men of the artillery to service its canon if need be. With scientists and three assistant Engineer officers aboard, Long steamed out of Pittsburgh in company with ten keelboats transporting the Sixth United States Infantry to the frontier, successfully crossing the Falls without damages on May 20 and proceeding to St. Louis where the steamboats built by James and Richard Johnson of Lexington joined the expedition, becoming the first steamboats to ascend the Missouri River.²⁴

Major Long not only made significant contributions to steamboat design, he also reported the obstructions he encountered on the Ohio to the Secretary of War. He described the sandbars and ripples that boats had to cross, the snags—trees fallen from caving banks into the river—that could puncture the hulls of wooden boats, and the major obstructions, the Letart Falls near Gallipolis, Ohio, the Grand Chain of Rocks a few miles above the river's mouth, and the Falls of the Ohio which were impassable for large boats except near flood stages. "The season in which the navigation of the Ohio can be relied on commences between the middle of February and the first of March and continues to the latter part of June," Long observed, adding: "A fall freshet usually takes place in October or November, and the river is again navigable for a few weeks."²⁵

Secretary of War John Calhoun relayed this and related information to President James Monroe and Congress, urging that improving the river's navigation could be valuable for national defense as well as for commercial purposes. Calhoun in 1817 had orchestrated enactment of a bill aimed at building the transportation projects recommended in 1808 by Albert Gallatin, including a Falls canal, only to see his bill vetoed by President James Madison as an unconstitutional federal activity. He advised President Monroe in 1819 that federal assistance to transportation projects would produce multiple civil and military benefits. "It is in a state of war, when a nation is compelled to put all of its resources in men, money, skill, and devotion to country into requisition," Calhoun asserted, "that its Government realizes in its security the beneficial effects from a people made prosperous and happy by a wise direction of its resources in peace."²⁶

Calhoun appointed a board of Engineer officers to study and plan the national defensive posture in the light of experiences during the War of 1812, when the British had captured the capital, burning the White House, and had attempted to capture Baltimore, New Orleans, and other ports by amphibious assault. He selected General Simon Bernard, formerly an engineer on Napoleon's staff, to lead the defense study. After Napoleon's defeat at Waterloo, Bernard had fled France to the United States carrying a recommendation from the Marquis de Lafayette, and he was appointed to the Corps of Engineers with the rank of brigadier general. Bernard and his colleagues on the defense study board contended that proper national defense should rest upon four pillars: a strong army, an active navy, well-armed coastal fortifications, and improved waterways.²⁷

Although congressional debates continued on the constitutionality of federal transportation projects, the federal power to conduct studies was never questioned, and in April 1820 Congress appropriated \$5,000 to continue the river survey begun in 1819 by state governments in the Ohio valley. General Bernard and his staff proceeded to Louisville where they met the *Western Engineer* to resume the survey, continuing it downriver to New Orleans. In comment on Bernard's mission, a Louisville news editor declared:

The contemplated improvement of the two principal rivers in the west, so as to render them navigable at all seasons must be an undertaking of the first magnitude to the government and people. It will greatly facilitate the passage of our produce to market at the most important season of the year, while the government will be able at any time, in case of the future invasion of New Orleans, to send men, arms and ammunition in time to defend it. We view the proposed improvement, as one of far higher interest than that by which New York is immortalizing herself [Erie Canal], as the whole population of the great valley between the Allegheny and Rocky Mountains will be benefited by its consummation.²⁸

General Bernard and his assistants descended the rivers, mapping the obstructions to navigation and recommending projects for their improvement. They proposed removing snags and rocks that endangered boats from the channels and building experimental wingdams, or longitudinal spur dikes, to constrict the river channel at shallow sand and gravel bars—narrowing the channel could increase river velocity over the bars, thereby encouraging the river's hydraulic action to scour deeper passages across the shallow shoals. Bernard also concurred with the conclusion reached by the state commissioners in 1819 that a canal on the Kentucky side of the Falls would be more easily constructed and less costly than one along the Indiana bank.²⁹

Congressmen from the Ohio valley seized on Bernard's report as additional ammunition in their campaign for federal navigation improvements on the inland rivers. When congressmen from the eastern states contended that such projects were unconstitutional extensions of federal powers, western congressmen retorted that the government had built lighthouses to benefit seacoast navigation and had funded improvements in coastal harbors since the formation of the republic. House Speaker Henry Clay of Kentucky pointed out the inland rivers bordered several states and were

the common commercial highway for all; improving river navigation should be a question of methods and expediency, not constitutionality. When this congressional debate waxed bitter, a Louisville news editor in 1821 complained: "If we ask the aid of the nation in removing an obstruction to the navigation of a river, penetrating to the centre of the Union, and forming the only outlet to the produce of several powerful states, our supplications are to be treated with contempt; until our Atlantic shore presents a chain of battlements and towers—till every port, bay and inlet is ornamented with a lighthouse."³⁰

Westerners finally prevailed in May 1824, when Congress enacted and President Monroe signed a bill providing \$75,000 for federal improvement of Ohio and Mississippi River navigation. The act directed that experiments be conducted with wingdam construction at sandbars obstructing the Ohio and that prompt steps be taken to remove the snags threatening to impale and sink wooden boats. Undertaking these missions was assigned to General Alexander Macomb, Chief Engineer of the Army, who had seen the Ohio's navigational dangers firsthand in 1801 when descending the river in company with the first chief of the Corps of Engineers, Jonathan Williams. Macomb promptly dispatched Major Stephen Long back to the Ohio to experiment with wingdam construction at a sandbar obstructing the river near Henderson, Kentucky. Long learned much from his experimental wingdam construction and the Corps of Engineers subsequently used this method of deepening the Ohio and other rivers at shoals until after the Civil War.³¹

General Macomb also advertised a \$1,000 prize for the inventor submitting the best plan for extracting snags from the rivers, awarding the prize to John Bruce of Vanceburg, Kentucky, for his machine boat design: it consisted of two keelboats linked by timbers mounting a windlass between the two hulls to chain onto snags and hoist them manually from the river. When Macomb received a strong endorsement from Henry Clay for John Bruce, Macomb then awarded Bruce a \$50,000 contract to build machine boats and clear the rivers of snags from Pittsburgh to New Orleans. Bruce started his contract and worked as far as Louisville in 1825 before General Macomb terminated the contract and had the inspecting officer court-martialed.

This debacle a year later resulted in the appointment of Captain Henry Shreve of Portland to continue the snag-removal effort.³²

REVIVED CANAL PLANNING

As the Corps of Engineers began its historic navigation improvement mission, two events in 1821 stimulated additional interest in building a canal bypassing the Falls on the Kentucky side. That year, a steamboat sank and was lost on the Falls and brash young James Guthrie moved to Louisville, providing canal proponents with capable and enduring leadership.

In April 1821 the steamboat *Maysville* attempted to ascend the Falls, warping its way up through Kentucky chute. Keelboats ascending the chute in earlier years had been warped up by their crews pulling hand-over-hand on ropes attached to trees or other upstream anchorage. Warping the larger, wider, and heavier steamboats up by this method was physically impossible, and steamboats installed capstans, or windlasses, on their bows for the purpose. Atop posts staunchly attached to hull timbers were mounted drums that the ropes could be wound around when crewmen turned the drums by pushing against handles spiking from the drums like spokes on a wagon wheel. Although manually operated, boat capstans functioned much like the common power winches used on off-road vehicles in the 21st century, pulling the vehicles along when they could not advance on their own power. The *Maysville* had a rope from its capstan attached to an anchorage and had nearly reached the head of Kentucky chute when the rope under high tension snapped and the boat spun back downriver out of control until it hit rocks and wrecked. Its captain died of wounds suffered in the accident. Other accidents to steamboats crossing the Falls soon followed, notably the loss of the *George Washington* which hit Ruble Rock in the center of Indian chute while descending, destroying an immensely valuable cargo. These accidents and consequent financial losses were a major concern to the marine insurance agents at Louisville, and they joined the campaign for building a canal.³³

The most vigorous leadership, however, came from attorney James Guthrie, a law partner of United States Senator John Rowan at Bardstown. Son of a pioneer family from Scotland, whose grandfather had been executed as a

revolutionary, Guthrie spent his youth at Bardstown and in his teen years worked as crewman on voyages to New Orleans, probably on boats owned by John Colmesnil of Shippingport. He returned to Bardstown and studied law with John Rowan, the owner of *Federal Hill* later called *My Old Kentucky Home*. During a legal dispute, Guthrie was shot and nearly killed, the wound inflicting a limp and changing his life. He became known for his acerbic personality and grim devotion to duty, his plain clothing and flat-topped, broad-brimmed dark hats; indeed, strangers sometimes mistook him as a Quaker. He became a formidable adversary in court and out, who never strayed from a cause once he had taken it.³⁴

When Rowan in 1821 secured control of the land previously owned by his bankrupt brother-in-law William Lytle, Portland's founder, Guthrie relocated to Louisville to accept appointment as Jefferson County's prosecuting attorney and also to watch after his patron's growing interests. Rowan, for example, claimed that Lytle, when he platted Portland, had not designated the town's riverfront as public commons, as the townsmen believed, and Rowan began charging wharfage fees for boats landing there, depriving the town of half its municipal revenues. He also sold sites along the riverfront for warehouses, ferry landings, and river businesses, and this bankrupted townsmen like Captain Henry Shreve, who had borrowed heavily to build a boat landing, blacksmith shop, boiler-making shop, ferry house, and warehouse at riverside. As Rowan's attorney in the case, Guthrie prevailed in the courts for several decades, and when Kentucky's legislature sent Rowan to the United States Senate in 1825, Guthrie took his place in the state legislature. There, Guthrie promoted building the canal on Rowan's land while Rowan promoted it in Congress.³⁵

Prospects for the Kentucky canal improved when Congress approved studies of building a national armory for weapons manufacture in the Ohio valley. Surveys of potential armory sites had begun in 1823 and paid close attention to the Falls of the Ohio, where abundant water power might be developed for manufacturing. Kentucky congressmen zealously lobbied for the Falls as the national armory site, while the states of Ohio and Kentucky displayed new interest in building the Falls canal to affect the decision on locating the armory.³⁶

Senator John Rowan at Louisville shrewdly added to his land holdings, purchasing the Falls of the Ohio for ten cents an acre under an obscure law of 1815 allowing Kentucky's governor to dispose of the Commonwealth's vacant lands. Kentucky claimed title to the bed of the Ohio River across the river to the low-water mark on the Indiana bank, and this frequently submerged land certainly was vacant. In early 1825 Governor Joseph Desha issued to Rowan three land warrants for 1200 acres of the rocky bed of the Falls adjacent to the land Rowan had acquired from Lytle. Rowan thus secured title to most of Louisville's riverfront downstream of the mouth of Beargrass Creek, also controlling any water power sites that might be developed for the national armory. When Louisville's city government, established in 1828, subsequently extended its wharf downriver, it agreed with Senator Rowan that in exchange for using his riverfront property, after paying wharf maintenance costs, the city would pay Rowan half of the wharfage taxes collected from boats using the landing, an arrangement that continued until the city bought the riverfront from Rowan's heirs in 1867.³⁷

Faced with the 1819 state commission report and the 1821 Corps of Engineers report that the Kentucky side offered a more economical canal route, and considering the possible selection of the Falls as the national armory site, Cincinnati reassessed its earlier support for the Indiana canal. Emulating the successful New York canal system, Ohio by 1823 was planning a network of canals linking the Ohio River with Lake Erie, employing New York canal engineers for design and construction management. At Cincinnati's request, Governor Jeremiah Morrow hired Erie Canal engineer David Bates to conduct a new survey of the Falls. Famous for designing the Erie Canal's serial locks at Lockport and the canal aqueduct over the Genesee River at Rochester, Bates was one of the most competent engineers of his day.³⁸

Bates, accompanied by Ohio canal commissioner Alfred Kelley, reached Louisville in December 1823, met with officers of the Kentucky canal company, examined the canal routes, and soon concurred with the 1819 and 1821 reports that the Kentucky route was superior to Indiana's. Bates and Kelley then went to Frankfort to meet with Governor Joseph Desha and members of the legislature,

recommending plans for a forty-foot wide canal with a mill raceway sufficient to propel sixty pair of millstones and two dry docks for boat repairs at estimated cost of \$306,000. They reported 5,000 flatboats and keelboats crossed the Falls each year, half of which would use a canal, each paying a three-dollar toll, the rate then charged by Falls pilots to take them over the obstruction. In addition, of the 100 steamboats then operating to Louisville, a quarter might pass through a canal six times a year, eventually paying tolls sufficient to amortize the canal's construction costs. Commenting that the "business of the country above the Falls annually pays a tax to this rock of greater amount than it would cost to make the improvement," Bates and Kelley estimated the canal would produce annual savings of \$150,000 in transport and portaging costs. Governor Morrow of Ohio assured Governor Desha that Ohio was willing to join with Kentucky in financing the canal.³⁹

While Governor Desha considered the Bates-Kelley plan and prepared to endorse it in his annual message when the state legislature convened, Kentucky congressmen introduced a bill appropriating \$100,000 for building the Louisville and Portland Canal on the rationale that the canal would not only promote commerce, it might also supply water power for the national armory. If the federal government provided the \$100,000 seed money, the states of Kentucky and Ohio would provide an additional \$250,000 to complete the canal within two years. Because the bill was introduced too late in 1824 to come to a vote, it was not enacted, and Congressman David Trimble warned Kentuckians that the War Department would not build its national armory at Louisville until the canal was constructed.⁴⁰

Governor Desha recommended in November that the Commonwealth fund the Louisville canal as part of its state-wide internal improvements program. Under the leadership of Desha, and of James Guthrie in the legislature, Kentucky in the 1820s was embarking on a state transportation program including macadamized turnpike roads, slackwater lock and dam projects on the Green, Kentucky, and Licking rivers, and the Commonwealth's first railroad linking Lexington with the Kentucky River at Frankfort. The Louisville and Portland Canal, Governor Desha contended, should be financed by state

government like the other internal improvements.⁴¹

Committees of the Kentucky House and Senate considered Desha's proposal, and called on Senator John Rowan to ask what terms he would offer for the land needed to build the canal. Rowan replied he would sell for its market value determined by independent appraisers, and was also willing to exchange it for use of the water power created by the canal. The committees also contacted the War Department, learning that the national armory would need fifty acres of land beside the canal. When endorsing Desha's recommendation, the House committee concluded:

The benefits to Kentucky trade will surpass the construction costs; moreover, it will encourage the national project of connecting by canal the Potomac with the Ohio river, thereby uniting the eastern and western sections of our continent. This canal would give us access to eastern markets as well as New Orleans. Next, we think the canal at Louisville will be profitable. Canals in England and in New York have proven profitable, and they are closed by ice several months each year. We estimate canal tonnage at: 20,000 tons descending steamboats; 10,000 tons ascending steamboats; 2,000 flatboats descending; 2,000 cabin and 4,000 deck passengers. Total tolls per year would be \$34,800. This should pay a 10 to 20% profit over the amortized construction costs plus operations expenses. To increase the profits, we think the state should build 2 drydocks which will be used. About 100 steamboats now trade to Louisville and Shippingport; about half of these need repairs each year and would use the drydocks for \$300 each, making an income of \$15,000 annually. Waterpower could also be developed, but we cannot make a cost or profit estimate. The canal would foster increased business and capital.⁴²

Thus, it seemed, economics dictated the canal's construction, and both legislative committees endorsed a bill for the Commonwealth to fund the canal's construction. Yet, the bill was tabled by the Kentucky Senate and defeated in the House during the first week of January 1825. This brought two reactions: Indiana Governor William Hendricks immediately announced that Indiana, with Ohio's help, would build a canal on the north side, supplanting the canal defeated in the Kentucky legislature. Louisville's leaders responded by urging the formation of a corporation to build the canal under state charter, and just a week later Charles Thurston, representing Louisville in the legislature, introduced a bill incorporating the Louisville and Portland Canal Company. The next week, the Kentucky legislature enacted a resolution ceding to the United States legal jurisdiction over any land it might purchase from John Rowan as the national armory site, and on January 12 it chartered the canal company.⁴³

CANAL CHARTERED

The charter members of the Louisville and Portland Canal Company were James Guthrie, Nicholas Berthoud, John Colmesnil, James Hughes, Robert Breckinridge, Isaac Thom, Simeon Goodwin, Charles Thurston, Worden Pope, William Vernon, John Jacob, Samuel Churchill, James Brown, James Overstreet, and Daniel Fetter. All these were well-known residents of Louisville. General Robert Breckinridge, a Revolutionary soldier and veteran of Valley Forge, moved to Louisville after the war and became a city trustee and commander of the Jefferson County militia. Attorneys James Guthrie and Charles Thurston represented Louisville in the state legislature. Worden Pope served many years as Jefferson County clerk. James Hughes, William Vernon, John Jacob, and Isaac Thom were Louisville bank directors and marine insurance agents. Nicholas Berthoud and John Colmesnil had become Shippingport's leaders after James Berthoud died in 1819 and the Tarascons went bankrupt. By 1825 the Tarascons had sold their lots, slaves, and other property to pay creditors and that year John Tarascon, overwhelmed by debt, shot himself, leaving his brother Louis locked in a vicious struggle with creditors, involving gunfights, to retain control of Tarascon Mill.⁴⁴

These charter members were authorized to sell \$600,000 worth of stock at \$100 per share, to borrow funds, purchase real estate, and build and operate the canal from Louisville to Portland along with related dry docks and mills. The legislature even gave the company the eminent domain power to take real estate needed for the canal, later settling the price through independent appraisal and court action. As soon as the first 1,000 shares of stock were sold, the stockholders could meet in Louisville to elect the company president and four directors.⁴⁵

Knowing that Indiana was moving ahead with its canal, the Louisville canal directors worked quickly, selling stock on the easy-pay plan with \$10 down per share and the \$90 balance due later in \$10 quarterly installments. By March 1825 they had sold more than 1,000 shares and on March 26 the stockholders met at the Louisville Insurance Company office to elect company officers. As first president they chose James Hughes, the president of Louisville's branch of the Bank of the United States. The four directors were Nicholas Berthoud representing Shippingport, Cincinnati literary figure John Foote, and John Shackford and Isaac Thom. Foote was a minor stockholder with just two shares, but he was popular in Cincinnati. John Shackford of St. Louis became the first major investor, subscribing for 1,000 shares, and Isaac Thom was his business agent in Louisville. Shackford was scion of a wealthy seafaring family of Portsmouth, New Hampshire, which also had founded Portsmouth, Ohio; he owned a river warehouse and commission business in St. Louis and the canal would ease river communication between St. Louis and Portsmouth, Ohio, where his brother headed the town's bank. With investors from several states, the stockholders thus considered themselves luckily safe from "imprudent interference by the Kentucky legislature" because they could appeal to federal courts.⁴⁶

The Louisville Insurance Company's president and directors were Thomas Prather, Nicholas Berthoud, John Jacob, Simeon Goodwin, John Colmesnil, and John Bucklin, and these all were canal investors. Two days after their election, the five canal company officers therefore met at the Louisville Insurance Company office and selected Simeon Goodwin as company secretary and John Jacob as treasurer. Goodwin, a marine insurance agent and Louisville's port

warden, was well known for his business acumen, and he was to serve as the canal company's secretary until his death in 1847. Jacob, the brother-in-law and partner of Thomas Prather, owned considerable real estate in Louisville and served as president of the Bank of Kentucky. The new officers also decided that, since New York engineer David Bates had drawn the action plans, they would offer him the position of chief engineer on the canal. Although Bates had already accepted Ohio's offer to become chief engineer of its canal system, he agreed also to become chief engineer on the Louisville canal, provided his son John Bates would serve as resident engineer at Louisville.⁴⁷

In April John Mullanphy of St. Louis became the second major canal investor, purchasing 650 shares. A wealthy Irishman who lived at Frankfort early in the century, Mullanphy had built sailing ships on the Kentucky River and had suffered losses getting them past the Falls. Later he moved to New Orleans, cornered the New Orleans cotton market, and became the first millionaire west of the Mississippi. It was his cotton bales that General Jackson used to strengthen the ramparts against the 1815 British attack. After serving with Jackson, Mullanphy relocated to St. Louis, and it was his largesse, first extended to stranded wagon trains on the prairies, that founded the Travelers Aid Society. Like John Shackford, Mullanphy could afford to pay cash up front for his shares, an investment that proved important to the canal company, although Mullanphy, unlike Shackford, never accepted election as a director.⁴⁸

Mullanphy's stock purchase brought the total number of shares taken in the Louisville canal to 3,600, more than half the 6,000 shares authorized in the company's charter. If installments on these shares were paid on schedule, the company would have sufficient capital to pay the \$306,000 estimated construction costs. When the company directors announced they would like to conduct the groundbreaking ceremony in July 1825, Indiana quietly dropped its pending plans for starting a competing canal on the north side of the Falls.⁴⁹

In 1825 DeWitt Clinton, the famed New York governor who orchestrated construction of the Erie Canal, came to Louisville on July 15 to break ground for the canal. He came from Ohio, where he had broken ground for Ohio's canal system on

July 4, in company with Ohio Governor Jeremiah Morrow and that state's canal commissioners. They inspected the canal route and visited Shippingport, where they received a forty-eight gun salute from the steamboats crowded at the landing, and boarded the boats for a sumptuous lunch. In the evening they convened a formal banquet at Louisville's Union Hall with Nicholas Berthoud presiding as master of ceremonies. After dinner, Governor Morrow raised a toast in honor of Robert Fulton, the steamboat inventor, and Governor Clinton congratulated the audience on their persistent pursuit of the Falls canal. He had inspected the canal site, had reviewed the engineering studies, and he thought it an entirely feasible and practical project. "Nature, in creating this impediment," Governor Clinton concluded, "has also provided great facilities for its removal, and the ingenuity and industry of art, will produce a speedy accomplishment." Thunderous applause drowned out, for the moment, the distant thunder of the Falls.⁵⁰

OBSERVATIONS

Both the opening ceremonies and Governor Clinton's remarks proved premature.

Engineering designs and specifications had not been completed, construction contracts had not been awarded, and the Falls impediment was more formidable than it may have seemed to Clinton. The engineering art of 1825 was not such that removing or opening a passageway around the Falls could be accomplished speedily. It had taken, after all, more than a quarter century to settle upon a specific passageway, the canal across the inner bend on the Kentucky shore. Both Indiana and Kentucky had organized several canal companies, and these successively failed, chiefly for lack of capital. Only when Ohio threw its considerable weight behind the Kentucky canal was an acceptable site decision achieved. And this only after the federal government held out the tantalizing morsel of a national armory that might come, if the canal were built.

Still, the canal company in 1825 had attracted wealthy capitalists willing to take the risks, and their investments gave the company an interstate reputation as perhaps a profitable enterprise worth watching. Moreover, the Monroe administration's support for federally funded transportation projects, notably the Ohio and

Mississippi River navigation improvement, had temporarily broken the impasse presented by constitutional issues. With the advent in March 1825 of President John Quincy Adams's administration, including Secretary of State Henry Clay, the chances of the canal company obtaining federal funding brightened considerably. Surely a national administration that embraced Henry Clay's "American system," encouraging internal business with high tariffs on imports and expending the taxes on transportation projects, would view the construction of a canal directly benefiting the commerce of seven states as a worthwhile investment.



3

CANAL DESIGN AND CONTRACTORS

To design and build the canal passing the Falls, the Louisville and Portland Canal Company employed the most expert engineers it could find and contracted for construction with experienced builders. These had learned their craft on New York's Erie Canal, especially at Lockport, where five navigation locks linked in series like a staircase raised or lowered boats fifty feet. The Louisville locks were to be larger than those at Lockport, to accommodate steamboats rather than smaller canalboats, but they would lift boats only half the distance required at Lockport. As the Erie Canal neared completion in the 1820s, canal engineers and contractors had relocated to take work on the State of Ohio's canal system, and they came to Louisville in 1825 with recommendations from Ohio's governor and canal commissioners, a significant consideration in view of Ohio's earlier political support of an Indiana Falls canal.

Louisville's chief engineer, David Bates, had designed the Lockport locks, and he brought with him other Erie Canal engineers, his son John Bates, his assistant John Henry, and a child genius, Increase Lapham, who had worked on the Erie Canal when only age thirteen. Bates and his associates prepared elaborate plans for the Louisville canal, including the largest navigation locks in the world capable of passing the steamboats then plying the Ohio around the Falls. The Bates plans, moreover, included novel features such as drydocks for boat repair, a massive stonemasonry bridge to carry turnpike traffic over the canal, an embankment levee protecting the canal against the greatest floods of record, and the first metal lockgates ever built. Many of Bates' design innovations, however, were abandoned during the course of construction.

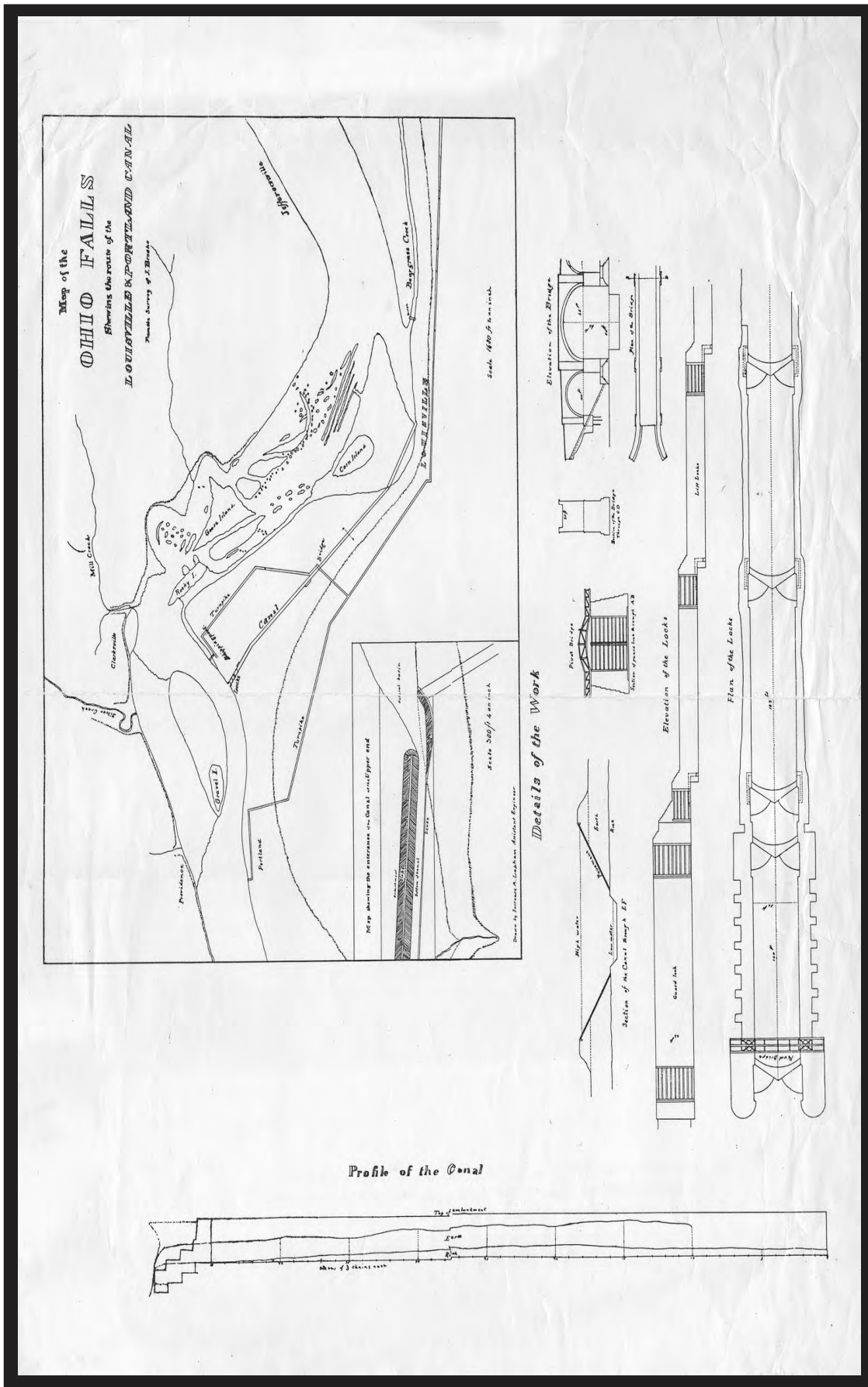
When Bates completed his plans, the canal company directors took construction bids and accepted the low bid of a contracting partnership that earlier had built parts of New York's and Ohio's canal systems. The contractors attempted to build Louisville's canal with manual labor and

animal power, with archaic technology not much improved over the methods used to build Solomon's Temple, the Parthenon, or Roman aqueducts in ancient times. Because concrete and steel had not been developed, the contractors built Louisville's locks and turnpike bridge of stone masonry; because powered construction equipment was unavailable in 1825, the contractors used oxen and horses, slaves and wheelbarrows, to excavate the canal. Before recounting how the contractors applied these ancient methods at Louisville, however, the plans and specifications prepared by David Bates for the contractors' guidance should be outlined.

BATES DESIGNS

A month after DeWitt Clinton stamped his approval on the Falls canal, chief engineer David Bates and his son John arrived at Louisville. They had designed the flight of five locks at Lockport, New York, which lowered the Erie Canal down five steps to bypass the fifty-foot drop of the Niagara escarpment. At Louisville, Bates investigated the foundation conditions, prepared detailed designs, drafted contract specifications, and staked out the work sections on the canal line. Bates estimated the job would require excavating 112,000 cubic yards of rock and 633,358 cubic yards of earth. Subsurface exploration then, however, consisted simply of digging a few shafts down to bedrock to inspect the strata and driving metal augers with hammers until they clanked against rock. These methods produced a rudimentary profile of subsurface conditions, and Bates' estimate of how much soil and rock the contractors would move was correct within an order of magnitude.¹

Bates planned the canal to have a bottom width of 50 feet, sloping wider up the sides, with a maximum excavation depth of 42 feet and average depth of 20 feet. At its head, the canal line cut into the riverbank at what became Louisville's Ninth street, then curved to follow a straight line toward the northwest and down through a ravine leading to the river. Bates placed the navigation locks at the canal's foot, in the ravine between Nicholas Berthoud's warehouse at Shippingport and a warehouse completed in 1824 at upper Portland by John Gray and Bowes McIlvaine—the latter was a substantial seven-story building for cargo storage with arched doors allowing wagons to enter the



These were the canal plans made by chief engineer David Bates and drawn by assistant Increase Latham. (William Kreisle's drawing on original plans in Increase Latham papers, Wisconsin Historical Society)

building and load directly onto boats. John Gray, one of canal stockholder John Shackford's business partners, owned another warehouse at Beargrass Creek in Louisville, offering complete transshipment services past the portage. Although completion of the canal surely would erode the warehouse and portaging business, both Nicholas Berthoud and John Shackford owned stock in the canal and supported its construction.²

Bates planned to build the canal's three navigation lift locks in series, like the series he had designed at Lockport, New York, each lock capable of lifting boats 8 feet and 6 inches to overcome the Falls descent of more than 25 feet. Each of the stone-masonry locks would be 50 feet wide and 190 feet long, with adequate space inside each for practically every steamboat then on the inland rivers. He planned two sets of massive stone guard locks with sturdy lockgates, one at the upper lift lock to protect the locks against damage by driftwood, ice, and flooding, and a second near the upper canal entrance at Louisville. Closing the guard locks could prevent drift, sediment, and flood currents from entering the canal and locks. Or, by closing the guard gates while opening the gates at the lower lift locks, water could be drained from the locks and the canal to permit repairs inside them.³

The initial plans included two drydocks, also 50 by 190 feet, excavated into rock at the side of the canal with gates across their entrances. When these gates closed, water could be drained from the drydocks through culverts, a convenient design for boat hull repairs. In 1825, when a Louisville boat needed hull repairs, the crew grounded it on a riverbank and installed wooden stanchions to support it; by digging soil from around the boat, workers could squeeze beneath the hull to repair damages. When the canal drydocks were completed, the canal company expected boat owners would abandon earlier repair procedures and instead pay the company substantial rents for use of its drydocks.⁴

Bates hoped to make the canal flood proof. Based on the flood marks set in 1809 and 1815, he intended to build an embankment from the guard lock near the canal entrance to higher ground, then use materials excavated from the canal to build an embankment along the canal's north side between it and the river. This bank would be ten feet wide at the top and two feet

higher than the elevations reached by the record floods of 1809 and 1815, thus protecting the canal against flood erosion and against the sediment deposited by floods. The ten-foot wide crest of the embankment could become a towpath, where teams pulling ropes attached to flatboats or keelboats could speed the boats through the canal, just as was done on the Erie Canal. To further protect the sides of the canal and the embankment from flood erosion, Bates planned to pave them with a total of 102,263 square yards of flat stones at least twelve inches thick. This was fine engineering indeed, but Bates apparently did not recognize that available flood records were too short and incomplete to forecast future flood levels.⁵

One glaring miscalculation marred Bates' plans. Because the canal would cut the Shippingport riverbend off from the mainland, converting it into an island, Bates planned a wooden swing bridge crossing the lower guard lock to pass road traffic between Shippingport and Portland. The canal also would cut across Shippingport Turnpike, running directly from Louisville to Shippingport, and perhaps Bates expected that wagon traffic would shift onto the road from Louisville to Portland, then cross the bridge at the locks from Portland into Shippingport. Nicholas Berthoud, Shippingport's principal businessman and a canal company director as well as president of the Shippingport Turnpike Company, would not submit, however, to loss of his direct route to Louisville. Moreover, Berthoud and Shippingport's residents refused to accept a cheap wooden pivot bridge to carry turnpike traffic over the canal; they demanded a bridge high enough for boats to pass under it in order that road traffic not be delayed while a pivot bridge opened and closed for boat passage. Accordingly, Bates added to his canal designs a stone-masonry bridge, 240 feet long, 68 feet high, for the turnpike crossing. Most steamboats in 1825 could pass under the high arched bridge, although its 66-foot clearance was reduced by the depth of water standing in the canal. Building this massive stone-arched bridge, with long graded embankments to take Shippingport Turnpike over the canal, would cost \$50,000, increasing Bates' estimated total project costs to about \$420,000. When news of this unanticipated additional cost reached the distinguished canal stockholders, they lost their equanimity and some were overheard to curse.⁶

REQUEST FOR PROPOSALS

Yet, in just ten weeks, Bates completed remarkably elaborate plans for the two-mile-long canal and for what would become at completion the world's largest navigation locks. With Bates' design specifications in hand, company secretary Simeon Goodwin on October 17, 1825, published a request for proposals from contractors for its construction. Goodwin announced the company would accept sealed bids until December 22 and would award the construction contract to the low bidder.

He instructed contract bidders to state specifically their price per cubic yard of rock and soil removed and per perch of stone masonry placed, and also to list the shortest time in which they would agree to complete the canal's construction.⁷

The canal company initially had hoped to start the construction during the low water and good weather of the autumn of 1825, but this proved impossible. Although Bates had performed the engineering with amazing speed, by October, when the request for proposals was

...Louisville and Portland Canal.

NOTICE is hereby given, that the President and Directors of the *Louisville and Portland Canal Company*, will receive proposals for the excavation, construction and completion of said canal, which, on the route surveyed from Louisville to Portland, is something less than two miles in length. The preliminary survey and estimate, as made by Judge Bates, the Engineer, describe the following work to be done, viz: 112,000 cubic yards of rock excavation, part of which is bare, and a part under the earth, chiefly limestone, in thin strata. 633,358 cubic yards of earth excavation, consisting of yellow clay, mixed with sand; average earth cutting, about 20 feet deep and 50 feet wide at the bottom, with a slope of 3 feet 6 inches for every foot of rise. 30,000 perches of stonemasonry, in two guard locks, and three combined lift locks, of 8 feet 8 inches rise, each; with two dry docks, together with suitable gates and fastenings. Length of locks, 190 feet in the clear; width, 50 feet. Length of dry docks, 190 feet; 50 feet wide at bottom, and same slope of the canal. A culvert of about 600 feet in length, from the dry docks, of 8 feet chord. Paving the slope and sides of the canal, with the stone taken from the bottom, 102,263 superficial yards. Embankment at the sides of the guard locks, about 20,000 cubic yards.

Sealed proposals for doing the work, including all materials, will be received at their office, in Louisville, Ky. until the 22d day of December next, directed to the Secretary, and marked "Proposals for contract for the Louisville and Portland Canal," on which day, they will be opened, and a selection made, if acceptable; and if none should be found acceptable, the work will, on that day, be let to the lowest bidder, provided satisfactory testimonials or security, are produced at the time.

Persons, either individuals or companies, making proposals for the above work, will state the price per yard, perch, &c. for all the work, and also, the shortest time in which they will agree to complete the same; it being the intention of the company, to have the same completed in the shortest possible time.

Per order of the board,
S. S. GOODWIN, Sec'y.

Office of the Louisville and Portland Canal }
Company, Louisville, Ky Oct. 17, 1825 } 734m2

Canal Secretary Simeon S. Goodwin published this request for contractor bids. (Public Advocate, Oct. 17, 1825)

advertised, the winter highwater season was approaching and it had become too late to complete much construction until the following year. Canal director James Guthrie took up this problem in the Kentucky legislature, and in December the legislature amended the canal company's charter, extending the time allowed for completing the canal by a year. Nevertheless, the canal company still hoped to finish construction in 1827, advising bidders that they could obtain all materials for building the canal within a mile of its site, that they could employ local labor for just \$8 per month pay, and that they could purchase feed at 12 cents a bushel for their oxen and horses. "Provisions are abundant, and laborers can be boarded extremely cheap," the canal directors said, optimistically concluding: "the whole work can easily be completed in the course of the next summer."⁸

When Governor DeWitt Clinton in December 1825 dedicated the completed Erie Canal, traveling by boat from Buffalo to New York City, the contractors on that canal were free to take on new jobs, and they flocked to Louisville to bid on the canal to Portland. On December 22 David Bates and the canal directors opened the thirty sealed proposals received for building the Louisville and Portland Canal and began reviewing the bids. In just five days the company made its decision, on December 27 awarding the contract to the low bidder for \$377,000, substantially less than David Bates' \$420,000 cost estimate. Fresh from finishing work on the Erie Canal, the low bidders had already bid and received a contract for building part of Ohio's canal system under the management of David Bates, Ohio's chief engineer. Most partners in the contractors' firm, operating as Collins-Chapman Company, came from the vicinity of Bates' hometown of Oneida, New York: these were Samuel Collins, Erastus Chapman, Oliver Culver, John Drake, Thomas Benedict, Henry Potter, Sylvanus Lothrop, and the majority partner William Perrine. Of these, only Sylvanus Lothrop claimed to be an engineer; he later sold out to his partners and entered practice, designing a canal aqueduct at Pittsburgh, a Wabash River lock and dam, and locks and dams on Tennessee's Duck River, all of which failed ingloriously.⁹

The ten-page handwritten contract provided the contractors would construct the Louisville canal in accordance with plans and diagrams

prepared by chief engineer Bates. They would begin by grubbing all timber and brush from the canal line, then they would start excavation, making the canal deep enough to hold at least four feet of water when the Ohio River was at its lowest stage. They would dump the materials excavated from the canal along its north side to form an embankment at least two feet higher than the record floods of 1809 and 1815 as determined by Bates. The stone masonry of the locks was to be set in regular courses at least one-foot thick, cemented with lime mortar and with the face stone dressed with hammers to remove projecting stone. The contractors would furnish the timbers and build the lockgates, using the iron cramping and operating machinery supplied by the company. They agreed to start the work by March 1, 1826, and complete the construction in twenty months, by November 1, 1827.¹⁰

The contract provided that the company would pay the contractors 93.7 cents per cubic yard of rock removed, 17.1 cents per cubic yard of earth excavation, and 13 cents per cubic yard placed in the embankments. For the stone masonry of the locks, it would pay \$3.87 cents per perch (about 16.5 cubic feet) and similar amounts for the stone placed in the turnpike bridge and dry docks. The company agreed to pay the contractors weekly, paying three-quarters of the sum the engineer estimated the contractors were due for work completed, while withholding the final quarter as a retained percentage to be paid when all work was completed. Withholding retainage for payment at the contract's successful completion was standard procedure then, as now, for construction projects, although the twenty-five percent retainage at the Louisville canal was quite high, threatening to exhaust the contractors' capital before completion. In its conclusion, the contract provided that the engineer's weekly estimates of the amount of work done by the contractors were to be "final and conclusive," and the company also reserved the right to abort the contract whenever the engineer determined the contractors had abandoned their job. The canal directors gloated over having a contract signed at a bid twenty percent less than the engineer's cost estimate and in which the contractors agreed to a twenty-five percent retainage; but neither provision boded well for either the company or the contractors.¹¹

The contractors started mobilizing in January, selecting Daniel Carroll of Shippingport to manage their company commissary, subcontracting for construction of frame shanties to house the laborers, and advertising that they wanted to buy pork, flour, potatoes, beans, corn and whiskey to subsist the workers. It then was customary for contractors to bring their skilled workers from other jobs and to hire local labor, offering them lodging and subsistence in a camp near the site—commuting from any distance then was impractical. For the workers' convenience, contractors established a local commissary, stocking necessary items, extending credit, and charging sales against workers' pay. Commissary prices were high—as modern convenience store prices are higher than supermarkets—but respectable contractors charged just fair profits; the unscrupulous took advantage, however, sometimes profiting more on commissary sales than their construction contracts. Even federal agencies such as the Army Corps of Engineers then built construction camps at isolated projects, with fencing to keep out “bootleggers, dope peddlers, agents for shyster lawyers, loan sharks and other predacious camp followers.” At Louisville in 1826, the contractors employed Charles Hitchcock to build the shanties and to subsist the workers, and he agreed to furnish the workers daily rations of pork, salt beef, and bacon, plus wheat or corn bread with coffee every morning, pepper, salt, and vinegar to make the food palatable, and sugar and butter once a week. For this “good and wholesome food,” the contractors agreed to pay Hitchcock \$1.50 per week for each worker he housed and fed.¹²

STOCKHOLDERS 1826 MEETING

The canal company's charter required that its annual stockholders meeting be conducted on the first Monday of each year, and in January 1826 the stockholders met amidst tumult, with the contractors mobilizing, the federal government taking interest in the project, the canal land purchase pending, and stock subscriptions falling short.

The canal company had awarded the construction contract in December before it actually owned the land where the canal would be built. As the attorney for Senator John Rowan, James Guthrie relieved the company from this bind by quickly closing the real estate

transaction, selling the company on January 10 the narrow strip of land it needed for the canal from Louisville's Ninth street down to Portland. The company purchased an aggregate of eighty-nine acres from Rowan, who did not extort an unreasonable price considering the circumstances. Construction requirements also forced the company to purchase two lots and houses at the foot of the canal belonging to Bowes McIlvaine, owner of the Portland warehouse. Reaching no agreement on price with McIlvaine, the company had the property condemned by the county court and then paid the \$2,024 market value set by independent appraisal.¹³

Less amenable to solution was the forfeited stock subscriptions as the Louisville and Cincinnati investors began to bail out. These had purchased their shares on the easy-pay plan, paying a dollar down and promising to pay the balance in regular installments. Even before construction had fairly begun, some small investors had lost interest or faith in the project, failed to pay their installments, and thereby forfeited their shares, with ownership returning to the company. More than a quarter of the subscribed shares were forfeited back to the company during its first year of operation, leaving the company seriously short of cash.¹⁴

At the 1826 annual meeting the stockholders replaced company president James Hughes with Edward Shippen. Hughes was president of the Louisville branch of the Bank of the United States and Shippen was its cashier, or executive officer. The Bank of the United States, a federal central bank which handled United States Treasury funds, then was the most powerful bank in the nation and, while Hughes was from Louisville, Shippen had been sent from the Bank's Philadelphia headquarters in 1821 to reorganize and manage its Louisville branch. Shippen, therefore, had useful contacts with Philadelphia capitalists, who might be persuaded to invest in the canal stock.¹⁵

Stockholders attending the annual meeting had reasons to feel encouraged about their investments. River commerce continued to grow and the steamboat *Pioneer* had reached Shippingport just ten days out of New Orleans, a new record time. More immediately significant, in 1825 Congress had enacted and President John Quincy Adams signed a bill to purchase 1,500 shares of stock worth \$300,000 in the Delaware

and Chesapeake Canal, under construction near Philadelphia by a stock company similar to the Louisville and Portland Canal Company. This precedent significantly enhanced the chances of federal investment in the Louisville canal, as Kentucky's congressmen were quick to point out.¹⁶

Even better news was an inquiry received from the Secretary of War at the end of December 1825. The Secretary asked the canal company on what terms it would furnish a site and water power for a national armory—it would require up to 200 acres of land and sufficient water power to operate twelve pair of five-foot burr millstones up to twelve hours daily. Canal president Edward Shippen drafted an immediate reply, advising the Secretary that, although the company had no land to sell, the Secretary could consult personally with Senator John Rowan in Washington, who had plenty. In Shippen's opinion, the Tarascon Mill and adjacent property at Shippingport might become an excellent site for weapons manufacture—like the armory at Harpers Ferry, Virginia. If the Secretary selected Shippingport for the armory, the company could build a mill race leading from the canal to the armory for \$22,000 and would supply from the canal all the water needed for power production in exchange for a \$3,600 annual rent.¹⁷

With Shippen's response in hand, stockholder John Shackford, with \$100,000 at risk in canal shares, departed immediately for Washington to deliver the response to the Secretary of War. The stockholders authorized him to negotiate terms directly with the Secretary, and he could also devote time while in the capital to exploring the possibility of federal investment in the canal; indeed, Shackford was such a personable lobbyist that the United States Senate eventually selected him as its official Sergeant-at-Arms. Yet, Shackford's efforts to secure Shippingport's selection as the national armory site proved unsuccessful; indeed, Congress never could agree on any site proposed for the national armory and it was not built.¹⁸

Shackford's efforts on behalf of federal investment in the canal proved more successful. Shackford advised Kentucky Representative Robert Henry that the forfeiture of stockholder shares meant the canal could not be completed without federal aid, and Henry reported a bill

out of committee on January 24, 1826, appropriating \$100,000 for the Secretary of Treasury to purchase 1,000 shares of the Louisville canal stock at par. Indiana Representative Jonathan Jennings opposed the bill, contending the Louisville canal was a poor investment and a canal should be built, instead, on the Indiana side. Kentucky Representative James Clark of Winchester also opposed the bill, not because he preferred the Indiana canal but because he objected to enriching Senator Rowan. When debate concluded, however, the Kentucky canal proponents prevailed, and the bill became law in May 1826, assuring sufficient funding to continue construction that year.¹⁹

This first federal funding for Louisville's canal project soon encouraged investments by Philadelphia capitalists, notably the Shorts and Ronaldsons. William Short of Philadelphia, a diplomat who once served as Thomas Jefferson's secretary, purchased 375 shares and brought his nephews, botanists Charles and J. Cleves Short, into the enterprise. J. Cleves Short, grandson of Cincinnati founder J. Cleves Symmes, was a widely known botanist with gardens on the Ohio River near Cincinnati called Fernbank. Charles Short, physician and medical professor at Transylvania University and later the University of Louisville, owned a herbarium for botanical research near Louisville. James and Richard Ronaldson, who built the first type-foundry in America at Philadelphia, purchased 815 shares. James was then serving on Pennsylvania's state canal commission; he also was the first president of Philadelphia's Franklin Institute for science, and was a noted horticulturist, introducing the sugar beet and other plants to American agriculture. As a principal stockholder in Louisville's canal, James Ronaldson became a leader of stockholder efforts to get the canal into profitable operation.²⁰

CONSTRUCTION START

Although the contractors, Collins-Chapman, had begun mobilizing in January 1826, when the March 1 construction start day came, the canal site was not visible, entirely submerged by a flood. People living at Louisville's riverfront were moving upstairs, loudly complaining that steamboats were "riding majestically in our streets and making excursions through our lots, passing over fences." And little but the roofs of

homes could be seen at Shippingport and Portland. Gloating over this disaster, an Indiana newspaper editor proclaimed: "the whole site for the famous Louisville and Portland canal was swallowed in the flood, and that great quantity of provisions lately brought down from the contractors has moved on, like the notes of the late Commercial bank, to New Orleans." In response to this needling, a Louisville editor declared that, although the canal site was indeed flooded, it would never be submerged again after its completion because an earth embankment built along the canal's north side with the excavated materials would surely prevent future flooding.²¹



To excavate rock from the canal, men drilled holes by hand that were filled with gunpowder and detonated. (Courier-Journal)

The flood apparently discouraged some contractor partners, and Sylvanus Lothrop and Oliver Culver sold their contract shares to their partner William Perrine and moved on to other projects. The flood had subsided by late March, however, and the contractors began grubbing trees and vegetation from the entire 10,247 feet of canal line—73 feet less than exactly two miles in length. Voiced by Indiana newspapers, rumors quickly spread that the first workers were afflicted by smallpox and other diseases, and as a result the contractors soon learned they could

not employ workers for \$8 a month plus subsistence. They had expected to bring skilled workers from the Erie Canal project, but these instead went to work on the canal projects starting in Pennsylvania and Ohio, rather than risking disease at Louisville. The contractors therefore increased their pay offer to workers to \$10 a month, then to \$12 monthly plus lodging and all the wholesome food and whiskey the workers could consume, also promising drillers, paid by the inch of rock drilled, that they might earn as much as \$1.50 per day.²²

In 1826 no steam or power drills were available, and rock drilling was done manually. While one driller held and turned a pointed metal rod against the rock, a striker struck the rod repeatedly with a sledgehammer; this required considerable trust in the aim of the striker. After drillers hammered the rod inch by inch into the rock, they packed gunpowder into the hole, inserted a fuse, tamped it with clay, and detonated a blast shattering the rock for removal in carts. The canal drillers started their work on the limestone ledge in the dry riverbed 800 yards from the canal entrance, excavating a channel six-feet deep that would allow boats to enter the canal. Here the contractors suffered their first disappointment: the exposed rock appeared to be friable, so fractured it could be profitably removed quickly with just sledgehammers and crowbars, but a few inches below the surface it became solid rock, requiring expensive and slow drilling and blasting. This condition not only curtailed profits—the contractors were paid a set fee per cubic yard excavated, no matter how it was removed—it also meant the contract might not be completed as early as expected.²³

At the riverbank the limestone rock ledge passed beneath the soil, and before the rock could be drilled and blasted the earth above it had to be moved. Here the contractors found another nasty surprise. The top layer was a yellow sandy soil, easily dug, but beneath it was a rocky blue soil, interlaced with nearly petrified tree trunks that obstructed excavation efforts. Earth excavation in 1826 was done manually with shovels and wheelbarrows and with teams of horses and oxen, just as it was done in ancient times. By May 1826 the contractors had thirty-five teams pulling plows to loosen the soil and scrapers to carry the soil to a disposal area, and a tourist visiting the site described the contractors' early excavation:



The original canal of the 1820s was built by manual labor and teams of oxen and horses. Stiffleg derricks made of timber poles and cable hoisted and moved stones into place. (Klauber Collection, University of Louisville Photographic Archives)

The soil intended to be dug out was first ploughed by a heavy plow drawn by six oxen. Afterwards a sort of scoop drawn by two horses was filled with earth. It contained three times as much as an ordinary wheelbarrow. It was then carried up the slope, where it was deposited, and the scoop was brought back to be filled anew.²⁴

Oxen were slower but more powerful than horses, so several yoke of oxen pulled the cutting plows to loosen the soil. Faster horses pulled the metal pan scrapers into the canal, where the driver set the scraper angle to cut into the plowed earth as his horses pulled, filling the scraper with perhaps a half yard of soil. The team then pulled the filled scraper to the top of the embankment, where the driver pulled a release to overturn the scraper and empty it. He then whipped the team back down into the canal again to refill, keeping his team and scraper continually moving, constantly circling from ditch to embankment and back again. After chief engineer David Bates returned to his duties on Ohio's canals, his son John remained as the resident engineer at Louisville, with his father returning monthly to monitor progress. When estimating the amount of excavation done by the contractors, resident engineer John Bates counted

one horse as equal to one laborer on the job, and this counting method proved misleading to the public: when canal news releases listed 100 workers on the canal job, for example, it possibly meant just 60 men with 40 horses and oxen.²⁵

For the cut stone needed to build the locks and bridge, the contractors selected a quarry located a few miles downriver where Knob Creek entered the Ohio on the Indiana bank. The quarry was owned by Thomas Joyes of Portland.

Stonemasonry was an ancient craft, a guild, learned on the job by serving an apprenticeship and fellowship before becoming master masons. Jack Holborn of Portland and Frank McHarry of Shippingport became the contractors' master stonemasons, managing the quarry where workers cut stone blocks for the lockwalls to size and piled them at riverside for transport aboard boats to Shippingport at the lower end of the canal. To transport the stone, the contractors built scows called stoneboats and chartered the steamboat *Triton* to tow the scows eight miles upriver to the locks. The contract required that the stones be set in the lockwalls with water lime, or hydraulic cement that would harden underwater, and David Bates, or perhaps one of the contractors, saw that a lower limestone strata to be excavated from the canal resembled the limestone used to manufacture hydraulic cement

on the Erie Canal. They collected samples of this limestone, ground and burned it into cement, then tested it underwater.

When it proved equal to the hydraulic cement found in New York, the contractors built at Shippingport a steam mill for grinding the limestone and three lime kilns for heating it. Mixing the resulting cement with sand manufactured this indispensable mortar on the spot, a substantial saving in costs over importing it from New York.²⁶

In addition to sending recruiters east to employ laborers and widely advertising the magnanimous pay of \$12 per month, the contractors sought to alleviate their labor shortage by subcontracting sections of the excavation to local construction firms, which brought their own workers and horses to the job. A contract for excavating a quarter mile of the canal line went to Jesse Beard, for example, who would be paid 20 cents per cubic yard of earth and 80 cents per cubic yard of rock, to finish his section in 4.5 months. This experiment foundered when some subcontractors, after collecting considerable pay, abandoned their jobs, leaving their workers unpaid. As a result, the contractors decided late in 1826 to eschew subcontracts, instead employing and paying all the workers directly. Despite distant rumors to the contrary, no epidemic disease troubled the canal workers, and in the first six months of construction the contractors suffered only one fatality when an earthen bank caved in atop a worker; in 1826 this was considered a remarkable safety record.²⁷

In May 1826 the canal board of directors inspected the job and were disturbed by slow progress, dispatching an inquiry asking the contractors what force they had at work.

Collins-Chapman replied that they had 135 men, 64 horses, and 28 oxen at work on May 15, and 40 more hands were en route from Akron, Ohio, where the contractors were finishing a job on the Ohio canal system. "We think, gentlemen, that we are getting along with the work as fast as could be expected," the contractors protested, "taking into consideration the difficulties we have encountered." By the way, the contractors asked the directors, could you advance us \$5,000?²⁸

Miffed by this, the canal directors warned Collins-Chapman that their work force was

totally inadequate to meet contract deadlines—even if they doubled their existing force it would not be adequate. The directors and engineer ordered the contractors to employ at least 800 men forthwith, threatening suspension of all payments to the contractors if they did not hire a larger workforce. Resident engineer John Bates put it more bluntly, advising the contractors they must excavate 105,000 cubic yards of earth monthly to have any chance at all of completing the work by the deadline of Halloween of 1827.²⁹

Under this spur, the contractors promised to pay recruiters a dollar for each worker sent to the canal and dispatched them east to hire workers in Ohio, Pennsylvania, and New York. Only sixty yankees were found willing to leave the canals building in the east to travel west to the canal at Louisville, then called the "graveyard of the West." The contractors therefore saw no other recourse than to hire unskilled laborers from Indiana, and, according to John Bates, these were third-rate hoosiers. Indeed, legend says Indiana hoosier, a slur like Kentucky hillbilly, originated at the canal, that the name came from contractor Samuel Hoosier who recruited the Indiana workers. Yet, available canal records never mentioned a Samuel Hoosier, and the legend appears no more accurate than another holding that Indiana frontiersmen were so pugnacious and prone to bite off ears, that one, walking into a saloon after a fight and seeing an ear on the floor, merely asked, "Who's ear?"³⁰

Possibly it belonged to one of the Hoosiers who crossed over to the canal in late 1826, bringing the contractors' total work force up to 700, including horses, by December, the end of the working season. Chief engineer David Bates was cheered by this increase, reporting that the contractors had gotten the topsoil removed from the lower end of the canal and had begun excavating the lockpits in which the locks would be built. The contractors had about half the stone for the locks cut at the Knob Creek quarry and had begun manufacturing hydraulic cement at Shippingport to make the mortar. Bates still hoped the contractors might meet their Halloween 1827 deadline, and Collins-Chapman prepared to rush their work during 1827, raising their pay offer to \$13 per month and advertising that they needed 3,000 workers and would be willing to hire slaves, if their owners were willing.³¹

When the canal stockholders met in January 1827, the chief engineer told them that Collins-Chapman had during 1826 completed nearly two-thirds of the earth excavation, about 6,000 of the 111,000 cubic yards of rock excavation, and a quarter of the 20,000 cubic yards of solid rock to be removed from the lockpits. Enough stone had been quarried and cut at Knob Creek to build two of the locks, and a plentiful supply of cement mortar was available. President Edward Shippen and the directors jubilantly told the stockholders: "No material difficulty or obstacle has presented itself, that an abundant supply of materials are and can be easily and cheaply obtained—the men employed on this canal have enjoyed as good health as any equal number of laborers in any part of the Union—and we are assured by the contractors that, if the approaching season should be favorable, the work will be completed within the time limited in the contract."³²

Expecting Collins-Chapman to substantially increase its work force in 1827, the canal company expanded its engineering staff. To assist resident engineer John Bates, the company employed John Henry and Increase Lapham. Henry, a rough-hewn construction engineer from the Erie Canal at Rochester, would ramrod the field work, while young Lapham handled drafting, mathematical, and clerical duties. Lapham was a child prodigy who began canal work at thirteen, cutting stones for the Erie Canal locks at Lockport, New York, while his father, Seneca Lapham, built the lockgates. When those were finished, the Laphams moved on to Canada's Welland Canal, then to Ohio's Miami Canal, and in 1827 to Shippingport. Hoping to obtain the contract for building the Louisville canal's lockgates, Seneca settled his family in a small house at Shippingport, while young Increase, just sixteen years old, roomed in the Orleans Coffee House Inn owned by Joseph Detiste. John Henry was Increase's roommate, and he, along with the Bates, soon learned to leave the drafting of plans and maps, the mathematical calculating of estimates and dimensions, and paperwork generally to this young genius. And when not working at the canal, Increase, together with John James Audubon's son Victor and other friends, roamed the Falls area, collecting and analyzing the geologic, botanical, biological, and archaeological treasures they found. The diary Increase kept when working on the canal became the best primary source on the canal's history.³³

"If the approaching season should be favorable," was the canal directors' caveat at the start of 1827, and Lapham's diary for the year indicated the season was far from favorable. Winter cold and heavy ice suspended most work from January into April 1827, then a flood rose over the temporary cofferdams the contractors had built to block both ends of the canal. Eroding the embankment the contractors had placed alongside the canal, the flood washed 50,000 cubic yards of rock and earth back into the excavation. Still short of workers, Collins-Chapman dispatched representatives to the Bluegrass plantations to employ slaves from their masters for \$90 a year each. A contract with William Hawkins of Frankfort, for example, paid Hawkins \$180 for one-year service of his slaves Tom and Bob. The contractors agreed to furnish the slaves with "good summer clothing, and at the expiration of the year to return them here with warm and comfortable winter clothing (escapes and accidents excepted) and to furnish them with good medical attendance in case of sickness."³⁴

The contractors treated the slaves little better than had their owners, however, and Increase Lapham was shocked to see a slave who had left the work without permission driven back to the job by an overseer on horseback, flogging the slave with a cowhide whip at every step. This perhaps may account for the difficulty the contractors had even in hiring slaves. "It is much to be regretted, that the slave-holders in Kentucky should be so backward in furnishing hands for the work," read one canal press release. "Experience has proved, that the hands employed on the canal, and particularly the slaves are as healthy as any in our country," it went on: "The contractors have able medical aid in their employ, and having a deep interest in preserving the health of their hands, they take especial care to effect it. If a slave should become unfit for service, they would pay the expense of removing him to his master." By year's end, the contractors had employed what they termed a respectable corps of blacks and announced they would gladly employ more, offering \$12 a month if the master clothed them, or \$10 a month with clothes and medical services supplied.³⁵

CONTRACT EXTENSION

When the Halloween 1827 deadline for contract completion arrived, the canal was hardly half completed. Earth excavation was advanced at both ends of the canal line, with much still remaining in the middle. Excavation of rock from the lockpits was advancing, and building the guard lockwall, at the upper end of the excavation, had begun. All the stone needed for the locks had been quarried at Knob Creek and was being sized; that is, the stonemasons were cutting the stone into shapes to fit the lockwalls. The canal company by November 1827 had invested \$209,000 in the project, of which it had paid to Collins-Chapman \$176,000. A canal news release sought to explain the project status:

The difficulty of procuring hands has of course prevented the advancement of the work as rapidly as was expected in the present year. There has however, been a considerable amount of work done; but from the nature of it, the show of progress is not so great as it was in the commencement of excavating the earth. The greater part of the work this season has been done at the lower end of the canal, in preparing the site of the locks, and building them. The construction of the upper locks is well advanced, & exhibits a beautiful & substantial piece of masonry. A considerable quantity of earth has also been removed, & some rock from the bed of the canal at the upper end. It would be useless to speculate on the probable period of its completion. Much will depend on the success of the measures hereafter employed to procure hands, & it is impossible to foresee the extent of that success. We have not understood, that there are any intrinsic difficulties in the work, which were not anticipated, & it will no doubt be prosecuted with unremitting perseverance to its final completion.³⁶

With the original contract deadline approaching, some principals became discouraged. Resident engineer John Bates left Louisville to join his father on the Ohio canal project; he later returned to New York's canal projects. Instead of searching for a replacement for Bates, the Louisville company promoted assistant engineer John Henry to the job.

Fortunately for his own economic future, Erastus Chapman sold out his contract interest to Congressman Nathaniel Allen. A blacksmith of Richmond, New York, and the Ontario County sheriff, Allen had represented western New York in Congress from 1819 to 1821, when he became Richmond's mayor. When he supplanted Chapman as partner, the contractors changed the firm's name to Collins-Allen-Perrine Company.³⁷

Near the end of the initial contract period, the canal directors met, complaining of the contractors' lack of energy and work force and directing David Bates to submit a full progress estimate. Bates reported the contractors had excavated a half-million cubic yards from the canal, had delivered 11,000 perches of cut stone to the guard lock, had another 31,000 perches at the Knob Creek quarry, and had pine timbers ready for building the lockgates, along with 4,000 bushels of cement stored at Shippingport and five stiff-leg derricks ready to hoist stone into place at the lockwalls.³⁸

Meeting with the contractors, the canal directors arranged contract modifications, extending the completion time by one year and also loaning them \$6,000, taking in exchange a mortgage on the contractors' construction equipment and related property. Collins-Allen-Perrine used this cash advance on November 17 to subcontract all the stonemasonry construction to Peter Carney, Benjamin Sayre, and Daniel Carroll; operating as Carney-Sayre Company—these had worked with the primary contractors earlier on the Ohio canal system. Carney-Sayre agreed to finish excavating the lockpits and to build the guard and lift locks, the turnpike bridge, and the guard lock at the upper canal entrance, if it was constructed. Carney-Sayre negotiated prices for their work of \$1.40 per masonry perch and 87 cents per cubic yard of rock excavation, promising to complete all masonry work by the first of November 1828.³⁹

Carney-Sayre promptly went to work, purchasing the tools Collins-Allen-Perrine had on

hand for masonry construction, making John Holborn their chief stonemason, purchasing a steam pump to remove ponded water from the lockpits, and finishing the guard lock masonry first. By the end of 1827 they had placed enough stone to raise the guard lockwalls to thirty feet above their foundation.⁴⁰

Collins-Allen-Perrine, however, was increasingly short of operating cash and found that lenders were becoming reluctant to extend them credit. John Bates later blamed this on the constant squabbling between them and the canal directors, especially Simeon Goodwin. "From the beginning," Bates declared, "the secretary of the board was hostile to the contractors' interest, not directly but by hints and innuendoes. This gave a bad public impression, especially to those from whom the contractors sought credit." To pay the subcontractor and their own workers, Collins-Allen-Perrine continually asked cash advances from the canal company, taking \$6,000 one month, \$5,000 the next, and by March 1828 their debt to the canal company totaled \$40,000.⁴¹

At the January 1828 annual meeting, the canal stockholders elected Nicholas Berthoud of Shippingport as the company president, and, concerned by the contractors' growing burden of debt, Berthoud soon acted to secure collateral for the company's loans. He ordered John Henry to inventory the contractors' equipment and property, and Henry compiled a complete listing indicating what construction contractors needed to build canal projects of the 1820s. His list may be divided into several categories. Structures: a stone canal store, 4 large shanties to house workers, 3 blacksmith shops, 1 carpenter shop, a powder magazine, a barn and stable, 2 keelboats, and 2 stone scows. Tools: assorted blacksmith and carpenter tools, 42 horses, 142 oxen and cattle, 145 drills, 48 crowbars, 65 picks, 200 shovels, 179 wheelbarrows, 60 ox yokes, 35 scrapers, 30 carts, 2 plows, 10 sledgehammers, 10 tamping bars, 16 wagons and harness, 15 kegs gunpowder, lockgate lumber, and 2 slaves, Ben and Mary of ages 35 and 40. Provisions: 7 hogs, 7 cows, 9,000 pounds bacon, 41 barrels whiskey, and 40 barrels flour. Shanty furnishings: 357 blankets, 153 bedticks (mattresses), 305 tin plates, 186 tin cups, 137 spoons, 153 knives and forks. This accumulated property seemed a meager showing for the \$176,000 in payments, plus \$40,000 in loans, the contractors had received during two years of work.⁴²

When Collins-Allen-Perrine came to the directors in March 1828 to ask an additional \$12,000 loan, Nicholas Berthoud demanded concessions, which in view of their approaching bankruptcy the contractors could not refuse. They signed an agreement with a preamble reading: "The pecuniary embarrassment of the contractors and the consequent want of energy in the progress of the work render it indispensable that some efficient remedy should be applied in order that the ensuing season may be met with proper ability to complete the canal." The contractors signed a deed assigning their construction property to the company and they agreed to employ Nicholas Berthoud for \$2500 as financial agent disbursing payments to labor, materials suppliers, and subcontractors. The company promised that when the canal was completed, they would pay to the contractors the profits due them, if any.⁴³

Berthoud's first challenge came from the subcontractors Carney-Sayre. When John Henry went to the Knob Creek quarry to inventory property, he was turned away by Frank McHarry and the stonecutters. They were striking for the back pay due them, and they seized the quarry equipment as security for their pay. This led to meetings with Peter Carney and his associates, and Nicholas Berthoud negotiated a new contract with Carney-Sayre at advanced prices, also loaning Carney-Sayre \$10,000 to settle the stonemasons' pay claims, thus allowing the subcontractors to resume work.⁴⁴

CANVASS WHITE'S INNOVATIONS

This crisis made the Philadelphia capitalists extremely anxious about their large investments, lost if the canal were not finished. Caucusing in Philadelphia, they offered the position of chief engineer at Louisville to Canvass White, the foremost canal engineer in the nation with experience on the Erie, Delaware, Raritan, and Union canals. White declined their generous offer because of his precarious health, but agreed to serve as a consulting engineer, whereon the stockholders elected him as a canal director.⁴⁵

White and an entourage of Philadelphia stockholders arrived at the Louisville canal in May 1828 and with help from John Henry surveyed and leveled the canal line to learn how much excavation the contractors had actually completed. The results indicated that Bates had



The guard gates at the head of the canal had a bridge that could be swung aside for boat passage. (Corps of Engineers)

overestimated the amount by 50,000 cubic yards, meaning the contractors had received substantial pay for work they never performed. Canal chief engineers, although employed by the canal company, were expected to act as independent umpires in disputes between the company and the contractors, but rumors circulated that Bates was too close to the contractors. Actually, the overestimate of excavation represented an error on the part of John Henry, who had neglected to add in the 50,000 cubic yards the contractors had excavated from the lockpits to the total. The canal directors also wanted David Bates to officially declare that the contractors had abandoned their work, allowing the company to take full control of the job as specified in the original contract, but Bates declined to take this punitive action. Seeing the chiseling on the lockwalls, however, David Bates resigned as Louisville's chief engineer in June, leaving the job to John Henry and consulting engineer White. Three days after Bates' departure, on the last day of June 1828 John Henry as the new chief engineer declared the Collins-Allen-Perrine contract forfeited and took control of the work and construction property, leaving the canal's completion entirely under company management.⁴⁶

During frequent visits in 1828 and 1829, consulting engineer Canvass White altered several features of Bates' original canal design. Where Bates had planned just a central arch span for the turnpike bridge over the canal, White redesigned it with three arches, adding an arch on both sides of the central arch and converting the central span from a circular arch to a flatter ellipsis. This was done to improve the clearance for boats passing under the bridge and also to reduce the amount of stonemasonry required for its construction. At the canal's upper entrance, White changed the canal route. Bates' design provided a straight entrance into the canal for boats coming downriver from the Louisville wharf, but this layout was wide open for floating driftwood, which indeed piled into the canal at every river rise. White therefore changed the entrance design from a straight line into a curve cutting into the bank. The curve could shunt driftwood past the canal entrance, although also it meant that boats coming down from Louisville had to make a left turn to enter the canal.⁴⁷

Survey showed that excavation of the curved entrance would run onto land still owned by Senator John Rowan, which John Henry valued at \$5000 while Rowan thought it worth considerably more. In the real estate negotiations, Rowan agreed that the company would excavate the curve and also a basin at the

upper canal entrance, which Rowan could lease out as a boat harbor. At this time, Senator Rowan also began subdividing and selling his property along the sides of the canal, auctioning the lots to the public at the new Elm Tree Garden built at the north end of the Shippingport turnpike bridge. As the name implied, a giant elm tree, its branches shading a one hundred foot area, stood on the ground, and when a flood smashed a floating house against the elm, Joseph Detiste bought the site and used the free house lumber to build a broad platform in the elm tree. His friend, Increase Lapham, helped with structural design, setting posts under the spreading tree limbs to support the platform. Detiste made the Elm Tree Garden a branch of his Orleans Coffee House at Shippingport, selling ice cream and refreshments to crowds seeking a cool summer breeze off the river. Detiste even built an Italian gondola to ferry customers from Louisville to his garden salon and a small rail track to take them from the boat up the canal bank to his garden. It became a pleasant resort, although a saloon built alongside the tree eventually became a notoriously rowdy concern.⁴⁸

In addition to altering the canal's entrance and the bridge design, Canvass White made major changes in the lockgate designs. Bates' original design had called for making the lockgates of pine timbers, and the contractors brought the timber to Shippingport, where Seneca Lapham, who had built Erie Canal lockgates, expected to contract to fabricate the gates. Troubled by deteriorating and warping wooden lockgates, Seneca recommended that Louisville's lockgates would be made of iron, curtailing the high maintenance costs associated with wooden gates. Engineers in 1828 were just beginning to use structural iron and no iron lockgates had ever been built, but when Seneca Lapham made and demonstrated a successful model of iron lockgates, David Bates and the directors had approved the concept, ordering fifty tons of quarter-inch boiler iron for the purpose. They expected to contract with Seneca Lapham to build four lockgates, each 30 feet wide and 42 feet high, for the two guard locks, and eight gates, each 30 feet wide and 19 feet high, for the lift locks.⁴⁹

When Canvass White and the Philadelphia stockholders saw the fifty tons of iron piled at Shippingport and learned its purpose, they protested the high costs compared to wooden

gates, at a time when the contractors were bankrupt and the company running short of funds. They canceled orders for more iron and Canvass White redesigned the lockgates, selecting cypress lumber instead of pine because cypress, which grew in standing water, seemed less subject to underwater decay. Little cypress grew near Louisville, so the company sent John Henry down the Ohio to its mouth, where cypress was abundant. Nicholas Berthoud had built a warehouse at Trinity, Illinois, where boats traveling the Mississippi exchanged freight with boats plying the Ohio; and Henry probably ordered the lumber at Trinity—it was located where the Cache River drained cypress swamps into the Ohio River. Leaving the cypress order, John Henry returned to Shippingport, and keelboats later hauled the fresh cypress lumber upriver. With his hope for building the first iron lockgates dashed, Seneca Lapham took an excavation contract on Ohio's canal system and moved his family north to Ohio, leaving Increase alone in Shippingport.⁵⁰

Canvass White authored another major change in lockgate design to eliminate paddle gates. On canals built earlier, the lock chambers were filled and emptied of water through openings in the wooden lockgates, closed by paddle gates resembling butterfly valves. These, like small revolving doors, had levers extending up through the lockgates to a crank at the top, which lockmen turned to operate the paddle gates. Turning the cranks in one direction opened the paddle gates so water could flow in and fill the lock; turning them the opposite direction closed the paddle gates. Seneca Lapham's design for iron lockgates had included the paddle gates, although they would be made of iron. White entirely eliminated the paddles in the lockgates by designing culverts set into the lockwall masonry. A culvert, with circular opening like a pipe, was installed inside the lockwall to pass water around each lockgate, taking water from an opening above the lockgate through the wall and around the lockgate and emptying into the chamber below. A door or valve closing the culvert's upper end could be opened or closed by lockmen turning a crank atop the lockwall. This was a major innovation, certainly one of the earliest and perhaps the first in America to use culverts in the sidewalls to fill and empty lock chambers; and it eventually became the preferred method, still used on a much larger scale at modern navigation locks.⁵¹

OBSERVATIONS

David Bates' canal designs were excellent, but costly, too costly for the canal company to complete in the face of severe labor and capital shortages. The contractors were capable and experienced canal builders, but in their eagerness to obtain the contract they bid the work far too low. Yet, the company erred as well by accepting a bid that was twenty percent less than their engineer's estimate. In addition, the twenty-five percent retainage from estimated earnings surely drained the contractors of capital and contributed to their early bankruptcy.

The contractors later protested their failure resulted from inadequate geologic investigation. They could excavate the upper sandy soil from the canal with horse-drawn scrapers, but the stiff blue clay below, filled with rocks and old tree trunks, could not be moved with scrapers, forcing its removal by hand with shovels and wheelbarrows. The friable rock near the canal's surface could be broken easily with hammers and crowbars for removal, but the solid limestone below forced the use of more expensive drilling and blasting. These conditions, together with a persistent labor shortage, brought the contractors to their knees, or at least their bank accounts to zero.

The canal directors attempted to salvage the contract by advancing funds to the contractors and by appointing Nicholas Berthoud as project manager. They also brought Canvass White from Philadelphia to redesign the project, cutting costs; and White made significant and innovative design changes. These initiatives did not save the contractors from forfeit, but encouraged David Bates to resign as chief engineer. In his stead, the directors appointed John Henry, chiefly because Henry claimed he knew how to build the canal for \$50,000 less than anticipated. How well chief engineer Henry and the canal company performed in 1829 and 1830, in comparison with the contractors earlier, the next chapter reveals.

4

CANAL CONSTRUCTION COMPLETED

With the original contractors Collins-Allen-Perrine off the job, the canal company pushed on with construction through smaller contracts and with hired labor, making substantial progress during 1829. It completed the stone-masonry navigation locks, the stone-arch bridge, a pivot bridge over the guard lock, and the largest lockgates ever built to that date. Although company attorney James Guthrie beat down the contractors' claims for additional compensation, construction costs climbed steeply during 1830 and the company again sought federal assistance. When President Andrew Jackson rejected the additional canal funding, the company had to resort to loans from its Philadelphia stockholders. Facing severe cash flow constrictions, the company and its engineers rushed the job to completion in 1830, leaving several important project features uncompleted.

Experimental lockage of boats began in December 1830, but the canal's uncompleted condition hampered its initial operations. It could only be traveled by boats drawing less than four feet of water, and then during only one-third of the year. The company, as a result, was unable to pay dividends to its stockholders or interest on its loans, and its directors decided to double the tolls charged to passing boats. The company had done no better than its contractors in building the Louisville and Portland Canal, and when project costs were totaled, it was evident that opening the canal passage around the Falls had cost more than double the original estimates and had required more than twice the time initially expected.

THE COMPANY RECOVERS

At the annual canal stockholders meeting of January 1829, the directors reported candidly on the construction debacles of 1828, mentioning the company had expended \$384,000 on the completed work and needed only another

\$247,000 to finish the canal. Yet, they remained optimistic:

Although the work will cost much more than the amount contemplated in the estimates of the first Engineer, and of the contracts predicated thereon, yet it will appear from the above statement, that the sum will come within the amount contemplated by the act of incorporation. The resources of the company, including the balance of cash on hand, debts due from subcontractors, materials and property received from contractors, arrearages due on stock, the 10th installment on the shares sold, and the sale of the shares in the hands of the company, will, in the opinion of the board, be adequate to its completion.¹

These were too many "ifs," presenting the company with severe budgetary challenges and time constraints. The deadline set by the Kentucky legislature for completing the canal by January 1829 had arrived, and James Guthrie, serving on the state's internal improvements committee, introduced a bill in the legislature allowing the canal company an additional two years to finish the work. This made February 6, 1831, the legal completion date. Conferring with the canal directors, a news reporter learned that they believed the company would not require the entire two years to finish the canal and might complete it in 1829: "With favorable circumstances, such as a long season of low water, and good luck in collecting hands, it is possible, that the work might be so far completed next year, as to be fit for use."²

Senator John Rowan took up the canal's funding shortage in Congress, introducing a bill in January 1829 for federal purchase of 1,335 additional shares in the canal. "The canal could not be completed without the aid of the Government," Rowan warned his colleagues, explaining: "Unfortunately the calculation of the Engineer employed to survey the route, and estimate the expenses, proved erroneous, and after the work was far progressed, it was found that the expense would far exceed the estimate." Leading the opposition to Rowan's bill was

Senator John Chandler of Maine, who objected that when Congress approved the purchase of 1,000 shares it had been told that \$100,000 would be sufficient; now the company wanted an additional \$133,500. "Now it appears the Government had engaged in it," Chandler sneered, "and, like other gamblers, they must play on to regain some portion of what they had lost." The Senate voted 24 to 18 for the appropriation, however, and it became law on January 28, 1829, fortunate timing for the company, because shortly after the law's passage Andrew Jackson became President and he disapproved of federal stock subscriptions in private companies.³

The stockholders at their 1829 meeting elected James Hughes to succeed Nicholas Berthoud as company president and made directors of engineer Canvass White and William Fitch, representing the Philadelphia investors. Collins-Allen-Perrine, the former contractors, who still hoped for a profitable settlement when the company completed the canal, were glad to see Berthoud go. In their opinion, Berthoud as project manager had "made many bad and improvident bargains and arrangements as agent and superintendent of the works, that he applied his force injudiciously and thereon expended a vast deal of money unnecessarily, in fine he knew nothing of such kind of business and was wholly inadequate to the superintendence and management of such work." Even Peter Carney, whose stonemasonry contract Berthoud renewed at an increased price, thought Berthoud a "damned old rascal." The contractors therefore added Berthoud's project mismanagement to their list of financial claims against the company.⁴

Berthoud returned to his business interests and also succeeded Louis Tarascon as Shippingport's postmaster. Louis and the heirs of John Tarascon had lost their fight to retain ownership of Tarascon Mill, and it passed to their Philadelphia creditors, who leased it to a flour miller. Both Berthoud and Louis Tarascon soon left Shippingport, moving to New York where Tarascon established a private school. The management of Berthoud's canal stock passed to his brother-in-law, William Bakewell, who chaired the annual stockholders meetings until 1840, and then to Berthoud's son, James Berthoud of New Orleans.⁵

VALUE ENGINEERING

Although Canvass White served as a canal director in 1829 and 1830 and returned regularly to Louisville as consulting engineer, project field management passed to John Henry and his assistant Increase Lapham. Canal stockholders insisted that costs be cut, starting with engineer salaries: they had paid chief engineer David Bates \$2800 a year, but employed John Henry for \$1500 annually. As the stockholders mandated, John Henry adopted every possible cost-cutting measure, and this troubled Increase Lapham, who told his brother, privately: "The system of retrenchment introduced into the construction of our canal is highly prejudicial and has been the means of spoiling the appearance of many parts of the work, particularly the lift locks."⁶



The Louisville and Portland Canal Company employed Canvass White, an Erie Canal engineer, to redesign the Portland canal. (American Society of Civil Engineers)

David Bates' canal plans had called for excavating rock from the lockpits to a sixty-six-foot width, leaving eight-foot spaces each side of the fifty-foot-wide lock chambers for the masonry lockwalls and supporting buttresses. To curtail excavation and masonry, John Henry eliminated the buttresses and reduced the lockwall width to about one-foot of masonry, thereby decreasing the excavation width to about fifty-four feet. In addition, instead of carrying the excavation down to the bottom of each lock chamber, Henry redesigned the lift-locks to set their masonry walls upon rock ledges left at the sides of the excavation. Henry also canceled the

hammer dressing to remove projections from the cut stones facing inside the lock chambers. As Lapham observed, this not only spoiled the locks' appearance, it left rough-surfaced stones and rocks projecting from the ledges inside the lock chambers, threatening to scar and sink passing boats.⁷

On the canal excavation the engineers experimented with a machine designed by Oliver Phelps on Canada's Welland Canal to speed the removal of materials from deep cuts. Timber railways laid from the bottom of the cut to the top of the bank carried carts up and down an incline, and positioned at the top of the rail tracks was a geared drum or wheel. A rope ran up the incline from a filled wagon at the bottom of the track, passed around the drum, and was attached to an empty wagon. Horses pulling the empty wagon down one track also pulled the filled wagon to the incline's top to be emptied while workers filled the wagon at the bottom. The Phelps machine apparently saw little use at Louisville, where Dibble cranes hoisted rock out of the canal excavation. Certainly it was used very little during 1829 when John Henry and the contractors, Carney-Sayre, focused on finishing the stone masonry rather than on excavation.⁸

The stone-arch bridge carrying Shippingport turnpike over the canal was finished in 1829. Carney-Sayre had placed the cornerstone on August 14, 1828, erected the piers during the winter, and in May 1829 began installing the arched spans and their keystones. This was dangerous work, accomplished from platforms suspended by cranes mounted atop the bridge piers, sixty feet above the canal bottom. Contractor Peter Carney fell from a platform while installing a keystone and landed on the rocks below; he survived but was so badly mangled that he retired from the work to a farm south of Louisville. Increase Lapham also reported that during this work a mason had his fingers crushed between two stones; another, when coming down from the bridge, grabbed a rope to descend and learned to his sorrow that the rope was not tied at the top; and a third fell from the center arch, saving himself only by seizing a support timber during his descent. That there were no fatalities was merely a matter of luck.⁹

Carney-Sayre's deadline for completing the stone-arch bridge was July 1, 1829, and they met

their schedule. Although the bridge was not entirely finished, Henry Clay, who was in Louisville campaigning, on June 25 became the first person to cross the bridge, and on the following day Carney-Sayre opened it for public use. Becoming known as the Eighteenth Street bridge, it was much admired, became a subject for artistic sketches and paintings, and saw heavy use until the canal company replaced it in 1856.¹⁰

The lockwall masonry was nearing completion at the same time as the stone bridge, and in May 1829 the canal company contracted for constructing a swing bridge over the guard lock piers and for fabricating the lockgates. Chief engineer John Henry designed the bridge and made a model that Senator John Rowan and canal secretary Simeon Goodwin inspected and approved. To span the fifty-foot space between the guard lock piers, Henry designed a 100-foot-long bridge in two fifty-foot sections. Each section had weights at the back to balance the span and help raise the bridge, clearing the lock chamber for boat passage. Maneuvered manually with a windlass and chains, it resembled the medieval drawbridges built to span moats. A Louisville carpenter named Tanner took the contract to build the wooden bridge for \$850, and Increase Lapham filled the boxes at the rear of each span with three tons of iron to achieve the proper balance. When workers swung the sections manually into place on July 10, 1829, spanning the gap, Lapham observed that the two bridge sections met precisely at the middle, although sagging timbers made the hand rails lap over each other about a half-inch.¹¹

Joseph Barbour of Louisville in May 1829 took the contract for building the lockgates for \$1900 and hired fifteen carpenters for the task, and Increase Lapham drew the lockgate plans that Barbour used to assemble them with cypress timbers furnished by the company. The two 42-foot-high and 30-foot-wide guard lockgates certainly were the largest lockgates in the world at the time. Adding the widths of the two gates together totaled sixty feet, ten feet wider than the 50-foot lock chamber, because they closed together, or mitered, at an angle, forming a V pointing upstream to bolster their resistance to upstream water pressures. At the bottom of the lock chamber the gates closed against stone miter sills, also in a V configuration and anchored with bolts to the rock foundation beneath. After the miter sills were placed, Increase Lapham had

poured molten lead around the iron bolt heads to secure them and prevent deterioration.¹²

The wooden lockgates swung open and closed in a fashion similar to a common house door, but instead of hinges they attached to the lockwall with cast iron fittings. The gate posts next to the lockwall had a hollow iron fitting at its bottom resting on an iron ball or pivot attached to the foundation; at its top, the post had an iron clamp fitting that rested in a recess cut into the lockwall. The weight of these gates could easily have ripped the gate posts off the lockwall, and therefore the ends of the gates hanging in the middle of the chamber had to be supported. This was accomplished, as at many other early canal locks, by attaching iron rails in an arc to the rock at the lock's bottom, and by installing rollers under the gate; as the gates opened and closed, their swinging ends rolled along the rails. This proved a maintenance headache, because gravel or drift collecting on the underwater rails could block, or derail, the rollers.¹³

Chief engineer John Henry proudly reported at the end of 1829 that the locks, bridges, and all canal masonry had been completed. In addition the lockgates had been installed and their operating machinery—capstans and chains—had been placed. To curtail expenditures, the original plans for excavating two drydocks at the side of the canal and for building a second guard lock near the canal entrance had been abandoned. The resulting cost savings were offset, however, by the \$50,000 costs of building an embankment at

the canal's entrance and excavating a basin for boats entering the canal. Henry in 1829 had concentrated on completing the masonry contract, and little had been accomplished toward finishing the canal line's excavation.

Henry predicted, however, that "a force of 800 men working 128 days could finish the canal," opening it in mid-1830 if not delayed by flooding or poor weather.¹⁴

Henry had lost his capable assistant, Increase Lapham, in October 1829. Claiming that Henry's lack of skill drove him from his job, Lapham went north to join his family and take a job with David Bates on Ohio's canal system. In 1836 he moved on to Milwaukee, Wisconsin, for a canal engineering job and later became Wisconsin's premier geologist and a founder of the Wisconsin State Historical Society. Near his life's end in 1875, he pioneered use of the telegraph to warn mariners on the Great Lakes of approaching storms and for this he later was hailed as a founder of the national weather service.¹⁵

PRESIDENTIAL VETO

Paying for the stonemasonry and other work accomplished in 1829 brought the canal company's total expenditures nearly to \$600,000, the limit set by its Kentucky charter, and left only \$55,000 in its account, totally inadequate to finish the project. James Guthrie and the canal's proponents in the Kentucky legislature arranged enactment of a charter amendment in December 1829, allowing the company to sell an additional 1,000



The swing bridge crossed traffic over the locks between Portland and Shippingport. (Corps of Engineers)

shares of stock worth \$100,000. The canal directors then sent a petition to Congress, asking that it purchase the 1,000 shares. Senator Rowan and colleagues quickly pushed a bill through the Senate for the purpose; and it passed the House by a surprisingly large majority of 79 to 35. Counting on this additional funding, the canal directors promptly awarded seven contracts totaling \$150,000 to finish the canal excavation.¹⁶

The canal directors had unfortunately neglected to take into account the views of President Andrew Jackson. During the 1828 presidential election pitting Jackson against John Quincy Adams and Henry Clay, the canal workers had supported Clay and his American System promoting federal transportation projects. Just before the election, the canal workers had boarded sixteen wagons, decorated them with banners supporting the "American System and Internal Improvements," and paraded through Louisville to cheers from admiring crowds; in June 1829 they gave Henry Clay the honor of being the first person to cross their Eighteenth Street bridge. After defeating Adams and Clay in the 1828 presidential election, Andrew Jackson often vetoed the federal transportation projects that Adams and Clay had supported, and when the bill to buy another 1,000 shares of Louisville canal stock reached his desk at the end of the congressional session, he became the first president to use a pocket veto. As provided in the Constitution, the President had ten days to sign or disapprove a bill, and if Congress ended its session before those ten days expired and he did not sign it, automatically it did not become law.¹⁷

President Jackson was not required to explain his disapproval of the Louisville canal appropriation, or any other pocket veto, but he thought it important enough to send a message on the subject to Congress. He contended that all projects funded by the nation should be available for public use without paying tolls. He thought it wrong for the federal government to mingle its concerns with state governments and certainly not with private companies. "The power which the General Government would acquire within the several States by becoming the principal stockholder in corporations," Jackson declared, "and giving a proportionate vote in all their elections, is almost inconceivable, and in my view dangerous to the liberties of the people."¹⁸

This news stunned the canal directors and stockholders, who had no intention whatsoever of threatening American liberties, merely wanting to open a profitable passage around the Falls of the Ohio. They had entered into contracts to complete the canal during 1830, but now they lacked the funds to pay for the work. In this crisis, they turned again to Philadelphia investors, instructing chief engineer John Henry to prepare a company prospectus explaining why its stock would be a profitable investment. Henry analyzed existing steamboat, flatboat, and passenger traffic passing the Falls and concluded the canal might easily collect \$37,000 in tolls per year, amounting to 5.25 percent interest on the \$700,000 initial construction costs. He felt sure that boats would patronize the canal because of the high costs of portaging around the Falls. Licensed in 1829 to operate between Louisville to Portland were 110 drays, 53 wagons, 86 carts, and 51 hacks (buggies) collecting in fares and cargo charges a total of \$88,000. The expenses of unloading, carrying, and piloting 1,000 flatboats down the Indian chute annually amounted to \$15,000. Thus, the costs of getting commerce past the Falls barrier in 1829 totaled \$103,000, and if the company charged tolls amounting to \$88,000, sufficient to pay twelve percent on its stock, it could still save shippers \$15,000 a year, not including the time they lost in transshipment. Henry predicted that Ohio River commerce would soon multiply, providing canal traffic sufficient to pay investors dividends up to the authorized eighteen percent allowed by the company charter.¹⁹

The company had Henry's dramatic prospectus printed and circulated in Philadelphia, and its Philadelphia stockholders led by James Ronaldson approached Thomas Hulme to ask his investment. Hulme had made a fortune bleaching and coloring fabrics in England, building a plant that employed 180 workers. Disenchanted with British aristocracy and confiscatory estate taxes, he sold out and moved with his nine children to Philadelphia in 1817. Settling there, he explored west in 1818 looking for investment opportunities, flatboating down the Ohio to Louisville. Finding the Falls City hotels infested with lice, he took a skiff and shot the Falls: "We found it very rough floating, not to say dangerous," he said of his adventure, adding: "The river is very unequal widths and full of islands and rocks along this short distance, and the current very rapid, though the descent is not

more than 22 feet." At Shippingport, Hulme found comfortable lodging with James and Nicholas Berthoud and was impressed by their shipping business and with the village generally. So, Hulme in 1830 understood the situation at the Falls intimately. He was also a close friend of Henry Clay, who as Secretary of State had arranged for Thomas, Jr., to go to France to study its dye industry.²⁰

The canal stockholders asked Hulme to supply the company with \$100,000 to replace the funds lost to Jackson's veto. Needing the cash immediately to pay contractors in 1830, they asked that Hulme loan the company the money, rather than purchasing canal stock in installments. If he liked, they would later repay the loan with company stock after the canal was successfully operating. When Hulme and his associates agreed to save the company with the loan, the company elected him as a new director, and with his sons Peter and John, Hulme went to Louisville to see to the canal's success. Their investment worth nearly 1,000 shares made the Hulmes the largest canal investors, owning about ten percent of the company and holding its property as security.²¹

Thus relieved from its cash flow shortage, the company resumed excavating the canal in 1830. Its directors and chief engineer divided the excavation work remaining on the canal line into seven sections, and awarded separate contracts for each section to different contractors. Of these, the largest contract went to Ives-Baldwin, a partnership of John Ives, formerly an Erie Canal contractor, and Ephraim Baldwin, who had a contract on the Pennsylvania Canal. Work by this firm went slowly, first, because Baldwin never left his job in Pennsylvania, and, second, because Ives often left the job to party and doctored the books to conceal profits. John Henry finally forfeited their contract, but employed Ives to ramrod the labor employed by the canal company.²²

As the excavation went farther down to the bottom of soil and entered the rock, it encountered the debris of an ancient civilization. Toward the Louisville end, the workmen found stone fireplaces still containing partly burned wood atop the rock as well as animal bones, human skeletons, stone and bone tools, flint arrowheads, and some metal pieces shaped like fishing or net-casting sinkers. Near Shippingport,

one cache yielded three human skulls, dog and deer bones, stone tools, a large piece of iron, and what appeared to be a brick. These archaeological finds puzzled the workmen and engineers, because the native tribes living near the Falls in pioneer times were not known to fabricate iron or make bricks.²³

As the canal line excavation reached its deepest levels in the rock strata, the contractors and workers used Dibble cranes, stiff-leg derricks, to hoist the broken rock in skips to the side of the canal. These dropped the rock along the sides of the canal and up the sloped embankment, where it was left in piles. At Lockport on the Erie Canal, rock excavated from the canal also was left on the canal bank and sold to become building or paving stone, and the Louisville canal directors hoped also to sell rock from the excavation for profit to builders who would cart it away. Very little of this rock was sold, however, and the piles of stone remained to hamper canal operations for years.²⁴

CONTRACTOR CLAIMS

Collins-Allen-Perrine first approached the canal company in 1829 with an offer to settle the claims it had against the company for just \$250,000. If this figure did not meet the company's favor, the contractors offered to accept independent arbitration of their claims "for the purpose of closing a complicated and disagreeable business and to enable us to pay our debts"—and because arbitration would be less expensive than lawsuits. "We came here strangers," lamented the contractors: "We were assured that any amount of labor could be had at \$8 per month. It has cost us nearly double that sum." They mentioned that their work had gone slowly because of extraordinary weather and floods bursting over the embankments, washing the banks back into their excavations. Of course, by 1829 the canal company had no funds available to pay contractor claims, and it stonewalled their claims until 1830.²⁵

Increase Lapham returned to Louisville in February 1830 at the invitation of David Bates and the contractors—Bates had promised him a college scholarship for testifying at the arbitration hearings. He found David Bates and all the contractors at a Louisville hotel, busily listing their claims and planning their attack on John Henry, Nicholas Berthoud, and the canal

company, while Bates endeavored to retrieve his reputation. "Placed in the midst of all this," mused Lapham, "who could neglect to learn some useful hints for his benefit through life."²⁶

The contractors took the shotgun approach, blasting the company with every charge in the book. They had not been fairly paid for building cofferdams to keep out high water, for removing materials washed into the canal by floods, for hammer dressing the lockwall stones, for extra grubbing and excavating culverts, for the turnpike bridge embankment, for the stone miter sills, for building a cofferdam and excavating the lower canal entrance, for pumping water from the excavation. The company had forced them to keep workers at the job during freezing weather when nothing could be done. The company had not fully investigated the subsurface conditions; and instead of moving the soil with scrapers the contractors had to perform much of it manually; instead of friable rock in thin strata, they found solid rock that required drilling and blasting. They would have finished the job, had it not been for unwarranted interference by president Nicholas Berthoud and the canal directors, or for the "evident hostility and unfairness of the Engineer of said canal company in making estimates of the work done by said contractors." Yet, when all their claims were totaled, the contractors dropped their \$250,000 settlement offer and asked just \$105,000 as final payment.²⁷

Meeting in what Increase Lapham described as a large and elegant but dusty and spiderwebbed room, the arbitration hearing began near the end of February 1830. After a lively dispute over membership of the board of arbitration, the contractors and the company at last agreed on five arbitrators—three prominent Louisville businessmen, plus engineer John Henry for the company and Samuel Forrer, a noted Ohio canal engineer, for the contractors. These sat at a long table centered in the room. At one end of the table sat contractor William Perrine and the contractors' legal counsel Charles Thurston, an attorney who had represented Louisville in the legislature. Representing the canal company's interests, as usual, were company secretary Simeon Goodwin and its legal counsel, James Guthrie. Contractors, engineers, and other witnesses occupied chairs along the walls back from the table, awaiting their turns to answer questions.²⁸

The first witnesses called to testify were David Bates and Nicholas Berthoud. As these two were grilled for a week, Nathaniel Allen, the former New York congressman who had bought out some original contractors, indirectly threatened blackmail. Declaring that if the canal company did not pay the contractors' claims, he would build a railroad from Louisville to Portland side by side with the canal to rob it of its business.

Suggesting that Increase Lapham might become the railroad's chief engineer, Allen employed him to survey the railroad route, which Lapham quickly accomplished. Allen then sent the map to directors of the Lexington and Ohio Railroad, chartered as part of Kentucky's internal improvements program—the Lexington and Ohio Railroad in 1830 was preparing to start construction of the state's first railroad, connecting Lexington with the Kentucky River at Frankfort. Allen invited the company to extend its tracks onward, passing on Louisville's south side to strike the Ohio River at Portland.²⁹

The canal company took Allen's threat seriously, and later in 1830 it supported a campaign to prevent the railroad's construction, which culminated with Louisville's political leaders declaring they would not permit the railroad to pass through the city.

Cincinnati's leaders reacted to Louisville's opposition by calling for early extension of the railroad from Lexington north to connect with the Ohio River opposite Cincinnati. With a railroad completed from Cincinnati to Lexington and thence to Portland, Cincinnati's southern commerce could entirely bypass Louisville, the Falls, the drayage charges, and tolls for using the canal, were it ever completed. Cincinnati's counter-threat troubled Louisville's leaders and some reconsidered their opposition to the proposed railroad from Louisville to Portland. One editorialized:

The Louisville and Portland Turnpike Company could at little costs build a railroad on their existing turnpike. The canal company stockholders, however, are interested in thwarting any project for a railroad, especially the Lexington railroad from reaching a point below the

canal which would deprive the canal of revenue. Should we allow these private interests to prevail over public good? Shall we allow Cincinnati interests, the turnpike interests, the canal interests, to drive the Lexington railroad to Cincinnati? We shall be foolish if we permit ourselves to be so gulled.³⁰

Thus began the historic competition and conflict between transportation modes, railroads, rivers, and canals, that troubled American transportation development well into the twentieth century. How great an influence the Louisville and Portland Canal Company exercised in defending its territory against railroad competition never became apparent, because the company seldom issued public statements on the issues. Its directors and stockholders individually enjoyed significant political influence in the Louisville, state, and national legislative bodies, however, and perhaps it is more than coincidence that, although the Lexington and Ohio Railroad began construction in 1831, its tracks did not reach Louisville until 1850, after most stockholders had sold their canal shares to the federal government. A striking exception to the canal's opposition to railroads, however, was its legal counsel, James Guthrie, who became Kentucky's foremost proponent of railroads and who organized the Louisville and Nashville Railroad.³¹

The contractors' threat to build a railroad depriving the canal company of its profits was never carried out, nor did they obtain compensation for their claims from the company. James Guthrie's legal talents prevailed at the 1830 contract arbitration, and after hearing many witnesses and two weeks of deliberations, the arbitration board presented its decision. It denied every single claim made by the contractors, refusing to award them a cent. Furious and desperate, the contractors immediately filed suit against the company in the Jefferson County Circuit Court, asking payment of their \$105,000 claim in full. While this litigation continued at length, contractor Nathaniel Allen made his residence at the Louisville Galt House hotel to pursue the case. When Kentucky courts also denied their claims, it devastated the contractors, and Nathaniel Allen perished in his room, a probable suicide.³²

Still, the contractors were not done with their claims, and William Perrine sought to collect the \$105,000 through the remainder of his life. After his death in Michigan in 1844, his widow and children persisted, and in 1854, when the United States had obtained control of the canal stock, they filed their claim with the Senate Committee on Roads and Canals. After reviewing the extensive evidence collected by Perrine and presented by his widow, the Senate committee reported: "It is now impossible to correctly conclude the justice of the claim, and committee thinks redress should be sought from the canal company, as that company is perfectly solvent and fully able to pay any claim against it."³³

THE PASSAGEWAY OPENS

Spring highwater during early 1830 delayed the resumption of excavation until summer, but from then through December the weather was excellent and the work moved to completion. The only challenge mentioned by chief engineer Henry in his yearly progress report occurred when he attempted to excavate Rowan's basin at the upper entrance to the canal. As the digging went down, instead of finding only earth as Henry had expected, the workers found a large deposit of massy timber, firmly cemented together by mud. Excavating this proved almost as difficult as solid rock, and the effort ceased. John Rowan later sued the company over this failure, claiming it had left his property littered with rocks and dirt without completing the basin as agreed. The court concurred with his complaint, awarding him \$3,300 in damages.³⁴

By the first of December, the river was rising, climbing toward the top of the cofferdam blocking the head of the canal. Henry ordered the cofferdam opened, and the canal began to fill. When it stood seven feet deep against the first lift-lockgate, the miter sill at the bottom of the lockgate gave way, sliding downstream and preventing gate closure. Henry closed the guard lockgates to shut off the water, and then proceeded to install a new miter sill. When this was accomplished, on December 20 Henry invited Captain Henry J. Beers to bring his steamboat *Uncas* into the canal for the first experimental boat passage around the Falls. Captain Beers had named his boat *Uncas* to honor a famous chieftain of the Mohican tribe. Built at Pittsburgh in 1826, a small sidewheel steamer with the figurehead of the chieftain on its bow, it

ran regularly as a packet between Pittsburgh and Nashville, hauling groceries and hardware to Nashville and bringing Cumberland Furnace pigiron back to Pittsburgh's foundries. Sometimes it carried passengers, but if it had any when Captain Beers accepted Henry's invitation, they were unlucky.³⁵

Captain Beers had pilots John Shrodes and Thomas Klinefelder taking shifts in the pilothouse when the *Uncas* left the Louisville wharf on December 20. They apparently had difficulty entering the canal where its narrow entrance curved into the bank and forced boats to come nearly to a stop and turn to the left, broadside to the river current that thrust them to the right. When the steamboat finally got into the entrance it crawled slowly down the two miles of canal, banging against rocks all the way. By the time it reached the locks, two days later, both of its paddlewheel shafts were broken and its hull damaged. The lower lock was filled with mud seven feet deep, but the lockmaster and crew pulled the *Uncas* through, and it arrived at Portland on Christmas Eve, two miles and four days out of Louisville. The canal company promptly accepted its responsibilities in this case, paid for the boat's repairs at Portland, gave Captain Beers a \$200 bonus, and even decided to forego its canal tolls.³⁶

After Christmas, Henry and the canal workers removed some of the obstructions the *Uncas* had identified and on December 29 they sent the first flatboat through the canal. Commanded by Captain Andrew Johnson, it had come all the way from Boston, Ohio, just eighteen miles from Cleveland. It had passed down the nearly completed Ohio canal and entered the Muskingum River, then descended it to Marietta and floated the Ohio to Louisville. Passing through the canal without incident of note, it continued its voyage with a full cargo of produce to New Orleans.³⁷

When the stockholders met on January 3, 1831, they were jubilant because the canal had opened a month before the legal deadline set by the Kentucky legislature and because John Henry reported that on New Year's Day he had locked through the steamboat *Cavalier*, the following day passed the *Cumberland*, and on January 3 had locked through four steamers, the *La Grange*, *Virginia*, *Gondola*, and *Tippecanoe*. Thomas Hulme chaired this annual stockholders meeting and,

cheered by the canal's opening, he and his associates loaned the company another \$30,000 to finance canal operations and maintenance during 1831. After the meeting, Hulme returned to Philadelphia, leaving sons John and Peter to carefully monitor their investment at Louisville.³⁸

The day following the cheerful stockholders meeting, secretary Simeon Goodwin published an official notice in Louisville newspapers that "the canal is now in order to pass boats drawing not more than nine feet of water. Masters of steamboats and others desiring to pass the canal should apply to the Engineer at the Locks." The steamboat *Huron* became the eighth steamer through the locks on January 4, then came the *Cleopatra* commanded by Captain David Jenkins.³⁹

Captain Jenkins had 51 passengers and 120 tons of freight aboard the *Cleopatra*, and after reading the company's public notice that boats drawing up to nine feet could navigate the canal, he thought his boat could easily pass through. As he was loading at the Louisville wharf he met Simeon Goodwin, who told him to hurry loading in order to pass through before dark. John Hulme later went to the *Cleopatra* to hurry Jenkins because the river was falling. Jenkins asked Hulme if the canal still had plenty of water, and Hulme told him there was. Jenkins got up steam and set out, finding Goodwin again waiting at the canal entrance to point him into the canal in spite of the heavy ice. Jenkins slowly worked his boat down the canal, breaking ice, until he reached the first lock, where engineer John Henry asked him how much water the boat was drawing. When Jenkins told him it was six feet, Henry waved him into the locks. Lockmen on both walls took the handles of the capstans and turned them in circles, winding up chains that pulled the giant lockgates open. The boat entered the first lock, the gates closed behind it, the culverts opened, and the water in the lock fell to the level inside the middle lock. Lockmen opened the next set of gates and Captain Jenkins steamed into the middle lock.⁴⁰

As the *Cleopatra* entered the middle lock, however, it stuck fast in mud, covered by only three feet of water, and its stern prevented closing the lockgates behind it.

There it stuck the next nineteen days, blocking the canal. Captain Jenkins refunded fares to his passengers, who walked to Portland to board other boats. John Henry offered to have

his lockmen offload the freight to lighten the boat, so it could back out of the locks and up the canal to Louisville, but Jenkins would not agree to it. Not until a river rise sent deeper water into the canal did the *Cleopatra* wrench free of the mud and pass on its way.

Jenkins and owners of the *Cleopatra* then sued the canal company for \$2,000 damages, basing their claim on the company's public notice that boats drawing up to nine feet could pass. John Henry's defense deposition said: "The river had begun to fall and weather was freezing. I sent word by Goodwin and Hulme that the boat should come on as soon as possible to get through the canal. The boat stuck in mud in middle lock chamber. I offered to use lockhands to take off cargo and let the boat get out of the lock, but Jenkins declined to take off cargo. The boat laid there until the water rose. I did not warrant safe passage of any boat through the locks. I never told the captain there was enough water to pass the locks." After nine years litigation, the canal company paid the boat's owners \$500 to settle their claim.⁴¹

After the *Cleopatra* debacle, winter ice blocked navigation on the river and through the canal for weeks, and most boats arriving from New Orleans still landed at Portland to transship freight to Louisville, simply because their captains were unaware the canal had become available. Descending boats still relied on the Falls pilots to guide them over the rocky cascades, until February at least, when the steamboat *Trenton* wrecked on Ruble Rock in the center of Indian Chute. Floating ice threatened to completely destroy the steamboat, along with the lives of its passengers, but a river rise floated it and it spun down the rapids without sinking. A flatboat shooting the Falls later on the spring rise, however, capsized and drowned three of the seven crewmen aboard it. These and less serious disasters on the Falls surely encouraged boatmen to try out the canal passage instead of hiring Falls pilots.⁴²

When river stages permitted, John Henry and the workmen in 1831 attempted to resolve three problems deterring use of the canal. Henry had expected currents flowing through the canal to erode and wash away mud from the lock chambers, and he manipulated the lockgates to encourage it but without success. Employing temporary labor, he began excavating the mud by

hand, only to find the mud compacted around rocks and driftwood that hampered the work; even with constant labor, the workers could excavate only a four-foot depth. During the rush to completion in 1830, the contractors had been allowed to drop rock excavated from the canal along its berms and embankment slopes; the high water and freezes of early 1831, however, shifted the rock piles and they rolled back into the canal, obstructing and damaging boats. Henry's workmen pulled some rocks back out of the canal, but many remained at year's end to threaten safe passage. After the ice broke in the spring, huge driftwood rafts also floated into the canal entrance, blocking it; and when Henry's workers pulled the drift out of the canal, swift currents down Kentucky chute past the canal entrance still prevented many boats from entering. Henry had rock loaded on scows, taken to the canal entrance and thrown into the water along a 400-foot line leading upstream from the northern canal embankment, aiming to break the current's force. At the same time, he had the south side of the canal entrance excavated to widen it by twenty feet.⁴³

For a fourth difficulty the company sought federal aid. The contractors had built a cofferdam around the lower lock entrance to hold out the river while they built the locks, and they had merely knocked a hole through it, leaving the remainder of the cofferdam in place, partly blocking the entrance of ascending boats and endangering their hulls. Simeon Goodwin appealed for help with this to President Andrew Jackson, pointing out that a \$150,000 appropriation recently had been made for improving Ohio River navigation, and Superintendent Henry Shreve, in charge of the federal project, and been ordered to spend the entire appropriation upriver, between Pittsburgh and Cincinnati. Goodwin declared this was unfair, because river commerce below the Falls was much larger than above Cincinnati. He urged the President to order Shreve to spend part of the funding on improving navigation below Louisville, and, while he was about it, to remove the cofferdam blocking the lower canal entrance.⁴⁴

Canal director Thomas Hulme went directly to Henry Shreve, then visiting Corps headquarters in Washington, and told him the cofferdam remains, by preventing the entrance of ascending boats, had cost the company at least

\$2,000 in tolls. Hulme knew that a dredge could remove it, but the company owned no dredge, and it therefore wanted Shreve to use the powerful snagboat he had invented and built at New Albany to take out the cofferdam. He told Shreve this was important to the United States because its \$235,000 worth of stock was at risk. Shreve discussed this request with the Chief Engineer of the Corps, Colonel Charles Gratiot, who responded that appropriations for removing obstructions from the Ohio River did not seem to apply to a cofferdam.⁴⁵

While Hulme met with Shreve, Canal director James Ronaldson went directly to higher authorities. First, he met with the Secretary of War in Washington, presenting Simeon Goodwin's petition and explaining their idea was to have Shreve remove the cofferdam as he worked his snagboat downriver from New Albany. When the Secretary of War declared this request lay beyond his authority, Ronaldson went after President Jackson, who was vacationing on the Virginia seashore. Finding the President at his seashore resort, Ronaldson explained to Jackson what was wanted. Jackson agreed to order that it be done, and Captain Shreve and his snagboat eventually removed the cofferdam along with the wrecked flatboats lying near the foot of the Falls.⁴⁶

The stockholders meeting at the end of 1831 proved far less optimistic than a year earlier. As the result of ice, sliding rocks, mud deposits, stranded boats, and cofferdams blocking the canal, during the thirteen months from December 1830 through December 1831, there were only 104 days when boats drawing more than four feet of water could pass in or out of the locks; indeed, there were only 183 days when any boats, however light their draft, could pass through the canal. Commerce using the canal in this period consisted of 406 steamboat, 48 keelboats, 357 flatboats, and 16 rafts, which paid tolls totaling \$12,750, all spent to upgrade the project. The stockholders, therefore, received not a cent in dividends on their investment, and decided at their annual meeting to increase tolls from twenty to forty cents per ton, hoping that doubled tolls might pay them some dividend in 1832.⁴⁷

It clearly was a sad year for commerce at the Falls, for east-west traffic using the canal or crossing the Falls, and also for north-south traffic passing across the Falls between Indiana and

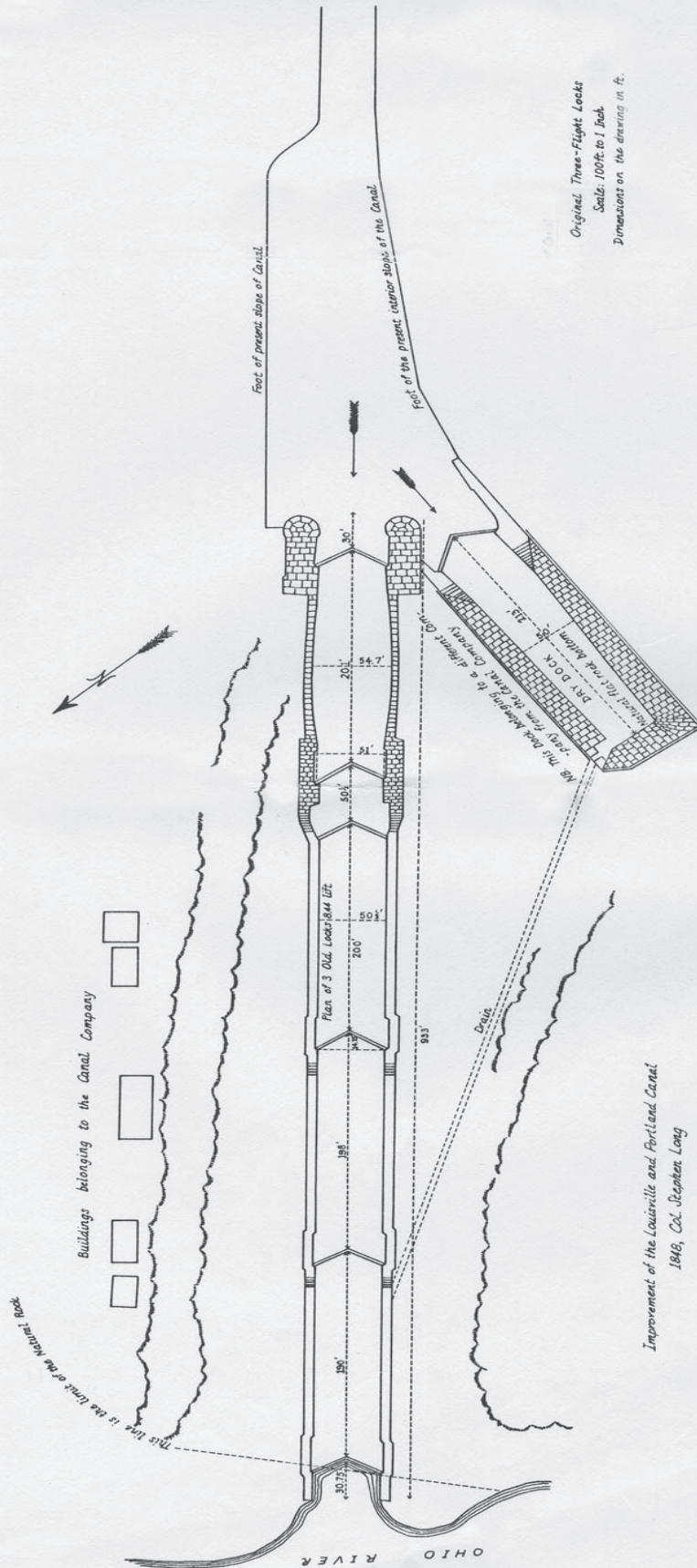
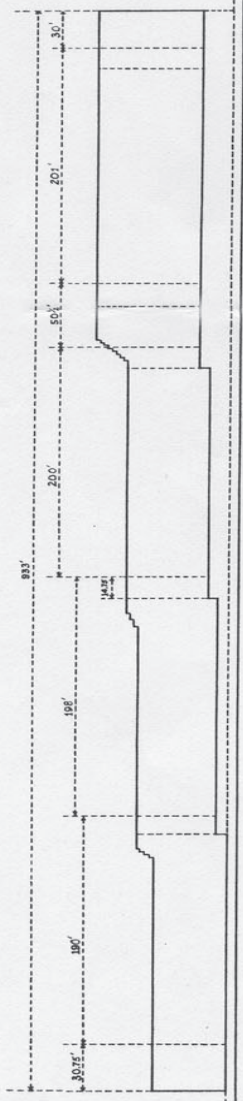
Kentucky. In October 1831, ferry service, formerly provided in boats powered manually by rowing or by horses turning paddlewheels, joined the steam age. A splendid ferry with steam-engine power, a broad deck to accommodate wagons, carriages, and horses, and a roomy upstairs cabin for passengers, began running just upstream of the Falls between the Louisville and Jeffersonville wharves. While crossing the river on November 7, however, its steam boiler burst in a tremendous explosion, wrecking the boat, killing its engineer, fireman, and two passengers, and scalding others.⁴⁸

Passage of the Falls in any direction remained expensive and dangerous. Canal records mentioned only a single fatality during construction, not including deaths from disease or suicide, and during the same period more lives were listed as lost while descending the Falls with pilots or when crossing the river on ferries. Yet, available canal records seldom revealed much concern for worker safety; the accidents suffered by Peter Carney and stonemasons building the turnpike bridge over the canal, for example, were mentioned in Increase Lapham's journal, but not in official canal records, nor in local newspapers.⁴⁹

Like accident statistics, canal construction costs also remained mysterious. The canal company admitted costs of about \$750,000 at the time the canal first opened, but the official totals later crept upwards. Some of this increase resulted from the uncertainties of cost-accounting: should costs of the 1831 work removing mud from the locks, taking fallen rock from the canal, improving the upper canal entrance, and excavating Rowan's basin be included in original construction costs or in maintenance expenditures?

The company finally added these to the original construction costs, bringing their total to \$802,273. To this, the company then added the \$21,900 paid to engineers and canal staff, the \$19,225 paid Rowan for the canal route property, the \$2,000 paid for two lots and houses at the locks, the \$1,800 for the iron purchased for lockgates that were never built, and the \$153,000 paid in interest on the construction loans arranged by Thomas Hulme, James Ronaldson, and the Philadelphia stockholders. This increased the costs of building a passageway around the Falls to a nice round figure of \$1 million.⁵⁰

Louisville and Portland Canal 1830



Original, Three-Flight Locks
Scale, 100ft. to 1 Inch
Dimensions on the drawing in ft.

Improvement of the Louisville and Portland Canal
1848, Col. Stephen Long

William E. Kreisle
Civil Engineer, 1983

Col. Stephen Long's 1848 plan of the original locks and drydock. (Redrawn by William Kreisle)

OBSERVATIONS

David Bates, an experienced engineer who had designed large locks on the Erie Canal, expected to complete the passage around the Falls of the Ohio within two years' construction at an estimated cost of \$420,000. The contractors, who had build sections of the Erie Canal and of Ohio's canal, thought it would take only eighteen months and \$370,000. Even after omitting the upper guard lock, two drydocks, and iron lockgates, the construction took nearly five years, March 1826 to January 1831, and, at nearly \$1 million, cost more than double the original estimates. Clearly, conditions at the Louisville and Portland canal differed materially from those on the Erie and Ohio canals.

Building the largest navigation locks and lockgates in the world, fifteen times larger than an ordinary Erie canal lock, proved a far more daunting engineering-construction challenge than Bates and the contractors expected. Contractor claims that the canal's subsurface conditions, rocky blue clay and solid limestone, multiplied the project costs were correct. The company's claim that the contractors never hired an experienced work force adequate to the task was correct, but the company itself did no better, hiring slaves who worked with few incentives other than punishment. If the contractors mismanaged their jobs, so did the company.

State governments declined funding for the canal and during the critical phase the President declined additional funding to complete the canal. Had it not been for the actions taken by Philadelphia capitalists to save their investments, construction of the Kentucky canal would have stopped in 1830, short of completion. The company at last overcame funding and construction obstacles to complete the canal; whether it could overcome the canal's operations and maintenance difficulties to make it profitable for the stockholders remained a murky question indeed at the end of 1831.



5

INITIAL CANAL OPERATIONS

During the canal's initial operations, its stockholders faced challenges from floods, saboteurs, and Congress. They encountered vigorous competition from the Falls pilots and minor competition from the Louisville to Portland Railroad, built parallel with the canal. Steamboat captains and shippers sought federal purchase of the canal to end its irritating tolls. Indiana sought construction of a second canal, on its side of the Falls. And the Falls pilots sought federal assistance in blasting a wider channel through Indian chute. As a result of these threats to the canal, its stockholders received no returns on their investment during the canal's first years in service.

John Hulme, a Philadelphia investor who also became the canal's superintendent in 1833, through wise management of canal maintenance made it profitable, paying the first dividends to stockholders in 1834. He secured nearly complete management of the canal, gaining enough votes to control the canal's future, and at the canal he launched Louisville's cement industry, a profitable source of employment that the city enjoyed for more than a century. Hulme also became the first to propose widening the canal and adding a second larger set of navigation locks, presaging eventual construction of the Scowden Locks during the 1860s.

FLOODS AND SABOTAGE

No valentines were exchanged at Shippingport in 1832. Underwater on February 14, the town was losing its small sheds, floating off toward New Orleans. The Ohio continued rising an inch per hour, and the next day the small buildings on Louisville's Water street began drifting away on the tide to smash over the Falls. The flood surpassed previous records on February 17, still rising, and the wooden swing bridge built over the canal locks between Shippingport and Portland departed downriver for places unknown. The flood's crest arrived on February 18, five feet and two inches higher than any remembered by Louisville's oldest citizens

and standing two feet over the canal's embankments, so carefully designed by David Bates to protect it from flood damages. At its crest, the flood's swift currents piled houses from Louisville and upriver into the canal and carried away many of Shippingport's houses and stores. A riverman below Portland profited indeed by catching twenty-one wrecked houses as they floated past, lashing them to trees for a splendid post-flood lumber sale. When the flood crested at 45.4 feet at Louisville, it set a record that stood until 1884. When it subsided at last, John Henry and John Hulme found the canal filled to the berm with driftwood and wrecked houses and sadly reported to stockholders that the flood "almost exceeds description. It swept over the banks of the canal (although raised two feet above any flood of which there was any tradition) carrying into the canal immense quantities of mud, driftwood, houses, to remove which has greatly increased the expenses and diminished the amount of receipts."¹

A week after the flood, chief engineer John Henry and his workmen began clearing debris from the canal and locks as fast as possible. The workmen in 1832 and in later years had to close the canal entrance with cofferdams to hold out the river while the wrecked houses, drift, and mud were removed. They fabricated these expedient cofferdams by filling a fifty-foot-long scow with stone, mooring it lengthwise across the canal and sinking it in place, dropping more stone and clay around it until it blocked river flow. While the cofferdam was placed and the debris clearance progressed, the company contracted for construction of a new wooden swing bridge over the locks and borrowed more money from Philadelphia investors to restore the canal to operation. Philadelphia investors later exchanged the funds they had loaned the canal for shares of its stock, and this exchange continued until the company had sold a total of 10,000 shares, representing \$1 million invested.²

The 1832 flood dealt a severe blow to Shippingport, which once had hoped to rival Louisville. Thronged by people working at Tarascon Mill, Berthoud's shipyard, and the canal construction, the town's population peaked at 606 in 1830, but as it became a working-class community, its wealthy French founders began relocating. The Berthouds and Tarascons left in 1831; John Colmesnil moved to Paroquet Springs on Salt River to found a mineral spa; and other

French pioneers dispersed to Portland and other towns. Although Shippingport still touted itself as the head of navigation of lower Ohio River navigation, Portland's landing offered easier access to steamboats and had better connections to Louisville at the head of the Falls. Completion of the canal in 1830 made Shippingport an island, accessible only by bridges, while the Portland portage had no bridges to cross. While Shippingport island had been entirely inundated in 1832, parts of Portland had remained above the flood, and Portland's growth continued during the 1830s, therefore, while Shippingport stagnated and began to decline.³

The river trade and the canal's construction brought a rowdier crowd to Shippingport. Among its new residents were rivermen like George Heslep, fresh off the keelboat *Saucy Jack*, and immigrants like Scotsmen Hew and George Ainslie, who built a brewery near Tarascon Mill. Canal stonemason and foreman Frank McHarry moved into John Tarascon's house, and with financial backing from John Hulme, purchased Tarascon Mill, converting it from a flour into a cement mill, grinding limestone for cement manufacture. The canal store closed and Shippingport's business district dwindled until it had a single grocery, a butchershop, a little-used church, and two saloons, one conveniently located near the canal locks and the other farther out at Elm Tree Garden. Where once Elm Tree Garden had seen grand parties and political hustings by Kentucky's governors and James Guthrie, it became a gambling and drinking den, the scene of rough-and-tumble fights where "the clash of bowie knife and rattling of bullets" marred the nights. Two river pirates, caught in crime, were hanged from walnut trees on Shippingport island, and the island's best pugilist Jerry Phipps, who killed several men, rivaled Jim Porter, the "Kentucky Giant," as Shippingport's favorite. Rumors circulated that the old French families had left treasures buried near their homes, and hunters dug up the mansion yards, without success save in one instance. The saloon-keepers who bought Elm Tree Garden from Joseph Detiste found two kegs of gold and silver coins when digging a new liquor cellar, and they immediately sold out at Shippingport, using their unexpected fortune to buy a fancy saloon at Tenth and Main in Louisville.⁴

HYDRAULIC CEMENT.

THE subscriber has on hand and continues to manufacture Hydraulic Cement, or Water Lime, of a superior quality to any known in this country, for water-tight Cisterns, Sugar Vats, Spring-houses; for foundations exposed to water or damp; for plastering in imitation of stone the outside of public or private buildings, and for the finishing coat of inside plastering. No article can surpass this cement for durability and hardness.

To the Southern planters, who require rain water cisterns or vats, it is peculiarly adapted, as it is only necessary to make the excavation and plaster the sides and bottom with mortar composed of equal parts of this cement and coarse clean sand. No lining of brick being necessary, a great expense is saved.

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JOHN HULME,
Louisville.

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S. S. Goodwin is agent for the sale of this Cement in this city. Apply at the Canal Office, in street.

Canal Superintendent John Hulme purchased Tarascon Mill for the production of cement for the Falls. (Louisville Journal, May 27, 1842.)

Reverend Steve Holcombe often attributed his youthful dissipation to growing up in Shippingport during the 1830s. Hundreds of construction workers had moved to the town, Holcombe recalled, but when the canal was completed the better classes moved on, leaving unemployed and destitute canal workers behind. At age seven, Holcombe had peddled pastries made by his mother to steamboat passengers at the canal locks, but he secretly wasted part of the money gambling in Shippingport's saloons. Needing money for his addictions, he also boated around the Falls in a skiff, scavenging for items washed out of wrecked boats that he might peddle. Holcombe became a noted steamboat gambler, but later he repented, reformed, and managed Louisville's Union Gospel Mission for forty years.⁵

The canal also might have become a victim of the 1832 flood had it not been for the fast work of John Henry and John Hulme. They cleared enough debris to permit a tricky passage by light-draft boats in late spring, then closed the

canal during autumn's low water to finish the job. In October 1832 they at last completed their work and invited boat captains and pilots to inspect the canal's condition before they removed the cofferdam and refilled the canal. When the canal reopened on November 2, four flatboats and the steamboats *Bolivar*, *Mount Vernon*, *Polander*, and *Caspian* passed through without incident, resuming full use of the canal. Yet, the total commerce passing through the canal in 1832, 453 steamboats and 179 flat and keelboats, proved substantially less than in 1831.⁶

After two years without a profit, chief engineer John Henry gave up his job and went south to work on an Alabama canal bypassing Muscle Shoals, whitewater rapids on the Tennessee River similar to the Falls of the Ohio. To replace Henry, the canal directors selected John Hulme, of the wealthy Philadelphia family that owned ten percent of the canal stock, as its toll collector and canal superintendent. At their January 1833 annual meeting, the stockholders elected Hulme as canal director along with Philadelphians Elihu Chauncey, John Hewitt, and president William Fitch. Only secretary Simeon Goodwin then remained on the board of directors to represent Louisville. These five sadly reported that canal tolls, although doubled, had remained insufficient in 1832 to permit paying stockholders a cent of dividend; furthermore, the company had gone even deeper in debt to clear the canal of flood debris.⁷

John Hulme's first priority as superintendent was to purchase a steam-powered dredge to supplement manual excavation, thereby shortening the times that the canal was clogged with mud and debris and out of service. Except for a steam-powered pump used during construction to remove water from lockpit excavations, this dredge marked the earliest application of steam-engine technology to canal operations. It was a ladder dredge with a steam engine turning gears to rotate chains, to which were attached a series of metal scoops. In operation, it somewhat resembled modern up-escalators, with scoops instead of steps mounted on an endlessly turning belt. When the crew positioned the dredge above mud deposits and lowered the tall ladder of scoops into the mud, the steam engine spun gears turning the chain of scoops, and the scoops hoisted mud to dump it off the back of the ladder onto the bank or into a mud scow for removal. The ladder dredge never

worked properly, however, and the company soon replaced it with a dipper dredge. Dipper dredges had buckets, or dippers, on the end of a boom that could pick up mud and swing it onto the bank or into a scow.⁸

Although canal stockholders in 1832 still had not received any return on their investment, their doubling of toll rates to forty cents per ton did not go unnoticed. Pittsburgh, Cincinnati, and St. Louis shippers dispatched petitions to Congress, asking that it purchase the canal company and remove its burdensome tolls. In May 1832 Thomas Hulme and John Shackford responded to these petitions by advising Congress that they and other stockholders would gladly sell the canal for what they had invested in it. They still believed the canal would become a profitable investment, but they would sell out for two reasons:

We believe the commerce of the West should not be subject to heavy tolls while millions are expended by the United States for the free use and convenience of foreign commerce on works of very little importance when compared with this canal. Secondly, because we are informed that petitions have been forwarded to Congress asking for an appropriation of twenty-five thousand dollars to be expended in cutting down the rocks in the falls of the River so as to enable boats to descend with more safety. But if the request of the petitioners be granted the canal company will be under the necessity of increasing the tolls on boats ascending, so that twenty-five thousand dollars expended in this manner would render no advantage to the public.⁹

The stockholders followed up the Hulme and Shackford initiative with their own petition to Congress. They protested that the high canal tolls had been required by the high costs of construction and maintenance, and they pointed out that shippers having cargoes portaged around the Falls typically paid \$1 per ton, totaling \$100,000 annually, a dead loss to the nation benefiting no one. "We would, therefore,

respectfully call the attention of Congress to the subject of securing to the Nation this great highway by purchasing the private stock in this canal, and throwing it open to the citizens of the west, with such slight duties only for its use as will keep it in repair.”¹⁰

The Falls pilots in 1832 were feeling the pinch of competition from the canal, and it was surprising that suspicion did not fall on them when saboteurs struck at the canal. On the night of January 23, 1833, someone sank a loaded coalboat across the canal’s entrance, while other conspirators planted kegs of gunpowder at the stone-masonry bridge and at each of the three locks. Heavy rain dampened fuses in the kegs at the bridge and at two locks, but the gunpowder detonated at one lock: the terrific explosion damaged the lockgates and blasted holes in the lockwall masonry. The company proffered a \$5,000 reward to anyone identifying the culprits, and the police conducted investigations. “All efforts to discover the perpetrators of these acts of villainy were fruitless,” the canal’s board of directors lamented to the stockholders, “except that the board were convinced that they emanated from worthless and irresponsible persons.”¹¹

Suspicion centered on the draymen and teamsters portaging boat cargoes around the Falls, because the canal threatened their business. Yet, the pilots who guided boats over the Falls were equally threatened, and they bitterly resented the canal. A traveler who landed at Portland and boarded a hack—a buggy for hire like a modern taxi—to ride to Louisville, reported his conversation with a Falls pilot: “With us in the hack were two men, one of them a pilot through the Falls, the most absurdly and offensively frequent swearer I ever met with: Protests that the canal has deprived him of many hundred a year.”¹²

When even a princely \$5,000 reward did not lead to the culprits’ apprehension, the canal directors arranged enactment by the Kentucky legislature of a law making attempted sabotage of the canal a felony. Superintendent John Hulme also installed lamps to light the canal at night and employed night watchmen to deter saboteurs. These security measures, costing \$1,000 per year, apparently served well—no further destructive efforts were reported.¹³

HULME’S MAINTENANCE

Superintendent Hulme put his new dredge into service in 1833 and began several modifications aimed at making the canal a safer and more convenient passage. Because the rails on the bottom of the locks and the rollers supporting the lockgates gave constant trouble, he replaced them with strengthened iron. Because the excavated stones left piled on the canal banks continued to slide into the canal, and heavy rains and the waves from steamboats eroded its banks, washing mud into the canal, Hulme employed a large force to remove them, closing the canal during the low-water season each year thereafter for the purpose. He had the canal entrance blasted wider, using the rock to start building vertical stone retaining walls the length of the canal to prevent additional erosion. His ultimate goal was to excavate the canal’s sides and increase its width to sixty feet, walling it with stone from one end to the other.¹⁴

This regular maintenance and special improvements proved costly, and the stockholders conducted a special meeting in November 1833 to again consider increasing the tolls. They learned that Hulme, thanks to intensive maintenance, had kept the canal open to traffic throughout most of 1833, and his toll collections had more than doubled, from \$26,000 in 1832 to \$61,000 in 1833. This encouraged the stockholders, who decided after lengthy debate to leave the steamboat toll at forty cents a ton. Even without increasing the tolls, the stockholders received their first small six-percent dividend, or \$6 per \$100 share, in January 1834, ending for those who had bought stock in 1825 a seven-year wait for any return whatsoever on their investment.¹⁵

In November 1833 the Secretary of Treasury appointed John Hulme to serve as the government’s proxy, casting the votes representing shares owned by the United States at the stockholders’ meetings. In this duty, Hulme succeeded canal president James McGilly Cuddy, appointed in 1830; and he was to vote in proxy the federal shares until 1850, when canal president James Marshall succeeded him. Owning 2902 shares, more than any individual stockholder, the United States was entitled to cast 308 votes, on the charter rule that stockholders cast one vote for each of their first twenty shares, then one vote for each additional

ten shares they owned. By voting the federal shares along with his family's large holdings, Hulme essentially had gained control of the canal by 1834.¹⁶

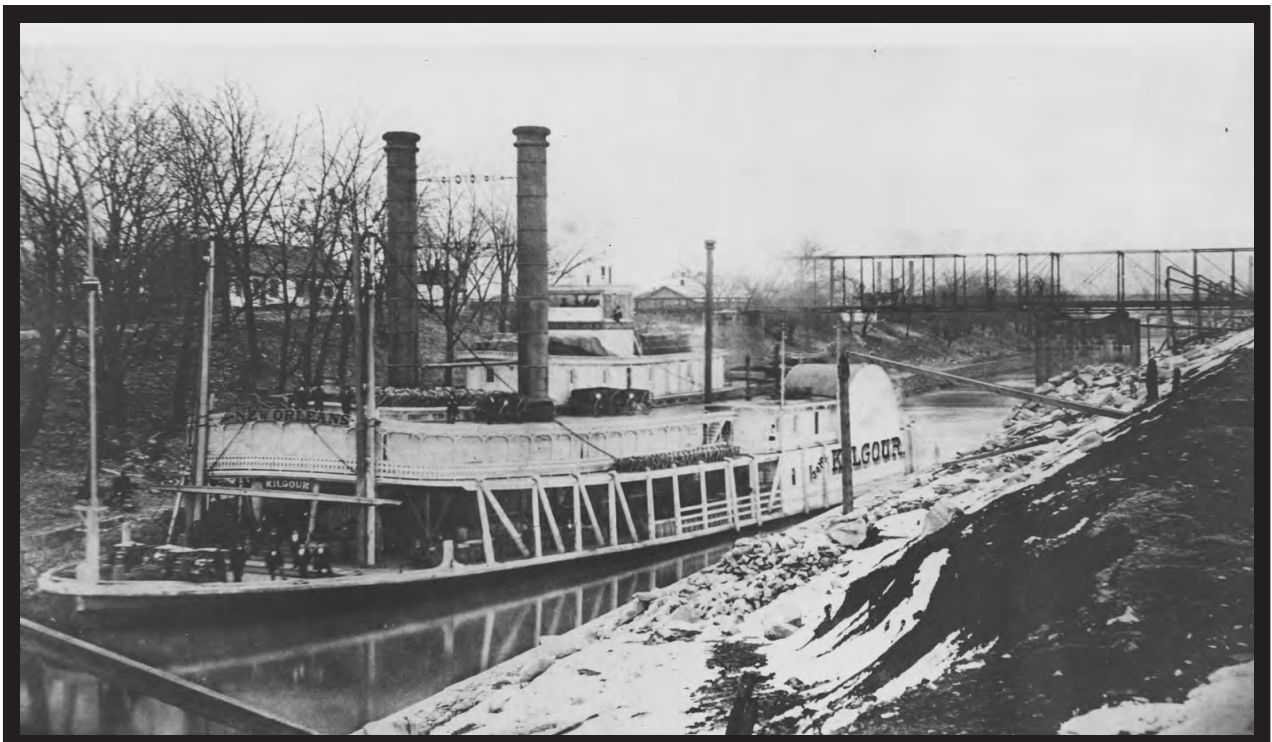
With John Hulme firmly at the helm, the Philadelphia investors began backing out of the company's management, and the stockholders elected James Marshall of Louisville as the company's president for 1834. A close friend of James Guthrie, Marshall had founded the Louisville Fire and Marine Insurance Company. Later he became president of the Franklin Bank of Kentucky, and Guthrie appointed him treasurer of the University of Louisville. Marshall took little apparent interest in the canal's daily operations, however, leaving that to John Hulme and Simeon Goodwin, but his legal acumen served the company well because it had tax litigation on its regular agenda.¹⁷

In 1835 the City of Louisville began assessing and attempting to collect city taxes on the canal company's real estate. The company at first ignored the tax notices, until the city assessor began legal procedures to condemn the canal for back taxes and sell it at public auction. The company then sued the city, contending it was exempt from municipal taxes because it was a state-chartered corporation; and its 1825 charter predated the city's charter of 1828. Moreover,

when the canal was built on John Rowan's property, it was not located within the city's limits; state government had only recently extended the city limits to the west to encompass the canal land. This argument prevailed in the Jefferson County Circuit Court, and the canal company never paid any city taxes.

Just to be sure, however, the company also arranged enactment by the state legislature of a law exempting it from city or county taxes. The company sued again when state government began to assess it taxes, but eventually it lost that case and began to pay state taxes in 1847.¹⁸

The 50-foot-wide canal was too narrow for two boats to pass, forcing one boat that met another unexpectedly in the canal to back out, and this often caused considerable resentment. Louisville news editor George Prentice once went for a stroll and reported: "Walking along the wharf last evening we met three men carrying a large bust of General Andrew Jackson. We asked what it meant and were told Jackson never backs out!" Wondering at this, Prentice inquired further and learned the *Andrew Jackson* when coming up through the canal had met bow-to-bow the steamboat *Gladiator* near the stone bridge. The captain loudly declared that the "*Jackson* never backs out," while the *Gladiator's* captain insisted he had the right of way. After a



Steamboats such as the *Kilgour* bound for New Orleans completely filled the fifty-foot wide canal and locks. (Murphy Library, University of Wisconsin)

heated discourse, they referred the issue to superintendent John Hulme, who decided that the *Jackson* would back out this time. The captain of the *Jackson* then ordered his crewmen to take the bust of Old Hickory from the boat's bow and carry it on to the city to wait until the steamboat arrived.¹⁹

Lack of space in the canal for two-way traffic remained a source of public complaint until passing places were excavated. William Smith, passing the canal in 1837, considered it a "poor concern," noting that it lacked a guard lock and often filled with mud that grounded boats. Moreover, it had no passing places, and of this, he complained:

At ten o'clock we are just entering the canal, nearly sticking in the mud, proceeding a few rods, bumping against the rocky sides, creeping on in consequence of the windings. We discovered an ascending steamboat, and we are compelled to back out; no signal, or telegraph, no information of a boat being in the canal is thought necessary. We are delayed an hour, and we again enter this pitiful concern. About half-way there is a splendid bridge of stone over the canal, with an arch about 60 feet over the water. About noon we enter the upper lock chamber. The stonework is splendid, and the whole appointment of the three locks which we pass in immediate succession is creditable to the company.²⁰

Although the canal line might properly have qualified as poorly constructed, commerce passing through it continued to grow during the 1830s, making it quite a profitable investment. Superintendent Hulme pursued his various project improvements, generally closing the canal each August in order to work while the river's low water deterred navigation by all but the smallest boats. In 1835 Hulme bought a second dredge and a set of spare lock gates to have on hand for emergencies. The costs of this annual maintenance and operations, the \$1,000 spent annually to light and guard the locks, and the other improvements brought the canal directors to a decision to again raise the toll rates further to sixty cents per ton. This decision also

permitted the payment of twelve-percent annual dividends to the stockholders.²¹

This additional toll hike shocked shippers. At sixty cents per ton, a Cincinnati steamboat built for \$24,000 to run back and fourth to St. Louis paid \$180 in tolls each time it passed the canal. During fifteen trips back and fourth a year, passing through the canal thirty times, it paid \$5,400 in annual toll charges; and in five years the aggregate in tolls paid exceeded the boat's construction costs. The Falls pilots' plans to improve the Indian chute channel, allowing boats to pass the Falls without paying canal tolls, thus became more attractive, earning support in Congress.²²

INDIAN CHUTE PROJECT

Congress resolved that the Army Corps of Engineers survey the Falls of the Ohio to study improving the Indian chute passage, and the Chief Engineer assigned the survey to Superintendent Henry Shreve, then managing federal river projects. A resident of Portland, Shreve had built early steamboats and in 1826 was appointed to supervise navigation improvements on the Ohio and other rivers. Shreve examined the Falls in 1834 and recommended a project to blast open a 150-foot wide and thirty-inch deep channel through the rocks obstructing Indian chute, using the broken rock to dam small channels on both sides of the chute. "There is a mass of detached rocks called by Falls pilots Ruble's Rock lying in the way," Shreve reported: "These are very dangerous to navigation and many boats have stove on them with heavy loses. A half mile below Ruble's Rock are other detached rocks, which should be removed. A mile below the head of the chute is a point of rocks from the Indiana shore about 100 yards into the river, and just below is another point of rocks on the opposite side of the chute extending 200 yards into the river from Goose Island, creating a strong counter current bend very dangerous to navigation. If a boat running down the chute is drawn into the eddy, it is thrown on the rocks and lost." Shreve therefore proposed blasting away Ruble's Rock and the points of rock extending into the chute, and, based on his experience blasting a passage through the Grand Chain of Rocks on the lower Ohio, he estimated project costs at \$25,000.²³

Shreve's recommendation that the federal government support the Falls pilots' competition with the canal stirred the canal's friends to action. In January 1835 James Guthrie introduced a resolution in the Kentucky legislature encouraging Kentucky's congressmen to seek federal purchase of the Louisville canal and to free it of tolls. Efforts by Kentucky's congressmen to obtain a favorable vote on a bill for the canal purchase failed, however, and Indiana Senator William Hendricks then proposed selling the canal stock owned by the United States and using the proceeds to build another canal on the Indiana side.²⁴

Responding to this initiative, the Indiana legislature chartered another company to build a canal from Jeffersonville to New Albany, also proposing to invest a half million dollars in its stock. For the first time, opposition to the Indiana canal plan was voiced in Indiana, where objections arose that such a canal might destroy New Albany, just as the Kentucky canal was destroying Shippingport. Indiana's congressmen, therefore, continued their support for federal purchase of the Louisville canal.²⁵

Congressman William Graves of Louisville in 1836 became the first to propose another

alternative. He submitted a bill to the House Committee on Roads and Canals that would permit using the United States' canal stock dividends to buy out the individual stockholders, thus eventually transferring the canal to federal ownership. Louisville greeted this proposal with jeers. A news editor protested, "This would take 20 years! In the meantime, the canal will not be free; it will not have a public work, an armory or a drydock connected with it. Graves does not represent Louisville well and should be turned out of office."

Graves did leave office, although perhaps as a result of his murder of a congressman from Maine rather than his canal proposal, and his bill never left committee; nevertheless, it stimulated renewed thought on the canal's future.²⁶

The opening of Pennsylvania's canal from Philadelphia to Pittsburgh brought increased trade to the Ohio, and steamboat commerce prospered and expanded during the 1830s as larger and faster boats entered service. In 1835, the *Arabian* reached Louisville with cargo shipped from Philadelphia just eleven days earlier via the canal and river. The same year, the *General Pike* made the 132-mile run from Cincinnati to Louisville in the record time of nine hours, while



Lockmen walked in circles to turn capstans, winding up chains to open or close the lock gates. (Corps of Engineers)

the *Argo* arrived with hemp bagging and rope shipped just nineteen hours earlier from Lexington—by the state railroad to Frankfort and steamboat to the Falls. Cincinnati's marine designers began to adjust to the canal's dimensions, building steamboats that were 185 feet long by 43 feet beam, filling the lock chambers to near capacity. To offset the dimensional limits, steamboats loaded with freight to a depth of nine feet used all the water in the canal by crabbing, or pulling through the canal backwards, their paddlewheels dragging them across the mud flats on the bottom. It might take them an entire day to get through the canal in that fashion, but it allowed continuing on to New Orleans or St. Louis without transshipment.

Growing commerce allowed John Hulme to pay canal investors as much as seventeen percent annually on their stock, and it also contributed to Louisville's rapid growth. When the canal opened in 1830, Louisville was still a small town of 10,336 people; by 1835 its population had nearly doubled to 18,966.²⁷

GUTHRIE'S CIVIC PROJECTS

Having successfully guided the passageway around the Falls through political shoals, James Guthrie turned his attention to other civic projects. He was credited with orchestrating the legislative act of 1828 that made Louisville the first town to achieve city status in the state. He became famous for his campaign to build the Jefferson County Courthouse, perhaps in hope of moving the state capital from Frankfort into the new courthouse at Louisville. Although the courthouse construction began in 1836, it stopped during the economic depression of the late 1830s and did not resume until 1860; the uncompleted structure was dubbed Guthrie's Folly, a nickname that stuck even into the twentieth century. As Louisville council member, Guthrie also recommended that the city purchase the Shippingport turnpike, a toll road, and make it free. Although its use as a portage was dwindling, the turnpike had remained profitable, collecting \$900 in tolls annually; and when operational costs were deducted it still had a net yearly income of \$675. The turnpike company offered to sell out for \$4,500, Guthrie countered with a \$3,600 offer, and the turnpike became city property in June 1836.²⁸

Another of Guthrie's civic improvements involved crossing the Falls in a north-south direction, a bridge from Kentucky to Indiana. This new direction was inspired by Canvass White, who had advised bridge engineer Athiel Town that the tolls paid for crossing the Ohio on ferries could easily make a bridge company profitable. Town was a well-known bridge engineer in the east, having built a long timber-truss bridge across the Susquehanna River at Harrisburg, Pennsylvania, and he foresaw no difficulties building a similar bridge over the Ohio at the Falls. Guthrie acquired charters for a bridge company from both Kentucky and Indiana, with the bridge to be funded, like the canal earlier, by sales of stock; and in 1836 the company awarded a contract to Town for building the bridge. Placement of the first bridge pier, at the foot of Twelfth street alongside the canal, had begun before the company failed, a victim of the 1837 national economic panic that dried up investment capital. The canal company had sold Town 675 perches of stone for the bridge pier, but got stuck for the payment. Guthrie regretfully deferred construction of his bridge, but he clung to the concept like a bulldog and, thirty years later, finished it.²⁹

The extended drought and low-water season of 1838 proved highly profitable for the canal company. The usual spring and fall highwater seasons on the Ohio never occurred, the river's flow dwindled to trickle, and as a result boats could not cross the Falls, forcing them to use the canal for passage. Canal stockholder Charles Short of Louisville gloated privately that during the drought "not a single boat has been enabled to pass up over the Falls during the last 12 months, a circumstance almost unparalleled in the annals of the river since the introduction of steamboats."³⁰

Congress had not appropriated the \$25,000 the Falls pilots wanted to widen Indian chute across the Falls, so in October 1838, having no other employment, the pilots took action on their own. Pilots George Gretsinger, Jacob Funk, and John Dunn employed laborers and went to work at the chute, blasting away rocks that impeded their business. News of this reached Captain John Sanders, the Army engineer officer responsible for federal improvements of Ohio River navigation from Pittsburgh to the Falls, and with approval from the Chief Engineer, Sanders sent Captain Joseph Dillingham to the Falls to consult

with the pilots. Commanding the snagboat *H. M. Shreve* in 1838, Dillingham earlier had blasted a passage through the Grand Chain of Rocks down the Ohio near Cairo. When Dillingham reported favorably, Captain Sanders authorized him to hire labor immediately and join in the efforts to widen the chute. Dillingham deployed his snagboat crew to work at the head of the chute with the Falls pilots and employed convicts from the Indiana prison at Jeffersonville to cut down Wave Rock near the foot of the chute. The workers drilled holes with rods and sledgehammers into the rocks, then filled the holes with gunpowder and detonated it to shatter the rock. Detonating as many as seventy-eight blasts daily, the workers shoved the broken rock into nearby slues to block them and divert more water into the main chute. When a river rise began in November, Dillingham stopped work after expending \$1,225 on the clearance project in addition to the \$700 spent personally by the Falls pilots. The pilots insisted the project had been a success, deepening Indian chute by as much as twenty inches and widening its entrance by twenty-five feet.³¹

Captain Sanders recommended that Congress provide additional funding to finish the work begun by the Falls pilots and Dillingham, opening at least a forty-foot wide channel through Indian chute; this would enhance the downstream passage and perhaps make it possible for steamboats to ascend the Falls without warping up through the Kentucky chute. "Louisville, as well as all the other ports on the upper Ohio," Sanders said, explaining his recommendation, "would be in a great measure freed from the onerous tax now paid to the canal company, by their steamboats and other river craft."³²

President Martin Van Buren and Congress responded to the national economic depression of the late 1830s by curtailing federal expenditures, taking no action on Sanders' recommendations for the Falls project; indeed, even Sanders' improvements of upper Ohio River navigation were suspended for lack of funding and he mothballed the Corps of Engineers snagboat fleet. Yet, the blasting he and the pilots had accomplished at the Falls had its effects. Tolls collected at the canal declined during the following two years because, John Hulme reported, the improved Indian chute channel allowed "free passage of the Falls for most of the boats that usually pass through the canal." As a

result, the dividends paid to canal stockholders diminished from seventeen percent to twelve percent, and farther the following year to nine percent before recovery began.³³

The meager improvements accomplished at Indian chute encouraged an attempt by a steamboat to steam up the Falls. Steamboats before 1840 ascended the Falls through the Kentucky chute and Middle chute, but none had braved the powerful currents, twisting channel, and sharp rocks of Indian chute. Captain Paul Anderson became the first to attempt it with his steamboat *Uncle Sam*, a 440-ton boat too large to pass the canal locks, which was equipped with a 250-horsepower steam engine. He started with his boat up the chute, but the engine's power proved inadequate to stem the current, leaving the steamer hanging against the rocks in a precarious position. Captain Anderson saved his boat and completed the passage by lining onto upstream anchorage and pulling manually through, but swore he would never again risk ascending the Indian chute. Neither he, nor other captains, attempted it until 1852, when the *G. W. Sparhawk*, *Georgetown*, *Eclipse* and the *Lady Pike* with more powerful engines successfully beat their way up against the currents and made the passage.³⁴

In addition to the Indian chute improvements, other competition to the canal arose in 1838, when a six-mile-long section of the Lexington and Ohio Railroad was built parallel to the canal, running cars on tracks made of limestone runners with iron straps for rails. The railroad owned a small steam locomotive that pulled railcars full of steamboat cargo and passengers from Portland to Louisville, but when Louisville's citizens objected to the locomotive's noise and fiery sparks, the railroad switched to mules for its motive power. The railroad received little business because its western tracks did not run down the hill and along Portland's wharf, and its eastern rails stopped at Twelfth street without reaching Louisville's wharf at Sixth street. To use this railroad, steamboat cargo landed at Portland had to be loaded into wagons to go uphill to the railroad terminal, transferred to the railcars, then at the eastern terminal loaded back into wagons to reach Louisville's wharf. It was more economical, therefore, for the wagons to transport the cargo along the turnpike all the way to Louisville, rather than shifting it back and forth to the railcars. As a result, the

railroad chiefly served to transport passengers to and from the Portland to New Albany ferry; passengers could walk the short distances between the wharves and the rail terminals. Rather than competing with the canal for cargo portage, the Louisville and Portland Railroad became the city's first passenger streetcar service.³⁵

By July 1840, the canal was recovering from its minor losses to competition from the Falls pilots and the Portland railroad, and John Hulme and his workers had put the canal in fine condition. At least, that was how Eliza Steele saw it when she arrived at the lower canal entrance aboard the *Monsoon* out of St. Louis. She vividly described her exciting passage through the canal:

There is a small place called Shipping Port, at the mouth of the canal, where we observed several handsome carriages in waiting, for those who thus preferred it, to the slower operation of ascending twenty-two feet of lockage. Here were several steamboats moored. As we entered the second lock, the *North State*, a fine boat, of one hundred and forty-eight tons came dashing into the lock we had left, and when we had both ascended, the *Maine*, which we had passed upon the river yesterday, entered the first lock, so that we had the novel spectacle of three large steamboats, filled with merchandise and passengers, all at one time rising and falling in several locks. The locks are large enough for first class boats, and the whole of the canal is finished in the most solid and beautiful manner. It is fifty feet wide at surface. No horses are used, we passed through by steam.³⁶

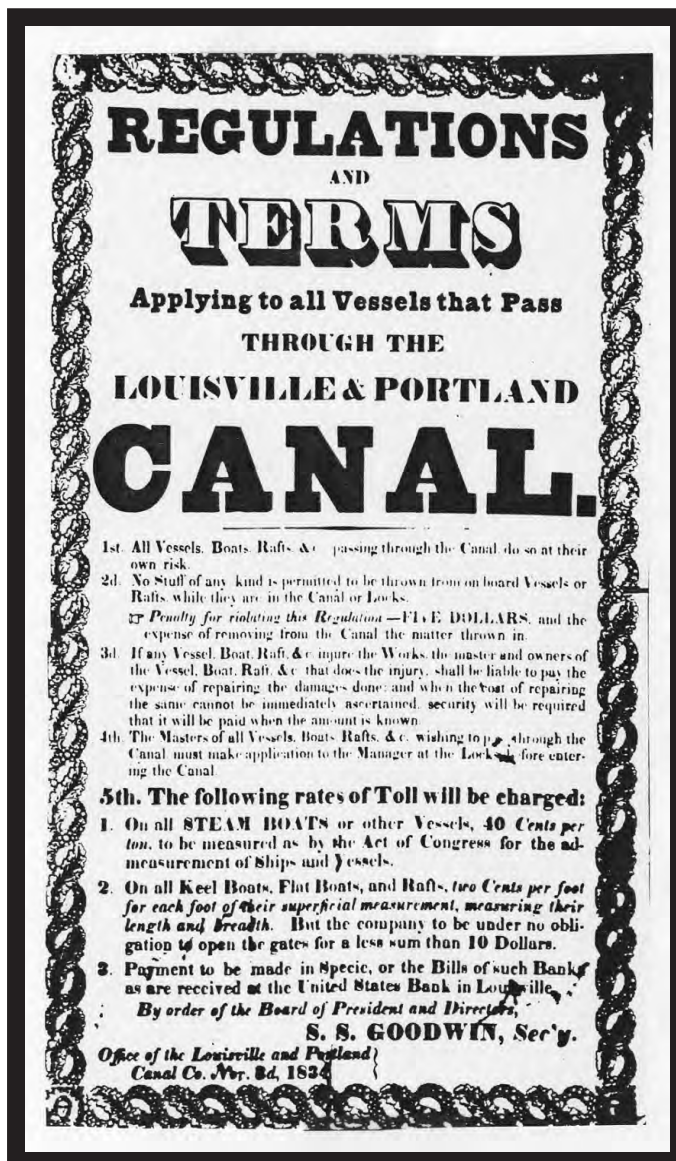
Still, loud complaints about the canal's tolls and conditions went to Washington regularly, from steamboat shippers, from Falls pilots, and from citizens worried about the effect on the Falls environment resulting from John Hulme's hydraulic cement business. Hulme had made stonemason Frank McHarry his deputy canal

superintendent, in charge of the workers operating the locks and maintaining the canal. When Hulme saw a profit to be made in hydraulic cement, he invested in the Tarascon Mill to manufacture cement and leased John Rowan's stone quarry on Corn Island, also placing Frank McHarry in charge of the cement production. Hulme's business received a contract to furnish the cement used as mortar at the Green and Kentucky River locks under construction by the state in 1840, and he also retailed his cement for use in lining water cisterns and plastering houses. Hulme's Hydraulic Cement became known throughout the South for its quality, and by the 1840s builders used it to make "artificial stone," or concrete, for house foundations. Hulme and McHarry shipped thousands of barrels of cement annually by river from Tarascon Mill to St. Louis, New Orleans, and throughout the South.³⁷

Stonemason Frank McHarry blasted the limestone to make Hulme's cement from quarries at Corn Island near the head of the canal, then loaded it on wagons to transport over the Shippingport Turnpike and canal bridge to Tarascon Mill for grinding and burning. Many tons of the stone moved to market in this fashion each year, and this industrial use of the Falls' rocks concerned citizens such as Jacob Wallen, Louisville's steamboat inspector. Wallen advised Congress that Louisvillians for many years had taken building and paving stone from Corn Island and its adjacent limestone ledges, but the cement industry had accelerated its removal and the quarrying threatened to open a new river channel, draining pooled water from above the Falls and ruining the canal. He declared he could prove that quarrying rock from the bed of the Falls had lowered the river surface above by more than two feet, thereby reducing flow into the canal by at least six inches. "This is serious and Congress should stop it," Wallen protested: "This is one of nature's dams and answers all the purposes of an artificial one."³⁸

HULME RESPONDS TO CRITICS

Congress then exercised little regulatory authority over navigable waters including the Falls, and it ignored Wallen's complaint. Nor were Louisvillians generally much concerned about conditions at the Falls. By 1840, Congress had considered so many bills to purchase the Louisville canal, to improve the Falls, to build



Canal secretary Simeon S. Goodwin printed the Louisville and Portland Canal Company regulations and toll rates in 1834. (Inland Rivers Library, Cincinnati, OH)

canals on the Indiana bank, that Louisvillians had become sick of the subject. They feared tampering with the Falls, as the Falls pilots wished, might drain water and ruin navigation upstream, and they believed that building a toll-free canal on the Indiana bank would cost millions, at least double the costs of Louisville's canal. A Louisville news editor declared that private stockholders had invested in the canal's completion when the state and federal governments would not, and the time had come for the federal government either to buy out the stockholders and make the canal a federal project, "or those who had the courage and enterprise to make the Louisville and Portland canal be left to enjoy the fruits of their industry undisturbed."³⁹

John Hulme also wearied of protests that high canal tolls were fleecing the nation and of the complaints by steamboat captains and shippers of the troubles they occasionally experienced when passing through the canal. When the Secretary of Treasury demanded that Hulme, as proxy for the government-owned stock, reply to his critics, Hulme tartly declared that his canal had sufficient capacity to pass all Ohio River steamboats except three, that it had locked through as many as thirty-six boats in a single day, and that it had averaged passing six boats daily. Nor had the stockholders received extravagant returns on their risky investment: in the twelve years from 1827 through 1839, the stockholders had received an aggregate of ninety-nine percent dividends on their stock, or an average of less than eight percent annually. Moreover, as canal superintendent, Hulme had substantially improved the canal and he had initiated planning for the eventual construction of a second set of locks. Describing his efforts, Hulme reported:

The improvements on the canal have been very great for the past seven years; a substantial perpendicular wall having been nearly completed on both sides for the protection of the water-wheels of steamers, and in widening the canal fifteen feet by excavating solid rock throughout its whole length. These improvements are nearly completed and will render this work one of the handsomest and most permanent in the world. Two turnout places or basins are being made, which, with an additional set of locks, will enable the Louisville and Portland canal to accommodate the commerce of the west for a century to come.⁴⁰

Hulme and the canal directors foresaw a troubled future for their investments in the canal, however, unless they took preventative steps, so in early 1842 they petitioned the Kentucky legislature to amend their company charter. They explained that the grounds for their petition were "the repeated applications to Congress for another canal, the hostility exhibited to the company from various quarters, and the apathy with which propositions to destroy its rights are

entertained in Congress and elsewhere.” Therefore, the stockholders were willing to sell their stock to the federal government, which would then free the canal of tolls. The legislature complied with their request, enacting a law permitting the stockholders to sell their shares to the United States indirectly, by applying the canal’s net revenues to purchasing stock instead of paying dividends. The law authorized the five canal directors to serve as trustees for the shares purchased for the United States, holding them until the federal government became willing to accept ownership of the canal and free it of tolls. The legislature also granted jurisdiction over the canal property to the United States, whenever it became the sole owner and accepted control of the canal.⁴¹

At a special called meeting, the canal stockholders gathered at Louisville on July 4, 1842, to consider accepting or rejecting the terms of the Kentucky acts. William Shackford of Portsmouth, managing John Shackford’s estate, chaired this meeting, attended by many stockholders holding or voting as proxy a total of 6,728 shares. After discussions, they cast their ballots and the owners of 6,078 shares voted to accept the act authorizing sale of the company to the federal government. It would have been unanimous, except the meeting’s chairman, William Shackford, declined to cast his 650 shares. The stockholders then directed canal president James Marshall to arrange the first purchases, allowing the owners of five or fewer shares to sell out first, followed by the larger stockholders in proportion to the amount of stock each held. The first year, shares were to be purchased for \$150 each. Although no further dividends would be paid to the stockholders, the value of their remaining shares would be advanced six percent each year until all shares had been purchased and delivered to the Secretary of the Treasury. As a final answer to their critics and also to improve their competitive posture, the stockholders voted to reduce the sixty-cents per ton canal tolls to fifty cents on ascending boats and thirty cents on descending boats, thereby taking more business from the Falls pilots.⁴²

OBSERVATIONS

The stockholders in 1842 finally accepted Congressman William Graves’ recommendation of 1836 that they use the dividends to buy themselves out and give the canal to the United States. Although protests arose in 1836 that Graves’ plan might require twenty years to transfer the canal to the federal management, the canal proved so profitable that the United States became its sole owner in just twelve years. Not until 1874, however, did Congress agree to accept the canal, and not until 1880 did it free river commerce of the tolls. As a result, not a single stockholder who voted in 1842 to transfer their property to the United States still lived when the government at last accepted their gift.

In the critical first years of canal operations, John Hulme converted it from a losing to a profitable enterprise. His work and prudent management paid the stockholders as much as seventeen percent dividends, but the average annual dividends were just eight percent, not an exorbitant return on an extremely risky capital investment. By 1842, the investors had received dividends equal to their invested capital, and they decided to use future dividends to buy themselves out, giving their stock to the United States. If they hoped by this strategy to allay their critics’ complaints, they were to be sadly disappointed, for public criticism continued so long as the tolls were collected.

During this early phase of canal history, the natural Falls environment had begun to disappear as the engineering art advanced triumphantly over nature. John Hulme’s creation of Louisville’s cement industry resulted in rapid excavation of limestone from the Falls, as it was quarried to make cement; in time, this excavation nearly removed Corn island from the Falls. At Indian chute on the opposite side of the river, efforts by the Falls pilots to blast away rocks blocking the passage found assistance from the United States Army Corps of Engineers, and thus began the destruction of the Falls’ natural environment in the name of commercial and industrial development.

6

THE CANAL CONUNDRUM

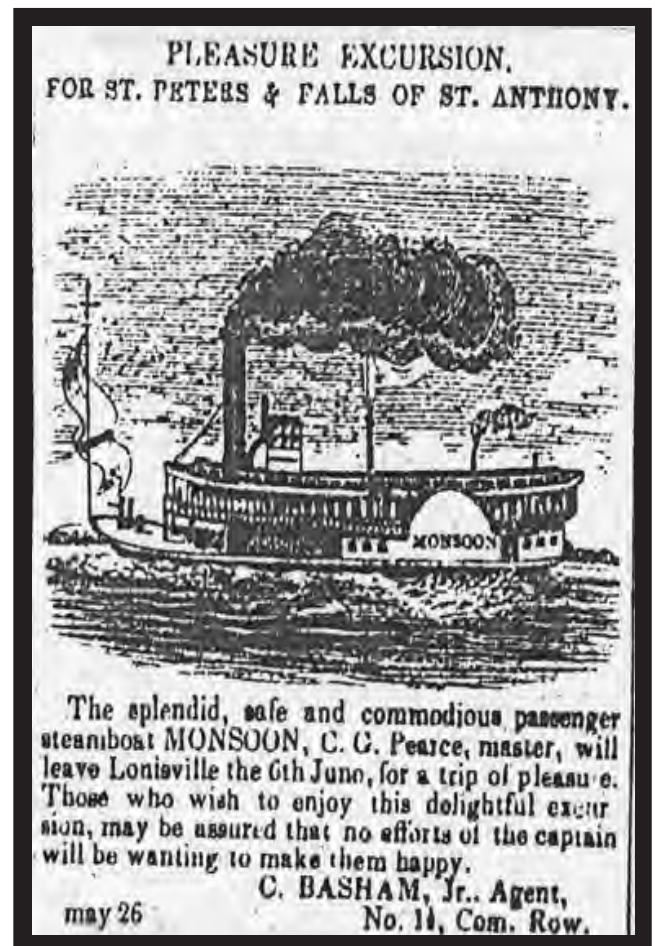
If stockholders hoped selling their shares to the federal government and reducing the tolls might ameliorate criticism, they were sorely disappointed. Shippers still complained of paying even the reduced tolls and of the canal's limited capacity. The Falls pilots still found significant support for their plan to blast a wider channel through Indian chute. Indiana's representatives continued to press for building another canal on their side of the river. Responding to these varying demands, Congress dispatched officers of the Army Corps of Engineers to assess the solutions to passing the Falls barrier. These produced elaborate maps, reports, and plans, none of which resolved the conundrum.

During the 1840s new technology heightened the need for a solution to passing the Falls. Marine designers built steamboats far too large to pass through the canal, and equipped them more efficiently. The telegraph crossed the river to Louisville, improving communications from the Falls to other ports. A railroad was completed from Louisville to Frankfort, and the Louisville and Portland railroad was reconstructed. Coalboats and the newly-designed towboats arrived at the Falls in great numbers, wrecking on the Falls and blocking the canal. A United States Marine Hospital was built at Portland to provide medical services to the rivermen floating into Louisville on every river rise. And canal superintendent John Hulme applied new technology to the canal dredges and lockgate operations.

The thriving river commerce of the 1840s stimulated ever louder objections to the canal tolls and calls for building either a second canal on the Indiana bank or enlarging the existing canal on the Kentucky bank. When an officer of the Corps of Engineers identified eight possible options for bypassing the Falls barrier, the Secretary of Treasury defined a ninth possible solution to the riddle. No acceptable solution to the Falls conundrum appeared, however, until James Guthrie put his very capable hand to the task.

THE CRAM OPTIONS

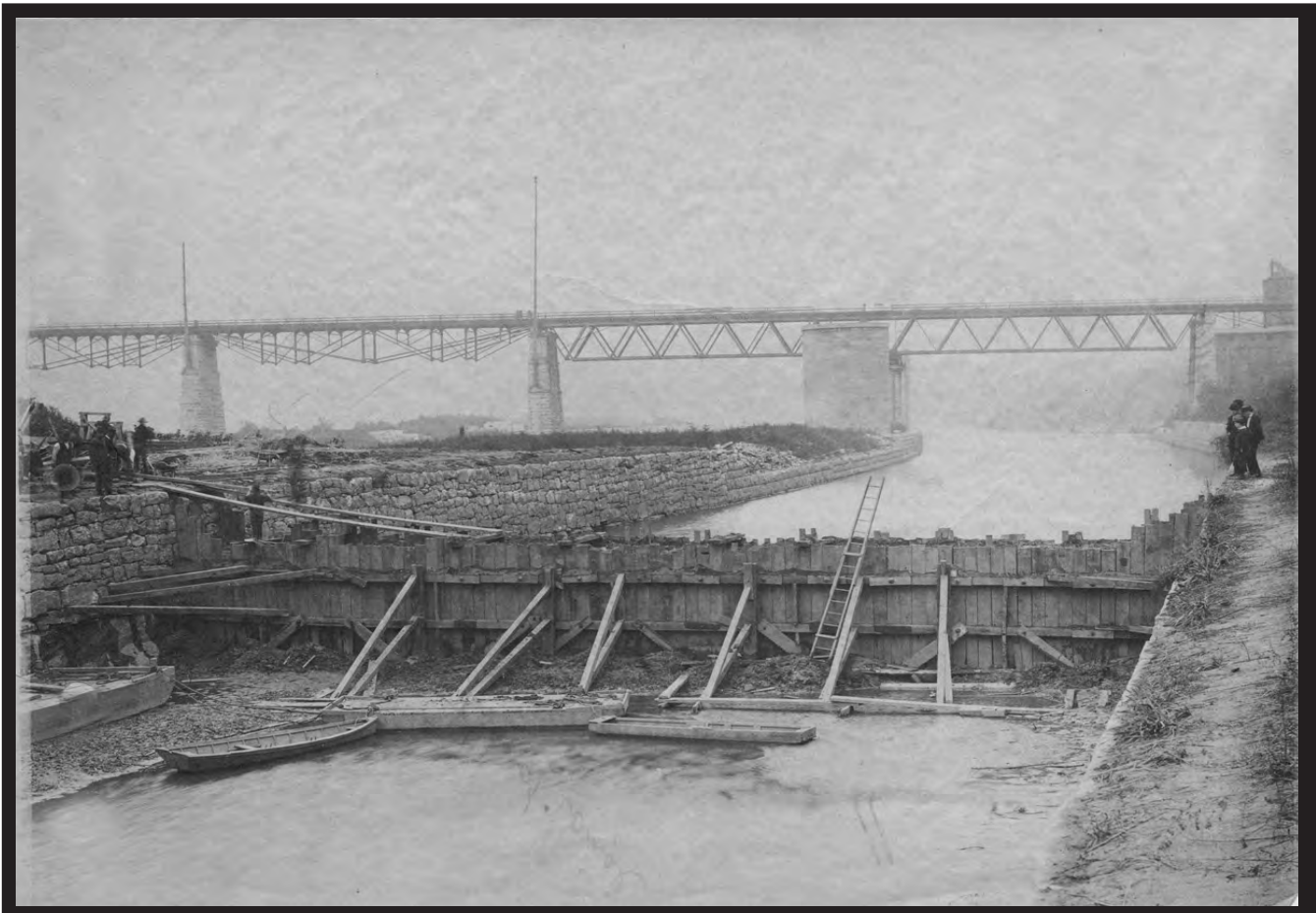
In 1843 Congress requested that the Corps take a closer look at the Louisville canal, soon to become federal property, and also to survey the Falls, reporting on the "best mode of improving the navigation of the Ohio at the Falls near Louisville and the probable expense of such improvement." In response, the Army's chief engineer sent to the Falls a brilliant young officer, Captain Thomas Cram, who had supervised harbor construction on the Great Lakes and navigation improvements on the upper Mississippi River. Cram reported at Louisville to Major Stephen Long, who had succeeded Henry Shreve as superintendent of the Corps snagboat fleet clearing the inland rivers, and Long assigned his son, civil engineer Henry Clay Long, to assist Cram with his surveys of possible routes past the rocky impediments to Ohio River commerce.¹



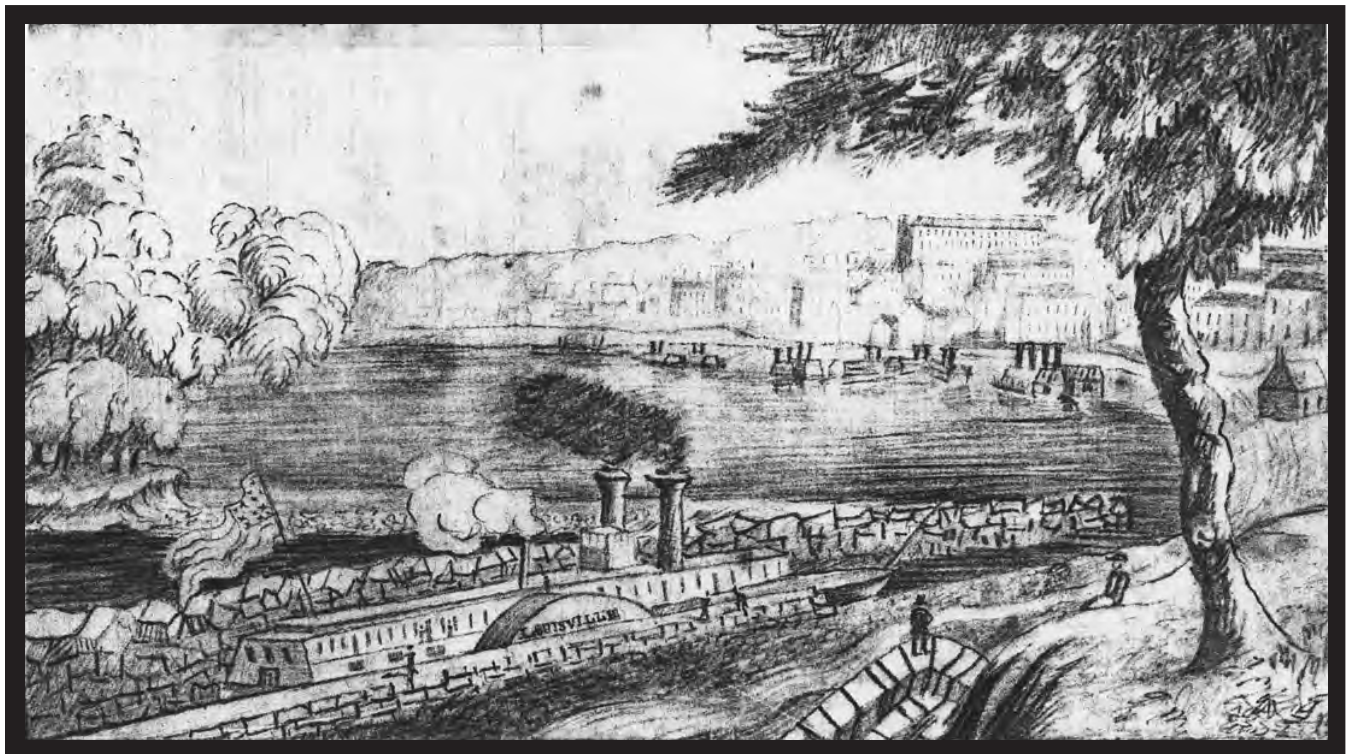
The steamboat Monsoon left Louisville in June 1840, bound for St. Paul, Minnesota. While passenger on this boat, Eliza Steele penned a description of the canal and locks. (Louisville Journal, May 29, 1840)

Arriving at the Louisville canal, Captain Cram was surprised to find not only a canal but also a new drydock built at its side. Although the canal company had omitted the drydock designed by David Bates from the initial construction, John Hulme had recognized the potential profit of a facility for boat repairs; and he organized the Portland Drydock Company, capitalized at \$50,000 to fund its construction. He excavated the drydock into the side of the canal near the locks, making it the same 190 by 50 feet dimensions as the locks, providing it with a solid rock foundation and masonry sidewalls. When the drydock's entrance gates closed, water could be drained through a culvert, leaving steamboats setting on supports inside the drydock with easy, dry access for hull repairs. Using the canal lockhands to operate the drydock, Hulme rented it by the day to steamboat owners; and as the first drydock at Louisville, it produced quick profits. Hulme pointed out to Captain Cram that the drydock was not owned by the canal company, nor did the federal government own any of its stock, but he would sell it to the United States for the \$50,000 invested in it.²

Captain Cram closely questioned Hulme about the high canal tolls. Hulme promptly declared that canal tolls were less than those charged by the State of Ohio for boats passing its Muskingum River locks, or charged by the Commonwealth for passage of its locks on the Kentucky and Green rivers. Vigorously objecting to public claims that the canal tolls constituted a "tax on commerce," Hulme pointed out the tolls were not mandatory—boats could cross the Falls if they wished, and they often did. Hulme recalled that Ohio River commerce, before the canal was completed, had left for New Orleans only when the river submerged the Falls, and as a result the boats reached the Crescent City in a rush, glutting the market. By making year-round passage around the Falls possible, the canal had ended those market gluts and the resulting low prices. When Cram asked Hulme his opinion on the best plan for improving transit past the Falls, Hulme recommended that Congress purchase the remaining canal stock and then reserve the toll revenues to pay for canal enlargement and more expansive locks.³



A box cofferdam was constructed across the canal entrance to hold out water while the locks were repaired or the canal cleaned. (National Archives)



This 1840 pencil sketch of the Louisville ascending the canal shows jagged rocks at its side. Note Louisville's wharf in the background and the round masonry in the right foreground, which was the bridge pier constructed in 1836 then abandoned. Trees on the left stood on Corn Island. (D. McNaughton, Mar. 24, 1840, Filson Historical Society)

Cram and his assistants spent 1844 surveying and mapping the proposed Indiana canal routes, the passages through the Falls, and the Louisville canal, then prepared an elaborate report analyzing eight different options. Half of the options consisted of improvements in the riverbed across the Falls themselves. Although Falls pilots pressed for blasting more rocks from Indian chute, Cram saw this would serve only descending boats—no steamboats then had successfully ascended Indian chute under their own power. Cram therefore suggested the alternative of blasting open a 100-foot wide channel, lining it with vertical stone walls, and installing at its foot a double set of locks to lift boats to the upper Falls level. His second option contemplated a walled canal leading from the head of the Middle chute to the foot of the Kentucky chute, again with double locks to hoist boats into the canal. His third plan involved excavating a canal down Indian chute to the Big Eddy, then across Goose island; it also would need double locks. Finally, a masonry dam could be built at the foot of the Falls, high enough to submerge them. Cram noted that such a dam would block the existing natural passages, however, and could be built only at great risk to contractors.⁴

Next, Cram considered three potential canal routes on the Indiana bank. The first route passed down through Cane Run about three miles with a double lock at its end; it needed a fifty-nine-foot deep excavation at estimated cost of \$1.4 million. A second route followed the first route for two miles then diverged to enter Mill Run valley and cross the Silver Creek valley to follow Falling Run back to the river; this seven-mile canal might cost \$2.9 million. A third route consisted of a high-level canal, studied by the State of Indiana in 1835, circling across the hills back from the river; it would require three locks at its upstream entrance and five locks at its exit back to the Ohio, costing some \$7.5 million.⁵

Eighth and finally, Cram, after consulting with John Hulme, submitted a plan for enlarging the Louisville canal's capacity. This consisted of finishing the work begun by Hulme of widening the canal to sixty-four feet and excavating an additional two and a half feet at its bottom to assure a minimum five-foot depth of water in the canal. Cram also proposed excavating a larger basin at the upper entrance and two turnout basins along the canal line to permit boats to pass each other. Two new locks should be constructed alongside the old triple locks, each with a 12.6-foot lift and chambers that were 320 feet long

and 62 feet wide, large enough to handle all boats then navigating the river. At John Hulme's urging, Cram also proposed installing a floating timber boom hinged to the abutment at the canal entrance. The boom could swing into place to close the entrance during high water, preventing driftwood from entering the canal; at normal river stages it could be opened and trussed to three outer masonry piers, serving as a floating guidewall to prevent currents from sweeping boats from the entrance and onto the Falls.⁶

Cram was still studying these options when President John Tyler appointed Louisville lawyer and judge George Bibb to serve as Secretary of Treasury—having boated the canal and strolled its banks, Bibb was thoroughly posted on the canal issues. As the cabinet officer responsible for the federal canal stock, Bibb immediately demanded that Captain Cram forward his report to Washington, and he also requested canal president James Marshall to relay the terms that stockholders might accept for their shares. Marshall replied the company then had seventy-three stockholders living in nine states, who owned 4,500 shares worth \$150 each; he thought they would sell for \$140 a share, meaning it would require \$630,000 for the government to buy them out. Noting that an average of 300,000 tons of commerce annually passed the canal, Marshall further advised Secretary Bibb:

"It is the general desire and expectation of all persons, who have any interest direct or indirect in the navigation of the western rivers, that this canal shall become the property of the United States and that the trade of the country must be relieved of this onerous and burdensome tax, a tax which is peculiar to the West."⁷

When Captain Cram's report arrived at the Treasury Department, Secretary Bibb learned that Cram had recommended two of the eight options presented. Cram proposed that Congress purchase the remaining canal stock and construct two new locks alongside the old triple locks and that it also fund construction of a second canal on the Indiana bank. One canal would handle ascending traffic while the other passed descending traffic, thus creating the equivalent of a two-lane highway around the Falls. It seemed a solution pleasing to everyone except the Falls pilots and except George Bibb, who vigorously disagreed with Captain Cram's recommendation. Although Bibb thought the federal government should pay the \$630,000 to buy the existing canal, he objected to Cram's plan of enlarging it and building new locks alongside the triple locks. From personal observations, he knew that the canal emptied into the Ohio at a narrow channel between Portland and Sand Island, where strong currents often delayed boats entering the locks.



This view of the original locks of 1830 show a thriving Shippingport in the background. Note the kingposts suspending the lockgates and the dredge in the lower lock chamber at the left. (National Archives)

Moreover, the construction of Cram's enlarged canal and double locks would entirely block commerce for several years. Bibb lacked any engineering qualifications whatsoever, yet he felt free to propose a ninth option. He recommended building an entirely new canal on the Kentucky side, starting just below the mouth of Beargrass Creek and diverging south of the existing canal to strike the river below Portland; this option, he contended, would be shorter and less expensive than building a new Indiana canal, and it would not block traffic through the existing canal during its construction.⁸

Bibb's objections killed any prospects for congressional funding of Cram's recommendations. Still, Cram's options stirred public interest criticism, especially his plan for building a high dam to submerge the Falls with a slackwater pool. Two contractors offered to build the dam for a half million dollars, proposing that its locks would be 400 feet long and 75 feet wide and the dam would be thirty feet high, built of stone masonry bolted to the rock foundation. This proposal met public skepticism, however, because the Kentucky state engineers had experienced great difficulties building dams that were just twelve feet high on the Kentucky River. On the plan to dam the Falls, Louisville news editor Walter Haldeman commented: "For all such bold projectors, we earnestly pray that asylums may be assigned, before the small job of damming the Ohio at the Falls is put up to the highest bidder."⁹

Although 110 steamboat captains signed a petition to Congress urging that it adopt Cram's recommendations, nothing was done. Even Secretary Bibb's proposal that Congress purchase the Louisville canal went down to defeat when it was appended to the 1845 Rivers and Harbors bill, vetoed by President John Tyler just before he left office. The new President, James K. Polk, passed through Louisville in early 1845 on the way to his inaugural, and James Guthrie, Kentucky's most prominent Democrat, accompanied him during his brief stay in Louisville. It would have been a convenient time for Guthrie to discuss the canal with the new President, but Guthrie probably was aware that Polk strongly disapproved of federal transportation projects—Polk vetoed all Rivers and Harbors bills that crossed his desk, thereby terminating the Corps' snag-removal project and

leading rivermen to dub the snags that sank their boats as Polk stalks.¹⁰

STEAM TECHNOLOGY AND THE CANAL

In addition to Presidents, John Hulme and the Louisville canal during the 1840s hosted other distinguished personalities and new boats with interesting technology. Famed novelist Charles Dickens boarded a steamboat at the locks, but took more interest in Shippingport's giant, Jim Porter, than in the canal. The Treasury Department's new revenue cutter *George M. Bibb* arrived in 1846 from Pittsburgh with a screw propeller instead of a paddlewheel—probably the first of its kind at the canal; steamboat captains, however, declared it underpowered when it arrived at night brilliantly illuminated by gas lights; it had an apparatus that made the gas and piped it throughout the boat for lighting.¹¹

River commerce steadily improved during the 1840s through the design of larger and faster steamboats and related technological advances. In 1841 the *Edward Shippen*, named for a Louisville canal president, arrived from New Orleans in five days, sixteen hours; and in 1848 the *Belle Key* beat that record in four days, twenty-three hours—four hundred percent faster than the 1815 trip by the *Enterprise* in twenty-five days. In 1847 Richard Smith, a steamboat supplier at the head of the canal, replaced the manual hoist used since ancient times to raise cargo from ship hulls with a steam-powered hoist invented by Louisville mechanic Leonard Nutz, thus speeding the loading of steamboats. At the same time, another invention called a "telegraph" allowed pilots to communicate directly with steamboat engineers. When pilots at the wheel moved a lever over a dial marked "slow, fast, ahead, stop," they also moved a lever across a similar dial in the engine room, alerting the engineer. This was a mechanical rather than an electrical device although its invention was contemporaneous with electric telegraph applications.¹²

In 1847 electric telegraph wires first crossed the Ohio from Indiana into Louisville, strung from a pole on the Indiana bank to another on Towhead island to reach the Kentucky bank. Because the wires sagged, however, they were often knocked down by boats passing under

during highwater, especially by the high masts of sailing ships. The brig *M. H. Gilmore*, built at Point Pleasant and loaded with whiskey bound for Boston, Massachusetts, broke the wires with its topmast in March 1848, leaving Louisville without telegraph communications for days. It was one of several sailing ships built along the Ohio during the 1840s: the bark *Muskingum* of *Marietta* bound for London, England; the schooner *Regina Hill*, built at Freedom, Pennsylvania, and loaded with hemp rope destined for New York; the brig *Kanawha*, built at Point Pleasant and bound for New York with pork and flour; the bark *John Farnum* of *Marietta* headed for Cork, Ireland; and the bark *Salem* of *Covington*, Kentucky, bound for Salem, Massachusetts. These sometimes took advantage of highwater to cross the Falls, but during low water they traversed the canal with masts lowered to pass under the stone-arch bridge.¹³

Wrecks on the Falls continued to encourage shippers to use the canal in spite of its high tolls. The steamboat *Goddess of Liberty* in 1843 hit rocks on the Falls and sank at Shippingport, losing its entire cargo of whiskey and dry goods. The *Car of Commerce* went down on the Falls after knocking a hole in its hull, saving its

passengers only by putting them aboard a barge it was towing, cutting it loose, and letting them float down to Shippingport where another steamboat retrieved them. While attempting to ascend Indian chute, the *Empire* hit Rubel's Rock and the current swept it downriver—it bounced from rock to rock, sinking and breaking in two as it spun backwards down the chute. Not until 1852 did steamboats, equipped with powerful engines and three boilers, safely make the ascent through Indian chute without also warping up with ropes.¹⁴

Still, using the canal was not always safer than crossing the Falls. The steamboat *Narragansett* bound for New Orleans in 1844 with heavy cargo hit rocks in the canal and sank into the mud above the stone bridge. So, too, the steamboat *Harkaway* in 1848, bound from New Orleans for Cincinnati with a cargo of coffee—it passed to the stone bridge before the crew found it taking on water, too late to save the coffee before it went down. The greatest steamboat disaster of the 1840s near the Falls, however, occurred not in the canal nor when crossing the Falls. In 1844 the crew of the steamboat *Lucy Walker* let its boilers go dry near the Portland wharf, then turned on the pumps, blowing the



The original lock chambers often filled with mud and debris, forcing closure for its removal. (Corps of Engineers)

boilers to smithereens, sinking the boat in twelve feet of water, and killing its captain and more than fifty passengers. This explosion occurred in sight of the Corps snagboat *Gopher*, whose captain and crew jumped into the river and swam to rescue the drowning passengers, then cared for the wounded and recovered the bodies.¹⁵

MOBILIZATION AT THE FALLS

More steamboat disasters occurred elsewhere along the Ohio—increasingly dangerous to wooden boats when President Polk’s administration suspended the Corps snag-removal project. Yet, these hazards did not deter use of the river for military transport and logistics during the Mexican War from 1846 to 1848. When General Zachary Taylor ordered Captain John Sanders, in charge of the Corps work on the Upper Ohio, to organize supply for the army advancing into Mexico, Sanders procured fourteen troop and supply steamboats and took them south to operate up the Rio Grande to the army’s supply bases. Sanders subsequently distinguished himself as a combat engineer at the Battle of Monterey in Mexico.¹⁶

Major Stephen Long, commanding the Corps office at Louisville in 1846, suddenly lost his assistant engineer, Franklin Saunders, who was elected captain of the Louisville Legion of volunteers and left immediately for Mexico. Major Long reported to the Chief Engineer that Saunders left so quickly that “he was excused from sending a formal resignation by reason of his having been elected late in the day and of the propriety of his embarking with his company the evening of the same day.” As his new assistant, Major Long employed Charles A. Fuller, a capable civil engineer who made Louisville his home.¹⁷

Major Long transferred the Ohio River snagboats to the Army Quartermaster Corps for clearing the Texas rivers of snags, and he managed the construction of steamboat transports and a steam dredge for service along the Rio Grande. Long contracted at Louisville and Cincinnati for building six steam transports—*General Jessup*, *Colonel Hunt*, *General Hamer*, *Ann Chase*, *General Butler*, *Colonel Clay*—and the steam dredge *Lavaca*. The contracts for building the *Lavaca* and the *General Jessup* went to James Howard, formerly the manager for John Hulme of the Portland Drydock at the canal.

To fill his contracts, Howard opened a boatyard at Shippingport, near the site where the Berthouds earlier had built ships and steamboats.¹⁸

As these and other craft moved the army south to the combat theaters, many passed through the Louisville canal, presenting John Hulme and the canal directors with a touchy issue: how much toll should the troop and supply boats be charged? By 1846 the canal stockholders had purchased and delivered many of their shares to the federal government, making the United States the majority stockholder. Therefore, the canal directors exempted the military boats from tolls, reporting to the stockholders that the tolls collected during the war were reduced because “the board have deemed it right to permit boats exclusively employed by the United States to pass through the canal free of toll, many of which, with troops and munitions of war, have availed of this privilege the past year.” Yet, the canal’s basic limitations became plain in late 1846 when the steamboats *Circassian* and *Messenger* crowded with volunteer troops arrived and found the canal blocked by grounded boats. Landed at Louisville, the volunteers formed in companies and marched past the Falls to Portland, while the transports crossed over the Falls and boarded the troops again at the Portland wharf.¹⁹

1847 FLOOD AT THE CANAL

A more serious disruption to military logistics came in December 1847 when a flood rivaling the 1832 record flood inundated lower Louisville and other towns around the Falls. The flood arrived quickly, forcing people to move up into the second story of their homes, then into the third story if they had one. Refugees took to the hills back of the river, finding any shelter available from winter snow and ice, and some drowned before getting to safety. Flood damages were so immense that the Louisville city council initiated a fund-raising campaign to care for the needy, declaring: “This is a great calamity, a public calamity, a calamity not brought on by human recklessness, vice, or improvidence, a calamity that no prudence or foresight could have arrested, and it is therefore just such a calamity as every one must feel has claims on him which he cannot set aside without incurring the condemnation of his own conscience.”²⁰

To see the flood, Louisville editor George Prentice traveled the Shippingport turnpike, crossing its embankment to the apex of the stone bridge and penning a vivid description:

The best point of view we have seen is the canal bridge below the city. To one standing upon that bridge, the spectacle is indeed awful. All below is one vast sea of waters covering not only the whole space between the channel of the river and the canal but a wide and extensive tract south of the canal, and submerging all the numerous dwelling houses and other buildings within that extent, some of them to the chimneys, some to the roofs, and others to the second windows. Most of the buildings appear to be nearly half a mile from land.²¹

This flood drove another nail in Shippingport's future. James Howard's boatyard on the town's riverfront was destroyed. Together with the steamboats and dredge he built for Major Long, he had completed six steamboats at Shippingport, providing employment for the community, but the sudden flood washed away two steamboats he had on the stocks. After the flood disaster, Howard left Shippingport, eventually opening the famous Howard boatyard across the river at Jeffersonville and building many of the finest and fastest steamboats ever to ply the inland rivers. Shippingport, left behind, had only 150 residents by 1850, compared to 600 in 1830. In 1830, it had been larger than adjacent Portland, but Portland by 1850 had grown to 600 residents and had largely supplanted Shippingport as the primary Kentucky landing below the Falls. Both towns had been eclipsed by the thriving steamboat-building town of New Albany across the river, which in 1850 attained a population of 6,000.²²

When the *Isaac Shelby* came upriver on the crest of the 1847 flood to enter the canal, it found the canal entirely submerged and it steamed up alongside the canal, dodging floating houses and brushing through the tops of small trees atop the canal embankment to reach the Louisville wharf. And when the flood subsided, John Hulme found the canal entirely blocked by debris and the locks

so full of mud that the lockgates could not be operated. The flood also carried off the dredgeboat and scows, leaving Hulme short of the equipment needed to reopen the canal. Hulme and Frank McHarry hired additional workers, and after several months of manual labor got the canal back into service. Hulme then paid \$8,000 for the construction of a new dredge and scows.²³

During the emergency flood recovery, John Hulme decided to change the lockgate operating system. Rails laid on the bottom of lock chambers to support the lockgates had frequently been blocked by rocks, debris, and mud, preventing gate maneuvers because the rollers under the gates could not pass along the rails. Hulme replaced the rails and rollers with a suspension system invented by Henry McCarty, an ingenious mechanic employed by the Corps of Engineers on the Ohio River project. First used at the Monongahela River locks, the McCarty system involved installing tall posts atop the lockwalls next to the lockgates. From these posts, iron tension rods connected to the tops of lockgates, suspending them as they swung open or closed. Atop these posts, the iron rods rested on scalloped metal caps, resembling a king's crown, and, hence, the posts were commonly called kingposts. The canal company paid McCarty a



Jonas Rohrer, shown here with his daughter, succeeded Simeon Goodwin as Louisville and Portland canal secretary in 1847 and served until 1874. (Courtesy of Margaret Barclay)

\$250 annual fee for using his patented suspension method, which proved so reliable that it later became part of the 1860 Scowden locks design and served throughout the nineteenth century.²⁴

After completing the 1847 repairs, Hulme left routine canal management largely to his deputy Frank McHarry and the paperwork to the new company secretary, Jonas Rhorer. Cashier of the Louisville Savings Bank, where the canal deposited its toll receipts after the Bank of the United States closed in 1832, Rhorer accepted the canal secretary position following the death of the first secretary, Simeon Goodwin, in 1847; and Rhorer continued as the canal secretary until the company's end in 1874. In addition to managing the canal and the Portland Drydock, Hulme and McHarry entered several business partnerships. They acquired the Tarascon Mill, establishing Louisville's cement industry, and purchased a strip of land along Clarksville's riverfront. If a canal around the Indiana side of the Falls were ever built, they could resell the riverfront strip; if not, they could quarry its limestone for cement manufacture.²⁵

John Hulme expanded into other business during the late 1840s. For his friend James Ronaldson, a famed horticulturist and large canal stockholder, Hulme retailed the exotic seeds imported from overseas by Ronaldson. Ronaldson became famous for introducing the sugar beet to American agriculture, and Hulme sold the beet seed, along with several novel grains—red Pomeranian wheat, Hopetan oats, and Scotch barley. Ronaldson advised Hulme that "if those farmers who get these seeds will pay as much attention and care to their culture as he had done in the selection of them, the result will be a blessing to the section of country that gets them."²⁶

For his seed and cement sales, Hulme needed warehouse space in Louisville. Boats plying only below the Falls, or passing downriver, landed at Shippingport to load the cement manufactured at Tarascon Mill, but to supply boats plying only the upper river Hulme needed space to store barreled cement to be loaded at the Louisville wharf. For these purposes, he funded and built a block of four-story warehouses with cast-iron fronts on Pearl street near the Louisville wharf. Indeed, a news release stated that he also designed the buildings, although this seemed

improbable considering his multiple business and civic interests.²⁷

Hulme and Jonas Rhorer sought and won election to the Louisville city council during the late 1840s. Rhorer, in fact, defeated the "Kentucky Giant" Jim Porter in an election to represent the Portland-Shippingport ward. When serving on the council, Hulme campaigned to improve the city's public hospital by assigning clinical staff from the Louisville Medical Institute, headed by James Guthrie, with two canal stockholders, Drs. Coleman Rogers and Charles Short, chairing its departments. He and Rhorer also defended the canal's interests on the council; when, for example, the council imposed new city taxes to pay for the railroad stock it purchased, Rhorer and Hulme urged that the canal company should not be subject to a tax supporting its competition.²⁸

RAILROAD FEVER

Hulme supported railroad development generally, however, and when the Louisville city council considered buying \$1 million worth of stock to finish the Louisville to Frankfort Railroad, Hulme's eloquent speech in favor of the measure encouraged the council to approve it. When the council in 1849 appointed its representatives to the railroad's directorship, they selected John Hulme and James Guthrie—Hulme became a railroad director and Guthrie became its president.²⁹

During the 1830s the Commonwealth had completed a railroad from Lexington to Frankfort and a six-mile section from Louisville to Portland. When construction stopped for lack of funding, the state had turned the railroad over to a private company, which also owned the steamboats transporting commodities from Frankfort to Louisville. With prodding from Hulme and Guthrie, a combination of private investments with municipal subscriptions developed to fund the railroad's extension from Frankfort on to Louisville. The last rails were spiked down in the summer of 1851, and Louisvillians gathered at riverside to see the towboat *Beauty* land a locomotive at Louisville's wharf and six yoke of oxen tow it uphill to start running the rails to Frankfort, cutting travel time between the cities to four hours and also reducing steamboat commerce on the Kentucky River.³⁰

The question remained of what to do with the six-mile section of railroad track between Louisville and Portland. It had failed during the 1830s because it did not connect directly with the Louisville or Portland wharves, offering no competition to the canal. In 1844 the state legislature transferred this small railroad's ownership to the Louisville Blind Asylum and chartered the Louisville and Portland Railroad Company to manage the line, authorizing the company to rebuild. The Asylum's managers formed the corporation, appointed directors, and raised \$100,000 to rebuild the track, only to meet roadblocks. Much of Portland's municipal revenues came from wharfage fees collected from steamboats, and the town demanded exorbitant compensation from the railroad for laying tracks down to the city wharf. Nor would Louisville allow extending the tracks from Twelfth street down to the city wharf at Sixth street.³¹

By the time the Louisville and Portland railroad's reconstruction began in 1853, most canal stock had been transferred to the federal government, and the canal company offered no opposition to the railroad, nor was it responsible for the blunders that followed. The railroad managers bought forty freight cars that were useless because the line did not connect with the wharves; it built six passenger coaches that had defective wheels and had to be replaced. The first "groove" rail tracks did not work well, so the company pulled fifty tons of expensive iron rails and sold them for pennies a pound. The original construction costs grew to \$127,000, and the railroad managers then spent another \$80,000 to remove abrupt curves and make the line passable, expending double the initial cost estimates. Touted as the fourth street railroad ever built in the United States, when it began operating in 1854 it was saddled with heavy debts that, for lack of business, were never recovered.³²

The Louisville and Portland railroad cars were comfortable, each with twenty-four cushioned seats, carpeted floors, wide aisles, windows with blinds, and a fare of only a nickel, one-way. Yet, it was plagued by operational troubles from the start. Its conductors drove the cars as fast as horse-flesh would permit, with resulting frequent wrecks. One news report, for example, described a fearful collision on the Louisville and Portland railroad "that broke one of the engines—a mule's leg. Conductors and

passengers escaped uninjured." More serious was its irregular schedule. Because the cars had to wait at Portland until the next ferry arrived, they reached the Louisville terminal at uncertain intervals, and therefore the omnibuses carrying passengers on into the business district or to the wharf could follow no dependable schedule. Or, when a New Orleans steamboat arrived at Portland crowded with hundreds of passengers, no cars would be ready because the railroad never knew when steamboats would land. Not until 1858 was the line put in condition to haul freight from the Portland wharf, and even then it received very little business at rates of sixty cents per hundred pounds—compared to fifty cents per ton through the canal.³³

The Louisville and Portland Railroad offered little competition to the canal, nor did railroads erode Ohio River commerce generally before the Civil War. Canal toll receipts steadily increased, river commerce expanded, and the 1850s later were remembered as a golden age of steamboating. As many as 6,000 steamboats landed at the Falls each year, carrying an average of forty passengers each, or a total of 240,000 passengers annually. The Falls cities then took pride in building and owning the finest, largest, and fleetest steamboats on the rivers, rivaled only by Cincinnati and St. Louis. Yet, the transition from the grand steamboats, dubbed floating palaces, to the less glamorous coalboat, barge, and towboat transportation system also began during the 1850s.³⁴

COAL COMMERCE

While coal shipments from Pittsburgh by river to Louisville and other ports began as early as 1794, during the 1840s steamboats and steam locomotives switched from wood to coal as fuel and steam mills replaced water mills, stimulating a bull market for coal. This demand was met initially by floating coalboats, barges, and smaller vessels called French Creeks, all wooden craft of varying dimensions. Coalboats typically were 170 by 25 feet, drawing 7 feet loaded and carrying 816 tons of coal; barges with shaped prows were 130 by 24 feet, drawing 6 feet loaded and carrying 412 tons; and French Creeks, built on an Allegheny River tributary of that name, were 90 by 18 feet and carried 300 tons of coal. These were filled with coal near Pittsburgh and awaited a river rise before leaving, then arrived as a fleet at Louisville.

Coalboats usually were lashed together in pairs, floating with the current while their crews steered them with oars around bends and obstructions in the Ohio. Crews from Pittsburgh brought them to Louisville, where new crews boarded to steer them south, even to New Orleans where the coal fueled sugar-plantation boilers and steamships. Steering coalboats down the Ohio was an extremely hazardous trade, especially when crossing the Falls.³⁵

When the coalboat fleet arrived at Louisville, the Falls pilots prospered mightily, often guiding as many as 100 pairs of coalboats through Indian chute. Pilot Henry Barnaby once set a record by taking twelve pairs over the Falls in a single day by arranging with a friend to drive his buggy to Clarksville to meet him at each trip's end; Barnaby furiously whipped the horses back to Jeffersonville to take another pair down, making each round trip in less than an hour. This rush to get past the Falls before the river fell often resulted in calamity. Four coalboats, for example, sank in Indian chute in January 1852, drowning many of the hands. Indeed, observers said that Indian chute was littered with wrecked boats and its bottom covered by coal after each coalboat rush.³⁶

When the river subsided and the Falls became impassable, coalboats waited for the next rise at the Pumpkin Patch, a holding area upstream of Jeffersonville, or they passed through the canal. Passing the canal was not without hazards, and coalboats often struck sharp rocks on its sides, sinking and blocking the passage until the coal was removed and the boats refloated. Drawing as much as eight feet of water, coalboats frequently stuck in the mud on the canal bottom and had to be pulled out with ropes. In one case, two canal lockhands were killed while pulling a grounded coalboat free. They wound a hawser from the boat around a capstan, and, under high tension, the hawser snapped, and the capstan spun free, its whirling handles striking the lockhands in the back and neck, killing them instantly.³⁷

When coalboat fleets reached Louisville to change crews before passing the Falls, every den in the city thrived, especially Elm Tree Garden at the canal. The coalboatmen had reason to celebrate when they arrived because their heavily laden boats set low in the water and were easily capsized by storms—one January storm sank 109 coalboats, drowning some of their crews and leaving the remainder freezing on the riverbank.



This 1959 view shows mud filling the old dry dock. (Corps of Engineers)

Their celebrations at Louisville were commonly marked by street fights, knifings, and shootings, and one reporter observed he could easily identify gangs of passing coalboatmen because every third man of them had a glass eye, replacing an eye gouged out in a fight.³⁸

As noted, many coalboatmen often needed medical attention and they along with steamboat deckhands were eligible for admission to the United States Marine Hospital, completed by Major Stephen Long at Portland near the canal in 1851 and managed by the Treasury Department. The Treasury Department collected a few cents from rivermen's pay, plus a tax owners paid on boat registration, to fund medical care for rivermen stranded at ports distant from their homes. These taxes collected at the port of Louisville originally went to the city's public hospital, which therefore was named the Louisville Marine Hospital, but in 1837 the Treasury Department decided to build federal marine hospitals at several inland ports including Louisville. Federal Architect Robert Mills in cooperation with Army Surgeon General Thomas Lawson prepared the plans for the hospital at Louisville, and the Treasury Department assigned construction management for the building to the Army Corps of Engineers, specifically to Major Stephen Long, who began its construction in 1845.³⁹

With assistance from Charles Fuller, Major Long revised the designs to fit the site and completed a striking brick building in the Greek Revival style—including a specially designed ventilation system and verandahs on two sides for the patients' comfort. Long contracted for its construction in 1845 and had the hospital's foundations nearly completed when the Mexican War's exigencies interrupted the work in 1847. Construction resumed in 1849 and the hospital opened in 1852. It normally served 100 patients a month, and because all rivermen paid the tax, it became one of the few racially integrated facilities in Louisville. Although its patients were mostly male, on occasion it also treated women who worked on steamboats, preparing the sumptuous cuisine for which the boats were famous. Perhaps its most unusual patient was a native American called Modoc John, who, at six foot and nine inches, towered over other patients and terrorized them with nightly war dances. The Marine hospital, along with similar hospitals at other ports, represented the first tangible

entry of the federal government into public health, and in its later years the United States Public Health Service managed it until patients moved to more modern facilities in 1933.⁴⁰

When the Marine Hospital was under construction, the first river towboats appeared at the Falls, and their crews also became eligible for the hospital's medical services. Steam-powered boats designed specially to push barges, rather than transporting passengers and freight together like the steamboat packets, towboats were initially developed near Pittsburgh to move coalboats and barges more efficiently to markets. The early towboats delivered coal no farther than Cincinnati, and records do not indicate which was the first towboat to reach the Falls, but possibly it was the *Beauty* or the *Venture*. The *Venture* from Pittsburgh crossed the Falls in May 1851 towing barges of coal and coke to St. Louis. The *Beauty*, which steamboat packet fanciers called the ugliest steamboat ever built, operated out of Cincinnati; and in July 1851 it towed barges to Louisville containing railroad locomotives for the Louisville and Frankfort railroad. The first towboat built at Louisville was appropriately named the *James Guthrie*. Launched at the King boatyard in September 1853, it was owned by the Hyatt coalyards of Louisville and designed to tow coal barges from Pittsburgh to Louisville, which it did on a monthly schedule. The first towboat at the Falls to have a screw propeller instead of paddlewheels probably was the *James N. Kellogg*, named for a Louisville coal dealer, which arrived in 1859 with eight coal barges in tow.⁴¹

The advent of the towboat-barge system presented new challenges at the Louisville canal, which was clogged by coalboats and barges crowding into the canal, blocking passage by other boats until they cleared the locks. This in combination with the growing number of steamboats that were too large to pass through the locks brought new demands for enlarging the canal, or building another canal on the Indiana bank. The demands for large locks came largely from Cincinnati's shippers, who bitterly complained of the size limitations at Louisville's canal and urged construction of a larger canal on the Indiana bank. Louisville responded by pointing out that the dimensions of the canal and its locks had been recommended by a Cincinnati committee in 1825 and had been planned and

designed by Ohio canal engineers David Bates and Alfred Kelley. "Why does Cincinnati want the Indiana canal?" a Louisville news editor asked rhetorically: "Because some Cincinnati folks have made a bad speculation in lands near Jeffersonville."⁴²

In 1850 Congress again took up the canal issue when Senator Thomas Benton of Missouri introduced a bill to pay the canal shareholders \$200 for each of the 1,950 shares remaining in private hands. Senator Jefferson Davis of Mississippi vigorously opposed this bill and suggested simply returning the federal stock to the company with the understanding that it would reduce the tolls accordingly. If the United States took control of the canal, Davis warned, it would open an office at the canal, further intruding federal influence into local affairs. Rather than expanding the federal influence, Davis recommended that the federal stock be given to Kentucky's state government, and Kentucky then could manage its own canal.⁴³

When Cincinnatians in early 1851 conducted a mass public meeting to urge construction of the Indiana canal, Kentucky Congressman Humphrey Marshall tartly responded to their complaints:

So far as the Louisville canal is concerned, the people of the West should understand that those most opposed to its navigation being made free, have personal and sinister objects in view. The construction of another canal on the Indiana side is a speculative movement altogether, and the names of several of the prominent outsiders are in my possession, and will be given in due time. Private speculation therefore is the cause of the opposition to as just a proposition as was ever brought to the notice of Congress, and to defeat all efforts at making the navigation of the Ohio free, by doing away with the tolls upon the canal at the Falls. It is in fact a monopoly which the Government, as the principal stockholder should not enjoy or consent to. The precedent is a bad one, and its continuation is an act of oppression and injustice on the part

of the Government to the whole commerce of the Ohio River.⁴⁴

Swift action followed in Congress. Humphrey Marshall of Louisville introduced a bill for Congress to purchase the remaining canal stock at \$200 per share, for the Treasury Department to take control of the canal and promptly terminate toll collection, and for the War Department to dispatch an Engineer officer to plan the canal's enlargement with lock dimensions sufficient to handle 400 by 90 feet boats. Senator Jesse Bright of Jeffersonville, Indiana, and Congressman David Disney of Ohio sponsored bills offering the canal stockholders only \$100 per share and calling for another survey of the Indiana canal. When the Cincinnati and St. Louis chambers of commerce sent petitions to Congress, Jeffersonville joined in to urge construction of the Indiana canal. The Jeffersonville report provided statistics stating that 1,200 flat and keelboats passed down Indian chute each year, at a cost of \$10,000 paid to Indiana Falls pilots. The Kentucky Falls pilots, chiefly guiding steamboats, collected \$6,000 a year in fees. The losses resulting from wrecks and injuries while crossing the Falls in 1851 exceeded \$10,000. "Add to this the greater insurance charges and the large portage costs around the falls, and the people of the West have a right to require swift relief from Congress," the report concluded. In the midst of this debate, Louisville's merchants dispatched a petition



Captain Enoch Lockhart (*Louisville Times*, May 27, 1893)

calling for the appointment of an independent commission of engineers to examine the canal routes and report whether the Indiana canal should be constructed or the Louisville canal should be enlarged.⁴⁵

CANAL MANAGEMENT TRANSITION

While debates over the canal's future waxed bitter, John Hulme decided to leave the issue for settlement by others, announcing his resignation as canal superintendent effective the first day of 1852 and his planned return to Philadelphia. This proved a shock in Louisville, and a news editor commented: "He will be a serious loss to Louisville and is one of the most energetic active people and thorough business man we have ever had."⁴⁶

Hulme never explained his career change publicly, but it may have resulted from personal considerations. When Hulme's canal stock was purchased and placed in trust for the federal government, the Secretary of Treasury had appointed canal president James Marshall as the government proxy; Hulme no longer controlled the company's management. The death of his older brother, Thomas Hulme, Jr., probably thrust responsibility for managing the family's investments on his shoulders. Moreover, he had been robbed several times. When burglars broke into Hulme's warehouse and got only \$25, a news editor smirked: "The robbers found out that Hulme keeps his big pile in a safer place than a warehouse." They also broke into his house and stole \$1,000 cash and jewelry. State government robbed him of profits on his sale of cement for the state's navigation locks on the Kentucky and Green rivers. When he billed the state for \$6,300, the legislature, strapped for funding, halved his bill and forced him to accept state bonds instead of cash payment.⁴⁷

Perhaps the railroad fever and his service with James Guthrie while arranging construction of the Louisville and Frankfort Railroad derailed his interest in canal management. When he sold his property in Louisville, transferring his interest in Tarascon Mill and the thriving cement industry to Frank McHarry, Hulme reinvested his funds in the Pennsylvania Railroad, becoming one of its directors. Twenty years later, when asked of his achievements at Louisville, rather

than the canal Hulme seemed proudest of his contributions to public health through use of his cement to line cisterns, preventing polluted groundwater from contaminating water supply.⁴⁸

At his departure, Hulme expected the canal directors to employ his deputy and business partner Frank McHarry as the new superintendent. It must have been a shock to Hulme, and certainly to McHarry, when the directors chose Captain Enoch Lockhart instead of McHarry. The directors never explained this selection, but perhaps they were concerned by McHarry's Irish temper. Certainly they knew of a pitched battle McHarry fought in 1849 with a trespasser who threw down a fence McHarry had constructed around the limestone quarry he and Hulme owned on the Indiana bank—no lives were lost in the battle, but it may have cost McHarry his job.⁴⁹

The new canal superintendent, Captain Enoch Lockhart, was born at Westport, Kentucky, a few miles upstream of Louisville, and, orphaned at an early age, he had survived by working on riverboats. He had become a Falls pilot, but he had no experience with canal management. The sole explanation for his selection declared that he was admirably suited to manage the canal "from his long and tried experience as a Falls Pilot, and his strict devotion to business. Boats under his guidance and care will not be liable to every mishap while entering the canal." Lockhart had helped equip Captain Pinckney "Pink" Varble with the skills required to guide boats through Indian chute, and Varble succeeded him as Falls pilot, serving for forty years and becoming legendary in Falls history. Perhaps Lockhart's appointment as superintendent represented an effort by the canal directors to improve rapport with their competitors, the Falls pilots.⁵⁰

When Hulme returned to Philadelphia, the future of the canal fell into the capable hands of James Guthrie. Guthrie by 1850 had become the largest landowner and probably the richest person in Louisville; he owned two hundred acres of property assessed at a half million dollars within the city limits and had built a mansion on Walnut street. His wealth attracted antagonism and political opposition, however, and one Louisville news editor declared that "such a man as Mr. Guthrie is an incubus on and a curse to any city." Although defeated in an election to become a city alderman, at the state

level Guthrie's popularity was growing. He was elected chairman of the 1850 Kentucky Constitutional Convention, and in 1852 Governor Lazarus Powell offered to appoint him to the United States Senate as successor to Kentucky's favorite son, the late Henry Clay. Guthrie declined the Governor's offer, but when President Franklin Pierce in 1853 asked him to become Secretary of Treasury, Guthrie accepted the challenge. This placed Guthrie in charge of the canal's fate, because by 1853 the last stock owned by individuals was transferring to federal ownership and the United States would soon have full control of the canal, whenever Congress accepted the gift. Guthrie moved swiftly to solve the canal conundrum.⁵¹





7

GUTHRIE'S PROJECT

The early 1850s marked a critical phase in the Louisville and Portland canal's history. Since 1842 the canal's toll revenues had been devoted to purchasing privately owned stock, transferring it in trust to the federal government, and by 1853 this transfer neared completion. The federal government owned no similar projects that offered precedents, nor was Congress interested in placing the canal under federal management. Administration of the federal canal stock fell, however, to the Treasury Department, and in 1853 James Guthrie of Louisville became the Secretary of Treasury. It was Guthrie who sidestepped political obstacles by assigning canal management to five directors, each owning a single share and serving as trustees for the federal shares, pending legislation accepting the canal. It was Guthrie also who responded to persistent complaints of the canal's high tolls by mandating that the canal directors cut them by half.

After twenty years service, the canal was falling into disrepair and it had become inadequate to serve burgeoning Ohio River commerce. Designed in the 1820s to serve steamboats that were twenty-five feet wide, the canal could not safely pass the boats of the 1850s that averaged forty feet in width. Seeing that Congress, which could not agree even on accepting the canal, would never appropriate funding for canal repairs and enlargement, Guthrie found an alternative solution. Once all private stock had been purchased, the canal toll revenues could be devoted to other purposes, and Guthrie used these to fund his project: repairing the crumbling locks and widening the canal from its restrictive fifty-two-foot width to a more spacious sixty-four feet. Accomplished in 1856, Guthrie's project made the canal a useful adjunct to military logistics during the civil war that followed.

THE PRAIRIE PLOW

President Franklin Pierce in 1853 appointed no cabinet members who rivaled James Guthrie's abilities, except perhaps Secretary of War Jefferson Davis. Secretary of Treasury Guthrie

cut a wide swath through Washington, and the press dubbed him the "Prairie Plow" because he cut deep furrows through bureaucratic red tape. He first gained public attention when he demanded that Treasury Department personnel be at their desks during all working hours, threatening them with termination if they left their work for a drink. Seeing him limping through government's corridors in his dark plain clothing and black hat, the press sometimes mistook him to be a Quaker; yet, other than devotion to duty, Guthrie shared few Quaker qualities. Quakers, the Friends, for example, stood firmly against slavery, but Guthrie owned slaves: when he moved from Louisville to Washington, one of his servants jumped steamboat at Cincinnati and fled north to freedom in Canada.¹

To assist with what the press termed his "ruthless reform" of the Treasury Department, Guthrie recruited his friends John Colmesnil of Paroquet Springs and William Gallagher of Pewee Valley as special agents. Guthrie decided to deposit all federal funds in the national treasury rather than in local banks, making it necessary to ship coins to the banks when needed, and, having complete trust in John Colmesnil, he assigned him to the specie delivery. As special treasury agent, Colmesnil traveled the nation, escorting millions of dollars worth of gold and silver coins to the banks. To ferret out fraud, Guthrie employed William Gallagher, a member of the Pewee Valley literary community near Louisville, to apply his brilliant mind to special audits of agency branches. With their help, Guthrie completed a major reorganization of the Treasury Department, quashed fraud, and substantially reduced the national debt. This earned him acclaim as the nation's greatest Secretary of Treasury since Alexander Hamilton.²

One of Guthrie's earliest acts as Treasury secretary was to confer with John Hulme of Philadelphia about the canal conundrum at Louisville. As Hulme reviewed for Guthrie the canal's need for repairs and expanded capacity, he highlighted the Portland Drydock issue. The canal company had agreed in 1846 to purchase this drydock, built on land leased from the company, for \$50,000, but it had never paid for the drydock. Hulme therefore advised Guthrie that legislation aiming to secure federal control of the canal should require that the company's debts, including the drydock's cost, be paid with

toll receipts before the transfer. Guthrie then requested canal secretary Jonas Rohrer to elaborate the drydock issue because it “is impossible to conceive of the United States carrying on the business of repairing vessels.” Rohrer replied the company had agreed to buy the drydock because it functioned as an emergency passing basin; that is, when it was necessary for boats traversing the canal to pass around each other, one could pull into the drydock while another entered the locks. The drydock, moreover, permitted quick repairs of the canal’s dredges and also generated \$8,000 in annual rental income.³

Guthrie first sought a legislative solution. He arranged with Congressman William Preston of Louisville to offer an amendment to the Rivers and Harbors bill providing that the federal government would take custody of the canal to preserve it as public property—after the canal company purchased and delivered all stock to federal control and paid its liabilities, including the drydock’s cost. This amendment appropriated \$250,000 for enlarging the canal, also authorizing the Secretary of Treasury to appoint the canal superintendent and operations staff and to end the collection of tolls. If enacted, Guthrie as Secretary of Treasury would have officially become the canal’s manager, but this amendment did not become law. Disapproving of federal waterways projects, President Franklin Pierce vetoed this along with every other Rivers and Harbors appropriation bill that reached his desk. Guthrie recognized that he had to move gingerly toward a federal solution to the canal conundrum, or risk the wrath of the President.⁴

In addition to Guthrie’s initiatives, other efforts to identify improved avenues around the Falls barrier were underway in 1853. Congress responded to demands from the Louisville and Cincinnati chambers of commerce by ordering another survey of the Falls by an independent board of engineers consisting of Colonel Stephen Long, Colonel William Turnbull, and civil engineer Charles Fisk. It was expected that these professional engineers, independent of political influences, might render an unimpeachable assessment of the canal conundrum that all interests could accept. During 1853 these engineers repeated the surveys done in 1844 by Captain Thomas Cram, preparing new maps, studying canals on both the Kentucky and Indiana sides, and submitting an elaborate report

on various options for bypassing the Falls. The board favored the construction of a new canal parallel with the old canal, built mostly in the riverbed through Kentucky chute, but its recommendations met such vigorous opposition from Indiana canal proponents that it, like Captain Cram’s earlier survey, merely filled space on a growing shelf of dead canal reports.⁵

CIVIC PROJECTS AT THE FALLS

With federal legislative action on canal control and enlargement stymied, local civic interests experimented with other means of bypassing the Falls barrier. When its hopes of becoming the western terminal of a railroad from Lexington that bypassed the Falls were dashed, Portland had seceded from the City of Louisville in 1842, reestablishing its own municipal government. As a substitute for the floundering Louisville to Portland railroad, Portland’s trustees launched a campaign to build a plank road bypassing the Falls, allowing wagons to load boat cargo at the wharf and proceed directly to the Louisville wharf. Although now a forgotten technology, plank roads before 1860 were considered an alternative to railroads. Many were built in frozen Russia and they were introduced to Canada in 1838. Their builders graded a roadway for a track composed of long timbers or sills set parallel in trenches, with space between the timbers packed with earth. Atop the sills, they spiked thick planks, eight feet long at right angle to the sills, and covered the planks with sand. Canada built 1500 miles of plank roads and by 1850 many had been completed in northern New York, Ohio, Indiana, and Michigan. Requiring no iron rails, plank roads were much cheaper than railroads and could be traveled by teams pulling ordinary wagons and drays, rather than locomotives and railcars. Mimicking the design of a New York road, Louisville built its first plank road in 1850 leading two miles out to the Oakland race track.⁶

Portland’s plank road initiative was inspired largely by the construction of a plank road on the far side of the Falls from Jeffersonville to New Albany, threatening Portland’s portaging business. When the Indiana plank road began operation in September 1851, it quickly took business from Portland—steamboats landed at New Albany and their passengers traveled the plank road to Jeffersonville and crossed on the ferry to Louisville rather than landing at

Portland and traveling the miserable roads to Louisville. Seeing Portland's losses, the Louisville city council met Portland's trustees and agreed to jointly build the plank road, if Portland agreed to its reannexation by Louisville. Both towns awarded contracts for the plank road's construction in late 1851, and in June 1852 Portland voted its agreement to reannexation. A month later the Portland plank road opened for traffic, but its builders had not laid sufficient sand over the planks and Kentucky's humid weather soon warped the boards, making it impassable. Attempts to repair the planks proved ineffective, and instead of reconstructing the plank road the city in 1854 substituted macadam stone paving along High street.⁷

In addition to impassable roads, Portland's wharf and portage faced new obstacles, notably the growing sandbars along the riverfront that blocked boat access to the wharf and lower canal entrance. These sandbars were part of dynamic changes in the Falls environment seen during the 1850s that included the river mud often obstructing the Louisville wharf and filling the canal. One early resident who observed these changes offered a perceptive explanation:

The harbor at Shippingport was one of great capacity (which ought to be a warning; it shows the necessity for a river police). This harbor commenced at the foot of Rock island—20 feet deep at low water—and extended down below the mouth of the canal with an average depth of 20 feet at low water, and an average width of from 1,500 to 2,000 feet—nearly all now filled up; and a high sand bank occupies the place where numbers of boats have rode in safety. The reason and cause of this derangement is assignable to the obstructions placed in the bed of the river by the Tarascon mill fixtures, such as the damming to gather the water to the mills, and the forebay all projecting out and interfering with the course of the current; also the projecting embankment at the mouth of the canal, which also contracts the channel and forms an eddy. These are all obstructions which should be removed.

I desire to call the attention of citizens in council to the piracies committed upon the bed of the river. The rock has been sold and quarried, and taken away from the bed of the falls, to the great injury of the navigation of the river above. This intrusion and interference with the property of the public, the great highway of the nation, should be stopped. This piracy is practiced under a spurious title, for surely there can be no legal right to sell this rock. It can be clearly shown that the water at the Grass Flats above this has been reduced in low water 11 inches or more; and the work of piracy is still progressing, and in a few years must prove ruinous. It is also clear that it affects the depth of the water at our landings and may finally ruin the harbor. This may appear to some light, possibly a chimera, but it is not. The falls is one of nature's dams to prevent numberless shoals, and to produce an easy and even flow of water. Reduce it here and you increase it at other places.⁸

His general observation that structures in the river could produce unexpected changes in the river's regimen both above and below the structures certainly was correct; and in some instances, records confirm his specific observations. In 1853, for example, the river current caught the *George W. Kendall* as it slowed to land at Louisville's wharf, sweeping it down onto the Falls near Corn Island where it sank, wedged firmly against the rocks. Its captain hired two Falls pilots to extricate the boat, but swift current broke their pulling hawsers, leaving the boat harder aground than before. The pilots blamed their failure on the large quantities of rock removed from near Corn island, which left a gap through which the river had taken a new and rapid course. The pilots predicted that if the excavations at Corn Island continued, the river current would so increase that boats could not enter the canal. The dam diverting flow into the Tarascon mill race and the guidewall extending from the canal's lower entrance into Kentucky chute, like all structures in the river, altered the

natural river flow, causing eddies and resulting sand and mud deposits. In addition, the river in the 1850s seemed to be carrying more suspended sediment than in earlier days, perhaps as a result of tree cutting and plowing by farmers throughout the Ohio valley upstream of Louisville. The river's natural equilibrium of pioneer days had been disturbed as settlers had removed vegetation and cultivated the land; and by the 1850s mud pouring off the plowed lands was clogging the riverine environment. Many years elapsed before the dynamic river achieved a new equilibrium.⁹

Whatever its causes, the sandbars obstructing Portland's wharf attracted the attention of Cincinnati investors. In 1851 they purchased a large tract of land near the settlement called Greenbush and established West Louisville a short distance downstream of Portland, where sandbars did not obstruct the riverfront. There, they built a sawmill and boat repair yard, towing a drydock from Cincinnati to the site. In late 1851 they subdivided their property and began selling lots, advertising West Louisville as the head of navigation for the large steamboats in the New Orleans trade. West Louisville not only offered new competition for Portland's steamboat wharf and portaging business, during the 1850s it became the preferred harbor for coal towboats. After small towboats brought coal barges from Pittsburgh and put them over the Falls or through the canal, larger towboats assembled larger barge tows at West Louisville to push on south to New Orleans. Just as the Portland wharf had earlier supplanted the Shippingport wharf, West Louisville took business from Portland.¹⁰

By the 1850s Louisville, including Portland, had grown to 40,000 in population, becoming a city and afflicted by urban crime. When passengers landed at Portland and elected to walk alongside the canal to Louisville, gangs sometimes waylaid them, or stole their money through the pigeon-drop ruse, but wealthy travelers landing at Portland often complained of robbery of a higher caliber. When Congressman John Quitman of Mississippi, for example, arrived with his family at Portland aboard the *Niagara* at night, he was forced to offer \$26 to hire hacks to convey his family to the Louisville wharf. When another passenger offered the hackmen more money, however, they left Quitman's family stranded at the wharf all night. Quitman swore loudly and publicly that he would never again

travel through Portland and submit to such extortion to get past the Falls. Better enforced city regulations of hack fares perhaps alleviated the worse extortion, and Portland acquired improved lodging for passengers forced to stay overnight in 1856 when Paul Villier completed the St. Charles Hotel, an airy five-story building near the landing and the railroad terminal. Despite these advances, crime and urban blight continued to challenge Portland and the canal vicinity for many years to come.¹¹

Slick robbery was not confined to the gangs and hackmen infesting the Portland portage. Emigrants bound for Missouri and California, unable to afford the posh St. Charles Hotel, camped at the Portland wharf with their wagons and equipment while awaiting steamboats to St. Louis and negotiating their fares with the steamboat captains. Once a party camped at Portland learned that two steamboats, one out of Pittsburgh and the other of Louisville, were leaving for St. Louis, and they began boarding the Pittsburgh boat which offered lower fares. The captain of the Louisville boat, however, had a friend mix with the emigrants to lie that a man on the Pittsburgh boat had perished of smallpox, thus persuading the emigrants to rush back and onto the Louisville boat. This the news reported not as a crime but as shrewd business.¹²

Passing through the narrow canal, commonly denigrated as the ditch during the 1850s, seemed hardly less hazardous than traveling Portland's portage. In 1851 the *Hiram Powers* while racing two other steamboats to be first to enter the canal hit the rocks and went down; and the steamship *Cincinnati*, constructed with both steam engines and sailing masts as an ocean packet to California, lowered its masts to get under the stone bridge but then grounded in the shallow canal, blocking it entirely until warped free. The *Umpire* hit a subsurface obstruction in the canal in 1854, knocking a hole in its hull and sinking it; and in 1856 the *Magnolia* while leaving the canal locks at night hit a rock in swift current and wrecked. The impact shock sent the *Magnolia's* cabin and boilers plunging over the side, and the passengers, wearing only their sleeping clothes, barely escaped drowning by climbing onto a barge near the boat. Canal superintendent Lockhart took survivors into his home, where Mrs. Lockhart found them clothing, and the St. Charles Hotel housed the others without charge.¹³

These and many similar steamboat disasters of the 1850s resulted in federal safety legislation requiring steamboats to carry lifeboats. To supply this need, R. Francis of New York invented a metal lifeboat and opened a factory in Louisville to build them. When the first lifeboat came out of the factory, Francis field tested it at the canal, filled it with oarsmen and sent them into the canal to ram his boat against the stone walls. With all the force the oarsmen could muster, the boat bounced off the wall a dozen times, throwing the oarsmen over each other but leaving the lifeboat undamaged and unsunk, an impressive demonstration. Other safety legislation required steamboat pilots to apply for federal licenses and pass strict tests to secure them; it also mandated regular safety tests of steamboat boilers and, to accomplish this, federal steamboat inspection offices opened in 1852 at Louisville and other ports.¹⁴

Like Portland, Louisville sought to maintain its position as a major river port, improving its wharf and diverting Beargrass Creek from its wharf area. The city council contracted in 1854 to excavate a new channel, a cutoff turning Beargrass Creek into the river upstream of the main business district. Just five-eighths of a mile long, this cutoff's construction proved very costly. In the first six months of its construction, the contractor and fifty of his workers died of illness, and another 150 of the 1,000 workers became seriously ill. Still, the work continued and the cutoff was completed in November 1855.¹⁵

Filling the old Beargrass Creek bed integrated the area known earlier as the Point into the city's riverfront, and there the city developed an expanded wharf, purchasing the section known as Strader's wharf and condemning the remaining waterfront for public use down to the canal's entrance at Ninth street. Earlier, the city had owned no public landing to serve boats during river rises, and boats had moored to any convenient point they could find during floods. With its wharf improvements of 1855, Louisville had useable landings for boats at every river stage.¹⁶

More chimerical projects that received serious attention during the 1850s included a marine railway around the Falls and a railroad tunnel under the Falls. A company organized at Jeffersonville in 1852, proposing to bypass the Falls on the Indiana side by building a marine

railway as substitute for a canal. This concept involved floating boats onto cradles atop rails at Jeffersonville, then transporting the boats by rail to a point below the Falls, where they reentered the river. Other than publishing an elaborate prospectus with maps to impress potential investors, however, the marine railway company accomplished nothing.¹⁷

The Fort Wayne and Southern Railroad to Jeffersonville proposed to build a tunnel under the Falls to connect its tracks with the Louisville and Nashville Railroad, and in 1854 it received a Kentucky charter for the work. Its plans did not contemplate a drilled tunnel, but rather a cut-and-fill built inside coffer dams—a deep trench would be excavated across the Falls and opened wide enough to lay double rail tracks, then the trench would be roofed over and covered with stone. The project enjoyed political support, notably from Indiana Governor Joseph Wright and from Louisville's city council which granted the company tax-exempt status, provided it dug the tunnel. The railroad's bankruptcy in 1855, however, permanently buried the tunnel project.¹⁸

Another 1850s project earned attention because it represented the second major application of the Falls' water power to manufacturing—Tarascon Mill was the first. Although small floating mills had operated along the Indiana bank since pioneer days, in 1855 the Smith and Smyser mill on the Indiana side of the Falls opened to grind wheat into flour. Its design included a wing dam extending two hundred feet upstream parallel with the riverbank to divert the river flow from Indian chute into the mill, along with a tailrace below the mill to return water to the river. Creating a fall of five feet, this water power spun turbines capable of grinding 360 barrels of flour daily. Although the Smith and Smyser mill produced flour throughout the nineteenth century and was plainly visible from Louisville, water-power advocates who often protested that the Falls' power potential went wasted entirely ignored it.¹⁹

GUTHRIE PERSEVERES

As the various civic improvements around the Falls proceeded, Secretary of Treasury James Guthrie persevered with his low profile efforts on behalf of Louisville's canal. He inquired of canal president James Marshall in August 1854

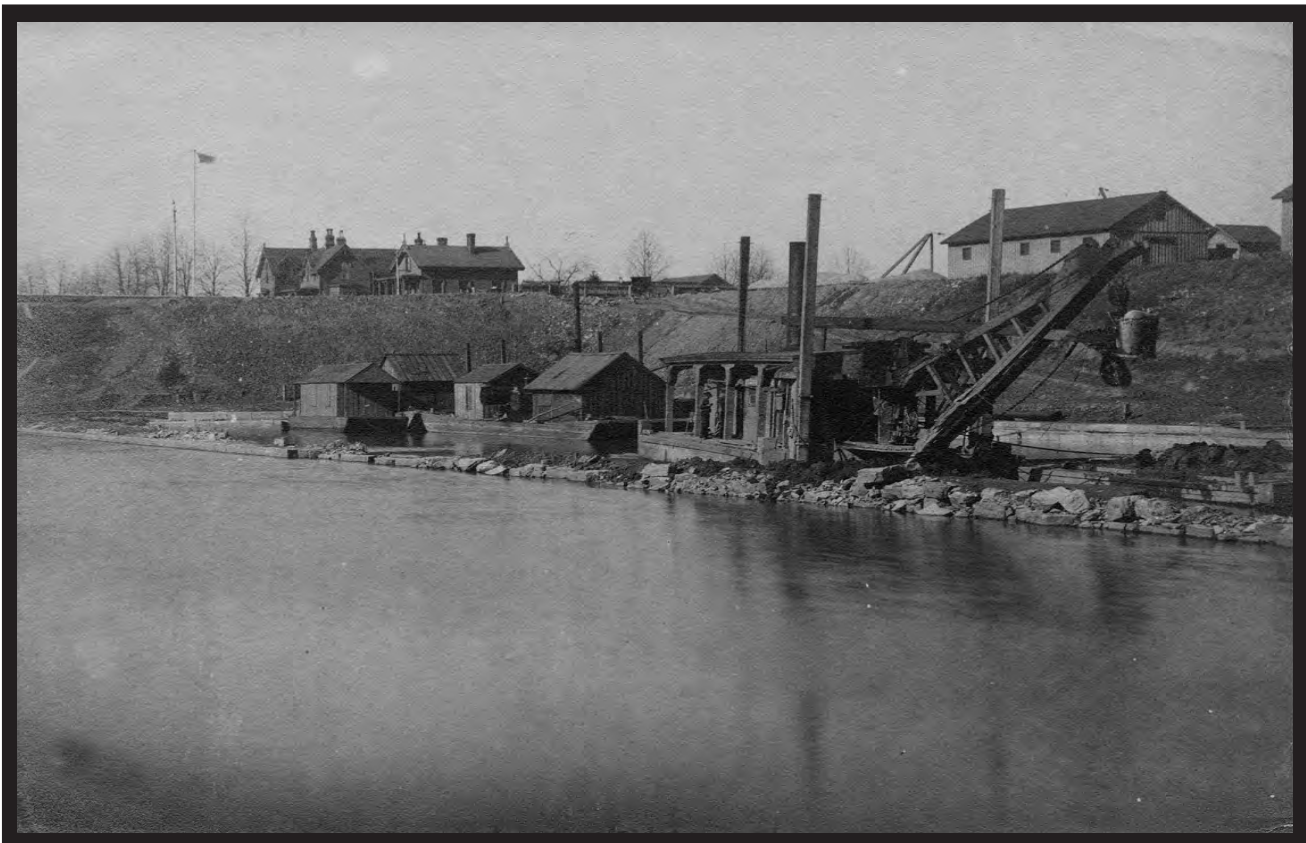
how many shares of stock remained in private hands, what were the canal's liabilities, and how much the canal officers were paid. Marshall replied that just 200 shares worth \$51,600 then remained in private hands and the canal still owed \$50,000 for the drydock—about \$101,600 could close out the canal's business before transferring it to the federal government. Marshall listed the pay of the canal president at \$1,000 a year, the treasurer at \$1,000, the secretary at \$500, the superintendent at \$2,000, and the lockmaster at \$1800 annually. The company paid no office rent, because it used a room without charge at the Louisville Savings Bank, where the bank's cashier Jonas Rhorer handled the canal's financial affairs.²⁰

Because legislation transferring the canal to federal control had failed, Guthrie asked Marshall if the canal company's five directors would each keep one share of stock and continue managing the canal until Congress and the President approved federal management. Marshall volunteered that they would manage the canal as long as the Secretary of Treasury wished. Marshall also advised Guthrie that annual toll receipts from 1842 through 1853 had averaged \$139,000, while average operational

expenses were \$24,000, or about eighteen percent of the toll receipts. Therefore, the tolls might logically be reduced from fifty cents to a dime a ton and still cover normal operating costs. Marshall warned, however, that canal repairs and improvements were urgently needed, and he recommended that tolls should remain at twenty-five cents per ton to fund this work.²¹

Secretary Guthrie accepted Marshall's recommendations, and Marshall implemented them. Toll revenues liquidated the last privately owned canal stock in January 1855, leaving only five shares in the hands of the canal directors as Guthrie had ordered.

The tolls collected in 1854 were sufficient for the directors to purchase the drydock, pay \$1,700 in annual state taxes, and pay the last \$5,000 installment on the construction loans made by Thomas Hulme a quarter century earlier. Effective the first of February 1855, the canal directors responded to Guthrie's mandate, slashing the tolls by half, from fifty cents to twenty-five cents per ton. Marshall advised Guthrie that the directors were prepared at any time to transfer total canal ownership and management to the United States. "A plan for



One of the dredges used to scoop mud from the canal waits in a mooring area near the locks. (National Archives)

improving the canal has been submitted by John Hulme of Philadelphia," Marshall mentioned, adding that the canal directors thought the plan both feasible and excellent.²²

Rumors that the Secretary of Treasury might soon assume full control of the canal spread and soon Guthrie was besieged by persons hoping for federal jobs, especially as the new canal superintendent. John Leathers of Covington, Kentucky, aspired to the job, and explained that he hoped to double the canal's size, because his brother, Captain Thomas Leathers, was building a boat at Cincinnati that would be 110 feet longer and 30 feet wider than the old canal locks. John Hulme urged Guthrie to hire his old friend Frank McHarry, saying: "You know Frank well and I need say no more." Mayor James Speed and Louisville's city officials addressed a special petition to President Pierce urging that Captain Enoch Lockhart continue as the canal's superintendent, declaring that "he has won the special regard of all who required his services." The mayor's petition carried the field for Lockhart, and Guthrie kept him as canal superintendent.²³

Reviewing John Hulme's plan for canal improvements, Guthrie learned that Hulme insisted the canal needed to be excavated deeper and wider, that larger basins for passing boats should be dug, and that larger locks were needed. Hulme strongly recommended the addition of a masonry guard gate across the upper canal entrance to permit closing the canal for repairs, and also a floating boom, or guidewall, to prevent river currents from washing boats from the canal's entrance onto the Falls. He declared this work urgent and suggested that it be done immediately with toll revenues, rather than awaiting congressional appropriations. Guthrie relayed a copy of Hulme's plans to President Franklin Pierce along with his report on the reduced toll rates and his arrangement leaving five shares of stock to the directors, who would manage the canal until Congress accepted the project.²⁴

Although the tolls had been halved, James Marshall estimated the surplus over operational costs would be sufficient by the end of 1855 to build all that John Hulme recommended, except the masonry guard lock near its entrance. Widening the canal and expanding the passing basins would greatly benefit commerce, because the usual width of steamboats had grown to

forty feet, forcing them to crawl through the canal to avoid striking projecting rocks. Large steamboats sometimes took as long as twelve hours to make the transit, and if Hulme's improvements were completed, Marshall predicted the passage time might be reduced to two hours.²⁵

Secretary Guthrie approved building a boom across the upper canal entrance, removing rock ledges from the sides sufficient to expand the canal's width to sixty-four feet, and excavating two larger passing basins—providing that this project was not perceived as committing the company or the government to building larger and very expensive new navigation locks. He warned Marshall that the contractors should clearly understand that their pay would come from toll revenues, not from federal appropriations. Seeing that the director would need an engineer, Guthrie suggested that he probably could secure, through the Secretary of War, the temporary services of Colonel Stephen Long. Guthrie forwarded a copy of this correspondence to President Pierce, who endorsed it with a directive that the work be done solely with toll revenues. The President wanted it understood by everyone involved that his approval did not commit the federal government in any way to building larger locks in the canal.²⁶

Steamboat owners and commanders meeting at Cincinnati to review the work Guthrie had authorized protested that widening the canal would never adequately serve commerce; they insisted the plans should encompass more substantial canal enlargement together with the construction of larger locks. When superintendent Enoch Lockhart delivered the steamboat convention's demands personally to Washington in the spring of 1856, Guthrie elected to proceed with the expedient work recommended by Hulme while also beginning a new survey for the canal enlargement and new locks. Conferring with Secretary of War Jefferson Davis, he obtained the services of Colonel Stephen Long and arranged with the canal directors to pay Long for planning a branch canal with new locks. He also employed Edward Watts, a Pennsylvania canal engineer, sending him to Louisville to assist Colonel Long and recommending him to the canal directors as construction manager for the expedient canal repairs.²⁷

Colonel Long in July 1856 submitted a preliminary report to Guthrie outlining his canal enlargement plans. He proposed the old canal line be widened to 100 feet and that a new canal section be excavated, branching to the south of the existing canal, and building at its end a single 25-foot-lift lock, 360 by 75 feet in the chamber, large enough for most river steamboats. When Long completed his branch canal plans, however, the canal directors refused to approve them, objecting that a single lock chamber would require immense lockgates, difficult to operate and probably blocked by mud for weeks after each river rise. Moreover, they thought the route Long laid down for the branch canal reentered the river at too much of a right angle, making its entrance difficult for ascending boats. The directors therefore decided to employ Edward Watts to make still another survey, after he had completed Guthrie's expedient project.²⁸

Edward Watts staked off the canal in sections, estimated the amounts of excavation, prepared contract specifications, and in July 1856, with \$87,000 in surplus toll revenues, the directors awarded contracts for excavating twelve feet of additional rock from the canal's sides. They also contracted with stonemason P. M. Pfeiffer to repair deteriorated walls of the old

triple locks, and they directed Superintendent Lockhart to employ hired labor to excavate the two passing basins and demolish the stone-arch bridge at Eighteenth street. Lockhart published a notice that the canal would close on August 1 for the repairs and would remain closed sixty days until October 1, 1856. On the last day of July, Lockhart sank a flatboat loaded with stone across the canal entrance to form a cofferdam and permit draining the canal. This was timed in order that the work might proceed during low water, when few steamboats could navigate the river.²⁹

MCHARRY'S HEX

Having the approval of Secretary Guthrie and President Pierce's tacit consent, the canal directors had made their plans without significant effort to inform the public. That they intended to pull down the stone-arch bridge and replace it with a wooden pivot bridge first attracted public notice when the directors asked permission from the city council—the city had purchased Shippingport Turnpike in 1836 and thus owned the road crossing the bridge.

The directors explained to the council that the bridge would be removed because much larger



Although Frank McHarry and Shippingport residents opposed it, this pivot bridge replaced the stone arch bridge across the canal at Eighteenth street in 1856. (Corps of Engineers)

and taller steamboats passed the canal than in 1829 when the bridge was built, and the taller boats were forced to lower their smokestacks to get under the bridge, while a pivot bridge could swing out of the way of passing boats.

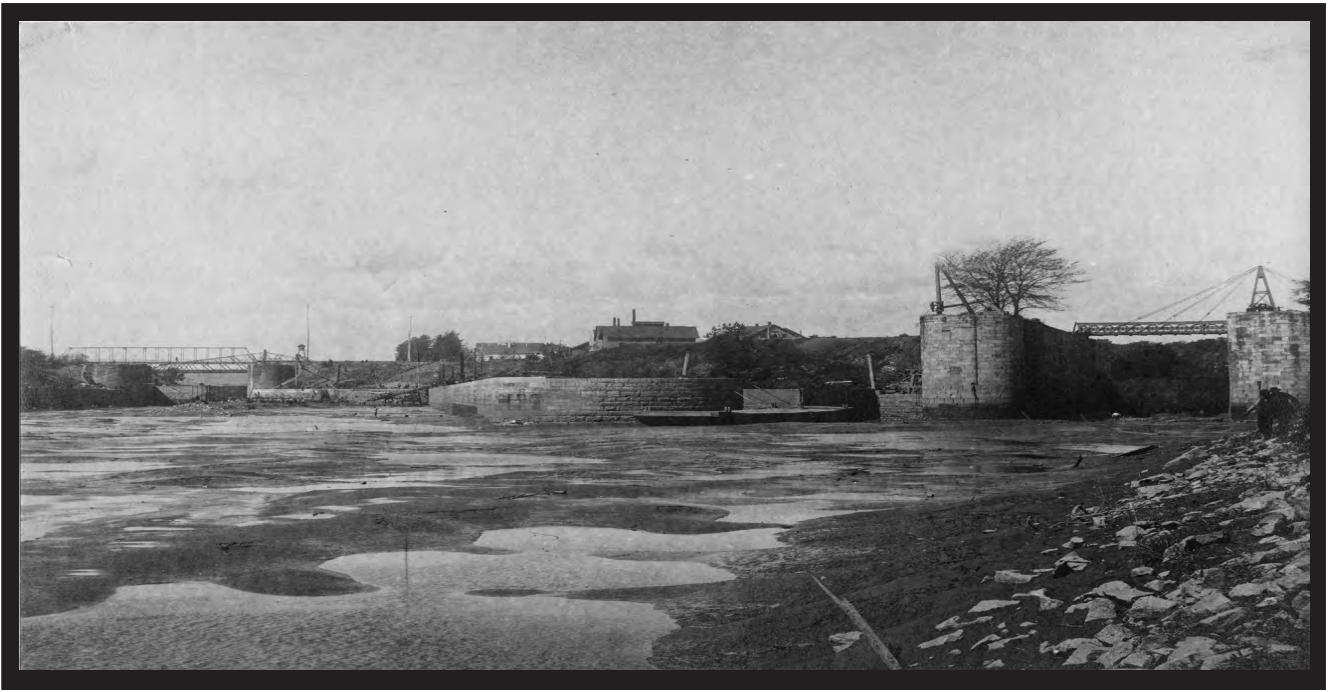
When the council approved the bridge's demolition, Frank McHarry and Shippingport's residents promptly employed attorneys, put up a \$5,000 bond, and obtained court injunction against the bridge's removal. Just as promptly, the canal company's attorneys, Walker Morris and Isaac Caldwell, prepared their defense against the lawsuit, taking depositions from practically every steamboat commander in Louisville and Cincinnati that the bridge had obstructed their boats when passing through the canal.³⁰

Frank McHarry and Shippingport's people contended that Nicholas Berthoud, John Rowan, and the Tarascons had insisted on the construction of the stone-arch bridge in 1826 and, in exchange for dropping their lawsuits, the canal company had signed a contract providing that it would maintain the high stone bridge permanently. They complained that removing the bridge would damage their property values, and McHarry pointed out that its removal might cost him his cement business. Wagons hauled limestone excavated at Corn Island to his Tarascon mill over the bridge; if a pivot bridge replaced the stone bridge, his wagons might be delayed hours each time the bridge opened to pass boats. Draymen operating between Shippingport, Portland, and Louisville lent their support to McHarry; by 1856 the drayage business was largely monopolized by Dan and Ike Batman, who owned scores of drays, each capable of hauling two hogsheads or seven barrels, that rolled constantly between the wharves; it was said that the Batmans made a million in the drayage business and spent it just as lavishly. Ike Batman's office was the Big Gun saloon in Shippingport, owned by the Kentucky Giant and named for the huge gun made to suit the Giant's eight-foot frame. The draymen often wasted hours awaiting closure of the pivot bridge over the locks between Shippingport and Portland, knew that the canal company always gave preference to passing boats over road traffic, and feared the same constraints if a pivot bridge replaced the stone bridge.³¹

William Bakewell, former partner of Nicholas Berthoud, explained that Berthoud's warehouse and papers had burned, and with them was lost the 1826 contract for permanent maintenance of the stone bridge—perhaps a copy was in the canal records? James Marshall diligently searched canal company records and declared that he found no such contract. In his opinion the stone bridge had become a public nuisance that should be removed—the canal company would, however, agree to maintain the replacement pivot bridge forever.³²

Steamboatmen became livid at McHarry's efforts to prevent the stone bridge's demolition. Boats wider or longer than the locks could not pass the canal, so marine designers had increased their capacity by building taller boats—almost all steamboats passing the canal in the 1850s had to stop at the bridge, lower their chimneys, then raise them on the other side. With the chimneys down, lying on the top deck, the engines could not be started for fear of fire, making it necessary to run out hawsers and warp each boat past the bridge. They estimated it cost as much as \$120 in labor and time lost each time steamboats passed the bridge. Lowering chimneys, moreover, was dangerous, and lives had been lost in that maneuver at the stone bridge. They mentioned several accidents of the sort, especially an 1851 incident aboard the *Hungarian*—while lowering its chimneys at the bridge, the hoist broke, dropping the chimneys and killing two crewmen. Most steamboat captains in Louisville and in Cincinnati swore that they considered the stone bridge an abomination. Some boatmen threatened that if McHarry stopped the bridge's removal, they would buy what little remained of Shippingport and then remove the bridge.³³

The canal's engineer, Edward Watts, made two cost estimates, one for the proposed pivot bridge and another for a suspension bridge high enough to clear the stacks of steamboats using the canal. If the company lost the case to McHarry, Watts estimated that an iron suspension bridge between two piers with high approaches clearing the canal surface by one hundred feet would cost the company \$86,000. It would cost only \$8,000 to build a wooden pivot bridge, sixteen feet wide, turning on rollers traveling over rails placed in an arc on a pier. To open, the bridge would swing to the canal's side while boats passed; it would have tenders who



Canal widening in progress at the entrance to the original locks on the right. To the left is the branch canal and Scowden locks. (National Archives)

could operate it at signals from approaching boats, timing its opening to pass the boats without stopping. Moreover, because the pivot bridge could be nearly level with the canal banks, the high approach embankments leading to the stone bridge could be cut down, reducing the grade for road traffic by ten feet.³⁴

Although the company could not pull down the stone bridge while under injunction, Edward Watts and Enoch Lockhart initiated the other work approved by Guthrie, and by the end of August they had 800 workers on the job. When the canal was drained, they found that loose stone, broken paddlewheels, and driftwood had accumulated on the canal's bottom to a four-foot depth in places. To remove this deposit, hundreds of workers with shovels filled wheelbarrows and horsecars to haul it out of the canal. Others drilled and blasted ledges of stone eight feet thick and extending twelve feet farther from the canal bank, while still others excavated two passing basins with 260 by 60 feet dimensions, one above the stone bridge and the other near the locks. To accomplish this, they drilled rock during the days, and fired the fuses, up to 150 shots at a time, in the evenings—only a single injury from the flying rock was reported. In the meantime, masonry contractor Pfeiffer set new stones to replace broken blocks in the old triple locks, entirely rebuilding a wall in one lock chamber. At the upper entrance, carpenters fabricated a floating wooden trestle that could

swing closed across the entrance, shunting aside floating driftwood before it entered and clogged the canal.³⁵

Superintendent Enoch Lockhart could not begin removing the stone bridge until a court lifted Frank McHarry's injunction. When a Jefferson County judge heard the case during several days at the end of September, Shippingport's residents and interested steamboatmen packed the courtroom. Thanks to the steamboatmen's supporting testimony, company attorneys Walker Morris and Isaac Caldwell successfully presented their case, and the judge terminated McHarry's injunction. Welcoming this decision, steamboatmen happily celebrated with what newspapers described as "high glee."³⁶

During October 1856 the stone-arch bridge, after twenty-seven years service, was demolished. Lockhart's workers removed the pier on the north side of the canal and on top of the stub of its southern pier they installed the new swinging pivot bridge. The company employed bridge-tenders, building a small shack beside the bridge to shelter them, who operated the bridge manually with few problems, except for poorly timing a bridge opening once and taking off the chimneys of a passing boat. When Lockhart reopened the canal a month behind schedule on November 3, it was a foot deeper and at sixty-four feet wide it provided safer

passage for larger steamboats, although the fifty-foot width of the old triple locks still restricted steamboat width to forty-eight feet. For these improvements, the company had expended \$92,000, \$14,000 of it going to stonemason Pfeiffer for rebuilding the lockwalls of the old triple locks.³⁷

Three months after Guthrie's canal project was completed and the stone bridge demolished, Frank McHarry died at Shippingport, in his home where John Tarascon had taken his own life a quarter century earlier. McHarry, a stonemason, had built a family sepulcher eight miles below Portland on a high bluff overlooking the river, and he had installed a porthole over its entrance. Legend said McHarry requested that his body be placed erect in the tomb, where he might look out the porthole and curse at passing steamboatmen. Ghost stories later circulated, steamboats collided in fog below the tomb, and steamboat captains sounded their boats' whistles as they passed it to ward off McHarry's hex. Although the family removed McHarry's body to Louisville's Cave Hill Cemetery in 1905, the legends of the tomb persisted for a century.³⁸

FALLS PILOTS PROJECT

When the canal company began Guthrie's canal-widening project, the Falls pilots sought to meet this competition by widening the Indian chute passage. Earlier work by the pilots had sufficiently opened the chute to pass boats with a twenty-eight-foot width, and they now wished to match the forty-eight-foot width available at the canal locks. Falls pilots David Dryden and Jesse Vansickle led this effort; Jesse and his brother Eli Vansickle were old Falls pilots and Dryden had won an important case for the Indiana pilots in 1854. Kentucky Falls pilots had arranged for Dryden's arrest for piloting steamboats from the Louisville wharf through Indian chute to land at Portland, thus beginning and ending his trip at Kentucky ports: Kentucky pilots contended Dryden's Indiana appointment did not authorize him to ply the river between Kentucky ports. Under an 1852 law requiring all steamboat pilots to obtain federal licenses, however, Dryden had acquired license to pilot the Ohio between Cincinnati and New Albany, and he contended that his federal license took precedence over Kentucky laws. Although he lost his case in a Louisville court, he prevailed in an appeals court, a victory breaking the tradition

that Kentucky pilots steered the steamboats over the Falls while the Indiana pilots guided the flatboats and coalboats. Dryden thereby became the leading Indiana pilot, competing vigorously with the Kentucky pilots for business.³⁹

With a \$300 grant from the Louisville chamber of commerce and \$200 from the city council, pilots David Dryden and Jesse Vansickle employed workers during the low-water autumn of 1856, building a cofferdam across the entrance to Indian chute to shut off the flow while they drilled and blasted rock from the channel. They expected Cincinnati and Pittsburgh shippers to contribute additional funding, because those would benefit from the work as much as Louisville, but when no donations were forthcoming the pilots approached Colonel Stephen Long of the Corps of Engineers with their funding request. For lack of funding from Congress, the Corps project to remove snags and improve Ohio River navigation had been suspended in 1854, but Colonel Long had a small balance from the last appropriation remaining on hand. With this, Long agreed to provide supplemental funding to keep Dryden and Vansickle at work on Indian chute until high water came, also requesting them to remove the wreck of the *Magnolia* which had gone down in June 1856, blocking the channel approach to the Portland and Shippingport wharves.⁴⁰

With this supplemental funding, Dryden and Vansickle continued blasting a wider passage through Indian chute while Falls pilot James Hamilton removed the wrecked *Magnolia*, and for this emergency work Colonel Long paid Hamilton \$559 and Dryden and Vansickle \$1,480. When the river rose in late October 1856, the Falls pilots estimated that they had opened Indian chute to a forty-foot width and with a minimum depth of eighteen inches at the lowest river stages. When they tested the improved channel by successfully taking through the steamboat *Red Wing*, drawing fully sixteen inches of water, Louisville newspapers hailed it as a great feat, declaring that before the improvements not even an empty flatboat could have passed the chute safely at the same river stage.⁴¹

Widening Indian chute did not end its hazards, as Captain Dryden sadly learned when steering the *J. P. Tweed* down the chute in May 1857—he hit the rocky ledge on the right side of the chute, sinking the boat. When the river again



The widened canal had turnout basins to allow boats to pass while in the canal. (Corps of Engineers)

fell to an extreme low stage, Kentucky Falls pilot Pink Varble hired drillers at his own expense to further widen the channel. Varble owned a small steamboat he used as a harbor towboat, taking coal barges cabled together in tows over the Falls, rather than piloting them down individually. Piloting coal barge tows across the Falls required a broader channel, and Varble therefore spent \$200 blasting a few additional feet off the right-hand ledge which had sunk the *Tweed*. Captain Dryden, the leading Indiana pilot, objected that Varble's work was ineffective, that it removed only the ledge's top, leaving submerged rocks that made passage even more dangerous. He contended that removing Ruble Rock, the infamous obstruction in the middle of the Indian chute where many boats dashed to pieces, should have been given priority. Yet, neither Dryden nor other Falls pilots joined Varble's effort and the blasting ceased when the river rose, leaving Ruble Rock a threat. Varble's work together with the earlier blasting by Dryden and Vansickle had increased the Indian chute width to forty-eight feet, allowing them to continue competing with the canal.⁴²

Before 1856, news of successful passage of the Falls, either through Indian chute or the canal, was hand carried on foot or horseback from Portland to Louisville. In November 1856,

entrepreneurs N. M. Booth and James Leonard installed a telegraph line from the canal office at Portland to the Louisville wharf. They expected to profit by quickly relaying news of safe passage and also by informing steamboat captains of where boats were located as they passed through the canal. The first telegraph message from Portland on November 26, for example, reported: "Steamer *Mediator* just passed, going to Louisville. *Red Wing* lying at the wharf with steam up. River stationary. Operator, Portland, KY." The telegraph had little to report during its first month of operation because the canal's lockhands went on strike for higher wages in December—unwilling to lose business, the canal company employed new lockhands to resume lockage services. Then the *Switzerland* with high smokestacks tore down the telegraph wire over the canal, and similar incidents reduced their expected profits, but Booth and Leonard persisted. Eventually they built the Ohio River Telegraph paralleling the river down to Evansville, establishing quick communications from steamboat captains back to Louisville and their home ports.⁴³

Colonel Stephen Long left Louisville at the end of 1856 to manage a project deepening the Mississippi River passes to New Orleans. Closing the Louisville accounts fell to his assistant,

Lieutenant James Abert, son of the Army's chief engineer. Abert had married a Louisville belle and immensely enjoyed his stay at the Falls City, where, for lack of funding, he had little to do. In his yearly report, Abert admitted: "There has nothing transpired worthy of special notice during the past year. This Congress did not appropriate any money to carry on such works as fall under my supervision." This condition eventually came to the attention of the Secretary of War, who ordered the Louisville engineer office closed in 1860 and dispatched Lieutenant Abert overseas to Europe to study the Swiss militia system during the American Civil War.⁴⁴

Colonel Long's survey, recommending a branch canal with a single lock capable of lifting boats twenty-six feet, had not met the canal directors' approval, and the directors in 1857 employed Edward Watts to conduct a resurvey. Watts proposed widening the canal from the 64 feet achieved in 1856 to a 100-foot width and deepening it to float boats with an eleven-foot draft. Near the drydock, Watts planned to excavate a new branch of the canal toward the south, returning to the river below the exit from the old locks and also below the rocks at Sand Island. Like many engineers before him, he recommended building a masonry guard lock at the canal entrance to shut out river mud and middle lockgates would be used to pass boats less than 265 feet long, thereby speeding the lock chamber filling. Watts estimated the total costs of building the features he designed at \$1.3 million.⁴⁵

Watts had completed his canal enlargement plans before James Guthrie left office in March 1857 and delivered them personally to Guthrie in Washington, also submitting the canal directors' request for permission to begin purchasing land needed for the canal branch. Guthrie approved the real estate acquisition and sent Watt's report along to the Senate together with the draft of a bill to launch construction of the branch and its new locks. When Congress declined Guthrie's bill authorizing \$500,000 for construction, Louisville news editors blamed it on opposition to the project from "Indiana free-soilers," the nucleus of the fledgling Republican party which had nominated an Army Corps of Engineers officer, John Fremont, for the presidency in the 1856 election.⁴⁶

When Democrat James Buchanan became President in March 1857, James Guthrie's service as Secretary of Treasury ended. Guthrie returned to Louisville for a gala reception at the Galt House and soon took in hand the city's floundering Louisville and Nashville Railroad. The railroad had been completed up Muldraugh Hill, but there it had stopped because it had exhausted its capital. Risking a half million of his personal fortune and promoting the railroad with Louisville and Kentucky banks, Guthrie managed to fund the resumption of construction, was elected the railroad's president, and in late 1859 completed it to Nashville, where it connected with railroads leading to Atlanta and New Orleans. Guthrie at the 1860 Charleston convention was nominated to become the Democratic candidate for President, and if a compromise between the North and South had been possible Guthrie might well have become the President that year instead of Abraham Lincoln.⁴⁷

OBSERVATIONS

James Guthrie's contributions to the Louisville and Portland Canal were pivotal. He had arranged enactment of the canal company's charter in 1825, had served as its legal counsel for years, and was behind much of Kentucky's legislation fostering the canal. As Secretary of Treasury, he arranged for the canal's continued management by five directors and also cut its tolls on river commerce by half. Although he tried several times to secure legislation for federal control and funding of the canal's operations and enlargement, Congress proved so divided over the canal, among many other issues during the 1850s, that none of Guthrie's initiatives obtained a favorable vote.

As Secretary of Treasury, Guthrie could have ordered that canal toll revenues be paid directly into the federal treasury, but instead he mandated that they be expended on the canal's repairs and expansion. The canal itself, therefore, reimbursed the costs of Guthrie's project of 1856, making the canal safer by widening it to sixty-four feet and by removing the stone bridge, opening two basins for boats to pass each other while in the canal, and installing a boom at its entrance to prevent driftwood from clogging the passage. Without this improved passage, the canal would have been of little service to the

Union Army's supply transports and the Navy's gunboats and monitors during the American Civil War.

Railroads and pressing national politics consumed Guthrie's attention during the turbulent years on the eve of the Civil War, and his achievements in these realms were not insignificant. Yet, he did not neglect the Louisville and Portland canal, accepting appointment as one of its five directors and becoming the canal's president in the midst of the war when rebel generals called for destroying the canal and obliterating any evidence that it ever existed.



8

SCOWDEN LOCKS AT WAR

Entrepreneurial nineteenth-century engineering differed materially from twentieth-century corporate engineering. Few early engineers attended professional schools, instead learning their craft as apprentices and through structural studies, and most practiced their trade individually rather than as corporate or government engineers. They achieved their reputations through the quality of the structures they designed and built, and some attained and deserved the label “engineering geniuses.” Theodore R. Scowden became one of these at the Louisville and Portland Canal. Without previous experience as a canal engineer, he designed his first navigation locks at the canal in 1860, then managed construction of the world’s largest navigation locks while a civil war raged around the canal. His achievement was little less than amazing.

Engineering the Falls of the Ohio always required a modicum of genius, and several engineers demonstrated their acumen at the canal. Among these were David Bates, who planned the original Louisville and Portland canal; Canvass White, who modified the original plans to permit the canal’s completion; and Increase Lapham, the child prodigy who contributed to the canal’s designs, also advancing engineering and geological sciences. The fourth genius, Theodore Scowden, first took interest in the canal at the Falls when he came to Louisville in 1857 to design its municipal waterworks.

Born in Pittsburgh, Theodore Scowden attended Augusta College in Kentucky, where his mechanical talents led him to an apprenticeship at the Harkness-Pierce steam engine foundry in Cincinnati. Like Increase Lapham, Scowden proved a prodigy, designing and patenting a breech-loading cannon, an iron rolling mill, and a low-pressure steamboat engine before he was age twenty-five. Cincinnati in 1845 employed him to design and build its municipal waterworks and sent him to study water-supply plants in Europe. For the Queen City, Scowden designed and managed construction of a water-supply

reservoir to store water pumped by steam engines from the Ohio River and distributed through iron pipes throughout the city. His successful water works at Cincinnati brought him similar design contracts at Cleveland in 1853 and at Louisville in 1857.¹

When Scowden arrived at Louisville in 1857, he learned of local support for damming the Falls and using its latent power to pump water into a city reservoir. With canal superintendent Enoch Lockhart, Scowden inspected the Falls, studying the construction of a dam to generate water power. When he and Lockhart agreed the dam’s cost would be far too great for water-supply purposes, however, he prepared designs for Louisville’s water works similar in principle to those he had built at Cincinnati and Cleveland, using huge steam engines to pump water from the river into a reservoir and standpipe. Scowden adopted Grecian inspired architecture for Louisville’s engine-house and standpipe that made them local and national landmarks, still standing although no longer in service in the twenty-first century.²

Entrepreneurial engineers working under contract during the 1850s, as today, constantly watched for new opportunities to market their services, in order that they might move profitably from one contract to the next. David Bates in 1826, for example, had made his son the Louisville canal’s resident engineer while he prepared designs for locks on the Ohio canal; and similarly Theodore Scowden, after finishing the Louisville water works design in 1858, employed his son Ransom Scowden to manage the water plant’s construction while he moved ahead to other projects. Scowden entered into partnership with Louisville canal director Jonas Rhorer in an iron furnace and rolling mill business, and he sought an engineering design contract to upgrade Louisville’s primitive sewer system. He recommended to the city council that a new sanitary system should be designed and constructed, and when this marketing ploy failed Scowden monitored the growing clamor for building a larger passageway around the Falls.³

CANAL ENLARGEMENT SUPPORT

The wider passage through Indian chute opened by Pink Varble and other Falls pilots had not removed all the hazards, and steamboats

attempting the chute's passage often wrecked. The engines of the steamboat *Pete Whetstone* failed, while attempting the passage with Falls pilot Jesse Vansickle at its helm, and it hit rocks at the Big Eddy, losing the boat and its four-hundred-ton cargo. The *David Gibson* hit rocks in the chute and went down in 1858; the *John Tompkins* struck the rocks and then burned; and the *Sunnyside* knocked holes in its hull. When the steamboat *Paul Jones* passed the Falls in 1857, it had a passenger aboard who called himself Mark Twain. Twain later remembered that after personal setbacks he had decided to move to South America and was on his way south when the *Paul Jones* hit rocks on the Falls and stranded against them for four days—it was this that inspired him to become a steamboat pilot instead of leaving the country. Such losses while crossing the Falls disturbed the marine insurance agents at Cincinnati where most of the damaged boats were owned, and they lent their support to building a canal around the Falls large enough for all steamboats, not just boats that could fit inside the canal locks completed in 1830.⁴

Theodore Scowden saw that James Guthrie's 1856 project, widening the canal and removing the stone bridge, had not fully resolved Louisville's canal challenges. The old triple locks were no larger than before, and superintendent Enoch Lockhart had to prop up or replace stones that were falling from the deteriorating lockwalls. Although the 1856 project had deepened the canal by a foot, by July 1857 it had filled again with mud, and Lockhart had the canal dredges constantly at work. The passage became so obstructed by mud in 1858 that Lockhart offered a \$200 reward to any steamboat that could crab its way through the canal, thereby plowing open a shallow channel. His dredging program also suffered setbacks: a crewman on one dredge had his leg tangled in a cable, tearing off the leg, and in 1859 fire destroyed one of the two canal dredges. Steamboats still had troubles making the left turn into the canal's upper entrance, and in 1857, for example, the *John Gault* hit the pier at the canal entrance and was swept stern-first onto the Falls, saved from destruction when its crew heaved its cargo, five hundred barrels of salt, into the river. And when steamboats exited the locks below, they often sank on rocks or stranded on the Portland Bar: the *Martha Putnam* in 1859 hit the Portland rocks and sank, losing 500 tons of

freight. Contemplating these disasters, marine underwriters raised their insurance rates, charging more for boats passing from Louisville down through the canal than for those departing from Portland.⁵

These and similar untoward events generated active local interest in further improving the canal around the Falls, but Guthrie's successor, Secretary of Treasury Howell Cobb, a states' rights Democrat of Georgia, did not support the canal enlargement plans. Instead, he urged that the federal government give the canal to Kentucky's state government. Lacking Treasury Department support, in 1857 the canal company arranged enactment by the Kentucky legislature of a resolution authorizing the company to borrow funds to enlarge the canal, using its toll revenues as security for loans; and Congress took up consideration of a bill that would allow the company to borrow the funds needed. This bill failed when Indiana congressmen attached a rider calling for the construction of a new canal on the Indiana side, but in 1858 new support for canal enlargement came from the State of Maryland which sent a resolution to Congress declaring that the enlargement was important to Maryland's commerce as well as to Ohio valley states. Maryland then was building the Baltimore and Ohio Railroad west, and by 1858 the tracks had reached Parkersburg on the Ohio. Improving the canal thus could extend Maryland's commercial empire through the Ohio valley to the Mississippi.⁶

While congressional debates over the canal enlargement continued, under the authority granted by James Guthrie before he left Washington the canal company began purchasing the land it needed to build a new branch canal with locks south of the existing canal. Canal president James Marshall and attorney Walker Morris approached the Jefferson County Court and obtained condemnation proceedings to secure title to the land, and the company thus acquired property owned by George Fetter and John Gray extending from the old canal drydock to the river at Gray's warehouse, along with a few lots in Portland where the new canal line would pass.⁷

In 1859 Cincinnati's steamboat owners and marine agents expressed great interest in starting the canal enlargement, asking Captain Lockhart for his opinion. Lockhart advised them that

building the new branch canal would not suspend traffic through the old canal during construction. The old canal would become the long leg of a Y, with the new canal forming the upper left branch of the Y; the branch canal could be built without connecting to the Y until it was ready for service. Lockhart explained that the canal directors contemplated making the branch eighty feet wide, ending with two lift-locks, each 350 feet long and 75 feet wide, at estimated costs of \$1 million.⁸

Cincinnati shippers in June 1859 appointed a committee including William Scarborough, the canal director representing Cincinnati, and Thomas Sherlock, president of the U. S. Mail Line of steamboat packets, to visit Louisville, inspect the canal, and meet with Louisville's steamboat interests. To confer with them, Louisville's merchants selected steamboat owners H. D. Newcomb and A. L. Shotwell, ferryboat owner John Shallcross, engineer Theodore Scowden, and others. These welcomed Cincinnati's delegation at the Galt House, then inspected the Louisville canal and crossed the river to examine potential canal routes on the Indiana bank.⁹



Theodore R. Scowden, Chief Engineer, Louisville and Portland Canal Company. (Joblin, Cincinnati Past and Present)

After reviewing alternatives, the steamboat committee determined that enlarging the Louisville canal was the most feasible, least expensive, and most readily accomplished option. Because forty-five percent of the steamboats operating in 1859 could not pass the old locks, they recommended widening the existing canal by thirty-six additional feet to a one-hundred foot width, and that the branch canal follow the line already selected by the canal directors—who had already purchased the land needed. They urged that two passing basins be excavated along the canal line (widening the canal would take in the existing passing basins), and that the two lift-locks should be 400 feet long and 75 feet wide, large enough for any steamboat on the river. Learning the canal directors had an \$80,000 reserve fund, the committee urged the directors to use this fund and apply the company's credit to borrow enough additional money to accomplish the construction. They advised the canal company not to await congressional action—a highly unlikely prospect given the sectional dissension then gripping Congress.¹⁰

Although Theodore Scowden had never before performed canal or lock engineering, he presented the Cincinnati-Louisville committee with a map of the Falls, marking on it his preliminary plans for the canal enlargement, convincing them he should be the engineer for the job. Both the Cincinnati and Louisville delegations respected the abilities Scowden had demonstrated while building their municipal water works, and they approved of his appointment by the canal directors as their engineer. Leaving his son Ransom managing the water works construction, Scowden went immediately to work on the canal and lock designs, completing them by the first of October 1859.¹¹

Scowden planned to excavate the existing 64-foot-wide canal to a 100-foot width by removing thirty-six feet from the canal's sides, lining both sides with vertical stone walls seventeen feet high. Plans included excavating two passing basins and a spacious basin at the old drydock. To prevent boats entering the canal from being swept by current onto the Falls, Scowden proposed a 600-foot-long timbercrib dam leading from the canal's entrance east toward the Louisville wharf. Like David Bates in 1825, Scowden hoped to floodproof the canal by using excavated materials to raise embankments

on both canal sides to an elevation two feet higher than the 1832 flood record, and also to construct a masonry guard lock between the embankments near the upper canal entrance. When floods approached, closing the guard-lock gates could prevent mud and debris from entering and clogging the canal, thereby ameliorating the constant maintenance headaches that had plagued Hulme and Lockhart in the older canal.

From the upper canal entrance to the intersection with the new branch, the canal enlargement would proceed 8,712 feet. The new branch diverged from the old canal line 420 feet above the entrance to the old locks and it extended westerly 2,600 feet in a straight line to new locks to be built 1500 feet downriver from the old locks. Each of the new double locks would be 350 feet long and 80 feet wide, each lifting boats thirteen feet to overcome the twenty-six foot gradient of the Falls. He did not explain why he designed shorter and wider locks than the committee had recommended, but the interior capacity of Scowden's lock chambers would triple that available in the 1830 locks, with enough space to pass the largest steamboats on the Ohio. When completed, Scowden's locks would become the largest navigation locks in the world; yet, he planned to continue the old locks in service for passing small craft and to make lockage available when the new locks were closed for repairs. Scowden estimated the total construction costs would amount to \$1.8 million.¹²

Senator Lazarus Powell, a Kentucky Democrat and close friend of James Guthrie, introduced a joint resolution to Congress in early 1860 authorizing the canal company to build the new branch canal enlargement, paying its costs with toll revenues. Although Senator Jesse Bright of Jeffersonville lamented that he had tried for years to get a canal constructed on the Indiana side, he had despaired of it and now would support Powell's resolution. Senator Robert Toombs, a states' rights Democrat of Georgia, loudly objected that the canal directors, holding only \$500 worth of shares, controlled federal property worth \$1 million, and he contended that the United States should give the canal to the Commonwealth of Kentucky. Toombs warned that if Congress allowed the directors to borrow the funds needed to enlarge the canal, in time it might be forced to repay the loans with federal funds. To this, Senator Powell retorted that the

other Ohio valley states using the canal would certainly object to giving it to Kentucky, and he maintained that his resolution asked nothing from the federal government except to allow the directors to apply the canal tolls to its expansion. The Senate amended Powell's resolution by ordering that the canal directors should never pledge the credit of the United States to obtain loans and, when the enlargement costs were repaid, they would reduce tolls to cover only the canal's operating expenses. Powell's resolution passed the Senate in March, the House soon after, and on May 4, 1860, President James Buchanan signed it into law.¹³

On May 30, canal directors James Marshall, James Guthrie, Jonas Rhorer, Walker Morris, and William Scarborough met to sign the instruments for a \$1.6 million loan obtained from investor groups represented by Isaac Caldwell and Dean Richmond. Richmond was president of the New York Central Railway and political wheelhorse of Buffalo, New York, and Caldwell was a Louisville attorney who became the University of Louisville's third president. They represented investors from Louisville and New York, but none at all from Cincinnati. To these investors, the canal directors issued sixteen hundred bonds, each worth \$1,000 paying six percent annual interest. As loan security, the directors mortgaged the canal property and tolls to guarantee amortization of the bonds at regular yearly intervals from 1871 until 1886.¹⁴

CANAL ENLARGEMENT CONSTRUCTION

With this funding in hand, the canal directors in June 1860 arranged for Jefferson County to condemn Gray's warehouse and adjacent lots in Portland, thus completing the land acquisition for the branch canal. Theodore Scowden prepared the contract specifications for bidders, and in July advertised the construction contract. Opening the bids on August 16, Scowden and the directors awarded the primary contract to Barton-Robinson of New York for a price slightly less than Scowden's cost estimates. Experienced construction contractors who had expanded their business to the west, Barton-Robinson in May 1860 had taken another contract for improving Kanawha River navigation, opening a channel for western Virginia's coal to compete with coal barged to Louisville from Pittsburgh. Barton-



The "Thompson" Iron Steam Shovel and Derrick,
BUILT BY THE
Bucyrus Foundry & Manufacturing Co.
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HAND CARS, PUSH CARS,
BALLAST UNLOADERS,
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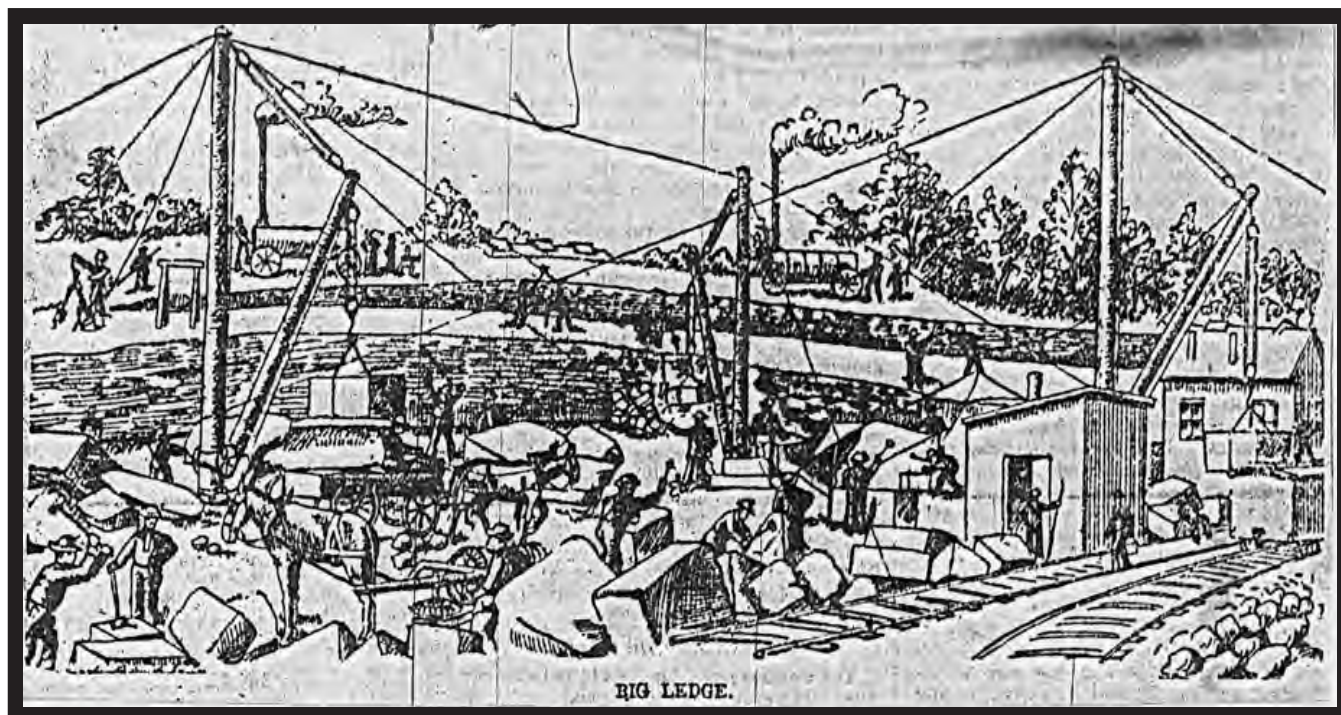
Steam shovels on rails replaced manual shoveling and horse-drawn scrapers for excavating the wider canal at Louisville. (Courier-Journal)

Robinson bought \$250,000 worth of the canal bonds issued in 1860, and subcontracted fabrication of the iron machinery for the locks to Ainslie-Cochran. George Ainslie, a Shippingport native whose father had owned the town's brewery, had joined with A. P. Cochran in 1854 to purchase Fulton Foundry; they had renamed it the Louisville Foundry and Machine Shop, manufacturing steamboat engines and other iron machinery.¹⁵

Examining the old triple locks, Theodore Scowden quickly rejected use of the Knob Creek quarry where their stone had been obtained. Knob Creek stone, instead of hardening with

time, had deteriorated and the old locks were crumbling. Kentucky's government sought to sell Scowden the stone left over from building the state's Kentucky River locks during the 1840s, but he thought it unsatisfactory for navigation locks of the scale he planned at Louisville. After investigating quarries along the river, he selected the American Cannel Coal Company quarry at Rock Island near Cannelton, Indiana, located 120 miles downstream of Louisville.

The stone for Green River Lock No. 1 had been taken from this quarry in 1837, and when Scowden inspected this lock he saw its stone was so durable that the builders' distinctive chisel



Stone used in the Scowden Locks was quarried near Cannelton, Indiana and boated upriver. (Courier-Journal, Oct. 16, 1887)

marks were still visible in 1860. Barton-Robinson leased the Cannelton quarry for three years and employed more than a hundred stonemasons there to cut out the stone in blocks averaging thirty-five cubic feet each for the lockwalls, planning to use steamboats to tow barges loaded with the stone upstream to Portland.¹⁶



Steam drills supplanted manual drilling for rock excavation during the 1860s. The drilled holes were loaded with explosives and detonated to shatter the rock. (Courier-Journal)

In September 1860 the contractors began work, making James Napier their project superintendent and employing three hundred workers to grub and clear the canal line. The contractors hired these laborers for a dollar per day wages, one-third paid in cash and the remainder in credit at the company commissary. In October the contractors' heavy equipment arrived by boat from Cincinnati, including a locomotive, railcars, rail-mounted steam excavators, and iron rails for tracks that would be laid along the excavation route. Fortunately for Scowden, the construction of Louisville's water works was completed on October 15, freeing his son Ransom from that project's management and allowing Scowden to employ him as resident engineer on the Louisville canal.¹⁷

In the thirty years since the original locks had been built using manual labor and horse and oxen teams, the construction industry generally had switched to steam power. Steam drills instead of sledgehammers pounded through rock

to prepare it for blasting. Portable steam derricks hoisted blasted rock from the excavations. Locomotives pulled steam excavators—cranes with booms and buckets powered by steam engines—along rails laid down along the canal route, and then pulled railcars filled with excavated materials to disposal areas for dumping. Of this equipment, Scowden boasted: "It may be safely said that in no work in America or in the Old World was there ever better or more complete machinery used to execute such work as was done upon the canal."¹⁸

Yet, it would be difficult to identify any more inauspicious moment in American history to launch a major civil construction project than the winter of 1860-61. The entire nation had become caught up in the furor leading to Civil War. Quasi-military organizations calling themselves home guards formed throughout the nation, and labor unrest became common. At Louisville in November 1860, for example, as the coalboat fleet prepared to depart downriver to southern markets, the deckhands left the boats on strike, demanding that their pay be increased by five dollars, from \$35 to \$40 for the trip; and the boat owners yielded, rather than losing the river rise and being stranded at Louisville with coal they could not sell. Even after settling the strike the coalboats had trouble departing south because the steamboat *Tecumseh* hit an obstruction when entering the canal and went down, the river sweeping over its deck drowning twenty horses and one passenger; the corpses ended up in the locks and its wreck obstructed the canal until superintendent Enoch Lockhart had it removed.¹⁹

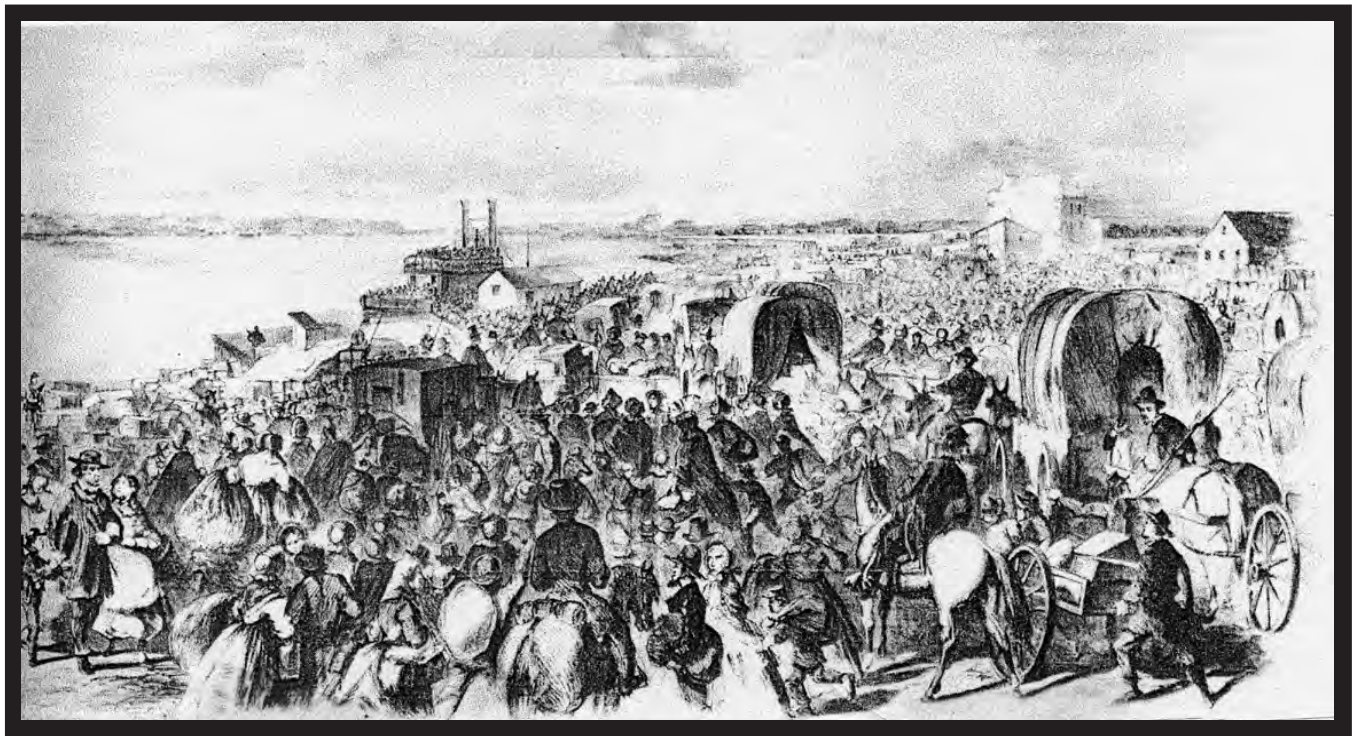
Since the revolutionary days when American patriots gathered to hoist Liberty poles, it had been the custom for proponents of political causes to caucus together to raise flagpoles—erecting hundred-foot flagpoles manually required cooperative efforts of many men. In the spring of 1861, raising flagpoles, either for the South or the North, became a test of loyalty at Louisville, and that test came at Shippingport when Union loyalists raised a huge flagpole and hoisted the United States flag to its pinnacle. Canal superintendent Enoch Lockhart, Lockmaster Alfred Needy, and Captain James Irwin, who managed Frank McHarry's estate, led this band of patriots who thereby publicly declared their loyalties.²⁰

When the State of South Carolina opened fire on Fort Sumter on April 12 and President Lincoln called for volunteers to put down the rebellion, political turmoil peaked in Kentucky, where Unionists and Secessionists strove to control the state's destiny. Although state government sought neutrality, it was known that General Simon B. Buckner, commanding the Kentucky state guard, had secessionist proclivities, while General Lovell Rousseau of Louisville opened a training camp for Union loyalists on Indiana's side of the Falls near the Big Eddy, naming it Camp Joe Holt after Lincoln's Attorney General. President Lincoln called on his closest friend, Joshua Fry Speed of Louisville, to arrange the secret distribution of "Lincoln guns" to Union loyalists in Kentucky. During this tumult, slaves attempted escape from Kentucky, crossing near the Falls, and one poor fellow actually waded across the Falls at extreme low water, jumping from rock to rock at the deepest channel to reach Camp Joe Holt. This proved a mistake because the Union troops there were Kentuckians, who promptly escorted him back over the river to his master.²¹

News reached Louisville in April that Cincinnati Unionists had seized steamboats to block arms shipments to Kentucky, and a mob of Louisville secessionists therefore took three

cannon from the Louisville armory and "amid the wildest enthusiasm" started for West Louisville to intercept the steamboat *Lehigh*, bringing up 1500 rifles the mob thought destined for Union forces at Newport Barracks near Cincinnati. When General Buckner sent word the arms were to become property of the Kentucky state guards, the mob dispersed without using their cannon to command the river. This raised the specter that artillery might be positioned on both sides of the Falls to control the river's passage, and the municipal officials of Louisville, Jeffersonville, and New Albany negotiated a pact that they would live in peace and guard the riverfront's safety even if Kentucky left the Union.²²

At Shippingport, Captain Enoch Lockhart organized a rifle company called the Island Home Guard to defend their homes and the canal against attack. Among the company's officers were Lockmaster Alfred Needy, contractor superintendent James Napier, and Melvin Rhorer, a brother of canal secretary Jonas Rhorer. Captain Lockhart called out these minutemen in June 1861 when the first Union gunboats, consisting of steamboats armored to serve as warships, arrived at the canal. Although the gunboat *A. O. Tyler* safely passed the canal, it stuck fast on rocks at Sand Island near the canal's exit, blocking passage by the gunboats *Lexington*,



As Confederate troops approached Louisville in 1862 citizens rushed to the wharf to escape by ferry to Indiana. (Frank Leslie's Illustrated Weekly)

and *Conestoga*. While awaiting a river rise to free the *Tyler*, Lieutenant S. N. Phelps, U. S. Navy, opened a recruiting station at the canal locks to employ gunboat crews. Meeting with Enoch Lockhart, Lieutenant Phelps reported him a staunch Union loyalist who had spent a substantial sum arming the Island Home Guard and had detailed them to defend the gunboats while they lay helpless on the rocks and in the canal. This, Phelps declared, had "in considerable degree been the cause of their being entirely unmolested and our people safe from insult in that secession hole, Portland."²³

As Louisiana, Mississippi, Arkansas, and Tennessee left the Union, the secessionists closed the lower Mississippi River to commerce from the North, seizing boats belonging to Union loyalists. Southerners canceled their orders for new steamboats, and the Howard boatyard at Jeffersonville by June 1861 had ceased building boats. Union forces occupying Cairo blocked all commerce leaving the Ohio River, and at Louisville the customs officers adopted a permit program that allowed boats to steam downriver only after their cargoes had been cleared of arms or other commodities that might contribute to Southern military preparations. Of this, Louisville news editor George Prentice lamented: "Not only the sixty millions of dollars worth of steamboats but the vastly greater value of the commerce carried on, through them, upon the Mississippi and its tributaries is to be lost, sacrificed, swept away by this wretched war, the most useless and foolish and insane war in the world's annals." Nearly the only downriver commerce from Louisville during the summer of 1861 consisted of smuggling—flatboats loaded at New Albany with butter bought for ten cents a pound, embarked under cover of darkness for a downriver voyage at night, selling the butter at Memphis and below for a dollar per pound.²⁴

The wartime commercial disruption cut the canal's toll revenues by two-thirds in 1861 and 1862, reducing the income which the directors had expected to apply to the branch canal's construction; yet, the Scowdens and the contractors pursued the branch's excavation vigorously. Contractors Barton-Robinson purchased two huge dipper dredges and put them to work excavating the canal entrances and approaches. On rail tracks placed along the line of the branch canal the contractors ran steam excavators, which in 1861 removed 543,096 cubic

yards of soil from atop the rock; rail cars on temporary tracks carried the excavated earth up inclined railways to dump on the disposal areas, the high embankments built on both sides of the canal. The contractors had largely accomplished removal of the soil overburden by the end of 1861, but only at sharply increased costs. Where they had been able to employ workers for \$1 per day at the first of the year, by the end of the year they had to offer \$2.50 per day and still they attracted few workers. Able-bodied workers were leaving for military service, or for higher paying work in industries manufacturing war materials.²⁵

U. S. MISSISSIPPI SQUADRON, }
CAIRO, ILL., Nov. 29, 1862. }

WANTED

IN THE MISSISSIPPI SQUADRON, SEAMEN, ORDINARY SEAMEN AND LANDSMEN.

The number of Steamers now fitting out offers a fine opportunity to the Western young men to enter in the Naval service of the United States more on the Western waters, and any one not over forty years of age will be received, provided he brings with him a certificate of a Surgeon that he has no chronic disease or physical disability of any kind. No person under eighteen years of age will be received without the written consent of parents attended before a justice of the peace.

The inducements to enter the Navy on the Western waters are very great—promotion by command for those who earn it; good pay and subsistence; and comforts not to be found in the land service. Any one who wishes to enter the Navy will have their actual mileage paid them on their arrival at Cairo, or any Naval Rendezvous, and after they are delivered on board the receiving ship.


The enlistments will be for the war, and not less than one year. At the war's termination advances will be paid, when the persons enlisting present themselves on board receiving ship, and every one will be allowed to have a half pay ticket for his family from the day of enlistment. An additional examination by the Surgeon will take place on board the receiving ship, and any one attempting to deceive will not enjoy the benefit of the war.

The following are the rates of pay to which persons are entitled on being sent from the receiving ship to a Vessel of War—all persons though must enter as Seamen, Ordinary Seamen or Landsmen, and obtain such higher ratings they may be fitted for:

Yeoman	.....\$45 to \$51 per month and one ration
Armorer	..... 40 " " " "
Master at Arms	..... 37 " " " "
Ship's Corporal	..... 34 " " " "
Cooksteward	..... 31 " " " "
Quarter Masters	..... 29 " " " "
Quartermasters	..... 26 " " " "
Captain of Tops	..... 23 " " " "
Carpenter	..... 21 " " " "
Painter	..... 19 " " " "
Ship's Steward	..... 18 " " " "
Officer's do	..... 17 " " " "
Cook	..... 16 " " " "
Master of Boat	..... 15 " " " "
Musicians	..... 14 " " " "
Boatswain	..... 13 " " " "
Ordinary Seaman	..... 12 " " " "
Landsman	..... 11 " " " "
Piratical, Real Catch	..... 10 " " " "
Piratical, Swindling Catch	..... 9 " " " "
Coal Heavers	..... 8 " " " "

The following Rendezvous are open ready to enlist men, and it remains to be seen if there is any patriotism left amongst the waterman's personnel to enlist:

ST. LOUIS,
CINCINNATI,
COLUMBIA,
CAIRO,
CHICAGO,
MEMPHIS,
DAVID D. PORTER,
Acting Rear Admiral,
Commanding Mississippi Squadron.



The canal became a recruiting station for Union forces during the Civil War. (Louisville Journal, Jan. 1, 1863)

In September 1861 the war came to Kentucky. General Simon B. Buckner went south to Tennessee, followed by many of the state guards, some taking their arms with them. Near midnight on September 4, wagons rolled up to the door of Duckwall's building in Portland, and thirty-five Portland secessionists entered the building and tossed the state guard's rifles stored there into the wagons. They then swarmed aboard the *Masonic Gem* at the Portland wharf, seized all guns and rifles aboard the boat, and fled south down the river. That month, General Buckner advanced from Tennessee back into Kentucky, occupying Bowling Green and sabotaging the Green River locks, while Confederates on the Mississippi advanced to Columbus, Kentucky, anchoring a chain across the river to block the passage of federal gunboats.²⁶

This forced fence straddlers to decisions, and among these were the Falls pilots. Captain Pink Varble owned a slave—who drove a buggy to retrieve the pilot at Portland after each Falls' passage and return him to Louisville—but Varble elected to support the Union, providing services critical to Union Army logistics. Captain David Dryden, the Indiana Falls pilot, volunteered in the Union Marine Brigade, and, ironically, was given command of the gunboat *Monarch*. Captain Dryden had sunk this boat in March 1861 by hitting Ruble Rock when descending Indian chute, but it was raised and then converted into a gunboat designed to ram and sink Confederate craft. Commanding the *Monarch* at the Battle of Memphis in 1862, Dryden distinguished himself by ramming and sinking three rebel gunboats, capturing their crews, and making it possible for the marines to raise the United States flag again over Memphis.²⁷

In September 1861, Pink Varble accepted a secret mission from the Union army, guiding thirteen steamboats towing 120 barges down the Falls and on to Paducah. It was the busiest day of his forty-year career as Falls pilot, thirteen trips over the Falls and back in a single day. The barges carried all the available mechanics from New Albany, who assembled the barges into the longest ponton bridge ever constructed, to permit Union troops to cross the Ohio into Paducah. Because the canal's larger Scowden locks were not completed, and the old triple locks were too small for most gunboats, during the war Pink Varble became the busiest man in Louisville guiding warships and supply boats

down Indian chute. Becoming exhausted by these labors, after ten years of accident-free piloting he lost the *Dunlieth* and its cargo in 1862 when it took a sheer and wrecked against Ruble Rock, breaking in two amidships.²⁸

By November 1861 steamboats poured federal troops into Louisville. The 41st Ohio Infantry arrived aboard the *Telegraph*, the 24th Ohio came on the *Economy* and *Florence*, the 15th U.S. Regiment from Newport Barracks arrived on the *Champion*. The *Silver Wave* brought the 17th Indiana, the *Marengo* brought the 15th Indiana, and several steamboats transported the 7th Pennsylvania Cavalry with their mounts. By early 1862 Louisville resembled a military camp, occupied by the Army's First Division including twelve infantry regiments, one regiment of cavalry, four artillery batteries, and a corps of 300 engineers. These paraded through Louisville to get aboard fourteen steamboats, proceeding to the front at Fort Donelson in Tennessee. The Ohio River thus had become a principal artery of national defense.²⁹

Enoch Lockhart and the lock force labored mightily to keep the old locks operational in support of military transport and logistics. When the steamboat *Arizona* hit rocks and sank in the canal in January 1862, they cut off its stern to swiftly reopen a passage, leaving the wreck for removal after the river fell; owners of the boat subsequently sued on grounds that their boat should have been pulled through with lines. The river fell slowly that spring because Louisville suffered four distinct flood crests, the most in a year since the spring of 1847 when there were three. These rises left the canal so clogged with mud that it took supply transports such as the *Westmoreland* three days to travel the two miles, and in May the Union rams *Queen of the West* and *Switzerland* grounded in the canal, and after beating a path through mud to the locks they grounded again on Portland Bar. Lockhart worked his canal dredges around the clock, clearing away the mud.³⁰

Barton-Robinson began excavating rock from the new branch canal in 1862, using heavy steam drills to make holes that were packed with gunpowder and detonated to shatter the rock. To hoist broken rock from the deep lockpits, the contractors applied steam-powered derricks, swinging the stone to the side for later use as rock before they reached the bottom grade of the branch canal and its lockpits.³¹

During this construction the contractors suffered several accidents. They had a steam towboat pushing barges of cut stone from the Cannelton quarry upriver to Portland for use in the lockwalls, and while on an upriver trip in February 1862 the towboat's boiler exploded five miles below Portland, killing three workers outright and scalding three others. Later, one of the contractors' steam excavators moving dirt and rock at the canal also burst its boiler, throwing pieces of machinery fifty feet and scalding a young boy the contractors had employed as a mule driver. Using heavy steam-powered equipment certainly expedited construction, but it also proved more hazardous than the horses, oxen, and keelboats used by the 1830 canal contractors.³²

When excavation of the lockpits at the canal's western end was finished, Barton-Robinson asked to schedule a grand public ceremony to highlight placement of the first stone in the locks, but Theodore Scowden modestly opposed the celebration. The huge cornerstone was lowered into place by steam-powered carriage cranes, therefore, with only the workers and the engineers present, on September 21, 1862. Perhaps no one would have attended even if Scowden and the contractors had conducted a public ceremony, because Generals Braxton Bragg and Edmund Kirby-Smith were then ripping through the Bluegrass, capturing Lexington and Frankfort, inaugurating a Confederate governor of Kentucky, and threatening Cincinnati or Louisville, or both.³³

THREATS TO THE CANAL

As the Confederate army entered Kentucky, General Pierre Beauregard advised its commanders what should be done after they seized control of the Ohio River's south bank to block the passage of federal gunboats: "When Louisville shall have fallen into our possession I would construct a work there for the command of the Ohio and the canal, and I would destroy the latter as soon as possible so completely that future travelers would hardly know where it was. This I would do as a return for the Yankees' vandalism in attempting to obstruct forever the harbors of Charleston and Savannah."³⁴

Beating back Union forces at Richmond, Kentucky, and seizing control of the Bluegrass region, the Confederate forces probed toward

the Ohio, burning Augusta on the river's south bank near Cincinnati. General Don Carlos Buell, commanding the Union army at Nashville, started north along the line of the Louisville and Nashville Railroad to reinforce Louisville. It was not clear, however, to General Horatio Wright, commanding Union defenses along the Ohio, whether the Confederates would strike first at Louisville or Cincinnati, and he ordered troops to reinforce Cincinnati rather than Louisville. Canal director James Guthrie, president of the Louisville and Nashville Railroad, protested Wright's troop deployment. "I am convinced there is no real danger of an attack on Cincinnati," Guthrie proclaimed: "The real danger is cutting off the line of communication with General Buell's army from this place and after that the conquest of Louisville." On the day that Theodore Scowden placed the cornerstone of the new canal locks, General Wright responded to Guthrie's criticism by ordering six federal gunboats to steam downriver from Cincinnati to defend Louisville and its canal.³⁵

Telegraphic news vividly described Louisville's crisis in September 1862: "Great excitement here. Every able-bodied man being impressed to take up arms for defense of city or work in entrenchments. An attack expected tonight or tomorrow. Buell close upon enemy's rear. Pontoon bridge being built to move over if necessary." Union army authorities ordered Louisville's saloons closed and prepared to evacuate the city in case Confederate forces entered Louisville before General Buell's forces arrived. Captain Lockhart called out the Shippingport home guards to defend the canal, and the contractors stopped construction and sent their workers to the city's outskirts to build roads, rifle pits, and expedient fortifications.³⁶

The army contracted with Falls pilot Pink Varble and his associates to station steamboats at Louisville's wharf, ready to transport civilians to Indiana, and to construct two ponton bridges across the river. Varble anchored barges in lines across the river from Portland to New Albany and from Clay street in Louisville to Jeffersonville, while Scowden and the canal contractors laid plank roads leading to the bridges and spiked double-track plank roadways atop the barges for crossing buggies and wagons.

They completed both floating bridges on September 26, leaving workers to guard and to open them for gunboat passage when required.

General Buell's troops won the race to Louisville, however, blocking the Confederate approach, and on October 8 they fought General Bragg's army to a standstill at Perryville, Kentucky, fifty miles from Louisville. After the rebel army had returned to Tennessee in late October, Varble disassembled and removed the ponton bridges.³⁷

That October, crowds enjoyed John Wilkes Booth's portrayal of the tyrant Richard III at Louisville's theater, and gathered at the wharf to inspect the new steamboat *Ruth* built at Howard boatyard in Jeffersonville. At 700 tons, the *Ruth* exceeded the old canal's capacity and its pilot therefore attempted to descend Indian chute—he wrecked it against the Backbone Rock. Captain Pink Varble used his harbor towboat to free it from the rock, saving it from destruction, but the army then commandeered it for military transport and a Confederate arsonist later torched it, killing thirty passengers.³⁸

Because General Bragg and the Confederate army destroyed Union supply trains at the Battle of Stones River on the first day of 1863, the Union army quartermasters commandeered all available steamboats on the Ohio and dispatched them with gunboat convoy to Nashville to resupply the forces driving Bragg toward Chattanooga. This rush of steamboats, together with the coal barges needed to fuel them, completely overwhelmed the canal; it took Captain Lockhart and the lockhands days to pass them through. While the canal was blocked by this traffic, the coal barge fleet elected to risk passage through Indian chute, and Captain Varble got them over with few losses, indeed he set a new record taking down and bringing up coal towboats on February 12. A newspaper reported: "The boats brought up were the *Shark*, *Whale*, and *Lake Erie*. The *Whale* made the run from the foot of the Falls to the towhead in forty-six minutes, the *Shark* in forty-three minutes, and the *Lake Erie* in thirty-six minutes. They were all brought up through the chute, stemming the current most gallantly. Captain Varble handles a pilot wheel as the enchanter does his magical wand."³⁹

Barton-Robinson's three towboats, used to haul stone upriver from Cannelton and to propel the contractors' two enormous dredges, were impressed into army service and went south. Two made it back to Louisville; Confederates captured and burned the third. General U. S.

Grant in February 1863 had the contractors' dredges commandeered and towed south, where he put them to work dredging a canal cutoff through a riverbend to get gunboats and transports safely past the Confederate batteries at Vicksburg. One of the dredges was lost; the other later returned.⁴⁰

With their work disrupted by the Confederate invasion of Kentucky, their floating plant taken for military service, and their profits entirely dissipated by escalating prices for wartime labor and materials, Barton-Robinson still attempted to persist in 1863 with project construction. They had workers building a dam or breakwater extending from the canal's entrance upriver to Sixth street, to prevent currents from forcing boats entering or leaving the canal into Kentucky chute and onto the rocks. Another force excavated rock from both sides of the canal just downstream from the entrance, where the stonemasons built walls for a guard lock. Rather than a lock with a chamber and two sets of lockgates, this guard lock merely had one set of gates that could be closed to shut off flow into the canal when urgent repairs were needed. A third force assembled an iron swing bridge, manufactured by Ainslie-Cochran, to carry a roadway across the locks when they were completed. Costs had so mushroomed by the summer of 1863, however, that Barton-Robinson, facing bankruptcy, appealed their plight to the canal directors. James Guthrie, who became the canal's president in August 1863 at the demise of his friend James Marshall, responded favorably to the contractors' complaint and granted them increased prices. To help pay for the increased construction costs, Guthrie and the canal directors then doubled the canal tolls, raising them from twenty-five cents per ton to fifty cents.⁴¹

While the canal contractors struggled to keep their project moving, Captain Lockhart and the lockhands witnessed interesting events at the Falls. They saw three barges full of hay catch fire and float onto the rocks at the head of the Falls, burning all night and brilliantly illuminating the cascades. They watched the army test a new repeater gun capable of firing 100 shots a minute; tested at the canal, this weapon sprinkled floating targets in the river and proved satisfactory. Surely the lockhands took notice of the passage through the canal of the steamboat *J. B. Ford*, the army's floating prison for rebels, and

doubtless they were amused by passage of the steamboat *Idahoe* loaded with prostitutes—Nashville’s army commander, weary of venereal diseases, had locked them aboard the boat and paid their passage north. And for the first time on record, women took hold of the oars and steered a flatboat down the Falls; according to the news report: “When the boat got in the rapids the fair ones took to the roof of the frail bark, apparently alarmed, but their fears were soon banished, and the little craft floated gallantly down the stream with two petticoats at the mast, representing, we suppose, a flag of distress. The crowd on the levee enjoyed the scene hugely.”⁴²

In May 1863 Colonel Orville Babcock, a Corps of Engineers officer, aide to General U. S. Grant and later President Grant’s chief of staff, visited Louisville to survey and plan its perimeter defenses against Confederate assaults. Construction of the fortifications was assigned to Major James Simpson, who with Captain Miles McAlester started construction of Cincinnati’s defensive fortifications, and with Captain Orlando Poe began building Camp Nelson on the Kentucky River. The Corps had not begun the construction of Louisville’s defenses, however, when General John H. Morgan and his Confederate cavalry threatened attack on the city in July.⁴³

As Morgan’s cavalry approached from the south, General Jeremiah Boyle, commanding Louisville’s garrison, and Mayor William Kaye declared martial law and ordered all men in the city enrolled in the home guard to prevent “the sacking of the city and the utter desolation which would follow.” Construction of the Louisville canal again paused during this emergency, as preparations were made for its defense. The Navy stationed its gunboats *Moose* and *Reindeer* at the upper entrance to the canal and sent the *Springfield* to guard its lower entrance against attack. But Morgan bypassed Louisville and the canal, seizing the steamboats *McCombs* and *Alice Dean*, and crossing the river forty miles below the canal at Brandenburg. Although the gunboat *Springfield* steamed downriver to shell Morgan’s forces, the Confederates completed their crossing into Indiana. Morgan’s staff then spared the Kentucky-owned *McCombs*, while torching the Cincinnati boat *Alice Dean*. Releasing rumors they were marching for Indianapolis to destroy its railroads and arsenal, Morgan’s cavalry seized

Corydon, then galloped eastward north of New Albany and Jeffersonville into Ohio. Panic prevailed in the Ohio Valley until federal gunboats caught up with Morgan’s forces as they forded the Ohio at Buffington Island and shelled them until Morgan surrendered to pursuing forces.⁴⁴

After concerns over Morgan’s raid dissipated, the Corps of Engineers began fortifying Louisville. Major James Simpson appointed civilian assistants to manage the defensive construction with labor supplied by military convicts and by city judges who sentenced “loafers found about gambling and other disreputable establishments” to work on the fortifications. Before the work stopped in 1865, Major Simpson and his assistants had completed eleven forts built along an arc ringing the city from Beargrass creek on the east to Paddy’s Run on the west. Because Morgan’s raid of 1863 was the last serious threat to Louisville by Confederate forces, however, the cannon mounted in Louisville’s fortifications were never used in defense of the city.⁴⁵

With his son Ransom managing branch canal construction, Theodore Scowden looked for new outlets for his talents, and he joined canal directors James Guthrie, Joshua Fry Speed, James Henning, and Jonas Rhorer in formation of the Louisville Hydraulic Cement and Water Power Company, capitalized by the Savings Bank of Louisville. For this company, Scowden and Rhorer, cashier of the bank and canal secretary, purchased the Tarascon cement mill from Frank McHarry’s widow Emily and acquired much of Shippingport island for the business, building a factory to make cement barrels at the island’s eastern end. They also acquired limestone quarries in Indiana and in postwar years the company, managed by Joshua Fry Speed’s nephew James, constructed new cement mills, notably at Speed, Indiana, twelve miles north of Louisville. Scowden perhaps expected to market his engineering services for designing a dam to develop the Falls’ water power for cement manufacture, but the company never undertook that massive project.⁴⁶

Scowden saw another marketing opportunity in early 1864 when the Louisville Board of Trade orchestrated a convention of delegates from throughout the Ohio valley to promote federal navigation improvements of the Ohio River.

Louisville's delegation included Scowden and Mayor William Kaye, who presided. The convention reported that military mobilization had overwhelmed railroad transportation, and improving the Ohio River therefore was vital to national defense. It asserted that if river shoals had not obstructed the river, federal gunboats might have reached Brandenburg in time to stop General Morgan's crossing there in 1863, thereby preventing the panic and damages that followed during Morgan's raid across Indiana and Ohio. The convention left planning for the Ohio River improvements to the "triumphs of engineering," but resolved that Congress should immediately appropriate \$10 million to start the work. Congress did not accept the convention's recommendation, but after the war had ended it ordered the Corps of Engineers to survey the Ohio and prepare comprehensive plans for its improvement.⁴⁷



Canal Resident Engineer Ransom T. Scowden, managed project construction, then served as Louisville City Engineer, 1876-1890. (Courier-Journal, Nov. 17, 1889)

By late 1863 the Falls area was becoming a resort for the recovery of wounded soldiers. Seizing the farm of U. S. Senator Jesse Bright of Indiana, who had cast his lot with the Confederacy, the army built Jefferson General Hospital with twenty-seven buildings to house up to 5,200 soldiers. At least nineteen buildings in Louisville became military hospitals, and the need for hospital space became so great that steamboats were transformed into floating

hospitals. When the hospital ship *Ohio* tied up at New Albany with a thousand patients aboard, a news report declared: "It lacks a promenade for recreation but patients enjoy fresh air and bracing breezes from the river." The hospital boat *Jacob Strader* at the Louisville wharf was crowded with wounded soldiers when ice tore it from its mooring and drove it onto the Falls. Fortunately it lodged on the rocks before sinking into the cascades, and Captain Pink Varble with his harbor boat *Gipsej* took off the soldiers, lightening the boat to float it off the rocks, then towed it back to the wharf.⁴⁸

CONTRACTORS FAIL

After the \$1.6 million loan had been expended on the branch canal, the canal directors had doubled the tolls to obtain funds to pay for the contractors' continued construction. Barton-Robinson concentrated in 1863 and 1864 on building the lock masonry, using carriage cranes to hoist cutstone from railcars and place it in the lockwalls. The contractors had erected vertical posts alongside the lockwalls and atop these they installed horizontal beams with iron rails. A pulley with hoisting chains rolled along the rails overhead to carry the stone blocks and lower them into position—these carriage cranes resembled the overhead cranes used in modern machine shops, although powered by steam rather than electric motors. As the job forced the contractors toward bankruptcy, owner T. D. Barton had personally taken over supervision of the work, and he was working on the overhead carriage crane when he slipped and fell to his death on the lockwall below. With this disaster, Barton's partners appealed to James Guthrie to release them from the contract, and Guthrie, with concurrence of the other directors, granted their request. The directors then instructed engineers Theodore and Ransom Scowden to continue the construction with the canal workforce, financing the job with toll revenues as they became available.⁴⁹

President James Guthrie asked director James Henning to investigate the chances of selling a second mortgage on the canal to raise the funding needed to finish construction, but Henning reported that the canal toll receipts were inadequate for any investor to consider taking another mortgage. Consulting with Theodore Scowden, Henning learned that his

cost estimate for completing the locks and canal enlargement would be high. "It seems as we progress into this work," Henning lamented, "the remainder increases faster than we go forward." Indeed, Scowden estimated that finishing the project might cost an additional \$1 million.⁵⁰

As Scowden and the canal forces laid the last stone in lockwalls in 1865, one of the largest troop deployments of the war passed through the canal. With destruction of the Confederate army that attacked Nashville in December 1864, the Union command ordered General John Schofield and his Twenty-third Army Corps to move covertly east to join in the final assaults on General Robert E. Lee's army in Virginia. Schofield's corps boarded seventeen steamboats on the Tennessee River and, maintaining secrecy, traveled up the Ohio to the canal. There the boats were detained several days attempting to pass through the canal or to ascend the Falls, and the mission's secrecy was broken. The soldiers rioted in Portland, breaking into stores and saloons, robbing people on the streets, a debacle that continued until other troops arrived to restore order, shooting some of the rioters. The troops left when their transports were above the Falls, successfully completing their long-distance deployment and joining the Union forces outside Richmond.⁵¹

By the spring of 1865 Captain Pink Varble was guiding highly unusual craft down Indian chute. The Navy had contracted for construction of seven ironclad monitors at Pittsburgh and Cincinnati, and these heavy ships, armed with fifteen-inch cannon in their revolving turrets, drew as much as thirteen feet of water. Indian chute seldom had a depth sufficient to float boats drawing thirteen feet, but Varble safely steered them down the Falls, although most had traveled no farther than Cairo before the war ended. That spring, the *Mary Belle Roberts*, built in Ohio and the last of the commercial sailing ships to float down the river, also went over the Falls.⁵²

In April, Louisville hailed the news that General Godfrey Weitzel had occupied Richmond while General Grant pursued Lee's army toward Appomattox. Weitzel, Louisville newspapers proudly explained, was a Cincinnati native, one of the most accomplished officers in the service. As Weitzel escorted President Lincoln on his victory tour of Richmond, Louisville celebrated

with cannon fire from its fortifications together with fireworks and bonfires in the streets. Another day of celebration followed when news came of Lee's surrender at Appomattox, quickly followed by a day of mourning at the news of Lincoln's assassination.⁵³

Confederates mourned also. In May the lockmen found a body floating in the canal, dressed in a gray uniform, with a last note to his sister in one pocket. At New Albany, three escaped rebel prisoners torched the steamboat *Eleanora Carrell*, carrying a large freight and many passengers. Louisville historian Alfred Pirtle was at the boat and he saw Captain David Dryden, the Falls pilot and Union gunboat commander returned from the war, snatch up an axe, jump in a skiff, row under the steamboat's wheelhouse, and smash holes in the hull to scuttle the burning boat. Water poured into its hold and the boat quickly sank, extinguishing the fire. Instead of burning to the water line, it was left in condition to be raised and repaired.⁵⁴

Scowden and the canal workers slowly continued building the lockwalls and on October 18, 1865, they set the last stone carefully in place. With pride, Scowden described his handiwork:

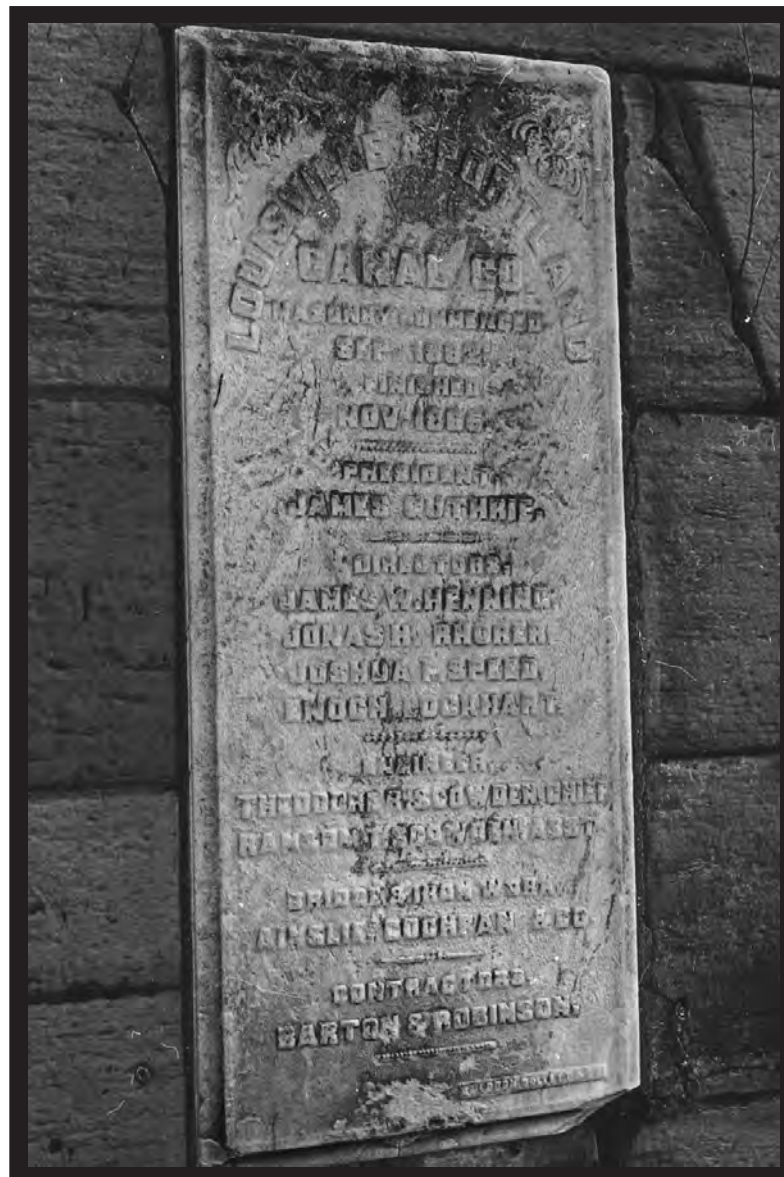
The locks of the Louisville and Portland canal are the largest in the world, not excepting the Suez Canal. The masonry cannot be excelled in design and workmanship by any ancient or modern work, each lock being three hundred and fifty feet long and eighty feet wide, and the whole lift in both locks twenty-six feet. The quality of the masonry of the locks and bridges can best be understood by a description. Every course is uniformly two feet in thickness, composed of alternate headers and stretchers. Each header is three feet wide on the face and laps back six feet on the wall, and each stretcher is seven feet long with a three feet bed. Every stone, the straight headers and stretchers, the hollow and square quoins, the carved stones, the steps, mitre sills, breast walls, bridge piers, bridge abutments and parapets, are all cut from

iron patterns prepared under the direction of the engineer. The masonry was laid in the best hydraulic cement, the backing in every course being thoroughly grouted and set before the next course was begun.⁵⁵

Suspending the lockgates and installing the operating machinery would make the locks operational, but the canal enlargement was far from complete. Dredging an approach channel into the lower lock entrance remained to be done. The plug of land left to hold water out of the branch canal had not been removed, and little had been done to increase the old canal's width by twenty-six feet, widening the 64-foot passage to a 90-foot width. Even after the excavation to

ninety feet was completed, then construction of vertical stone walls along the canal's entire length would be required.

Completing this work, Scowden estimated, might cost as much as \$1 million, and the canal company was essentially bankrupt—future toll revenues were pledged to pay the canal's operating costs and retire the \$1.6 million in loans for construction. James Guthrie and the canal directors therefore instructed Scowden that unless he could identify sources for more funding, the work must stop. Scowden then went home to Cincinnati in October and personally appealed to his friends and civic leaders for the wherewithal to finish the canal.⁵⁶



Marble plaques listing canal officers, engineers, and contractors for Scowden Locks were mounted on the masonry. (Corps of Engineers)

When Scowden received a cold reception in Cincinnati and returned empty-handed, Guthrie and the directors ordered him to close down the job. Scowden had the lockgate timbers painted, stacked, and covered. He stored away the lockgate iron and operating machinery. He finished the as-built drawings and final cost estimates and submitted them to the canal directors. He ordered two marble plates briefly outlining the project's history and mounted them on the walls of the guard lock, then suspended the work in November 1865. Cincinnati's leaders in 1859 had urged the enlargement and the employment of Scowden as chief engineer, but none had invested in the project's construction, and in 1865 they again declined to invest in finishing the construction.

This so upset the canal directors that it was said, "the citizens of Louisville were so disgusted at the want of interest on the part of the citizens of Cincinnati that they swore in their wrath they would not finish the work."⁵⁷

Floods in the winter of 1865 filled the new locks and branch canal with river mud, and trees were already growing in the rich silt when U. S. Civil Engineer W. Milnor Roberts arrived at Louisville. Appointed by the Corps' Chief of Engineers to survey the Ohio River and plan its improvement for navigation, Roberts had thirty-years experience as a hydraulic engineer—he had designed and managed construction of navigation locks for the Pennsylvania Canal and for the Monongahela River project. Examining Scowden Locks, Roberts declared them magnificent: "They are on the grandest scale, and superior in workmanship to any I have ever seen. The masonry of these immense locks is entirely finished, but a large amount of work still remains to be done, including lockgates, rock excavation, &c., which the late chief engineer estimated would, at present high prices, cost a million dollars." In his report to Congress, Roberts recommended that the federal government take charge of the canal's construction and complete it at the earliest possible date.⁵⁸

9

WEITZEL'S MISSION

Theodore Scowden's efforts to obtain funding to complete his locks and the Louisville canal enlargement had failed; yet, they brought General Godfrey Weitzel to the Falls in 1867 to plan federal projects supporting the Ohio River's growing commerce. Weitzel's studies led to a grandiose strategy to attack the Falls challenge at its center and on both flanks: he recommended completing Scowden locks on the Kentucky side, building a second and larger canal on the Indiana bank, and constructing a dam across the center of the Falls to deflect deeper water through both canals and down Indian chute.

When Congress and President U. S. Grant ordered construction of the crest dam and completion of Scowden locks and canal enlargement, Weitzel received that mission and soon found himself amidst one of the greatest battles of his life. He and his forces suffered accidents and setbacks and the struggle proved a bitter education for Weitzel, but when he completed and opened Scowden locks and the canal to navigation in 1872, Louisville hailed him as one of the greatest engineers of the age. Although the formal title did not become official for many years after Weitzel's campaign at the Falls, he became unofficially the first commander of the Louisville District, United States Army Corps of Engineers.

FEDERAL FUNDING SOUGHT

Theodore Scowden again sought funding to complete the canal enlargement in 1866, persuading Cincinnati's Chamber of Commerce to send a committee to inspect the canal. When Scowden assured the delegation that an additional \$1 million would complete the enlargement, the committee returned with a favorable report to the Chamber of Commerce. Rather than seeking loans from Cincinnati capitalists, however, the chamber referred the issue to Ohio Congressman Benjamin Eggleston, asking that he obtain federal legislation to loan \$1 million to the canal's directors while taking a second mortgage on the canal property and revenues. This seemed a novel approach, considering the fact that the United States already owned the canal's stock.¹

As recommended by Cincinnati, Eggleston broached the loan concept with the House Committee on Commerce, which declined to include the requested loan in its 1867 Rivers and Harbors appropriation bill. This bill, however, appropriated funding to begin building a canal with locks on the Upper Mississippi River at Des Moines rapids, and Eggleston suggested to Cincinnati's leaders that if Congress funded a canal on the Mississippi that would be toll-free when completed then the Louisville canal surely deserved to be placed on the same footing. Agreeing, Cincinnati quickly dispatched a resolution to Congress asking that it either appropriate funds needed to complete the Louisville canal enlargement and eventually free it of tolls, or that it loan the canal directors the money for the purpose.²



Godfrey Weitzel (Corps of Engineers)

Although Congressman Eggleston found he could not secure federal loans or funding for completing the canal enlargement, he obtained authority for two studies. First, he persuaded the Secretary of Treasury to audit the canal company to ascertain its fiscal status. For this audit, the Secretary employed William Gallagher who had served as special auditor when James Guthrie was Secretary of Treasury before the war. Gallagher left his retirement home at Pewee Valley in 1867 and conducted an exhaustive review of the canal company's records and books. He found no evidence of malfeasance in all the canal company's history, and, after reviewing its construction of Scowden locks during the war, he reported: "It affords me pleasure to report the existence of important and decided evidences of plans well-matured, materials selected with judgment, and work executed in the most substantial manner."³

In a congressional joint resolution of March 1867, Eggleston obtained authority to initiate a new survey of the Falls and of canals bypassing them on both sides of the river. This resolution assigned the survey to the Secretary of War, directing him to prepare plans and cost estimates for building a canal on the Indiana bank and for completing the Louisville and Portland canal on the Kentucky bank. It requested the report be submitted to Congress by 1868.⁴

By direction of the Secretary of War, General Andrew Humphreys, Chief of Engineers, assigned the Falls mission to Major General Godfrey Weitzel, supplying him with copies of the prewar canal surveys made by Thomas Cram, Stephen Long, and the 1853 board of engineers. This appointment was a brilliant stroke by Humphreys because Weitzel was a much-admired officer and a native of Cincinnati. Who better to serve Cincinnati's demands for an independent investigation of the merits of building a new canal in Indiana as compared with finishing the Kentucky canal than a Cincinnati native?⁵

As military engineer and commander, Godfrey Weitzel had few peers in his time; yet he remained an unsung Civil War leader. The son of German immigrants, Weitzel grew up in Cincinnati, graduated at West Point, joined the Army Corps of Engineers, and during the 1850s designed and constructed fortifications to defend New Orleans. An officer of the Engineer battalion assigned to protect Abraham Lincoln during the 1861 presidential inauguration, he was then sent on a secret mission in 1862 to plan the joint army and navy assault on New Orleans, and his success there led to his appointment as military mayor of New Orleans and as chief engineer of the Union army in Louisiana. After Union forces had reopened the Mississippi River to commerce, Weitzel went east to serve in General U. S. Grant's assault on Richmond, receiving command of the 25th Corps with the rank of major general. Weitzel and his corps occupied the Confederate capitol in April 1865, and he escorted President Lincoln on his triumphant tour of Richmond. General Weitzel's services thus bookended the war from Lincoln's inauguration to his assassination. He distinguished himself in both the western and eastern theaters of the war, and at its end he commanded troops sent to Texas to close out action in the trans-Mississippi theater and confront the French forces that had seized

Mexico while the United States was preoccupied with its civil war.⁶

In the postwar demobilization, Weitzel returned to regular command in the Corps of Engineers, married a Cincinnati lady, and gladly accepted the engineering assignment at Louisville near his bride and home in Cincinnati. In May 1867 Weitzel went to New Albany, Indiana, lodging as guest of his friend, General Thomas Sedgwick, and accepting Floyd County's generous offer of free office space in its courthouse. This, of course, assured New Albany that Weitzel would begin his mission with the Indiana canal survey. Louisville, however, remained skeptical of all plans to build an Indiana canal, and a news editor commented: "Congress has done some very foolish things, but we doubt if it could possibly do as foolish a thing as to authorize the digging of a seven-mile canal, and leaving the half-finished canal on this side, that is only two miles and one-half long, after the million and a half that has been expended. Gen. Weitzel himself and all others that are well posted do not expect that Congress will authorize the Indiana canal."⁷

As Weitzel arrived at the Falls, Theodore Scowden departed. Despairing of obtaining funding for completing the canal enlargement, Scowden moved to Cleveland, Ohio, to promote his steel-processing patents and, with investors Jonas Rhorer, James Guthrie, and Joshua Fry Speed, to enter steel manufacturing. Scowden and company built steel mills at Cleveland, New York, Cincinnati, and in Louisville with Scowden serving as the engineer. Scowden also continued his consulting engineering business, taking contracts to design water-supply systems at Newport, Kentucky, and Dubuque, Iowa, and assigning his son Ransom to their construction management.⁸

THE FALLS BRIDGE

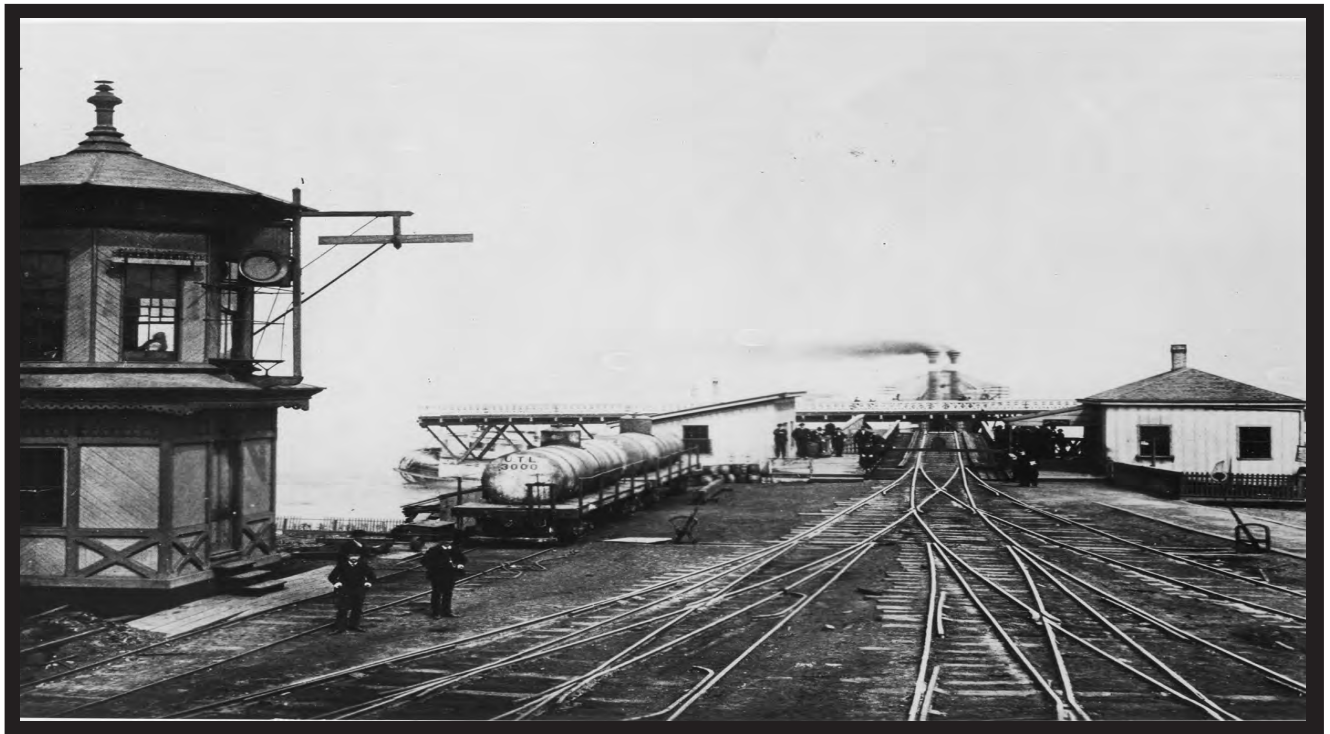
Employing a survey crew headed by George Eichbaum with Phil Schopp as draftsman, General Weitzel began his survey of the Falls and canal routes on July 25, 1867. He soon observed that environmental conditions at the Falls were changing, partly as a result of James Guthrie's bridge project. Although his efforts to bridge the Falls during the 1830s had failed for lack of funds, Guthrie had renewed this project during the 1860s, forming the Louisville Bridge

Company to link Indiana's railroads with his own Louisville and Nashville Railroad. This bridge, providing a direct rail link, would foster increased commerce between northern manufacturers and southern agricultural producers, making Louisville a central commercial hub.⁹

In January 1865 the Kentucky legislature elected James Guthrie to the United States Senate, where he obtained a federal permit to build a bridge over the Falls. He led the Louisville Bridge Company's efforts to market its stock, efforts unconsciously abetted by Cincinnati, which at the war's end funded the construction of a suspension bridge over the Ohio to tap into the commerce of northern Kentucky and the South. Seeing Cincinnati's bridge and railroads as a threat to their commercial prospects, the cities of Louisville, New Albany, and Jeffersonville at the Falls invested heavily in Guthrie's bridge, and in 1866 Guthrie employed Albert Fink as the bridge engineer. Fink designed an iron truss bridge resting atop stone masonry piers. Including its graded approaches, the bridge would total 7,720 feet in length with a 264-foot-long swinging pivot bridge over the canal and thirteen spans over the river—the longest span over Indian chute had a 49-foot clearance above the river's high level.

Promoting Guthrie's bridge, Louisville news editor George Prentice wrote: "By the erection of this bridge we will have rid the city of a portage and its endless train of annoyances, which have always impaired our facilities of transportation, operated to reduce our trade, and inflicted upon us and our customers the injury and embarrassment of high freight tariffs. The removal of this millstone about our necks would of itself justify the outlay, by our own merchants and capitalists, of the amount required to bridge the Ohio."¹⁰

A week after Weitzel began his Falls survey, Guthrie's company laid the masonry cornerstone in the bridge's first pier on Corn Island. After rising along a graded approach to the pivot bridge over the canal, Fink's bridge would cross Corn island and follow a straight line across the head of the Falls to the Indiana bank. Designed with a 5,220-foot-long iron superstructure resting on 25 piers and 2 abutments, when completed the Ohio Falls bridge would be the longest iron bridge in America with exception of the Victoria Bridge at Montreal. The bridge contractor, Flannery, lowered the first pier cornerstone into place on Corn island on the first of August 1867 and handed the bridge company president a mallet, saying: "Now sir, I want you to strike this stone three times and pronounce it well and truly



The approach to the Ohio Falls bridge on the Kentucky side as it looked when the turnspan was open. The stacks and the smoke of the passing steamboat are visible above the tracks. J.C. Cox, standing in the left foreground, had charge of the bridge operation; the two men with him managed railroad telegraph operations. (University of Louisville Photographic Archives)

set." When the president performed this Masonic ritual, the bridge's construction began in earnest.¹¹

The bridge contractor built a landing at the canal's entrance to unload stones brought down by boat from Utica, Indiana. From this landing, mules pulled the stones on railcars along a trestle built over Corn island and farther to piers in the river. The early pier construction went quickly but not safely. In October Patrick Welch, while riding a railcar hauling stone across the trestle, jumped from the car and a line tangled his foot, tumbling him onto the rails where the loaded car crushed him. The next month the contractor was placing three-ton stones in the pier built to support the pivot bridge over the canal when the derrick operator misunderstood an order and suddenly dropped a huge stone into the foundation pit. Before it plunged down the contractor and five workers were standing beneath the stone, but they moved just in time—its fall left them only badly scared and bespattered with mud, water, and cement.¹²

The bridge company assured rivermen that Fink's bridge would not obstruct their navigation over the Falls. "Science and skill, in the structures named, have silenced opposition," read a company news release, but Falls pilot Pink Varble soon learned different. In May 1867 Varble had earned plaudits by guiding the 42-foot-wide steamboat *Louisiana* safely down Indian chute.

"A 42-foot-wide boat passing through a 48-foot-wide chute with no water to spare calls for great skill in a pilot," commented a reporter, praising Varble for his nerve, but the new bridge tested that nerve again in January 1868. Varble started down Middle chute in his towboat *T. D. Horner* to retrieve a boat stranded against the Falls' rocks, but fog obscured the new pier at the chute's edge and he rammed it amidships. Sudden shock upset everything aboard the towboat, dropped its boiler into its hold, knocked Varble from his feet, injuring his hand in the pilotwheel spokes, and plunged two crewmen overboard to their deaths. Varble and the surviving crew boarded their yawl to continue down the Falls to save the other boat,



The Ohio Falls bridge at Fourteenth street, designed by Albert Fink and completed in 1870, was the first bridge between Louisville and Jeffersonville. In the foreground is its turnspan over the canal supported by the round pier. (University of Louisville Photographic Archives)

but the bridge pier had cost Varble his \$15,000 towboat.¹³

Steamboatmen reacted to Varble's disaster quickly, petitioning Congress to direct General Weitzel to review the bridge plans, and Congress agreed with steamboatmen that the Louisville bridge's design should be investigated. The bridge's low clearance troubled Weitzel, "because in the very highest stages of the river there are some boats so large that even by lowering their chimneys they could not pass under the bridge." This would occur only during brief flood periods, however, so Weitzel did not force the company to increase the bridge's clearance over the water.

He negotiated a concession from the bridge company, however, to spread its channel piers an additional thirty feet apart, providing a 400-foot width for boat passage into the chutes. This review of bridge plans initiated the regulatory authority of the Corps of Engineers that Congress gradually expanded, in 1890 requiring that all bridge plans and construction be reviewed by the Corps.¹⁴

Weitzel soon saw that river transportation was in transition during the postwar years, changing from steamboat packets transporting both passengers and packaged freight to towboats and barges moving bulk commodities. Although steamboat packets continued plying the Ohio for many years, few were owned at Louisville because the war had nearly destroyed Louisville's river commerce with the South, and in postwar years the Falls City's capitalists invested in railroad and bridge companies rather than in steamboats. On this development, a Louisville river reporter in 1868 observed:

The steamboat business has undergone a material change in the past few years, and, as every one must know, is fast getting worse every day.... Before the war Louisville prided herself upon having the fleetest, finest, and largest steamers in the United States, and we are proud to add that they were well sustained and patronized. Our merchants in those days felt some obligation on their part to aid, help, and sustain their home boats and regular packets.

We suppose there are few who do not remember the brilliant career of the *Eclipse*, *Shotwell*, *Diana*, *Robt.J. Ward*, and numerous other splendid steamers in the Louisville and New Orleans trade, together with the *Alvin Adams*, *Crystal Palace*, *Moses McLellan*, *Fashion*, *Southerner* and *Northerner* and etc. of the great lightning U. S. Mail Line between this city and St. Louis.¹⁵

Louisville's merchants attempted to revive their southern commerce in 1867 by contracting with Captain Pink Varble to run his towboats and barges up the Tennessee River into Alabama and up the Arkansas River to Fort Smith, but this initiative did not restore the city's southern commerce. Yet, as passenger and packaged goods switched from steamboats largely to railroads, in terms of total tonnage river commerce did not falter. Coal from the Monongahela and Kanawha rivers, pig iron from Portsmouth and St. Louis, and cement from Louisville regularly moved by towboats and barges in a steadily growing stream. When Pink Varble took the towboat *W. H. Brown* over the Falls in 1867, for example, a news reporter observed that it had brought down from Pomeroy, Ohio, a tow of 20,635 barrels of salt and 10,000 bushels of coal in just two days. "Years ago if a flatboat loaded with a few hundred barrels of salt came floating down the river in a week or ten days it was considered a big thing, but now a powerful tug takes a score of thousand barrels of salt and a half a score of thousand bushels of coal and whisks them down the river in forty-eight hours. That is moving things in a lively manner."¹⁶

The swelling coal commerce barged downriver from Pittsburgh was the most striking commercial development of 1867. On the spring rise that year, twenty-two towboats pushing 100 barges and 40 coalboats arrived at Louisville with 1.9 million bushels of coal, and of this more than half went down the Falls to southern ports. After Varble and other Falls pilots had steered the tows over the Falls, even larger tows formed at West Louisville to deliver the coal on to southern markets. Where the coalboats before the war were sold south along with their cargoes, it increasingly became the custom to return empty coal barges up the river to

Pittsburgh; as example, the towboat *Ajax* brought up from New Orleans six coalboats and eighteen empty barges forming a 200-foot wide and 800-foot long tow, described as the “biggest tow” ever brought upriver and over the Falls. Experimentation also began in 1867 with the use of petroleum instead of coal as steamboat fuel. The steamboat created quite a stir when it arrived at Louisville from Cincinnati using petroleum to heat its boilers, but its inventor, H. S. Saroni, found no capitalists at Louisville interested in investing and steamed his novel boat back to Cincinnati. Later, when petroleum gummed up the pipe orifices under the *Fire King’s* boilers, Saroni abandoned his boat, leaving the future development of petroleum-fueled boats to other inventors.¹⁷

WEITZEL’S STUDIES

In light of river commerce’s changing character, General Weitzel polled a convention of steamboat owners and operators meeting at Cincinnati in October 1867 on their preferences for Falls development. They voted in favor of installing locks that were 400 feet long and 110 feet wide in any new canal on the Indiana side, but they preferred early completion of the 350 by 80 feet Scowden locks. Weitzel also contacted the Louisville canal’s president James Guthrie, asking what the company might require for the federal government to take control of the canal. Guthrie responded that the five canal directors would gladly sell their shares as soon as the government agreed to pay the mortgage on the canal property—the canal company’s debt was \$1.5 million while it had \$200,000 cash on hand from toll receipts.¹⁸

Examining the abandoned canal enlargement construction, Weitzel saw the canal directors had modified Scowden’s designs in only one major respect. To reduce excavation costs during the war, the directors had narrowed the canal line’s excavation from the 100-foot proposed by Scowden to just 90 feet; Weitzel saw little harm in this modification, however, because the new locks were only 80 feet wide. Weitzel reported the Scowden lock masonry completed except for stones to be placed at the bottom of the lock chambers, forming the miter sills holding the lockgates. The wooden lockgates assembled during the war were stored near the locks, and new iron drawbridges across the upper lock and at Elm Tree Garden (Eighteenth street) were in

place and in service. He saw that the 28-foot-high masonry lockwalls of a new guard lock near the canal’s entrance were completed and ready for lockgate installation, and the embankment next to the river was nearly completed, running 2,500 feet from the upper guard lock downriver—when completed the embankment would be two feet higher than the 1832 flood crest.¹⁹

In his 1868 report to Congress General Weitzel reviewed the options for improving the passage around and over the Falls, reaching conclusions similar to those of Captain Thomas Cram in 1844. Weitzel supported both completing the canal enlargement begun by Scowden on the Kentucky side and building a second canal on the Indiana bank, the latter being 120 feet wide and its locks 400 by 100 feet. Weitzel argued that growing river commerce would soon justify the costs of building both canals, with ascending boats using one canal while descending boats used the other. To reduce the amount of expensive rock excavation required for deeper canals, Weitzel proposed building two low dams, one along the crest of the Falls and the other below at Sand Island—these would deflect water into the canal approaches, affording a deep channel at less cost than rock excavation. He told Congress that, because of the 1830 locks’ limited capacity, the Union Army during the war had paid in drayage fees for portaging supplies around the Falls a sum sufficient to have built both the new Indiana and Kentucky canals. “The Ohio River is a national highway and the Falls are an insurmountable obstruction in this highway on an average of 300 days in each year,” Weitzel lectured, adding: “It was clearly the duty of the government to remove this obstruction, as it did and does almost everywhere else, but instead of doing this duty, it became a stockholder, and made money in a company chartered by the State of Kentucky, which levied an onerous and unjust tax on the commerce.”²⁰

Weitzel estimated the costs at about \$1 million for completing the Kentucky canal, \$3.4 million for building the new Indiana canal, and a half million dollars for constructing the two dams, or an approximate total of \$4.8 million, and he asked for a \$400,000 appropriation to start construction. In July 1868 Congress enacted a River and Harbor bill that, in an unusual move, did not list how much funding should be expended on specific projects; instead, it directed

the Secretary of War to expend the funding as he deemed best. Asked how this funding should be allocated, General Andrew Humphreys, Chief of Engineers, advised the Secretary of War: "The improvement of the navigation at the Falls of the Ohio is perhaps of greater importance than any other western river improvement." Under this authority the Secretary of War allocated \$85,000 for Weitzel's mission at the Falls, and the Chief of Engineers directed Weitzel to expend it solely on building the dam he had planned at the crest of the Falls, thereby delaying work on the canal and locks pending further consideration of federal relations with the canal company.²¹

With this allotment Weitzel awarded contracts to build a cribdam extending from the head of the Louisville canal along the crest of the Falls toward the Middle and Indian chutes. Contractors then built the cribdams by spiking timbers in a rectangular pattern forming a pen or crib resembling a log cabin; they placed these timber cribs side by side in the river, bolted them to the foundation stone, filled them with rock, and planked over their tops. Such cribdams had been used since ancient times to impound streams to use the water for irrigation or to power mills. Kentucky's pilgrims had built hundreds of cribdams to impound small streams, providing water power for grist and lumber mills, and the Commonwealth's engineers had built them during the 1830s on the Green and Kentucky rivers to afford slackwater navigation for steamboats. The cribdam built along the Falls' crest was designed to deepen the river above it—at low-water stages—by about three feet, with a corresponding increase of depth in Louisville's canal. Building such dams could only be accomplished at low-water stages, however, and Weitzel moved slowly with the dam construction because he recognized that it might increase current velocities down Middle and Indian chutes, hindering the ascent of boats. He urged that the Louisville canal enlargement should be started to afford safe passage for ascending boats before completing the cribdam. The Chief of Engineers saw the merits of Weitzel's opinion and so advised the Secretary of War, who broached the issue at a meeting of President U. S. Grant's cabinet. President Grant then authorized an additional \$180,000 allotment in 1869 to begin the federal effort to complete Scowden locks and the canal enlargement.²²

When this plan reached Congress, a royal battle over finishing the canal began, with John Sherman of Ohio and Oliver Morton of Indiana leading its proponents in the Senate. When critics complained that steamboats should use Middle and Indian chutes to pass the Falls instead of the canal, Senator Morton responded that General Weitzel had told him of three boats lost on the Falls that winter: the *J. P. Webb* hit Wave Rock at the Big Eddy and went down stern first, wrecking the boat and losing its freight; the *LeClaire* struck the new bridge pier, capsized, and went to the bottom of Big Eddy; and the *Falls City* rammed Ruble's Rock, shivering its timbers and floating to Sand Island before sinking. Senator Simon Cameron of Pennsylvania interjected that he personally knew John Hulme of Philadelphia, who had assured him the canal was profitable, that its tolls would easily pay its operational costs; on behalf of Pittsburgh's coal-towing trade, therefore, Cameron urged speedy funding of the enlargement. Congress passed the 1869 bill funding the completion of Scowden locks, although Senator Jacob Howard of Michigan warned that federal canal funding might lead, unfortunately, to federal operations: "If we become the owners of the canal, we shall be obliged of course to keep an agent there to collect the tolls, to keep it in repair, and to attend to all the ordinary consequences of ownership of a canal. I do not believe that the Government is well fitted in its nature and framework to carry on such an enterprise." This warning went unheeded.²³

Watching Weitzel's construction of the Falls dam and Albert Fink's construction of the Ohio Falls bridge simultaneously in 1869 entertained the crowds who gathered to watch at Shippingport's Elm Tree Garden, recently purchased and renamed the Louisville Garden. The new owner supplied his customers with meat and drink, also offering them opportunities to enjoy wholesome baths in the river while listening to "the roaring of the angry waters of the turbulent Falls, the hissing, roiling billows that rise and fall and break as they sweep downward on the heart of the great river." As the bridge's construction inched toward Indiana, the Garden's crowds sometimes witnessed mishaps. Ordered to work at one of the river piers, three builders took out a skiff, but when they dropped anchor at the pier its cable tangled the foot of chief derrick operator Henry Smith, jerking him overboard and capsizing the skiff.

Two of the men caught onto the pier as they floated pass, saving themselves, but Smith floated down the Falls, desperately clinging to the skiff. Ascending aboard the *Camelia* at the time, Captain Pink Varble saw Smith's peril and went after him but the Falls sucked Smith to the bottom before Varble could save him.²⁴

The sportsmen at the Garden also could see work underway nearby on Louisville's new wharf and coal elevator. At an 1868 referendum the city's voters had approved purchasing land from John Rowan's heirs to build a new lower wharf and basin near the canal entrance. With permission from the canal directors, John P. Byrne and James B. Speed also began construction of a coal elevator in a 450-foot-long and 80-foot-wide basin excavated at the side of the canal. Byrne lived at Shippingport in the mansion once owned by John Tarascon and Frank McHarry; Speed managed Tarascon Mill and allied cement production plants. Their coal elevator at the canal basin was the first built at Louisville for unloading boats, replacing the earlier manual labor of shoveling coal from barges into carts. It had a high derrick that hoisted iron buckets full of coal from barges into a large storage bin; coal carts and wagons then

passed under the bin to be filled and weighed before retailing the fuel to Louisville's mills and homes.²⁵

On the north side of the Falls, Indiana pressed for immediate construction of the large new canal that Weitzel had recommended to Congress. A pep rally at Jeffersonville in the summer of 1868 called for its early construction to pass steamboats and loaded barges while also affording opportunities for water power and industrial development. Political support for the Indiana canal gradually died, however, probably deterred by the \$3.4 million price tag pinned to it by Weitzel. Asked later about Indiana's dwindling support, Weitzel speculated that perhaps the proponents objected to the route he had chosen for the canal. He maintained to the end, however, that the Indiana canal should have been constructed to better serve the burgeoning commerce passing the Falls.²⁶

As Weitzel prepared to start work on completing Scowden locks and the canal enlargement the project lost its greatest proponent. Suffering a stroke, James Guthrie retired from the United States Senate and returned to Louisville where he died in March



Reporters observe the excavation of Scowden locks. (Corps of Engineers)

1869. Thousands thronged the streets around Guthrie's home during the Masonic rites, and the Louisville canal directors served as his pallbearers, also publishing a formal tribute: "That in the death of Hon. James Guthrie the board has lost its most efficient member, a man of great energy, of enlarged views, and generous in his confidence. We, with the whole community, deeply lament his death and tender to his family the tribute of our heartfelt sympathy." Joshua Fry Speed succeeded Guthrie as canal president, and Guthrie's son-in-law, John Caperton, inherited Guthrie's single share of canal stock and took his seat as canal director. Guthrie had been the central pivot in the development of the canal and Louisville generally for a half century; although renamed and rebuilt in various incarnations during subsequent years, Louisville's canal, railroad, university, bridge, and county courthouse continued in service a century and a half later, mutely testifying to Guthrie's vision and leadership.²⁷

WEITZEL'S CONSTRUCTION PROGRAM

To resume construction of the Scowden locks and canal enlargement, suspended in 1865, Weitzel first met with the canal directors and Theodore Scowden—he had known and admired Scowden at Cincinnati before the war. Weitzel decided to follow Scowden's plans with three

exceptions. First, Scowden had planned to excavate the canal from its 64 feet to a 100-foot width, but the canal directors as a cost-cutting measure had reduced the excavation to 90 feet. Because the locks could pass boats no wider than 80 feet, Weitzel further reduced the canal excavation to an 85-foot width.

Second, because the Ohio Falls bridge blocked boat passage at extreme high water stages, Weitzel opened a new channel under the railroad draw bridge alongside the canal; called Varble Pass, this opening allowed boats to pass by the pivot bridge at high water and enter the Kentucky chute. Finally, Weitzel extended the apron dam, a cribdam at the upper canal entrance, to an 1800-foot length instead of 600 feet Scowden had planned; this extension guided low-water flows into the canal.²⁸

During the summer of 1869 Weitzel awarded contracts to extend the apron dam at the entrance and to excavate a wider approach into the canal; and late in the year he contracted for completing Scowden locks and excavating the canal to an 85-foot width. He advised the Cincinnati Chamber of Commerce that the work they had so long desired had begun, and when Scowden locks opened, triple the size of the 1830 locks, every boat on the Ohio could pass through them except the great packet *Richmond*. Cincinnati immediately dispatched a committee to Washington to lobby for additional project



Both steam and mule power was used to finish the canal. (National Archives)

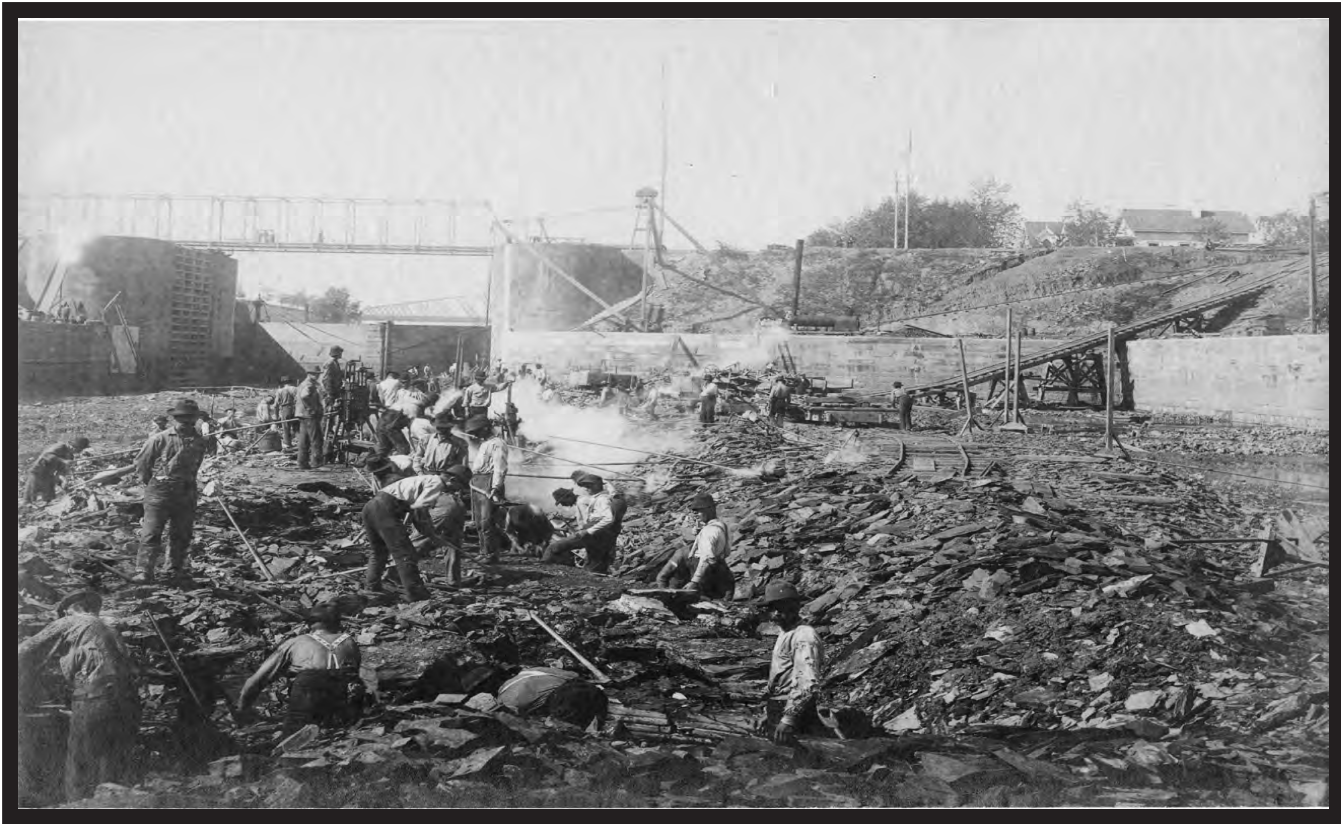
funding, but Louisville displayed little excitement over the construction start because it came as the Ohio Falls bridge was completed: the first train crossed the bridge on February 12, the city formally celebrated its opening on February 18, 1870, and the first freight train, loaded with Great Lakes ice for Louisville's summer refreshment, soon initiated the bridge's commercial service. This did not please Cincinnati, however, which complained that Louisville's bridge had blocked safe passage of the Falls: "some of the best river pilots lost their boats and lives against the bridge piers trying to run the rapids."

With the bridge construction and the unfinished canal, Cincinnati believed that Louisville was deliberately blocking its commerce with the South, and it determined that it must have a new trade route, initiating construction of the Cincinnati and New Orleans Railroad, called the "Queen and Crescent," traversing Kentucky and Tennessee to southern markets.²⁹

To facilitate excavation of the canal enlargement, General Weitzel closed the canal on July 25, 1870, promising to reopen it by December. By July he had put five contractors to

work, one completing Scowden locks and four excavating sections of the enlarged canal. Hundreds of workers swarmed over the job as Weitzel pressed the contractors to finish their work by winter. When a gang of laborers went on strike, asking a pay increase to \$2 per day, Weitzel advised the contractors to employ other hands and he would see to it that they were protected. Safety hazards were plentiful, and in August a contractor employee perished. The contractors drilled holes all day, and at the end of the day packed the holes with nitroglycerin and detonated it to shatter rock for excavation. When one charge seemed a dud, an employee left his shelter, walking toward the charge to learn what happened, when the blast detonated and killed him. In September the contractor on the upper section reported he had encountered a changed condition at the foot of Tenth street where his workers had discovered the bed of a creek ten feet beneath the solid rock. It was packed with tree trunks and even leaves, perfectly preserved, that mystified everyone—even Louisville's oldest resident could not remember when a creek flowed in that vicinity.³⁰

When some contractors lagged behind schedule, in October the Cincinnati Chamber of



Completing the canal enlargement was hard work, requiring removal of deep expanses of stone. (National Archives)

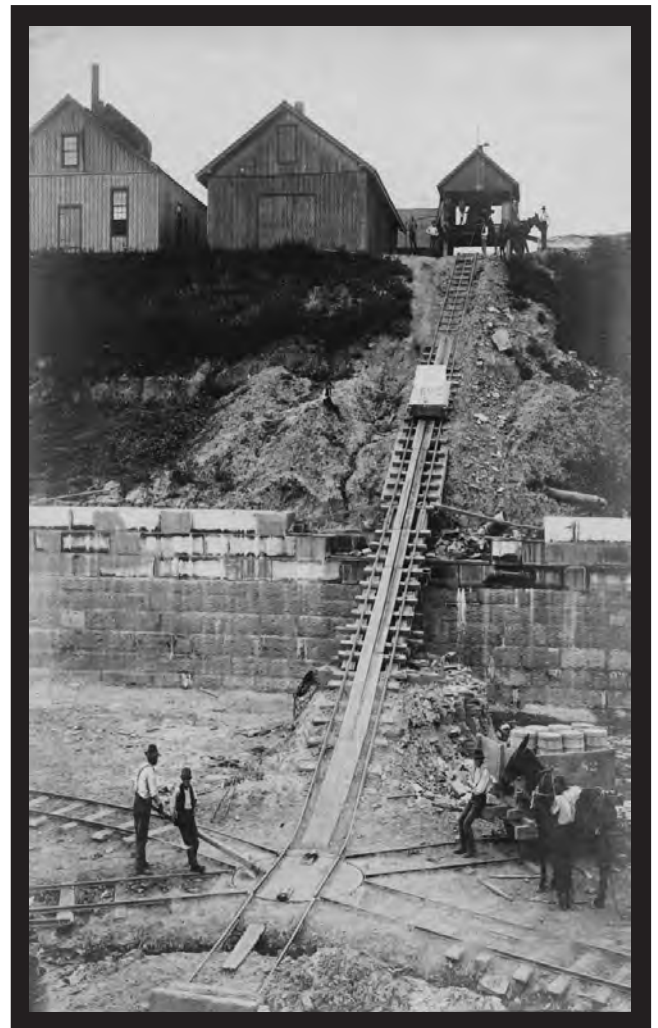
Commerce sent a committee to meet with Weitzel and urge accelerating the work to reopen the canal to navigation. Weitzel told them the contract completion dates were set for December 19 and, although three of his five contractors were behind schedule, if good weather continued he could open the canal to traffic then.

This would not complete the work, however, and Weitzel told the committee of his scheduling challenges:

Retaining walls must be built, the basin at the head of the old and new locks must be excavated, and the ledge of rocks between the exit of the new locks and the river channel must be removed. I have requested additional appropriations of \$200,000 this December and \$250,000 for following year. To build the retaining walls that keep steep earth slopes from slipping into the canal, it is necessary to quarry the stone now, and the \$200,000 will be used for this purpose. I want to contract for the stone on January 1, but cannot contract until Congress has made the \$200,000 appropriation in its December session. The reason my contractors are behind schedule is that behind the old retaining walls on three-fourth of the line the fill had been made with rocks thrown in, not earth. So this was not just earth excavation as I had been led to believe.... Cincinnati can help by pressing for an early appropriation. It should send a committee to Washington that will explain the grave importance of this work and show that this is the most important work of river improvement in the country, and which will insist on the appropriation.³¹

To pass boats over the Falls while the canal remained closed, the Falls pilots drove ring bolts into rocks at the head of Indian chute as anchorages for ascending boats to line onto and warp their way up the passage; and this expedient proved beneficial because Weitzel's

contractors fell farther behind schedule. By November, Cincinnati's warehouses were full, commercial loans were coming due, and the Queen City feared financial disaster unless the canal soon reopened. The president of Cincinnati's Board of Aldermen met personally with General Weitzel to ask if he could reopen the canal to traffic at night; he urged Weitzel to install gates in the guard lock near the canal's entrance, opening them at night to flood the canal and allow boat passage and closing them at morning to drain the canal for continued excavation. Weitzel understood that the blockade cost his Cincinnati friends money, but he refused to open the canal at night—the rock blasting each evening threw chunks into the canal that might sink boats passing in the dark. The canal directors also pressed Weitzel to reopen the canal because they desperately needed the toll



Rails and a hoisting engine lowering stone on rail carts into the canal for its masonry. The mule at the right pulled a rail cart loaded with cement barrels. (National Archives)

revenues to pay the first \$350,000 installment on their loans coming due in January 1871. But Weitzel also denied their request because "the government wants me to conduct the work for the benefit of all, and not for a particular class. I am doing all in my power to do this."³²

By December 1870, Weitzel saw that the contractors could not finish the enlargement excavation as scheduled, and he therefore suspended work for the season, reopening the canal. With authority from the Chief of Engineers, Weitzel extended the contractors' schedule to allow them to complete their work during 1871. Although at points the canal width was still restricted to 64 feet and boats had to use the old canal locks, many dozens of waiting flatboats, coal barges, and steamboats passed. Yet, the resulting toll collections proved insufficient for the canal directors to pay the first \$350,000 installment on the loans they had taken in 1860 to build Scowden locks, forcing them to borrow \$100,000 to meet their obligations.³³

In the winter of 1870-71, Weitzel expanded his project designs, preparing contract specifications to build a dam connecting Sand Island with the Indiana bank, to remove a rock ledge below the canal's exit, and to remove the old stone wall from the north canal bank next to the railroad's pivot bridge. The Sand Island dam would divert river flow below the Falls down the Kentucky side of the island to provide a deeper channel at the canal's exit and at Portland wharf. Removing the stone wall next to the pivot bridge would permit boats to pass around the railroad bridge during high river stages when they could not get under the span over Indian chute; when boats entered the canal, the railroad bridge over the canal could be pivoted out of their way, then they could steam over the canal's north bank into Kentucky chute and down the Falls. Suggested by Falls pilot Pink Varble, this passage, dubbed Varble Pass, often proved useful to commerce.³⁴

Work on Scowden locks resumed in April 1871 and Weitzel predicted that they and the enlarged canal would open to commerce by November. More than a thousand workers were on the job by July 20 when Weitzel again closed the canal to continue its excavation, announcing it would reopen by October 20. By August, however, Cincinnati had become uneasy about his progress and sent another committee to

inspect the work. Weitzel along with Captains Pink Varble and Richard Woolfolk gave the committee a grand tour. They saw the contractor on the upper canal section had completed his excavation and was building the stone retaining wall, employing eight masons, 30 laborers, 3 boys, 4 horses and carts, a 3-horsepower steam engine, and hoisting derricks. McGlincey Company, contractor for the second section was far behind schedule with its excavation and Weitzel pressed it to hire more workers to expedite. The contractor for sections 3 and 4 was on schedule, as was the contractor for section 5, working five foremen, 140 laborers, 25 horses and carts, 18 stonemasons, 6 blacksmiths, 6 carpenters, 5 steam engines, and 12 derricks. H. T. Cook Company of New Albany, the contractor for completing Scowden locks by installing the miter sills, lockgates, and operating machinery, was ahead of schedule. The Cincinnati committee was pleased that Weitzel intended to forfeit any contracts not completed on schedule and to re-award the contracts to finish the job. "He will not allow the commerce of this great valley to be blockaded by the tardiness, inattention, and indifference of any contractor," the committee reported.³⁵

As promised, Weitzel forfeited the McGlincey contract in September, whereon the contractor's employees rioted until McGlincey paid them to date. After taking their pay, the workers began drinking and fighting amongst themselves, leaving many with shiners and bloodied noses. When the survivors gathered later that afternoon at the end of the railroad bridge, threatening to block trains, police officers arrived and fired shotguns into the air to disperse the crowd. Weitzel then awarded a contract to finish McGlincey's section, and the new contractor put four steam excavators (shovels) to work, each capable of removing 350 cubic yards of materials daily, soon putting the work nearly on schedule for completion in November.³⁶

SCOWDEN LOCKS COMPLETED

By mid-November when the Cincinnati committee returned to inspect the project while also attending a national steamboat convention at the Galt House hotel, they observed that Weitzel had completed the canal enlargement and had nearly finished "the largest and most perfect locks in the country." According to their

assessment, Weitzel's project at Louisville earned him a ranking among the greatest engineers of the age: Albert Fink and his Ohio Falls bridge, Cyrus Fields and the Atlantic telegraph cable, James Eads and the Mississippi River bridge at St. Louis, and Godfrey Weitzel and the Louisville and Portland Canal.³⁷

Their accolades proved premature. At midnight on November 22, 1871, canal superintendent Enoch Lockhart opened the gates of the canal guard lock, allowing the river to enter and refill the canal. Water had risen against the gates of the locks to a nineteen-foot depth, when the upper lockgates and miter sill gave way, releasing a sudden flood that damaged the lockgates and sills below. Weitzel quickly closed the canal guard gates to shut out the river, marshaled his forces and worked around-the-clock for three days, throwing a cofferdam across the branch canal's entrance—thereby allowing boats to resume passing the canal through the old locks on November 26. When water emptied from the new locks, Weitzel went down into the chambers to examine the gates and sills, and he concluded the failure had occurred when the dry lockgate timbers became saturated with water, then expanded, pushing the gates up and fracturing the stone miter sills. Embarrassed, Weitzel lamented to the Chief of Engineers:

Now, when I came here to supply my want of experience in these constructions, I did just as you advised me to do. I wrote to Mr. Milnor Roberts, and he sent me two assistants of experience, and I have read every work I could reach on the subject of locks, even sending to Europe for two works at a large expense. But the trouble is that no locks were probably ever built, or ever will be built again, where the gates are put together eight years after all their parts are framed, and all this assistance and information, to me thus gained, was of no practical value in this instance.³⁸

Weitzel was absolutely correct. He had indeed conferred with W. Milnor Roberts, who designed the Monongahela River locks, and also with Theodore Scowden and with George

Stealey, engineer for the Kentucky River locks built during the 1840s. He had not only studied every publication on hydraulic engineering he could find, he had translated and published German plans for Weser River lockgates. The Chief of Engineers appointed an investigating board composed of Colonel John Barnard, Colonel John Foster, and Major Orlando Poe that met in Louisville and reviewed the lockgate failure; they generally concurred with Weitzel's conclusions on its cause. They recommended that the repairs include installing two-inch iron bolts through all miter-sill stones to anchor them into the bedrock, and Weitzel ordered this done.³⁹

At Weitzel's request, the canal directors brought Theodore and Ransom Scowden back to Louisville to reinforce the wooden lockgates against future disaster and contracted with Howard boatyard at Jeffersonville to strengthen the gates by installing additional cross braces and tension chains. With these repairs completed, Weitzel removed the temporary cofferdam from across the branch canal and Captains Enoch Lockhart and James Howard tested the gates before opening Scowden locks to traffic on February 26, 1872. That afternoon the *Mollie Ebert* followed by the *E. H. Durfee*, *Esperanza*, and *Potomac* became the first boats through Scowden locks; all were too large to have passed the old 1830 locks.⁴⁰

Louisville's merchants and shippers rejoiced at completion of the new locks, triple the capacity of the old locks, and the news flashed by telegraph to Cincinnati. The *Potomac* was the first boat to pass the new locks ascending on to Cincinnati, and as it approached the Queen City flags were hoisted, cannon salutes fired, and crowds at the wharf cheered the boat's arrival. Louisville newspapers extended public congratulations to General Weitzel on his successful mission, while the city council passed a resolution in tribute to Theodore Scowden.

Whereas, the branch canal and the enlargement of the Louisville and Portland canal, now opened to the commerce of the South and West, are works of great national importance, and reputed to be the largest and finest in the world, designed by T. R. Scowden, Engineer. The immense locks, bridges and extensions completed during his administration were built under very



Scowden locks during construction and as they appeared at their completion in 1872. (National Archives)

adverse and discouraging circumstances caused by the late war. And whereas the acknowledged benefit derived from this great public work can scarcely be estimated in promoting the general and commercial interests of the South and West which tends to unite the people of these sections by a common, closer, and stronger business and friendly tie: Be it therefore

Resolved, that the thanks of the General Council of the City of Louisville be tendered Mr. T. R. Scowden, the chief engineer of the canal, as a mark of our esteem and just appreciation of the able and valuable services he had rendered during his administration on the canal, and in the final opening of the new locks to Southern and Western Commerce.⁴¹

Completion of Scowden locks and the canal enlargement did not conquer all the Falls' navigation hazards. Two weeks after the new locks opened, the *Falls City* passed down through the old locks as the *J. W. Garrett* with barges in tow passed through the new locks. Both exited the locks at the same time and then collided, overturning heating stoves aboard the *Falls City* and setting it afire. It drifted against coal barges at West Louisville and its crew swiftly conveyed its passengers onto the barges just before the boat went down, taking a crewman with it. Another crewman named William Johnson earned public acclaim for coolly calming the terror-stricken passengers and leading them to safety.⁴²

A few days after loss of the *Falls City* the packet *Charmer*, descending Indian chute with a full cargo and many passengers, took an unmanageable sheer on Falls pilot Billy Varble, a brother of Pink Varble. When it hit rocks just below the cribdam on the crest of the Falls and sank, the captain of the towboat *Champion* risked his boat to get alongside the *Charmer* and save its passengers. After landing the passengers safely at Portland wharf, the *Champion* returned upstream via the canal, asking Captain Enoch Lockhart to let it pass free of tolls. Lockhart refused because the request violated company rules and he subsequently suffered public abuse for taxing charity.⁴³

Blame for both of these disasters fell squarely on the shoulders of General Weitzel. His dam closing the back channel of Sand Island diverted a current like a mill race down the Kentucky side of the island, past the entrance to the locks and Portland wharf and surely contributing to the *Falls City's* calamity. His cribdam across the crest of the Falls left but a 400-foot-wide entrance to Indian chute, intensifying current velocities through the chute. "It is the dam built to increase depth in the canal that has increased the current in the chute causing accidents," correctly warned a *Courier-Journal* editor. Manmade alterations to the Falls and the river generally, inexorably affected riverine hydrology, slowing currents at one point, speeding them at another. Weitzel recognized this and in 1873 he began studies of dams that could move with the river, up when it receded and down when it rose.⁴⁴

OBSERVATIONS

General Weitzel learned at the Falls that his mission of designing and managing hydraulic engineering projects—civil works—was no less difficult than commanding and leading an army. His attack on the left flank of the Falls at Scowden locks, after several setbacks, proved successful and earned him plaudits. His plans to build a second canal on the right flank in Indiana collapsed entirely, because his superiors lacked the resources needed to marshal a full scale attack there. His center assault, the cribdam at the Falls' crest, succeeded, but resulted in serious casualties; and his deep thrust to the foot of the Falls, the Sand Island dam, floundered, causing as much harm as benefit. This struggle made him painfully aware that his success on the front depended upon support from the rear, specifically from Cincinnati and its powerful influence in Congress and from his friends in Washington, his fellow combat veterans, General Andrew Humphreys, Chief of Engineers, and General U. S. Grant, elected president in 1868. Both knew Weitzel well and relied on him at Louisville just as they had during the siege of Richmond.

An old truism describing the use of overwhelming force to achieve an objective reads: "like Grant took Richmond." While Grant was the supreme commander, however, it was Weitzel who took Richmond. Historians generally neglected Weitzel's role in that final campaign of the war; just as his civil works achievements have received scant notice. At the time, however, Louisville hailed him as one of the greatest American engineers of the century. His studies and empirical education at the Falls made him the Corps' expert on navigation lock design and construction, a reputation that soon brought him a new mission—to design and build locks even larger than those at Louisville. This and his continuing struggles at the Falls surely earned him a ranking with General George Goethals of Panama Canal fame as one of the finest hydraulic engineers of the age; yet, everyone has heard of Goethals, few of Weitzel. As partial remedy for this neglect, the following chapter reviews his work at Louisville during the 1870s and his management of the first navigation locks ever operated by the Army Corps of Engineers.



10

THE FEDERAL CANAL

The largest navigation locks in the world. The first river navigation locks ever completed by the U. S. Army Corps of Engineers. Scowden locks also became in 1874 the first ever operated by the Corps. Their completion in 1872 initiated the second historic engineering phase at the Louisville canal. With an area within its chambers three times greater than the original locks completed in 1830, Scowden locks tripled the historic capacity for passing commerce around the Falls, and during the second phase they served as the primary navigation facility bypassing the Falls until 1921, forty-nine years. When launching this second phase of canal history, General Godfrey Weitzel met two principal challenges: negotiating with the canal directors the transfer of ownership from corporate to federal management, followed by formulating policies for managing the Scowden locks' operations, a mission new to the Corps.

General Weitzel learned the five Louisville canal directors shared comity of interests, united by loyalty to the Union, mutual business interests, and blood. Having no stockholders to elect them after 1853, when one director retired or died the other four selected a friend or relative as his replacement. James Guthrie was the leading Union Democrat of Kentucky; Joshua Fry Speed and his brother James Speed were among President Lincoln's best Republican friends; James Henning was Joshua Speed's brother-in-law and his partner in developing such real estate as the Highlands of Louisville; and Jonas Rhorer was their banker and canal secretary. One exception was Captain Enoch Lockhart, the canal superintendent since 1851 who was brought onto the board of directors because of his vast practical experience; although a prominent Union loyalist, Lockhart considered himself a workingman Democrat, yet he invested heavily in Jonas Rhorer's land speculations with John Caperton. As James Guthrie's son-in-law, John Caperton received part of Guthrie's estate in 1869 and succeeded him as canal director. A Californian, Caperton encouraged Rhorer, the Speeds, and Lockhart to invest in lands along the Sacramento River near San Francisco. This spiderweb of mutual political and business

interests prompted unity among the directors when they confronted General Weitzel and Congress in 1872 over the canal's management.¹

General Godfrey Weitzel initially enjoyed genial amity with the canal directors. Like them, he had the confidence of Presidents Lincoln and Grant and, politically, he was a Radical Republican—Weitzel sometimes boasted that as the 25th Army Corps commander he had led more black troops in battle than any other Union officer. And like several canal directors, Weitzel was a Freemason, credited with saving Richmond, Virginia's Masonic Lodge from destruction in 1865. The issues of managing the Louisville canal proved so divisive, however, that by 1872 the canal directors were throwing dirt in Weitzel's direction—literally.²

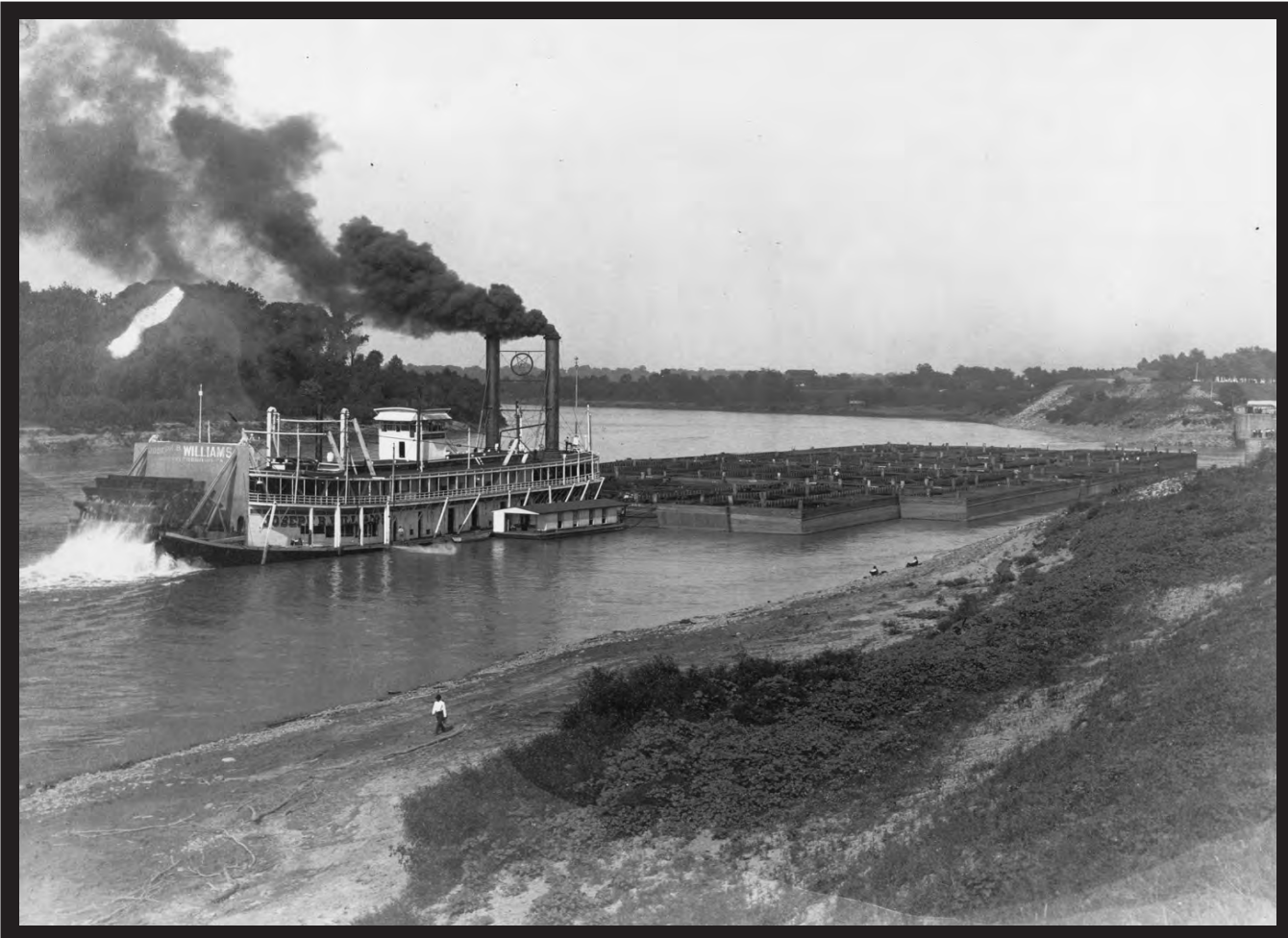
FEDERAL CANAL SUPPORT

Even as Weitzel opened Scowden locks to traffic in February 1872, Cincinnati's civic leaders were campaigning to obtain major federal funding for Ohio River navigation projects and, in particular, federal control of the Louisville and Portland Canal. Louisville's representatives Pink Varble and George Ainslie together with delegates from other river cities attended an Ohio River Improvement Convention at Cincinnati in 1872 where they heard Weitzel report his progress at the Louisville canal and Colonel William Merrill describe his planning for new Ohio River locks and dams. Sent to Cincinnati in 1870, Merrill had charge of federal navigation projects along the entire river except at the Falls, and he warned the Cincinnati convention that Congress had provided only \$50,000 funding annually for the Ohio River project where \$500,000 was needed. Organizing to lobby for building new locks and dams on the river, the convention requested governors of states bordering the river to appoint delegates to an Ohio River Commission and this was soon done: the Commission met regularly for years, annually testifying before congressional committees on behalf of the Ohio. The Cincinnati convention also appointed a committee to champion federal funding for the Louisville canal, and when the convention adjourned this committee left immediately for Washington, accompanied by General Weitzel ordered to report personally on his work to the Chief of Engineers.³

Encouraged by the convention's canal committee, Congressman William Holman of Indiana drafted a bill providing that the United States would pay the canal company's debts, take control of the canal, and reduce its tolls to a rate sufficient to pay the canal's operational costs. Responding to this initiative, the Kentucky legislature approved a resolution in March 1872 authorizing the canal directors to surrender ownership to the United States when it paid all canal company debts and purchased the five shares held by the directors. Qualifying this, the legislature mandated that federal managers would charge only tolls sufficient to cover operation and maintenance costs, that Louisville would retain the rights to build bridges over the canal and empty storm drains into it, that property owners along the canal could develop its water power—subject to all federal regulations—and that Kentucky would retain the power to serve criminal and civil warrants on the canal property.⁴

The canal company's attorney James Speed and General Weitzel had actually drafted this resolution together and the canal directors had approved it before Louisville's representatives presented it in the legislature, which enacted it without a single dissent. Weitzel recommended to the Chief of Engineers that Congress accept the state's terms because Louisville's storm drains already emptied into the canal and he did not foresee the construction of another bridge over the canal for years. The federal government could regulate any use made of the canal's water power, and local law enforcement could assist canal officers in preventing the property from becoming a "refuge for all vicious characters in the neighborhood."⁵

As Congress considered the canal's future, an anomalous management situation prevailed at Louisville with Weitzel in charge of new construction while Enoch Lockhart remained responsible for the canal's operations and maintenance. Lockhart met several operational



Coal traffic became the largest commerce through the canal after the Civil War. This is the Joseph B. Williams pushing a tow of empty coal barges upriver to the canal's lower entrance, visible at the picture's right edge. Sand Island is to the left of the towboat. (National Archives)

challenges, starting a month after Weitzel opened Scowden locks—a March flood left the canal full of mud, blocking it from March into May. Although Lockhart employed a large force to clear the mud, these workers went on strike for higher wages, stranding a dozen steamboats above the Falls, waiting and threatening the canal company with lawsuits to recover the costs of their delays. When Lockhart finally cleared the canal, the new lockgates remained stuck in place and he had to employ a diver to go down in the lock chambers and remove obstructions to the gate's movement. Lockhart saw that the existing lockgates would not adequately serve and he contracted with Howard boatyard to build a new set of gates. Once Lockhart had the lockgates operational, the canal reopened in May, then was clogged again in June 1872 by towboats pushing 115 coal barges and 12 coalboats, forcing passenger steamboats to wait while the coal passed. Lockhart sped the coal-barge passage by putting six barges, three and three abreast, through the new locks at a time, while two additional barges passed the old locks. These and other delays exasperated rivermen, however, who complained that declining steamboat packet service resulted more from the obstructions at the Falls and the canal than from railroad competition, and they urged that "if Congress would only take over the canal, it would get rid of the perpetual wrangles that result from its spasmodic opening and closing."⁶

Congress responded to these complaints in June 1872, appropriating \$300,000 for Weitzel to continue work at the canal and to prepare it for federal management, adding a deadly stinger that canal tolls thereafter would not exceed five cents per ton. With this new funding, Weitzel immediately awarded contracts for constructing vertical stone masonry walls along the entire length of the newly widened canal and for other finishing touches. Yet, when he told the canal directors they had to reduce tolls to a nickel a ton, James Speed, the former U. S. Attorney General, advised his fellow directors that they should not cooperate. The directors told Weitzel that the company would not permit any work with the \$300,000 appropriation whatsoever, if it also required reducing tolls to a nickel, because they feared the reduced toll could not repay the investors who had funded construction of the Scowden locks. "As the representative of the people," Weitzel warned the directors, "I

consider it my duty to guard against any such consequences, and I will therefore carry on the work until I am ordered by my superiors to stop; and I request that you do not interfere until I can hear from them."⁷

"You take it for granted that the Louisville and Portland Canal belongs to the Government of the United States," tartly replied canal president Joshua Fry Speed, adding: "In that you are mistaken. The Government is but a stockholder in a Kentucky corporation, and has only such rights as are conferred by the act of incorporation and its amendments."⁸

In a letter to canal director John Caperton, secretary Jonas Rhorer reviewed this contretemps:

The matter of Weitzel's canal work has caused some excitement. Congress passed an act appropriating \$300,00 to continue the canal improvement with a proviso that from and after the passage of the act we should charge only 5 cents per ton tolls. We took legal advice and were assured that if we accepted a part of the law we must take it all; that is, if we accepted, or permitted the appropriated money to be used on the canal we are legally bound to reduce the tolls. We refused both, and warned Weitzel not to use the appropriation on our property. He paid no attention to us. We moved for an injunction to stop his contractors, who are St. Louis men. They, being residents of another state, claimed the right to be heard in the Federal Court.⁹

While the contractors appealed to a federal court, at Weitzel's urging they also continued work at the canal—the canal had closed to traffic during the construction and it was imperative that it be reopened at the earliest date. To stymie the contractor's progress, however, the directors ordered the canal's dredges to remove the cofferdam at the head of the canal and throw it back into the contractor's excavations. "We have a right to work on our own premises as we please, and as fast as the contractors threw dirt in (to make a dam which they needed) we threw it back on them with our dredges," explained secretary Rhorer: "As much as they could throw in a day, we could throw back on them in an

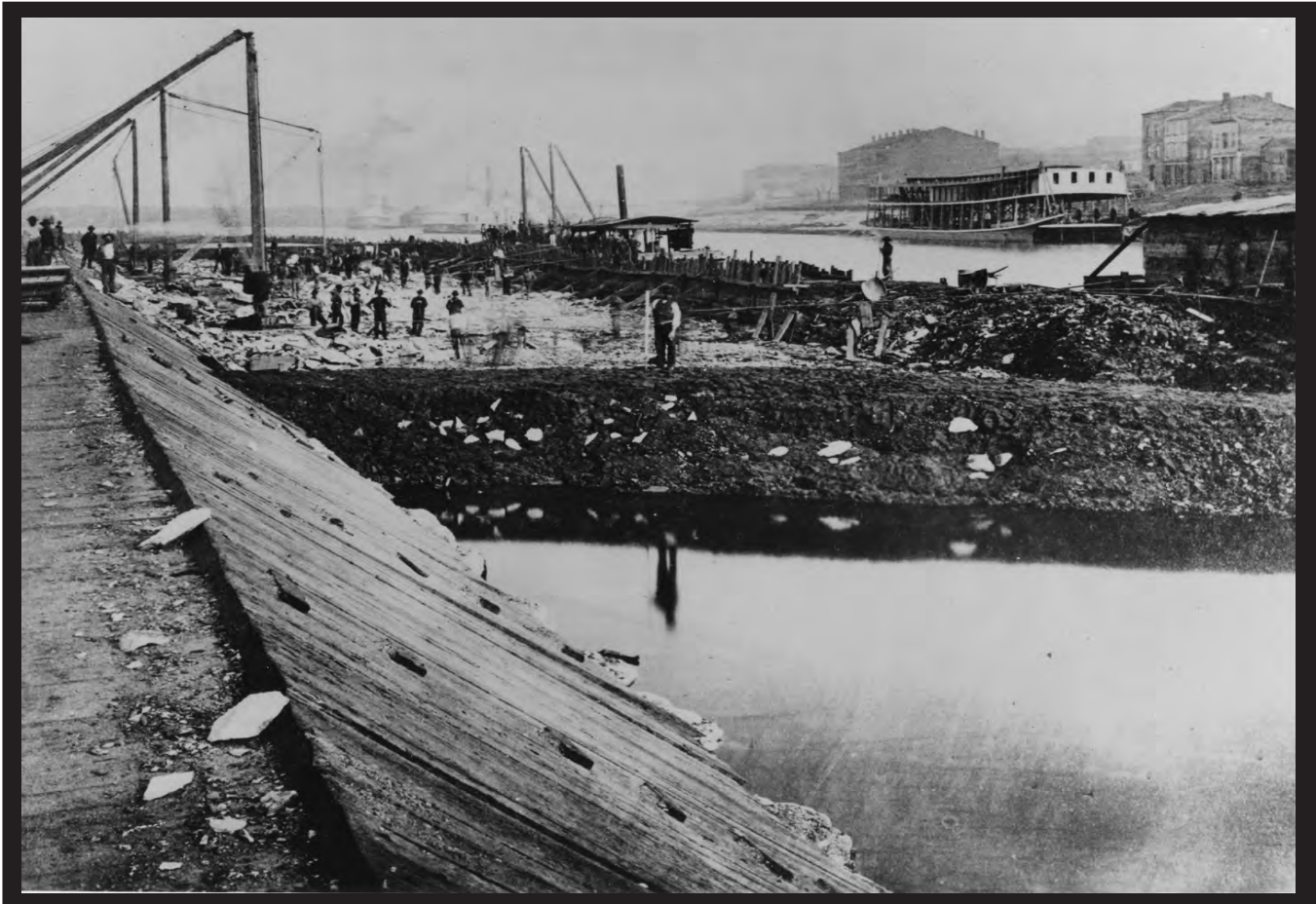
hour, and so they and their lawyers saw we had them, and they are giving up. Weitzel finds himself completely checkmated." Not until rumors spread that the United States Marshal was coming with troops did the canal hands and dredges cease their mud-slinging.¹⁰

Louisville's news editors sided with the directors, and when Cincinnati's newspapers fumed that the directors had exceeded their authority and were obstructing commerce, the Louisville editors pointed out that no Cincinnatians had invested a cent in the Scowden locks, not a single canal bond-holder lived there, and the Queen City therefore sought to repudiate legal debts. Even Louisville was disturbed by the litigation's delay to construction, however, and one editor complained: "As for lawyers, they nearly always make matters worse. What with their subtleties, their quibbling, hair-splitting constructions, their fanatical regard for formulas, and their love for time-consuming processes, everything goes slow, and wrong, and injuriously the moment you have to place it in a lawyer's hand."¹¹

The editor's slur on the legal profession proved erroneous in this case, however, when Weitzel appealed to United States District Attorney G. C. Wharton for help.

Wharton met personally with canal attorney James Speed, and they quickly agreed to appeal the case directly to the United States Supreme Court. Because this court was not in session at the time, they took the case personally to Justice Samuel Miller, native of Richmond, Kentucky, and found him at his summer home.

Miller soon rendered a decision worthy of Solomon: he granted an injunction forbidding the canal directors from interfering with Weitzel's construction and also decided that the canal directors, not Congress, had the sole power to set toll rates. His decision placated all except those who hoped for immediate toll reductions, and it allowed Weitzel and his contractors to finish building the canal's masonry sidewalls, excavating rock from the canal's downstream exit, and opening the Varble pass, a highwater passage beneath the railroad's pivot bridge



Excavation behind a cofferdam at the canal's entrance in 1873 with Louisville's wharf in the background. At the left is the apron dam built to guide boats into the canal. (Corps of Engineers)

crossing at Fourteenth street. This allowed General Weitzel to reopen the canal to commerce in November 1872.¹²

TREASURY DEPARTMENT MISSION

At the Chief of Engineers' request, Weitzel reported that the canal's annual operation and maintenance costs were \$50,000 and suggested this expense might be recovered with tolls set as low as twelve cents per ton. Because the Corps of Engineers had never before operated navigation locks, and because the Secretary of Treasury had managed the federal interests in the canal for many years, Weitzel thought the canal's operations should become a Treasury Department mission. He advised the Chief of Engineers:

In framing the act for accepting the canal, I think that the Secretary of the Treasury, by whose department the canal would of course be operated, should have the power to fix the toll from time to time, so as just to pay the running expenses and keep a fund of about \$50,000 on hand for repairs. He should also be authorized to employ the persons necessary to operate the canal, and fix their pay. The persons should all be employed during good behavior, for it will work serious if not fatal injury to the best interests of commerce if experienced men are not continually employed on the work, especially in opening and closing these enormous gates.¹³

Congress in March 1873 directed the Secretary of Treasury to take control of the canal from its directors and then reduce the tolls by half, to twenty-five cents per ton. The Secretary moved slowly, however, because the heirs of John Campbell had sued to recover the canal property on grounds that the land had been awarded to their ancestor by the Governor of Virginia before the Revolution. Senator John Rowan in 1835 had defeated a similar lawsuit by the Campbell heirs, but the litigation was sufficient to deter early action by the Treasury Department. "First one thing and then another has been suggested as being in the way of its


accomplishment," complained a Louisville editor, "and the sluggish wheels of legislation have been turned again and again to remedy or correct something that had been overlooked in a previous act...and they are still fooled and cheated out of the free navigation of the canal."¹⁴

While the Secretary of Treasury wrestled with this dilemma, General Weitzel left Louisville. Ordered to Michigan, Weitzel took charge of building a new lock at Sault Ste. Marie, where Great Lakes ships passed from Lake Superior into Lake Huron. He designed this lock with the same 80-foot-width as Scowden locks, but made it 515 feet long to accommodate lake shipping; when completed in 1881 it succeeded Scowden locks as the largest in the world and was named Weitzel Lock. Weitzel remained in charge of the Louisville canal, however, throughout his Michigan assignment, with an assistant, Captain Milton Adams, stationed at Louisville for on-site supervision of the canal.¹⁵

Captain Enoch Lockhart, the canal superintendent since 1851, also left the canal in 1873, weary of its heavy labor. All the wooden lockgates built in 1866 and installed by Weitzel in 1872 had proven weak, and Lockhart spent much of 1872 arranging the fabrication of replacements at Howard boatyard and installing them at the canal. Then an emergency arose when the steamboat *Brill* loaded with pig iron sank in the locks. Approaching the locks from below, the *Brill* hit rocks that breached its bow, but its captain installed a tarpaulin over the hole, started the pumps, and steamed on into the lower lock. Soon after entering the lock, the tarpaulin collapsed, water gushed into the boat's hull, and the crew and passengers saved themselves by climbing onto the lockwall. The *Brill* went down quickly, careening over when it hit bottom and blocking the lock so that salvage and pumping boats could not enter the chamber to remove the wreck. The 1830 locks reopened to pass small boats, but the new locks remained closed until divers had torn the wreck to pieces and removed it and the pig iron from the chamber. Frazzled by these mishaps, Captain Lockhart left the canal in charge of Smith Speed and went west for his health, visiting California along with Theodore Scowden. Their business partners Jonas Rhorer and John Caperton needed an engineer and a dredging expert to plan land reclamation along the Sacramento River, where they hoped to settle a colony of Kentuckians.¹⁶

By October 1873 Cincinnati's efforts to cajole the Secretary of Treasury into taking control of the canal had stalled, and two commissions met at Louisville to encourage action. The Ohio River Commission, a lobby appointed by state governors, met at the Galt House where they heard Colonel William Merrill of Cincinnati recommend building a movable dam near Pittsburgh to test the ability of wicket dams designed in France to hold slackwater pools for navigation during low-water stages and to drop to the river's bottom at high water, opening a clear passage for barge tows. The Commission heartily approved Merrill's recommendation and strongly urged the Secretary of Treasury to immediately take possession of the Louisville canal.¹⁷

On the heels of the Ohio River Commission came the Senate Committee on Transportation Routes to the Seaboard, known as the Windom committee after its chairman William Windom. The Windom committee hoped to increase America's export trade by improving waterways transportation to coastal harbors; it met at Louisville because the canal and the restrictive passages over the Falls obstructed the exports. The Senate committee inspected the canal, then met at the Galt House to hear testimony by canal directors James and Joshua Fry Speed, Captain Pink Varble, and Captain Milton Adams, Weitzel's deputy. The Speeds reviewed their management of the canal and urged that the federal government should pay off the canal's



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The Byrne and Speed coal elevator was built in 1872 at a basin near the canal's entrance. (Courier-Journal, May 1873).

mortgage before it took control from the directors. Captain Adams described the Corps of Engineers' work at the Falls, and Captain Pink Varble advocated opening a wider channel through Indian chute, telling the committee:

Our channel over there is 48 feet wide. Up to 1856 it was only 28 feet wide. They commenced building boats longer and wider and the pilots went to work themselves and opened the channel at the head of the Falls. They opened it to 48 feet, and Congress later gave the money back for the job. The channel can be opened to 100 feet at little cost and this would allow many boats and barges to pass through that now must use the canal. The channel on the Falls could be widened by blowing out a reef of rocks which is a twelve-foot wide obstruction between two channels. If that was blown out, it would greatly aid navigation.¹⁸

Although not endorsing Varble's proposal, the Windom committee approved Weitzel' work at the canal and also Colonel Merrill's plans to build locks and dams along the Ohio River establishing a reliable depth for commerce. Even the committee's findings, however, did not hasten the Secretary of Treasury's action to take control of the canal. In addition to the legal complications presented by Campbell's land claim, the canal company faced suit by the city of Louisville to collect \$114,000 in back property taxes and also by the owners of Elm Tree Garden who were the parents of little Lucretia Murphy. Lucretia, age five, and another little girl were crossing Elm Tree bridge at Eighteenth street when Lucretia lost her footing and fell through a space where an upright had broken from the bridge railing. Falling forty feet into the canal, she drowned before rescuers reached her, and her parents sued the canal company for neglecting bridge maintenance, which had become the company's responsibility when it demolished the stone arch bridge at the site in 1856.¹⁹

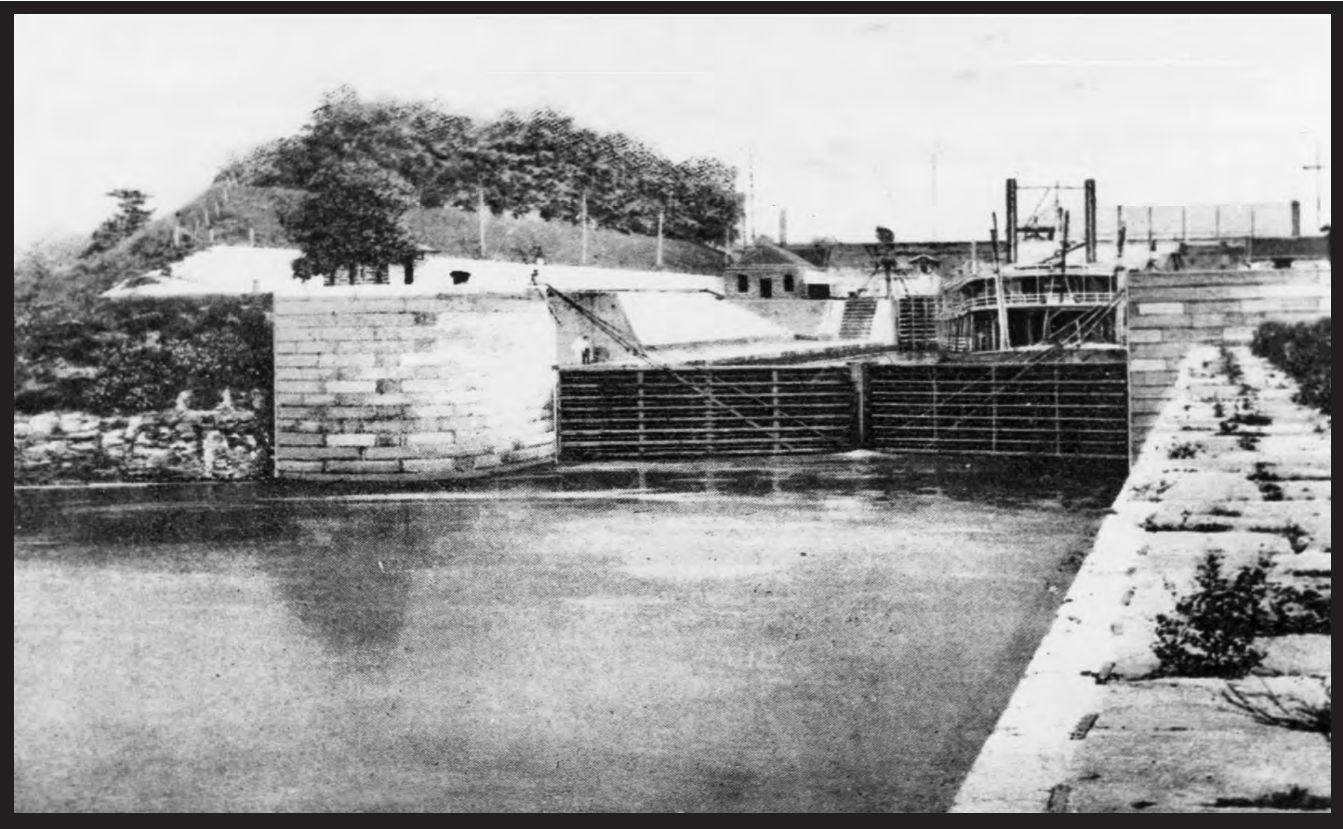
Recognizing the city's claim for back taxes was deterring federal action at the canal, Louisville's board of trade requested the city council to relinquish its claim, and in March 1874

the council agreed to drop it when the United States took control of the property. The canal's attorney, James Speed, also assured the Treasury Department that the Campbell heirs' land claim had no merit and would be rejected by the court, while the Murphy case could be satisfactorily adjudicated.²⁰

Congress in the meantime lost patience and abruptly settled the issue. Senator John Sherman of Ohio, after consulting with the parties, introduced a bill to pay the canal mortgage and buy the five shares held by the directors. As enacted in May 1874, the bill directed the Secretary of Treasury forthwith to pay the canal's mortgage, purchase the five remaining shares of stock, and audit and pay the canal's just debts, except any claims for back taxes. This law required that the "canal and property appertaining thereto shall be held for the common use and benefit of the people of the United States, free of all tolls and charges except such as are necessary to pay the current expenses of said canal, and to keep the same in repair," and mandated that tolls be straightway reduced to ten cents per ton, subject to annual revision thereafter as required to meet operational expenses. To the surprise of General Weitzel and Louisville generally, it directed the Secretary of War, not the Secretary of Treasury, to take possession of the canal within thirty days, meaning that it would be operated by the Army Corps of Engineers. The delays by the Treasury Department in taking control of the canal thus had encouraged the assignment of canal management to the Corps, although no records suggest that Treasury wanted the task.²¹

Louisville was elated when Congress cut the canal's knot. Louisville's bard Will Hays, renowned musical composer and river reporter for the *Courier-Journal*, summed up the city's euphoria at the law's passage, announcing:

President Grant has signed the canal bill, and it is now a law. Rejoice, Oh, rejoice! Thus has the great mogul of this country done an act commendable to him. He has, by a single stroke of his goose feather, scattered one of the black clouds of adversity which has hung for years over our commercial interests. Now all is sunshine where clouds prevailed.



A steamboat in the lower lock prepares to leave the canal when the lockgates open. (Glenn Drummond Postcard Collection)

The mighty ditch, the connecting link between our city and the classic city of Portland, will no longer be closed to their purses or to heavily laden steamers, but will be as popular a thoroughfare for boats as the free, open river. No longer 50 cents a ton tollage. It is now ten cents. Rejoice, Oh, rejoice!

Sound your horn,
Beat your drum,
Toll's ten cents,
Till de kingdom come.²²

CANAL TRANSFER

In compliance with the law, the Secretary of War ordered General Weitzel to return from Detroit to Louisville to confer with the canal directors and to employ operational personnel by June 10, when the thirty-day period mandated by law expired. Weitzel met with directors Joshua Fry Speed, Jonas Rhorer, and James Henning on June 9 to make arrangements, agreeing to take a canal property inventory and to conclude the formal transfer at midnight on June 10. They then

joined in an impromptu celebration launched when, by surprise, a Cincinnati delegation led by Congressman Benjamin Eggleston arrived on the morning mailboat. Led by Louisville's mayor, the crowd boarded the canal towboat *Walker Morris* and drifted slowly down the waterway, giving the visitors time to enjoy a glass or two of bourbon. Because the Cincinnatians planned to return home that day, time was too short to test the locks, so the *Morris* turned and steamed upriver. All became jolly during the trip, enjoying several speeches: Louisville's mayor urged that the next step should be to free the canal entirely of tolls, and General Weitzel was proud that the occasion marked the success of a campaign "which the people of the West have been endeavoring to effect during the last thirty-four years." The Cincinnatians then boarded the afternoon mailboat, and when they arrived back at the Queen City with news of the federal canal transfer, the city fired a one-hundred gun salute.²³

Whether the speakers aboard the *Morris* that day mentioned former canal superintendent John Hulme was not recorded, but perhaps they did. Hulme at age sixty-six had perished in Philadelphia six weeks earlier, and thus the sole



Rowing races sponsored by the Louisville Boat Club were popular during the late nineteenth century. This sketch of an 1885 race includes the club's boathouse in the background. (Courier-Journal)

surviving original canal stockholder missed the canal's transfer to the United States, a goal he had sought since 1830. It was Hulme who had made the canal so profitable that its stockholders in 1842 could afford to begin buying out their own stock and giving it to the United States. In 1874, however, the federal government had to pay \$1.7 million, the value of the mortgage bonds and debts that had financed Scowden locks, to secure full control of the canal.²⁴

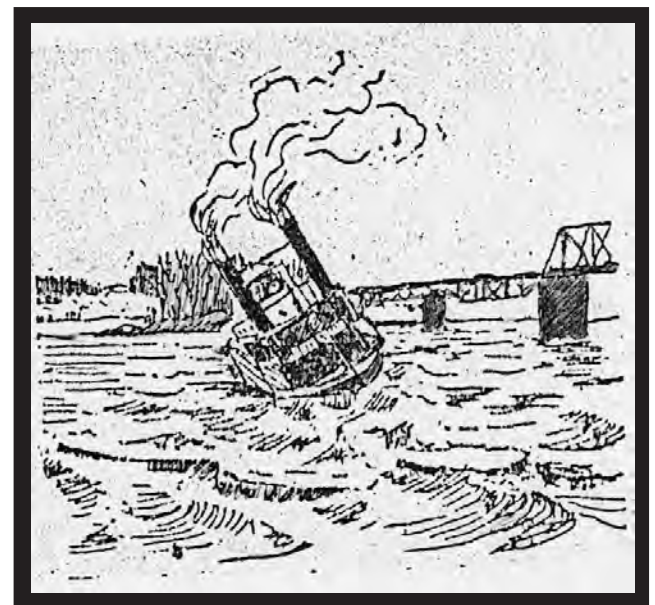
Five minutes after midnight of June 10, the *Charles Bodman* became the first steamboat through the canal at the reduced ten-cents-per-ton toll. A sidewheel packet owned at Cincinnati, the *Bodman* had waited in the Louisville harbor until midnight in order to qualify for the lower tolls. Perhaps the *Bodman's* captain was also anxious to use the canal because his boat had just been repaired from damages it had suffered by wrecking against Wave Rock when it attempted to descend Indian chute. After the *Bodman* safely passed the locks, the *Arlington* and *Charmer* soon followed to enjoy the benefits of lower tolls.²⁵

General Weitzel turned the canal property's inventory over to Treasury Department auditors and he signed a receipt for one canal and property complete, plus the towboat *Walker Morris*, two steam dredges, four mud scows, one barge, three horses, one cart, one spring wagon, one Jersey wagon, one buggy, three sets of

harness, one diving armor suit, one blacksmith shop, one carpenter shop, and an iron safe. The auditors proceeded with the transfer's paperwork, paying the mortgage bonds and buying the directors' five shares of stock. "The Canal has been transferred to the Government," secretary Jonas Rhorer explained in a letter to director John Caperton in California: "The First Comptroller of the Treasury, with several clerks, is here examining our books, papers, &c. We each transfer his share of stock on the back of a certificate, yours being sent herein with the endorsement required. By signing yours and adding two witnesses, the document will be complete, and you can enclose it to R. W. Taylor, First Comptroller of the Treasury, requesting him to send you a Treasury draft for the amount."²⁶

FEDERAL CANAL OPERATIONS

Before returning to Detroit, General Weitzel temporarily appointed the canal managers and lockmen to serve under his assistant, Captain Milton Adams. He left assistant canal superintendent Samuel Palmer, toll collector H. N. Adams, and lockmaster Thomas Jones on staff directing the work of fifty-six lockhands and dredge operators. He chose Phil Schopp as his canal superintendent to replace Enoch Lockhart—Schopp had been Weitzel's assistant during the 1867 Falls survey and had also assisted as construction supervisor of the canal enlargement. Weitzel never explained why he released Captain



When the river rose to submerge most rocks on the Falls, steamboats with skilled Falls pilots went over the Falls. (Courier-Journal)

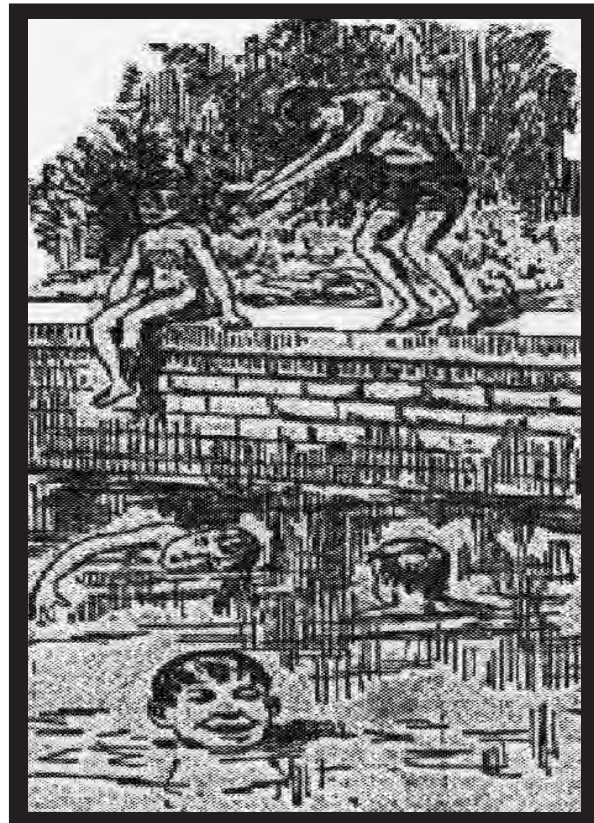
Lockhart, who had twenty-three years experience as canal superintendent, but the reason probably was political: Lockhart along with Falls pilot Pink Varble and Falls bard Will Hays had led a coalition of rivermen into the Democratic party, where they opposed President Grant's Republican administration. Whatever the reason, Lockhart, who had been a Falls pilot before 1852, returned to his earlier profession until a Democrat was elected President and reappointed him to the canal's management.²⁷

The Louisville canal's staff and workers became the first lock operations personnel employed by the Corps of Engineers. Until 1874 the Corps had been a survey, design, and construction agency principally for fortifications, and its rivers and harbors work—civil works—had been confined chiefly to removing snags, building wingdams, and dredging channels. State and private agencies, not the Corps, had built and operated canal and river navigation locks and dams on the Green and Kentucky rivers in Kentucky, the Muskingum in Ohio, the Monongahela in Pennsylvania, and other rivers. The Corps, however, had never before operated a navigation lock or similar permanent facility with a single exception. Near Detroit on the St. Clair River linking Lakes Huron and Erie, the Corps in 1871 had completed the St. Clair canal consisting of two parallel timbercrib walls lining the sides of a dredged channel for Great Lakes shipping. This canal had no locks, but the Corps thought it wise to employ a caretaker charged with preventing fisherman from chopping the timber walls for firewood and similar vandalism. Watchman William Mott thereby became the first operations specialist ever employed by the Corps, and Congress paid his \$1500 annual salary with special appropriations for the purpose. The Louisville canal's personnel were to be paid from the tolls, however, not from congressional appropriations.²⁸

Captain Milton Adams in June 1874 supervised the sodding of the canal banks with bermuda grass turf, then left for a new assignment, replaced by Captain Alexander Mackenzie. A brilliant officer and future Chief of Engineers, Mackenzie came to Louisville from New York where he had experimented with electrically-operated torpedoes for harbor defense. Mackenzie soon became troubled by the dilapidated equipment the Corps had inherited from the canal company: the towboat *Walker*

Morris and the dredges had been built before and during the Civil War—one of the dredges wore scars acquired at the Battle of Vicksburg. Although Lockhart had installed new gates in Scowden locks, the lockgates at the old three-flight locks were decayed; the carpenter and tool shops needed rebuilding, and the iron swing-bridge over the locks was eaten by rust. Although the canal company had used an office in Louisville, two miles from the canal, Captain Mackenzie preferred to be on the job site directly, and he took the toll collector's building as his office. Mackenzie insisted that major reconstruction of the canal's deteriorated facilities was imperative and that a new canal office should be built.²⁹

Captain Mackenzie's first significant change in canal management involved installing a two-mile telegraph line from the upper canal entrance to the locks. When he arrived in 1874, news of boats entering the canal was still carried by runners or on horseback down the canal wall to the lockmaster. Mackenzie recommended obtaining surplus wire and equipment from the Corps' torpedo experiments and stringing it between the locks and the head of the canal,



Swimming in the canal was a popular, albeit dangerous, sport during summers. These boys were diving off the canal wall. (Courier-Journal)

where a small shed could be built to house the transmitter and operator. Weitzel approved this low-cost technological advance, Mackenzie installed it in 1875, and telegraphic communication of boat movements proved quite useful to the canal managers.³⁰

Mackenzie had little need for a telegraph in the summer of 1874, nevertheless, because the river receded soon after he arrived and little commerce traversed either the canal or the river until the following December. Inspecting the riverfront in July, the bard of the Falls, Will Hays, vividly described what he saw:

The deserted wharf; a lonely boat laid up; a low, quiet-looking stream; boys in swimming, folks fishing, three long dams stretching far out into the stream—a fisherman's hut on one; a lonely coalboat; mouth of the canal to the left; the great bridge; trains passing over it; in the distance a bed of stone, beyond that the Falls; on the opposite bank stands old Jeffersonville, a deserted-looking village; the ferryboats far up river; a blank silence prevails; Tow-head island asleep; on the shores all sizes

and colors swimming; the sawmills resting; the shore fringed with log and lumber rafts and empty boats; dust and coal carts along the pavement; on the levee lie folks asleep; children play in the gutters; police tired of watching; roustabouts in groups; no teams visible to the naked eye; the hot sun has melted trade and commerce.³¹

Although Will Hays had applied his powerful influence in support of Weitzel's completion of Scowden locks and the enlarged canal, after 1874 he became increasingly critical of the timbercrib dam Weitzel and the Corps were slowly building along the crest of the Falls, stretching toward the Indiana bank, leaving only a 400-foot-wide entrance to Indian chute.

Labeling this project "Weitzel's dam-foolishness," Hays argued that the dam dangerously increased current velocities through Indian chute and that it trapped river sediment, filling Louisville's harbor with mud. Hays recommended that the dam be shortened or removed, and he also initiated a campaign to obtain a \$30,000 appropriation from Congress for Pink Varble to blow a 125-foot-wide channel



Small harbor towboats moved coal barges through the canal. Here, the towboat Transit bound upstream exits the locks while the towboat Rescue enters downbound. Falls Pilot Dan Varble usually was at the Transit's helm. (Charles Parrish Postcard Collection)

through Indian chute. While Weitzel's dam on the Falls' crest increased the depth above by about three feet, certainly accelerating flow through Indian chute, whether it also encouraged sediment deposits above it remains questionable—thick mud deposits in the canal and along the riverfront were common during the 1850s before the dam was constructed. And the deeper water the dam impounded between Louisville and Jeffersonville, however, surely stimulated greater recreational use of the river.³²

RECREATION AND COMMERCE

Rowboat races in two, four, and six-oared boats, usually pitting teams from New Albany or Jeffersonville versus Louisville's boatmen, had been popular each spring for many years; the 1874 races along Jeffersonville's waterfront featured six boats and crews in colorful uniforms. At Louisville in 1874 two recreational boat clubs formed, the Falls City and the Mattie Hays clubs, the latter named for Will Hays' daughter. The Falls City club purchased the *Tyrone*, a barge formerly carrying picnic excursions to the islands, as its boathouse, anchoring it near the canal's entrance, while the Mattie Hays club challenged Cincinnati's rowers to races for stakes. These clubs' rowing races remained popular on the riverfront for a half century—until the advent of motor speed boats.³³

The annual racing regattas and other recreation opportunities attracted crowds to the riverfront, especially in summer when river breezes offered a cool respite from city heat. Fishing on the Falls remained a favorite sport and picnics and fishfrys brought people each summer to shady spots around the Falls and on the islands. While Kentucky's favorite sport of dueling on the Indiana bank had died by the 1870s, prize fights were often held on the river's islands and sandbars, out of easy reach by law enforcement. Enthusiasm for the new sport of baseball spread even to the river, and a Louisville merchant was badly hurt on the wharf in 1875 when he strolled too near a baseball game played by the steamboat *United States* crew and was hit by a stray ball. In 1874 the Howard boatyard at Jeffersonville finished its first recreational sailing yacht named the *Lucille*, eighteen feet long and six feet wide, for the owners' use on the pool above the Falls' dam, launching a recreational boating trend on the river that has continued.³⁴

The Howard boatyard also launched its last commercial sailing ship in 1874, a 95-foot-long schooner named the *Relief* destined for service on Galveston Bay, but it had to await a river rise before sailing because extended low-water seasons suspended river commerce except for flatboats. During the 1870s, a revival occurred in the use of flatboats, now called produce boats because their typical cargo consisted of potatoes and apples. Built and manned by Indiana farmers, produce boats ranged from 90 to 125 feet long and from 16 to 25 feet wide, depending on the farmers' energy. With crews of five plus the owner and a cook, these floated with the current to a port, where they landed to wholesale their cargo if possible, or if not, retail it to townspeople. Twelve produce boats lay at Louisville's wharf in 1874 until their cargoes sold, while others crossed the Falls and floated south as far as New Orleans.³⁵

To reduce costs, produce boats sometimes attempted to descend the Falls without paying Pink Varble, with unfortunate consequences: a produce boat wrecked against Ruble's Rock in Indian chute, losing its 1,200 barrels of apples. By 1874 Captain Pink Varble had nearly a lock on Falls piloting. He made it a family business, securing appointments as Falls pilots for his brothers Richard and William Varble and his nephew Dan Varble, and purchasing small harbor towboats, used to help steamboats ascend Indian chute, or to push coal tows from Pumpkin Patch down the Falls to West Louisville. Pink Varble and his clan took four-fifths of all boats down the Falls, driving his principal competitor Captain David Dryden out of business. Dryden opened a hotel in New Albany, and John Littrell, Varble's brother-in-law, took Dryden's post as Indiana Falls pilot. Because he dominated the Falls piloting trade, Pink Varble had significant influence on the design of dams and other structures at the Falls.³⁶

Neither the Varbles nor the canal had much income during the 1874 low-water season, nevertheless, and the canal ran red, its operational expenses exceeding toll revenues when a reporter interviewed Captain Alexander Mackenzie for a briefing on the first six-months of federal canal operations. Asked about operating costs, Mackenzie told him the Corps had inherited from the company fifty-six employees: superintendent and assistant toll collector, lockmaster and assistant, two

carpenters, two blacksmiths, towboat pilot, three boat engineers, a foreman, two divers, twenty-two lockhands, a lock watchman, two dipper tenders, three towboat hands, eight dredge hands, two dredge watchmen, one teamster, and a bridge tender. Lockmaster Thomas Jones was paid \$95 per month and the lockhands about \$50 a month. The canal payroll totaled \$3,330 monthly plus a \$300 fuel and materials bill, aggregating \$3,630 monthly, or a yearly operating cost of \$43,560. Mackenzie admitted the canal had received so few tolls during the 1874 low-water season that it was \$5,000 in the red. The canal also received \$75 a week rental for use of its drydock for boat repairs, but the drydock was too small for most steamboats and the rental income was negligible.³⁷

Mackenzie thought the Corps would soon have to replace all the floating plant, built at the time of the Civil War, and also replace deteriorated lockgates in the old three-flight locks and at the emergency guard lock at the canal's upper end. To pay these expensive maintenance costs, he feared it might become necessary to raise the tolls from a dime a ton to fifteen cents—a small increase compared to the fifty cents a ton charged earlier by the company. Another alternative would be to reduce operating costs, and Mackenzie had a plan: he was considering replacing the lockhands needed to operate the lockgates with horses. If four horses could be trained to turn the capstans winding the chains that pulled the gates open or closed, instead of using manual labor, operating costs might be slashed. Of course, he hoped when the river rose and the Pittsburgh and Kanawha coal fleets arrived to lock through, a major addition to toll revenues might be expected. The reporter went away pleased with Mackenzie's knowhow, declaring that "Uncle Sam is showing himself a first-class canal owner."³⁸

Shortly after this interview, as Mackenzie expected, the leisurely paced canal operations quickened when the river rose and coal tows arrived from upriver, crowding into the canal and challenging the lock force's energies to pass them through before the river receded. It took five hours and forty-five minutes to lock through one towboat with sixteen coal barges—three hours operating the gates and the remainder moving barges in and out of the lock chambers.

In the meantime, five more towboats with up to twenty barges each awaited their turns. While the coal tows were passed down, upbound tows and steamboat packets were delayed below the locks. Working as fast as they could, the lockhands turned the capstans by hand, running from one lockgate to the next. Mackenzie later reported that in a year the lockhands passed 2,280 boats in 1,401 lockages, opening and shutting the lockgates 8,406 times; when accomplishing this, each lockhand averaged walking seven miles a day, or 2,600 miles a year. It was not a job for portly or sickly workers.³⁹

Because the coal fleet blocked the canal for days, other boats sought to use Indian chute and found the current too swift. The *Charles Morgan* and tow, with the harbor towboat *Robin* on one side and the *Ida* on the other side helping, made the ascent around Weitzel dam on the Falls' crest, but the trip took four hours and burned a pile of fuel. The *Sam Brown* with fourteen empty barges and Pink Varble at its helm attempted the ascent through the chute and failed to stem the current—Varble had to break the tow into five sections and make five trips up the chute to get all the barges through. Rivermen were becoming so unhappy with Weitzel's dam that they were overheard to say "damn Weitzel."⁴⁰

Weitzel's Cincinnati heritage had been an advantage in 1867 when he was sent to plan the Falls' projects, but now it became a handicap. On this, the bard of the Falls published a stinging editorial:

Cincinnati builds railroads to get business, and Weitzel builds dams here to stop navigation and trade. Weitzel is a Cincinnati man. And still Weitzel is not happy. According to the report he sent Washington, he has spent \$25,000 for wages in seven months and only taken in \$20,000, and over half of that he took in December, and some of that time he refused to let boats go through after night. He hasn't done as well with his new canal as the old managers did with the old one, and now he appeals to Congress and says boats must pay more to go and come through the canal; if they don't he can't repair it. This is mad! He says the old locks and some parts of the new locks need

immediate repairs, and he calls for \$50,000 more money to throwaway upon it. We hope he won't get a cent. Let the canal sustain itself like it used to do. It made money, paid its own expenses, and was run to the satisfaction of everybody before he got hold of it. No! not a cent. He has spent enough of the people's money now, building dams to obstruct navigation here. Let the government give some man, who knows his business, \$30,000 to buy powder and blow out the chute at the head of the Falls, and steam boatmen can then run boats at all seasons.⁴¹

company, operational costs were excessive, especially considering the mandated eighty percent reduction in toll revenues, from fifty cents per ton down to a dime a ton. This disparity between operational costs and income costs would soon force the managers either to increase toll rates, reduce operational costs, or obtain supplemental funding from Congress. Finally, modifications of the crest dam on the Falls were imperative, not only to placate rivermen and Falls pilots, but to afford a usable passage when the canal was blocked by burgeoning river commerce or for major maintenance. How General Weitzel developed solutions to these challenges is related in the following chapter.

General Weitzel and Captain Mackenzie recognized that rivermen's complaints about delays at the canal and swift currents through the chutes had merit. They began studies of applying steam-power to lock operations, of policies to regulate canal traffic, and of changing the crest dam's configuration to minimize current velocities and sediment deposits. To explore these problems, they met with Captain Pink Varble and with Captain Enoch Lockhart, who had returned to Falls piloting. Major revisions in federal canal operations and Falls project designs soon followed.

OBSERVATIONS

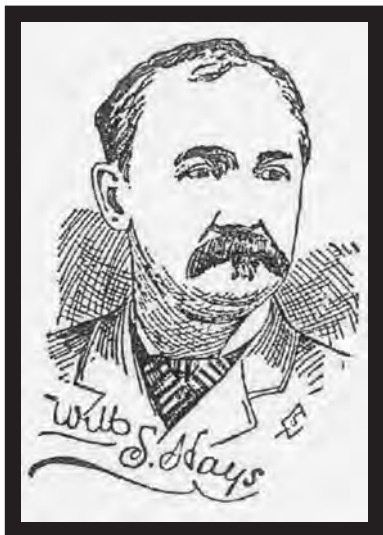
An old adage maintains that engineers should learn as much from their design and construction failures as from their successes, and this also proved true for operations when the Corps in 1874 first learned canal and locks management. When General Weitzel, after handling setbacks and dirt-throwing, attained the canal's transfer to federal control in June 1874, he soon learned that managing the Scowden locks and canal would be no less challenging than completing their construction.

In their first year of canal operations, Weitzel, Mackenzie, and the Corps received baptism in water. Although Scowden locks were the largest in the world with a capacity triple that of the locks built in 1830, they were still too small to efficiently pass the coal rush; their operations had either to be accelerated, or an alternative method for passage around the Falls had to be devised. With fifty-six employees inherited from the canal

11

HEROES OF THE FALLS

William Shakespeare Hays, the Falls bard, wielded emerging political influence during the 1870s, thanks to his sparkling daily river news column in the Louisville *Courier-Journal*. Advising travelers of scheduled steamboat arrivals and departures was his column's essential function, but most Louisvillians opened their newspaper each morning to Hays' column first. At a time when newspapers lacked comics or fashion news, his column offered humor, usually involving the antics of fictitious goats, jacks, or odd wharf rats at the riverfront, and he often commented on the latest fashions worn by ladies strolling the wharf. Moreover, Hays vigorously campaigned for church, school, and social improvements, for wharf and canal refinements, and for his preferred political candidates. His unique combination of humor, fashions, politics, and river news amused Louisville, attracting rivermen, civic leaders, ladies, children, and a wide readership base.¹



Song writer Will S. Hays, river editor of the Courier-Journal, exercised political influence over Falls engineering. (Courier-Journal)

Hays understood the river intimately. During the war he had been a steamboat captain running Louisville to New Orleans and once was briefly imprisoned at the Crescent City for Southern sympathies—he claimed to be the lyricist for the tune “Dixie”. After the war, in addition to

penning his river news column, he promoted the steamboat industry and sold steamboat-passenger tickets. As spokesman for river interests, Hays paid close attention to the dynamic Falls environment and the boat passages over and around it, detailing the engineering and natural changes in his column. When promoting improvement of the city's wharves, of the canal and locks, or of the Falls, Hays tended to present his arguments in stark contrasts, in sets of heroes and villains. He created the Falls heroes, or at least his daily reports on their activities drew public acclaim and made them local celebrities. Through his political influence, Hays and his heroes had lasting impact on the Falls developments, including the federal projects of the late nineteenth century.²

EFFECTS OF SCOWDEN LOCKS

Although Will Hays disapproved of Radical Republicans generally, he initially welcomed General Godfrey Weitzel as one of his Falls heroes. He supported Weitzel's efforts to complete and open the Scowden locks and applauded the 1874 reduction of canal tolls by eighty percent when Weitzel began managing the canal. Changes at one point in the Falls environment always initiated changes at another, however, and this proved to be the case with the completion of Scowden locks.³

After Scowden locks had opened and canal tolls were reduced, Hays observed that the grand steamboats, formerly stopping at Portland to land passengers and cargo to be portaged, began passing on through the canal locks to Louisville without pause. The use of Portland's wharf therefore declined precipitously after Scowden locks opened until by 1879 only nine steamboats landed at Portland during the entire year. This transition undermined the historic drayage business from Portland to Louisville. The Batman brothers, Dan and Ike, who made a fortune owning and operating dozens of drays between the wharves, left the business in 1875; they had spent lavishly, made poor investments, and soon lost their fortune. Ike Batman then opened a Portland saloon decorated with the huge gun, shoes, and chair once owned by Jim Porter, the Kentucky Giant, and he lived out his days as a bartender. Where hundreds of drays and wagons once had plied the portage daily, by 1876 the Falls bard reported that dray-driving

was becoming a lost art. "There is one man," Hays recalled, "who used to make a whip-lash play music on the shaft mule, while the leader mule danced the fling. He could use that cheerful persuader to pick a horse fly off his roof and engineer that team up the old road with two hogsheads of sugar or five barrels of molasses on his dray." This unemployed drayman had swapped his whip for a pen, clerking on the steamboat *Robert E. Lee*.⁴

Shippingport, however, once eclipsed by Portland, enjoyed a minor boom during the 1870s, perhaps even surpassing Portland as a landing because steamboats often moored near Tarascon Mill to take aboard thousands of barrels of cement. The Louisville and Union cement companies had purchased most of the land on Shippingport island, building steam-grinding mills, a barrel factory, and a narrow-gauge railroad running up the island and into the riverbed to haul limestone from the quarries near Corn island to Tarascon Mill (renamed Byrne and Speed mill after its new owners). Unable to commute long distances, the mill and quarry workers migrated into Shippingport, swelling its population to more than 1,000, but most workers did not build or buy homes, instead boarding at the old French mansions where the landlords furnished them meals in addition to lodging. As one example, the Fitzmorris family managed a workers' boarding house, probably to their regret. Their daughter Mary was riding the dinky locomotive up the tracks from Shippingport, carrying lunch to her father's boarders at the quarry, when, sadly, she fell off and was crushed by its wheels. Shippingport's revival proved brief, falling dormant when the Louisville cement company built larger mills at Speed, Indiana, and ending when Tarascon Mill burned in 1892.⁵

At Louisville, Will Hays reported the city's wharfage tax, collected from all landing boats, fell sharply from \$40,000 annually in 1872 to \$17,000 in 1879 for several reasons. When Scowden locks tripled the capacity of the 1830 locks, it became possible for Cincinnati's marine engineers to build larger steamboats transporting more cargo at lower operating costs—the larger boats carried the same cargo as two or more older boats but paid fewer wharfage taxes. Louisville's dwindling wharfage tax revenue resulted more from political crusade against the tax led by the Falls bard, however, than from

marine design improvements. In his river column, Hays hammered away everyday against high wharfage taxes, for example writing:

There was a time and only a few years ago, when Louisville could boast of more fine steamboats and a heavier river trade than any city between Pittsburgh and the Gulf. Alas! Where are the boats and the trade now? There is no denying the fact, Cincinnati has almost cleaned us out of both. How? By watching her opportunity and, what is more remarkable, is the fact that we have not only sat still and let her do it, but we have actually aided her in robbing us of what legitimately belonged to us. You ask how? Why, what has done more to drive the river trade and commerce of this city to Cincinnati than the damnable curse of high rates of wharfage?⁶

Hays predicted the opening of Scowden locks might allow steamboats to pass Louisville without landing at all, thereby avoiding high wharfage taxes, and his dire warning brought results: the city council reduced wharfage taxes several times during the 1870s. At the same time, Hays conducted campaigns to reduce the tolls collected by the Corps of Engineers at Scowden locks and also for federal funding to initiate his friend Pink Varble's proposal of blasting wider the Indian chute. The Falls bard's political influence steadily advanced, especially after his friend Albert Willis, the Jefferson County Attorney, was elected to Congress and became the powerful chairman of the House Rivers and Harbors committee. This committee managed the bills appropriating funding for the federal improvements at the Falls and other obstructions to navigation, and, in the end, the Falls bard won all that he asked.⁷

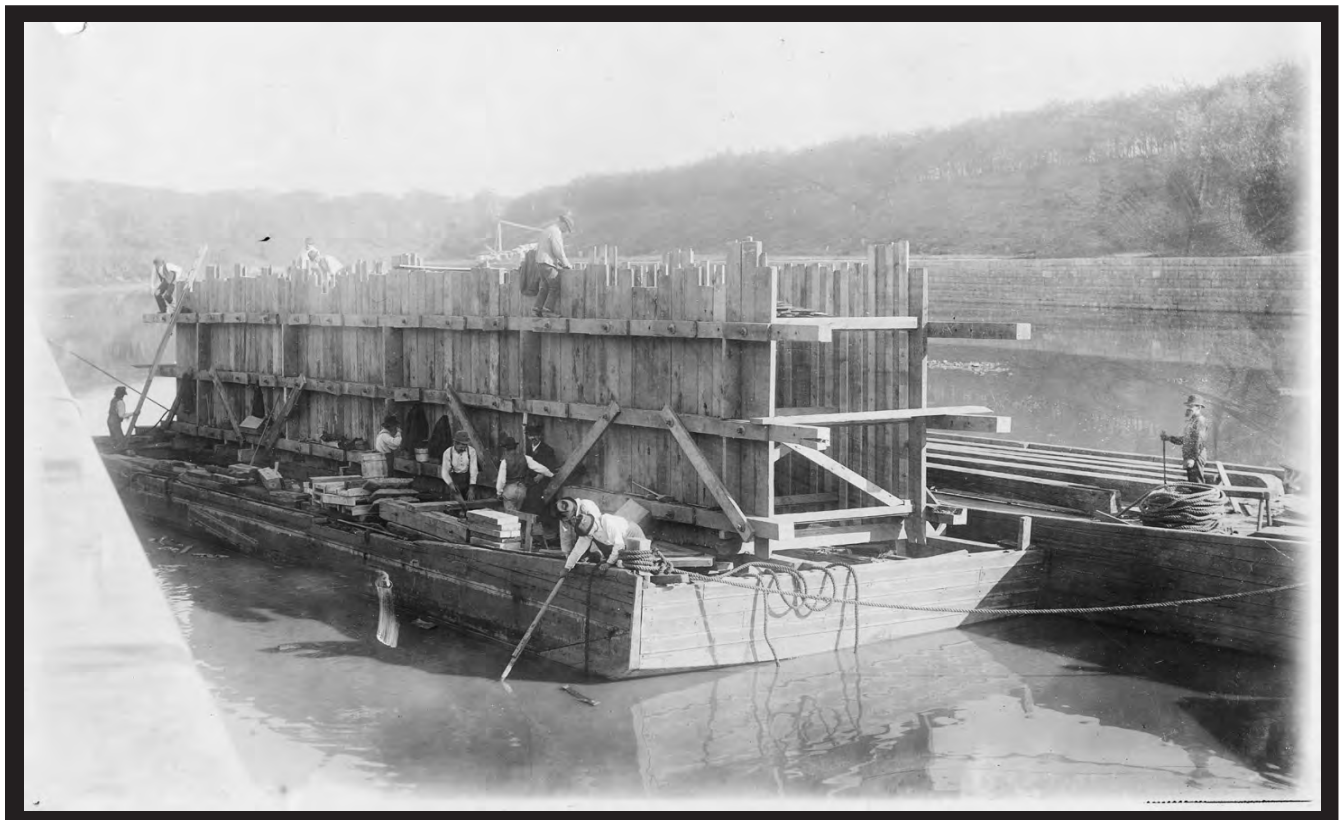
WEITZEL RESPONDS

The swift changes in steamboat packet commerce at the Falls did not trouble General Godfrey Weitzel, nor his deputy Alexander Mackenzie in local charge at Scowden locks. They were busy learning the basics of canal lock operations, and in 1878 Mackenzie penned a description of these operations, writing:

The lock chambers are filled and emptied through the lift gates, there being in a set of gates 10 openings, each 30 by 36. These openings are closed by cast-iron wickets turning on a vertical axis. They are moved by a lever through a vertical rod running to and projecting slightly above the top of the gate. The gates are opened and closed by capstans, two for each set located on adjacent side walls. Men turn the capstans and the motion is communicated through a beveled gear to two horizontal shafts, being under the coping and parallel to the axis of the lock. At end of these shafts are pinions working in large wheels which carry the drums on which wind the chains. On the upper drum, the chain is carried vertically down through a well-hole under a friction-drum and out through the side walls over

friction rollers, 5 feet above the bottom of the lock. It is attached to the gate on its side, 5 feet above the foot of the miter post. On the lower drum, the chain passes down and out like the upper chain and is then carried across and attached to the gate at the opposite side. As one chain winds the other unwinds, thus turning the capstan in one direction opens the gate of its own side while turning in the other direction closes the opposite gate. The opening in the sidewalls are 5 feet above the lock bottom to avoid as much as possible the deposit of sediment; this height requires some slack in the chain to prevent catching onto passing boats.⁸

Observing the difficulties when operating the Scowden lockgates, Mackenzie saw that the system was inadequate. It was impossible to keep the rail tracks on the lock chambers' bottom clear for passage of rollers under the swinging



To allow construction in the dry on the Falls, box cofferdams were made of lumber then placed in a line and filled with rock and dredged materials to form a temporary dam. (National Archives)



In 1876 Paul Boyton became the first man to deliberately swim over the Falls. He was marketing his rubber suit as emergency life preservers for boat passangers. (Courier-Journal)

lockgates, and the wooden kingposts that held iron rods suspending the gates were decaying. Mackenzie replaced the wooden kingposts with iron masts planted firmly in the lockwalls, capable of suspending the mitering lockgates even without the rollers. He met an irritating surprise in 1877, however, when Louisville's city council demanded that he repair the pivot bridge over the canal at Eighteenth street—the old Elm Tree Garden bridge. When he demurred, the city presented him with a copy of the canal company's promise made to Frank McHarry in 1856 that it would keep the bridge in good repair. Since the federal government had taken the canal and had accepted the company's obligations, Mackenzie was bound to repair the city's bridge with federal funds.⁹

As he gained operational experience, Mackenzie observed that Scowden locks easily handled steamboat packet commerce because the boats seldom arrived at the locks simultaneously. It was the Pittsburgh coal rush that complicated operations. Arriving in fleets of several tows on each river rise, the towboats and their barges crowded into the canal, with their captains contending for lockage and condemning each

other and the canal staff when they did not receive priority. As many as fifty towboats and five-hundred barges massed in and above the canal during the coal rushes, awaiting lockage and meanwhile blocking passenger packets from the lock entrances. It sometimes required the canal's staff as long as five days of around-the-clock work to pass these coal fleets.¹⁰

Mackenzie with General Weitzel first responded to the coal rush by converting the old triple locks of 1830 into double locks. Taking out the middle-chamber lockgates in 1878 and constructing new lockgates, they transformed the triple locks into two chambers, each 258 feet long and fifty feet wide. Although still having a restrictive fifty-foot-width, the increased length made passing more coal barges possible during coal rushes, or when the Scowden locks were closed for repairs. This was accomplished at such low cost that it seems odd that John Hulme or James Guthrie had not done it years earlier.¹¹

The officers also investigated methods of mechanizing and speeding lockgate operations. While Weitzel thought replacing manual labor with teams of horses might serve the purpose, Mackenzie studied applying the Falls' water power to the task. The Smith and Smyser flour mill on the Indiana side of the Falls had two 84-inch turbines in its mill race, transmitting power through spinning wire cables to their millhouse, where each cable drove seven mill stones. A similar turbine-powered mechanism in a mill race excavated near the locks could easily operate the Scowden lockgates, but Mackenzie estimated the installation cost at a prohibitive \$200,000. Instead of mill or horse power, the officers determined to experiment with steam power.¹²

Obtaining a used boiler and a small steam engine, Weitzel and Mackenzie installed them near the middle lockgate's northern leaf, which at ninety tons was the heaviest in Scowden locks. Geared to a capstan, the steam engine turned to wind up chains pulling the lockgate open or closed. After breaking a few chains, the experiment proved a complete success: where the lockgate had required fifteen minutes to open manually, steam power reduced this to slightly more than three minutes. Indeed, the steamboat *Golden Rule's* captain timed the gate opening precisely at three minutes and thirty-eight seconds. Thus encouraged, the officers secured permission from the Chief of Engineers to purchase another boiler and five steam engines.

Installing the two boilers at the sides of the canal near the middle gates, they then piped steam from the boilers to engines at each of the six lockgates, mechanizing the system. This not only sped traffic through the locks, it allowed reducing the canal staff by sixteen employees, from fifty-six down to forty, with resulting operational savings that were soon reflected in reduced canal tolls. From the initial ten-cents a ton in 1874, Weitzel gradually decreased the tolls to six-cents a ton by 1881.¹³

Weitzel recognized that another cause of delay in the canal lay in some boat captains' uncooperative attitudes. He reported: "Some trouble has been experienced during the year and delay caused by the refusal of boats to move promptly and make room for those coming after them. The absence of all laws on the subject often renders the superintendent of the canal powerless." At Weitzel's direction, Captain Mackenzie drafted formal regulations for canal traffic providing that the superintendent would control the order of entering and the movement of boats in the canal. In order of priority, the superintendent first locked federal watercraft, then passenger packets, followed by loaded, then by empty tows. All boats in the locks would fasten bow and stern lines to snubbing posts on the lockwalls and install fenders to avoid hitting the walls. All boats wishing to enter the locks would signal with four distinct whistles, and would pay tolls at the time of lockage, only with U. S. currency. No checks accepted. Along with traffic controls, Mackenzie inserted prohibitions against interfering with canal employees at work and throwing debris into the canal. These sensible rules Congress endorsed as law to assure their legal enforcement.¹⁴

Weitzel and Mackenzie initiated other improvements in the canal's operational routines. Canal company officers had hand carried the daily toll collections to Jonas Rhorer's bank in Louisville, but H. N. Adams, the new federal toll collector, established his residence in a building at the locks, placing an iron safe in his home to protect the toll revenues until transferred to a federal bank. Because the lockhands who did not own homes in Shippingport or Portland lived in dilapidated barracks-like buildings near the locks, the officers recommended building small plain cottages for the lockhands' use, collecting reasonable rents to recover the costs. To service the steam engines, they built a machine shop

adjacent to the old carpenter shop, and to protect the property they excavated water cisterns for use during fires and installed fire alarms connected to the city's system. They also initiated efforts to curtail use of the canal by private businesses.¹⁵

In 1872 the canal company had granted the Byrne and Speed coal company the privilege of excavating a basin at the canal's side, without charge, to construct a coal elevator for barge unloading. While the canal superintendent technically controlled the basin's use, the coal company often ignored his orders, leaving barges extending from the basin into the canal, partially blocking the passage. After personal and legal coercion failed, Weitzel initiated a legislated remedy, and eventually Congress imposed a \$250 annual rental fee on the company and granted the Corps authority to terminate the agreement at any time, thereby improving the company's cooperation.¹⁶

Captain Mackenzie urged that Congress also should repeal Louisville's right to discharge sewers into the canal, and for good reason. When an unusual August flood of 1875 washed offal from the Beargrass Creek slaughter houses into the canal, the stench was unbearable. Its water became so polluted that fish kills resulted, further enhancing the stench. Although Mackenzie speculated this affected the lockhands' health, causing fevers prevalent among them, forcing the city to relocate its seven sewers emptying into the canal or the nearby river at great costs proved too difficult for Mackenzie to negotiate. It would require congressional action.¹⁷

THE FALLS HEROES

Events of the national centennial year 1876 proved critical to Falls history. That spring Will Hays and Louisville hailed the first man to swim over the Falls deliberately. Paul Boyton, famous for swimming the English channel and rivers in a rubber suit sold as a shipboard life-saving device, came to Louisville to demonstrate it by shooting the Falls. Promoting Boyton's visit, Hays chartered Pink Varble's *Magnolia* to take the press and public to the demonstration. Rivermen advised Boyton not to attempt descending the whitewater rapids while the wind was high, but Boyton donned his air-tight rubber suit and jumped into the river at Jeffersonville. Floating on his back, head foremost, he tested gadgets

attached to his suit: the crowd following him in boats cheered when he sounded his foghorn and hoisted warning flags on the toes of his boots. As he entered Indian chute the six-foot waves nearly dashed him into the railroad bridge pier, but he shot swiftly through the rapids to Big Eddy, where the savage turbulence drew him down. When he arose, a wave crest tumbled him over in a back-somersault, a mishap that he had not met with in the ocean or on other rivers. Fortunately he missed the rocks that might have ripped open his suit and killed him, arriving in New Albany at last, exhausted but unmaimed.¹⁸

Will Hays and the newsmen aboard the *Magnolia* watched several sturdy men in skiffs following Boyton down the Falls in case of disaster, handling their craft like masters. Inquiring, they learned these expert boatmen were William Devan, John Tully, and Jack Gillooly: Tully was a Falls fisherman, Devan and Gillooly worked at coal docks on the Louisville wharf, and they had gained public attention by their daring rescues of people floating to their death on the Falls. At the time of Boyton's exploit, they saved three men whose boat had capsized and were being drawn by the torrent down the Falls. Jumping into their rowboat *Always Ready*, Devan, Tully, and Gillooly paddled into the teeth of the Falls, catching the men before they drowned. Similarly, the next month they saved two men whose skiff went over Weitzel's dam and capsized on the Falls. Working entirely as volunteers, these superb oarsmen saved dozens of people from the Falls, and Will Hays and the press began promoting them as the "Falls heroes."¹⁹

The Falls heroes earned even greater public acclaim when they saved passengers from steamboats that went down on the Falls. When, for example, Pink Varble hit Ruble Rock and wrecked the *James D. Parker*, and its passengers took refuge on the top deck, Devan, Tully, and Gillooly rowed across the river from Louisville and down the Falls, reaching the wreck in just ten minutes. By then the steamboat was splitting in half and had caught fire, and panic-stricken passengers crowded toward the two lifeboats, which could take off only a few at a time. Husky John Tully jumped up with an oar and beat back the men, taking off only women and children first. Rowing back and forth from the wreck to the Indiana bank as fast as possible, the heroes transported 150 passengers to safety without loss

of life. These heroes had ample opportunities to demonstrate their courage and skills in this fashion, because the *Parker* was just one of eighteen steamboats that wrecked on the Falls during the late 1870s.²⁰

In tribute to the stunning voluntary rescues by Devan, Tully, and Gillooly, Will Hays orchestrated public fund-raising in Louisville to purchase metal lifeboats for their use; and Kentucky's legislature in 1880 awarded gold medals to the three heroes. Working closely with Congressman Albert Willis, Hays sought the establishment of a federal life-saving station at the Falls as a branch of the U. S. Life Saving Service that managed stations along the coasts to rescue shipwreck victims. The commander of the Life Saving Service, Sumner Kimball, doubted the need for a station on an inland river until Congressman Willis brought him to Louisville in early 1881. After the Falls heroes demonstrated the hazards by boating Kimball personally down the Falls and around Big Eddy, he agreed that the conditions certainly justified a life-saving station manned by the heroes.²¹



John Gillooly, John Tully, and William Devan received gold medals from Congress and Kentucky for their heroism when saving boat passengers from wrecks on the Falls. Called the "Falls Heroes," in 1881 they became the first crew of the Life Saving Station at the Falls. (Rick Bell Photo)

Congressman Willis sponsored the formative legislation and Kimball contracted for building floating quarters with a tower where the crew could lookout over the Falls. To man this station, in 1881 Kimball appointed the three heroes plus Edward Farrell and Joseph Martin. William Devan became the life-saving station's first officer and in thirty years service rescued thousands from drowning on the Falls, saved many valuable boats and cargoes, and recovered the bodies of drowning victims. Merged into the United States Coast Guard in 1915, Louisville's life-saving crews continued their services until completion of the McAlpine Locks and Dam submerged the Falls during the 1960s. Their last lookout station, later named the Andrew Broaddus for a Louisville Mayor still adorned Louisville's riverfront in the twenty-first century.²²

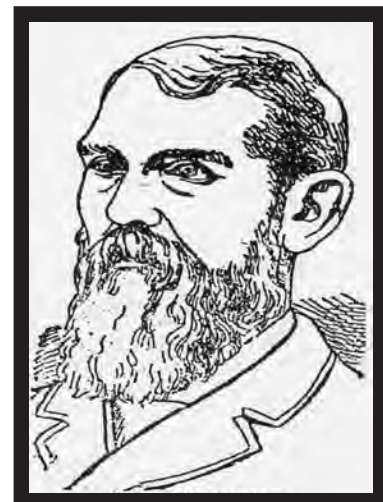
The Falls bard also devoted newspaper space to some unsung heroes of 1876, victims of politics during the 1876 presidential election, pitting Republican Rutherford Hayes against Democrat Samuel Tilden. That July, Will Hays, Pink Varble, and Enoch Lockhart organized a Rivermen's Tilden Club consisting of the Falls pilots and steamboat captains, with Lockhart as president. Offering free barbecue, entertainment, and orators, their club conducted political rallies to erect tall hickory poles flying Tilden flags at the Louisville and Portland wharves. Lockmaster Thomas Jones and five canal lockhands enjoyed the festive barbecues, subsequently to their regret. When their support of Tilden and the Democrats became apparent, the Republican Grant administration ordered them fired from federal service. Fuming at their abrupt dismissal, the Falls bard declared:

Old Man Jones has been a faithful,
clever, energetic boss of the men
who work the gates in the canal
locks for upwards of thirty-five
years. Now he and five others
have been discharged because they
expressed themselves for Tilden
and reform. If this dirty, rotten,
thieving administration ain't
getting low down in the grade of
honesty, dignity and character
then we don't know what low
down is. Old Caesar [Grant]
seems determined to rule or ruin
while he does run the old ship.
But never mind, boys, he'll strike

a rock, sink her, and drown the
whole ship's crew of pirates, and
Tilden and Hendricks will build a
new one, and we will sail safely
then over prosperous seas.²³

Hays' 1876 political forecast proved optimistic. Democrat Tilden received the majority of the popular vote, but the electoral college and Congress selected Rutherford Hayes; thus, Grant's discharge of the Democratic canal hands stood as ordered. To replace the fired employees, General Weitzel promoted Peter and William Black to become the new lockmaster and assistant lockmaster, and these excellent employees served through the remainder of the century. Yet, by firing Lockmaster Jones and his partners, the Grant administration set in chain an ominous precedent. When Republicans were voted out of office in 1880, the Democrats fired the canal superintendent and appointed another, and, when the Republicans regained the presidency in 1884.... Political interference with canal management remained rife well into the twentieth century.²⁴

According to Will Hays, the greatest Falls champion of all was Captain Pink Varble. Hays meticulously recorded Varble's every adventure, promoting his services as Falls pilot and urging General Weitzel to allot \$30,000 to blast a wider path for the pilots through the Indian chute, assigning the management to Captain Pink. In 1876 Hays proclaimed that General Weitzel had wasted money building the cribdam along the crest of the Falls; that it was filling Louisville's



The legendary captain Pink Varble served as Falls Pilot for forty years, 1852-1892. He directed the blasting to open a safer passage through Indian chute on the Falls. (Courier-Journal)

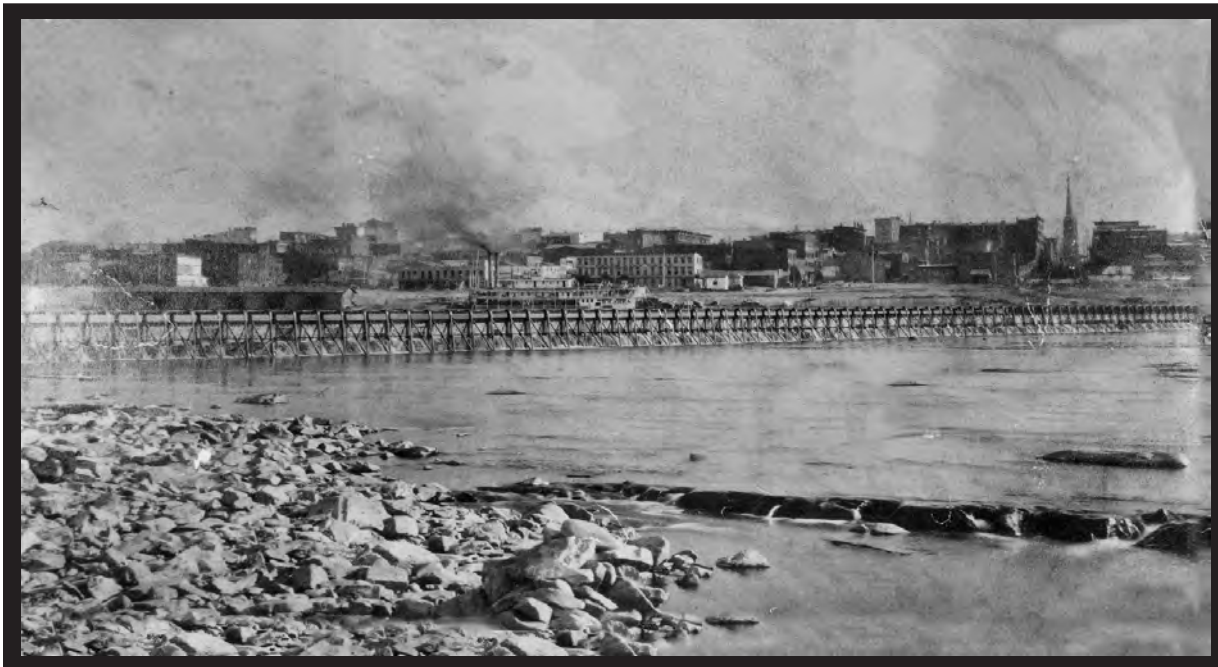
harbor with mud and making the currents through Indian chute exceedingly dangerous to boats. Congress should fund a project to blow open a wider channel through Indian chute, Hays maintained, adding: "We trust Uncle Sam will at once see the necessity of making this allowance, and let somebody like Captain Pink Varble, who knows what ought to be done, superintend the job, and we'll guarantee it will be done as it should be done."²⁵

Perhaps influenced by the knowledge that General Weitzel was a Radical Republican who fully supported President U. S. Grant, Hays, a Democrat, began portraying Weitzel as a villain, describing the Falls crest dam as "Weitzel's dam-foolishness." Headquartered far away at Detroit, Weitzel probably read few of these personal slurs; yet, he recognized the shortcomings of the fixed crest dam and sought a solution in movable dams. He and Colonel William Merrill at Cincinnati in 1873 had initiated studies of movable dams for use on the Ohio River after Pittsburgh coal shippers had objected to fixed dams.²⁶

Planning a slackwater project for the Ohio, Colonel Merrill estimated that canalizing the 981-mile channel from Pittsburgh to Cairo might require building as many as fifty-four locks and dams. Pittsburgh shippers reacted to this negatively, shuddering at the prospect of breaking their huge coal-barge tows into sections

to pass locks with fixed dams, warning it might destroy their trade. Merrill, Weitzel, and Colonel William Craighill, the latter responsible for the Kanawha River project, therefore initiated studies of movable dams that could be propped up to hold deep pools during droughts, or dropped to the river bottom during rises, thereby allowing tows to pass the dams without using the locks. Their studies began with examination of the beartrap dams invented in 1818 by Josiah White and widely used by American loggers to float timber rafts to sawmills. These dams consisted of two long panels or leaves that collapsed one atop the other—opening valves to admit river water beneath the panels caused them to rise and dam the river; closing the valves allowed the panels to fall to the bottom, opening a channel for rafts to float downstream while riding water released from the dam. These dams bore a fancied resemblance to the deadfalls used by pioneers to trap bears, hence the name beartraps.²⁷

Rejecting beartraps as inadequate for rivers the size of the Ohio, however, the Corps officers expanded their search worldwide, learning that French engineers had designed movable dams for European rivers. After visiting France to see the dams in operation, Colonels Merrill and Craighill selected the Chanoine wicket dams built on the Seine River near Paris for use on the Ohio and Kanawha rivers. General Weitzel, however,



This view looking upstream at the Boule dam across Middle chute shows Louisville around 1888 with the B.S. Rhea at the wharf. (National Archives)

preferred the Boule wicket dam, consisting of metal trestles chained together in series.

Pulling a chain raised the trestles to stand side by side, and the front of the trestles were covered by panels to form a dam during low-water stages. Then when the river rose, removing the panels and collapsing the trestles opened a clear passage for boats.²⁸

To help flush mud from above the Falls crest dam and to reduce the currents through Indian chute, General Weitzel decided to replace sections of the crib dam with movable Boule wickets, starting at the head of the Middle chute. Managing this work fell to Weitzel's deputy, Captain A. Nesbit Lee, a young Baltimore native and West Point graduate who succeeded Alexander Mackenzie in local charge at Louisville. At the entrance to Middle chute in 1879, Captain Lee and the canal hands demolished five hundred feet of the fixed crib dam, excavating a key trench across the opening to hold the foundation for Boule wickets. The canal shops fabricated the metal trestles and wooden panels, installing the movable dam during autumn low-water seasons. When the wickets were standing, they held a deep pool in Louisville harbor; when the river rose, the canal hands went to the dam aboard a maneuver boat equipped with a derrick, pulled the wooden panels aboard the boat, and collapsed the trestles to the river bottom. This opened a passage for mud washed by the river from the harbor and

released water that otherwise would have passed down Indian chute. When operations showed the first Boule wickets worked satisfactorily, General Weitzel planned to install other movable sections in the crest dam.²⁹

INDIAN CHUTE EXPERIMENTS

While Weitzel and Lee built the movable dam, the Falls bard and his friend Pink Varble elevated their political pressures for blowing holes in Indian chute.

By 1876 political influence on the Ohio River was shifting from steamboat owners and captains to the Pittsburgh shippers and towboat captains, whose coal commerce had begun to surpass the value of the steamboat packet trade. Recognizing this power shift, Captain Pink attended meetings of the Pittsburgh Coal Exchange, where he obtained its vocal support for widening Indian chute. Cincinnati's support for this initiative grew after another steamboat disaster on the Falls, when the Cincinnati packet *Glasgow*, with Pink Varble's brother Billy at the wheel, rammed rocks on the left-hand reef of Indian chute and plunged to the bottom, a total loss—except to Pink Varble who salvaged the wreck.³⁰

After this catastrophe, General Weitzel saw something should be done to make Indian chute passage safer. He sent Captain Lee with Falls pilots Pink Varble and Enoch Lockhart to select the most hazardous rocks in Indian chute for



General Weitzel adopted the Boule movable dam, invented in France, to control river flow over the Falls. The metal trestles were manufactured and assembled at the canal repair station, then installed in the dam at the crest of the Falls. (National Archives)

removal, then sought permission from the Chief of Engineers to expend part of the Falls appropriation on clearing the chute. "This improvement was known as the method of the Falls pilots, and it was in their interest," Weitzel explained: "The enlarged canal and reduced tolls had injured their business seriously, and would have destroyed it if Ohio River commerce had not expanded so rapidly. To relieve the enlarged canal of congestion, the experiment of improving the chute was begun by removing a few of the worst obstructions."³¹

At the first extreme low-water stage after receiving approval for the experiment, Weitzel ordered Captain Lee to hire Pink Varble as project manager and to put the canal hands to work in Indian chute. Varble and Lee started their work in October 1879 on the rocky left-hand reef at the chute's entrance where the *Glasgow* had wrecked, seeking to blow open an eighty-foot-wide channel, compared to the forty-eight-foot width previously available. Placing temporary wooden breakwaters upstream of the rocks to divert river flow, the canal hands waded in and drilled holes in the rocks by hand, packing them with explosives and detonating the charges to shatter the rocks. Will Hays loudly proclaimed these explosions "bully" and predicted that Captain Pink would even remove the dreaded Ruble Rock if the river did not rise. The stress of rushing this demolition before the river rose apparently proved too great for Captain A. Nesbit Lee, however—he perished on Halloween, felled by a stroke at age thirty-six.³²

Canal superintendent Phil Schopp replaced Captain Lee on the job and the drilling continued, but the river rose in November before Varble attacked the formidable Ruble Rock in the chute's center just below the railroad bridge. Still, Will Hays declared that Varble surely deserved the award of a gold medal for his \$5,000 worth of work on the chute, and he proclaimed that Indian chute should now be named "Varble chute—most worthily named to honor a live, enterprising man, Pink Varble." Captain Pink asserted that his project had widened Indian chute to eighty feet and had made it at least eighteen inches deeper. Unfortunately, the wider passage did not prove safer. Two weeks after high water stopped his blasting, Captain Pink at the wheel of the *Alice* rammed into the left-hand reef and stuck the boat on the rocks. He had a barge brought

alongside, transferred twenty-five tons of nails to lighten the *Alice*, then pulled it off the rocks to safety. When descending the Falls, however, he lost the barge load of nails.³³

Varble's mishap demonstrated that more work was needed in the chute, but General Weitzel lacked any authority to continue the experiment. News of this soon reached Congressman Albert Willis of Louisville, however, and this influential chairman of the House Rivers and Harbors committee solved Weitzel's dilemma with a letter to the Chief of Engineers demanding that the blasting of Indian chute continue. The Chief allotted \$10,000 funding for the Indian chute work in 1880 and promised that more would come. Weitzel then prepared to resume the blasting, but delayed the work. "As the river gets lower the amount of water passing down the Indiana Chute becomes less," Weitzel said, explaining his delay, "and in consequence of the great velocity which causes the stream then to assume the character of a wild mountain torrent running through a rugged, crooked, rocky bed, to create so many difficulties that the cost of removing the scattered rocky points, ridges, and sharp edges at that time would be exceedingly expensive, and in my opinion, a criminal waste of the public money."³⁴

To collect data justifying the Indian chute work, Weitzel appointed Falls pilots Pink Varble, Enoch Lockhart, and John Littrell to keep track of the number of boats and their cargoes passing the chute. Their records for 1880 listed the Falls navigable for both descending and ascending boats during high stages lasting 41 days, while descending boats used the chute during 148 days. That year, 1,723 boats carrying 517,361 tons of merchandise, coal, salt, and iron ore crossed the Falls. This was nearly a third of the commerce, 4,196 boats with 1.1 million tons, that passed the canal the same year. This ratio subsequently varied, depending on river stages: during dry years more boats used the canal than Indian chute, and during years of lengthy high water the number of boats passing the chute increased.³⁵

When Weitzel applied the funding allocated by the Chief to blasting more rocks from Indian chute, he assigned canal superintendent Phil Schopp to manage the work in consultation with Pink Varble. Schopp started his attack at the rocky reefs upstream of the railroad bridge,

removing 1200 feet of the left-hand reef and 1300 feet of the reef right of the chute. He also dispatched drillers down the chute in flatboats to blast two feet off the top of Ruble Rock and Alecks rock. Schopp had another crew build a cofferdam and install 160 feet of Boule wickets in the cribdam: raising or lowering these wickets allowed some control over river flow passing into the chute. In this season, Schopp blew 4,200 cubic yards of the coral reef bordering Indian chute to smithereens, proclaiming that "in the swiftest part of the Ohio Falls, where formerly existed a clear channel of only 45 feet, widened in the season of 1879 to 80 feet, a width of 200 feet is now secured."³⁶

This ended some Indian chute hazards but created another. Howard boatyard had built twin palaces, the *City of New Orleans* and *City of Baton Rouge*, both too large to pass Scowden locks, and the *Baton Rouge* with Pink Varble at the wheel made its maiden voyage as the first boat through the newly blasted Indian chute. To Varble's surprise, the excavations in the chute had caused new currents to develop, and one smashed the magnificent new steamer onto the rocks. The Falls heroes came across the river in a flash, taking the passengers off the boat, including its builder John Howard who was enraged by the wreck. Howard trusted Captain Pink enough, however, to let him steer down the great *City of New Orleans*, and Varble got it safely below the Falls, then extricated the damaged *Baton Rouge* from its perch on the rocks.³⁷

Nor did Varble's project accomplish much toward making the chute safer for coal tow passage, because towboats guided the barges around bends by flanking from one side of the channel to the other, like the tail wagging the dog. Pink Varble took coal tows down the chute by dividing them into smaller sections, or by cabling a small towboat to the head of the barges to assist the towboat at the rear in threading the intricate channel. By 1881 Varble had piloted a total of 520 steam and towboats over the Falls, and that March he steered the towboat *John A. Wood* pushing eleven barges down Indian chute, which Will Hays lauded as "a feat few men would have had the nerve to perform." Captain Varble once described how he steered tows into the chute:

We come down along the straight shore above Jeffersonville until we reach a point near the ferry

landing which is about Spring street. We immediately change the course of our boat or tow and head over toward Louisville at an angle of 25 to 30 degrees, and then we flank the point, throwing the boat on a quarter and backing up to the right point at the end of Mulberry street, and continue that way until we get down within one-half a mile of the head of the Falls, then straighten up our boat to run the dam and piers of the existing bridge. On a sudden rise, or head rise, the current will reach six miles an hour, ordinarily five miles an hour. Of course, the danger to boats is largely increased in windy and foggy weather. There have been accidents below, both on the dam and on the bridge. I consider the Falls the most hazardous place for navigation from Pittsburgh to the Gulf.³⁸

When the river rose high enough for tows to pass Indian chute, their owners could save up to \$1,000 by hiring a Falls pilot instead of using the canal and losing several days waiting in line for lockage. General Weitzel recognized this flourishing coal commerce needed an improved passage through the Falls, but he feared Indian chute might never prove adequate. He therefore devised a new scheme, proposing excavation of a coal canal north of and parallel with the existing canal and in the riverbed next to Shippingport island. He envisioned this canal, for exclusive use by barge tows, as a 300-foot wide walled channel leading into a navigation lock built near Tarascon Mill. This new lock would be 110 feet wide and 600 feet long, the same dimensions as Ohio River Lock No. 1 that Colonel William Merrill had begun building at Davis Island near Pittsburgh. Weitzel's proposal was a harbinger of Ohio River Lock No. 41, completed in 1921 on Shippingport island with the same dimensions, but his coal canal project of 1881 never materialized.³⁹

THE FREE CANAL

Will Hays, having launched Pink Varble on his inglorious stint as waterways engineer, turned in his daily column to the nagging issues of wharfage taxes and canal tolls. He wanted them

abolished, and his campaign garnered congressional interest because the Des Moines canal, built by the federal government on the Upper Mississippi, was nearing completion in 1880 and it would be entirely free of tolls. How could the government charge tolls for using Louisville's canal if it did not charge them at Des Moines or at the Weitzel Lock in Sault Ste. Marie?⁴⁰

With Congressman Albert Willis pressing Louisville's case, Congress responded in May 1880, enacting a bill to end toll collections after the first of July 1880. Because the tolls funded the canal's operation and maintenance costs, the act also authorized the Treasury Department to pay these costs after the canal had been freed. An amending act in June even allowed General Weitzel to keep the \$30,000 in surplus canal tolls on hand, rather than turning them over to the Treasury, to be applied to canal improvements.⁴¹

As mandated by the law, Weitzel ended the toll collections at midnight of July 1, 1880, and prepared a toll history summary. He reported the canal company from 1830 to 1874 had collected a total of \$5.6 million, and the United States from 1874 to 1880 had collected \$417,069.38 cash from its tolls. Altogether, more than \$6 million in tolls had been extracted from commerce at the Falls during fifty years, a figure surpassing the canal's aggregate construction costs by \$1.2 million. Truly it had been a profitable venture, both for the company and the United States Treasury.⁴²

Although boasting he had been the nexus behind the free canal bill along with the bill creating the Louisville life-saving station, the Falls bard gave the end of canal tolls scant mention in his column. Hays had moved on to other issues, writing: "Now as the canal is free, why cannot wharfage be made free? There is no reasonable excuse in the world why the wharfage should not be free. Steamboats should at least have the same free privileges that our big-hearted city gives to railroads."⁴³

General Weitzel's euphoria at the end of canal tolls was dashed in late 1880 when news came that the Comptroller of the Treasury declined to pay vouchers for the canal's operating expenses, on grounds that the act of Congress had not specified which appropriation would be used to fund the operations. By the end of 1880 all available operating funds had been exhausted and no reimbursements had arrived from the

Treasury Department, forcing Weitzel to close the canal to commerce on New Years Day, 1881. Livid, Weitzel complained to a Cincinnati friend:

The ways of lawyers are truly wonderful. Congress passes a law and the President signs it, saying that the canal at Louisville shall be operated and kept in repair by making monthly drafts on the Treasury. The First Comptroller of the Treasury, after thinking over the matter about six months, says that the law makes no appropriation for operating or keeping the canal in repair. The same law directs the canal to be free after midnight July 1, 1880. I am paying operating costs out of construction funding, but if the comptroller decision stands and Congress does not correct it, I am personally liable for the whole \$17,933.22 which I have expended. The wisdom of some of our Solons passeth my understanding.⁴⁴

Cut off from its southern river trade by the canal closure, Cincinnati was just as upset at Weitzel. Its board of trade immediately protested to Congress, as did Louisville's James B. Speed, heading Louisville's protest, advised Congress that rivermen might even prefer paying tolls again to having the canal closed. Congressman Albert Willis personally contacted more than a hundred members of the House to promote resolution to this conundrum. Will Hays completely agreed with Willis, but took umbrage at a Cincinnati news release crediting Louisville's canal to hard work by Weitzel and the Republican party. The canal, Hays maintained, was a Kentucky project conceived by James Guthrie, managed by Enoch Lockhart, and designed and built by the Scowdens—most of them good Democrats.⁴⁵

Some of Hays' pantheon of canal heroes had fallen on hard times by 1881. Ransom Scowden, after working with his father designing municipal water systems for Dubuque, Iowa, and Newport, Kentucky, had returned to Louisville in 1874, establishing his own consulting engineering firm and designing Atlanta, Georgia's water system. Then his consulting business floundered and he accepted election in 1876 as Louisville's city

engineer, a position he filled for fifteen years. His father, Theodore Scowden, after the Caperton-Rhorer land speculation and steel mill ventures failed, designed San Francisco's water system before returning east and perishing at the end of 1881. Collapse of the Caperton-Rhorer ventures cost Scowden and Enoch Lockhart dearly, but Lockhart joined with Ransom Scowden in promoting Falls water-power development. They obtained a charter for their Louisville Water Power and Canal Company in 1882, but never obtained sufficient capital for construction.⁴⁶

Sadder still was the fate of former canal directors Jonas Rhorer and Joshua Fry Speed. In January 1880, when it came time for Rhorer to submit his accounting of the Louisville Savings Bank to its stockholders, he penned a note at his desk and fled his office. When assistants saw the note, they immediately contacted stockholders Joshua Fry Speed, James Henning, and others, finding that Rhorer's note confessed that he had doctored the bank books for years. Scattering through the city, the stockholders hunted down Rhorer, and Henning found him, sitting on the jailhouse steps awaiting his fate. Promising he would not be jailed, Henning escorted Rhorer back to the office, where a full confession and audit of his books ensued. By the end of the day the stockholders found that Rhorer had embezzled \$67,000, investing most of it in the failed Caperton-Rhorer ventures. Worse, they soon learned that Rhorer had also used \$40,000 of the bank's bonds as collateral for private loans, making their losses more than \$100,000, a figure exceeding the bank's capital stock.⁴⁷

By the end of the month, Rhorer's bank had bankrupted, paying depositors and creditors only ten cents on the dollar. His personal property confiscated, Rhorer left the city in disgrace. Broken by the bank's collapse, Joshua Fry Speed went south for his health but died in 1882. Suspicion arose that Rhorer, the canal secretary from 1848 to 1874, might also have misapplied canal revenues, but if so he was so sly that government auditors never detected it. Another issue remained unresolved, even into the twenty-first century: what happened to the canal's internal papers and books inherited from Simeon Goodwin and meticulously kept by Jonas Rhorer for a quarter century? In view of the circumstances of his departure, Rhorer could have taken no records from his office, and no evidence indicated he ever transferred the canal

records to the Corps of Engineers or Treasury Department. The largest creditor of Rhorer's bank was Louisville Banking Company, which held the clearing-house stock and whose president was Theodore Harris. Possibly, Rhorer's canal records went along with his bank records into possession of the Louisville Banking Company and, if not destroyed, might still repose in some banking warehouse.⁴⁸

The Louisville bank debacle drew no notice from Will Hays, nor did he fulminate against Weitzel's closure of the canal for lack of funds in January 1881. The river at the time was frozen from bank to bank and nothing moved on it except ice skaters; of these, Hays noted that two nifty men actually skated down the Falls on the ice and made it safely to the Big Eddy. When the ice broke in late January, however, sinking the steamboat *Etna* in the canal where it had taken refuge, it cut a sixty-foot swath through the cribdam at the canal's entrance near Eighth street. Through this gap the river rushed, creating what Hays dubbed a "suck" and drawing boats through the gap onto the Falls. First, the towboat *Sam Brown* entering the canal lost some of its barges through the gap; then, the suck caught the *Paris C. Brown*, sinking two barges, scattering coal from thence to Portland, and leaving its hull decorating the dam. Next was the *James W. Gaff* with Pink Varble and his towboat *Hop Loudon* lashed alongside to help it past the suck. The current proved so strong, however, that the tow and both towboats crashed through the gap and sank on the Falls. Devan, Tully, and Gillooly saved the passengers, and Varble extracted the *Gaff* from its predicament, but lost his own harbor towboat.⁴⁹

Labeling the canal the "graveyard chute," Will Hays demanded that Weitzel repair the dam, making it even higher and stronger—a reversal of his earlier attitude toward the dam. Weitzel had no funding to repair the dam, and even if he had the funds little could be done until the flood subsided. Congressman Willis, meanwhile, took in hand Weitzel's request for \$82,000 to repair the dam and operate the canal, and pushed a bill through Congress revising the law funding operations of the Louisville, Des Moines, and Sault Ste. Marie canals. This revision simply added a single phrase directing the Treasury Department to pay the Corps warrants for canal operating expenses "out of any money in the Treasury not otherwise appropriated."⁵⁰

THE ROLLOVER

Weitzel resumed the canal operations and began repairing the entrance dam when another challenge cropped up at Sand Island near the canal's exit. In April 1881 the towboat *James H. Blakemore* bound upstream past Portland wharf became caught in the swift current through the chute past Sand Island. When the current drove the little steamer toward Portland, the captain reversed its engine to avoid ramming the bank, and then the boat turned bottom-up and went tumbling downriver. Seeing this disaster, Will Hays was amazed that no lives were lost, labeling it the most sensational steamboat wreck he ever witnessed:

It seemed every soul on board was doomed. Many of the crew were hurled with great velocity away out into the water, and their shrieks for help, as they battled with the swift-rolling current, were soul-harrowing in the extreme. During this trying moment the heroic conduct of the captain was most remarkable. Though he could not swim a lick, he clung desperately to the rocking craft and encouraged his men to keep cool. In a few minutes after the first roll the boat partially righted and it seemed she was about to resume her natural position. As it righted up, it was pitiable to witness the wonderful desperation with which the half-drowned men who had been buried in the water clung to her tossing hull. Those on one side were lifted away out of the water, while those on the other were submerged again. The boat might have righted to safety had it not been for her heavy boilers which, with the unaccustomed commotion, had been loosened from their fixings, and ...caused her again to roll over in the opposite direction. By this time her cabin had been smashed to smithereens, and the heavy fragments, turned into a heavy raft, whirled along by her side and ruthlessly tore away the grip of the desperate men who were

clinging to her hull. When by almost superhuman efforts these unfortunate fellows again secured their hold on the rocking boat, it was agonizing to see them strain and again be washed away. Strange to say, the whistle rope during this time had got fouled in some manner, and from the moment the boat first pitched over until the boiler rolled way, the whistle blew continuously one shrill, beseeching scream for assistance. Skiffs from Portland manned by strong, noble fellows, shot out from the shore and hurried to the aid of the unfortunate floaters as rapidly as brawn and muscle could propel them. As the wrecked boat went tossing down the stream, alternately rolling over and righting, one of these skiffs attempted to approach, but was caught under the bottom by the rising hull and thrown fairly out of the water up into the air, coming down again with a splash that spilled its men in every direction. Others of them were upset, but fortunately nobody was injured. It looked as if it was the sinking boat's intention to drown all on board, but...not a soul was lost.⁵¹

Captain Varble with his towboat *Andy Fulton* arrived in the nick of time to save the crewmen clinging to the hull and tow the hull back to Portland. Incredibly, only a single injury occurred, when steward Thomas Brady, while trying to save chambermaid Carrie Cornelius, was thrown over the railing and hit his head on the rudder, requiring medical attention at Portland.⁵²

This spectacular rollover certainly made the Corps aware that something should be done to make Sand Island chute safer, but a jurisdictional issue arose: was Sand Island part of the Falls and General Weitzel's responsibility, or was it part of the general Ohio River project administered by Colonel William Merrill at Cincinnati? This question was settled in 1882, when Weitzel became ill and transferred from Detroit to Philadelphia, also relinquishing command of the Louisville canal and Falls projects. Will Hays

announced his pleasure at this news, dropping into dialect to reveal his reason: “He’s dun spent a pile o’ de people’s money an’ played hell wid nabbigashun ‘round hear an’ de Falls generally.” The Chief of Engineers masterfully resolved the Sand Island jurisdictional question by rolling command of the Falls over to Colonel Merrill. This made Merrill responsible for federal projects along the entire length of the Ohio River. At Sand Island, Merrill soon designed a half-mile-long wingdam to ameliorate swift currents past the canal’s exit while also protecting the island from erosion.⁵³

Will Hays’ vehement opposition to Weitzel had no apparent influence on the transfer of Falls projects to Merrill, but his political activism certainly affected federal activities at the Falls. Although Congressman Albert Willis had sponsored the legislation freeing the canal of tolls, creating the Louisville Life-Saving Station, and funding the canal’s operation and maintenance costs, Will Hays claimed credit for these initiatives and clearly deserved it. In his daily columns Hays promoted his Falls heroes by focusing public attention on their heroism and used them to influence federal planning at the Falls, leaving indelible impacts on the Falls environment—some beneficial, others lamentable. His harping criticisms of Weitzel’s dam led to its modification through installation of movable wickets to reduce sedimentation above the dam and to mollify the swift currents through Indian chute. His promotion of Captain Pink Varble’s plans led to actions that made Indian chute somewhat safer for navigation while also destroying it, blasting unrecoverable coral reef to bits. Not even heroes could restore such fragile environments.



12

MERRILL AND UNCIVIL SERVICE

Critics of the Corps of Engineers often protest it is as much a political as it is an engineering agency, and the Engineers indeed take pride in their responsiveness to policies set by the President and Congress. Politics ideally represents an expression of the will of the sovereign of the United States—its citizens. General Lytle Brown, who managed the Louisville and Portland canal early in the twentieth century, succinctly summarized the Engineers' view on politics:

It may be said with equal truth that politics may further the adoption of a project, and may prevent it. Furthermore, as may be claimed without disturbing the equanimity of a citizen or his faith in his government, politics is involved in everything that affects the welfare of the people of the Republic. Other wise there would be no democratic principle in the government.

The preceding chapter highlighted the political influence of Will Hays on federal projects at the Falls, in securing approval of Pink Varble's plans for Indian chute and in obtaining a Life Saving Station at Louisville. Hays lived during the Gilded Age, from the Civil War until the twentieth century, when like newspaper editors, the Presidents and Congresses of both political parties exercised politics in its fullest context, both in policy formulation and in federal appointments. Although some Presidents of the age espoused civil service reform—removing federal appointments from the patronage system—at the Falls of the Ohio as elsewhere they still clung to the old political adage “to the victor belongs the spoils.”

So long as the Louisville and Portland canal was privately controlled, its personnel had not been subject to loss of employment for political reasons. Although the canal directors before 1874 removed employees for incompetence, they

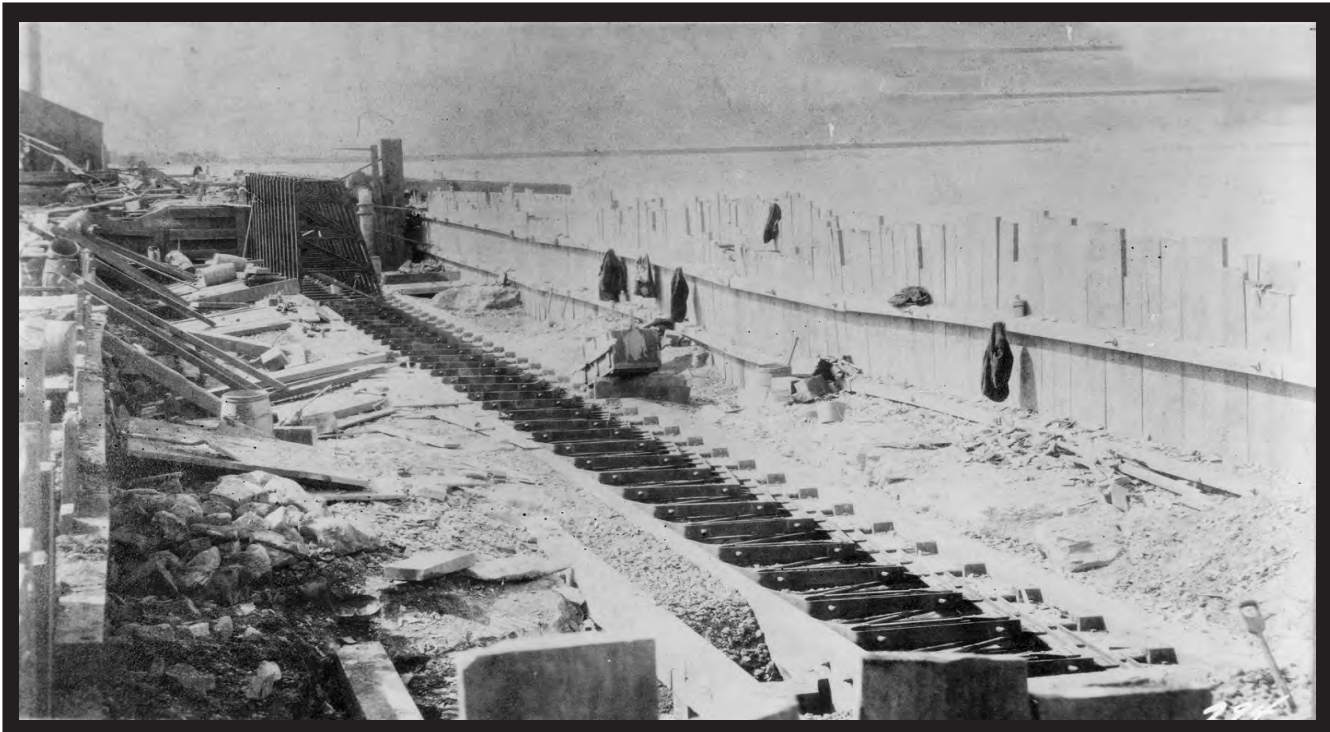
recognized that experienced personnel were vital to successful lock operations and their lockhands often served thirty or forty years at the canal. This changed soon after the canal became federal property. In 1876 the canal's lockmaster and four lockhands lost their jobs because they had supported the wrong presidential candidate, and subsequently the canal's top civilian positions became political plums dispensed by political parties.

President James Garfield's assassination in 1881 by a disappointed office seeker was later listed by historians as a key to the origin of federal civil service reform, aiming to select employees on the basis of merit rather than through political patronage. His successors, Chester Arthur and Grover Cleveland, during the 1880s initiated the federal civil service system, but their reforms did not extend to the Louisville canal, where uncivil service dominated its management throughout the late nineteenth century.

This was among the many challenges Colonel William Merrill encountered at the Falls when he took charge of the canal and related projects in 1882. Merrill substantially modified the projects and initiatives of his predecessor, but the spoils system and its political interference with canal management so troubled him that he eventually resigned from the canal's command.¹



William E. Merrill (Corps of Engineers)



The movable Boule dam was constructed on the Falls behind a box cofferdam. Some of its metal trestles stand on the left, while the remainder in the foreground are collapsed against the foundation. (Corps of Engineers)

MERRILL'S COMMAND

The son of an Army officer killed in action during the Mexican War, William Merrill attended schools in Louisville and Cleveland before entering West Point. Dubbed the “Padre” because of his deep religious convictions, Merrill graduated at the head of his class in 1859. He joined the Corps of Engineers and during the Civil War became chief engineer of the Union Army of the Cumberland, reconnoitering ahead of the army’s advance and mapping its routes south. Wounded and captured by Confederates, he spent months in the infamous Libby prison at Richmond until escaping. For the Union army’s advance on Atlanta, Merrill designed portable ponton bridges of canvas stretched over wooden frameworks that were easily transported to rivers and assembled for crossings; and after the war he served as engineer on the staffs of Generals William Sherman and Philip Sheridan until appointed in 1870 to manage the Ohio River project.²

Opening his office at Cincinnati, Merrill established what became known as the Cincinnati Engineer District, managing the Ohio River navigation project from 1870 until the turn of the century. He built the double-hulled *E. A. Woodruff* to clear the Ohio of snags, constructed the dipper

dredges *Ohio* and *Oswego* to deepen its channel, and designed wing dams at shoals to constrict river flow, thereby encouraging the river to scour its own path through sandbars. Merrill earned the sobriquet “Father of the Ohio River Improvement” in the 1870s when he proposed canalizing the river with locks and dams to provide slackwater navigation for commerce and constructed the first Ohio River lock and dam (No. 1) at Davis Island near Pittsburgh.³

To appease Pittsburgh’s coal-towing shippers, Merrill designed the Davis Island structure as a movable dam, adopting Chanoine wickets that collapsed at high water to allow coal-tow passage over the dam without using the locks. Further, when coal shippers complained that locks with the 80-foot by 390-foot dimensions of Scowden Locks, then largest in the world, would still be too small for coal tows, Merrill designed a 110-foot by 600-foot lock and invented a new lockgate to close wide chambers. He could not use swinging (mitering) wooden lockgates in 110-foot locks because their weight would rip them from their anchorages, so he designed a wooden-truss lockgate rolling on tracks like a railcar across the 110 by 600-foot lock, the largest in the world. Barges then were 25 feet wide, so four abreast could enter a 110-foot-wide lock; indeed, its 600-foot length handled the standard barge

tow: four in the first row, four in the second, and two at the rear on each side of the towboat. Advances in steel manufacture eventually permitted designing swinging steel lockgates that could withstand the stresses, making Merrill's rolling lockgates obsolete, but his design for a 110-foot-wide lock became standard on the Ohio as on other rivers.⁴

It was to inspect its lockgates that Merrill first visited the Louisville canal in 1882. He watched canal superintendent Phil Schopp and the lockhands installing new gates in Scowden locks, then toured the Falls to review Weitzel's plans. Columnist Will Hays, pleased to be rid of Weitzel, welcomed Merrill to Louisville, commenting that his appointment was universally applauded by rivermen and steamboat owners. Hays also seized the opportunity to influence Merrill's management, suggesting that he replace superintendent Schopp with Captain H. N. Adams, the canal toll collector, a real gentleman in Hays' opinion. If Merrill would promote Adams, Hays urged, "we'll all feel Merrill-y over it."⁵

Merrill declined Hay's kind suggestion, continuing Schopp as the superintendent and leaving the canal personnel undisturbed, but he initiated major revisions in the Falls project. Just before his departure, Weitzel had recommended to Congress that a new chute exclusively for the use of coal tows be excavated in the riverbed along the north side of Shippingport island.

This 300-foot wide canal would lead into a lock that was 110 by 600 feet, the same dimensions as Merrill's Davis Island Lock. Reviewing this proposal, Merrill quietly dropped it, principally to prevent interference with Shippingport's prosperous cement industry.

The coal chute's construction would deprive the cement plants of easy access to their Falls quarries near Corn Island. Although Shippingport's cement plants and quarries could perhaps be condemned and purchased to make way for the coal chute, the costs would be enormous, Merrill warned, and he therefore recommended delay. In time, Merrill reasoned, the cement companies would work out and abandon the quarries, and then the coal-tow chute could be built quite economically because the companies would have completed part of its excavation while quarrying rock from the Falls.⁶

Instead of a coal chute, Merrill strongly recommended enlarging the canal's entrance, which was so restrictive and dangerous that boats often missed it and were carried onto the Falls by the current. Indeed, even as Merrill wrote, the steamboat *Buckeye State* lay on the Falls, a wreck ornamenting Weitzel's cribdam. Merrill proposed excavating the canal's entrance wider from the Fourteenth street railroad bridge upstream to Louisville's wharf, affording easier entrance to the canal, a larger holding place for coal tows, and a more commodious harbor for Louisville. Widening and deepening the entrance



Canal Superintendent Thomas Taylor inspects the completed Boule trestles. Taylor twice served as Louisville's Chief of Police. (National Archives)

by four feet would cost, Merrill estimated, \$1.3 million compared to the \$3 million Weitzel had estimated as the coal chute's cost. Congressman Albert Willis of Louisville arranged federal funding for Merrill's plan, and Merrill soon awarded contracts for the entrance enlargement, appointing Granville Shaw as assistant engineer to manage the excavation. Shaw had served as a steamboat captain, an engineer for railroads, editor of the *Louisville Commercial*, and Louisville's assistant city engineer before accepting Merrill's job offer.⁷

In addition to the constrictive entrance, Merrill identified a restriction in the canal passage from the locks upstream to the first passing basin. This 800-foot stretch of the canal was only ninety feet wide, and caused lost time because downbound boats had to wait in the passing basin until ascending boats passed before steaming the 800 feet to the locks. To reduce delays, Merrill proposed excavating this section to a 215-foot width. When Congress funded this work, Merrill hired Robert R. Jones as assistant engineer in charge of the excavation. Jones had learned engineering at Princeton University and had participated in steam engine and locomotive design before joining the Corps on construction of Des Moines Rapids Canal on the Upper Mississippi River.⁸

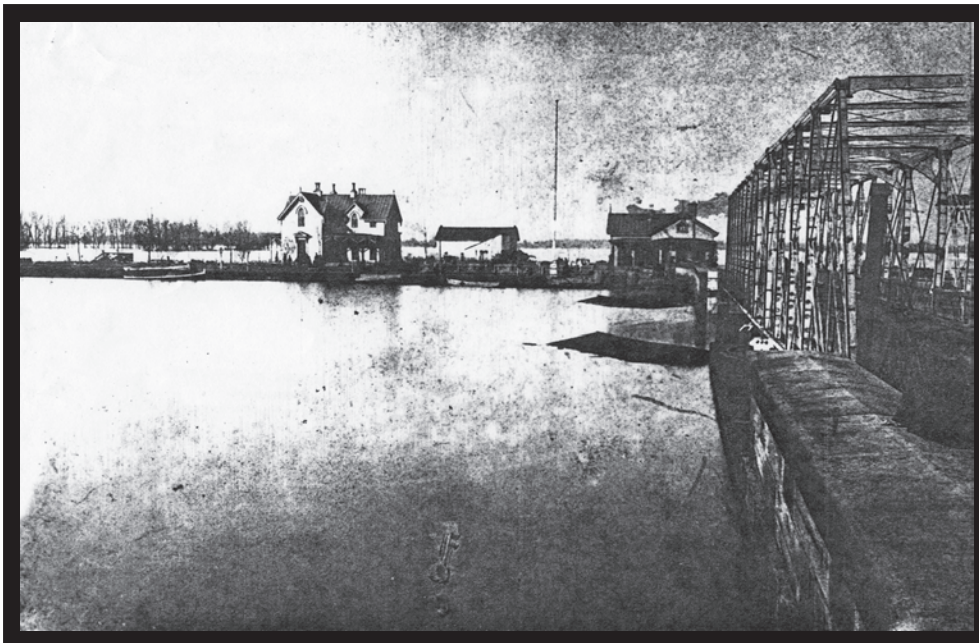
Colonel Merrill thus professionalized his management at the canal and Falls, with two

graduate engineers, Shaw and Jones, managing the contractors excavating the canal, while superintendent Schopp, also an engineering professional, directed the temporary labor employed to replace sections of the Falls cribdam with movable Boule wickets. Neither the contractors nor hired labor got much accomplished during the early 1880s, however, because their tasks required excavating the canal and river bottom, a work that could only be accomplished—without high cofferdams—during the river's lowest stages. And these river stages were rare in 1882, 1883, and 1884 when Louisville suffered three great floods, each higher than the previous.⁹

THE FLOODS TRIPLED

Although not surpassing the 1832 record, the flood of February 1882 inundated Louisville's waterfront structures, stood six feet deep in Portland's riverfront stores, and inundated all of Shippingport along with the canal. It destroyed 2,000 barrels of cement at Tarascon Mill and hundreds of whisky barrels at Portland's distillery. Shippingport families abandoned their wooden houses or moved into the upper stories of their brick houses.

The city's relief committee purchased rations of beans, sugar, coffee, hominy, potatoes, onions, meat, and bread that Falls heroes of the Life Saving Station delivered in their lifeboats to the



The 1883 flood submerged the canal in the foreground and nearly entered the lockmasters' houses across the canal. The larger house on the left, occupied by assistant superintendent H.N. Adams, served as an emergency distribution center for food sent to flood refugees in Shippingport and Portland. (Corps of Engineers)

refugees, making the home of toll collector H. N. Adams next to Scowden locks the Shippingport relief center. The flood washed frame shanties out of Louisville and Shippingport, dropping the wrecked buildings on Portland's streets, and the receding flood packed the canal and locks with mud. The cleanup efforts by home owners, municipal authorities, and the canal force had scarcely been accomplished before a higher floor smashed through town the following February.¹⁰

While the 1882 flood was more than routine for the Falls cities, the February 1883 disaster astounded Louisvillians. "The Prize Flood of 1832 Will Please Hand over the Horns to 1883," headlined Will Hays in his description of the catastrophe. When the city in 1854 excavated Beargrass Creek cutoff, it had dammed the old creek channel; and in 1883 the Ohio River backed into the cutoff, threatening to overtop the dam and flood the old Beargrass valley below. When residents living in the valley rushed to the dam to open its gates, allowing the flood water to escape through sewers, city engineer Ransom Scowden stopped them, warning the flood's pressure would surely rip out the sewers and destroy the dam. Late that night, however, the river went over the cutoff dam and a news reporter described what he saw:

Suddenly the roar increased almost to a thunder, and the flood came pouring down, growing deeper and deeper every moment, and sweeping everything before it. Quick as a flash light after light was extinguished and the screams of danger and scrambles for life mingled with the war of the flood. In a few minutes the news spread like wildfire and many persons living much as a square away were awakened by the calls for help and rushed to the banks, which in half an hour were filled with people. A telephone message was sent to the engine-houses, and about twenty of the firemen were soon on the scene, assisting in the work of saving the lives. The screaming of the women was plainly heard at the ferry-dock, and aroused the life-savers in the station, who immediately rushed off to the scene. A great many large bonfires were kindled on the railroad track, and threw a light which extended nearly halfway across the valley, and greatly



The 1883 flood submerged most of Shippingport. The tall building with adjacent smoke stack on the right was the Tarascon cement mill. The two-story building on the left was a French mansion later owned by Frank McHarry. (Filson Historical Society)

aided in the work. The houses could be dimly seen floating rapidly around on the surface almost like logs of wood. Soon lights began to spring up all over the flooded space, showing that the people were climbing out on to the roofs of the houses in their efforts to save themselves.

Meanwhile the boats had been doing faithful work, and fully twenty were on the go constantly, being led by the lights of the lamps which were being kindled and the screams which resounded from all sides.¹¹

That few people drowned in this harrowing calamity was amazing: Louisville listed only ten lives lost to the 1883 flood and five of these occurred at Shippingport, where the entire town was submerged, driving people into trees to await rescue. Fifteen hundred refugees crowded into Portland's schools and churches, while crowds of worried people collected at the flood's edge, staring ruefully toward their homes. "A great deal of swearing and drinking were going on," a reporter at the scene observed, "and men in all stages of intoxication were adding their muddled wits to the general confusion."¹²

Captain Pink Varble took the helm of the steamboat *Mattie Hays* and, with Mayor Charles

Jacob, City Engineer Ransom Scowden, several volunteer physicians and the life-saving crew aboard, wended slowly through the flooded districts, rescuing people from the upper stories of their homes and furnishing them emergency food and medical care. Again, they selected the residence of toll collector Adams at Scowden locks as the emergency supply center for Shippingport, along with a fire station to serve Portland's needs. Noting that some flood refugees had been without food two days before the steamboat arrived, Will Hays pronounced the ration distribution quite a "timely one, as many, especially the colored people, were beginning to suffer the pangs of hunger and had no earthly resources to which to look for assistance."¹³

At the flood's crest, nothing of the canal could be seen, only housetops and trees marked Shippingport's site, and when the steamboat *Grey Eagle* came in to land at Louisville's wharf, it passed over Shippingport island, plowing its way through the treetops. Shippingport residents generally, however, accepted their losses laconically, like George Haslett's widow who said, "I am a lone widder and here comes this flood a swinging along and without as much as saying by your leave, sweeps into my house, takes possession and drives me out. Well, there's some as suffers more than me, and I guess I got off light enough." Perhaps in comparison to Shippingport's cement plants, she did: the cement



Repairs underway at the Scowden lockgates in 1884. Note the kingposts used to suspend the lockgates. (National Archives)

companies lost their cooper and blacksmith shops and the barreled cement stored in their warehouses. While the 1882 flood had left the canal filled with mud that was soon dredged out, the 1883 flood also filled it with driftwood and wrecked shanties atop the mud, and it required weeks of labor to clear it for passage.¹⁴

A year later, the February 1884 flood surpassed the 1882 and 1883 flood crests, climbing to 46.7 feet on the Louisville gauge, a foot above the 45.5 foot stage of 1832. On Valentine's day the flood washed dozens of cottages out of Shippingport, including the homes of lockmaster Peter Black and assistant lockmaster William Black. The lockhands had placed heavy weights on the bridge over Scowden locks and managed to hold it in place with only its side rails above water. Alec Folwell of Shippingport, who had survived the 1832 flood, took refuge from the 1884 flood in the third story of the house once owned by Jim Porter, the Kentucky Giant. When rescuers arrived, Folwell told them: "I have been here since long before '32 and have been in every flood. I have never moved out yet and don't propose to. I thought that we would never see another flood like the one we had last year, but this one kinder knocks me out."¹⁵

Lower Portland, where two church buildings overturned and floated toward Cairo, was in little better shape. When the walls of the Bellair distillery on Thirty-Fifth street fell, 300 barrels of whiskey stored in its second story swished away downriver with a dozen skiffs in hot pursuit. Refugees who took shelter in the upper story of the St. Charles Hotel had to be evacuated. The most catastrophic damage occurred, however, in Happy Hollow, a neighborhood in a ravine below the road embankment leading to the bridge over Scowden locks. When the flood overtopped this road embankment, it released a flood wave that swept off fifty homes, leaving the valley tragically barren.¹⁶

During the night of the flood's crest, a terrific windstorm sent waves ripping through Shippingport, while forlorn home owners prowled along the nearby bank, seeking glimpses of their houses across the turbid water. Although they could hear the sounds of falling timbers and the beating of driftwood against the buildings, they could see nothing except a single light in the upper story of the toll collector's house, where Captain Adams had remained to ride out the

flood. After interviewing the refugees at the flood's edge, a news reporter concluded, "It is safe to say that Shippingport has received its death blow. A great many persons whose property has been swept away have announced their intention of never building there again."¹⁷

Canal superintendent Phil Schopp reported the 1884 flood had done no serious damage to the Scowden locks masonry, but it had torn a broad gap through the canal bank just above the locks. Inundating the entire canal property, the flood washed out the road leading to Shippingport, eroded the grounds around the shops, and caused the earth embankments to slide into the canal. It cost thousands to repair these damages.

When restoring the property after the 1884 flood, materials excavated from the canal were heaped to form an elevated mound, and the canal's shops were relocated atop the mound to raise them above ordinary flood levels.¹⁸

This triple whammy of three successive floods, all in February and each progressively higher, seemed a result of some major climatic or environmental change. Yet, none was identified; the floods came after heavy rains and snowmelt. Some speculated the extensive logging and deforestation of tree cover throughout the Ohio valley, especially at its headwaters, might have contributed to the flooding, and national forests eventually were established in the headwaters to preserve tree cover. Yet, the flooding of the 1880s might merely have been the result of such distant factors as the warming of Pacific Ocean currents—the El Niño made famous in 1998.¹⁹

These floods were so devastating in the Mississippi as well as the Ohio valley that major federal policy revisions resulted. After the 1882 flood the Mississippi River Commission, a federal agency, joined local efforts to build levees along the Mississippi to prevent flooding of the lowlands, and Congress approved the first federal disaster assistance to flood victims, calling upon the Corps of Engineers to use its snagboats to deliver emergency supplies for refugees. During the 1884 flood these policy departures also extended into the Ohio valley. At Louisville the army chartered the steamboats *Mattie Hays* and *Reindeer*, loaded them with quartermaster rations, and dispatched them to distribute emergency supplies to flood victims, the *Hays* from Louisville downriver to Evansville

and the *Reindeer* upstream to Madison.²⁰

In the wake of the 1884 flood some civil engineers pleaded for assignment of the Corps of Engineers to studies of building reservoirs on Ohio River tributaries to reduce flooding and the appalling annual losses of lives and property. Congress then was not prepared to initiate such broad studies, but it did order investigations of the construction of levees, sometimes called floodwalls, to protect the devastated towns of Jeffersonville and Lawrenceburg, Indiana, and Shawneetown, Illinois.²¹

The 1884 flood had forced eighty percent of Jeffersonville's residents from their homes and also suspended the transport of military supplies from the Jeffersonville Quartermaster Depot. Congress therefore directed Colonel William Merrill to study constructing a levee to reduce flooding in Jeffersonville and protect the approaches to the army depot. Consulting with Jeffersonville's city engineer, Merrill reported that, if the city would furnish the right-of-way, the levee's costs would amount only to \$50,000. In the Rivers and Harbors Act of July 1884 Congress funded construction of the Jeffersonville levee, the first federal appropriation for flood protection in the Ohio valley. Because flood protection then was not an undisputed federal policy, however, the act carefully worded the appropriation as a contribution toward protecting government property and for improving navigation—the levee would keep boats in the channel and out of Jeffersonville during floods and also serve as high-water wharf for loading military supplies. Merrill awarded a contract for the levee's construction in 1885 and it was completed the next year, a mile long with its top two feet higher than the 1884 flood crest. Similar levees subsequently were built to protect Lawrenceburg and Shawneetown.²²

When the first extended low-water season in several years came after the 1884 flood, Superintendent Phil Schopp went after the much dreaded Ruble Rock in the center of Indian chute. Building a breakwater to divert river flow around the rock, Schopp measured it and found it approximately 160 feet long and 43 feet wide composed of flinty limestone extending five feet above Indian chute bed. Because it was centered just below the railroad bridge in a strong current, Schopp described its removal as "dangerous and irksome." He and his drillers persevered,

blasting away more than 3,000 cubic yards of rock and at last clearing Indian chute of its central obstruction. This destruction of the coral reef elicited no public protests, except an observation from Will Hays that the heavy blasting had driven away the fish and fishermen could catch none within two miles of the Falls.²³

Schopp proclaimed that his blasting had exploded the chute to a 250-foot-width and the Falls pilots seemed quite satisfied with this result. During the following April, when the river rose to a twelve-foot depth, the Falls pilots towed down Indian chute three coal barges abreast, all drawing eight feet of water, a feat never before accomplished. During the forty-one days that the river filled Indian chute to a navigable depth in 1885, 803 boats carrying 256,015 tons of coal and commodities passed down the chute. Schopp admitted, nevertheless, that Indian chute remained too crooked and narrow to pass full coal tows without first breaking them into smaller sections for the passage—much more blasting would be necessary before all obstructions were cleared.²⁴

CANAL POLITICS

Even more troublesome than floods for Colonel Merrill's administration were his political tribulations. This trouble began innocuously, when Superintendent Phil Schopp demanded that canal employees earn their pay. During the low-water season of 1884, Schopp directed a gang of temporary laborers to repair the Falls cribdam by hauling stone in wheelbarrows up a thirty-foot incline to fill a gap cut by the February flood. Schopp could not personally supervise this wearying labor at every moment, and, after noting the amount of work completed in his absence, he suspected the laborers of loafing. A quarter-mile away at his office, he trained a field glass on the job and soon confirmed his suspicions. Returning to the work-site, Schopp lectured the laborers on their short comings, warned they were not earning their pay, and threatened to fire them. Although he did not fulfill his threat, at the start of the next job he refused to rehire the loafers. This made them his enemies, and they hired an attorney and went directly to local political leaders with their complaints.²⁵

This incident occurred during the 1884 election, when Grover Cleveland was elected

President, the first Democrat to hold the office since 1860. Democrats Will Hays, Pink Varble, Enoch Lockhart, and their political allies were elated by Cleveland's election, and Hays predicted it would have direct impacts on the Falls project, commenting:

Uncle Sam fills the harbor up with mud and then refuses to scoop it up with his dredge boats. Never mind. Things'll change when Grover gets in. There won't be so much red tape and dam foolishness as there is now. It will be a democratic, not an aristocratic government, run in the interests of the people on business principles.²⁶

Soon after Cleveland's inauguration, Oliver Stratton, a local political leader and attorney for the loafers Schopp had chastised, brought charges against the superintendent, contending that all employees had been Democrats in 1874 when the federal government took control of the canal, but Schopp had systematically cleansed them from the payroll. Stratton specifically charged Schopp with the "use of money, cigars and liquors at a coffee house adjacent to said old locks to influence and corrupt voters at the election in 1878 to vote the Republican ticket."²⁷

The Chief of Engineers ordered these charges investigated, and Colonel Merrill conducted an inquiry at Louisville with Congressman Albert Willis, chairman of the House Rivers and Harbors committee, present. Acting as prosecutor, Oliver Stratton presented his charges and called as witnesses the employees Schopp had chastised. Merrill discovered, however, that the local election of 1878, listed in the specific charges, was between two Democrats—no Republicans were involved. And when one of the witnesses, a laborer who had been refused employment "on account of laziness," declined to corroborate the stories told by other laborers, Merrill exonerated Schopp of all their charges.²⁸

This decision resulted in attacks on Merrill and his canal management in the local press. Even Merrill's insistence that supervisory canal managers must be professional engineers met skepticism, and Will Hays editorialized on the subject:

It is said that a man can't be Superintendent of the canal here unless he is a scientific, practical engineer. That's what's the matter with Ohio River improvements. Uncle Sam wants less "engineering" and more good, hard, horse, common sense, and he'll save money and have better improvements. A teaspoonful of common sense is sometimes worth a barrel of science.²⁹

Political pressures in Washington mounted, and in 1885 the Chief of Engineers ordered Merrill to forward to Washington a list of all canal employees together with their political affiliations. Merrill replied that of the personnel inherited from the canal company in 1874, three were Democrats and fourteen Republicans; and of the twenty-five who had been employed after 1874, six were Democrats, eighteen Republicans, and one independent. Thus, the charge that most employees were Republican was accurate, but most had also been Republican before the canal passed into federal hands. Despite Merrill's report and his decision favoring Superintendent Schopp, word circulated that Schopp was to be dismissed, leading to a flood of applications to President Cleveland for Schopp's job. One applicant claimed he deserved the job simply because he was a loyal Democrat and the job paid better than "drumming through Arkansas with two or three large trunks."³⁰

Will Hays reported in February 1886 that Schopp had been terminated as superintendent and was to be replaced by General Thomas Taylor, a former Confederate officer who had become Louisville's chief of police. Taylor's appointment as canal superintendent came at the insistence of Simon B. Buckner, another former Confederate officer best-known for surrendering Fort Donelson to General Grant in 1862; Buckner had become leader of Kentucky's Bourbon Democrats and was elected as the state governor in 1887. Merrill received the surprise announcement of General Taylor's appointment in Will Hays' column before word came to him from Washington, and he angrily complained to the Chief of Engineers that, although he knew Taylor personally and liked him, Taylor was neither an engineer, nor competent for the appointment. Therefore, Merrill angrily concluded:

Inasmuch as the Department has ordered me to appoint as my chief assistant on this great work a gentleman whom I consider incompetent, and a due regard for my reputation as an Engineer, compels me to request that I be relieved from the charge of the Louisville and Portland Canal.³¹

Several days later, Merrill received an employment application from J. P. Claybrook to become General Taylor's assistant, and Merrill acerbically advised him that if he wanted the job he should do as others had done and "get it through the politicians." Claybrook took this excellent advice to heart and got the job. Moreover, Captain Enoch Lockhart, the Falls pilot and canal superintendent from 1851 to 1874, returned to the canal in a capacity specially tailored for his talents: the Cleveland administration made him the canal's Traffic Manager, stationed at its entrance to assign priority to the boats and guide them into the canal and locks.³²

As Merrill had requested, the Chief relieved him of the canal command in March 1886, but Merrill still retained command of the Cincinnati District, responsible for the remainder of the Ohio River and several tributaries. Merrill took Phil Schopp to Cincinnati and made him the engineer for building new locks and dams on the Monongahela River. Merrill also continued his management of the Ohio River's canalization project near Pittsburgh, completing Davis Island Lock and Dam (Ohio River No. 1) in 1885 and initiating construction of Locks and Dams Nos. 2 through 6 to establish slackwater navigation on the uppermost river section from Pittsburgh to Beaver, Pennsylvania. Lock and Dam No. 6 at its completion was named Merrill Dam in his honor.³³

At Louisville, Major Amos Stickney arrived at the canal as Merrill's replacement. Highly qualified, Stickney had managed the construction and initial operations of the Mississippi River's Des Moines Canal, which had locks patterned after the Scowden Locks. In addition to this useful experience, Stickney was well-known in Louisville because he had married the daughter of George Fetter of Louisville; his sister-in-law was famous actress Selena Fetter, who had launched her career at Louisville's Macauley

Theater in 1881. Although the Corps of Engineers did not formally adopt the label "District" for its principal field offices until 1893, Stickney's arrival at the canal marked the origin of the Louisville Engineer District. While General Weitzel had commanded from Detroit and Colonel Merrill from Cincinnati, after Stickney's appointment in 1886 the chronology of command at Louisville remained unbroken through the twentieth and into the twenty-first century.³⁴

Major Stickney's first challenge at Louisville involved the failure of contractors excavating a wider entrance and passage down the canal. Their excavation had removed the upper guard lock near the canal's entrance and therefore they had to build cofferdams to hold the river off their work sites. Yet, they had fallen far behind schedule because their cofferdams could not withstand the record floods of 1883 and 1884. Although Stickney extended their contracts to allow for time lost to flooding, they never secured adequate equipment and workers for their tasks. Their earth-moving equipment—scrapers pulled by horse teams—was no better than that used to excavate the original canal during the 1820s. For rock excavation, they had adopted steam-powered drills, but their laborers still shoveled the broken rock into small railcars that ran up an inclined track out of the excavation; a steam-hoisting engine fabricated by Ainslie-Cochran of Louisville pulled cables attached to the cars to haul them up the incline. Although their contract specified that they would employ at least 300 laborers, the contractors seldom had half that number, even after going south to recruit tenant farmers. Stickney at last forfeited their contracts and proceeded to perform the work directly with government forces.³⁵

To complete the canal-widening work with hired labor, Stickney needed more efficient equipment, and his assistant Robert R. Jones, an equipment expert, arranged its purchase. Jones bought forty-horse-power steam engines and boilers, steam pumps, steam drills, rail dump cars, and steam-hoisting engines with winding drums to pull the dump cars out of the excavation. With thousands of crossties and twenty-four tons of steel rails, Jones installed rail tracks with switches and turnouts crisscrossing the excavation, and over these tracks the dump cars moved up the incline, connecting with the cement company's track that crossed

Shippingport island from the quarries to Tarascon Mill. Jones agreed with James Speed of the cement company to dispose of the excavated rock by grinding it into cement at the mill.³⁶

When the excavation was completed, a 215-foot-wide waiting and passing basin became available just above Scowden locks, and the widened canal entrance had eliminated Varble pass, the high-water passage used by steamboats when they could not safely get under the railroad-bridge span over Indian chute. The railroad pier that supported the Fourteenth street pivot bridge over the canal now stood in the center of the canal, with boat passages on both sides. During this excavation the masonry guard lock near the canal's entrance, used to close the canal for emergency repairs, was removed, and materials dug from the canal were placed in an elevated mound near the locks where the canal's shops and warehouses were relocated for improved security against flood damages.³⁷

While Stickney and his staff labored to improve the passage around the Ohio Falls bridge completed in 1870, a second bridge was

built below the canal. Chartered in 1881, the Kentucky and Indiana Terminal Railroad Company (KIT), a corporation formed by the Southern, Monon, and Baltimore and Ohio railroads, completed a mile-long bridge by 1886. A single-track bridge with vehicle roadways on both sides of the track, it linked railroads at New Albany with Louisville's lines. Alongside the canal, the terminal company also built its Youngstown yard, named for company president Bennett Young, better known as the Confederate officer who had attacked St. Albans, Vermont. Trains crossing the KIT bridge interchanged cars in the Youngstown yard, then traversed the 130 miles of track serving industries in Louisville. One of the new bridge piers was situated on the canal property, and with permission from Congress the company purchased the pier and trestle site.³⁸

Electrically powered streetcars began running on a line paralleling the canal to cross the KIT bridge to New Albany during the 1880s. This came as the canal changed to the electric lighting made famous by Thomas Edison, and as



Looking downstream toward Kentucky and Indiana bridge as the steamboat Cricket awaits lockage in the upper Scowden lock chamber. Captain Jesse Hughes commanded this boat in the Big Sandy River trade. (Murphy Collection, University of Wisconsin)

steamboats also switched to electric lights. The Louisville steamboat *R. R. Springer* in 1879 sported an electric headlight to illuminate the channel ahead of it at night; and Will Hays proudly announced in 1882 that a new steamboat bearing his name would have electric lighting throughout, improving safety by eliminating oil lamps.

Louisville installed electric street lamps in its central business district in 1882; and in 1886 canal superintendent Thomas Taylor proposed replacing the kerosene (coal-oil) lamps lighting the locks with an electric lighting system. This was accomplished in 1887 by installing a Jenney electric generator capable of powering twelve lights placed around the locks.³⁹

Electric lighting proved to be Superintendent Thomas Taylor's principal contribution to canal operations. Major Stickney had proven just as obstinate as Colonel Merrill in dealing with political appointments, and, when Republican Benjamin Harrison replaced Democrat Grover Cleveland as President in 1889, Stickney rid the canal of Taylor. In Stickney's opinion, Taylor had demoralized the canal force by telling them he would employ his Democratic friends to replace them. Stickney then recommended to the Chief of Engineers that the Superintendent and Assistant Superintendent positions be eliminated, and the new positions of Master and Deputy Lock Managers be established to supervise operations only, leaving construction management entirely to Robert R. Jones, Stickney's professional engineer assistant.⁴⁰

When the Chief of Engineers accepted Stickney's recommendation, Thomas Taylor and his assistant left the canal. The Republican Benjamin Harrison administration then appointed William Ekin and J. A. Needy as the new Master and Deputy Lock Managers. Stickney thus separated operations from engineering, assigning Robert R. Jones to construction management of the canal and Granville Shaw to management of the movable and fixed dam projects at the crest of the Falls.⁴¹

This functional management system did not prove as enduring as Stickney had hoped. As the construction engineer, Robert R. Jones hired most of the temporary labor employed on the canal, and soon he was under political attack for "hiring democrats and ex-confederate soldiers to perform the work on said canal to the exclusion

of ex-federal soldiers and republicans who have done good service for their party." Petitions to this effect flooded President Harrison's office, claiming that Jones was an unreconstructed South Carolina Democrat, that he and canal employees had torn down Republican campaign posters and daubed them with mud. One petition to the President, blatantly asserted "to the victors belong the spoils" and declared:

Mr. Cleveland appointed Gen'l Taylor, a rebel, as superintendent and no kick was made. Since Cleveland left office the same crowd has been running the canal. All the leaders of the Republican party in Louisville, New Albany and Jeffersonville want Mr. Jones removed.⁴²

When investigation revealed that Robert R. Jones was a New Jersey Republican, rather than a South Carolina Democrat, and that few canal employees were Democrats, the canal's commander wryly suggested that perhaps it might be wise to leave these few Democrats on the job where the Republican majority might convert them. More to the point, the commander complained that politics grievously interfered with canal management. Nevertheless, the Secretary of War ordered that Robert R. Jones and Master Lock Manager William Ekin be discharged, replacing them with two good Republicans, Hart Vance and Josephus Pell—the latter apparently having learned canal management in his previous occupation as a grocer. Jobless, Robert R. Jones transferred to Colonel Merrill's Cincinnati District in the heart of Republican country, where he served as senior engineer until his retirement in 1928. Jones headed the 1896 Ohio River survey that chose sites for its locks and dams, penned an authoritative guide to the river, and even commanded the Cincinnati District during the First World War when Corps officers were overseas on combat duty.⁴³

Uncivil service at the canal persisted for years. When Democrat Grover Cleveland was reelected president in 1892, the Republican canal managers lost their jobs. When Republican William McKinley succeeded Cleveland in 1896, the canal's Democrats moved on to other jobs. Protection for canal employees from political patronage came at last in 1896, when the

President ordered the canal placed under the Civil Service rules prohibiting the discharge of personnel for political reasons. Civil Service reform came very tardily to the Louisville canal, and even after its arrival the Master Lock Manager's job remained a political plum, dispensed chiefly by Louisville's congressman.⁴⁴

OBSERVATIONS

Colonels Merrill and Stickney during the 1880s sought to professionalize canal management, securing the assistance of trained and experienced civil engineers. Although they recruited highly capable engineers such as Robert R. Jones, their efforts at securing career professional leadership were stymied by the political spoils system of the Gilded Age. The engineers they employed soon came under political attack and transferred from the canal, leaving its management in the hands of marginally competent political victors. Through vicious threats to remove lockhands for political reasons, these demoralized the canal force. Not until 1896, when national civil service reform finally reached down to the canal, were the lockhands made secure from removal on purely political grounds.

Despite efforts by the Corps officers commanding at Louisville, confrontations with the political canal managers continued well into the twentieth century. It finally ceased in 1911, when President William Taft, a Cincinnati native familiar with political patronage problems at the canal, personally reviewed a report by the Chief of Engineers on the troubles experienced with the Master Lock Managers. At the bottom of the Chief's report, President Taft penned his blunt decision: "Don't worry about the master lock manager. I am not going to reestablish an office like that."⁴⁵



13

BLASTED INDIAN CHUTE

The origin of the name Indian chute had been forgotten by 1890. Rivermen labeled this northernmost Falls passage the Varble chute because Captain Pink Varble had planned its enlargement, and engineers referred to it as Indiana chute because it was the passage nearest the Hoosier state. Based largely on information about its hazards supplied by Falls pilots Pink Varble and Enoch Lockhart, the Corps of Engineers at every low-water season during the 1880s blasted the hazardous rocks lining Indian chute, opening it to a 250-foot width. Major Amos Stickney by 1890, however, had concluded that more systematic enlargement and deepening of the chute might relieve the traffic congestion at the canal during coal-tow rushes; moreover, diverting some boat traffic through a wider and safer chute might protract Scowden locks in service until expanding Ohio River commerce made the construction of larger locks imperative. He requested the Chief of Engineers to appoint a board of engineers to review the engineering plans for Indian chute.¹

Colonels William Merrill and Alexander Mackenzie joined with Stickney to form the board of engineers assigned to study the Indian chute enlargement. Hoping to establish a rational foundation for this project, they first assembled maps and hydraulic data and attempted to apply the engineering mathematical formulas devised by hydraulic engineers to the challenges posed by the chute.

They concluded that while these might suffice for ordinary river channels, the standard formulas could not be applied at Indian chute where such factors as slope and cross-section area varied in each foot of the channel. Next they tried modeling, building a wooden model of the chute and passing water through it to analyze the flow patterns that might affect coal-tow passage. The tows arriving at the chute from upriver usually consisted of twelve barges carrying 1200 tons of coal, and to pass these tows without breaking them into sections the board of officers in 1890 recommended opening a 400-foot-wide

channel through the chute. This could be achieved by further blasting of the rocks and by constructing dikes down both sides of the chute to constrict the water flow.²

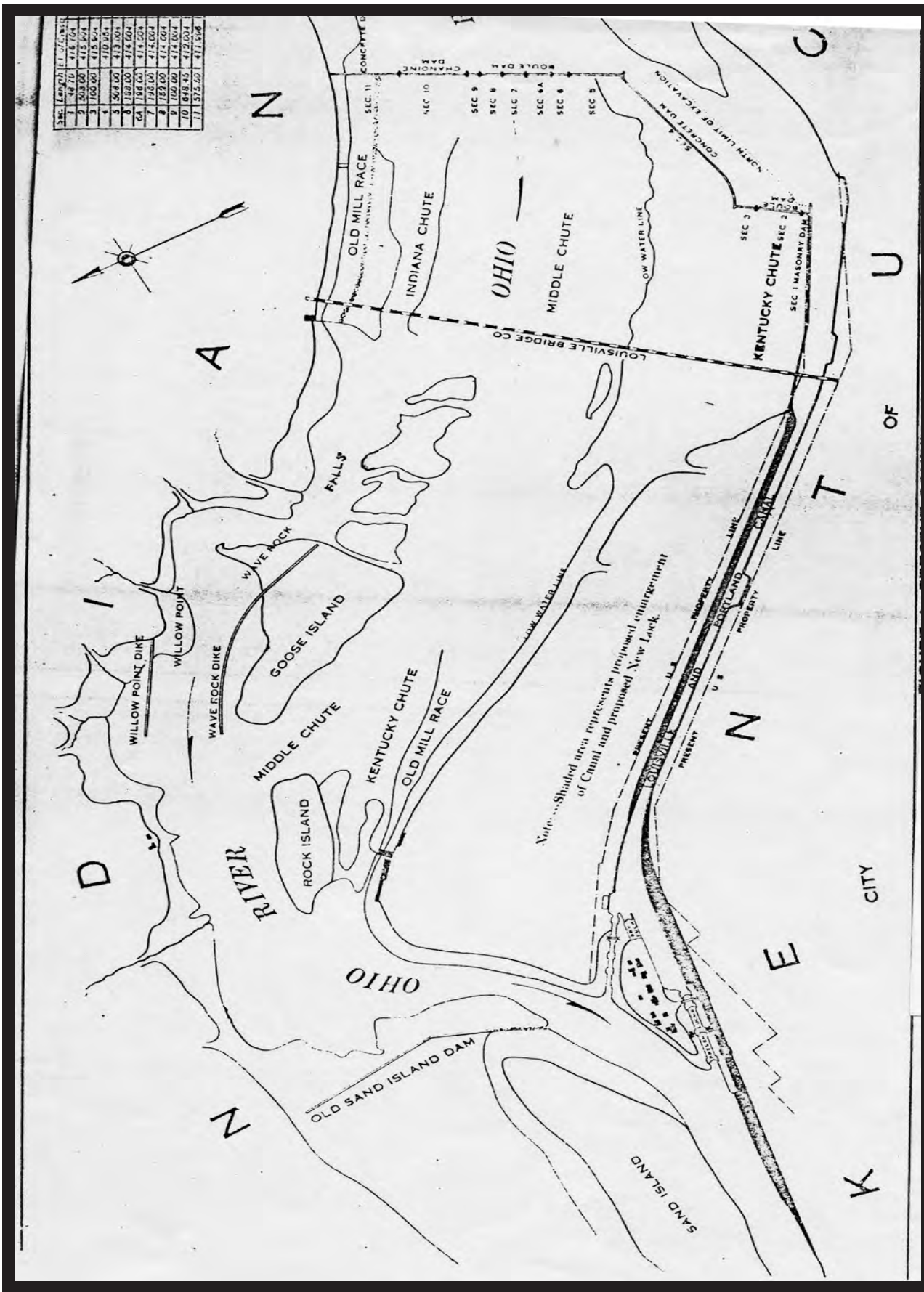
While the officers conducted their studies, Major Stickney found expedient measures necessary to assist ascending traffic. Because only the most powerful steamboats could overcome turbulent currents to ascend Indian chute, Stickney sought to keep Scowden locks in service longer during high water stages—when the river rose to 11.5 feet on the upper gauge it stopped lockgate operations. By installing heavy timbers atop the walls of the upper lock and rebuilding the middle lockgates, an additional fifteen inches could be gained to keep the locks in operation until the river reached a 12.7-foot stage. Quickly done, this modification proved an economical expedient, although troubles arose when new and heavier lockgates were installed. Two feet taller and ten tons heavier than the older gates, the new 100-ton lockgates wrenched the kingpost columns suspending the gates from their anchors, which extended only seven feet down into the lockwall masonry, too shallow to suspend 100-ton gates.

To reinforce the kingposts, Stickney had new holes drilled twenty feet down into the lockwalls, anchor bars installed in the holes, and the annular space around the bars filled with concrete. With this design modification, the kingposts held the larger lockgates, allowing Scowden locks to remain open to traffic during high water as much as seventeen percent longer than in previous years.³

FALLS PILOTS FADE

The extended operation of Scowden locks pleased the Falls pilots, and they heartily approved of Stickney's Indian chute project, thinking it largely designed for their benefit. One pilot's endorsement declared:

But even the canal does not afford an unimpeded navigation as the country demands. The time consumed in going through the locks is a drawback; the Government work on the Falls will largely answer this demand. The Indiana chute of the Falls is being deepened, so at the lowest stage of



The map shows the line of the dam built in the early twentieth century and the Wave Rock and Willow Point dikes confining Indian chute. (Corps of Engineers)

the river a sufficiency of water will be directed thereto to safely float steamers.

The work the Government has had in hand has been to make cuts at the beginning of the chute at the right-hand reef, at Goose Island, and at Willow Point, dynamiting out projecting rocks that have opposed free navigation, deepening the channel between the upper reef from six inches to twenty-six inches, making cuts at Goose island of ten feet and like cuts at Willow Point.⁴

Yet by the 1890s the Falls pilots were on the rocks. The coalboats that had once descended the Falls on every rise, with crews manning the oars and a Falls pilot on deck, had been supplanted by towboat and barge fleets—each coalboat had hired a Falls pilot, but a twelve-barge coal tow also needed just a single Falls pilot. Moreover, the historical Ohio River flatboat commerce with the South was moribund, dying after a century of trade. When in 1893 a flatboat loaded with Kentucky produce and manned by crewmen pulling the side oars and end sweeps rounded Towhead island and came into view at Louisville, the crews of every steamboat stopped work to watch and cheer on the flatboatmen. “It was a rare sight to see such a craft,” observed river

reporter Will Hays, “and they have so long been in the past tense that many young steamboatmen had forgot even reading about them.” With the passing of flatboat and coalboat commerce, only steamboat and towboat traffic remained in need of the Falls pilots’ services.⁵

Professional Falls pilots suffered a triple loss when the greatest members of their fraternity expired in the 1890s.

Captain David Dryden had become a Falls pilot during the 1840s and, through an 1853 lawsuit, had won for Indiana pilots the right to steer steamboats from Louisville to Portland, Kentucky. Hero of the Union navy during the Battle of Memphis, Captain Dryden had returned to Falls piloting after the war, only to be driven from the profession by competition from the Varble clan. He had become a snagboat captain for the Corps of Engineers, eventually retiring to a Western Kentucky plantation where cancer took his life in 1892. “He was as big hearted as he was brave,” the Falls bard concluded in his obituary of Dryden.⁶

While Captain Dryden died at home, Captain Pink Varble perished, as he had lived, with a flourish. On the March 1892 river rise, Captain Varble steered the towboat *John A. Wood*, pushing an immense coal tow over the Falls down Indian chute. Suddenly he released the wheel and fell to the pilothouse floor, prostrated by a stroke, and



Temporary dams across the head of Indian chute allowed drilling and blasting to proceed. (Corps of Engineers)

the towboat's captain seized the spinning wheel to hold the tow in the chute as it raced into the Big Eddy whirlpool. Captain Pink regained consciousness in time to instruct the captain on how to maneuver the tow through Big Eddy and steer it safely on to Portland before lapsing into a coma and dying. Forty years a Falls pilot, Pink Varble had pursued his craft to the end.⁷

Deeply cut by this loss of his closest friend, Will Hays organized Louisville rivermen to commemorate Captain Pink's funeral rites, and he penned anguished tributes to the Captain in his river news column: brave as a lion, a gentleman, Pink was the leading Falls pilot, a boatman without rival.

He has turned his last wheel,
He has rung his last bell.
He will pilot the steamer no more;
He has made his last trip
Down the river of Life,
Landed, and gone out ashore.⁸

The third loss to the profession came with the demise of Captain Enoch Lockhart in 1893. A Falls pilot during the 1840s, Lockhart had served as Louisville and Portland Canal superintendent from 1851 to 1874 and then had returned to Falls piloting. Politically active as a Democratic party leader, Lockhart went back to the canal during the 1880s when President Grover Cleveland made him its Traffic Manager. For this task,

Lockhart opened an office at Third Street on the Louisville wharf, where he coordinated boat entrances into the canal, establishing precedence according to canal regulations and telephoning advance notice of departures from the wharf to the canal lockmasters, Peter and William Black. His was a political job created for him at the demand of Louisville's congressmen, and when Republican Benjamin Harrison became President in 1889 Lockhart lost his job to Will Ekin, a local political delegate to the Republican party's national conventions.⁹

In retirement, Lockhart often used the newspapers to lecture the Corps of Engineers on its shortcomings. He thought its expensive enlargement of the canal's entrance a "senseless and stupendous blunder and a wanton waste of the public funds." He pointed out that it was already possible to put more coalboats into the canal in ten hours than could be locked through it in twenty-four, and he maintained that funding for the entrance enlargement would have been better spent on building larger locks. "What we need is men in charge of river improvements who understand river interests and river business," Lockhart proclaimed, "and not a lot of red-tape theorists who have only their theories to guide them."¹⁰

As the last of the antebellum Falls pilots, Lockhart's death in May 1893 corresponded with an abrupt decline in prosperous Falls piloting.



Concrete dikes were built along both sides of Indian chute to confine river flow and boats to the channel. Goose island is behind, to the left, of this dike, and Indian chute is on the right side. (University of Louisville Photographic Archives)

Although the ending flatboat and coalboat trades had eroded their income, the Falls pilots had unconsciously contributed to their own demise.

Their vigorous advocacy of federal improvements at Indian chute had aimed to benefit their trade, but the constant blasting of coral reef from the chute, making it wider and deeper, also made it so safe that experienced coal-tow captains had begun steering their own boats down the chute, leaving the Falls pilots with diminishing income. Just a year after Pink Varble's death, the Falls bard lamented:

"There was a time, and not many years ago, when it took the late Capt. Pink Varble and several others to take steamboats down over the Falls and bring them up, every day when there was Falls water. Things have changed. Now, Capt. Dan Varble does it all, and he has time between jobs to think of what boats and business on the river used to be, and what they are now."¹¹

With Captain Pink dead, his brothers Richard and William retired, and his Littrell in-laws departing, the Varble clan's control of Falls piloting was shattered. The Corps of Engineers had put them out of business, not through competition by enlarging Scowden locks, but by carrying out the Falls pilots' wishes, making Indian chute deeper, wider, and safer. Yet, Pink's nephew Dan Varble, who had learned piloting in 1873 from his uncle, stayed on the job for years, eking out what little profit remained. Serving

mostly as captain of harbor towboats, helping coal towboats assemble and move their tows, Captain Dan Varble pursued the profession until his death in 1912.¹²

LYDECKER'S RECORD

Colonel Garrett Lydecker succeeded Amos Stickney as Corps commander at the Falls in 1891. Lydecker had distinguished himself as combat engineer during the Civil War and then entered the Corps' civil works program. An 1889 court martial for mismanaging construction of a water supply aqueduct in the District of Columbia marred his record, but it did not much hamper his subsequent career. He proved as capable as Stickney in the Louisville canal's management.¹³

Lydecker saw that the three cast-iron bridges over the canal connecting Shippingport with Portland and Louisville had all become unsafe. While their wooden decks could be replaced, their iron trusses had so rusted that Lydecker feared their collapse under a heavy load. The Eighteenth street bridge (formerly Elm Tree Garden bridge) over the canal was a Whipple truss, one of the first iron drawbridges ever built; so Lydecker had it overhauled and moved down the turnpike to replace the bridge over the old triple locks of 1830, where traffic was light. He contracted with the Louisville Bridge and Iron Company to build and erect two new steel drawbridges over the canal, one at Eighteenth street and the other over Scowden locks.



With the dams blocking river flow, the bottom of Indian chute was revealed in 1898. This view shows Jeffersonville in the background; the white structure was part of the Smyser mill race. (University of Louisville Photographic Archives)

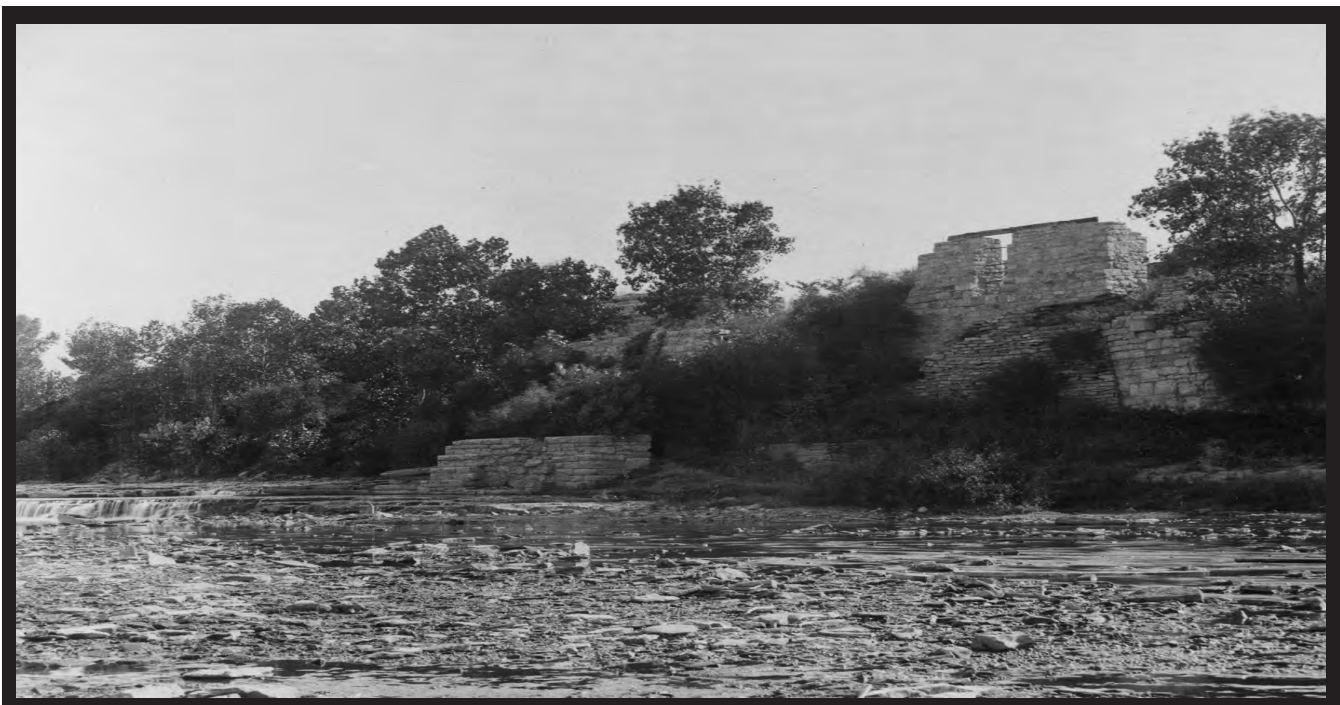
Both proved so well balanced, Lydecker announced, that a single lockhand could easily turn them to pass boats.¹⁴

Until 1892 coal barges were hauled in and out of Scowden locks manually, usually by the towboat crews pulling with ropes and capstans. Lydecker arranged the installation on the lockwalls of a winding engine, similar in principle to modern power winches used to retrieve vehicles from ditches. It turned a drum winding a cable attached to barges and pulled them along into the locks, and Lydecker proudly remarked that this new haulage motor substantially expedited barge passage through the locks. This and similar operational improvements even impressed the highly critical Falls bard, who once complimented the lockhands on their excellent work done when in five days they locked through 166 loaded coal barges plus three tows pushed by the *Ironsides*, *Tom Rees*, and *H. F. Frisbie* that carried 17,122 tons of iron and steel.¹⁵

Colonel Lydecker attempted to arrange the extension of Louisville's municipal water lines to the canal shops to supplement the cistern water then available, but had no success until February 1892 when flames engulfed the canal's machine shop housing steam engines and boilers. The city's fire engines arrived to help lockhands extinguish the fire, but with only cistern water

available this accomplished little other than preventing the fire's spread to nearby buildings. After this disastrous loss, the municipal water company extended its main line onto the canal grounds and installed six fire hydrants for future emergencies. Colonel Lydecker ordered the replacement machine shop built of stone taken from the old canal walls, with concrete flooring and a corrugated iron roof. He planned, as funding became available, to replace the other canal shops with similar fire-resistant structures.¹⁶

Another ferocious blaze in August 1892 destroyed Shippingport's major industry. The Tarascon mill had manufactured flour and cement since 1815 for its successive owners, the Tarascons, John Hulme and Frank McHarry, Theodore Scowden and Jonas Rhorer, and the Louisville Cement Company managed by James Speed. After the Speed cement company acquired the mill in 1869 it had manufactured cement only; and by 1892 it produced 1,060 barrels of cement daily, employing fifty of Shippingport's residents. The 1892 fire, beginning in a shed adjacent to the mill, spread quickly, gutting the building's interior, leaving only its stone foundation and part of its brick walls standing. Although a smaller steam-powered cement mill continued in operation, the Tarascon mill's destruction left many of Shippingport's residents unemployed, eroding the community's economic base and



The cement-producing Tarascon Mill, Shippingport's major industry, burned in 1892 and was not rebuilt. The ruins which overlook the bed of Kentucky chute, could still be seen in the twenty-first century. (Portland Industry)

ultimately sealing its fate. The only local work left for the town's people consisted of fishing, or securing employment from Colonel Lydecker as canal laborers.¹⁷

In addition to the conflagrations, Colonel Lydecker met other nasty surprises while managing the canal. In August 1892 laborers were wielding picks and shovels to clear mud from the canal, when worker Charles Reed struck something with his pick and, digging down farther, he discovered a body clad in stylish suit and new shoes. Colonel Lydecker called the coroner, who identified the corpse as that of a suicidal cashier from a recently failed bank. More serious, however, was the wreck in the canal of the steamboat *Buckeye State*. It rammed a huge snag that had floated into the canal and lodged at Eighteenth Street, ripping open a great gash in its wooden hull. When the boat went down, many tons of cargo were lost and the canal blocked until the wreck was removed.¹⁸

In January 1893 the river at Louisville froze over and became a skating rink. Hundreds skated back and fourth across the river between Kentucky and Indiana, and entrepreneurs opened saloons and coffee shops on the ice near the bridge piers. While skaters had their fun, Lydecker had the *Major Mackenzie*, the canal towboat, break ice through the canal to open it as a harbor of refuge for steamboats. Safe in this

harbor, no steamboats were lost when the ice broke, but across the river at the Pumpkin Patch coal-barge holding area the ice snapped hawsers and carried away 127 barges that went down the Falls, wasting their cargoes, tinting the Falls black with coal.¹⁹

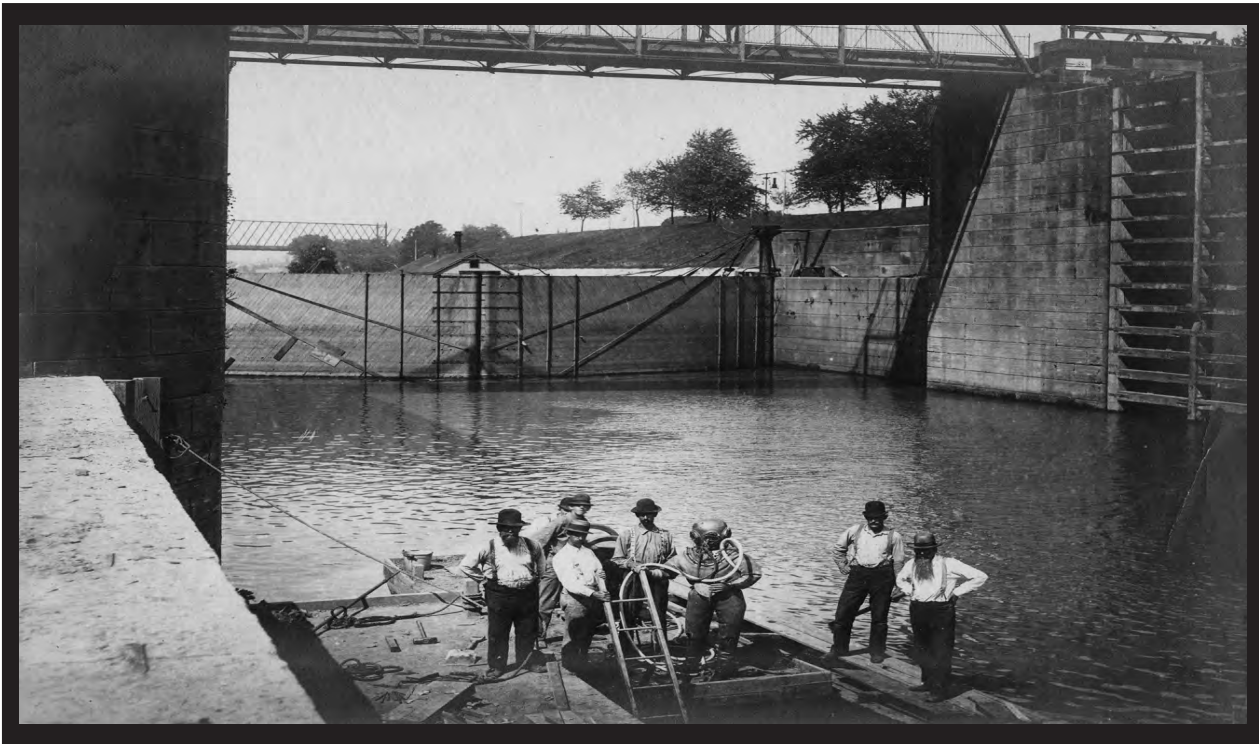
TECHNOLOGICAL ADVANCES

While no steamboats were lost to the 1893 ice at Louisville, the ice sank many boats at other ports, and this, together with the losses suffered by steamboat commerce during extended low-water seasons, troubled river bard Will Hays. He reminisced in 1893 that he could remember seeing as many as twenty steamboats tied together at Louisville's wharf, while others waited for space to land, but "those days are gone, never to return." Conditions nevertheless were not as serious as Hays thought. Although fewer steamboats plied the Ohio, the new boats were larger, transporting as much cargo as two or more antebellum craft. In addition there seemed no end to growth of the coal trade, and coal shippers constantly built larger and more powerful towboats to serve this trade.²⁰

Several technological advances of the 1890s proved harbingers of future towboat design. A few steamboats with iron hulls had plied the Ohio since the 1840s, and the construction of



The Louisville Repair Station maintained the Corps' workboats from Cincinnati down to Cairo. This view shows repairs underway on derrickboats, the dredge Northern, and the snagboat E.A. Woodruff. (Corps of Engineers)



Repairs inside Scowden locks often required the services of divers, who received small bonuses for their underwater work. The diving boat is moored between the guard gates and beneath the swinging bridge over the locks. (Corps of Engineers)

steel-hulled boats began in the 1890s. Will Hays lauded the *Tom Pickles*, built in 1893 at the Howard boatyard in Jeffersonville to become a ferry, as nothing less than a “marine wonder.” It had an immense puncture-proof steel hull and it was steered without a pilotwheel. Instead of the wheel, it had a little control lever in its pilothouse that used steam-power steering to manipulate its rudders. This guidance system was invented by John Irvin, engineer aboard the towboat *Beaver*, which also had one of the first power-steering systems seen on the inland rivers.²¹

The transition from steam to internal combustion engines for boat propulsion also originated during the 1890s. Although the steamboat *Fire King's* design of 1867, using crude petroleum to heat steamboat boilers, had failed, a sixteen-foot-long skiff powered by a Shipman oil-engine passed the Falls in 1884. Using oil to heat a boiler only eighteen-inches high, its tiny steam engine turned a shaft extending to a screw propeller at the skiff's stern. At 450 revolutions per minute, the engine and screw thrust the craft downriver at ten miles per hour. This achievement soon made the little Shipman engines popular for small craft propulsion and industrial applications, but they were miniature steam engines, not internal combustion engines

like those used in modern towboats and highway vehicles.²²

The first boat propelled by an internal combustion engine at the Falls was the *Delia*, built for Kentucky Governor Simon B. Buckner in 1893 at Howard boatyard. It had a four-horsepower Sintz gas engine, designed specially for Buckner at the Sintz plant in Grand Rapids, Michigan. (A year later Elwood Haynes used a Sintz gas engine to power his horseless carriage, considered the first operating automobile in America.) The *Delia's* little gas engine turned a sternwheel paddle, pushing the twenty-five-foot long and six-foot wide boat accommodating ten passengers along at a respectable pace. Governor Buckner took it to the Green River and put it in service transporting passengers and cargo from his plantation to the railroad bridge at Munfordville, Kentucky.²³

Boats with internal combustion engines joined steam launches in the increasingly popular sport of recreational boating. At the Falls by the end of the 1890s fourteen recreational launches were in use: seven with steam engines, three powered by gasoline engines, three with naphtha engines, and one with an alcohol engine. The fastest of these was the *Minnie May* with a fifteen horsepower steam engine and screw propeller that

could travel at eleven miles per hour. Built in 1896 at Brook street in Louisville by S. G. Connell and named for his two daughters, at thirty-five feet long and eight feet wide it carried twenty passengers on excursions as far as Frankfort on the Kentucky River. The steam launch *Dick Burke* built in 1898 was the largest recreation boat at sixty feet long; it could carry thirty-five passengers and, with two sleeping rooms and a kitchen, it qualified as the first motorized houseboat at Louisville. These craft were so costly that only the wealthy could own them, and a news reporter warned: "The owning of a pleasure craft is an expensive luxury, and this is not fully realized until a person become an owner of one. Incidental expenses amount to a good deal during a season. The boats are nearly all sent to Towhead island and kept there during the winter to avoid the ice."²⁴

CHITTENDEN'S TOUR

Advancing technology also interested Lydecker's deputy at the canal in 1893, Captain Hiram Chittenden. Truly a Renaissance officer, Chittenden patented inventions, wrote histories, and qualified as the Corps' first environmentalist. He arrived in Louisville from Yellowstone where he had charge of developing the first national park. The Corps had recommended in 1872 that the magnificent geysers and unique geology of Yellowstone be preserved, and when Congress approved this recommendation Captain Chittenden was made responsible for carrying it out. His appointment at Louisville had nothing to do with preserving the Falls environment, however, and everything to do with canal politics.²⁵



Captain Hiram Chittenden designed a beartrap gate installed in the original locks of 1830. It began operation in 1899 to flush mud from the locks and canal into the river below. (Corps of Engineers)

Colonels Stickney and Lydecker had separated canal operations from maintenance and construction, assigning their assistant engineers to manage the dredges and maintenance construction and restricting their master lock manager and deputy to supervision of lock operations. The operations staff then consisted of a lockmaster, assistant lockmaster, eight engineers and firemen in charge of the six steam-engines operating the lockgates, four lockhands, one tender at the Eighteenth street bridge, plus a watchman and laborers. These operated the locks on two twelve-hour shifts, one under the lockmaster and the other the assistant lockmaster. Recognizing that the duties of these two shift leaders were identical, Lydecker in 1893 awarded the assistant lockmaster the same title and pay as the lockmaster—these were Peter and William Black, brothers of Shippingport.²⁶

This functional separation of operations from maintenance did not prove as satisfactory as Lydecker had hoped. The assistant engineer sometimes requested the operations staff to assist with maintenance while the master lock manager often asked help from the maintenance staff, resulting in embarrassing conflicts and challenges to the commanding officer, who had little voice in selecting candidates for the political job of master lock manager. In March 1893 Lydecker determined to resolve this running dispute by dispensing with the services of both the assistant engineer and the master lock manager; he obtained authority from the Secretary of War to eliminate both jobs and to appoint in their stead a Corps officer, Captain Hiram Chittenden. Lydecker timed this change to match the change in presidential administrations. Master Lock Manager William Ekin had been appointed in 1889 by Republican Benjamin Harrison, and Democrat Grover Cleveland became President (again) in March 1893. On this initiative, Lydecker commented, "The idea is simply to get under control of the War Department what rightly should be free from political workings, the canal, which has nothing to do with Democracy or any other political party."²⁷

When Captain Hiram Chittenden arrived at Louisville, his energy and abilities impressed even Will Hays. Chittenden moved his family into the house adjacent to the locks formerly occupied by Master Lock Manager Ekin and earlier by the canal toll collector H. N. Adams.

Although his house and office was connected through the municipal telephone system to the Louisville wharf—for relaying news of the boats leaving the wharf to enter the canal—Chittenden found the local service unsatisfactory and he therefore had a private telephone line installed at the canal. It led from a small building at the canal entrance down to the locks and into Chittenden's office, where a switchboard permitted connecting the line into the city exchange as needed. This telephone system superseded the telegraph system used earlier at the canal.²⁸

Chittenden's interest in waterways technology centered on the automatic beartrap gates invented in 1817 by Josiah White. These consisted of two flat panels, with the upstream panel lying atop the downstream panel. River water passing through culverts into the space beneath the panels caused them to rise into position to form a dam; shutting off the culverts allowed the panels to collapse, opening the channel. In 1886 the Corps had built an experimental beartrap as substitute for a navigation lock on the upper Kentucky River at Beattyville—fabricated of timber on a gravel foundation, the experiment had failed ingloriously.

Chittenden maintained, however, that beartraps, while perhaps not adequate substitutes for navigation locks, could maintain stable pool levels above dams; that is, they could be easily raised or lowered to hold or pass water as needed through dams to keep a constant pool level above the dams. Conducting a wide-ranging study of beartraps, Chittenden prepared an improved beartrap design and proposed that it be installed in the Louisville canal's old triple lock chamber. After more than sixty years service since 1830, the old locks were crumbling, their wooden lockgates decaying, and their maintenance costs becoming excessive, considering that they were used only when the Scowden locks closed for repairs. Chittenden's beartrap design subsequently was adopted and installed in the old locks to flush mud from the canal. By alternately raising and lowering the beartraps, a current could be created through the canal and the old locks, washing away sediment and reducing maintenance dredging.²⁹

It was at Louisville also that Chittenden launched his avocation as historian, in the evenings penning his history of the Yellowstone



Falls piloting near the turn of the century involved using harbor towboats, such as the Wash Gray, to shuttle coal barges owned by the River Combine through the canal or over the Falls. The dam built at the turn of the century is visible in the background upstream of the Ohio Falls bridge. (Murphy Library, University of Wisconsin)

National Park. He subsequently wrote classic histories of Missouri River navigation, the American fur trade in the Far West, and other useful studies. Reviewing the water resource requirements of the Far West, Chittenden became the first Corps officer to recommend the construction of reservoirs for water supply and flood control. He had not launched that study, nor finished his pioneering Yellowstone history, however, before abruptly departing Louisville, again as a consequence of canal politics.³⁰

Colonel Lydecker's abolition of the master lock manager's job in March 1893 lasted only until September, when the Secretary of War re-established the job and appointed Eugene Terry to fill it—Terry's principal qualification was his relation as brother-in-law to Louisville's Congressman Asher Caruth. When Terry's appointment forced Captain Chittenden to vacate the lock manager's house at Scowden locks, Chittenden soon requested reassignment and returned to Yellowstone park, leaving Colonel James Warren in charge at Louisville. His early departure proved unfortunate because it came before a contract was awarded to fabricate and install the automatic beartraps based on his patented design in the old locks. What looked as though it would work on paper, didn't. Without Chittenden's personal guidance, the canal staff tried unsuccessfully for two years to get the beartraps to rise and lower as planned. Their efforts to correct the beartrap's flaws persisted until it finally became operational on October 22,

1899, and thereafter functioned as Chittenden had predicted, generating stiff currents through the canal and carrying away the mud deposits.³¹

By 1895 the last living memories of the construction and operational management of Scowden locks project were fading. Ransom Scowden, the project's resident engineer and subsequently Louisville's city engineer, perished in December 1893; and in 1895 Lockmaster Peter Black died after forty years service. Black had become assistant lockmaster at the old triple locks in 1860 and in 1876 he became the lockmaster at Scowden locks with his brother William as his assistant. These losses did not seriously impact lockage services, however, and a news reporter in 1896 penned a vivid account of his voyage aboard the steamboat packet *Tarascon* through the canal and locks:

The vessel skimmed swiftly over the yellow water, with a dreary waste of rock and falling water, the impregnable dam and the Pennsylvania bridge on the north, and smoking factories standing high on the south bank. The channel, man-made, narrowed gradually between an artificial island and the city. The boat whistled madly at the Pennsylvania bridge, that extends from Fourteenth street across the canal and river to Indiana. Just

then a railroad train shot into sight on its way across the structure, high above the decks of the *Tarascon*. The steamer halted. The train sped out of sight. A minute later the span of the bridge, that seemed to obstruct the passage, began moving and soon it swung into mid-air. The steamer then resumed the journey. She had now got a fair start into that part of the canal that swerved from the river and curved into the land, out of which it was carved. The sides are walls of heavy, substantial masonry—huge blocks of stone evenly put together. On each side the banks are green, sloping and beautiful. On the north the trees are abundant and shady. A verdant hedge grows along the upper edge of the sloping south bank, like a fringe, and adds much attractiveness to the scene. On the north, glimpses of the machinery and quarries of the canal engineers are seen through the trees. The vastness of the enterprise of constructing the canal shows itself at every hand and the tremendous amount of labor and materials. About Eighteenth street another small drawbridge turns to let the boat pass. Still another bridge travels into air at Twenty-sixth street. Here, also, are seen the gates of the old canal, that turned northward from this point to rejoin the river, and that have not been in use for many years. The new channel bends to the south.

A few feet ahead are the first gates of the canal, huge structures of wood and iron— each large enough to be a house. One extends from each side of the canal and they join ends in the center, keeping back the powerful weight and pressure of the immense quantity of water that comes flowing from the river above....

Within a few feet of the gate the *Tarascon* stopped. Two men walked

out on the gate's broad top and with an iron rod opened a small wicket under the surface of the water. Through this the water began its flow into the next lock. The passengers saw the line of the water on the gates move gradually lower and lower as the water emptied into the basin beyond. They felt the boat sink lower and lower in the lock. The solid stone wall, the sides of the canal, which they were a few minutes ago looking down upon...seemed to grow steadily taller. They found themselves looking up at it. The gate which appeared only a few feet above the water at first now rose high above and disclosed its gigantic proportions.... As another wicket was opened the water rushed faster and faster. On the other side of the gate it was bubbling and spitting.... The whole basin was seething and turbulent. The water rolled over and under and made small hills and dales of water. And the noise was great and harsh. Its volume told of the vast quantity of water that was moving.

When about fifteen minutes had passed the steam was turned on and the big gates were opened. The water was now calm and the boat crept into the next lock, the passengers having noted that she was thirteen feet lower than it was before. The gates were closed behind her. A half square further was the second gate. Another halt was made while the water slowly and then rapidly gushed into the adjoining lock through the openings in the lower parts of the gates. Again the steamer descended with the water, and after fifteen minutes passed to the third and last gate— about a mile and a half from the entrance to the canal. Within another minute they had again passed out into the broad river.³²

Not all reporters were equally impressed by the canal's operations, and certainly not that perennial gadfly Will Hays. After the *Tell City* hit rocks in the canal and went down with cargo and passengers near the locks, Hays protested this slaughter by pointing out that the canal belonged to the people of the United States. "The people have a right to demand that it be kept in a safe and navigable condition by those who are paid fat salaries to attend to it," he complained: "It has been in a worse condition during the past year than it was ever known to be. It should always be a safe passageway for all kinds of floating craft, instead of a mud-filled trap."³³

Environmental conditions at the Falls were little better than in the canal as observed by historian Reuben Thwaites who passed Louisville in a small craft in 1897. "The action of the water, hastened by the destruction of trees whose roots originally bound the loose soil, has greatly worn the islands in the rapids," he sadly reported, adding that "little is now left of historic Corn Island, and that little is, at low water, being blasted and ground into cement by a mill hard by on the main shore." After his disappointing view of the Falls, Thwaites camped on Sand Island near Portland and spent a sleepless night, disturbed by the urban noises of steam locomotives and electric trolleys passing overhead across the Kentucky and Indiana bridge along with the whistles and roar of towboats signaling their approaches to the locks. The advancing technology of rapid transit had bypassed the river and the historic steamboat packet trade was dwindling, leaving the Ohio to slow moving towboats pushing coal and bulk commodities to markets.³⁴

BLASTING INDIAN CHUTE

The Corps' removal of the coral reef from Indian chute proceeded slowly until 1897 when the work was placed under continuing contract. Congress previously had enacted river and harbor appropriations every two years, and when the Corps exhausted a project's appropriation work ceased until Congress provided additional funding. Because these interruptions slowed progress and increased costs on many projects, Congress at the suggestion of the Chief of Engineers approved continuing contracts for selected projects; under this system, the Corps could contract for the entire construction costs of a project with



Captain Dan Varble succeeded his uncle, Captain Pink Varble, in 1892 as the leading Falls Pilot, continuing in his craft until 1912. (Courier-Journal)

payment guaranteed in subsequent civil appropriations. Thus in 1897 when the Falls project was placed under continuing contract, the Corps was authorized to expend up to \$350,000 on finishing the excavation of Indian chute without awaiting further legislative action.³⁵

Late in 1897 Colonel James Warren and his assistant engineer John Casey closed Indian chute with temporary cribsdams, diverting all river flow through Middle chute and for the first time exposing all the coral reef left in the Indian chute for inspection. "We have now an accurate knowledge of what has been done and what remains to be done," Colonel Warren declared, "and in addition will be enabled to dispel the cloud of mystery which has for years made the Indiana Chute a terror to steamboat men." Measuring rock that obstructed the chute, Warren found that the amount remaining to be excavated far exceeded earlier estimates. To speed this excavation, he and his staff built compressor boats which carried air compressors on their deck. They set drills into place on the rocks and connected them through pipes with air compressors on the boat, allowing a 300-man workforce to bore the reef with gangs of drills simultaneously, opening lines of holes for explosives. This considerably accelerated destruction of the chute's coral reef.³⁶

Management of Indian chute's excavation went in 1898 to Captain George Zinn, successor to Warren as Louisville District Engineer and an energetic personality who thoroughly enjoyed his work. Captain Zinn built the towboat *Wave Rock* to move the compressor boats and drills quickly into position and achieved the 400-foot channel width in the upper chute by directing the boring of 13,479 holes, swiss cheeseing the rocks and packing the holes with 7,450 pounds of dynamite to blast them to smithereens. The work in the Indian chute, Will Hays laconically commented, was booming.³⁷

By October 1899 all that remained to complete the Indian chute project was removal of the Wave Rock and Willow Point obstructions that created the turbulent whirlpool called the Big Eddy. Captain Zinn timed their demolition to coincide with the annual convention of the Ohio Valley Improvement Association (OVIA) meeting at Louisville that October. Formed to lobby for improved Ohio River navigation, the OVIA had encouraged Congress to approve the construction of Locks and Dams 2 through 6, similar to the Davis Island Lock and Dam (No. 1) on the upper river from Pittsburgh to Beaver, Pennsylvania. By 1899 the OVIA was lobbying to extend the slackwater project downstream to Louisville, starting with the locks and dams that would create deeper harbors at Marietta, Gallipolis, and Cincinnati, Ohio. To entertain the two hundred OVIA convention delegates Captain Zinn arranged a tour of the Falls aboard the *Columbia* on October 19. As their steamboat approached the Indian chute, at Zinn's signal an immense charge of dynamite detonated, permanently shattering Wave and Willow rocks, removing the last major hazards from the Indian chute passage, and thrilling the convention's delegates.³⁸

This destruction was done with the best of intentions. It opened an unobstructed passage for coal tows supplying fuel for ports below Louisville as far away as New Orleans, where sea-going steamships coaled for foreign commerce. It was seen as a direct consumer benefit because the prices charged for coal included the transportation costs from the Pennsylvania, West Virginia, and Kentucky coal mines to markets. Shorter delays and fewer wrecks when passing the Falls would reduce those transport costs, with savings that might be passed on to consumers. These savings may not have reached consumers, however, because in

1899 the coal-towing commerce down the Ohio fell into the hands of a monopoly. Just as corporate monopolies seized control of the national steel and oil industries at the turn of the century, so too the river coal trade with formation in 1899 of the Monongahela River Consolidated Coal & Coke Company, called the Combine, that owned all towboats and barges transporting Pennsylvania coal and eliminated most competitive coal pricing. The Combine soon eliminated competitive Falls piloting also, putting Captains Gus Jutte and Dan Varble on its payroll as its Falls pilots.³⁹

The energetic Captain Zinn thus completed in 1899 the excavation of Indian chute initiated by Captain Pink Varble and Will Hays in 1876. Moreover, Zinn at last settled the political interference with canal management begun by President Grant in 1876. In 1899 Zinn fired Master Lock Manager Eugene Terry and requested that this political job be abolished. Opposition quickly arose, asserting Terry had been fired because he had supported Kentucky Governor William Goebel, the only state governor ever assassinated while in office. When a reporter interviewed Zinn on this issue, Zinn bluntly explained that his action had nothing to do with state politics. He and his predecessors had long sought to abolish the Master Lock Manager's position, and, when the Secretary of War authorized it, he had immediately discharged Terry—the Master Lock Manager was not protected by civil service rules. Deputy Lock Manager J. W. Pell remained on the job with responsibility for managing the entrance of boats into the canal, and for him Zinn built a small office on the canal's south bank at Ninth street. To prevent its destruction by floods, the little office was made of heavy timbers bolted to concrete pedestals; and from there Pell had telephones connected directly to the locks and to the city exchange to coordinate the canal passage.⁴⁰

OBSERVATIONS

In the score of years from 1880 to 1900, 135,630 boats passed Scowden locks transporting a total of 37 million tons of cargo, an annual average of 6,781 boats with 1.8 million tons over twenty years. Despite lamentations of the Falls bard over the moribund steamboat packet trade, river commerce actually increased during the 1890s. Compared to the annual average, in 1901

the canal locks passed 8,037 boats carrying 2 million tons and 13,000 passengers. Indeed, these figures understated the total commerce at the Falls because they did not include traffic through Indian chute, usually amounting to nearly a third of the traffic through the canal.⁴¹

Much of this commerce in 1899 fell under control of the River Combine at Pittsburgh, which operated fifty-five sternwheel towboats and innumerable barges moving 80 million bushels, about 1.5 million tons, of coal downriver annually. Half of this tonnage went to Pittsburgh's steel mills and the other half downriver to Louisville. Louisville consumed 14 million bushels annually to fuel its steam mills, locomotives, and steamboats, and the remainder went below the Falls and on to St. Louis, or to plantations on the Lower Mississippi, and New Orleans, which annually consumed 10 million bushels. Unless delivering coal to upper river ports such as Cincinnati, the coal tows proceeded directly from Pittsburgh to Louisville, a 600-mile voyage normally accomplished in five days at a cost of fifty cents per ton. All tows stopped at Louisville, either to break into sections to enter the canal or to pass through Indian chute, proceeding to West Louisville where larger towboats put together immense barge tows and pushed them another 1,400 miles to New Orleans at a cost of fifty-three cents per ton. To move the amount of coal shoved south by a single towboat would have required 1,937 railcars pulled by 97 locomotives, forming a continuous train twelve miles long. This immense coal trade was to dominate Ohio River commerce until 1916 when it abruptly ceased.⁴²

Pleased with successful operation of the Davis Island Lock and Dam (Ohio River No. 1), the coal-towing interests ceased their opposition to locks and dams—a slackwater project—on the Ohio River and joined with steamboatmen in lobbying Congress for the construction of more locks and dams. By 1899 these interests had recognized the value of the stable pool provided for Louisville's harbor by Weitzel's cribdam on the Falls' crest, as modified by the addition of movable Boule wickets across the head of Kentucky chute, Middle chute, and part of Indian chute; and above this dam a minimum depth of three feet was available for navigation even during the lowest river stages. Rivermen by 1899 had begun urging that the Falls dam be raised higher and that wickets be installed entirely

across the head of Indian chute to deepen Louisville's harbor an additional three feet, thus extending its low-water pool farther upstream to Madison, Indiana, and the mouth of the Kentucky River. Even Will Hays dropped his historic opposition to Weitzel's dam and his dire warnings about its environmental impacts on the Falls. In 1899 the Falls bard pointedly announced: "Many steamboatmen think if the government would extend the wickets entirely across Indian chute to Indiana it would make a deep pool all the way up to Madison in low water stages."⁴³



14

THE THIRD PHASE

Concrete, steel, and comprehensive planning. These became the cornerstones of third-phase engineering at the Falls as well as hallmarks of twentieth-century waterways engineering. Nineteenth-century engineers relied on the ancient construction materials, stone masonry and timber, at the Louisville canal as elsewhere: the 1830 locks had stone masonry walls and timber lockgates; the 1872 Scowden locks likewise were of stone masonry and wood; and Weitzel's dam on the Falls consisted of stone-filled timbercribs. In the third Falls engineering phase, however, the Corps of Engineers, like builders generally, switched to concrete and steel. Although costing more than stone and timber, concrete and steel became the chosen construction materials of twentieth-century corporations and governments because they offered greater design flexibility and strength, reduced long-term maintenance costs, and perhaps also because they enhanced the corporate delusion of permanence.

In addition to the materials transition at the dawn of the twentieth century a momentous change occurred in Corps planning for Falls development. Engineers of the first and second phases had conceived the Falls as an individual obstacle to be bypassed by site-specific engineering. When the 1830 and 1872 locks at the Louisville canal were completed, they had been the sole navigation locks on the Ohio. Third phase engineers, however, conceived a new dam and lock at the Falls as just one in a line of fifty-three locks and dams planned to canalize the entire 981 miles of the Ohio from head to mouth, from Pittsburgh to Cairo. Counting downstream from Pittsburgh, the new navigation structure planned at the Falls numbered forty-first, and the Corps therefore named it Lock and Dam 41.

Building a new concrete and steel dam and a new and larger lock presented many difficulties as the twentieth century began. Floods. Catastrophic cofferdam failures. Fatalities. And if these were not enough, a triple bogey entirely out of the engineers' control struck the Lock 41 project in 1917. Doubling the capacity for passing commerce around the Falls of the Ohio proved as challenging as construction of the original locks.

REBUILDING THE DAM

Falls development was still site-specific in 1899, nevertheless, when the Chief of Engineers appointed a board of officers to review the Falls' engineering. Composed of former Louisville District Engineer Amos Stickney, Cincinnati District Engineer William Bixby, and Captain George Zinn, this board observed that Weitzel's timber cribdam, built in the 1870s to hold six feet of water in the canal and Louisville's harbor, had become inadequate to match the evolving towboat and barge commerce. Although a six-foot depth had served steamboat packets, loaded coal barges normally drew more than eight feet of water; and the board of officers therefore agreed the Falls' dam should be raised by three feet to afford a minimum nine-foot depth. This depth (el. 412 above sea level) would extend the slackwater pool held by the dam fifty miles upriver to Madison, Indiana, which had become a boat building center, and moreover would deepen the lower Kentucky River where the Corps had begun building locks and dams in 1880.¹

To permit coal tows to pass down Indian chute without stopping to await rises, the board of officers calculated they should design the new Falls dam to divert a minimum of 77,000-cubic-feet of water per second into the chute. They expected to accomplish this with movable Boule trestles made of steel that could be closed to control the flow into the chute. To close Indian chute itself, thereby holding stable depths in Louisville's harbor during extreme low water, the officers planned to install Chanoine wickets across the head of the chute; these could be lowered to the river bottom at high river stages, allowing tows to pass over them when descending the chute. As foundation beneath these Boule and Chanoine wickets and as the fixed sections of weir between the wickets, the officers selected concrete construction rather than stone masonry, reflecting the nationwide shift from stone masonry to more easily formed concrete then underway.²

Although concrete had been used as foundation mortar since 1830, when canal superintendent John Hulme had profited by selling Louisville cement for the purpose, its structural use had begun during the 1890s. In 1893 the first concrete roadway was poured at Bellefontaine, Ohio; in 1895 the first reinforced

concrete bridge was erected at Philadelphia, Pennsylvania; and in 1896 the Corps of Engineers built its first concrete river-navigation lock on the Rough River near Hartford, Kentucky. Although the development of structural concrete augured well for James Speed's Louisville Cement Company at Shippingport and in Indiana, in the 1890s the cement industry began a transition from natural cement, ground from limestone quarried at the Falls, to a cement manufactured with different materials and processes. Called Portland cement—after Portland in England, not in Kentucky—the new cement compared favorably with Louisville's hydraulic cement. Indeed, when planning the new dam on the Falls the Corps undertook some of the earliest comparison testing of natural cement with Portland cement, found the new cement's quality excellent, and began substituting Portland cement for the cement manufactured from the Falls' ancient coral reef.³

The Corps designed the new concrete dam to stretch across the Falls from the canal entrance to the Indiana bank, consisting of eleven sections with piers between the sections. The section nearest the canal was a fixed concrete weir; sections 2 and 3 consisted of Boule trestles; section 4 was a 1,912-foot-long fixed concrete weir, while sections 5, 6, 7, 8, and 9 were Boule trestles. Section 10 across Indian chute was to be closed by Chanoine wickets that could be raised or lowered faster than the Boule sections, and the final section 11 was a concrete dam between Indian chute and the Indiana bank. Assistant Engineer John Casey started work in 1899 on the dam's three sections nearest the canal, excavating a trench called the keyway in the foundation rock along the line of the dam, installing wooden forms fabricated at the canal shops, and placing the first concrete inside the forms in June 1899. To minimize cement costs, he adopted what was then labeled "giant" concrete, dropping boulders inside the forms and pouring the concrete around them.⁴

Work on the dam progressed slowly toward the Indiana bank throughout the following decade, not from lack of funding or energy but as a result of inadequate cofferdam technology. The temporary timber cofferdams then used to hold out the river while work continued behind them could only withstand ten-foot river rises, limiting construction to low-water seasons from August to November of each year. With only a

two to four month annual working season available, the Corps finished perhaps a single section of the dam each year, resuming with another section the following year. Therefore, placement of the Chanoine wickets in section 10 across Indian chute did not begin until 1908. For this section and the concrete dam of section 11, the Corps installed a concrete-mixing plant on the Indiana bank. From this plant, a cableway, or highline, hanging over sections 10 and 11 hoisted buckets of concrete and carried them to fill the forms. As the dam neared completion, the engineers installed three twenty-foot-high signal towers, made of concrete around steel rail reinforcement, one on each side of Indian chute and a third near the canal entrance. Workers painted these towers white as day markers and installed electric lights at their pinnacles to guide nighttime navigation. When completed in 1910 the new dam was a mile long (5,247 feet), and the Louisville District Engineer proudly boasted: "No other movable dam of as great width or contending against such adverse conditions is known to exist anywhere. The work was therefore more or less experimental and in view of the knowledge available at that time is very successful."⁵

The dam eventually proved less successful than hoped because its design had not adequately considered operational challenges. The piers constructed between each of the Boule and Chanoine sections extended forty feet upstream of the dam's face, apparently serving as ice breakers—the piers broke floating ice coming downriver before it struck the dam. The projecting piers caused constant headaches, however, because the maneuverboats, with derricks and hoisting engines to raise and lower the wickets, had no propulsion engines. Unless pulled by the canal towboat, the maneuverboats had to get around the piers on their own and accomplished this by lining onto steel anchor buoys stationed upstream of the piers. Chained to the riverbottom, the buoys formed anchorages to which the maneuverboats could attach lines from a winch to pull themselves around the piers, a cumbersome and hazardous operation.⁶

With a mile of dam to tend in a fluctuating river, the maneuverboats were constantly raising, lowering, or repairing the dam's wickets in fast currents, and accidents were common. In 1912 a maneuverboat and barge were swept by current through the section 5 Boule dam and onto rocks

in the Middle chute, where the Falls heroes of the Life Saving Station rescued the crew. To slide Boule wickets down the face of the steel trestles, crewmen had to place boards atop the trestles and stand on them, holding a wicket as it was lowered by the derrick to guide it into place. If gravel and drift had accumulated on the concrete sill, blocking closure of the wickets, the crewmen had to pound the wickets with sledgehammers to dislodge the debris. This while standing on boards above the turbulent river, where a misstep tumbled them into whitewater. Most survived, but some didn't.⁷

NINE-FOOT DEEP

As the Louisville District rebuilt the Falls crest dam to provide a nine-foot depth for coal tows, a similar effort began upriver in the Pittsburgh Engineer District, which was building Locks and Dams 2 through 6 similar to Lock and Dam 1 (Davis Island), originally designed to hold six-foot pools. Seeing that coal tows needed a minimum nine feet of water, the Pittsburgh District Engineer, Major William L. Sibert and his deputy Lieutenant George Spalding, recommended that the pool depth be increased to nine feet simply by installing longer Chanoine wickets on the existing dam foundations. Congress approved this modification and in 1905 ordered full-scale study of building locks and dams along the entire Ohio to afford a standard nine-foot depth for navigation. This legislation was obtained by what became known as the "waterways bloc," an informal coalition of Ohio valley congressmen formed in 1905 by Nicholas Longworth of Cincinnati, son-in-law of President Theodore Roosevelt and Speaker of the House of Representatives.⁸

To study the proposed nine-foot project the Chief of Engineers appointed the Lockwood Board, composed of district engineers along the river chaired by Colonel Daniel Lockwood, formerly a deputy to Colonel William Merrill. This board boated down the Ohio, conducting public hearings on the slackwater project at every port. When it arrived at Louisville, it received an enthusiastic reception by rivermen led by the Falls bard. By 1905 Will Hays had abandoned his ridicule of Weitzel's dam; Louisville's harbor had not filled with mud collected above the dam as he had so direly predicted. A late convert, Hays bluntly told the Lockwood Board: "God

Almighty gave you the Ohio River and if you fellows can't raise enough money at Washington to improve what God Almighty gave you, you are a poor lot.... I trust that no one of you will have a grandson who will look upon the Ohio and say that it may be locked, but it isn't worth a dam."⁹

For his loyal readers, Hays attempted to explain how the Chanoine movable dams proposed to canalize the river would function. "This dam is the invention of a French engineer named Chanoine. They are known as the movable variety. They are movable inasmuch as they are provided with movable wickets, which can be let down to the river bottom when necessity requires, allowing the water to escape naturally. When it is necessary to retain the water, the wickets are raised. When the wickets are up, the passage of steamboats is done through a lock."¹⁰

Hays also offered his readers the benefit of his seventy years experience of the Falls environment. He recalled, for example, that in his youth every river rise or flood would wash down immense quantities of driftwood, filling the canal, blocking the wharf, and damaging boats. This wooden assault on navigation no longer occurred, a result he believed of the saw and ax harvesting logs for boats and buildings. "The mighty forests are no more," he declared.¹¹

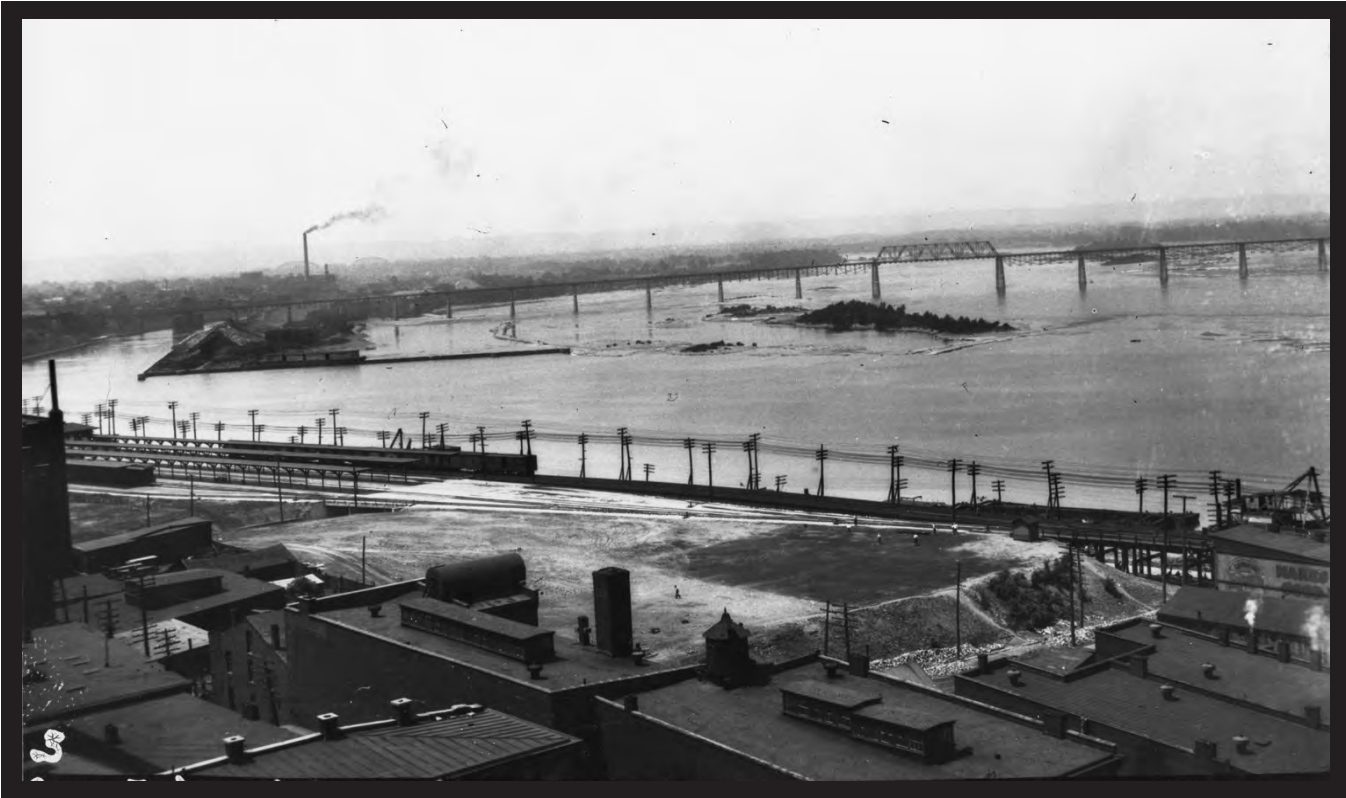
Of the island and chutes at the Falls, Hays reviewed the dynamic evolution he had seen over the years:

In the fifties there were two large islands on the falls and three channels, all of which were used by the largest-sized boats going down or coming up when there was a good stage of water in the river. One of these islands was called Corn island and the other Goose island. The former was nearer the Kentucky shore and the latter nearer the Indiana shore, but further down. The high stages of the river have washed both islands away, and only a small portion of either can be seen now, the current of the river having cut them away. The three chutes on the Falls were known as the Kentucky, Middle, and Indiana chutes. The last two named still retain their names.¹²

Perhaps Hays' memories were fading as the result of a series of strokes he suffered. He did not remember that much of Corn Island had been quarried away to make cement, nor that part of Goose Island had been blasted out to help the Falls pilots pass Indian chute, a project for which he was largely responsible. Hays, nevertheless, persisted with his daily river column to the end, making his last visit to the wharf on a Sunday in July 1907. Because Louisville's Mayor Robert Bingham had clamped a lid on Sunday liquor sales, instructing city police to close the saloons, Hay found the wharf very crowded that hellishly hot Sunday. He saw children along the wharf playing marbles, quoits, and horseshoes, and a minister preaching a riverside service, shouting his message to be heard over the clatter of passing streetcars and the cries of steamboat mates bossing the crews. At one end of the wharf Hays saw a vendor peddling hamburgers from a cart, while at the other a boy sold ice cream from a wagon. Well-dressed crowds crisscrossed the wharf to board the Sunday excursion boats, while one steamboat, thanks to an arrangement made by Hays, took aboard children from the city's hospitals and orphanages for a refreshing cool and free trip up the river. The wharf, Hays

declared, on that Sunday was lined by "a motley mass of humanity, ranging from the well-dressed and well-fed, to the ragged and hungry, and of all nationalities and colors. In fact, in no other place can it be so readily noticed that Louisville is a great metropolitan city with her quota of cosmopolites as on the levee when people are idle."¹³

That day Hays suffered a final stroke and was confined to his bed the last days of his life. When he perished on July 23, 1907, the Falls cities fell into mourning, steamboat flags lowered to half mast, and the Corps lost its dearest critic. Eulogists mostly ignored his long services as a river reporter, his political influence on the Falls engineering, focusing instead on his music, on the three million copies of his songs that had been sold. Although after his death, his sentimental and often racist ballads of the Old South gradually fell out of public favor, people walking the trail alongside the wharf and canal to Portland in the twenty-first century sometimes were heard humming snatches of his tunes, perhaps thinking them ancient folk music without remembering their composer. Time was not kind to his music, but his river columns, buried in



This 1914 view of the Falls shows the remnants of Corn Island in the center upstream of the Falls bridge. The canal entrance is at the left and the Louisville wharf in the foreground then was lined by the Short Route railroad. (University of Louisville Photographic Archives)

endless rolls of microfilm, remained perhaps the key gauges of the dynamic environmental transitions at the coral reef called the Falls.¹⁴

Falls heroes also met the scythe not long after Hays. William Devan, captain of the Life Saving Station for thirty years, died in 1911, and his partner Jack Gillooly succeeded him and led the station's greatest rescue in 1913 when the heroes went to flood-wrecked Dayton, Ohio, and plucked 500 families from rooftops and trees to safety. In 1916 the Life Savers suffered their first fatality when, while pursuing a boat caught in swift currents, they drove their lifeboats over the Falls dam, taking the nine-foot plunge into the maelstrom below. Their lifeboats capsized, but they saved the passengers and all swam to safety except surfman John Munz who went down.

When the Life Saving Service merged into the United States Coast Guard, Louisville's floating life-saving station remained in Coast Guard service, and it operated until 1972, when transferred to the City of Louisville which made it a historic riverfront attraction and wharfboat for the *Belle of Louisville*.¹⁵

As last Kentucky Falls pilot, Dan Varble hoped to train his son Lyman as his successor. In 1910 as his son passed at the helm of the *R. L. Aubrey* Dan proudly saluted at him from the wheel of the *Fulton*. A moment later the *Aubrey's* boiler exploded, scalding the entire crew and killing two, including Lyman. After thirty-five years as a Falls pilot, in March 1912 Dan Varble suffered a stroke when walking up the stage to the towboat *Transit* for another trip down the Falls; and the Falls heroes' era ended when he fell to his death in the river.¹⁶

At the canal, John McFee, the last surviving employee of the Louisville and Portland Canal Company, completed fifty-four years of service and retired. McFee began work for the company in 1853 as a boat measurer, checking hull dimensions for toll assessment; and when the Corps of Engineers took charge in 1874 he became the blacksmith, then mechanic for steam engines operating the lockgates, and finally the lockmaster on the graveyard shift. As McFee neared retirement in 1907, a news reporter interviewed him and heard tell of the flatboats, sailing ships, and gunboats that had once passed through the canal. McFee also revealed that he and the night crew were sometimes troubled by an apparition. They saw a giant snow-white cat,

four feet long and two feet tall, gingerly walking along the crest of the dam during the wee hours. Mystified, McFee had once peppered the mystic feline with bullets, with no apparent effect. Incredulous, the reporter also questioned the lockhands, who confirmed McFee's story but could offer no explanation other than mentioning the workers who had died during the dam's construction.¹⁷

After three years' intensive study, the Corps' Lockwood Board made its report in 1908 and recommended establishing a minimum nine-foot depth for navigation on the Ohio. This the board expected to be achieved by building fifty-three locks with movable dams numbered in downstream order from Pittsburgh to Cairo. To support their favorable recommendation, the Board rationalized:

Having in view the fact that a canalized river offers an upstream navigation lower in cost and quicker in transit than an open-river project, the Board, arguing from the known natural resources of the section and its population, concluded that a river improved by this method will afford facilities for the cheap exchange of mineral, agricultural, and manufactured commodities, which from their low value and bulk cannot be exchanged unless such cheap facilities are offered, and that there is every probability that the improvement of the Ohio River by canalization, as proposed, would induce a very large future commerce which does not now exist in addition to retaining and greatly facilitating and cheapening the commerce which the river now bears.¹⁸

The Lockwood Board hence urged this major tax-dollar investment on grounds that when the nine-foot project was completed it would stimulate a redoubled increase in the Ohio's commerce, perhaps rising to as much as thirteen million tons annually. The Chief of Engineers blinked at this conjectured commercial growth and refused to endorse it, leaving the plan to the "wisdom of Congress." Railroad lobbyists fumed at the board's proposal, and even the influential *Engineering News* forecast the Ohio River canalization was "bound to be a losing one."

President William H. Taft of Cincinnati, however, threw his support behind the Lockwood report, commenting: "It seems to me that in the development of our inland waterways it would be wise to begin with this particular project and carry it through as rapidly as may be."¹⁹

Congress in June 1910 authorized construction of the nine-foot project essentially as recommended by the Lockwood Board, and moreover it promised to supply sufficient funding to complete all the locks and dams by 1922, in just twelve years. Congressman Nicholas Longworth of Cincinnati, who led the proponents of this legislation, declared that Congress had accomplished three things: it established the controlling depth at nine feet; it set a definite time for project completion; and it directed the Corps to manage the project as a single unit, to build the locks and dams in the order best suited to meet the time schedule. Under this mandate the Corps decided not to construct the locks and dams in downstream order from Pittsburgh, but rather to first build the locks and dams that would provide harbors for major ports—Wheeling, Gallipolis, Marietta, Cincinnati, Louisville—and then to build the structures needed between those harbors, leaving canalization of the river below Louisville, where it was naturally deepest, for the final campaign. Although the Lockwood Board estimated construction of the locks and dams might cost \$63 million, Congress in its first appropriation provided only one million. At that rate it would have required sixty-three years to finish the canalization, instead of twelve, unless Congress accelerated funding in later years.²⁰

FORTY-ONE

The locks and dam at the Falls became Lock and Dam 41 in the order established by the Lockwood Board, and because it provided a harbor for a major port it was slated for early construction. At the Falls the board had recommended widening the canal from 86 feet at its narrowest point to 170 feet and building a new single-lift concrete lock south of and adjacent to the two-lift Scowden locks, which together with related improvements might cost \$1.7 million. For reasons not readily apparent to Louisville District Engineer Lytle Brown, the board had proposed that the new lock in the canal be 600 feet long and 85 feet wide. These

dimensions would permit twelve coal barges to enter the lock as a tow unit, but they did not match the dimensions authorized at all other locks on the Ohio, which on the pattern set at Davis Island (Lock 1) would have a 110-foot width.²¹

Perhaps the Lockwood Board conceived the narrow width recommended for Lock 41 as acceptable in view of the extensive use made of the improved Indian chute. In April 1906 the towboat *J. B. Finley* took down the chute 26 coal boats, 5 barges, and a model barge in a single tow, a new record. Below the Falls, the great towboat *Sprague* lay in wait, assembling this and other tows in an immense tow of 57 barges and fuel flats, transporting 49,190 tons of coal, railroad ties, and lumber. Surpassing records set years earlier by the towboats *Ajax* and *Joseph B. Williams*, the *Sprague* delivered this load south, making the 1,600 mile run to New Orleans in ten days and eight hours—including time lost laying by at night and getting past bridges. Why would the Louisville canal need a 110-foot wide lock when a 400-foot wide chute was open on the Indiana side during major river rises?²²

Major Lytle Brown, Louisville District Engineer, strongly disagreed with the Board's decision on the narrow dimensions, arguing that Lock 41 would become a bottleneck when shippers adjusted to the 110-foot width available at other locks and configured their barge tows to fit into them. Moreover, if the canal were widened to 200 feet instead of the 170 feet recommended by the board, tows that were three-barges wide could pass each other while in the canal without using the old passing basins excavated at the sides of the canal. Building Lock 41 with the 110-foot width and widening the canal to 200 feet might increase construction costs by a half million dollars, but the increased width would eliminate the necessity for shippers to reassemble their tows at Louisville to pass through an 85-foot-wide lock, eventually saving shippers substantial time and money. This forward thinking impressed the Chief of Engineers and Secretary of War, who approved Brown's recommendations, and the 110-foot lock width at Louisville became one of the initiatives that eventually fostered Brown's appointment as Chief of Engineers.²³

For the design of Lock 41, Brown and his successor, Major John Oakes, recruited the best

waterways engineers to be found as nucleus of the Louisville District's engineering division. To lead the design effort, they imported the impressive William McAlpine from the Kentucky River project, where he had designed the last locks on that river to open slackwater navigation to its head at Beattyville, Kentucky. A graduate of the Massachusetts Institute of Technology, McAlpine had joined the engineering staff for the Kentucky River in 1902 and by 1906 had become its senior engineer. It was McAlpine who had managed the transition at the Kentucky River locks from stone masonry and timber to concrete and steel, and he led a similar transition at the canal. At the Falls, McAlpine attained an international reputation as waterways expert, becoming known as "Mr. Mac." Tennis was his hobby and he played so aggressively that he soon became Louisville's city amateur champion.²⁴



William McAlpine (Corps of Engineers)

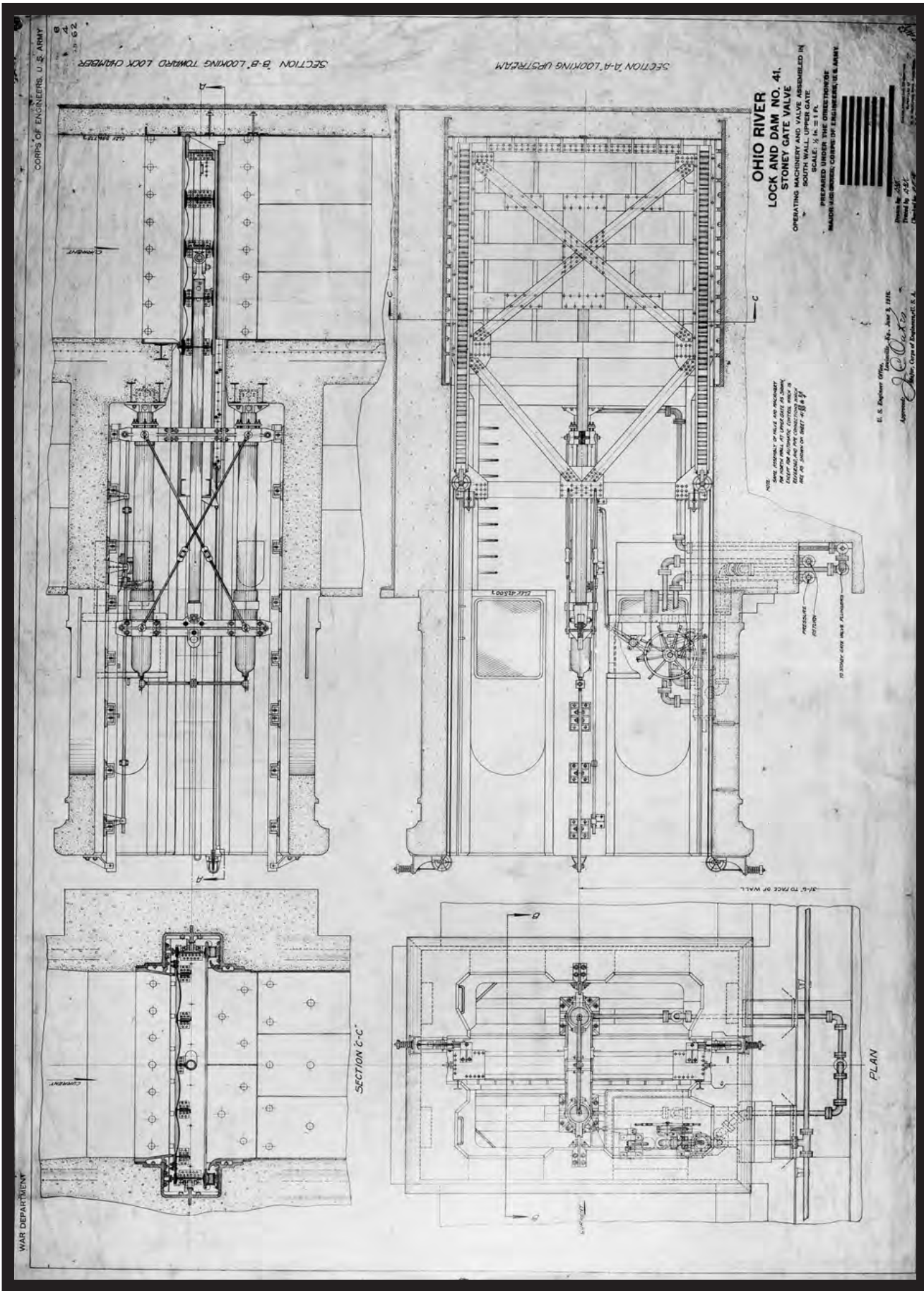
Mr. Mac placed Malcolm Elliott in charge of the difficult lockgate design challenge. While designed with the same 110 by 600 feet dimensions as other new Ohio River locks, Lock 41's lower lockgate had to be forty-eight feet high, double the height required at the other locks—the lockgates therefore had to be much sturdier. For the lower lockgates, Elliott designed a horizontal arch lockgate, and for the upper lockgate, just twenty-five feet high, he adopted vertical framing, essentially a cantilever truss allowing correction of any sagging by tightening diagonal braces—this design became standard for Ohio River locks. Elliott then served as resident engineer during the construction of

Lock 41 until 1917 when he volunteered for military service during the First World War; becoming a Corps officer and subsequently the first commander of West Virginia's Huntington Engineer District, established in 1922.²⁵

Preparing the specifications, McAlpine and the staff awarded a \$1 million construction contract on the first day of December 1911 to Ohio River Contracting Company, a building consortium formed to contract for the new locks and dams. This contract required them to excavate the south side of the canal to a 200-foot width at the new lock's approach and to construct the concrete walls of Lock 41. The company built a warehouse with machine and blacksmith shops at the site and brought in their equipment, the towboats *Armstrong* and *Gillette* towing dipper dredges, derrickboats, and dump scows, which began removing the old canal's masonry and excavating the approach. Later the contractors brought steam shovels, locomotives, dump cars, and laid down rails for excavating the lockpit and placing the new lock's concrete foundation and walls.²⁶

As the first contractor began work at the locks, a second contract for \$700,000 went in May 1913 to Henry Bickel, a prominent local contractor who had paved many of Louisville's streets. Bickel agreed to widen the canal to a 200-foot width, excavating 6,200 feet along its north side, building a new concrete wall alongside the canal, installing an emergency movable dam upstream of the locks for use during lock repairs, and filling the chambers of the 1830 canal locks with materials taken from the canal-widening excavation.²⁷

The triple locks completed in 1830 were no longer in use, and they were to be filled to make more space available on Shippingport island. Before filling the old triple locks, Bickel was required to place a concrete wall across their upper entrance to block seepage through the fill and to extend the canal drydock's discharge culvert, formerly draining into the locks, across the lock chamber and another 600 feet to the river. While excavating a trench across the old locks for the new culvert, Bickel encountered a surprise. Lying beneath the water on the middle lock-chamber floor was one of the original lockgates, its wood still sound even after fifty years. Bickel merely jerked the lockgate out of the way and went on with the excavation,



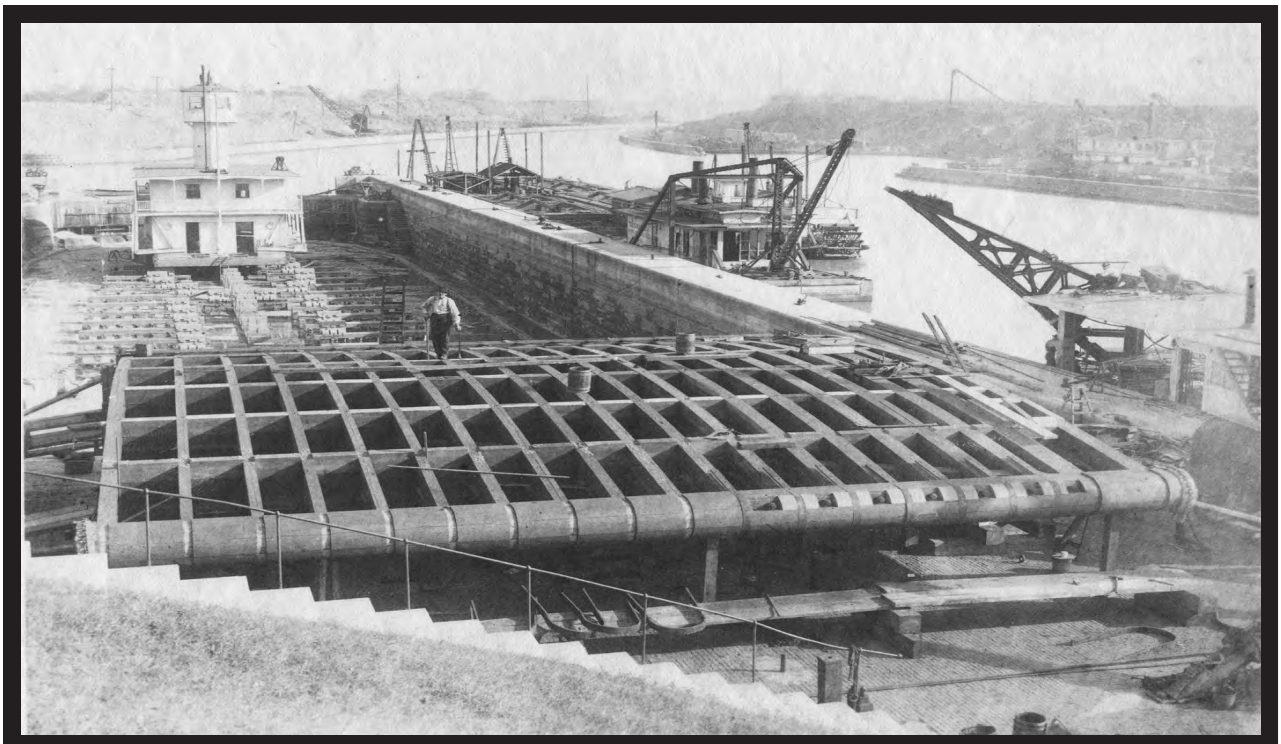
Plans for the Stoney gate valves used in the filling and emptying culverts of Lock 41. (Corps of Engineers)

keeping his job on schedule and burying the old locks beneath several feet of earth. Doubtless they may remain there undisturbed until industrial archaeologists of the third millennium wish to learn how nineteenth-century engineers built navigation locks.²⁸

Bickel's canal excavation suffered one major mishap. In order that navigation might continue through the canal and Scowden locks during the widening, Bickel left the old stone-masonry canal wall and fifteen feet of rockfill behind it standing to serve as cofferdam holding water in the existing canal while the digging went on. The masonry wall, however, had many joints through which water flowed into the excavation. To plug these leaks, Bickel had workers drive wooden wedges into the leaks, then dump sawdust and manure into the water on the canal side to seal seepage. On October 5, 1915, 250 feet of this wall collapsed and released a flood into the excavation. Contractor employees Louis Wright and Milton May were rowing through the canal when the wall fell, and the suction shot their boat through the crevasse; May made a timely leap onto the remaining wall and climbed to safety, but not Wright. Some 3,000 feet downstream from the break, a hundred men were down in the pit at work, but they heard the roar of the

approaching twelve-foot wall of water and scrambled out before it engulfed them. Hearing the rumble, residents of western Louisville, many related to the workers, ran to the canal bank for news. Rumors that scores had drowned panicked the crowd, fears that were assuaged only after the contractor called the roll and learned that only Louis Wright was missing. Although the disaster's cause was never discovered, engineers concluded the wall had either been weakened by nearby blasting, or the wedges driven to plug leaks had separated and weakened the rock strata along a seam.²⁹

After this disaster Frank Louckes replaced Robert Strecker as resident engineer for the canal widening, and Bickel retrieved, dried out, and repaired his equipment, finishing his contract without further debacles in 1917. William McAlpine and the Lock 41 engineers, nevertheless, encountered difficulties with other contractors. Because the canal widening forced removal of the old swinging bridge at Eighteenth street (Elm Tree Garden), a new and longer bridge had to replace it. After reviewing various bridge designs, McAlpine selected a direct-lift bridge with a span that could be hoisted forty feet in a minute when a tall boat approached. Having a 204-foot span between piers, the new



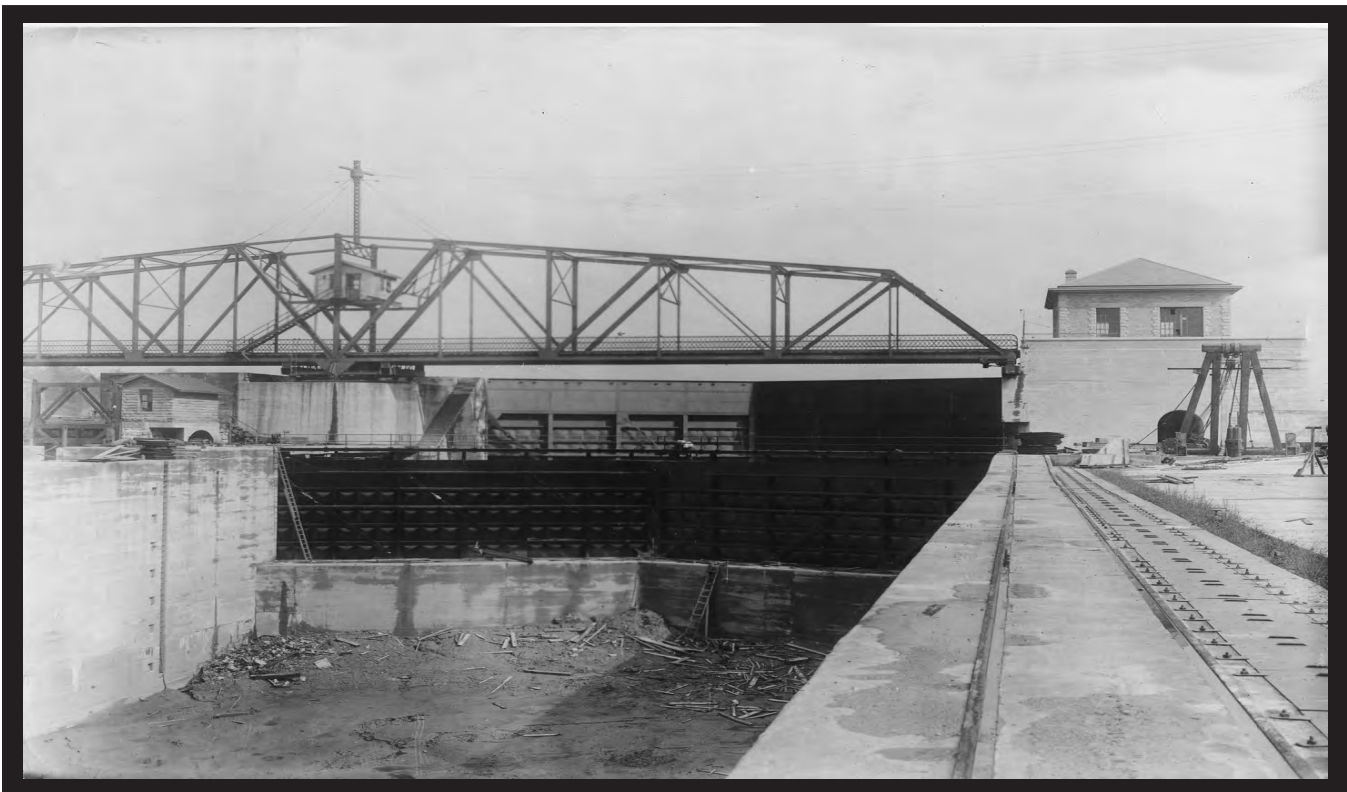
The view of the canal's drydock shows the fabrication of a new wooden lockgate for Scowden locks and the repairs underway on the U.S. Life Saving Service boat with its watchtower. (Corps of Engineers)

bridge had a sixteen-foot-wide roadway made of oak planks on steel joists. Although the contractor completed the bridge on schedule, during operational testing a mechanic removed a pin on one side, then mistakenly removed a pin on the far side, releasing the bridge to fall cockeyed across the canal. A derrick soon hoisted the bridge back into position, however, with no significant damages except to the mechanic's ego.³⁰

The contractor building the new lock was not as fortunate. The great flood of 1913, which stands as the record on a section of the river upstream of Louisville, washed out the contractor's cofferdam and sucked six loaded barges through the break; the barges rolled over and over as they passed through the excavation, destroying much of the contractor's equipment and suspending progress for nearly a year. Indeed, the contractor never recovered from the losses and bankrupted in 1915. Finishing the job went to the T. A. Gillespie Company, which in 1916 began placing steel-reinforced concrete in the lockwalls. For this task, Gillespie barged sand and gravel to Shippingport island for storage. From the storage piles, small railcars with two compartments hauled the correct proportions of

sand and gravel to make a cubic yard of concrete to a one-yard "cube" mixer at the lock. The proper amount of cement went into the mixer, which then dumped concrete into buckets lifted by a crane to forms for the lockwall sections. This system proved capable of placing forty cubic yards of concrete in an hour, and it averaged thirty.³¹

A striking feature of Lock 41 was the Stoney valves, named for their British inventor, installed to control the filling and emptying of the locks. Mr. Mac and the engineers became concerned that butterfly valves, traditionally used at low-lift locks, could not control the flow into the large chamber of Lock 41, fearing that it might create turbulence sufficient to capsize boats inside the chamber. For improved flow control, they changed from butterfly to Stoney valves. Installed in wells alongside each lockgate, these valves were lifted open by hydraulic jacks powered by oil at high pressure. A powerhouse built at the side of the valves housed the oil pumps and pressure accumulators needed to operate the jacks, and over each valve well was a framework resembling a guillotine for emergency repairs to the valves. Although the Stoney valves initially permitted filling Lock 41's chamber in



Lock 41's upper lockgates and its guard gates as they appeared under construction in 1919. (Corps of Engineers)

twenty minutes, in later years, at other large locks, Mr. Mac switched to reverse Tainter valves, quite different from Stoney valves, for still greater flow control and reduced maintenance costs.³²

THE TRIPLE BOGEY

The engineers building Lock 41 suffered a triple bogey in 1917—three disasters that were entirely out of their control. That year, commercial traffic on the Ohio River precipitously declined by half. That winter the river froze and ice cut down dozens of steamboats, nearly destroying the historic steamboat packet trade. And in April the United States went to war. These three bogeys delayed the completion of Lock 41 and threatened its future. “Towboats Vanish and the Ohio is Left to Catfish,” screamed a news headline of 1917. The River Combine of Pittsburgh, which had operated 80 towboats and 4,000 barges annually transporting 1.2 million tons of coal downriver as far as New Orleans, abruptly ceased long-distance river transport in 1916.

The need for coal to fuel steel mills producing armaments in the Pittsburgh area, competition from Alabama coalfields and Oklahoma oil in the lower Mississippi valley, and heavy losses of floating plant on the lower rivers contributed to the Combine’s decision to end its Ohio River coal

trade, in one stroke severing the river’s total waterborne commerce by half. The Combine, indeed, left only two towboats on the lower rivers, the *Exporter* bringing coal down to Louisville, and the *F. M. Wallace* plying the Mississippi. Although the C. M. Budd Company of Pittsburgh still had a landing at Jeffersonville and with its towboats *Monitor* and *A. R. Budd* brought coal to Louisville, traffic through the canal plummeted from six million tons in 1916 to less than a million in 1917.³³

Suddenly the Pittsburgh coal-tow trade for which the Ohio River locks and dams had been designed was gone. With steamboat packet trade declining as well, total waterborne commerce on the Ohio dwindled in 1917 to a nadir of 4.5 million tons. Because the construction and overhead costs on the canalization project were generally fixed, the diminishing traffic produced a relative increase in the average transportation costs per ton-mile. Project costs were estimated at 13.4 mills per ton-mile, and adding the 5-mill charge of carriers led to the conclusion that freight moved on the river in 1917 at a total of 18.4 mills per ton-mile. When compared to the contemporary railroad rates of 13.9 mills per ton-mile, the Ohio River appeared a poor investment indeed. After this comparative analysis, one railroad executive proclaimed: “The Ohio is the one river in the United States on which there seemed to be a fair prospect of developing a



The old canal wall was left in place while the canal was widened to 200 feet behind the wall. (Corps of Engineers)

large and important traffic. These great expectations have not been realized and the writer feels it must be admitted that the experiment is a failure."³⁴

Ohio River commerce suffered its second disaster in the winter of 1917. The river froze over and then was gorged by ice floes that scraped landings along the river clear to Cairo. Dozens of steamboat packets went down, and the ice swept away the Corps' workboats at the Falls, although some were caught downriver and recovered. The most serious loss at the Falls occurred at the movable dam, left up during the ice storm to keep water in the canal as a refuge for steamboats and to permit continued operations of the Louisville to Jeffersonville ferry. When the ice broke loose, it smashed down the dam's metal trestles, twisting them and carrying away the wickets. As soon as the ice had passed, however, the canal hands went onto the dam, applying blowtorches to heat and straighten the metal trestles and installing new wickets to speedily restore navigation in Louisville's harbor and through the canal. This solved the Corps' immediate challenges after the ice had passed, but its passage proved a death knell for the steamboat packet trade. Most of the steamboats lost to the ice were never replaced, and the commercial losses were never regained.³⁵

Just as the Civil War had disrupted the construction of the Scowden locks during the 1860s, so too at Lock 41 when the United States entered the First World War in 1917. Some of the Lock 41 engineers, such as Malcolm Elliott, and the contractor's construction forces volunteered for military service, leaving the Lock 41 job short of workers.

Corps of Engineers officers received combat engineering assignments overseas, and by 1918 all Corps officers at the five engineer districts within the Central Division had left for foreign service. In their absence, civil engineers rose to command of all districts in the division. At Louisville, senior engineer William McAlpine became the District Engineer, becoming the only civilian ever to hold this important command. Reporting to Colonel Lansing Beach at Cincinnati, McAlpine and the other civilian commanders carried on the construction and operations as best they could during the emergency.³⁶

Although Ohio River commerce reached its nadir in 1917, the wartime emergency demonstrated the commerce's value to national defense. During the winter of 1917, with Pittsburgh coal unavailable and rail delivery of coal blocked by military shipments, plant shutdowns and suffering from the cold threatened Louisville and the entire lower Ohio valley—most homes in Louisville as elsewhere then used coal as heating fuel. Responding to this threat, the Corps acted to move Kanawha River coal south by releasing water from behind the movable dams, creating artificial river rises that could float coal tows over shallows in unimproved river sections. This action prevented suffering, economic losses, and disruptions to wartime armament and munitions production. In addition, to alleviate an energy shortage in 1917 the first tank-barge shipments of petroleum and gasoline moved up the Ohio from Kentucky and West Virginia to Pittsburgh and farther east by rail. Although the Ohio in 1918 did not possess the tactical significance it enjoyed in 1862, its strategic importance to military mobilization could not be denied.³⁷

Overwhelmed by the military emergency requirements, Congress neglected the peacetime promise it had made in 1910 to supply funding sufficient to complete the Ohio River's nine-foot project by 1922. Yet, William McAlpine had enough funds in 1917 to pay the contractor's invoices for work at Lock 41, although the contractor's progress slowed as a result of labor shortages. McAlpine awarded a separate contract for building the powerhouse and concrete shelters for the Stoney valve mechanisms on the lockwalls, and these were completed by 1919. Another contractor erected a new steel swing bridge across the lock, while other contractors fabricated the new lockgates. By the end of the war in November 1918, Lock 41 was ninety-four percent completed, and McAlpine proudly reported the south lockwall entirely finished and the north lockwall nearly completed. His assistant, Whitney Gregory, had designed a 110-foot-long Poiree dam—a movable emergency dam—that was installed on the canal's bottom upstream of the lock, where it could be raised to close off flow for emergency lock repairs. The primary contractor had become discouraged by labor shortages, however, and through mutual agreement with the Corps left his job, leaving installation of the Stoney valves and lock-



The Corps towboat *Cherokee* made the first test lockage at Lock 41 on April 18, 1921, and the new 600-foot lock officially opened to commercial traffic on May 1. (Corps of Engineers)

operating machinery for McAlpine to finish with the canal hands.³⁸

Short of funding and work force, William McAlpine required two years after the war's end to complete Lock 41. After test lockages by the Corps towboat *Cherokee*, McAlpine formally opened the lock to commercial navigation without fanfare on the first of May 1921; and lockhands were the sole spectators when the steamboat *Nashville* became the first to lock through while on its way to Evansville. Lock 41 could pass a towboat pushing twelve barges, compared with the Scowden locks' four barge and towboat capacity. It required barge-tows forty-five minutes to pass through the double Scowden locks; Lock 41 halved this passage time to twenty minutes. Although Lock 41 had the same 110 by 600 feet dimensions standard on the Ohio River, its lift was double that of other locks on the river. Just as the 1830 locks and the 1872 Scowden locks were the largest of their time, Lock 41 laid claim in 1921 to the largest lockgates in the United States—although perhaps not the world.³⁹

During its early operations Lock 41 exhibited one unexpected design flaw, a unique phenomenon—Old Faithful. Every time a boat

locked through, a geyser of water shot forty feet into the air from the lockwall. It spouted from an air vent leading down into the filling culverts. At first the lockhands sought to stop it by piling sandbags over the vent, but the geyser blew the bags to bits as if by dynamite. Engineers agreed the geyser's force resembled that of a hydraulic ram, generated by swift water flowing through the culvert and the Stoney valves. This phenomenon remained a harmless puzzle.⁴⁰

OBSERVATIONS

Built of concrete and steel, integral to comprehensive plans for developing the entire Ohio River, Lock 41 set the pattern for twentieth-century waterways engineering. The 1830 locks and fifty-foot-wide canal had served as the principal navigation structure bypassing the Falls for forty-two years until the completion of Scowden locks in 1872. In the second phase, Scowden locks and the eighty-six-foot wide canal served for forty-nine years until 1921. Although the epitome of engineering when built, Lock 41 and the 200-foot-wide canal were to serve as the principle structures in the third phase during the forty years from 1921 to 1961, when riverborne commerce expanded to volumes far exceeding

the maximum predicted by the Lockwood Board in 1908 when it justified the canalization project.

The passage of the Falls has been blessed by innovative engineering throughout its history. David Bates, Canvass White, and Increase Lapham at the 1830 locks were recognized engineering geniuses, and Theodore Scowden at the 1872 locks clearly should share that distinction. Godfrey Weitzel displayed similar acumen when completing Scowden locks and designing the Falls crest dam of the 1870s; and certainly William McAlpine, manager of the design and construction of Lock 41, also qualified as an engineering genius. Indeed, Congress eventually recognized Mr. Mac's special talents by designating him as the senior engineer of the United States Corps of Engineers and by naming the project at the Falls in his honor. Although engineers commonly are marked by their addiction to mathematics, slide rules, calculators, and computers, their human talents and frailties have been fundamental to the triumph of engineering art at the Falls as elsewhere.



15

POWER ON THE FALLS

Steamboats, steam locomotives, steam mills, steam-electric plants powered the world and supplied Louisville's energy in the nineteenth century. Fueled by abundant cheap coal barged down the Ohio River from Pittsburgh, steam engines transported Louisville's commerce, drove its manufacturing mills, and lighted its homes and streets. So much coal burned in Louisville that its air filled with smog, coal wagons rutted its streets, and soot coated every exposed surface. These environmental impacts seemed acceptable costs for Louisville's greater commercial prosperity until coal shortages during the First World War drove fuel prices upward and the city looked to alternative energy sources.

As a benefit for the thriving Pittsburgh coal-towing trade that delivered the valley's fuel, the Corps of Engineers designed its Ohio River canalization project with 110 by 600-foot locks to handle standard coal tows and with a nine-foot depth that matched the coal-barge draft. The First World War disrupted this historic fuel-delivery system, however, when Pittsburgh in 1917 abruptly ceased shipping its coal down the entire length of the Ohio. Louisville's Lock 41 then was half completed and the Corps was studying the construction of Dam 41 across the Falls of the Ohio to provide a more reliable nine-foot channel for coal barges, and sudden loss of the coal trade shook the rationale for these projects. The projects' planners reasoned, nevertheless, that this deeper channel could also float coal barges from West Virginia and Kentucky as well as from Pittsburgh; it would offer reliable transport for the bulk shipment of petroleum and other commodities, a waterborne commerce that surely would burgeon once the nine-foot channel became available. Moreover, the proposed Dam 41 at the Falls might provide a new energy source in addition to fostering commercial navigation and fuel deliveries.

The Corps of Engineers in the nineteenth century had been a single-purpose civil works agency, focused exclusively on navigation projects. This changed at the advent of the

twentieth century, thanks largely to the leadership of President Theodore Roosevelt and allied progressives. The Corps hearkened when President Roosevelt proclaimed: "Every waterway should be made to serve the people as largely and in as many different ways as possible. It is a poor business to develop a river for navigation in such a way as to prevent its use for power when by a little foresight it could be made to serve both purposes." This mandate influenced William McAlpine and his engineers at the Corps' Louisville District after the First World War, when they designed and built Dam 41 in cooperation with private enterprise to develop the power on the Falls.¹

HYDROELECTRIC POWER

When fires in 1892 and 1902 ruined Shippingport's Tarascon mill and Jeffersonville's Smith and Smyser mill, any use of the Falls of the Ohio's magnificent water power stalled. The whitewater rapids of the Falls' twenty-seven-foot descent offered splendid opportunities for generating hydroelectric power—as had been done at Niagara Falls during the 1890s. Neglect of such opportunities seemed shameful to progressive conservationists led by President Theodore Roosevelt, who urged that water should not be allowed to waste in damaging floods, but instead be stored in reservoirs for use in agricultural irrigation, municipal water supply, or hydroelectric-power production. At the dawn of the twentieth century this conservation movement hailed the creation of the Bureau of Reclamation to develop Western water resources, the formation of the Pittsburgh Flood Commission to plan Ohio valley flood-control reservoirs, and the organization of the Miami and Muskingum Conservancy Districts to reduce flooding in Ohio. Although no similar progressive organizations arose to press for Falls' water-power conservation, the Ohio Falls Hydraulic Manufacturing Company, which owned the burned Smith and Smyser Mill on the Indiana side of the Falls, employed engineers in 1903 to study dams capable of transforming the Falls' water into hydroelectric energy as had been done at Niagara Falls.²

Because hydroelectric power generation required a constant and reliable river flow and fall, or head, to spin waterwheels or turbines, the Ohio Falls Hydraulic Manufacturing engineers

surmised that the Louisville Falls were unsuitable for power production. During highwater flows the river below and above the rapids rose to the same elevation, erasing the head and stopping power generation; and during droughts the Falls flow dwindled until it became too small to spin power turbines. Building power dams on the Falls would cost millions, the engineers concluded, and who would buy an electric supply that might be disrupted several weeks in each year?³

Major Lytle Brown, the Corps commander at Louisville in 1912, revived the earlier studies of Falls power. A brilliant young officer from Tennessee and a future Chief of Engineers, he conducted his studies independently, without orders from headquarters, and he reached more optimistic conclusions than earlier engineers. First, he saw that power technology was advancing: both the turbines converting falling water into power and the transmission lines carrying electric power to users had become more efficient. Moreover, the national political climate had shifted, with President Roosevelt and progressive leaders of Congress vigorously supporting joint federal-private water power developments. In 1905, for example, Congress had approved the Corps' cooperation with a privately owned power company to construct Hales Bar Dam at Chattanooga on the Tennessee River—the first federally sponsored hydroelectric project east of the Mississippi. The pioneering Hales Bar Dam began producing electric energy in 1913.⁴

With both power technology and federal policy advancing, Lytle Brown planned a hydroelectric project involving Corps cooperation with private enterprise in building a higher dam across the Falls of the Ohio. Rather than raising the existing dam built across the head of the Falls nearly in a straight line, he designed an "L" shaped dam with its short upper leg crossing Indian chute and its long leg leading downstream to Rock Island. This long leg would divert river flow downstream through Kentucky chute into a hydropower plant anchored across the chute between Rock Island and Shippingport—where it eventually was constructed. To generate electricity when the Falls' flow was unsuitable for power generation, Brown proposed building an auxiliary coal-fired steam plant on Shippingport island. Space on this island had become available at low cost by 1912, he pointed out, because the

cement plants there had closed. "This industry," Brown observed, "while of the greatest importance in the recent past, has now been practically abandoned since Portland cement has driven Louisville cement from the field apparently forever." The Shippingport cement plants had been replaced by a plant manufacturing Portland cement located below the Falls at Kosmosdale, Kentucky.⁵

Not only had Shippingport lost its principal industry, repeated flooding had driven many residents from the island. When the 1913 flood swept down the island, for instance, firemen evacuated the residents as the rising water floated down a huge lockgate from an upstream dam that threatened to smash into the houses; meanwhile, the lockhands cabled the bridge over the canal to nearby anchorages to prevent its destruction and loss of access to the island. Shippingport's people sought refuge in the U. S. Marine Hospital at Portland, which opened to the public for the purpose until the flood receded. Some residents returned to the island after the 1913 flood and in a few years had repaired their homes, only to evacuate again during the 1916 flood. Discouraged by these repetitive disasters, many residents relocated to housing on higher ground while others rebuilt their frame homes atop stilts to place them above the reach of ordinary floods. A reporter visiting Shippingport after these floods described the decadence he found there and in neighboring Portland:

At 34th and Water just below K&I bridge, push aside dead weeds and find cobblestones of a dock when river traffic was in its prime. Steamboats palaces went to the foot of the Falls and deposited their passengers and cargoes to be transported to boats of upper river. Near the dock is the old St. Charles Hotel, a gaunt, tattered building with ancient carved woodwork. It has a fine old ballroom, now filled with rags and filth from vagrants who vandalize the place and use it for shelter. It is a furtive rendezvous for crapshooters and bootleggers. A houseboat ties to the chain where gorgeous river steamers once docked. Such is the condition of Portland and her twin sister, Shippingport. Shippingport at the

foot of the Falls where all traffic of the Ohio had to stop and unload, had a very profitable toll for hundreds of teamsters carrying the river traffic around the rapids, and hundreds of singing roustabouts loaded and reloaded the meat and flour and hemp and cotton passing between the North and South in pioneer times. These were the days when Pink and Billy Varble and other pilots shot the rapids in flatboats that came down and charged for doing it. No longer are the docks crowded with steamboats with flags; the horses, carriages and gigs are no more; and the pedestrians find more inviting places to go than the grim, drab ruins of Shippingport.⁶

When Major Lytle Brown published his independent report on Shippingport's hydroelectric power site, it soon drew the attention of investors, who sent engineers to Louisville to study his plan. One was Henry Byllesby who had worked with inventor Thomas Edison when installing Louisville's first incandescent electric lights at its 1883 Southern Exposition. "Where the nights are illuminated, you see new buildings, busy factories, clever and effective people," said Edison, expounding, "where there is no cheap and effective artificial light you find stupid people." Inspired by such wisdom, Louisville in 1884 installed Edison lights to illumine its wharf from First to Fifth streets; and Henry Byllesby established an engineering company at Chicago to design municipal power systems—he subsequently formed the Standard Gas and Electric Company that acquired control of public utilities including the Louisville Gas and Electric Company. Byllesby dispatched his engineer John Link to Louisville in 1913 to explore Lytle Brown's proposals for power development on the Falls. Link had just initiated his studies of the Falls, however, when the erupting First World War altered conditions at Louisville as throughout the world.⁷

Until 1916 Louisville obtained most of its electric energy from the Waterside coal-fired steam plant, located at the wharf where it could obtain the cheap coal barged from Pittsburgh. The First World War's onset disrupted this fuel

source when Pittsburgh's coal went to its local steel factories for armament production and was no longer barged down the Ohio. Railroad transport then replaced the coal barges, but in 1917 even this supply faltered when military shipments clogged the nation's railroad network. Most mills in the Falls cities then still operated with steam power, requiring coal as fuel, and most homeowners heated with coal; hence, the scant coal supply threatened to shut down Louisville's manufacturing plants and to leave its homes without heat. The Corps of Engineers alleviated this energy crisis by opening its movable dams on the Kanawha and Ohio rivers to flush West Virginia coal barges downstream to Louisville, but the persistent shortages sharply increased black coal's price, making the "white coal" of hydroelectric energy more attractive financially when compared to steam-electric power. Higher coal prices also confirmed the conventional wisdom that urged the development of alternative energy sources.⁸

Moreover a special provision of the 1916 National Defense Act drew closer attention to the water-power potential at the Falls of the Ohio. Before the war the United States had been largely dependent on imported nitrates to manufacture explosives and, fearing that enemy submarines might cut off the foreign supply, Congress in the 1916 defense act authorized the rushed construction of plants to produce nitrates for military ordnance. Because the manufacture of nitrates required abundant electric power, the War Department examined many sites where cheap hydroelectric power might be produced, and one of these was at the Falls of the Ohio. Louisville's leaders desperately hoped that the War Department would select the Falls as the site, quickly constructing a hydroelectric dam on the Falls and building nitrate plants that might employ thousands. The War Department in 1917, however, chose instead the Muscle Shoals, or falls, on the Tennessee River in Alabama, there constructing the Wilson Dam—the largest hydroelectric dam in the nation—along with two nitrate plants for ordnance production. This national nitrate crisis not only alerted strategic planners to the defense value of sites that could be used for hydroelectric-power generation, it eventually resulted in formation of the Tennessee Valley Authority to develop the electric power at Wilson Dam and to build more power dams. As in 1825 when Shippingport nearly became the bustling site of a national armory built by the

War Department, again in 1917 the island narrowly missed becoming the industrial site of a major ordnance production facility, perhaps eventually the headquarters of an Ohio Valley Authority.⁹

FUEL MIXTURE

Because the high coal prices persisted even after the First World War had ended in 1918, public interest grew in switching to other fuels, chiefly petroleum, and this included engines for propelling river craft. First applied to small recreation boats during the 1890s, internal combustion engines in the early twentieth century had begun to supplant steam-engine power in commercial craft. In 1905 the Howard boatyard at Jeffersonville, for example, had built its first commercial gasboat: the *White Oak*—at ninety feet long, it was twice as large as recreational gasboats and it had a fifty-horsepower gasoline engine that could operate more economically and with a smaller crew than steamboats. By 1918 similar commercial gasboats had begun competing with steamboats for Louisville's river trade, especially in the local distance trades to the Kentucky, Salt, and other tributary streams. Some steamboat owners, moreover, converted their steam engines to use oil instead of coal to heat the boilers.¹⁰

This transition also affected river recreation as motorboats drove rowboats from the Louisville waterfront; in 1916 the Ohio Falls Motorboat Association and the Louisville Power Boat Club organized, building riverfront docks for their members' boats. Wealthier club members like William Semple acquired very expensive motorboats; he paid \$21,000 for the seventy-five-foot gasoline yacht *Miramar* that could accommodate thirteen passengers and had two forty-five-horsepower engines turning twin-screw propellers. These early marine engines could operate on kerosene as well as gasoline, and when gasoline prices increased during the war the motorboat owners commonly fired them with a half gasoline and half kerosene fuel mixture. Although sailing and rowing recreational craft could still be seen at the Falls even into the twenty-first century, gasoline motorboats came to dominate Louisville's aquatic sports milieu.¹¹

Louisville's Life-Savers also switched to internal combustion. When Captain Jack Gillooly

and the Falls heroes merged into the United States Coast Guard in 1915 they acquired an early motorboat with a five-horsepower engine. The powerful life-savers could row their yawls faster than the little motor could spin its prop, however, and Gillooly soon swapped it for a two-cylinder, eight-horsepower engine capable of towing small craft back from the brink of disaster on the Falls. In addition to acquiring power boats, the life-savers were pleased by other benefits from their transfer under the Coast Guard flag: they received higher pay and retirement pensions along with the gasoline engines. Where Captains William Devan and Jack Gillooly had managed the life-saving station with considerable leeway, however, the Coast Guard exercised much tighter control, meshing the Louisville station into its national mission. After Gillooly retired in 1917, the Coast Guard sent officers from Great Lakes stations to command its sole inland-river station. This proved unsatisfactory because conditions at the Falls differed materially from those at Great Lakes or coastal stations. Louisville's commanders had to know how many strokes of the oars or time was required to reach specific points on the Falls, a knowledge that came only from experience. In 1922 the Coast Guard therefore appointed Walter Farrell of Louisville as commander of its inland river station, and he served until the Second World War. Although Farrell ranked as Chief Warrant Officer under Coast Guard rules, Louisvillians continued to call him "Captain" because this had been his predecessors' rank in the Life-Saving Service.¹²

The advent of gasoline engines expanded the life-saving missions at the Falls. Where earlier the Falls heroes had rescued unpowered craft and steamboats from destruction, many of their challenges after 1915 involved motorboats with dead engines drifting into the maw of the Falls. Indeed, during postwar years the life-savers spent considerable time salvaging automobiles and their occupants, dragging as many as sixteen vehicles a day from the drink after cars had skidded down the wharf into the river. This usually happened when ice coated the wharf's cobblestones and the vibrations of gasoline engines left running nudged the automobiles down the wharf. And during one spectacular postwar Armistice Day celebration, the Coast Guardsmen pulled the pilot and passengers of an Army aircraft from the river; after a parade flyover, the plane's engine had stalled and the

pilot had splashed it down in the river, where the life savers retrieved him without injury.¹³

Marine diesel engines were seen at Louisville soon after the First World War. These early diesels were manufactured after 1912 at the Winton plant in Cleveland and a Fairbanks-Morse plant in Beloit, Wisconsin. Early in the century Winton made the famous Winton Flyer automobiles at Cleveland, then it began manufacturing diesel engines for boats and locomotives (it became the General Motors Diesel Engine Division in 1930). As in the case of gasoline engines, the first boats with diesels were recreation craft, notably the yacht *Whitemarsh* with crew of ten that an Oklahoma oil baron brought from New Orleans to the Kentucky Derby in 1921—ninety-five feet long, its Winton diesel could thrust it along at eighteen miles per hour. Oliver and Bert Shearer operated one of the Louisville area's first Fairbanks-Morse diesel, using it in a towboat in 1917 that barged Kentucky River coal—the Shearers later acquired a diesel towboat fleet and managed it until 1973. The application of diesel engines to commercial towing did not become widespread, however, until the 1930s.¹⁴

Whether gasoline, diesel, or hydroelectric, alternatives to coal fuel became increasingly attractive after the First World War, not only for the sake of economy but also, in the case of power production, to reduce the confounded coal-smoke nuisance. In Louisville, steamboats and locomotives, steam engines at the mills, and coal-fired steam-electric plants puffed coal smoke; indeed, most home owners burned coal for heat. The resulting smoke and soot ruined laundry on outside lines, filtered into homes, and so clouded the city's atmosphere that Colonel George Hoffman, the Louisville District commander in 1920, averred that developing the Falls' hydroelectric power might well be justified as a smoke abatement measure.¹⁵

PERMIT APPLICATIONS

Hoffman's successor, Colonel G. R. Lukesh, and his senior engineer William McAlpine went to Louisville's Engineers and Architects Club in early 1921 to explain that the ice storm of 1918 had so heavily damaged the Falls' dam that it needed very expensive reconstruction. During this reconstruction the Corps intended to increase the dam's height by eight feet, providing

a deeper harbor at Louisville and also saving taxpayers \$3 million by eliminating the need to build Dam 40 originally planned near Madison, Indiana. Raising Dam 41 by eight feet could establish the required nine-foot channel some seventy-five miles upriver to Dam 39 without constructing Dam 40. William McAlpine pointed out to the influential club members that this increase in Dam 41's height afforded a splendid opportunity develop a profitable hydroelectric plant on the Falls. McAlpine urged that this should be brought to the attention of corporations that might be willing to develop the dam's power potential in cooperation with the Corps, and his initiative quickly found public support. A Louisville news editor seconded his motion:

For many years steam has been man's faithful servant, carrying him from place to place, turning the factory wheels and heating the civilized sphere unceasingly and tirelessly. But the day of steam is passing and we shall have to look for a more economic and reliable way to obtain our physical energy. Water power has been tried and not found wanting. What better way is there to obtain cheap power than by harnessing the Ohio?¹⁶

The Louisville Gas and Electric Company, subsidiary of Byllesby Engineering of Chicago, heard McAlpine's request for proposals, and Mr. Mac soon enjoyed visits from Byllesby's manager Frank Shenehon and engineers John Link and H. G. Roby. Shenehon had worked for the Corps on its Great Lakes Survey and had been the University of Minnesota's dean of engineering before becoming Byllesby's general manager. Seeing the merits of McAlpine's proposition, Shenehon and Byllesby Engineering Company sought a permit to plan the Falls' project from the Federal Power Commission; and when the Power Commission set a June 1922 deadline for accepting permit applications the Louisville city council jumped into the competition. The council appropriated \$5,000 to employ an engineer to apply for the permit on behalf of the city, and Mayor Huston Quin lent his enthusiastic support to the plan. Mayor Quin estimated the city's construction of a Falls hydropower plant might save its people as much as \$3 million annually in energy costs and another million a year in

laundry cleaning by reducing coal-smoke emissions.¹⁷

As the city's consulting engineer, Mayor Quin employed Major General William Sibert who had commanded the Louisville Engineer District early in the century. Sibert later distinguished himself as construction division commander on the Panama Canal, and during the First World War he commanded the Army's Chemical Warfare Service. After the war he had retired to Bowling Green, Kentucky, and entered private engineering practice. Although he declined becoming Kentucky's first state highway commissioner, Sibert gladly accepted the City of Louisville's challenge to plan its Falls' water-power development.¹⁸

While Byllesby Engineering expected to rely on the Louisville Gas and Electric's Waterside steam plant for service when high or low water suspended hydroelectric production at the Falls, General Sibert sought to further reduce dependence on coal and to abate the smoke nuisance by planning an all water-power municipal system. He examined hydroelectric dam sites on the Green and Cumberland rivers in Kentucky and selected Cumberland Falls, where the river plunged fifty feet, as the site of a proposed 180-foot-high dam. The Cumberland River dam would store water in its reservoir, and, when unsatisfactory flows interrupted hydropower production at the Falls of the Ohio dam, water would be released at Cumberland Falls to generate electricity, and an electric transmission line would transfer the Cumberland Falls power into Louisville. Mayor Quin and the Louisville city council therefore submitted applications to the Federal Power Commission for two permits, one to developed hydroelectric power at Cumberland Falls and another at the Falls of the Ohio. Cheap energy, cleaner air, municipal ownership. These appealed to Louisvillians.¹⁹

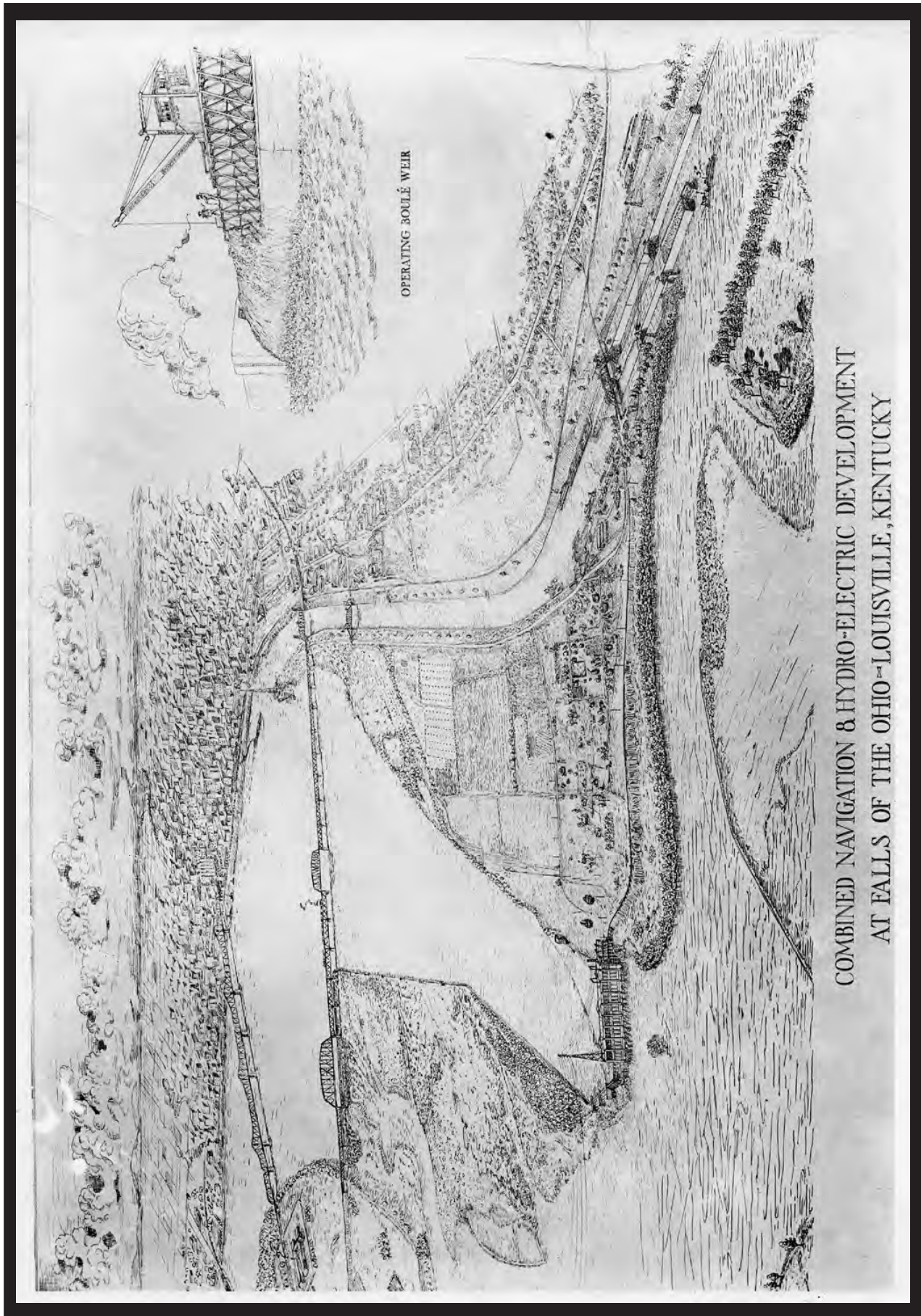
When the Federal Power Commission conducted its hearings on Falls of the Ohio permit applications in January 1923, Mayor Quin, General Sibert, and Congressman Maurice Thatcher attended to represent the City of Louisville. Opposing the city's application were Byllesby Engineering's manager Frank Shenehon, Louisville Gas and Electric executive L. G. Streng, and Louisville attorney Matthew O'Doherty. General Sibert described at length for the Commission his plans for using "white coal,"

for a power system relying entirely on hydroelectric power without an auxiliary coal-fired plant. Rather than attacking Sibert's plan, which was perfectly feasible, Frank Shenehon then merely presented the rival Byllesby plan and unleashed his attorney Matthew O'Doherty. This lawyer warned the Power Commission, first, that Louisville's government lacked the bonding capacity needed to capitalize the construction of two huge dams and, second, that such a municipal project would surely become a political football in the city's hands.²⁰

The Secretary of War, who directed all Corps of Engineers projects throughout the nation, then also served as chairman of the Federal Power Commission; and he understood the Corps' need to get Dam 41 under construction quickly, if it were to achieve the nine-foot navigation project on the Ohio River by 1929 as mandated by Congress. At the end of the permit application presentations, therefore, the Secretary of War questioned the Byllesby Engineering delegation closely. If granted the permit, he asked, would Byllesby start the construction immediately and build its share of the project quickly? When Byllesby representatives promised that they would rush the job, Mayor Quin sensed that Louisville had lost its claim to the project permit. As Quin expected, the Federal Power Commission gave Byllesby its notice to proceed in August 1923.²¹

News of plans to dam the Falls got mixed reviews in the Louisville press. One news editor exulted that the higher dam and deeper pool would not only give the city the best river harbor in the nation, it "will mean the passing of the Falls of the Ohio, where hundreds of human lives have been swept to watery graves and where countless boats, big and little, have been dashed to splinters." Another reporter worried that the new dam might inundate the Big Eddy in Indian chute, where whirling, tumbling water still clutched the hulks of wrecked boats and perhaps the bones of missing persons. According to rivermen the reporter had interviewed, the indigenous tribes had once treated the Big Eddy as a shrine:

Away back before the white man came to these parts, the Indian loved and respected the Big Eddy for its awful beauty. It was to them the abode of evil spirits whose constant quarreling moved the



This drawing shows the locks, Shippingport, hydroelectric station, and beartraps. Insert at the upper right shows the movable Boulé dam. (Corps of Engineers)

waters into a veritable maelstrom. The place was a sort of shrine where, when wars were lost and adversity visited the tribes, the Indian offered up his prayers to the water gods. Historians have learned these facts through inscribed bits of pottery, weapons, and implements dug up from Indian mounds in the vicinity of the Big Eddy.²²

DAM 41 CONSTRUCTION

Evil spirits apparently did not trouble the Falls engineers. Colonel George Spalding, William McAlpine, and the Corps' engineering team in 1923 elected not to reconstruct Weitzel's dam that had been rebuilt and modified several times since its original construction in 1871; instead, they selected a site downstream of Weitzel's dam and nearer the Ohio Falls (Pennsylvania Railroad) bridge. Where Weitzel's dam had maintained Louisville's harbor at a 412-foot elevation above sea level, the new dam hoisted the pool to a 420-foot elevation, thereby extending deep water another twenty-five miles farther upstream to Dam 39 and affording as much as a thirty-seven-foot head, or fall, for hydroelectric power generation. Where Weitzel's

dam had extended straight across the river from the canal's entrance, McAlpine's team designed the new dam in an "L" shape when viewed from an aircraft. The short leg of the "L" extended from the Indiana bank to midstream, where it turned abruptly and formed the long leg directing river flow down Kentucky chute into the hydropower plant built between Rock Island and Shippingport.

They planned the concrete and steel dam with a twenty-foot base and twenty-foot height, stepped into the foundation reef and built in sections. At a total of 8,652 feet long, the dam had an 860-foot-wide Chanoine navigation pass to admit boats into Indian chute, 3,807 feet of fixed concrete weir, 3,740 feet of Boule wicket weirs, and two 90-foot-wide beartraps next to the hydroelectric station. This complex structure qualified as the longest navigation dam on the Ohio—by far—and one of the longest in the world.²³

H. G. Roby and the Byllesby team designed the 534-foot-long, 74-foot-wide hydroelectric plant for housing up to ten turbines and generators to be built between Rock Island and Shippingport at the lower end of Kentucky chute. They planned a two-story building with two-foot-thick walls atop a staunch foundation. The upper floor at elevation 436 (above the 1884 flood



Construction of the beartraps to control minor river flows. (U.S Army Corps of Engineers)

record crest) was the generator room. Beneath it, the first floor at elevation 417 supported the generators' weight and the runners and shafts of the turbines. Beneath this at elevation 408 was a 9-foot-wide corridor opening access to the turbine pits for necessary maintenance. On top of the powerhouse was a 20-ton gantry crane to handle the steel gates and trash-racks installed across the ports where water flowed into the turbines. The turbines themselves were the propeller type with fifteen-foot-diameter runners and an operating speed of 100 revolutions per minute. Byllesby touted this plant as the seventh largest in the United States and rated its total turbine capacity at 100,000 horsepower, compared to the 125,000-horsepower rating of Louisville's Waterside steam-electric plant. Because Byllesby expected Louisville's energy demands to rise to 250,000 horsepower by 1930, the company also planned to build a second steam-electric plant at Shippingport alongside the hydroelectric plant whenever the market justified the investment.²⁴

For its hydropower plant facilities, Byllesby purchased forty-four acres of land owned by the Louisville Cement Company and adjacent properties on Shippingport island. This included the ruins of Tarascon Mill and its lime kilns. Expecting many visitors coming to see the dam's construction, Byllesby wisely installed its visitors center atop a stone limekiln where visitors could overlook the construction in safety.²⁵

With plans in hand, the Corps and Byllesby agreed to proceed with construction. The Corps would modify Lock 41 by raising its lockwalls with concrete to the new 420-foot elevation and installing longer lockgates. The Corps would build the new power dam by contract, while Byllesby constructed its own hydropower plant. In September 1925 the Corps took competitive bids for the dam's construction, and Byllesby bid \$2 million, substantially less than the Corps' \$2.3 million cost estimate. Byllesby bid low because it had to assemble its equipment and labor to build the hydropower plant and these could also be applied to building the dam; moreover, its engineers wanted to control the job to assure it would be a "tight" dam. This concern was not entirely chimerical—the Hales Bar hydroelectric dam completed in 1913 on the Tennessee River had leaked like a sieve, severely curtailing its power production.²⁶

Byllesby contracted to finish the dam by the end of 1928 but planned to complete both it and hydropower plant in 1927 to initiate power production at an early date for the rapidly expanding Louisville market. During the early 1920s Louisville's population jumped a phenomenal thirty-eight percent and 328 new industries opened in the city, multiplying its energy consumption. Supporting Byllesby's goal of getting the additional power on line quickly, Colonel Spalding and William McAlpine cooperated by starting work on the new dam in



Workmen excavating a key trench into the Falls rock as foundation for the new dam. (Corps of Engineers)

September 1925 to take advantage of autumn's low-water stages, rather than waiting until the spring of 1926. They built a cofferdam across Indian chute while Byllesby built another around the hydropower plant site. The Corps also employed hired labor and in March 1926 began placing concrete to raise the walls of Lock 41 to match the increased 420-foot pool elevation.²⁷

As its construction manager, Byllesby Engineering employed A. G. Butler who had supervised the Louisville canal widening in 1913 for the contractor Henry Bickel Company. Butler in 1925 assembled the company's construction equipment, consisting of 15 dinky locomotives, 9 hoisting cranes, 12 flat railcars, 24 dump cars, and 4 concrete mixers, plus pumps, air-compressors, and 10 miles of railroad track. By the 1920s the construction industry was switching from steam to petroleum-fueled equipment, and practically all of Butler's equipment, including the dinky locomotives, had gasoline engines. To get the locomotives and equipment across the canal to the hydropower plant site, Byllesby installed a new steel turnbridge over the locks, putting it in service on the last day of May 1926; a combination highway and railroad bridge, it had rail tracks crossing to the construction site.²⁸

To rush the project to completion in 1927, a year ahead of schedule, Butler and Byllesby employed 2,400 workers working around the

clock in three eight-hour shifts under flood lights at night. In early 1926 these began excavating the powerhouse foundation and laying rail tracks inside cofferdams along the axis of the dam. From strategically located concrete mixers, the dinky locomotives pulled concrete buckets on flatcars along the tracks to cranes, which hoisted the buckets and placed the concrete into the forms around steel reinforcement. Beginning in May 1926, this mechanized system averaged placing 1,250 cubic yards of concrete a day and, altogether, some 90,718 cubic yards of concrete and 1.89 million pounds of steel reinforcement went into the dam.²⁹

Byllesby completed its concrete and steel powerhouse at the end of June 1927, and its gantry crane began lowering the electric generators into position. Although the massive structure afforded space for ten, Byllesby installed only eight 13,500-horsepower generators initially with a total capacity of 108,000 horsepower. By September 1927 William McAlpine's team had placed 20,332 cubic yards of concrete to raise the walls of Lock 41 and had installed longer steel lockgates; and in October they hoisted the Chanoine navigation pass, Boule wickets, and beartraps of Dam 41 into position for the first time to raise the pool to elevation 420. With the thirty-seven-foot head now available, Byllesby began testing the new



The nearly completed box cofferdam dries the Falls for dam construction. In the background is Jeffersonville. (Corps of Engineers)

generators. They completed the testing on November 29 and switched the electricity onto to a new transmission line that had been installed to circle Louisville.

Colonel George Spalding, commanding at Louisville, proudly reported to the Chief of Engineers that the power of the Falls had been turned on to energize the city.³⁰

Louisville was extremely proud that this new energy resource bolstered its list of attractions for new industry. "These combined power sources should be a means of concentrating industry around the Ohio Falls," proclaimed one booster: "Big factories should find this city attractive because of the combination of plentiful power, adequate rail and water transportation, available modern highways and a good labor market." The deeper harbor the new dam created, another writer contended, offered new opportunities to redevelop Louisville's riverfront, emulating the scenic drives, parks, and beaches that Chicago was building along Lake Michigan. "Purify the water for bathing beaches, condemn old shacks to create a river drive, build terminals and harbors, create river parks along the banks, alongside a river drive," the reporter predicted, "and you will have made in this city real progress, and inaugurated what will, without a doubt, become one of Louisville's

greatest assets." At Varble park on the river between Second and Third streets, the Outdoor Art League and Mamie Stratton, the daughter of Captain Pink Varble, installed a children's playground and walkways; and to welcome visitors from the north the League planted shrubbery and installed a water fountain on a grassy area near the end of the municipal (George Rogers Clark Memorial) highway bridge completed in 1929.³¹

These riverfront recreational attractions were abetted by attempts to revive the moribund steamboat trades. Packet companies still ran regularly to Cincinnati and Evansville during the 1920s, while the Turner Brothers operated the gasboats *Revonah* and *New Hanover* to the Kentucky River and Madison. Captain Frederick Way, Jr., piloting the *Betsy Ann*, initiated efforts to restore the weekly packet trade between Louisville and Pittsburgh, and he even revived steamboat racing against the Greene Line boats at Cincinnati. Yet, Louisville had begun turning its back on its steamboat heritage. In 1925, for example, the *Courier-Journal* dropped its daily river column, begun at the newspaper's 1868 creation by Will Hays and continued after his death by other reporters, filling its space with news about exciting automobile races and tours. Railroads had never defeated and killed their steamboat rivals, but cars, trucks, and highways soon would.³²



Coal smoke haze hangs over Louisville in early 1926 while a box crane lowers a wooden box into place as the locomotive on the left brings stone to fill the box. (Corps of Engineers)

Less entertaining but more significant was the postwar resumption of barge commerce from Pittsburgh. After Armistice Day the Pittsburgh steel industry switched from armament to peacetime production and, to curtail transportation costs, launched what were dubbed the "Steel Argosies." In 1921 barges loaded with steel pipe, wire, trusses, and rolled steel began to arrive at Louisville from Pittsburgh on their way to St. Louis and Memphis, saving shipping costs of up to \$3 per ton compared with rail rates. Making Louisville a central distribution center, Jones and Laughlin Steel Company of Pittsburgh leased the Byrne and Speed basin in the canal at Fourteenth street to unload its barges, while the American Steel and Wire Company established a terminal on the riverfront at Fulton street. These companies transported their metal products in standard welded-steel barges, replacing the wooden barges of old and launching a revolution in the barge-towing industry.³³

The first steel barges operating out of Louisville itself were built by Patrick Calhoun, David B. G. Rose, and James Howard, who formed the Inland Waterways Company in 1922 to build steel barges for towing coal, steel, and crude oil from Louisville and the Kentucky River to Pittsburgh. They leased wharf land from the city to build a terminal at the foot of Preston street and another plot between 32d and 35th

streets in Portland. Although the elaborate river-rail terminals they planned never materialized, their firm over time evolved into American Commercial Barge Line of Jeffersonville, the largest barge-towing concern in the nation.³⁴

The Inland Waterway Company's director David B. G. Rose with his huge yacht *Vivian III* took contractors aboard in February 1924 to inspect the upriver land Rose had purchased at Fourteen Mile Creek, where he planned to build an amusement park. When the yacht's engine stalled above the Big Four bridge, however, the boat drifted swiftly backwards, smashing into a bridge pier and floating toward a wreck on the Falls. Captain Walter Farrell dispatched his two Coast Guard emergency crews from the life-saving station, and these saved Rose and his passengers from the brink of disaster. Rose and the contractors then motored on to their destination, where they built the legendary Rose Island amusement park, running the excursion steamer *America* to carry huge crowds from Louisville upriver to the recreational resort until the 1937 flood destroyed the park.³⁵

Rose, Patrick Calhoun, and James Howard of the Inland Waterways Company and Captain Pinkney Varble II, son of the Falls pilot, joined with a campaign to obtain resumed postwar funding for the Ohio River nine-foot canalization



Construction of the powerhouse foundation and hydrocones in late 1926. (Corps of Engineers)



A May 1926 view of the combined railroad and highway bridge placed over the locks by the power company. Scowden locks are in the foreground and Lock 41 is in the back at the right. (Corps of Engineers)



Onlookers on April 4, 1930, watch for a boat to make the first lockage through the new auxiliary lock built in the lower chamber of Scowden Locks. (Corps of Engineers)

that had stalled during the First World War. When the Ohio Valley Improvement Association met at Louisville in 1922, it urged Congress to make major appropriations to construct the locks and dams needed to canalize the river from Louisville on to Cairo. Additional support from Cincinnati's river interests and from Pittsburgh's steel industry encouraged a congressional decision in 1922 to provide the funding needed to complete the canalization by 1929.³⁶

As a result of this decision, William McAlpine and his staff at the Louisville District faced enormous challenges during the 1920s, not only building the new hydropower dam (No. 41) at Louisville but also building eleven locks and movable dams along the Ohio below Louisville. Just as Lock and Dam 40 was eliminated by raising Dam 41's elevation, Lock and Dam 42 below Louisville was also dispensed with to reduce costs by raising Dam 43 to a higher elevation. Hence, Mr. Mac had only eleven locks and dams numbered 43 to 53 to build below the Falls. This "little job," however, made his Louisville office "the largest construction district in the United States."³⁷

With plentiful funding, construction of the eleven Ohio River locks and dams below Louisville went on nearly simultaneously during the 1920s, the rushed work calculated to finish the nine-foot project by 1929 before President Herbert Hoover came to inspect it. By working construction forces twenty-four hours a day, seven days a week, Mr. Mac and his team completed Lock and Dam 53, the last of the series, a few weeks before the President boarded a steamboat at Cincinnati bound for Louisville.³⁸

Unusually wretched October storms disrupted President Hoover's inspection of the Ohio River project in 1929. Traveling in an open touring car through Cincinnati to dedicate a monument to the nine-foot project's builders, he and Mrs. Hoover were drenched by driving rain and chilled by the cold. They first planned to travel the Ohio aboard the *Mississippi*, the grandest steamboat the Corps had in its fleet, but this floating palace, as result of a downriver mishap, did not reach Cincinnati in time, forcing the President to board a Coast Guard vessel. Pounding waves, beating rain, and ferocious wind confined the President and Mrs. Hoover to their cabin during much of their voyage to Louisville. Trailed by Corps boats filled with newsmen and by a dozen steamboats carrying

the Ohio Valley Improvement Association and state officials, the President stopped overnight near Madison, Indiana, where the National Guard fired a cannon salute in his honor. Because of the storm, the President did not hear the explosion that maimed the artillerymen.³⁹

As the President's boat parade passed down the Indiana shore at Jeffersonville, the President, in heavy coat, defied the weather to wave to the workers as the Howard boatyard launched the all-steel towboat *Loretta Howard* into the river. Braving the sleet, seven thousand Louisvillians gathered at the wharf to greet the President, scheduled to address the crowd from the deck of his boat, and when the first steamboat approached the wharf, the crowd cheered and bedlam ensued as sirens and whistles blew to welcome the President. This celebration puzzled the Corps captain of the snagboat *Kentucky*, which was the first to land and thus received the crowd's accolades. When the President's boat finally arrived an hour later, his wharfside speech was canceled because of the weather, and he motored on to the Brown Hotel to dry out his clothes before dinner. After dinner, Hoover formally dedicated the Ohio River's nine-foot project at Louisville's Memorial Auditorium, paying fitting tribute to the men and women who had planned and completed it, then developing his steamboating theme:

Those who must hurry will have little inclination to journey by river steamers, but those who wish recreation may well return to this magnificent and powerful river. The majesty of the Ohio was born of the Ice Age, half a million years ago. Its beauty remains today undisturbed by our improvements, and will remain long after our nation and race have been replaced with some other civilization.⁴⁰

The President was also scheduled to dedicate the new George Rogers Clark Memorial highway bridge, to inspect the new power dam on the Falls and perhaps to continue his voyage personally down the Ohio. The severe weather deterred all these plans, however, and he returned home to Washington on the night train. The steamboat pageant went on to Cairo, nevertheless, stopping at each port along the way, and arriving at the confluence of the Ohio with the Mississippi just as the stock-market

crash ended the economic roar of the 1920s.⁴¹

It was regrettable that President Hoover, a professional engineer, missed the opportunity to inspect how the art of engineering had been applied at the Falls. The turbines of the new hydropower plant were spinning fast, lighting Louisville's homes and powering its mills. During 1929, they produced 218,079,810 kilowatt hours of electricity, a large percentage of Louisville's power. Although as the city's energy requirements mushroomed the percentage declined in later years, the dam's average annual hydropower production remained high throughout the twentieth century, and at very low cost to Louisville and its Gas and Electric Company. Byllesby Engineering Company's shrewd engineers had agreed to pay a flat rental fee of \$95,000 annually to the federal government for the first fifty years, and only when the first half century ended and the license was renewed did this rental fee increase.⁴²

President Hoover might also have found interesting the finishing touches William McAlpine and his engineers had implemented in connection with the new power dam. At Sand Island below the dam, the dike between the island and the Indiana bank to divert low-water flow past the canal's exit had been cut down by ice in 1918 and had so deteriorated that Mr. Mac rebuilt it, completing a 1,600-foot-long concrete dike in 1928. McAlpine had also observed that the old double-lift Scowden Locks built in 1872 and used as auxiliary when Lock 41 was out of service had decayed beyond repair. Its wooden gates were weakening and its lockwalls were not high enough for much service with the upstream pool raised to the new 420-foot elevation.⁴³

When Mr. Mac and Colonel George Spalding requested \$600,000 to tear out Scowden locks and build an entirely new auxiliary lock, however, the Division Engineer denied their request, cutting it by half on grounds that the auxiliary lock was so seldom used that it would be more economical to reconstruct it, changing its dimensions and installing steel lockgates. McAlpine's engineers therefore redesigned the old double locks to convert them into a single-lift structure 360 feet long and 56 feet wide. These were the standard dimensions at the Monongahela River locks, and the Pittsburgh District in 1922, when designing Emsworth Locks and Dam to replace Locks and Dams 1 and 2 on the Ohio River, had adopted the 360 by 56 feet dimensions for auxiliary locks on

the Ohio River. McAlpine's team elected to place the new auxiliary lock in the lower chamber of the old Scowden locks where, with longer steel lockgates, the new chamber could raise boats thirty-seven feet in a single lift. Because the old locks were 80 feet wide, a wide concrete wall placed along the south side narrowed the chamber to 56 feet, while several feet of concrete atop the old lockwalls raised them to the required 37-foot lift. This complicated redesign left the stone masonry of the Scowden locks' upstream chamber in place and the upper lockgates latched back into their recesses standing beneath the concrete. McAlpine and Spalding awarded the contract for converting Scowden locks into the single auxiliary lock on 11 April 1929 to Vang Construction, which had the work underway when President Hoover visited Louisville in October 1929. Although completed economically in 1930, this jury-rigged redesign eventually curtailed the auxiliary lock's useful service life.⁴⁴

At the time of his inspection and dedication of the Ohio River's nine-foot project, President Hoover was considering a similar canalization project for the Upper Mississippi River from St. Louis to St. Paul. When he approved this major project in 1930, Hoover made Colonel George Spalding of Louisville the new Upper Mississippi Division Engineer to supervise its construction; and Spalding took with him William McAlpine and other Louisville District staff to direct the project's design and construction. With abundant funding provided to stimulate employment during the Great Depression of the 1930s, these engineers designed twenty-six locks and dams on the Upper Mississippi River that were built in just ten years.⁴⁵

OBSERVATIONS

As early proponents had expected, developing the power on the Falls cost \$12 million or more depending on which structures were included in the total. Thanks to the cooperation of McAlpine and the Corps with Byllesby Engineering and its subsidiaries, however, the massive hydroelectric plant and the nearly two-mile long Dam 41 were completed in just two years, an amazing achievement in 1928 as it would be today. Dam 41's power generation supplied a substantial percentage of Louisville's energy needs for more than thirty years before the reconstruction of the dam became necessary.

The economical power it produced repaid the dam's costs several times over, vindicating President Theodore Roosevelt and the other progressive conservationists who had urged that water resources should be developed to generate energy and other purposes in addition to navigation improvement. The dam's energy helped supplant the nineteenth-century steam engines and coal-fueled heating systems as they became obsolete and thereby reduced the thick smoke and soot that had marred Louisville's atmosphere during the early twentieth century.

Originally planned to serve the steamboat packet and Pittsburgh coal-towing trades, Lock and Dam 41 promoted an ever-expanding waterborne commerce on the Ohio River conducted more by gas and diesel towboats than by steamboats and including steel, petroleum, and bulk commodities in addition to coal. Lock and Dam 41 became an integral part of the McAlpine Project when a larger lock was added in 1960 and it continued in service as an auxiliary lock until 2001. Surpassing its fifty-year design life by thirty years, Lock 41 repaid the investment in its construction many times over.



16

NAVIGATION MODERNIZATION

Riverborne commerce passing the Falls multiplied several fold between the World Wars and during the Second World War. This traffic, including Navy warships, proved strategically critical to national defense—so vital that the Falls area was secured against enemy sabotage by the United States Coast Guard and the Corps of Engineers. Powerful diesel towboats supplanted steam towboats during these years, pushing barge tows so long they had to be split into two sections to pass through Lock 41 and other Ohio River locks. As early as 1944, William McAlpine and the Louisville District’s engineering team understood that this emerging commercial transition demanded modern navigation facilities—locks double the size of those completed in 1929. When its plans matured in the early 1950s, the Corps proposed a navigation modernization project, replacing the Ohio River’s fifty-one original locks and movable dams with nineteen larger locks and fixed dams,

converting the river into a staircase of nineteen slackwater lakes.

The navigation modernization project at the Falls during the 1950s dramatically increased the Louisville and Portland Canal’s width from 200 to 500 feet, doubled the capacity available at Lock 41, and marked Louisville’s final victory over its erstwhile competitors for river trade, Shippingport and Portland. Although Portland was encompassed within Louisville’s high floodwall built to protect against floods like that of 1937, the wall cut off Portland’s access to its wharf and commercial boats no longer landed there. Left outside the floodwall’s protection, Shippingport had no future. The Corps demolished it in 1958 to make room for the expanded canal, leaving little other than Tarascon Mill’s stone foundation to mark its site.

OPERATIONAL CHALLENGES

The Louisville and Portland Canal’s 100-year centennial in December 1930 passed without ceremony. Memories of the steamboat *Uncas* and its four-day struggle to pass the fifty-foot-wide canal and locks in December 1830, of the engineering achievements of David Bates and Increase Lapham, of John Hulme, James Guthrie,



Towboat W.J. Creighton ascending the Falls through Indian chute under the Ohio Falls (Pennsylvania Railroad) bridge. The foremost barge is crossing the dam’s navigable pass. (Corps of Engineers)

and Theodore Scowden, of General Godfrey Weitzel and Captain Pink Varble had faded from public recollection. The original triple locks built by the canal company in 1830 were gone, entirely buried beneath fill on Shippingport island and largely forgotten in 1930 by a city wrestling with unemployment, deprivation, and growing lines at the soup kitchens. Only the Corps of Engineers noted the canal's centennial, but it too in 1930 was fully occupied by its own challenges. Operating the 200-foot-wide canal, the 600-foot-long Lock 41, its 360-foot auxiliary lock, and the two-mile-long dam with Boule and Chanoine sections serving both navigation and energy demands proved extremely complex, indeed tricky, during the national economic and military emergencies of the 1930s and 1940s.¹

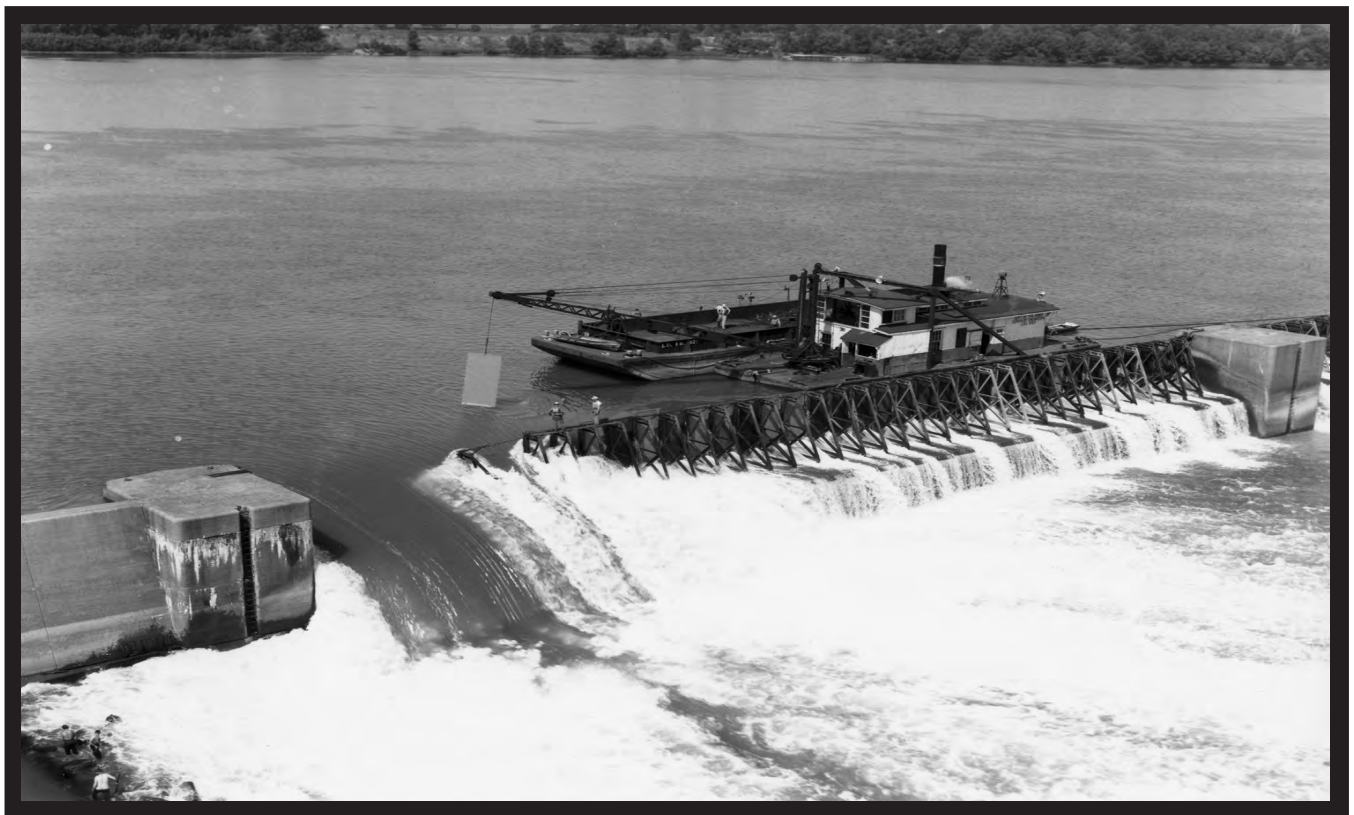
Managing the dam completed in 1928 to serve Louisville's need for a stable harbor pool, the towing industry's expectations for fast passage of the Falls, and the area's rapidly expanding demand for cheap hydroelectric energy posed unexpected challenges. To operate the complex dam, the Corps used the two beartrap gates near the hydroelectric station to pass minor pool fluctuations—because a single lockman operating a control could open or close the valves to raise or lower the beartraps. When the river rose beyond the beartraps' capacities, however, maneuverboats with crews had to venture out onto the river in all kinds of weather, icy or smothering, wet or white, to hoist or collapse the movable Boule and Chanoine wickets. For operating these wickets, the Corps stationed two maneuverboats with powerful hoisting derricks on the north side of Shippingport island in the Kentucky chute. The lockhands used only one maneuverboat at a time but required a second boat to standby for use when the first was out of service—else they could not change the wickets to keep the upstream pool at elevation 420 level or above. After lengthy empirical experience an operational pattern emerged. When river flow exceeded the hydroelectric station's capacity to convert the discharge into energy, one lockman at the control valves lowered the beartraps. For greater rises a maneuverboat went out to lower the Boule shutters; its derrick hoisted each shutter onto a storage barge, then removed the next shutter in line until the Boule dam was entirely down. If the river did not subside after the lowered Boules opened more space for the river's passage, the maneuverboat lowered the

Chanoine wicket dam across Indian chute. Again a crewman fished with a hook for the handle atop each wicket, attaching a cable from the derrick, which then hoisted the wicket, releasing its prop and letting it settle backwards to the river bottom. With this done and all the movable dam down to pass the full river's discharge, Indian chute was open for boats if their captains preferred to use that passage rather than awaiting lockage. Few did.²

Working aboard the maneuverboats, despite every safety precaution, proved extremely hazardous. Raising or lowering both the Boule and Chanoine wickets required crewmen to stand at the maneuverboat's gunwale, grappling in the river with hooks to find the wicket handles. To guide the Boule shutters into place, crewmen had to stand on boards laid atop the Boule trestles, with the river surging beneath them. Floating drift or ice that passed when the crew was at work posed additional hazards. During the thirty years the movable dam was in service, its operations maimed several crewmen and killed four, a sad toll and one reason the wickets were entombed in concrete in 1961.³

The Louisville Gas and Electric Company operated the dam's hydroelectric station at full capacity, supplying Louisville's growing demands for energy. Unlike Corps dams built later on the Cumberland and other rivers, Louisville's dam had no power-production storage, and the Corps did not permit the company to draw the navigation pool down below elevation 420, which would have hampered barge-tow passage. The Corps raised the wickets closing the dam during droughts to hold all possible water, but when the pool receded to elevation 420 the Corps ordered the power company to shut down the dam's generating units, using instead its steam-electric plants to produce the city's energy. During the 1930s the dam's hydroelectric station generated a third of Louisville's electricity, and, although its average production remained stable, this proportion gradually declined as the company built more steam-electric plants to fill the city's gapping energy maw.⁴

When the movable dam was raised with all shutters closed, the Corps as early as 1928 saw that it had environmental impacts at Indian chute below the dam. Fish schooled on the rocky riverbed in the chute, and thousands of them perished when the dam was raised during



The maneuverboat swings a metal shutter to the Boule Dam for placement to close the dam. (Corps of Engineers)



Workers guide the metal shutter down the front of the Boule trestles. This was hazardous duty and at least four District personnel lost their lives in this service. (Corps of Engineers)

droughts, shutting off flow over the rocks and leaving the fish stranded in potholes. To alleviate these impacts, the Corps decided to leave ten Chanoine wickets open at all times, thus releasing sufficient flow to wash fish away from the rocks into deeper water downstream, a conservation measure much appreciated by fishermen although perhaps not by citizens denied the cheap power this water might have generated.⁵

HARBOR DEVELOPMENTS

Although the nation was locked in a grinding economic depression throughout the 1930s, river commerce at the Falls expanded after 1931. Boats passing Lock 41 and the canal in 1932 carried 1.3 million tons of commodities, further increasing to 2.1 million tons in 1935 and 2.4 million tons in 1937. On the other hand, the Depression stifled the historic steamboat passenger packet business. The Louisville and Cincinnati Packet Company, that had run daily packets between the Falls and Queen cities since before the Civil War, closed its business in March 1931, selling its Louisville wharfboat to the Greene Line Company. The Louisville and Jeffersonville ferry, after crisscrossing the river for a century and a half, lost its business when a new highway bridge opened in 1929 and it sold its Louisville wharfboat in 1930. Passenger traffic at the Falls and along the Ohio River thereafter was slim and mostly recreational.⁶

To serve growing aquatic recreational demands, Louisville in 1935 acquired a \$140,000 grant from the Works Projects Administration, a federal agency formed to reduce unemployment, to construct a municipal yacht basin. This project employed 300 workers building a dam parallel with the river's edge near the mouth of Beargrass Creek cutoff and then excavating a basin into the river bank behind the dam. Once the excavation was done, the workers cut openings at both ends of the dam to afford boat passage into the basin. When completed in 1936, the basin offered mooring space for 400 pleasure craft, supplementing the boating facilities available at the Louisville Boat Club's marina near the municipal waterworks.⁷

Swimming in the river remained popular into the 1930s. Although the Indiana bank was steep, deep, and dangerous for swimmers, the north

side of Towhead Island was a favorite swimming spot (shantyboats and barges filled the south side chute). Fast currents around Sand Island made swimming below the Falls hazardous, but the Kentucky bank above Louisville offered fine swimming, and the Louisville Boat Club kept a lifeguard on duty there. The best beach at the Falls lay in mid-city between Louisville's Market street and Broadway, but sewage contaminated the water there. Boys regularly swam in the canal between Ninth street and the locks, but this was the most perilous swimming hole on the river—every summer the Coast Guard dragged the canal to recover the corpses of the five to ten people annually drowned in the canal. Small wonder that people soon abandoned the river's swimming holes when federal unemployment relief funds made possible the construction of public swimming pools.⁸

With the steamboat packet trade's end, river swimming's decline, and the 1928 completion of the dam submerging the Falls, the Louisville Coast Guard station, home of the Falls heroes, shifted its mission emphasis. During the 1920s its crew had patrolled the river with federal prohibition agents to intercept rum-runners, or break up the illicit moonshine stills found on Towhead, Sand, and other river islands. For this duty the station in 1927 acquired a swift motorboat, thirty feet long with a seventy-five-horsepower engine capable of making twenty-five miles per hour. The Coast Guard also benefited in April 1929, when a steel-hulled floating station, which even had electric lights and running water, replaced its wooden-hulled station. This steel station continued in service until 1972, when transferred to city government for use as the *Belle of Louisville's* wharfboat—it still served this function in 2003.⁹

The Louisville Coast Guard station lost part of its heritage in 1930 when the last original Falls hero died. John Tully had never enjoyed government service, and soon after the life-saving station's formation in 1881 he had returned to his business, a bait and tackle shop on the city's riverfront. He continued his voluntary life-saving work on the river, nevertheless, personally saving sixty-two people from drowning; and in his obituary even the *New York Times* hailed Tully's career as inspirational, especially when compared to Al Capone and other hoodlums filling the news in 1930.

One editor proclaimed that Tully's life demonstrated:

That attitude of mind which unhesitatingly volunteers for dangerous service for the service of his fellow man is not absent from us yet. A people may well be grateful for those who are so bold, so courageous, so noble that they risk all not once but many times to save others. Such was John Tully—hero of the River.¹⁰

Soon thereafter the Coast Guard also lost Edward Farrell, last original crewman at the life-saving station of 1881 and its commander in 1917. His son, Walter, in 1923 had become the chief warrant officer commanding Louisville's station, and he had earned acclaim in 1927 when he led the crew south for rescues during the record Mississippi River flood. Captain Walter Farrell commanded the station with distinction throughout the Depression, especially during the 1937 flood crisis at Louisville.¹¹

RECORD 1937 FLOOD

From 1881 through 1936, by actual count the Louisville station crews saved 5,896 people from death on the Falls and retrieved \$6 million worth of endangered boats, cargoes, and property; and in 1937 they increased these totals by at least a tenth, saving lives and property from the greatest flood that ever hit Louisville and cities adjacent to the Falls. Cresting at 57.1 feet on January 27, 10.4 feet higher than the previous record set in 1884, the flood inundated three-quarters of Louisville, forcing the evacuation of 175,000 residents, causing 90 flood-related fatalities and about \$50 million in property damages. Similar damages were inflicted along the Lower Ohio from Cincinnati to Paducah, where only a cemetery remained dry. In Louisville, the flood severed power, water, and telephone services, forcing the Engineer District to relocate its headquarters temporarily to Evansville and, in conjunction with the Coast Guard, to initiate boat patrols to communicate with the flooded port cities and towns.¹²

Just as the Louisville life-saving crew went to Dayton during the 1913 flood and to Memphis in 1927 for rescue service, distant Coast Guard crews arrived at Louisville in 1937 bringing fast

picket boats from the Great Lakes and the coasts. These established relay patrols along the Ohio from one port to the next, each boat with three Coast Guardsmen and one Army Engineer to survey damages and assess needs for emergency services. This was accomplished on the fast currents of a flooded river, in January cold and fog, while evading debris and empty rail tankcars bobbing downriver on end like corks. The Corps' fleet of workboats also went out on the flood for rescue and relief, and a news reporter covering the disaster vividly described the situation:

Conditions on this river are simply hell. The people simply refuse to evacuate ahead of the time of serious danger, and then the rescue load comes all at once. The army engineers stepped into this strange job of rescue and evacuation in great style. They are doing all that is humanly possible to bring order out of chaos. I have seen it happen right here today.¹³

News reporters had learned from long experience that Shippingport, lying within the river's floodway, usually was the first part of Louisville inundated; and when the river rose reporters customarily went there first to find a story. When the January 1937 flood arrived a reporter paid the usual visit to Shippingport and there saw two forlorn women on the Eighteenth street bridge over the canal, shivering beneath an umbrella, watching the river take their homes. "Wind-whipped water gurgles within a foot of the bridge's floor, and across the vanished canal there protruded only a few humps of bare earth, a shack or two, an occasional treetop," the reporter declared, ending dramatically: "Save for a few roofs, Shippingport likewise had disappeared." Ten feet above previous flood records, the 1937 flood swept all except one building off their foundations and out of Shippingport, forcing all its residents to seek refuge. Few thought anyone would ever rebuild their homes in the ruined town after the flood.¹⁴

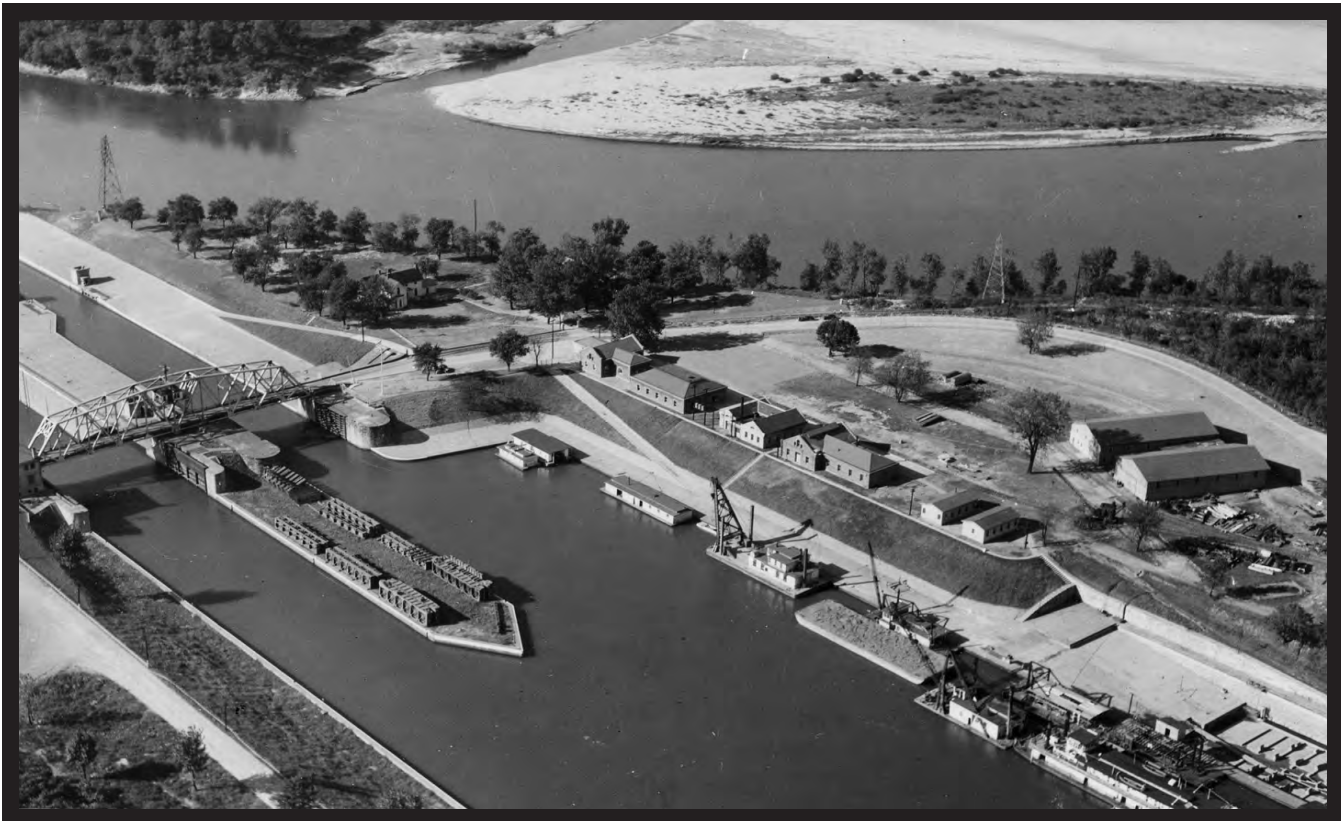
The river remained at flood stage for twenty-three days at Louisville before receding in February, leaving misery in its wake. While the Corps of Engineers prepared its survey reports on the damages for submission to Congress, it

and the Coast Guard also prepared for future floods. When the 1937 flood had washed out telephone and power lines, the Louisville Engineer District and Coast Guard station had worked in the dark during the flood without communications. Therefore, for future disasters Arthur Shultz for the Coast Guard station and Whitney Gregory for the Louisville Engineers arranged the purchase of radio transmitters and receivers for their offices and boats, together with portable electric generators for use when floods knocked out power lines. The Coast Guard station also obtained a powerful Great Lakes picket boat with a 290-horsepower engine, ten-passenger cabin, and tanks carrying sufficient fuel for twenty-four hours running.¹⁵

Sixty days after the flood ended in February 1937, the Corps of Engineers presented its damage assessments to Congress together with plans to build flood-control dams and reservoirs on tributaries of the Ohio River and local protection projects consisting of levees, floodwalls, and channel improvements in urban areas. Congress in 1937 appropriated \$25 million to initiate this flood-protection system, following it up with major appropriations in subsequent

years. No flood storage dams were built on the Ohio River's main stem, however, and thus no dam on the river, not even McAlpine Dam at Louisville, provided any flood control whatsoever. The Corps instead offered local flood protection to riverside cities through the construction of floodwalls and levees in cooperation with municipal governments, including Louisville's.¹⁶

The Corps' plans to protect Louisville proposed constructing a combination of earthen levee and concrete walls in a line paralleling the river, starting at high ground upstream of Beargrass Creek and stretching downriver to high ground near Shawnee Park. More than ten miles long, the wall's top would be three feet higher than the 1937 record flood crest. Gate openings left in the wall would allow use of major streets during normal river flows, but at the approach of a flood these were closed with gates or stoplogs. And after these gates closed, pumping stations along the wall could pump drainage from the city over the wall into the river. Even the flow of Beargrass Creek would go over the wall during floods, moved by the second largest pumping station in the world.¹⁷



An aerial view of Lock 41, Scowden Locks, and the Louisville Repair Station taken in 1938. The lockmasters' house is visible among the trees on lower Shippingport island. (Corps of Engineers)

In its authorizing laws of the 1930s, Congress offered to construct floodwalls with federal funding when the local municipal governments purchased the lands where the walls were built and agreed to maintain the walls after their completion. Louisville's city government fully supported the Corps plans, placing the issue squarely before the voters: a bond issue to purchase the floodwall's rights-of-way went before the city's voters in a November 1940 referendum. When voters approved the bonds, the city government in February 1941 agreed to proceed with land acquisition and accepted the other stipulations for local cooperation required by Congress. The outbreak of the Second World War in late 1941, however, interrupted most of the Corps' civil works projects, delaying construction of Louisville's floodwall until the national military mobilization concluded.¹⁸

MILITARY MOBILIZATION

When war flared in Europe in late 1939, American mobilization began, involving both the Coast Guard and the Corps of Engineers at the Falls. President Franklin Roosevelt transferred navigation light and buoy maintenance along with river patrol and security duties to the Coast Guard; and the Coast Guard formed volunteer auxiliaries of recreation craft and their owners—

at Louisville four volunteer flotillas formed under the management of Captain Foster Embry. When the President in November 1941 transferred the Coast Guard from the Treasury to the Navy Department during the military emergency, the Louisville station responded by urgently recruiting new crew members. This mobilization reflected lessons learned from the British Army's successful evacuation from Dunkirk, France, across the English channel by small fishing and recreation craft. Hite Gillooly, son of Falls hero Jack Gillooly, was one of the volunteers when the Louisville station's crew increased to twenty-six, double its peacetime complement. When the Coast Guard also requested the owners of large recreation craft to lend them for military service, boat owners at the Falls transferred fourteen cruisers to the Coast Guard for the patrol service.¹⁹

By the summer of 1940 commerce on the Ohio and at Lock 41 had assumed growing significance to military mobilization as the nation beat plowshares into swords. Lockmaster Peter English told a reporter that thousands of tons of steel and scrap iron were passing Lock 41 that year, mostly to be refined into military armor. Even as this reporter interviewed the lockmaster, he witnessed the towboat *Crescent* pushing nine barges of scrap iron from Memphis through Lock 41. "With a huffing and pulling and ringing of



Many warships built on the Ohio passed through the canal on the way to overseas service during the Second World War, but few photographs of them exist because cameras were banned for security reasons. This ship, the U.S.S. *Grafton*, moored in the canal during postwar years for training use by the Navy Reserves. (Corps of Engineers)



These were the guards employed during the Second World War to assure the security of Lock 41 and the dam. (Corps of Engineers)

bells the sternwheeler maneuvered itself to the side of one of the barges since the 600-foot lock chamber was not long enough to accommodate the entourage strung out in a straight line," described the reporter, adding that "when the water reached its 37-foot level, fresh fruits and meats and a supply of groceries and ice were loaded from the lockwall on the *Crescent*." Then the swing bridge across the locks moved around and the towboat and its barges thrashed out of the lock onwards toward Pittsburgh's steel mills.²⁰

To the critical shipments of iron, steel, and petroleum passing Lock 41 were added warships. For the first time since the Civil War, the Navy awarded contracts for building ocean-going warships to inland-river boatyards at Pittsburgh, Point Pleasant, Evansville, Nashville, and Jeffersonville. At Jeffersonville the American Commercial Barge Lines (ACBL) had bought the Sweeney-Barmore boatyard in 1938, renaming it the Jeffersonville Boat and Machine Company (Jeffboat); and the Navy in 1940 awarded this yard contracts for constructing Coast Guard cutters and four Navy submarine chasers. After the Pearl Harbor attack the Navy also awarded contracts to Jeffboat for building LSTs (Landing Ship, Tanks) and condemned the adjacent

Howard boatyard for integration into Jeffboat's production center. Jeffboat employed as many as 13,000 workers during the war, building 123 LSTs, 26 submarine chasers, plus other naval craft. It built a substantial portion of the more than a thousand Navy ships launched on the Ohio River during the war.²¹

When enemy submarines sank many oil tankers along the Gulf and Atlantic coasts, partially blockading the sea lanes, a petroleum shortage arose on the East coast in 1942. The Defense Plant Corporation in 1942 hastily constructed towboats and barges to transport oil up the Mississippi and Ohio rivers for transshipment east by rail. The rivers thus became strategic logistical routes during the Second World War, just as they had been during the Civil War and earlier conflicts; and Lock and Dam 41 at the Falls became a vital component of the national defense efforts.²²

When enemy saboteurs who landed on the East coast were captured with plans for locks and dams in their possession, security immediately tightened at Lock and Dam 41 as elsewhere along the rivers. The Coast Guard required all boat owners, recreational or commercial, to obtain identification cards with fingerprints and also

prohibited boat crews from carrying firearms and cameras aboard their vessels. The Corps of Engineers also acted to protect Lock 41 at the Falls against sabotage, but, as a reporter explained, it used concealed security measures:

The three-mile long and a mile-wide stretch of water encompassing the key to navigation between Pittsburgh on the Ohio to Cairo is secretly guarded night and day by the U. S. Engineering Department, a branch of the Army. So carefully guarded is the secret protection scheme that persons living near the canal locks, the Government drydocks, shops, and a ten-acre dockyard on the northside of the canal at 26th see no outward signs of anti-sabotage precautions in their daily lives. The engineers are not telling, but it was learned the plan was approved by the War Department and thus far not a case of sabotage or attempted sabotage has been reported.

Sprawling in the open, unprotected by land and aerial batteries as is the Panama Canal, the layout from the uninitiated view invites visitors. Casually one can cross the 26th or 18th street bridges and walk about, but the fellow fishing harmlessly at the river's edge may be... who knows. He may be a G-man or may be just a fisherman.

Louisville's strategic position on the Ohio is no secret. The navigation tonnage passing through the canal has almost doubled since 1938 when 2,000,000 tons went through. If the dam went out and the pool between here and Madison, Ind., the nearest upriver locks, were drained, navigation would stop, say rivermen. Boats couldn't negotiate the Falls and the canal would be useless without a pool stage. But the Army says

"It can't happen here."
That's one reason why the plans for protection are secret, more so than the safeguards thrown around the Fort Knox gold vault. There's nothing hidden, either, at the 80x200-foot drydock, capable of receiving the biggest river craft for repairs. Everything lies open for inspection from a distance. Cameras are not barred anywhere. This in contrast to the guard system at Ohio bridges, the Louisville waterworks, telephone companies and other utilities plants. The Army has nothing to hide, except its plan for discovering the saboteur.²³

By the time the United States entered the Second World War at the end of 1941, the Ohio River's traffic had multiplied with tows pushing as many as twenty-two barges through Lock 41, carrying scrap iron and petroleum to Pittsburgh, or sand, gravel, and cement for construction at Fort Knox and the Charlestown, Indiana, powder plant, or linter pulp for manufacturing gunpowder. In addition, the first of the Navy's warships were plowing south down the river with Coast Guard pilots and patrols guarding their voyage to New Orleans for overseas service.²⁴

The Corps of Engineers absorbed the Army Quartermasters' construction mission at the advent of war. After the Civil War the Engineers had performed reconnaissance and combat engineering overseas while the Quartermasters had built homeland forts and camps. In 1916-18, for example, the Quartermasters built Camp Zachary Taylor near Louisville for troop training, while the Engineer officers went to France, leaving civilians in charge of civil works—William McAlpine had commanded the Louisville Engineer District in 1918 and directed the construction of Lock 41. To expedite military construction in 1941 the President reassigned mobilization construction to the Corps of Engineers, which absorbed the constructing quartermasters into its organization and assigned field management to its Districts. The Louisville District's assignment consisted of military construction projects within its boundaries—among these were Godman airfield at Fort Knox,

Bowman and Standiford airfields in Louisville, Camp Breckinridge in Kentucky, Camp Atterbury and Fort Benjamin Harrison in Indiana, and the Hoosier, Wabash, and Evansville ordnance plants along with a host of mobilization facilities.²⁵

Faced with such an enormous workload, the District curtailed construction at most civil works projects to focus on the military work. Of the 377 staff members at the Louisville District office, 367 became engaged in performing the military mission. At Lock 41 and the Falls meanwhile, the District's operations staff concentrated on keeping the locks in service to move war materials to river ports while also assuring security. Perhaps the most direct contribution at Lock 41 to the military mission consisted of a sawmill set up on Shippingport island to manufacture the lumber needed to build barracks at the new troop cantonments.²⁶

The swelling wartime traffic revealed the inadequacies of Lock 41 along with the other Ohio River locks. Tows of coal, chemicals, and petroleum en route to war production plants often included so many barges that they could not all fit into 600-foot locks, making it necessary to resort to "double lockage." When a long tow arrived at a lock, the leading barges were separated from the tow and put through the lock with haulage motors, then the remaining barge

section with the towboat made its passage. This doubling delayed not only its own lockage, but also the other tows awaiting turns to enter the lock. Moreover, the Navy warships on the river often exceeded the 600-foot locks capacity and had to delay their departure until high water arrived and the Chanoine wickets in the dams could be dropped to open a passage downriver. Observing these conditions, William McAlpine returned to the Ohio River from Washington in 1944—he had become the Corps' senior engineer, consulting on the design and construction of flood control and navigation projects throughout the nation. Meeting with the Ohio River Division and District engineers, McAlpine initiated plans to modernize the Ohio with larger navigation structures; and it was Mr. Mac who proposed that the river's capacity be doubled by building 1200-foot locks alongside the older 600-foot locks.²⁷

Nothing could be done to implement McAlpine's proposals before the war's end, however, and indeed the postwar emphasis focused on achieving flood protection rather than improving navigation. This emphasis resulted in part from the surprising March 1945 flood, which took twenty-four lives along the lower Ohio River and shut down 188 defense plants for weeks. Short of personnel during the 1945 flood,



The March 1945 flood reached the lockmaster's house and the canal's garage. The lockmaster's house was the home of the canal superintendent during the nineteenth century. (Corps of Engineers)

the Louisville District used prisoners of war in efforts to shore up the floodwalls, and these worked successfully at the Jeffersonville floodwall but not at Louisville where the river overtopped an emergency dike they constructed. Clearly, the 1945 flood demonstrated that flood protection in the Ohio valley deserved the highest priority.²⁸

The fortification of Louisville against the river's floods resumed in 1946. The Corps of Engineers prepared the specifications and the City of Louisville purchased the land needed for its floodwall. This enormous project consisted of 12.8 miles of earth levee, 4 miles of concrete wall, and 13 stations housing great pumps to move drainage over the floodwall when its gates closed against the river. Construction began in March 1947 and continued a decade until the Corps turned the floodwall over to Louisville for operation and maintenance in February 1957. Louisville, like many another river port during the 1950s, began to resemble the medieval cities of old Europe, walled off against an enemy, the river. Indeed, Louisville's floodwall, designed to stand off floods three feet above the 1937 record, rose even higher than the walls surrounding medieval cities.²⁹

From highlands east of the city to high ground southwest of Portland, the floodwall held out river floods and blocked public access except through openings left at the main streets. Its completion marked the final victory of Louisville at the head of the Falls over its pioneering urban rivals, Portland and Shippingport, at the foot of the Falls. Cut off from the mainland by the canal, what little remained of Shippingport after the 1937 flood was left outside the floodwall's protection; in fact protecting Shippingport with a floodwall could not have been accomplished at any reasonable cost. The immense floodwall sliced through Portland, severing the town from its wharf and oldest business district. When the old buildings were razed to make way for the floodwall, nothing was left of Portland's historic riverfront district other than cobblestones and a few steamboat mooring rings. Except from atop bridges and high buildings, Louisville in 1957 lost sight of the river, hidden by the floodwall, and the city turned its back on its riverfront, lining it with an interstate highway in 1964 and leaving it to moulder.³⁰



The steamboat trade was nearing its end when this January 1948 picture was made of the Louisville wharf. The Greene Line steamboats were among the last in commercial service. (Corps of Engineers)

MODERNIZING NAVIGATION

Although concealed behind the floodwall, Ohio River commerce still prospered during the postwar years as never before, and by 1950 nearly fifty million tons of commodities moved on the Ohio each year. Much of this growth served the new steel, aluminum, chemical, and steam-electric plants built at riverside to take advantage of low-cost waterways transport and reliable water supply; and these plants' location in the valley had a rippling effect, attracting secondary industry to the region to use the primary products and the power generated at riverside. Also by 1950, diesel towboats had nearly replaced steam towboats, and in 1952 the last steamboat passed over the Falls when the *Monongahela* and its nine-barge tow ascended when the river was at flood and all the dam's wickets were down. Powerful diesel towboats with larger tows together with postwar commercial growth had made the canalization locks and movable dams completed in 1929 obsolete, and the Corps began designing the modern river's navigation structures.³¹

As they matured during the early 1950s, the navigation modernization plans called for

building nineteen new structures to supersede the old movable dams with 600-foot locks. Instead of movable dams with wickets raised and lowered manually, the new dams would be massive concrete and steel structures, fixed in place and non-navigable—barge tows would no longer pass over lowered dams at high water and all traffic would move through the locks. Rather than Boule or Chanoine wickets, the new dams would have Tainter gates to control the pool levels above each dam. French engineers had used Tainter gates as early as 1853, but in America lumber baron Thomas Parker independently invented it for Wisconsin's logging rivers—he sold his design rights to Jeremiah Tainter, who patented the gates in 1886 and collected royalties for their use. The Corps of Engineers had installed its first Tainter gates on Wisconsin's Fox River in 1890; and by the 1950s it commonly used these steel gates for spillway regulation at its flood-control dams. Tainter gates had a metal face shaped in the sector of an arc and supported by girders connected to an axle or trunnion fixed between two concrete piers; they could be rotated up or down to release water through a dam and clear space for the passage of floods or ice.³²



The lockmaster's house was demolished in 1958 to make way for the 1200-foot McAlpine Lock. (Corps of Engineers)

Because rivermen agreed with William McAlpine that a 110-foot-wide and 1200-foot-long lock could pass the most efficient barge tows on the Ohio, the navigation modernization locks would have these dimensions, plus an auxiliary 600-foot lock. Most of the modern dams would include both new 1200 and 600-foot locks, although in some cases, as at Louisville's Lock 41, the existing 600-foot lock would remain in service. Where the old canalization locks lifted boats an average of seven feet each, the new locks would be designed with lifts ranging from twelve up to thirty-seven feet. Lock 41, of course, already had a thirty-seven-foot lift to raise boats past the steep drop at the Falls.³³

Navigation modernization of the Ohio River had multiple benefits. The nineteen new structures replacing fifty-one older locks and dams would substantially reduce operations and maintenance costs while eliminating the hazards associated with wicket maneuvers. The nineteen higher dams and greater lock-lift would form long slackwater pools, almost lakes, offering smoother barge propulsion, reduced lockages, and enhanced recreational opportunities. The new 1200-foot locks would end the slow double-lockage required when tows had exceeded the old locks' 600-foot length; and moreover the new locks would have faster filling and emptying systems to reduce filling time to eight minutes, compared to eighteen minutes at older locks.³⁴

Six of the river's nineteen modernization structures—Markland, McAlpine, Cannelton, Newburgh, Uniontown and Smithland, were located within the Louisville Engineer District, and after project approval came in 1953 the District began to build these in general downstream order, starting with Markland Locks and Dam replacing old Locks 35, 36, 37, 38, and 39 upstream of Louisville. As construction of the Markland project began, the District's engineering team proceeded with planning and design for navigation modernization at the Falls of the Ohio.³⁵

SHIPPINGPORT'S DEMISE

The District's team saw that navigation modernization at the Falls would require razing historic Shippingport and relocating its few remaining residents. Widening the canal from a 200 to a 500-foot width would take a big bite from the island and would force relocating the

canal shops and the Louisville Repair Station farther back onto the island; in addition, the island would become a disposal area, covered with the materials excavated from the canal. Shippingport's demise therefore was orchestrated by the District's real estate division headed by Fred Morgan, nationally famous for quickly purchasing 56,000 acres of Tennessee in 1942 as site of the Manhattan District's Oak Ridge nuclear complex. Fred Morgan employed appraisers to estimate Shippingport's value, and these found little left of the town. The Board of Education had closed the town's school in 1933, sending its nine pupils to Dolfinger school in Portland; and the 1937 flood had washed away the town's school along with every building in Shippingport except its grocery. Only a few stubborn home-owners had rebuilt after the flood, and in 1956 the town had just fifty-five residents among nine families living in twelve homes.³⁶

Corps appraisers found Shippingport to be sadly neglected. Only three houses had indoor plumbing, and the town lacked sewers, gas lines, or sidewalks. Its crumbling streets were crowned with grass, and because vehicles no longer traveled Tarascon Avenue (earlier the Shippingport to Louisville Turnpike) to the Eighteenth street lift-bridge over the canal, the Corps had closed the bridge, thereby saving the bridge-tender's salary and reducing delays to towboats passing the canal. The Corps reckoned that past flooding had forced Shippingport's families to evacuate an average of once every seven years and predicted this would continue in the future because the town was outside the Louisville floodwall's protection. The remaining families owned fifteen lots, mostly along McHarry street, and a dozen lots had houses on them. Estimating the fair market value of each lot at an average of \$500 and the twelve houses at \$2,000 each (in 1956 dollars), Corps appraisers thought Shippingport might be purchased for \$31,500 plus about \$3,000 to pay for moving the families to new houses. For less than \$35,000 the government could own Shippingport outright, making space for the navigation modernization.³⁷

When the startling news came that the Corps would buy Shippingport, a reporter left the well-traveled streets and went to see and describe the town's vestiges:

Once the harbor waters of Shippingport were churned by the paddlewheels of every boat on the Ohio and Mississippi rivers, landing or leaving the broad levees of the most prosperous town on Western waters. But that's just a memory now, and Shippingport is only the dusty ashes of a dream that flowered and failed. Despair and suicide rewarded the men who had the dream and built it into the reality that was the famed river town of Shippingport. Apart from Government employees, Shippingport will be without homes for the first time in more than 150 years. Opening of the canal which made Shippingport an island 125 years ago cut sharply into the business of this bustling port, for it permitted boats to pass on through. Widening of the canal and creation of a boat harbor would cut sharply into the island itself, the last traces of the romantic old river town then vanishing forever. There are less than a dozen dwellings on the island now, plus a few trailers and a houseboat on blocks. A comfortable old frame two-story house in a park-like spot on the edge of the canal is the home of P. B. English, lockmaster of the Portland Canal. More than a score of Government warehouses and repair shops are scattered along the north side of the canal near the 26th Street bridge. The 18th street bridge has been closed for several years now, but the 26th street bridge leads to the government office and warehouse area.³⁸

When the Corps purchased Shippingport in early 1958, allowing its residents until July to move to their new homes, reporters again went to investigate. One spoke with Laura Schafer, an elderly niece of Jim Porter, the Kentucky Giant.

"There's nothing here to entice people," she lamented, "but it's where I've lived all my life. I can remember when there were 200 eligible voters living here." She sadly pointed out the vacant lot where Jim Porter's Big Gun tavern once had entertained riverboat gamblers.³⁹

Captain William Zurlinden at eighty-four was the oldest resident, and he and his sister Florence owned six of the houses left in Shippingport. Captain Zurlinden had piloted the steamboat palace *Cincinnati* to Louisville on its 1929 voyage in company with President Herbert Hoover to dedicate the Ohio River canalization project, but among rivermen he was better known as owner of the *G. W. McBride*, one of the last wooden-hull sternwheelers running *Cincinnati* to the South. Between river trips the Captain had managed a saloon near the canal and he had been forced to relocate it twice when the canal was widened. Serving as city alderman from 1935 to 1941, Zurlinden was affectionately known as the "Mayor of Shippingport," and he complained that leaving their life-long home would be extremely stressful for him and his sister.⁴⁰

As the deadline for the final evacuation of Shippingport approached, the families organized a reunion picnic in Captain Zurlinden's yard on McHarry street. More than fifty former residents returned, bringing five kinds of potato salad, grilled hotdogs and chops, baked beans, endless casseroles and colas. On a sticky June day they sat beneath the giant shade trees, the men in straw hats, the women in floral cottons with polished white pumps. Between bites, they reminisced and laughed, talking of old times on the island, of Halloween pranks, childhood games, and holiday festivities. But Captain and Florence Zurlinden sat somberly to the side, watching, waiting. "I hope I'm not alive when the time comes for me to be moved away from this island," moaned the Captain. But the Captain's wish went unfulfilled. He and most other islanders moved across the canal into Portland, and Shippingport's last mayor lived another two years in pain.⁴¹

Navigation modernization quickly proceeded, the contractors' bulldozers smashing Shippingport's remnants away while pan scrapers hauled materials excavated from the canal and new lock site to deposit as fill on the island. Soon, few vestiges remained of Louisville's chief pioneer urban rival. Memories of the French

pioneers, the Bertholds and Tarascons, of Frank McHarry and the Irish byes who built the canal and ran the cement mills, and of the steamboat captains, deckhands, and fishermen who once thrived in rambunctious Shippingport gradually faded, relegated largely to museums near the Falls.





17

THE MCALPINE PROJECT

Louisville's engineers began emplacing their share of the Ohio River navigation modernization project in 1956 at the Markland Locks and Dam near Cincinnati, and in 1958 they initiated the second phase by building McAlpine Locks and Dam to modernize navigation at the Falls of the Ohio. Earlier known as Lock and Dam 41, the Falls' navigation structures were renamed in 1960 by Congress as the McAlpine Locks and Dam in well-deserved tribute to the services of Louisville's senior engineer William McAlpine.

The McAlpine project represented the fourth cycle of engineering at the Falls. It again doubled the locks' capacity and more than doubled the size of the canal bypassing the Falls. Lock 41, the third-phase 600-foot lock completed in 1921, had become obsolete after forty years as the primary navigation structure; and the 1200-foot McAlpine Lock supplanted it in 1961. At the same time the engineers expanded the 200-foot-wide canal's capacity to a 500-foot width and replaced the

movable wickets on the Falls with a fixed concrete dam and Tainter gates to hold Louisville's harbor. Operating McAlpine's modern structures proved just as challenging and perhaps equally hazardous as the smaller locks and wicket and crib dams that had preceded them. During the fourth phase, time and the river destroyed lockgates, threatening the project's stability, and occasional wrecks drew intense attention, notably the 1972 chlorine-barge accident that forced the evacuation of Portland nearest the canal. Although engineering at the Falls had inexorable impacts on the riverine environment, the river often counterattacked, relentlessly seeking its path to the sea.

MCALPINE CONSTRUCTION

Navigation modernization and the McAlpine project were the Corps' response to the continuous growth of Ohio River commerce. From 1929 to 1958, this commerce nearly doubled at eleven-year intervals with a spike in the 1950s, chiefly in coal shipments to new steam-electric plants built at riverside. Some of these plants met the burgeoning energy demands of such fast growing cities as Louisville and Cincinnati while others served the nuclear weapons plants built by the Department of Energy near Portsmouth,



A 1952 view of the Boule dam section with shutters installed before forms were placed to hold concrete. (Corps of Engineers)

Ohio, and Paducah, Kentucky, and elsewhere. Coal and commodity barge tows a thousand feet long commonly crowded into the Ohio's 600-foot locks, breaking into sections to pass through while other tows awaited their turns. Analyzing this situation, Louisville District's commander Jack Person offered the metaphor that Lock 41 had become as obsolete as a 1929 Model T automobile, inadequate because a third of all tows split in two to pass Lock 41 and it was handling 3,273 tows per year, approaching the saturation point. Clearly, national energy and defense strategies obliged modernizing the river's navigation, replacing the 600-foot with the 1200-foot locks proposed by William McAlpine in 1944.¹

Even as the final evacuation and demolition of Shippingport proceeded in June 1958, digging began for a new 1200-foot lock just north of the existing 360-foot (Scowden) and 600-foot locks, for increasing the canal width to 500 feet, and for slicing a surge basin from the island. When Lock 41 had filled with water, the level in the 200-foot canal dropped as much as 1.7 feet, a surge that shook passing boats. This surge would be reduced by cutting a basin upstream of the new 1200-foot lock to store more water for lock filling, while also offering anchorage for the Corps workboats adjacent to new warehouses and shops built for the Louisville Repair Station. This massive excavation would eliminate the self-draining drydock originally built by John Hulme in antebellum days. It also forced relocating the Louisville Repair Station to new warehouses and shops, and it forever changed the shape and elevation of Shippingport island.²

When the excavation contract went to Traylor Brothers Company in 1958 and the lock-building contract to Hardaway Construction Company, the District selected its staff to manage the work. Arch K. Boyle with twenty-nine years' experience became the resident engineer, assisted by Ike Uland and by office engineers William Schulz, Jack Kiper, John Emmerich, and Charles M. Haddaway, Jr. William Fowler became the electrical specialist, A. John Colombo the mechanical specialist, Sam Nelson the engineer technician, Mike Weedman the materials technician, and Harry Newman the field clerk. Construction inspection was done by Fred Stevens, Don Sexton, Bill Ford, and John Eberman with Dave Pattison, Don Dabney, and Charles M. Haddaway III assigned as student

co-ops. Some of this McAlpine crew subsequently served the Corps as long as forty years, achieving national prestige within their profession.³

Unlike the canal and locks of 1830, the Scowden locks of 1872, or the Lock 41 project of 1921, the McAlpine project was built without a single steam engine. Just as riverine commerce had switched from steam to diesel towboats by the 1950s, the construction industry also shifted from steam-powered to diesel-powered equipment; some was still tracked—bulldozers and draglines—but most was the rubber-tired equipment pioneered by Robert LeTourneau. Emulating the excavation scrapers pulled by horses at Louisville's canal in the 1820s, LeTourneau had devised rubber-tired scrapers powered by diesel engines; and in 1938 he amazed construction managers by demonstrating one that could load and haul twelve cubic yards of soil at each pass, leaving steam-powered equipment behind in the dust.⁴

These powerful rubber-tired machines made it possible to excavate the 500-foot-wide canal and the new surge basin in just three years at the McAlpine project, compared with the six years required to excavate the original 50-foot-wide canal with horses and slip scrapers. Still, the McAlpine excavation did not proceed uneventfully. The contractor elected to emulate the contractor of 1914, who had widened the canal to 200 feet by leaving the old canal wall in place to serve as cofferdam while excavating in the dry behind the wall. He met problems similar to those of 1914: a 1959 flood overtopped the wall, saturating the island's soils, and it became necessary to use draglines, pulling up the wet soil one scoop at a time. The remaining earth had to be disked and allowed to dry before it could be removed by diesel-powered pan scrapers, and even then bulldozers behind the scrapers had to push them as they loaded the heavy wet materials.⁵

Pan scrapers carried the excavated material steadily toward the north and dropped it onto Shippingport island. This filling significantly raised the island's elevation. The Corps limited the spoil area's height to elevation 442, however, because the island lay in the river's floodway and raising it farther might increase flood crests, impinging on the effectiveness of the Louisville, New Albany, or Jeffersonville floodwalls. As this

filling neared completion, a reporter visited the job and inspected the remnants of Shippingport, writing:

The once-booming town of Shippingport has disappeared. All evidence of the dozens of houses, the six-story Tarascon Mill, the Big Gun tavern once operated by Kentucky's giant Jim Porter and a hotel that welcomed such distinguished guests as Andrew Jackson and Charles Dickens has disappeared. Only the broken fragments of streets remain to show that Shippingport was a busy place, with as many as 40 boats a day unloading their cargo for haulage around the Falls for subsequent reshipment.⁶

As excavation progressed and the new lock's construction began, dredges worked to open the downstream approach to the locks and to cut a channel through Sand Island. As part of land acquisition for the McAlpine project, the Corps purchased Sand Island from the Nugent Sand Company, which had owned the island since the 1890s and had planned eventually to dredge out its sand and gravel. This purchase perhaps saved Sand island from destruction, but it was made because the Corps recognized that flow changes

at the new lock might affect the island's environment. To open additional space for river flow, the District required the lock contractor to remove the old rock dike from around Sand Island and to cut a 200-foot-wide swath through the island's midsection. Sand Island thus became two islands in 1960, but the river apparently preferred one. In this case, nature later triumphed over the engineering art when the river's sediment filled the cut channel, reuniting the two islands as one and restoring its wilderness environment.⁷

With the filling on Shippingport island restricted by flood protection considerations, the District needed space to dispose of materials dredged from below the locks; and it saw that Portland's wharf, outside the floodwall's protection, had been abandoned, the buildings lining it demolished. The District therefore negotiated an agreement with Louisville to deposit spoil on the Portland wharf. Soils, dredged from the McAlpine project and pumped through a pipeline, spilled onto the wharf, where dikes were placed to hold the soil while allowing water to flow away. This dredge fill covered the wharf and raised it several feet, providing soil the city was pleased to obtain. The city expected to use it in approaches to the new interstate highway (I-64) crossing the river to New Albany and in other highway projects underway across western Louisville.⁸



With forms in place, concrete placed in the Boule sections converted the movable to a fixed dam. (Corps of Engineers)

Much of the nineteenth-century construction at the Falls had been hampered by the inability of wooden-box cofferdams to keep work areas dry during higher river rises; and the Hardaway Construction Company therefore drove steel piling in circular cells to form a cofferdam around the new lock's site, filling the cells with excavated materials and topping them with concrete to hold out higher floods. The Corps of Engineers had pioneered the use of steel-cell cofferdams in 1911 when it raised the wrecked battleship *Maine* from the bottom of Havana harbor; steel cells held out higher water than wooden boxes, extending the season when work could be done at the river bottom, and by the 1950s steel-cell cofferdams were in universal use at the Falls as elsewhere on the rivers.⁹

Once the cofferdam was placed around the McAlpine lock site, the contractor treated the rock foundation and began placing concrete. Lining old McHarry street in Shippingport with stockpiles of sand and aggregate, the contractor erected belt conveyors to transport the aggregate into a concrete mixing plant, then trucks hauled the concrete for placement in the forms. Resident Engineer Arch Boyle pointed out that the contractor used mobile steel-slip forms to place each concrete section, or monolith, in the lockwalls. Because the concreting went on around the clock, each eight-hour shift averaged raising a monolith an additional five feet. This

allowed timely on-schedule completion of the massive new lock with double the capacity of Lock 41.¹⁰

Like the 1200-foot lock at Markland, the new lock at the Falls incorporated features to speed and improve its operations. Large culverts built inside the lockwall allowed water to rush in and out of the lock chamber to speed its filling and emptying. Experience had shown the Stoney gates used at Lock 41 to control lock filling were unsatisfactory—slow and expensive to maintain—and Tainter gates replaced these in the new lock; these were preassembled and set into the filling and emptying culverts in one piece. The engineers expected that this redesigned filling system together with related improvements might reduce the total time of barge tows transiting the larger lock to less than thirty minutes, compared with forty-five minutes at Lock 41.¹¹

For the Ohio's navigation modernization, the Corps abandoned the numbering system used for the 1929 canalization project, merely naming the new structures after the nearest town or village. Continued use of the Lock 41 name therefore was inappropriate, and the new structure might have become known as the Louisville Lock except for an act of Congress. Approving a resolution sponsored by Senator Thruston B. Morton of Kentucky, Congress named the project McAlpine



Downstream view of the Eighteenth street bridge just before its removal in 1959. Excavating on the right or north side widened the canal from 200 to a 500-foot width, also removing the former site of the Elm Tree Garden. The pier on the left or south side remained and in 1999 became the base of an overlook on the municipal Riverwalk. (Corps of Engineers)

Locks and Dam after the Corps' dean of engineering, William H. McAlpine. When Mr. Mac during the Second World War had reached retirement age, Congress kept him on the job through legislation appointing him as senior engineer and special assistant to the Chief of Engineers. He retired in 1952 after fifty years of distinguished service and he expired in 1956. In a highly unusual act of May 1960, Congress named the Falls project in tribute to McAlpine's distinguished services, the only Corps civilian employee ever to receive so great an honor.¹²

Steel cofferdams, diesel-powered equipment, and other advances in waterways design and construction fostered speedy completion of the 1200-foot McAlpine Lock. The job was done ahead of schedule, without major disaster, and the lock might have opened in the summer of 1961 except for a last minute accident. Studying the history of other locks, engineers learned that lockgates had sometimes collapsed, draining the pools above the locks; indeed, in 1961 such an accident happened at the Wheeler Lock on the Tennessee River. If McAlpine's lockgates collapsed, it would drain Louisville's harbor, blocking commerce and threatening the city's marinas and water supply. The engineers therefore designed stoplogs—metal trusses stacked one atop another to block the lock's entrance—that could be installed during any emergency. The stoplog system, moreover, made it possible to leave the lockgates open during extreme floods, offering more unobstructed space for the passage of flood waters. When testing this emergency stoplog system at McAlpine in August 1961, however, latches holding the upper lockgates back in their recesses failed, heavily damaging the gates and delaying the project's opening.¹³

After the lockgate repairs were completed, stronger latches installed, and the stoplog test repeated successfully, the McAlpine project's dedication took place on November 20, 1961, but only a hundred people braved freezing weather and flurries to see the first operation of the new Falls project—the 1200-foot lock, 500-foot wide canal, and 30-acre surge basin. After Congressmen Winfield Denton of Indiana and Frank Burke of Kentucky spoke briefly, describing William McAlpine as the “great river master of the United States,” Lockmaster Dellar Stephens opened the lockgates admitting the

towboat *Philip Sporn* with a seventeen-barge tow. Following through was the *John Ladd Dean*, also with a seventeen-barge tow. Each of these took forty-three minutes to transit the new lock while spectators stomped their feet and clapped their hands to loosen their frozen extremities. Lockmaster Stephens promised them the new lock could make better time, and indeed it did that day, passing smaller tows in twenty minutes.¹⁴

With the new lock and widened canal starting service, the older 600-foot Lock 41 and 360-foot Scowden lock could be closed for repairs. Unlike other modern Ohio River structures—where both a new 1200-foot and new 600-foot lock were built—the engineers economized at Louisville by rehabilitating the existing 600-foot and 360-foot locks. By 1961, Lock 41 had been in service for forty years and the 360-foot lock for thirty years, although its stone-masonry sections had served almost a century. Rather than the fifty-year design life set for new locks, the engineers in 1961 set a service life of thirty years for the rehabilitated Lock 41 and Scowden lock. They improved or replaced the electrical and mechanical equipment, painted the lockgates and valves, and added emergency-closure bulkheads, but they made no structural alterations except for resurfacing deteriorated masonry. They added floating mooring bitts in the old locks for towboat anchorage during lockage and paved an area between the old locks upstream of the swinging bridge called “Coney Island” to store metal trestles and spare gate parts. Accomplished at modest costs by 1963, these repairs allowed Lock 41 to surpass its design life, although Scowden lock failed only a decade after its rehabilitation.¹⁵

As rehabilitation of the old locks progressed, the engineers also modernized the Falls dam originally built in 1927. Plans developed by 1961 proposed using the older dam as a foundation and preserving its L-shaped alignment crossing the Falls crest to turn down Kentucky chute to the hydroplant. The movable Boule and Chanoine sections of the old dam, used to regulate pool levels, would be replaced by two Tainter gate sections. The lower section composed of four Tainter gates next to the hydroplant would stand in place of the two old beartraps and part of the fixed weir; and the upper section of five Tainter gates across Indian chute near the Indiana bank would replace the

Chanoine wicket section. These nine Tainter gates, each 100 feet wide and 22 feet tall and installed between concrete pillars, would rotate up clear of flood crests, or rotate down beneath the river for ice and drift to pass over—engineers called these submergible and non-submergible Tainter gates.¹⁶

Built from 1961 to 1964, the modern Falls dam included some interesting historic preservation, although this was not the engineers' intent. Between 1927 and 1952 the engineers had learned that the Falls dam had more Boule wickets than required: the maneuverboat crews could maintain Louisville's harbor stability by raising or lowering the upstream Boule wicket sections, so they never lowered a 600-foot section near the hydroplant. When the wickets in that section needed replacement in 1952, the engineers merely filled that section with concrete, saving the replacement costs. They accomplished this during a low-water season by leaving the metal shutters and trestles in place as a ready-made cofferdam, erecting forms on the back side of the foundation, and placing concrete between the metal shutters and forms. When the concrete cured, the engineers removed the wooden forms, leaving the shutters and trestles standing as metal reinforcement for the concrete. A most economical construction method, it also preserved the Boule wickets, whose metal shutters lining the upstream side of the concrete dam could be seen from passing boats.¹⁷

The successful use in 1952 of Boule wickets as construction cofferdam and steel reinforcement in the concrete dam encouraged the engineers to use the same method when modernizing the dam in 1961. One complication involved treating the Chanoine wickets in the navigable pass across Indian chute, where part of the space would be taken by new Tainter gates and pillars, but 620 feet of the Chanoine pass would remain. Unlike the watertight Boule shutters, the Chanoine wickets had four-inch spaces between them. In this section, the engineers installed wooden needles filling gaps between the wickets, braced the wickets to the sill to serve as the upstream cofferdam, and welded the wicket props to their seats on the foundation. The metal Chanoine horses and wicket props were thus left in standing position and encased in concrete, becoming part of the dam. There, they will remain entombed until it again becomes necessary to replace or modify the McAlpine Dam.¹⁸

The navigation modernization design generally included amenities for the comfort of the operational staff. It provided elevators to carry the staff and supplies to upper levels and small galleys for their use at lunch time. The floating mooring bitts in the lockwalls eliminated the hazardous handling of lines from barge tows during lockage. Electrical equipment and panels allowed a single lockmaster to control lockages from an overlook. However, the dam's Tainter gates could not be monitored from the lock control tower. To maneuver the lower four Tainter gates, an operator followed an access route through the hydroplant to the gates; and for the upper five-gate section an operator walked across the Fourteenth Street railroad bridge to the gates. These operators sounded warnings that the gates were about to open and inspected areas below the gates to assure that the operation would not endanger fishermen or people exploring the Falls.¹⁹

OPERATIONAL HAZARDS

Soon after the lower Tainter gates began operation in December 1963 and the upper gates a year later, the dam's environmental impacts became evident. Severe erosion occurred along the Indiana bank opposite the lower Tainter gates, apparently the result of turbulent discharges through the gates. Although the District lined that riverbank with stone protection, this merely slowed the erosion, which eventually caved in part of Harrison Avenue in Clarksville. The District therefore purchased the eroded property and arranged with Clarksville to realign the street.²⁰

The new dam also modified the hydrology of Louisville's harbor, producing "the hump." At the old movable Boule and Chanoine wicket dam before 1964, the pool above the dam did not begin to rise until river flow exceeded 340,000 cubic feet per second (cfs). With the fixed concrete dam and nine Tainter gates in place, the pool level rose earlier, at a 220,000 cfs flow, and these rises became known as "humps." After 1964, two-foot rises in the harbor occurred twice as often as formerly, threatening unattended recreation boats tied on short lines to docks, perhaps breaking them loose to float away. To alleviate this trouble, the District arranged for weather forecasters to warn boaters of these rises and began operational modifications at the dam to reduce the humps.²¹



Materials excavated from the canal basin were pumped through these pipes to create fill along Portland wharf. (Corps of Engineers)



Looking upstream at the cellular steel cofferdam around the new 1200-foot McAlpine Lock while the Scowden Locks and Lock 41 continue in service. Kentucky and Indiana bridge in the foreground and Sand Island on the left. (Corps of Engineers)

From 1961 to 1970 the McAlpine project had three locks in operation, all with thirty-seven-foot lifts but with varying dimensions and histories: the new 1200-foot McAlpine Lock, the 600-foot Lock 41, and the auxiliary 360-foot by 56-foot lock. The little auxiliary lock was a jury-rigged apparatus that reflected nearly the entire history of engineering at the Falls. It was built on the lower chamber of the old two-flight Civil War-era Scowden locks whose upper stone-masonry still served as guidewall to the lock entrance. When Lock 41 had been completed in 1921, the Scowden lock had been converted from the primary into the auxiliary lock, changed to a single-lift lock with concrete walls and Stoney gate valves controlling its filling and emptying culverts. Later its wooden lockgates had been changed to steel miter gates. Although the District spent \$1 million in 1963 to rehabilitate this jerry-built lock, it failed just seven years later.²²

Because of its antiquated size, the 360-foot auxiliary lock could handle only a single towboat and barge at a time; it was used chiefly to pass recreational craft. In 1968 it operated for 163 lockages; in 1969 it operated 141 times; and in 1970 its use further declined to just 110 lockages—about two percent of all lockages at McAlpine. A commercial towboat and barge was in the lock, however, when it failed entirely on December 15, 1970. After the lockgates had

closed and the chamber filled with water, the lower lockgates collapsed, dropping into the lower lock approach. Inquiry later surmised that an obstruction had lodged at the bottom of the lock between the miter sill and the closing lockgates, shearing the steel bolts. The gates failed from the bottom up, broke their anchorages, and collapsed. After placing an emergency bulkhead sealing off the lock, the District reconsidered Scowden lock's future. Its 1963 rehabilitation had been expensive, replacing its destroyed lockgates would cost more, and this merely to serve an occasional one-barge tow. Clearly the repair costs could not be justified, and the District installed a permanent bulkhead across the lock's entrance to assure that another failure would not drain Louisville's harbor. There the Scowden auxiliary lock remained undisturbed another thirty years, an abandoned historical curiosity. What once had been an engineering triumph, the largest lock in the world, became merely an obstruction in the path of lock operators moving back and forth between the 1200-foot and 600-foot locks.²³

Even had the auxiliary lock been repaired, the robust diesel towboats and jumbo barges plying the Ohio during the 1970s were becoming too large to use it, even one barge at a time. By the 1970s the last of the sternwheel towboats had left service, replaced by screw propeller craft with powerful diesel engines. The *Sprague*, the



Rock excavation to open space for the McAlpine Lock. The temporary bridge in the background carried vehicles to Shippingport island during construction. (Corps of Engineers)

largest steam sternwheel towboat ever built, had engines rated at 2,750 horsepower; diesel towboats with double that rating plied the river in the 1970s, many owned by the energy companies operating coal-fired steam plants at riverside for electric energy generation. About fifteen percent of the nation's freight then moved economically in barges slowly but surely to its destinations. Mike Hagan of the American Commercial Barge Line admitted: "We're pokey but low-priced." His firm, ACBL, and its subsidiary Jeffboat at the Falls operated 4,500 barges with 200 towboats employing 4,500 workers, nearly half of them living in the Falls cities. Its nearest competitors were Ingram Industries of Nashville with 2,600 barges, Midland Enterprises of Cincinnati with 2,400 barges, and Archer Daniels Midland with 1,900 grain barges. Their tows commonly consisted of fifteen barges on the Ohio, three wide and five deep, entirely filling McAlpine's 1,200-foot lock.²⁴

As barge tows increased both in number and average size, traffic congestion multiplied the chances of accidental collisions with bridge piers, dams, and other craft. At the McAlpine Locks and Dam a hazardous condition existed that had troubled boatmen since 1830: high river flows prevailing from February through April often swept boats into Kentucky chute and wrecked them on the Falls. To enter the original canal, descending boats had to turn left, and when they

slowed their engines to turn the currents washed them downstream past the entrance and into the chute. To reduce these accidents, John Hulme before the Civil War had widened the canal to sixty-five feet and had built a guidewall at its entrance. General Weitzel in the 1870s further widened the canal to ninety feet, extended the guidewall, built a cribdam along the Falls crest, and still the currents wrecked boats, smashing them into the dam. When building Lock 41 and the hydropower dam during the 1920s, William McAlpine's team doubled the canal's width to 200 feet, again extended the guidewall, and raised the dam eight feet. Construction of the McAlpine project in 1961 further widened the canal to 500 feet and improved its entrance safety, but this did not entirely solve all problems. Surging past Louisville's wharf, the river's currents still swept boats toward the north, or right, around Shippingport island, just as it had when the island was on the inside of the bend and resembled a peninsula.²⁵

That the McAlpine project's design had not adequately accounted for the unique hydrology at the canal entrance became apparent during the spring high water of 1972 when three successive towboat accidents occurred near the canal's entrance, one being the infamous chlorine-barge debacle of March 19 that forced evacuation from Portland and western Louisville. As the towboat *James F. Hunter* downbound with nine barges



Downstream view from Ohio Falls (Pennsylvania Railroad) bridge of the canal widening in 1960. The old canal wall has not yet been removed, indicating the old 200-foot canal width. (Corps of Engineers)



The nearly completed 1200-foot McAlpine Lock in January 1961. (Corps of Engineers)



Concrete placement in the Tainter gate piers shown in this May 1961 view. (Corps of Engineers)

attempted to enter the canal, the pilot sounded the whistle signaling the bridge tender to hoist the Fourteenth street railroad bridge for the tow's passage. Hearing no return signal from the bridge, the pilot reversed the towboat's engine to stop and wait. As the tow came to a stop, the current drove it into the upper end of Shippingport island and the collision broke the tow apart, setting barges loose to go booming down Kentucky chute. The pilot radioed for help as the current swept the barges down, and the Coast Guard Life-Saving Station responded but it owned no towboats capable of corralling the barges. The harbor towboat *Joe Taylor* lined onto one barge and pulled it from the chute, but three barges smashed into McAlpine Dam and the hydropower plant at the end of the chute: one barge dashed against the hydropower plant, another washed through a gate and sank below the dam, and the third lodged on the dam under a Tainter gate. The third carried tanks of liquid chlorine that, if released into the air, might form a toxic cloud floating over Louisville.²⁶

Responding to this emergency, the District sent its towboat *Person* to secure the barge that had slammed into the hydropower plant and contracted with Captain John Beatty with his

catamaran salvage rig to hold on to the barge lodged in the Tainter gate bay while an empty barge came alongside to pump off the chlorine. If a chlorine tank on the barge ruptured during the transfer, it might endanger nearby residents, and 4,400 of them evacuated from Portland as a precaution. A few days later the barge was stabilized, the chlorine pumped into another barge and removed, and the crisis passed without further incident.²⁷

The chlorine barge and similar accidents brought legislation expanding the U. S. Coast Guard's authority over towboat transportation at the McAlpine project and elsewhere. The Coast Guard established a traffic control system in 1973 to prevent the meeting and passing of tows at critical points in Louisville's harbor during river rises, opening "hot" radio-telephone lines for better communication between the McAlpine lockmasters, the bridge tenders, and the Coast Guard control center. The Coast Guard also closed its historic but obsolete Life-Saving Station at the Falls in 1972, transferring the steel-hull station to the city. After many years as home of the Falls heroes, the station remained in service as a wharfboat-office for the municipal steamboat, the *Belle of Louisville*.²⁸



Tainter gates assembled and ready for installation in the 1200-foot lock's filling and emptying culverts. (Corps of Engineers)

Concerns about the canal crossing at the Fourteenth street railroad bridge—originally the Ohio Falls bridge, later known as the Pennsylvania bridge and eventually the Indianapolis and Louisville bridge—were allayed by operational decisions. The 241-foot distance between the bridge pier and the canal's south wall was the narrowest passage on the Ohio River, but it was located within the Coast Guard's no-pass zone with adequate clearance for single tows. The railroad company had also curtailed operations at its Portland yard, formerly the Youngstown yard, in favor of its Jeffersonville switchyard, and thereby reduced its use of the bridge. In earlier years trains had crossed the bridge as often as twenty times daily, blocking the canal up to three hours a day, but by the 1980s daily trains crossed the bridge about eight times, substantially decreasing canal blockages. The Corps expected that no modifications of the bridge would be required for thirty years.²⁹

Immediately after the chlorine barge incident Congressman Romano Mazzoli called for a restudy of McAlpine project's design deficiencies; and the Corps followed up this request with project model studies at its Waterways Experiment Station. When these studies identified means of improving safety at the canal's entrance, the District in late 1972 constructed a vane dike and installed mooring cells near the entrance to prevent the river's current from sweeping barges down Kentucky chute. The 600-foot vane dike permitted tows to approach the canal with less power than previously and left little chance for tows to be rotated out of alignment toward the chute. Indeed, the model studies indicated the vane dike and cells might even permit downbound tows to come to a stop when entering the canal without hazarding a wreck. In following years the dike and cells proved generally effective, apparently resolving the historic challenges at the canal's entrance.³⁰

The project restudies also considered methods of diminishing erosion on the Indiana bank, decreasing the troublesome swellhead or "hump," reducing the river sediment deposited atop the remaining coral reef in Indian chute, and other modifications. To eliminate excessive vibration at the lower Tainter gates, the engineers replaced the submergible gates with the non-submergible type; and in 1974 they

converted the dam's Tainter gates from manual to remote operation from the lockmaster's control center, installing video cameras to assure public safety before the gates were maneuvered. They also installed siphons to suck water over the dam onto the Falls to keep the potholes in the coral reef filled for the benefit of fish and birds, mirroring the growing public interest in preserving wildlife.³¹

ENVIRONMENTAL IMPACTS

The Earth Day celebrations of April 1970, reflecting mushrooming public support for environmental protection, preservation, and education, had encouraged renewed interest in the Falls as a natural and recreational resource; and Louisville's civic leaders took interest in creating a nature park on Shippingport island. In 1975 Louisville Mayor Harvey Sloane inspected the willow-covered peninsula, home to many birds and small animals, to assess its use as a park with nature trails for public recreation and environmental education. A reporter touring the island with the mayor, however, was distinctly unimpressed, writing:

Shippingport Island in the Ohio River is a 116-acre spit of land off the shoreline of western Louisville, established by and for barge navigation and electrical power. Its borders are corseted by concrete walls. Its middle is filled with dredge spoils from the river bottom. Exploited for 145 years, it will be changed even further by the activities of man.... Old dam machinery is stored on the downstream part of the island along with gallons of federally discarded paint. The USGS also stores radioactive material in lead and wax containers inside a concrete wall. This material is used occasionally in the USGS well-testing program. It is not hazardous to passersby, but it would have to be moved if the island became a park. Remote Shippingport island once was the commercial nerve center of the Falls.

Before the canal, boats landed there and there was built the city's first

tobacco warehouse. Floods swept houses away and made others uninhabitable over the years; much of the island is submerged an average of once every seven years now. When the fixed dam replaced the movable dam, water no longer roared down Indian chute. This scouring action had kept the fossil beds clean of silting. In last 20 years nearly half of the fossils have been covered up with dirt and a forest of willow trees. Water also from the hydroplant eroded part of Clarksville, which lost the use of Harrison Avenue. Barge accidents three years ago prompted a congressional request for the Corps to study modifying the dam to improve navigation and Corps broadened its study to include environmental concerns such as erosion and wildlife.³²

This reporter also interviewed John Bleidt, the District's out-spoken operations chief, about the proposed park and the Corps' model studies. Bleidt explained the model studies were incomplete but they included examination of various methods to increase river flow across

Indian chute to scour sediment from the fossil beds. Bleidt admitted the Corps was cool to the proposed nature park on the island because another feature of its studies contemplated the future construction of a second 1200-foot lock on the island. He predicted that commercial traffic increases on the river would force the construction of the new lock by 1995.

The Corps therefore sided with the Louisville Audubon Society and other environmental groups who preferred the preservation of the island and Falls as wildlife sanctuaries rather than as a public park. These groups complained that cutting nature trails across the island for public use would disturb nesting birds, especially the prized black-crowned heron and the green heron. This combined opposition discouraged the creation of a municipal park on the island, but studies of a national park to preserve the Falls continued under aegis of an Interstate Park Commission created in 1968 by the states of Indiana and Kentucky.³³

Heightened sensitivity to the McAlpine project's value and nature's environmental impacts came in the chill winter of 1977, when the Ohio River froze from bank to bank and from head to mouth. Ice suspended towboat shipments of coal, petroleum, and road salt through McAlpine Locks, raising the specter of fuel



Aerial view of the four lower Tainter gates next to the hydroelectric station. They are closed against the sills and holding the pool at elevation 420. In the background is the L-shaped remnant of Shippingport island and a barge tow approaching the McAlpine Lock. The filled site of Shippingport village was on the right along the road from the locks to the power station. (Corps of Engineers)

shortages, homes without heat, and roads impassable. These conditions even forced the temporary closure of manufacturing plants, causing scattered unemployment. When spring sun melted the ice, restoring towboat services on the river and alleviating fuel shortages, it also revealed that the river, which can deposit sediment to create islands, may also destroy them. Upriver from the Falls near Cincinnati, the passing ice scraped away most of Big Bone Island and subsequent flooding washed off the remainder. Seen by the earliest European invaders and mapped by the first engineers to lay down the river's topography, Big Bone Island was gone. While 1977's ice did not destroy any islands at the Falls, the disappearance of Big Bone Island served as reminder that the river's potent hydrology will alter its environment slowly over time and, sometimes, abruptly.³⁴

OBSERVATIONS

The Ohio like other rivers is dynamic. Its highly variable flow continually exerts erosive forces on its bed and banks and on the coral reef beneath it at the Falls. It is a meandering stream, shifting materials by erosion at one point and deposition at another. At any chosen time, riverbanks along the Ohio can be found eroding, others healing, and still others stable, a natural phenomenon relentlessly taking place through time. The human engineering art, as practiced at the McAlpine project and elsewhere, may curtail or exacerbate the river's natural dynamics, but they can never be stopped. The Falls of the Ohio, in spite of the industrialization around them, the concentration of people surrounding them, the growing barge traffic past them, and the multiple-use engineering of the McAlpine project, remain a constantly changing, dynamic, and unique geologic feature, always worthy of close attention.

18

FIFTH PHASE RENAISSANCE

Rebirth, renewal, redevelopment, renaissance. By any name, the Falls of the Ohio saw momentous transitions as the twentieth century waned. Engineering the Falls environment, whether natural, urban, commercial, or historical, became a crucial public concern during its fifth phase; and the Corps of Engineers' historic focus on navigation expanded to include these and related concerns. It participated in planning to preserve the Falls environment by developing and managing a national wildlife refuge on the coral reef. Meanwhile, Louisville and its sister Falls cities initiated major redevelopment of their riverfronts facing the Falls. Monitoring Ohio River commerce, the Corps saw that barge traffic past the Falls was again redoubling, and it initiated plans to augment the canal's capacity through construction of a second 1200-foot lock. Because building this new lock would destroy the remnants of the Scowden locks and had other historical impacts, the Corps became involved in historic preservation at its Falls project and in nearby communities. Engineering the Falls thus came to encompass far more than commercial navigation in the twenty-first century.

The four historic phases of Falls engineering—the original 1830 locks, Scowden locks of 1872, Lock 41 in 1921, and McAlpine Lock in 1961—had concentrated on improved passages for boats around the coral reef with little or no concern about the impacts these had on the natural environment, the Falls cities' riverfront developments, or the historically significant structures demolished to make way for larger structures. Engineering design during the fifth phase, however, perforce considered all of these impacts and more.

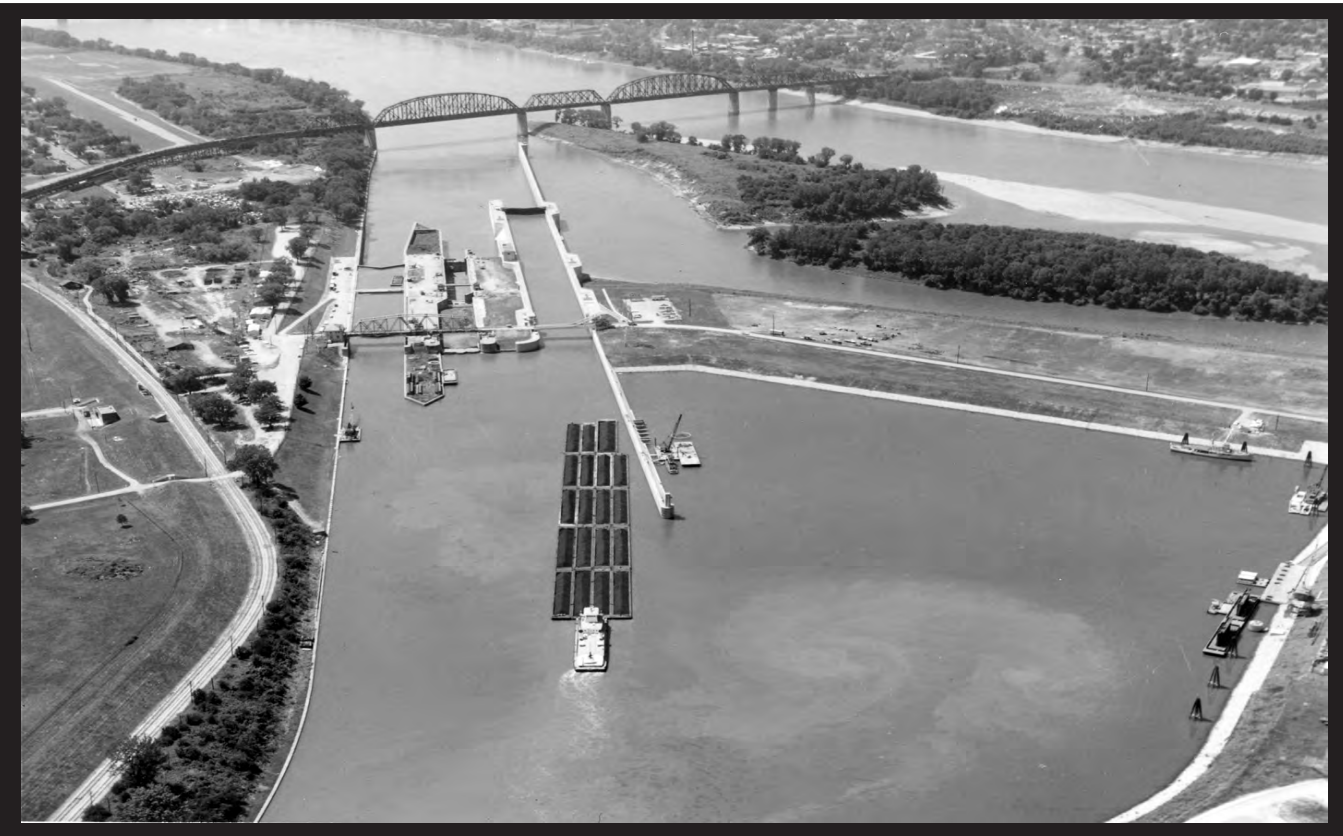
NATURAL ENVIRONMENT

When the McAlpine Dam in 1964 inundated approximately sixty percent of the coral reef composing the Falls of the Ohio, about 220 acres of the rocky reef remained accessible north of the dam in the area once known as Indian chute.

There, environmental leaders, notably the Audubon Society and associated birding clubs, urged that the remainder of the natural Falls should be protected from vandalism, littering, and human disruption of the ecosystem. To assure that sufficient water for birds and wildlife flowed onto the Falls after McAlpine's gates were closed, environmental groups also persuaded the Corps to install siphons sucking water over the dam into the Indian chute. When these siphons clogged, the Corps subsequently replaced them with eight notches cut into the dam to assure continuous water flow onto the Falls for the benefit of wildlife.¹

Environmental considerations also altered McAlpine Dam's operating procedures. As previously described, the dam crossed the river like a "Z" with Tainter gate sections in its upper and lower arms, the upper section emptying into Indian chute, the lower section discharging into the river below the Falls. Lockmen initially operated the dam's gates manually, walking to both Tainter gate sections to manipulate the controls. Because the shortest walk was to the lower Tainter gates, the lockmen closed these gates first; and if the river continued to recede they took the longer walk to close the upper gates and thereby hold the pool above the dam to near elevation 420. By the time they had closed the upper gates, however, water often had drained out from Indian chute, leaving fish stranded on the dry reef. When thousands of fish perished as a result of gate closures in June 1984, the Corps altered its gate-operations sequence in order to hold more water in Indian chute and allow the fish time to escape. The Corps subsequently enhanced this procedure by switching the Tainter-gate operations from manual to remote control. Rather than walking to the gates, the new system allowed the McAlpine staff to maneuver the gates from the lock tower, using video cameras to see that people had moved off the fossil beds before changing the gate settings.²

Environmentalists properly argued that the enormous geological, historical, and ornithological significance of the Falls required that it should be managed for preservation and protection of the remaining reef. Standing in the way of such management, however, was its location at the boundary between two states and several cities with multiple jurisdictional claims. To resolve this issue, Congress in 1970 consented



Aerial view of a 19-barge tow entering McAlpine Lock; left of the 1200-foot lock are the 360-foot Scowden Locks and Lock 41. Sand Island and the Kentucky and Indiana bridge to New Albany are in the background. (Corps of Engineers)

to the formation of a Falls of the Ohio Interstate Park Compact that might facilitate cooperative park development by the bordering states of Indiana and Kentucky. These states then established an interstate commission that studied the Falls for several years and in 1978 concluded that managing the coral reef should become a federal responsibility.³

Congress directed the National Park Service to review the issues and alternatives at the Falls and in 1981 the park service formed a multi-agency task force for this purpose. This task force reported that human engineering and dynamic natural events had substantially altered the Falls environment. Of the three chutes over the Falls—Kentucky, Middle, and Indian—only Indian chute remained and it had been blasted during the late nineteenth century by the Falls pilots and by the Corps. Of the four islands found at the original Falls—Sand, Rock, Goose, and Corn—only Sand Island wholly remained and another newer island had been created. When the canal in 1830 severed Shippingport peninsula from the mainland, it formed Shippingport island, which in 1981 consisted of 214 acres mostly owned by the United States as part of its McAlpine project.

The loss of the three original islands and the addition of another, meant that neither the indigenous natives nor European pioneers would have recognized the Falls in 1981 as the wholesome environment they had enjoyed in 1781.⁴

While McAlpine Dam had submerged most of the Falls' coral reef, the rugged remainder and nearby lands still served as a vital fish spawning and bird nesting habitat. Yet, few of the identified endangered species called the Falls their home. Some perhaps were among the migratory birds that stopped by the Falls during their travels; and it seemed possible that a rare Indiana bat might rest on Sand Island. Although it found no endangered flora at the Falls, the park service task force noted that two plant species once seen at the Falls had vanished. Botanist Charles Short, a canal stockholder before the Civil War, had seen the rare scurf pea and had identified Short's goldenrod at the Falls; but by 1981 the scurf pea had become extinct and Short's goldenrod had disappeared from the Falls, its survivors found only at Blue Lick State Park in Kentucky. Even sadder was the decline of the mussel shellfish that once sustained the

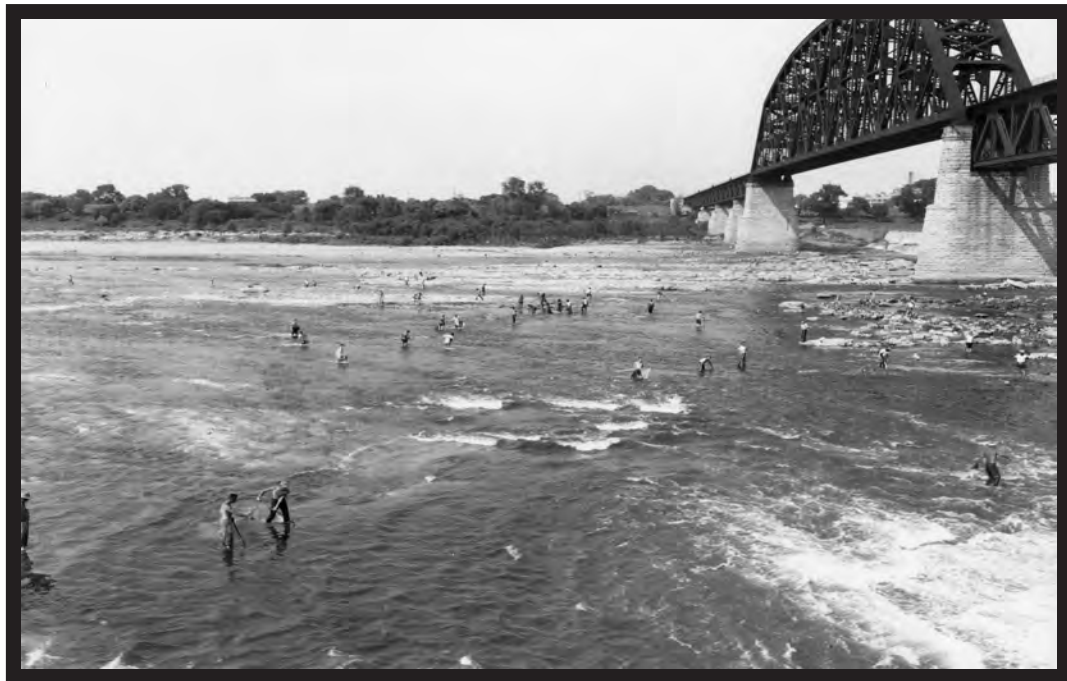
indigenous natives, who had piled the shells in huge mounds alongside the Falls. Few mussel beds were found near the Falls by the 1980s.⁵

After reviewing changing conditions at the Falls, the park service task force analyzed alternative plans for Falls management by the National Park Service, the Fish and Wildlife Service, the Corps of Engineers, or jointly by federal and state agencies, and submitted its report to Congress. Because of its historic mission at the Falls, its intense interest in future planning, and its existing office in Louisville, the Corps of Engineers wanted to manage the Falls area, and Congress assigned this mission to the Corps in 1982 when it established the Falls of the Ohio National Wildlife Conservation Area. Congress mandated the area's development and management by the Corps in consultation with the National Park Service and other interested agencies. Congress initially appropriated \$300,000 for the Corps to develop a master plan and initiate land acquisition, requiring that any Falls interpretive centers or education facilities be sponsored by local or state agencies on a cost-shared basis.⁶

The Corps study team at Louisville headed by James Loper delineated the 1,404-acre conservation-area boundaries, prepared regulations to protect the Falls, conducted public meetings, developed a master plan, and initiated

land acquisition. The real estate acquisition proved complicated, however, by the historic claims of heirs of U. S. Senator John Rowan that they owned the Falls. As mentioned in an earlier chapter, Senator Rowan, better known as the owner of "My Old Kentucky Home" at Bardstown, in 1821 had acquired the lands of his brother-in-law William Lytle, the founder of Portland. Lytle earlier had purchased this property from British subjects granted the lands before the Revolution, and his title had extended to the Falls of the Ohio. In 1825 Senator Rowan further confirmed his claim of ownership by obtaining warrants to 1,200-acres of the Falls from Kentucky's governor, paying a dime an acre for the Falls whether submerged or not. During the century and a half following Rowan's death, his heirs reaped significant profits through sales of inherited real estate, and they continued paying yearly taxes on the Falls of the Ohio. For the Corps to secure clear title to the Falls, therefore, it became necessary to condemn the Rowan claims in court. Although the court initially denied the Rowan claims, the heirs appealed their case, and, rather than continuing the litigation, federal attorneys settled by paying the heirs a stipulated price that extinguished their claims. The Falls of the Ohio thereby became property of the United States.⁷

To pay for the park land and implement the master plan, the Corps needed additional



People fishing and exploring the Falls below the Ohio Falls (Pennsylvania Railroad) bridge. Indian chute passed under the bridge and downstream (to the left). (Corps of Engineers)

funding; and congressmen and senators from Indiana and Kentucky united in 1986 to secure a \$900,000 appropriation to finish the project and help build an educational center for the Falls. Before building an educational-interpretive center, the Corps had to secure cost-shared cooperation from a state or local agency. After negotiating with several agencies, the Corps at last obtained cooperation from the Indiana Department of Natural Resources to build and manage a large Falls of the Ohio Interpretive Center, completed in the early 1990s on the Indiana bank overlooking Indian chute. With permanent exhibits and staff, this center subsequently conducted a broad array of educational programs at the Falls for school children and the public generally. There, people learned how a coral cemetery from a remote age came to be located 600 miles from the nearest seacoast.⁸

URBAN ENVIRONMENT

“What does Louisville want to be when it grows up?” jested reporter C. Ray Hall in 1988 when describing the municipal plans for riverfront renaissance. Since the demise of the steamboat packet trade in the 1930s, plans and projects aplenty had been presented for riverfront development at the Falls, all to be abandoned for one reason or another. Theme parks, shopping centers, and even canoe slaloms were proposed, all coming to inglorious ends. Over riverfront development, Hall quipped: “friendships have been splintered, businessmen have flinched and snarled, politicians have gotten tested and testy, environmentalists have staked a claim on the river, and the city has been ridiculed as something of a naïve maiden waiting for a white knight.”⁹

This conundrum was blowing away about the time Hall published his critique. Louisville’s Mayor Jerry Abramson and civic leaders admired the waterfront development at Baltimore, Maryland, which had converted its decaying wharves and old warehouses into a cultural and shopping mecca attracting many tourists. Coastal ports were following Baltimore’s lead, and it along with the San Antonio Riverwalk became the models for ambitious river ports like Louisville, anxious to develop waterfronts that might attract people to the city core. Symbolic of these ambitions for river renaissance, the

Louisville Falls Fountain began spraying water 375 feet high from the middle of the river in 1988. Privately financed by the Bingham Family Fund, the floating fountain spewed up a spray in fleur-de-lis shape emblematic of Louisville’s French connection. Although operational problems and costs eventually curtailed the fountain’s displays, while in operation it epitomized the new visions for riverfront development that engrossed both Louisville and its sister cities in Indiana.¹⁰

Unlike Baltimore, however, Louisville had walled off access to its waterfront with flood protection structures and interstate highways. This made getting to the river difficult in the first place; and, lined by barge terminals, plants, and warehouses, the city’s river frontage seemed uninviting to tourists and residents. To manage its march back to the riverfront, Louisville in 1986 chartered the Waterfront Development Corporation, headed by David Karem. As its plans matured, this corporation aimed to open the riverfront, offering people a vista of the river including promenades, benches, public attractions, and civic events to make it a “people place.” After completing plans, acquiring and clearing properties, the corporation opened the first phase of its Waterfront Park in 1999, a 55-acre area at riverside that hosted a million visitors in its first year. Work on the second phase, a 35-acre addition to the park with various amenities, then began, opening more space for visitors, especially the crowds that thronged to see the spectacular Thunder Over Louisville fireworks each Derby Festival.¹¹

Greenways supplementing municipal parks became an immensely popular concept among park planners during the 1990s at Louisville as elsewhere; and the Falls cities developed plans to line the river on both sides with greenways. First coined in a 1959 publication by William Whyte, “greenways” was an amalgam combining “greenbelt” with “parkways.” The latter were landscaped, shady scenic drives designed originally for pleasure trips in vehicles, and greenbelts were forested natural perimeters around metropolitan areas. Greenways, on the other hand, were conceived as linear parks often following abandoned transportation lines or stream corridors, affording a natural environment for wildlife, pedestrians, and bicyclists moving from one neighborhood to another without disrupting vehicle traffic.

Instead of considering public parks merely as islands of refuge from city bustle, the greenways movement contemplated bringing parks through and into the city.¹²

Louisville during the early 1990s planned a thirty-seven-mile long greenway trailing along the river from one end of Jefferson County to the other; and in 1996 the first 6.9-mile segment called the Riverwalk opened from the Louisville wharf downstream alongside the canal through Portland to Chickasaw Park. A ten-foot-wide asphalt trail, built partly atop the flood protection levee, Riverwalk sported occasional historical markers and park benches, including a turnout at the Eighteenth street (Elm Tree Garden) bridge pier where visitors could overlook the canal. This trail was considered an encouraging municipal venture, opening opportunities for people wishing to see the river while contemplating the historic Louisville and Portland Canal and McAlpine projects.¹³

On the Indiana side, Clarksville developed Ashland Park on Riverside drive, offering family space for viewing the Falls and the Louisville

skyline, and it participated in plans made for an Ohio River Greenway, a seven-mile-long trail and recreational area alongside the river to link Jeffersonville with Clarksville and New Albany. The first phase of this greenway, a terraced lawn amphitheater on Jeffersonville's riverfront, was constructed in 2001. This greenway, it was expected, would allow people walking for recreational exercise from town to town to stop at the Falls of the Ohio Interpretive Center for an educational adventure and a closer look at that nemesis of Falls pilots, the Indian chute, then to enjoy another stop at a replica of George Rogers Clark's cabin overlooking the Falls.¹⁴

People walking these greenways followed the paths once trodden by natives, explorers, and pioneers portaging their boat cargoes around the Falls. If they looked carefully, they might also detect vestiges of the Indian chute and canal projects engineered to pass boats over or around the Falls without portage. Indeed, if they sauntered down the Louisville Riverwalk before 2008 they might watch the fifth-phase of canal engineering in progress from the Corps' visitor



Construction of the vane dike (straight white line of rock) above the head of Shippingport island in 1976 to help prevent the current from sweeping barges down Kentucky chute to the hydroelectric station. At 241-foot width, the space under the railroad lift bridge in the canal is the narrowest passage on the Ohio River, requiring only one-way barge traffic. (Corps of Engineers)

overlook, inspecting firsthand the new 1200-foot lock as it was built to replace Lock 41 and Scowden locks.

COMMERCIAL ENVIRONMENT

Explaining why the Corps initiated the canal's fifth engineering phase—adding a second 1200-foot lock to replace the 600-foot lock completed in 1921—project manager George Flickner pointed out: "It's a 1930s-vintage structure, and it would have to be completely rehabbed; even then it still wouldn't be able to pass traffic fast enough since tows have to be broken in half to go through it." He mentioned that the 1200-foot lock built in 1961 passed about 20 barge tows daily, nearly its maximum capacity because it required nearly an hour for each tow to transit the lock. When Congress approved the second 1200-foot lock in 1990 and allowed preliminary construction to begin in 1996, this proved timely because the 600-foot lock's design life expired in 2001 and, like Oliver Wendell Holmes' wonderful one-horse chaise, it was badly deteriorated.¹⁵

From the opening of the first 1200-foot McAlpine lock in 1961 to the end of the century, commercial navigation through the lock had multiplied several fold. McAlpine lock passed cargoes aggregating about 20 million tons

annually in 1960, 40 million in 1980, and 55 million in 2000, thus almost tripling in forty years. Even if the growth rate slowed, best estimates indicated that the annual tonnage would redouble in the early twenty-first century, climbing to 75 million by 2010, 90 million by 2030, and 140 million tons by 2050. Clearly the 600-foot lock, nearing the end of its design life in 2001, could never support commercial increases of this magnitude.¹⁶

As emphasized previously, the McAlpine project was unique among Ohio River locks and dams. During the postwar Ohio River modernization, each of the new high-lift dams were supplied with new double locks, one 1200 feet and the other 600 feet long, but at McAlpine this was not the case. Although a new 1200-foot-long lock was built in 1961, the old 600-foot lock built in 1921 and the 360-foot lock of 1930 were rehabilitated for extended service. The 360-foot lock closed in 1970, but the 600-foot lock of 1921 remained in service for eighty years, presenting many operational challenges. Because of its small filling and emptying culverts and its obsolete Stoney gate valves, the 600-foot lock took twice as long to fill as the 1200-foot lock; therefore, when the 1200-foot lock was closed for repairs colossal traffic jams developed at the 600-foot lock, costing the waiting tows, and ultimately consumers, millions of dollars.¹⁷



A 1988 view inside the 1200-foot McAlpine Lock with lower lockgates opening. (Corps of Engineers)

In the last stages of the Ohio River modernization program, the engineers had recognized that the combined 1200-foot and 600-foot locks built at the new high-lift dams would soon become inadequate to handle the mushrooming commerce, so they redesigned the new locks built at the Smithland and Olmsted dams nearest the Ohio's mouth. Instead of a 1200-foot main lock and a 600-foot-long auxiliary lock, these two projects had twin 1200-foot locks built side by side. Hence, when the time came to replace McAlpine's old 600-foot lock the twin 1200-foot-long locks solution seemed obvious. The engineers could accomplish this economically by building a second 1200-foot lock supplementing the first McAlpine Lock completed in 1961.¹⁸

Although the second 1200-foot lock solution seemed obvious, where to build it was not. After analyzing a dozen sites and alignments, the engineers eliminated many sites for economic or environmental reasons and learned that sites just north or south of the existing 1200-foot lock seemed best—twin chambers close together meant a single lockmaster and crew could operate both, a significant long-term savings. Placing the new lock on the north side of the old lock, however, would require slicing a new channel across Shippingport island, widening the canal, excavating the approaches, and thereby threatening more environmental damages than locating it south of the existing 1200-foot lock. On the south side, the new lock could be built atop the site of the old 600-foot lock, thereby holding new environmental alterations to a minimum because the damages had been done during the earlier construction. Reduced construction and operating costs and minimal environmental damages made building the new lock south of and parallel with the old 1200-foot lock the most efficient plan, although it also involved major historical costs.¹⁹

Building the new 1200-foot lock on the site of the 600-foot lock required removing the steel swing bridge built in 1926 over the 600-foot lock and tearing out both the 600-foot and the adjacent 360-foot lock.

This bridge and both locks were antiques, especially the 360-foot chamber which incorporated remnants of the 1872 Scowden locks as its upstream guidewall. Indeed, the two white marble tablets Theodore Scowden had installed

in 1866 in tribute to the Louisville and Portland Canal's directors, engineers, and contractors, still graced the surviving stone-masonry at the lock entrance. These marble tablets along with the stone-masonry would be ripped from the river and the site filled as an esplanade connecting the two 1200-foot locks. Loss of this archaic structure, together with the project's impacts on the adjacent Portland historic district, presented portentous objections to selection of the south site.²⁰

Building the new lock on the site of the old 600-foot lock offered so many advantages, nevertheless, that it could not be denied. It caused less environmental damage and appeared more economically efficient: engineers estimated a 1200-foot lock built on the south site could generate benefits sixty percent greater than its construction costs during its fifty-year design life. To mitigate the project's historical damages, therefore, the Corps opened negotiations with state and local authorities while moving forward with the engineering. Authorized by Congress in its Water Resources Development Act of 1990, the 1200-foot lock design moved into the detailed phase during the early 1990s and included a major design change. A bascule bridge crossed the 1200-foot lock, an old swing bridge crossed the 600-foot lock, and each passing boat required moving the bridges out of the way, sometimes delaying traffic. The engineers decided to eliminate these movable bridges, erecting a highway bridge on piers across the canal upstream of the locks. High enough to pass towboats beneath without stoppage, the new bridge would carry vehicles across the locks without interruption.²¹

Preliminary work began in 1996 with the award of a contract to Sang Corporation of Louisville for building storage facilities on the south side of the canal locks and a resident engineer office, to become a visitor center after construction was completed. The District appointed David K. Klinstiver as the project's resident engineer with Charles M. Haddaway III as the assistant, and these with a small staff eventually moved into the new office overlooking the locks after it was completed in late 1997. The second contract, awarded to Vanguard Construction of Minnesota, called for extending the Louisville Repair Station's wharf in the surge basin above the locks. This work included erecting concrete towers tall enough to

suspend huge standby lockgates in an upright position, ready for quick installation in case of a lockgate failure. This was extremely important because building the new lock would require closing the 600-foot auxiliary lock, leaving only the existing 1200-foot lock to pass boats around the Falls for several years while the new lock was built.²²

“We entered into this project with industry knowing that we were taking a risk,” explained project manager George Flickner. “We’re tearing out the auxiliary lock; the 1200-foot lock is left in operation and is the only way to pass traffic up and down the river. So if we should have a problem with that lock, we would shut down the towing industry.”²³

The engineers took three measures aimed at reducing the risks of a 1200-foot lock failure, or at least shortening the time such a failure would block commercial towing past the Falls. The wharf extension and suspension towers, affording easy access to standby lockgates, was the first. The second consisted of thorough repairs to the existing lock in advance of construction; and the third involved purchasing a new crane boat capable of lifting the heavy lockgates and swinging them into position as replacements for any failed lockgates.²⁴

Before closing and demolishing the 600-foot lock, the District in 1997 thoroughly overhauled the 1200-foot lock built in 1961. The crew replaced broken and worn parts of the lock and its operating mechanisms, welded shut cracks in the lockgate metal, and cleaned drift and junk from the lock chamber’s bottom and approaches. The District also ordered a staunch new crane boat or gate lifter capable of lifting a 500-ton load and swinging it a 100-foot radius to the side. Able to carry two massive lockgates in a vertical position, it was so powerful that the District named it the *Henry M. Shreve*, honoring the pre-Civil War superintendent of Corps projects who had invented the mighty snagboats dubbed “Uncle Sam’s toothpullers.” George Flickner estimated that with this new lifter and the standby lockgates available at the nearby wharf the sixty-day downtime usually required to replace a lockgate could be cut substantially.²⁵

With preparations thus underway, the District conducted its groundbreaking ceremony on June 25, 1999, for the 1200-foot replacement lock. A crowd of hundreds gathered beside the locks to

see the arrival of the *MV Mississippi*, the Corps’ great inspection vessel, with General Hans Van Winkle, the division engineer, and dignitaries aboard, while Corps personnel arrived on the *Belle of Louisville*. After listening to members of Congress extol the project’s merits and Louisville’s mayor and local officials hail this new Falls passage, the District detonated a charge symbolizing demolition of the old locks. This explosion formally began the contract to place cofferdams across entrances to the 600-foot and 360-foot locks, to demolish the old locks, and to expand the welcoming area for visitors observing the construction. These jobs went to a joint venture composed of the Morrison Knudsen Corporation and the Lane Construction Corporation, both with vast waterways construction experience. When these contractors completed their tasks in 2002, the engineers would then award the major contract for building the new 1200-foot structure.²⁶

HISTORICAL ENVIRONMENT

Speakers at the 1999 groundbreaking hailed the minimum environmental consequences and maximum economic efficiency of the 1200-foot replacement lock project. Clearly they were correct. Historic preservationists, on the other hand, were disgruntled at loss of the Scowden locks remnants and accompanying disruption of the adjoining Portland historic district. Long a neglected part of Louisville, Portland was enjoying a turn-of-the-century renaissance, operating its own heritage museum, restoring historic buildings, and tying civic redevelopment to the new Riverwalk circling past Portland’s abandoned wharf where a park was planned. Portland also desired the restoration of the United States Marine Hospital, built by the Corps during the 1840s for the Treasury Department. The only surviving structure of its design, its services as a federal hospital had ceased decades earlier, but the striking building seemed potentially a Portland renaissance centerpiece. Civic planners insisted that demolition of the old locks and construction of the new lock would severely disrupt Portland’s historic district; and they urged that the project’s budget should offer funding for historic preservation including the Portland wharf park and the marine hospital restoration.²⁷

Corps planners recognized that Scowden locks' destruction should be mitigated, perhaps by preserving its records and salvaging its stone masonry, but questioned applying project funding to Portland's wharf and marine hospital preservation—these were located several blocks from the locks and were not managed by the Corps. Historic preservationists countered that all were located within the same historic district and all were part of the Falls of the Ohio navigation milieu. This disagreement extended the negotiations to the brink of construction, and Charles Parrish, the Louisville District's historian, admitted: "We realized when you alter a feature in a historic area, then you affect the whole district."²⁸

To preserve Portland's legacy the Corps entered into an agreement with the Kentucky Heritage Council and the Advisory Council on Historic Preservation to budget \$1.5 million toward restoring the magnificent marine hospital and \$150,000 for the Portland Wharf park. This agreement also called for thorough documentation of the demolished locks and salvage of the stone masonry and swing bridge for reuse. The Corps accomplished preservation of the Scowden locks masonry at a visitor observation area built where the municipal Riverwalk passed by the locks. Designed by Corps architect Douglas Pohl, the visitor area's central feature became the stones and steps from the locks rebuilt as a monument and bearing one of the two marble memorial tablets Theodore Scowden had installed on his locks at the end of the Civil War. The Corps also retrieved its little towboat *Whitewater*, built in 1939 to service the locks and dam, from storage on Shippingport island, refurbished it like spanking new, and mounted it on display adjacent to the Scowden monument. Visitors thus could see remnants of the project's historic structures while also observing construction of the new 1200-foot lock from a safe observation point.²⁹

After the Scowden monument was in place the Corps offered the remaining lock stones to local governments, which eagerly accepted them for use in parks and elsewhere—some of the stones even went back to Cannelton, Indiana, where they had been quarried a century and a half earlier. The historic steel swing bridge, erected over the locks in 1926 by the Louisville Gas and Electric Company and one of the last of its kind, also was offered for reuse elsewhere.

Demands of historic preservationists thus were met, and the Corps planned further efforts. It expected the new resident engineer office next to the visitor area would, after the new lock was completed, become an indoor visitor center attracting more tourists to the Portland historic district. And after the new lock's completion, the visitor area would further extend onto a overlook for the public to observe the boats transiting through the lock to bypass the hazards of the Falls of the Ohio.³⁰

By the summer of 2001 the visitor center was nearing completion as demolition of the old locks began. A dizzying swirl of heavy equipment pulled up the stones, broke the concrete, excavated the fill, and drove steel piling into the cellular cofferdams. None of the horses and oxen pulling scrapers and plows, or the gangs of laborers armed with picks and shovels, that excavated the original canal and locks in the 1820s were on the job; none of the steam engines that performed construction at the Scowden locks during the Civil War and at Lock 41 in the early twentieth century were to be seen. The construction industry's transition to heavy equipment powered by internal combustion engines was complete. The construction record set at the 1830 locks, the Scowden locks, and Lock 41 had been marred by many accidents, maiming and killing workers and even the contractors, but by 2001 the Corps and its contractors had assigned worker safety the highest priority and lost-time accidents were few.³¹

The Corps attended to public safety by developing its visitors area at an early construction phase, providing a protected spot for observing the work. This proved important because the construction forced suspending public access to Shippingport island—the bridges across the locks to the island were part of the construction site and became haul routes for the heavy equipment. Security concerns also arose after terrorist attacks on the United States on September 11, 2001, because Shippingport island actually forms part of the dam that provides Louisville with its harbor.³²

McAlpine Dam across the Falls abuts against the hydroelectric station, which ties into Shippingport island. If the river should break through the island, the pool above the island and dam would flow through the break until empty,

suspending navigation. The Corps therefore monitored the island's condition as closely as it did the dam. During the 1990s, for example, when developing seepage threatened to pipe open a channel through the island, the Corps' investigations indicated that the seepage may have passed through the channel excavated from the rock in the 1820s for the original locks. These original locks had been filled in 1913 when Lock 41 was constructed, but this fill was not placed and compacted according to modern standards. To stop this seepage, the Corps during the mid-1990s installed a bentonite cutoff wall in the island across the fill. Any future threats to the island's integrity would also be handled promptly, else disaster might afflict the commercial, natural, urban, and even the historical environments of the Falls.³³

OBSERVATIONS

As demolition of the historic locks was completed in March 2003. A major contract was awarded in September 2002 for construction of the new lock and high bridge over the canal upstream of the lock. The new lock will have the

same 1200' by 110' inside chamber dimensions as the existing lock built in 1961, but it will incorporate design changes based on historical experiences to eliminate the weakest links. Perhaps the most significant change will be in the lock gates, which will be heavier built and have a four foot lower sill to improve conditions for tows entering the lock. Construction of the bridge was essentially complete in 2006.

The new lock is scheduled to be completed in 2008 with the total project costs aggregating nearly \$430 million - compared to about \$1 million for the 1830 locks, \$3 million for the 1872 Scowden lock, \$10 million for Lock 41 in 1921, and \$60 million for the McAlpine Lock of 1961. Opening and maintaining a passage around the Falls has been expensive now and in the past, but few would deny that this investment has been fully reimbursed as a significant contribution to national economic development. In addition to its contributions to the commercial environment, the fifth phase of Falls engineering demonstrated a sensitivity that may preserve and perhaps enhance the related natural, urban, and historical environments.



Rendering of the completed McAlpine Lock Project.

EPILOGUE

When tracing the five-phase engineering at the Falls, history indicates that national issues had major influence on project designs. First, the evolution of inland river commerce dictated structural dimensions of the locks. The pioneers' canoes, flatboats, keelboats and ships required safe passage at the Falls when traveling the rivers from Pittsburgh to New Orleans, and to serve these vessels the Louisville and Portland Canal company completed its narrow canal and three-flight locks in 1830. But as this project was built, marine engineers developed more efficient steamboat transportation, which soon overwhelmed the capacity of the 1830 locks. Much of the canal company's history involved efforts by John Hulme and James Guthrie at improving the canal's capacity, culminating with construction of the larger Scowden locks during the Civil War. In postwar years, Congress at last accepted the gift made by the company stockholders, taking ownership of the canal locks and assigning its future management to the Corps of Engineers.

The Corps of Engineers completed Scowden locks just as towboats and barges began supplanting steamboat packets. When the Corps canalized the entire Ohio River to serve towboat-barge traffic, it constructed a single lift lock, number 41 in the series, along the Ohio capable of passing towboat and coal barge fleets in a single lockage. Although river commerce suffered setbacks when long-distance coal towing ended in 1917 and again during the Great Depression of the early 1930s, it revived during the Second World War and afterwards as marine engineers developed diesel-powered towboats and steel barges. By the 1950s, towboat-barge commerce demanded navigation locks with greater capacities, and in response the Corps built 1200-foot-long locks including the McAlpine lock bypassing the Falls. As a low-cost and less environmentally damaging transportation mode, towboat barge traffic multiplied along the rivers during the late twentieth century, requiring an additional 1200-foot lock at the Falls. Thus, engineering at the Falls responded promptly to marine engineering and the steady growth of waterways commerce, so vital to national economic development.¹

Federal policy shifts have impacted engineering at the Falls since pioneer times. Although Secretary of Treasury Albert Gallatin in 1808 proposed funding a canal around the Falls, funding shortages and constitutional issues so delayed the work that a private company formed to capitalize the project. Its proponents found federal funding during the administration of President John Quincy Adams, but this support ended in 1829 when President Andrew Jackson vetoed supplemental funding for the Louisville canal, even terming it a threat to American liberties. The company's stockholders in 1842 voted to use their profits to purchase and give stock to the national treasury, and by 1854 the canal had become federal property. Secretary of Treasury James Guthrie arranged for use of profits to enlarge the canal and initiate construction of the larger locks designed by Theodore Scowden. During postwar years Congress approved federal aid to transportation modes including the Louisville canal and assigned its management to the Army Corps of Engineers. Patronage politics marred canal management during the late nineteenth century, yet Congress supplied the funds needed to enlarge the canal and apply steam power and electronic communications to lock operations.

Progressive federal policies of the early twentieth century advocated by Presidents Theodore Roosevelt and William H. Taft approved comprehensive waterways development nationally and canalization of the entire Ohio River specifically. This policy shift allowed the Corps to increase capacity at the Falls by constructing Lock 41 in the canal. Subsequent federal policy also approved cooperative public-private water power development, and thus the Corps joined Louisville Gas and Electric Corporation in building a water power dam across the Falls. Congress approved modernization of Ohio River navigation during the 1950s and the 1200-foot McAlpine lock was built at the Falls as a result. With cost sharing by the towboat industry, construction of a second 1200-foot lock began in the twenty-first century, and development of the Falls as a national wildlife conservation area began as Congress responded to the rise of environmental consciousness. Federal waterways policy affected

the engineering of the navigation structures, the power dam, and the conservation area, and it will influence Falls' development in the future.

At the Falls of the Ohio the Army Corps of Engineers built and operated its first navigation locks system. There it first learned the complexity of navigation locks engineering design, subsequently applied at Sault Ste. Marie, on the Upper Mississippi River, and elsewhere throughout the nation. It recognized at the Falls that proper lock operations required an experienced staff managed by a permanent command, the Engineer District organization now common throughout the United States and overseas. At the Falls, the Corps learned that efficient management required legal control over traffic using the locks and regulatory authority to prevent the obstruction of navigation by bridges or other environmental alterations. In time, these authorities became statutory law applicable to the entire nation.

Engineering inevitably affected the environment of the Falls as elsewhere. Engineering the canal, locks, and dams at the Falls destroyed islands and created more. Alterations in river flow patterns caused erosion, sedimentation, and deposition. Were the pioneers able to see the Falls of the Ohio today, they might not recognize them. The two-mile long expanse of whitewater rapids is gone, largely inundated by the slackwater pool above McAlpine dam. Thriving Shippingport has disappeared. Boats no longer cross the Falls, proceeding instead through a spacious canal to huge navigation locks to bypass the Falls. Engineering has produced major alterations in the Falls environment for the benefit of wildlife and public education.²

In each half century, changing and growing inland river commerce has made it necessary to double the capacity of locks and navigation facilities at the Falls of the Ohio. The successive structures built during each phase served a half century and by the end of their design life had become inadequate to accommodate steadily increasing riverine commerce and the industrial-commercial economy it serves. "Logic is logic," wrote Oliver Wendell Holmes, concluding his poetic analysis of the chaise built by a deacon for a century-long design life. Triumph of the engineering art at the Falls confirms the logic of

the fifty-year design life applied to navigation locks at the Louisville and Portland canal.

Yet the Falls are part of an ever changing riverine environment, where dynamic forces relentlessly wash away river banks and build anew, carving rocks and dispatching their sediment toward the ocean. Historian Reuben Durrett of Louisville saw this in 1883:

Old banks have been washed away, and new ones formed, old sandbars have been obliterated and new ones created. One thing is certain, that the great valley of the Ohio and the Mississippi are passing gradually away. We see every year great floods which sweep away our soil to the Gulf, and it has been estimated that the water carries down enough sediment in 7,000 years to cover with soil a foot deep the entire valley. The time must come when we will sink to the level of the Gulf and the ocean roll back upon its original territory.³

NOTES

PROLOGUE

1. Oliver Wendell Holmes, "The Deacon's Masterpiece" (1891). See E. M. Tilton, *Amiable Autocrat: A Biography of Dr. Oliver Wendell Holmes* (New York: Henry Schuman, 1947), *passim*.
2. Leland R. Johnson, "Engineering the Ohio," in Robert L. Reid, ed. *Always a River: The Ohio River and the American Experience* (Bloomington, IN: Indiana University Press, 1991), pp. 180-209. For elaboration and sources for this systems analysis, see Leland R. Johnson, *The Ohio River Division, U.S. Army Corps of Engineers: The History of a Central Command* (Cincinnati, OH: U.S. Army Engineer Division, 1994), *passim*.

1: FALLS PASSAGES

1. Joel Watkins, in Virginia Smith Herold, ed. "A Diary—Journal—Began April 28th 1789," *Register of the Kentucky State Historical Society* 34(1936):234; Richard L. Powell, *Geology of the Falls of the Ohio River* (Bloomington, IN: Indiana Department of Natural Resources, 1970), *passim*.
2. Donald E. Janzen, "Excavations at the Falls of the Ohio River Region," *Filson Club History Quarterly* 45(October 1971):373-80; Donald E. Janzen, "Archaeological Investigations in Louisville and Vicinity: A Historical Sketch," *Filson Club History Quarterly* 46(October 1972):305-321. Investigation of McAlpine pool identified 37 archaeological sites with hundreds of stone artifacts, ceramic fragments, and a prehistoric copper item: "Findings of Preliminary Archaeological and Historical Sites Reconnaissance of McAlpine Pool," Planning Division, Louisville District, U. S. Army Corps of Engineers, Louisville, KY. Janet L. Walker, "Digging for History," *Courier-Journal*, 29 Apr. 1956, describes archaeological studies of the Falls "Shell People" and prints photographs of bone fishhooks and other artifacts.
3. *Louisville Journal*, 24 Apr. 1857; J. Stoddard Johnston, *Memorial History of Louisville* (2 vols. Chicago: American Biographical Publishers, 1896), I, 64, quoted John Colmesnil, an early Shippingport French settler related to the Tarascon brothers, on the French use of *barre grasse* to describe the Falls. Johnston argued that from this the name of Beargrass Creek evolved, but Otto Rothert, "Origins of the Name Beargrass Creek, The Point, and Thruston Square," *Filson Club History Quarterly* 2 (October 1927):19-21, contended the creek's name came from a yucca plant that bears ate.
4. Fairfax Harrison, "The Virginians on the Ohio and the Mississippi in 1742," *Virginia Magazine* 30(April 1922):203-22.; Robert R. Hubach, *Early Midwestern Travel Narratives, An Annotated Bibliography, 1634-1850* (Detroit: Wayne State University, 1961), p. 21. Salley's partners were John Howard, Josiah Howard, John Poteet, and Charles Sinclair; Salley escaped the New Orleans prison in October 1744, walked back to Virginia, and reached home in May 1745.
5. Capt. Harry Gordon, "A Journal of a Journey from Pittsburgh down the Ohio," in Newton D. Mereness, ed., *Travels in the American Colonies* (NY: Antiquarian Press, 1961), p. 467. The large bateau *THREE FRIENDS* commanded by Patrick Roberts and belonging to Baynton, Wharton, and Morgan of Philadelphia hit rocks at the Falls in May 1768 and was lost; see Clarence Alvord and Clarence E. Carter, eds., *Trade and Politics, 1767-1769* (Illinois Historical Commission: Springfield, IL, 1921), pp. 274-75.
6. A study of conditions at the natural Falls is printed in War Department, Office of the Chief of Engineers, *Annual Report of the Chief of Engineers for 1882* (Washington, DC: Government Printing Office, 1883), pp. 1881-82 (this serial set published annually since 1867 cited hereafter as ARCE followed by the date of the fiscal year report); James Hall, *Letters from the West* (London, EN: Henry Colburn, 1828), pp. 184-86. A small section of Indian chute may be seen from the Indiana bank at the Falls of the Ohio Interpretive Center.
7. The outlines of these islands are clearly delineated on maps of the Falls, starting with Thomas Hutchins' map drawn in 1766; Corps dams on the river inundated the islands, except Corn Island which was quarried and its rock used in Louisville for paving, building stone, and cement manufacture. Towhead or Willow Island two miles upstream of the Louisville landing was a sandbar until 1819 when it began to expand in size; local tradition states it formed after a flatboat loaded with millstones sank on the sandbar where, by slowing the current and encouraging sediment deposition, it became a nucleus for the island. See Alfred Pirtle, "River Reminiscences No. 3," Manuscript Division, Filson Club, Louisville, KY.
8. Consult early maps of the Falls and ARCE, 1882, pp. 1881-82; eyewitness accounts are extracted in Dorothy C. Rush, "Early Accounts of Travel to the falls of the Ohio: A Bibliography with Selected Quotations, 1765-1833," *Filson Club History Quarterly* 68(Apr.1994):232-66.

9. Charles H. Ambler, *A History of Transportation in the Ohio Valley* (Glendale, CA: Arthur H. Clark, 1932), pp. 1-29; Nicholas Cresswell, *The Journal of Nicholas Cresswell, 1774-1777* (New York: Dial Press, 1928): pp. 68-86; James Nourse, "Journey in Kentucky in 1775," *Journal of American History* 19(2d Quarter, 1925):121-38; 251-60, 351-64; Henry Timberlake, *Memoirs, 1756-1765* (Ed. by Samuel C. Williams. Johnson City, TN: Watauga Press, 1927), p. 36-58, 84-85; *Courier-Journal*, 4 Nov. 1927, reported a dugout found in Whiskey Chute of Goose Island.
10. Clarence E. Carter, ed. *The Correspondence of General Thomas Gage with the Secretaries of State, 1763-1775* (2 vols. New Haven, CT: Yale University Press, 1931), I, 309; Anna Quattrochi, "Thomas Hutchins, 1730-1789" (Ph.D. dissertation, University of Pittsburgh, 1944), pp. 95-98.
11. "Affairs at Fort Chartres, 1768-1781," *Historical Magazine* 8(August 1864):258, prints a report on this crossing by George Butricke, who was the ensign that found a passage over the Falls. Expelled from England during the Revolution, Thomas Hutchins became an engineer in the Continental army and after the war Congress appointed him "Geographer of the United States," in which service he performed the first surveys of Ohio and developed the rectangular land survey system used north and west of the Ohio.
12. Samuel W. Thomas and Eugene H. Conner, "George Rogers Clark, Natural Scientist and Historian," *Filson Club History Quarterly* 41(July 1967):203; Mary Verhoeff, "Louisville's First Newspaper," *Filson Club History Quarterly* 21(October 1947):289; Neal O. Hammon, "Early Louisville and the Beargrass Stations," *Filson Club History Quarterly* 52(April 1978):151-52; Charles G. Talbert, "A Roof for Kentucky," *Filson Club History Quarterly* 29(Apr. 1955):145-65.
13. "Gen. Butler's Journal," in Neville B. Craig, *The Olden Time* (2 vol. Reprint of 1848 ed.; Millwood, NY: Kraus Reprint Company, 1976), pp. 493-94.
14. Dale Van Every, *Ark of Empire: The American Frontier, 1784-1803* (New York: William Morrow and Co.: 1963), pp. 35-36;; Francois A. Michaux, *Travels to the West of the Alleghany Mountains in Reuben G. Thwaites, ed., Early Western Travels*, 3(Cleveland, OH: Arthur H. Clark, 1904):166.
15. Wallace Carson, "Transportation and Traffic on the Ohio and the Mississippi before the Steamboat," *Mississippi Valley Historical Review* 7(June 1920):33-35; "News from the Ohio Valley as Reported by Barthelemi Tardiveau in 1783," *Bulletin of the Historical and Philosophical Society of Ohio* 16(Oct. 1958):267-92.
16. Mary Verhoeff, *The Kentucky River Navigation* (Louisville, KY: Filson Club Publications No. 28, 1917), 55-58.
17. Leland R. Johnson, "The Doyle Mission to Massac, 1794," *Illinois State Historical Journal* 63(Spring 1980):6.
18. William Littell, *The Statue Laws of Kentucky, Vol. 1* (Frankfort, KY William Hunter, 1809), pp. 604-05; Thomas and Conner, "George Rogers Clark, Natural Scientist and Historian," p. 223.
19. Francis Bailey, *Journal of a Tour in Unsettled Parts of North America, 1796 & 1797* (London: EN: Bailey Bros., 1856), pp. 239-40.
20. George Henri Victor Collot, *Journey in North America* (2 vols.; Firenz, FR: O. Lange, 1924), I, 149.
21. Louisville, KY, Farmers Library, 1 April 1802.
22. Dwight L. Smith, "The Ohio River in 1801: Letters of Jonathan Williams, Junior." *Filson Club History Quarterly* 27(July 1953):203-12. A nephew of Benjamin Franklin, Jonathan Williams served with Franklin's mission to France during the Revolution. Although George Washington's army had chief engineers and engineer officers during the Revolution, they left the service when the army demobilized after the war. Thinking that a Corps of Engineers could serve the nation during both war and peacetime, President Thomas Jefferson reestablished the Corps of Engineers in 1802 and appointed Jonathan Williams as its chief.
23. *Ibid.*
24. George Gretsinger to Henry Clay, 20 Jan. 1840, SEN26A-D17, Committee on Roads and Canals, Record Group 46, National Archives, Washington, DC.
25. Leland Baldwin, *The Keelboat Age on Western Waters* (Pittsburgh: University of Pittsburgh Press, 1941), *passim*; William Cullen Bryant, *Picturesque America* New York: D. Appleton and Co., 1872), pp. 165-66.
26. Cargo manifest of keelboat *La Belle Riviere* in "New Orleans Flats and Keels," Record Group 36, National Archives, Washington, DC; Baldwin, *The Keelboat Age*, pp. 68-70, 177-78; Bryant, *Picturesque America*, pp. 165-66.
27. Cargo manifests of the keelboats named are in "New Orleans Flats and Keels," Record Group 36, National Archives, Washington, DC; Works Projects Administration. *Ship Registers and Enrollments of New Orleans, Louisiana* (6 Vols. University, LA: Louisiana State University, 1941-42), I, 5; II, 105; *Courier Journal*, 23 Jan. 1876, quoted John Young.
28. Cincinnati, OH, Liberty Hall, 29 May 1811 and 15 Jan. 1812; Robert R. Jones, "The Ohio River" (1920 manuscript, Box 1141, Records of the Corps of Engineers, Record Group 77, National Archives,

- Washington, DC; this record group cited hereafter as NARG77).
29. John J. Crnkovich, "Tarascon, Junr., James Berthoud & Co. and the Development of Shippingport, Kentucky" (MA Thesis, 1959, University of Louisville, Louisville, KY), *passim*.
30. *Ibid.*; Newman F. McGirr, "Tarascon of Shippingport at the Falls of the Ohio," *West Virginia History* 7(Jan. 1946):89-100; Doyce B. Nunis, Jr., "Tarascon's Dream of an American Commercial Empire in the West," *Mid-America* 42(July 1960):170-84.
31. Cincinnati, OH, *Western Spy and Miami Gazette*, 18 May 1807; Christian Schultz, *Travels on an Inland Voyage in the Years 1807 and 1808* (New York: Isaac Riley, 1810), pp. 191-92.
32. Charles E. Parrish and Leland R. Johnson, *The Kentucky River Development: The Commonwealth's Waterway* (Louisville, KY: U. S. Army Engineer District, 2000), pp. 9; Richard T. Wiley, "Ship and Brig Building on the Ohio and Its Tributaries," *Ohio Archaeological and Historical Publications* 22(1913):54-64.
33. Leland R. Johnson, "Aaron Burr: Treason in Kentucky?" *Filson Club History Quarterly* 75(Winter 2001):1-32.
34. Crnkovich, "Tarascon, Junr., James Berthoud & Co. and the Development of Shippingport, Kentucky," *passim*.
35. *Ibid.*; Alice Ford, *John James Audubon* (Norman, OK: University of Oklahoma Press, 1964), pp. 392-93; Stanley C. Arthur, *Audubon: An Intimate Life of the American Woodsman* (New Orleans, LA: Harmanson Publisher, 1937), pp. 54-55; John J. Audubon, "Catfishing in the Ohio River," from *Ornithological Bibliography* (1835), on Henderson County Historical and Genealogical Society Website, Henderson, KY, 2000; *Courier-Journal*, 17 Mar. 1872, reported the 180-pounder as the largest fish ever caught at the Falls.
36. Hugh Hayes, "Rise and Fall of Shippingport," (untitled news clipping, 6 June 1887, Historical Files, Louisville Engineer District, Louisville, KY).
37. Lexington, KY, *Kentucky Gazette*, 17 January 1809; Portland Museum, *The Tarascon Mill: Shippingport's Great Mill Reconstructed in Words, Pictures and a Model* (Portland, KY: Portland Museum, 1981), *passim*. A more damaging flood of 56 feet at Shippingport occurred in 1815; see William Richardson, *Journal from Boston to the Western Country, 1815-1816* (New York: Valve Pilot Corporation, 1940), p. 11, for his interview with James Berthoud.
38. *Niles Register*, 7 Sept. 1811; Lewis C. Baird, *Baird's History of Clark County, Indiana* (Indianapolis, IN: B. F. Bowen & Company, 1909), pp. 324-28; Francis S. Philbrick, *The Laws of Indiana Territory, 1801-1809*, Vol. 21 of Collections of the Illinois State Historical Library (Springfield, IL: Illinois State Historical Library, 1930), pp. 63-64, 97.
39. Herbert L. Roush, ed., *The Adventures of T. C. Collins—Boatman: Twenty-four Years on the Western Waters, 1849-1873* (Baltimore, MD: Gateway Press, 1985), p. 68.
40. *Ibid.*
41. John G. Stuart, "A Journal of Remarks or Observations in a Voyage Down the Kentucky, Ohio, Mississippi Rivers," *Register of the Kentucky Historical Society* 50(January 1952):14-15.
42. Baird's *History of Clark County, Indiana*, pp. 324-28.
43. *Ibid.*
44. *Ibid.*
45. Thomas Ashe, *Travels in America Performed in 1806* (London, EN: Williams Sawyer & Co., 1808), pp. 237-38.
46. *Ibid.*; *Courier-Journal*, 24-25 Nov. 1874.

2:PASSAGEWAYS PLANNED

1. Histories of Falls cities' development are: Henry McMurtrie, *Sketches of Louisville and Its Environs* (Reprint of 1819 ed. Louisville, KY: G. R. Clark Press, 1969); Henry Ford and Kate Ford, *History of the Ohio Falls Cities and Their Counties* (Cleveland, OH: L. A. Williams Co., 1882); Samuel W. Thomas, *Views of Louisville Since 1766* (Louisville, KY: Courier-Journal Company, 1971); George H. Yater, *Two Hundred Years at the Falls of the Ohio: A History of Louisville and Jefferson County* (Louisville, KY: Filson Club, 1987); Martha Kreipke, "The Falls of the Ohio and the Development of the Ohio River Trade, 1810-1860," *Filson Club Historical Quarterly* 54(Apr. 1980):196-217. Although wagons remained in modern use, drays have disappeared and should be described. Two-wheeled carts with their bed close to the ground, drays could haul two hogsheads or seven barrels at a time; iron pins attached the front of the bed to the tongue, and when the pins were drawn the front rose and the rear went to the ground, allowing the barrels to roll off onto the wharf. See Dan Walsh, Jr., "Dan and Ike Batman, Pioneer Draymen," *Courier-Journal*, 2 July 1916.
2. *Louisville Journal*, 24-25 Apr. 1857 and 24 Oct. 1863 discuss Evan Williams and Louisville wharf development; John E. Kleber, ed., *The Encyclopedia of Louisville* (Lexington, KY: University Press of Kentucky, 2000), p. 247; Crnkovich, "Tarascon, Junr., James Berthoud & Co. and the Development of Shippingport, Kentucky," *passim*.

3. Courier-Journal, 10 Dec. 1868, reprints grant of Clarksville riverfront to William Clark; Archer Hulbert, ed., *Ohio in the Time of the Confederation* (Marietta, OH: Marietta Historical Commission, 1918), pp. 92-94; Gaillard Hunt, ed., *Journals of the Continental Congress, 1774-1789* (Washington, DC: Government Printing Office, 1922), p. 427.
4. Stuart S. Sprague, "The Canal at the Falls of the Ohio and the Three Cornered Rivalry," *Register of Kentucky Historical Society* 72(Jan. 1974):38-54; Heber P. Walker, "Louisville and Portland Canal," *Indiana Magazine of History* 28(Mar.1932):21-30; James O. Parker, "A History of the Canal Projects at the Falls of the Ohio River" (MA Thesis, University of Kentucky, Lexington, KY, 1937), passim; Paul Fatout, "Canal Agitation at Ohio Falls," *Indiana Magazine of History* 57(Dec. 1961):279-309.
5. Stuart S. Sprague, "The Louisville Canal: Key to Aaron Burr's Western Trip of 1805," *Register of the Kentucky Historical Society* 71(January 1973):69-88; Isaac J. Cox, "The Burr Conspiracy in Indiana," *Indiana Magazine of History* 25(Dec. 1929): 257-80.
6. Johnson, "Aaron Burr: Treason in Kentucky?" passim.
7. "Canal from the Head to the Foot of the Rapids of the Ohio River," House of Representatives, 19 Mar. 1806, in U. S. Congress, *American State Papers, Class X: Miscellaneous* (2 vols., Washington, DC: Gales and Seaton, 1834) I:453-54; Alfred Pirtle, "Early History of the Louisville and Portland Canal," Box NA1045, NARG77, Kansas City, MO, Federal Records Center, National Archives; Proceedings of the Managers of the Ohio Canal Company at Louisville, the 11th Day of September 1805 (pamphlet, Lexington, KY, 1805; Filson Club copy), passim.
8. Victor L. Albjerg, "Internal Improvements without a Policy." *Indiana Magazine of History* 28(June 1932):168-79; "Canal from the Head to the Foot of the Rapids of the Ohio River," U. S. Senate, 24 Jan. 1807," in U. S. Congress, *American State Papers, Class X: Miscellaneous*, I:479, 724-921.
9. Ford, *History of the Ohio Falls Counties*, I:224; Thomas and Conner, "George Rogers Clark, Natural Scientist and Historian," pp. 206-7; Mary Verhoeff, "Louisville's First Newspaper—The Farmer's Library," *Filson Club History Quarterly* 21(Oct. 1947):285-86; *Louisville Courier*, 2 July 1851; F. Van Loon Ryder, "The New Orleans, the First Steamboat on Our Western Waters," *Filson Club History Quarterly* 37(Jan.1963):29-37; Arthur E. Hopkins, "Steamboats at Louisville and on the Ohio and Mississippi Rivers," *Filson Club History Quarterly* 17(July 1943):143-62.
10. Ford, *History of the Ohio Falls Counties*, I:224-25; Fred E. Dayton, *Steamboat Days* (New York: Frederick A. Stokes Company, 1925), pp. 333-34; John H. B. Latrobe, *The First Steamboat Voyage on the Western Waters* (Baltimore, MD: Maryland Historical Society, 1870), pp. 16-22; Frederick B. Read, *Up the Heights of Fame and Fortune* (Cincinnati, OH: William H. Moore Company, 1873), pp. 63-65.
11. Read, *Up the Heights of Fame and Fortune*, pp. 63-65; Kleber, ed., *Encyclopedia of Louisville*, p. 654; Louis C. Hunter, *Steamboats on the Western Rivers: An Economic and Technological History* (Cambridge, MA: Harvard University Press, 1949), is the scholarly account of early steamboat development.
12. McMurtrie, *Sketches of Louisville and Its Environs*, pp. 194-97, 201; William F. Gephart, *Transportation and Industrial Development in the Middle West* (New York: Columbia University Press, 1909), pp. 76-78.
13. Works Projects Administration, *Ship Registers and Enrollments of New Orleans, Louisiana* (6 Vols. University, LA: Louisiana State University, 1941-42), I:52, II:37, II:129, lists steamboats piloted by Capt McKeever.
14. Harvey B. Gaul, "The Minstrel of the Alleghenies," *Western Pennsylvania Historical Magazine* 34(Mar. 951):10-13; Leland D. Baldwin, *Pittsburgh: The Story of a City* (Pittsburgh, PA: University of Pittsburgh Press, 1937), p. 153; John H. Niebaum, "The Pittsburgh Blues," *Western Pennsylvania Historical Magazine* 4(Apr. 1921):110-22; James Monroe to Robert Fulton, 11 Jan. 1815, and James Monroe to James Morrison, 13 Feb. 1815, in *Military Book 8:17-44*, Records of the Secretary of War, Record Group 107, National Archives, Washington, DC.
15. *John Rowan Heirs v. Portland*, Jefferson County Circuit Court Case 2979, 1844, Kentucky State Library and Archives, Frankfort, KY; *John Rowan v. Bank of the United States in Ben Monroe*, Reports of Cases at Common Law and in Equity Decided in the Court of Appeals of Kentucky (3 vols., Frankfort, KY, 1843), 3:138-59; Johnston, *Memorial History of Louisville*, 2:618-20; Virginus C. Hall, "From Tomahawk to High Finance, The Life of General William Lytle, 1770-1831," (typescript, 1957, Inland Rivers Library, Cincinnati, OH), passim.
16. Victor M. Bogle, "New Albany as a Commercial and Shipping Point," *Indiana Magazine of History* 48(December 1952):369-78; Ford, *History of the Ohio Falls Counties*, II:140-43, 150-51, 220; *John Rowan Heirs v. Portland*, Jefferson County Circuit Court, Case 2979, 1844, Kentucky State Library and Archives, Frankfort, KY, contains Peter Tallon and Martin Himes depositions on their building of the Fayette and relocation to New Albany.
17. Logan Esary, "Internal Improvements in Early Indiana," *Indiana Historical Society Publications*

- 5(1912):65-69; Fatout, "Canal Agitation at Ohio Falls," pp. 295-300.
18. Hall, "From Tomahawk to High Finance, The Life of General William Lytle, 1770-1831," passim; "Laommi Baldwin, Jr.," in *American Society of Civil Engineers, A Biographical Dictionary of American Civil Engineers* (New York: ASCE Publication No. 2, 1972), pp. 6-7.
19. *Louisville Public Advertiser*, 4 Aug. 1818; Walker, "Louisville and Portland Canal," pp. 21-30.
20. McMurtrie, *Sketches of Louisville and Environs*, pp. 172-77, 190.
21. Harlow Lindley, ed., *Indiana as Seen by Early Travelers* (Indianapolis, IN: Indiana Historical Collections, 1916), p. 235; Louis C. Hunter, *Studies in the Economic History of the Ohio Valley* (Northampton, MA: Smith College Studies in History, 1933), passim; "Reconnaissance of the Ohio River above the Falls Made in 1819," *Historical Files, Louisville District, U. S. Army Corps of Engineers, Louisville, KY* (also printed in *Pennsylvania Archives, Fourth Series, Vol. 5*, pp., 167-75).
22. "Reconnaissance of the Ohio River above the Falls Made in 1819," *Historical Files, Louisville District, U. S. Army Corps of Engineers, Louisville, KY* (also printed in *Pennsylvania Archives, Fourth Series, Vol. 5*, pp., 167-75); Leland R. Johnson, *The Headwaters District: A History of the Pittsburgh District* (Pittsburgh, PA: U.S. Army Engineer District, 1979), pp. 53-54.
23. Lindley, ed., *Indiana as Seen by Early Travelers*, p. 235; John T. Starr, "Long's Expedition to the West," *Military Engineer* 53(Mar.1961):116-18; Maj. S. H. Long to John Calhoun, 20 Apr. and 27 May 1819, in W. Edwin Hemphill, ed., *The Papers of John C. Calhoun* (Columbia, SC: University of South Carolina Press, 1969), 4:31-34, 79-80.
24. *Louisville Public Advertiser*, 22 May 1819; Roger L. Nichols, "Army Contributions to River Transportation, 1818-1825," *Military Affairs* 33(Apr.1969):242-49; Richard G. Wood, *Stephen Harriman Long, 1784-1864: Army Engineer, Explorer, Inventor* (Glendale, CA: Arthur H. Clark Co., 1966), p. 62-77; William E. Lass, *A History of Steamboating on the Upper Missouri River* (Lincoln, NB: University of Nebraska Press, 1962), pp. 5-6.
25. "S. H. Long's Report of the Western River Expedition," 20 February 1821, pp. 106-07, bound volume on Western River Expedition, in NARG77, Washington, DC.
26. John C. Calhoun, "Roads and Canals," 14 Jan. 1819, in U. S. Congress, *American State Papers, Class X: Miscellaneous*, 2:534.
27. Françoise Planchot-Mazel, "Un General Français aux États-Unis de 1816 à 1831" (2 vols. Doctoral dissertation, Université de Paris—Sorbonne, Paris, FR, 1988), passim; Leland R. Johnson, "Waterways: Fourth Pillar of Defense," *Military Engineer* 72(Nov. 1980):404-08; Simon Bernard to John C. Calhoun, 7 Feb. 1821, in Hemphill, ed., *The Papers of John C. Calhoun*, pp. 599-616.
28. *Louisville Public Advertiser*, 13 Oct. 1821 and 4 Sept. 1824.
29. U.S. Congress, House, Message from the President of the United States Transmitting a Report of the Board of Engineers on the Ohio and Mississippi Rivers Made in the Year 1821, H. Ex. Doc. No. 35, 17th Cong., 2d Sess., 1823, passim.
30. *Louisville Public Advertiser*, 2 May 1821; Curtis Nettels, "The Mississippi Valley and the Constitution, 1815-1829," *Mississippi Valley Historical Review* 11(Dec. 1924):332-38.
31. U. S. Congress, House, Sand Bars of the Ohio River, H. Ex. Doc. No. 45, 19th Cong., 1st., 1826; U. S. Congress, Senate, A Report of the Chief Engineer Relative to the Application of the Appropriations for Removing Obstructions to the Navigation of the Ohio and Mississippi Rivers, Sen. Doc. No. 14, 19th Cong., 1st Sess., 1826; *Louisville Public Advertiser*, 6 Nov. 1824, 23 Nov. 1825, and 5 Feb. 1826.
32. Leland R. Johnson, "The Contest of 1824," *Military Engineer* 65(May 1973):166-71; Leland R. Johnson, "The Contract of 1824," *Military Engineer* 65(July 1973):252-57; *Louisville Public Advertiser*, 23 June 1824.
33. *Louisville Public Advertiser*, 28 Apr. 1821, 21 Aug. 1821, 9 Mar. 1825; John R. Henry, *A Few Statements Showing the Utility and Importance of the Louisville & Portland Canal* (Philadelphia: Charles Alexander, 1830), pp. 19-20.
34. Ford, *History of the Ohio Falls Counties*, I:489-91; John L. Dugan, Jr., "James Guthrie: His Interests in Internal Improvements in Kentucky from 1820 to 1869," (MA thesis, 1952, University of Florida, Gainesville, FL), passim.
35. *John Rowan Heirs v. Portland*, Jefferson County Circuit Court Case 2979, 1844, Kentucky State Library and Archives, Frankfort, KY; *Louisville Public Advertiser*, 14 Sept. 1823.
36. *Louisville Public Advertiser*, 23 Jan. 1822, 18 June 1823, 10 Sept. 1823
37. Copies of Rowan's land warrants and title survey to the Falls are in "Attorney's Opinion: Status of Title to the Falls of the Ohio River," 23 Oct. 1980, Real Estate Division, Louisville District, U. S. Army Corps of Engineers, Louisville, KY; *Louisville Journal*, 23 July 1867, reports sale to city of Rowan's wharf property.

38. Louisville Public Advertiser, 11 Oct. 1823; "David Stanhope Bates," in American Society of Civil Engineers, *A Biographical Dictionary of American Civil Engineers*, pp. 7-8.
39. Louisville, Public Advertiser, 20-24 Dec. 1823, 3 Jan. 1824; Kentucky Senate Journal, 1824-25, pp. 193-98, prints Bates' preliminary survey report.
40. Louisville Public Advertiser, 17 Apr. 1824, 24 June 1824, 29 Sept. 1824; U. S. Congress, *Annals of Congress*, 18th Cong., 1st Sess., 1825, p. 1961.
41. Leland R. Johnson and Charles E. Parrish, *The Kentucky River Navigation: The Commonwealth's Waterway* (Louisville, KY: U. S. Army Engineer District, 2000), pp. 18-23; Message of Governor Joseph Desha, 1 Nov. 1824, Kentucky Senate Journal, 1824-25, pp. 9-10; attached to the message are reports by Ohio Governor Jeremiah Morrow, engineer David Bates, and canal commissioner Alfred Kelley.
42. Louisville Public Advertiser, 11 Dec 1824, 8 Jan. and 29 Jan. 1825
43. Louisville Public Advertiser, 3 Nov. 1824, 19 Jan. 1825; Paul B. Trescott, "The Louisville and Portland Canal Company, 1825-1874," *Mississippi Valley Historical Review* 44(March 1958):688-89.
44. Louisville and Portland Canal Company, Charter: An Act to Incorporate the Louisville and Portland Canal Company (Louisville: S. Penn, 1825), lists charter members; Kleber, ed., *Encyclopedia of Louisville*, pp. 866-68, describes Tarascon's troubles, and see also Louisville Public Advertiser, 24 Nov. 1821, 3 Sept. 1823, 16 June 1824.
45. Louisville and Portland Canal Company, Charter: An Act to Incorporate the Louisville and Portland Canal Company, *passim*.
46. Lexington, KY, Kentucky Reporter, 31 Jan. 1825; Louisville and Portland Canal Company, Charter: An Act to Incorporate the Louisville and Portland Canal Company, lists the officers elected on 26 Mar. and notes on 28 Mar. they selected Goodwin and Jacob; Louisville Public Advertiser, 18 Jan. 1823. And 7 Apr. 1824, print Shackford's ads for his river commission and warehouse business at St. Louis; Suzanne Loder, Portsmouth, Ohio, Public Library to Leland Johnson, 4 Apr. 2000, provided biographical information on John Shackford family's founding role at Portsmouth. His heirs at Portsmouth, New Hampshire, owned his canal stock until 1852.
47. Louisville Public Advertiser, 9 Jan. 1822, 9 Mar. and 23 Apr. 1825.
48. John Mullanphy's biography by Thomas Meehan from Catholic Encyclopedia is conveniently reprinted at website: www.newadvent.org. Mullanphy and his daughter Ann Biddle endowed many charities, and she inherited his canal stock.

49. Louisville Public Advertiser, 18 May and 31 Dec. 1825. Indiana had difficulty competing with Kentucky for private capital and hoped for federal aid to the canal project that was not forthcoming.
50. Louisville Public Advertiser, 16-20 July 1825, reported Clinton's visit and speech. To view Louisville's canal in the national perspective, see: Paul K. Walker, "Building American Canals," *Water Spectrum* 12(Winter 1979-80):18-25; Harry N. Scheiber, "The Ohio Canal Movement, 1820-1825," *Ohio Historical Quarterly* 69(July 1960):231-56; Ronald E. Shaw, *Canals for a Nation: The Canal Era in the United States, 1790-1860* (Lexington, KY: University Press of Kentucky, 1990).

3: CANAL DESIGN AND CONTRACTORS

1. Louisville Public Advertiser, 10 Aug. and 10 Oct. 1825.
2. Louisville Public Advertiser, 19 Oct. 1825, for Bates' designs; *ibid.*, 7 April 1824, describes Gray-McIlvaine warehouse.
3. Louisville Public Advertiser, 19 Oct. 1825.
4. *Ibid.*, 19 Oct. 1825, outlines the drydock plans, with the same 190- by 50-foot dimensions as the navigation locks.
5. *Ibid.* Lexington Kentucky Gazette, 17 Jan. 1809; Richardson, *Journal from Boston to the Western Country, 1815-1816*, p. 11; and Alfred Tischendorf and E. Taylor Parks, eds., *The Diary and Journal of Richard Clough Anderson, Jr., 1814-1826* (Durham NC: Duke University Press, 1964), p. 23, describe the 1809 and 1815 floods. Bates perhaps determined flood elevations by marks left on buildings.
6. Mann Butler, "An Outline of the Origin and Settlement of Louisville, in Kentucky," *Filson Club History Quarterly* 4(Apr.1930):72; Francis McHarry et al. v. Louisville and Portland Canal Company, Case 12094, 1856, Jefferson County Chancery Court, Kentucky State Library and Archives, Frankfort, KY, reviews controversy over the Shippingport turnpike bridge.
7. Louisville Public Advertiser, 19 Oct. 1825, prints the request for proposals.
8. Louisville Public Advertiser, 22 Oct. and 21 Dec. 1825; William E. Perrine v. Louisville and Portland Canal Company, Case 2688, 1830, Jefferson County Circuit Court, Kentucky State Library and Archives, Frankfort, KY.
9. Louisville Public Advertiser, 24 and 28 Dec. 1825. For Lothrop, see Louisville Public Advertiser, 1 Dec. 1829; Leland R. Johnson, *The Falls City Engineers: A History of the Louisville District* (Louisville, KY: U.S.

- Army Engineer District, 1975), p. 139. Cost estimates, bid prices, and similar totals used herein are rounded.
10. Copy of the contract, 27 Dec. 1825, in SEN 26A-D17, Records of Congressional Committees, Record Group 46, National Archives, Washington, DC (cited hereafter as NARG46)
11. *Ibid.*; Louisville and Portland Canal Company Annual Report, 1826, in Kentucky Senate Journal, 1826-1827, p. 203-06. The high retainage was ameliorated by the company's promise to pay the contractors six percent annual interest on the retained percentage.
12. Louisville Public Advertiser, 14 Jan. 1826; Leland R. Johnson, *Memphis to Bristol: A Half Century of Highway Construction* (Nashville, TN: Tennessee Road Builders Association, 1978), pp. 22-23; Charles L. Hitchcock v. Louisville and Portland Canal Company, Case 19898, 1830, Jefferson County Circuit Court, Kentucky State Library and Archives, Frankfort, KY; Leland R. Johnson, *Engineers on the Twin Rivers: A History of the Nashville Engineer District* (Nashville, TN: U.S. Army Engineer District, 1978), p. 169, quotes Major Harry Burgess, USACE, from his 1916 fenced camp plan.
13. *City of Louisville v. Bank of United States*, in Ben Monroe, *Reports of Cases at Common Law and in Equity Decided in the Court of Appeals of Kentucky* (Frankfort, KY, 1843), pp. 138-59; Louisville and Portland Canal Company Annual Report, 1826, in Kentucky Senate Journal, 1826-1827, p. 205.
14. Louisville and Portland Canal Company Annual Report, 1826, in Kentucky Senate Journal, 1826-1827, pp. 204-05.
15. *Ibid.*, pp. 206-07; Louisville Public Advertiser, 3 Nov. 1821, and 7 Jan. 1826. Although the canal company did its banking with Bank of the United States, no evidence indicates this bank invested in the canal; it may, however, have made loans to canal stock purchasers. Hughes resigned as canal company president to become a director, apparently requesting that Shippen replace him as the president.
16. Louisville Public Advertiser, 29 Jan. and 16 Mar. 1825.
17. *Ibid.*, 31 Dec. 1825; "Correspondence with the Officers of the Louisville and Portland Canal Company Relative to a Site for a National Armory," 18 Jan. 1826, U. S. Congress, American State Papers, Class V: Military Affairs, 3:188-93; U. S. Congress, House, Site for an Armory—Louisville, Kentucky, H. Doc. No. 46, 19th Cong., 1st Sess., 1826, *passim*.
18. Louisville and Portland Canal Company Annual Report, 1826, in Kentucky Senate Journal, 1826-1827, p. 204; Biographical Directory of the American Congress, 1774-1971 (Washington, DC: Government Printing Office, 1971), pp. 123-27, lists Shackford as Senate Sergeant-at-Arms from 1835 to 1837.
19. Louisville Public Advertiser, 11 Feb., 17 and 31 May 1826.
20. Albert P. Davies, "Charles Wilkins Short, 1794-1863: Botanist and Physician," *Filson Club History Quarterly* 19 (July 1945):131-55; James Ronaldson, *Specimen of Printing Type*, from the Letter Foundry of James Ronaldson (Philadelphia, PA: J. Ronaldson, 1816); James Ronaldson, *Observations on the Sugar Beet and Its Cultivation* (Philadelphia, PA: W. F. Geddes, 1840); Louisville Public Advertiser, 23 May 1825; "Early Sugar Beet History," at website www.monitorsugar.com. J. Cleves Short's Fernbank park later became the site of Ohio River Lock 37 and Cincinnati Engineer District's fleet headquarters.
21. Louisville Public Advertiser, 1, 3, and 29 Mar., and 19 Apr. 1826.
22. *William E. Perrine v. Louisville and Portland Canal*, Case 2688, 1830, Jefferson County Circuit Court, Kentucky State Library and Archives, Frankfort, KY; Louisville Focus, 20 Dec. 1826; Louisville Public Advertiser, 12 July and 2 Aug. 1826.
23. Louisville Focus, 20 Dec. 1826; Johnson, *Engineers on the Twin Rivers*, p. 116.
24. Karl Bernhard, *Travels through North America During the Years 1825 and 1826* (2 vols. Philadelphia, PA: Carey, Lea and Carey, 1828), II:130-31.
25. Louisville Focus, 20 Dec. 1826. Copies of John Bates' weekly estimates of work completed are in Perrine case records, SEN33A-H22, NARG46. For details and photos of scraper excavations, see J. Cleo Lee, "Mr. Mac and the Wheelers," *Military Engineer* 73 (May 1981):172-77.
26. Depositions of Thomas Joyes and John Holborn, 30 Aug. and 1 Sept. 1856, in Francis McHarry et al. v. Louisville and Portland Canal Company, Case 12094, 1856, Jefferson County Chancery Court, Kentucky State Library and Archives, Frankfort, KY; Louisville Focus, 20 Dec. 1826.
27. Louisville Public Advertiser, 5 July, 2 Sept., and 25 Oct. 1826; Collins, Chapman and Company contract with Jesse Beard, undated, in Perrine Case, SEN33A-H22, NARG46.
28. Simeon Goodwin to Collins-Chapman, 15 May 1826, and Collins-Chapman to Canal Directors, 19 May 1826, Perrine Case, SEN33A-H22, NARG46.
29. Canal Board Minutes, 20 May 1826, and John Bates to Collins-Chapman, 1 July 1826, in *ibid.*
30. Deposition of John Bates, 5 Dec. 1829, in *ibid.*; Oscar D. Short, "Origin of the Term Hoosier," *Indiana Magazine of History* 25 (June 1929):101-03; "Why is

Indiana Called the Hoosier State?" at website www.progress.org.

31. Deposition of John Bates, 5 Dec. 1829, Perrine Case, SEN33A-H22, NARG46; Louisville Focus, 20 Dec. 1826; Louisville Public Advertiser, 2 and 30 Aug., 2 Sept., 25 Oct., and 27 Dec. 1826.

32. Louisville and Portland Canal Company Annual Report, 1826, in Kentucky Senate Journal, 1826-1827, p. 206.

33. Shaw, *Canals for a Nation*, pp. 149-50; Samuel W. Thomas and Eugene H. Conner, "The Falls of the Ohio River and Its Environs: The Journals of Increase Allen Lapham from 1827-1830," *Filson Club Historical Quarterly* 45(1971):5-34, 199-226, 315-41, 381-403. The Increase Lapham Papers at Manuscript Division, Wisconsin State Historical Society, Madison, WI, include canal maps and drawings. John R. Henry was the son of Francis Henry of Cooperstown, NY, and was distantly related to Joseph Henry, founder of the Smithsonian Institution; see Nathan Reingold, ed., *The Papers of Joseph Henry* (8 vols. Washington, DC: Smithsonian Institution Press, 1972-1998), 1:345-49.

34. Louisville and Portland Canal Company Annual Report, 1827, in Kentucky House Journal, 1827-1828, pp. 222-28; Ephraim Baldwin v. John B. Ives, Case 2146, 1831, Jefferson County Circuit Court, Kentucky State Library and Archives, Frankfort, KY, contains the Hawkins contract.

35. Increase Lapham Journal entry for 20 Feb. 1828, Lapham Papers, Manuscript Division, Wisconsin State Historical Society, Madison, WI; Thomas and Conner, "The Falls of the Ohio River and Its Environs: The Journals of Increase Allen Lapham from 1827-1830," p. 19; Louisville Focus, 13 Nov. 1827 and 8 Apr. 1828.

36. Louisville and Portland Canal Company Annual Report, 1827, in Kentucky House Journal, 1827-1828, p. 222-28; Louisville Focus, 13 Nov. 1827 and 8 Apr. 1828.

37. For Nathaniel Allen, see O. Turner, *History of the Pioneer Settlement of Phelps and Gorham's Purchase* (Rochester, NY: William Alling, 1851), pp. 204-05; *Biographical Directory of the American Congress, 1774-1971*, p. 507; Deposition of John Bates, 5 Dec. 1829, and John Bates to William Perrine, 6 May 1830, Perrine Case, SEN33A-H22, NARG 46

38. Canal directors to David Bates, 15 Oct. 1827, and David Bates to Canal directors, 23 Oct. 1827, Perrine Case, SEN33A-H22, NARG 46

39. Contract Agreement (Modification), 6 Nov. 1827, and Contract with Carney and Sayre, 17 Nov. 1827, Perrine Case, SEN33A-H22, NARG 46.

40. Tool Bill, 9 Dec. 1827, *ibid.* Carney-Sayre paid \$309 for a set of blacksmith tools, 34 rock drills, 9 stone hammers, 71 sledgehammers, 3 matlocks, 2 tamping

bars, plus chains and crowbars. The steam pump cost \$250.

41. Deposition of John Bates, 5 Dec. 1829, and Collins-Allen-Perrine to Nicholas Berthoud, 4 March, 1828, Perrine Case, SEN33A-H22, NARG 46.

42. Louisville and Portland Canal Company Annual Report, 1827, in Kentucky House Journal, 1827-1828, p. 227; Inventory of Property, 20 Feb. 1828, in Collins, Allen, Perrine and Company v. Louisville and Portland Canal Company, Case 2688, 1831, Jefferson County Circuit Court, Kentucky State Library and Archives, Frankfort, KY.

43. Agreement, Collins-Allen-Perrine with Canal directors, 5 Mar. 1828, Perrine Case, SEN33A-H22, NARG 46.

44. Deposition of John Holborn, n. d., and James Hughes, 10 Apr. 1829, in William Robson and John Holburn v. Carney, Sayre Company, Case 1725, 1828, Jefferson County Circuit Court, Kentucky State Library and Archives, Frankfort, KY.

45. Thomas and Conner, "The Falls of the Ohio River and Its Environs: The Journals of Increase Allen Lapham from 1827-1830," p. 224; Harley J. McKee, "Canvass White and Natural Cement, 1818-1834," *Journal of the Society of Architectural Historian* 20(Dec. 1961):194; *American Society of Civil Engineers, A Biographical Dictionary of American Civil Engineers*, pp. 126-27.

46. Deposition of Increase Lapham, 1830, Lapham Papers, Wisconsin State Historical Society, Madison, WI; Louisville and Portland Canal Company Annual Report, 1828, copy in SEN21A-D16, NARG46.

47. Thomas and Conner, "The Falls of the Ohio River and Its Environs: The Journals of Increase Allen Lapham from 1827-1830," pp. 337-39, 382, 392; Louisville and Portland Canal Company Annual Report, 1830, in Kentucky House Journal, 1830-1831, pp. 254-58; John Rowan v. Louisville and Portland Canal Company, 1836, in James G. Dana, *Reports of Select Cases Decided in the Court of Appeals of Kentucky* (Frankfort, KY, 1837):4:606-10.

48. John Rowan v. Louisville and Portland Canal Company, 1836, in Dana, *Reports of Select Cases Decided in the Court of Appeals of Kentucky*, 4:606-10; Thomas and Conner, "The Falls of the Ohio River and Its Environs: The Journals of Increase Allen Lapham from 1827-1830," p. 385; Kleber, ed., *Encyclopedia of Louisville*, pp. 270-71.

49. Increase Lapham Journal, 25 Mar and 13 May, Manuscript Division, Wisconsin State Historical Society, Madison, WI; Louisville Public Advertiser, 16 April 1828; ARCE, 1872, p. 715, quotes Albemarle and Chesapeake Canal's president on his 1872 plans to build iron lock gates: "As no iron lockgates are used on

the canals of this country, we shall, if we introduce them, be the pioneer in this."

50. Louisville and Portland Canal Company Annual Report, 1828, copy in SEN21A-D16, NARG46; Thomas and Conner, "The Falls of the Ohio River and Its Environs: The Journals of Increase Allen Lapham from 1827-1830," pp. 208-09, 329, 334, 388.

51. The lock-filling culverts were clearly diagrammed by Increase Lapham in his detailed project drawings in Increase Lapham Papers, Wisconsin State Historical Society, Madison, WS. Review of canal design literature did not reveal earlier use of filling culverts. Available Louisville canal records do not indicate the design for valves opening and closing the culverts; perhaps they were fabricated of boiler iron the company had on hand.

4: CANAL CONSTRUCTION COMPLETED

1. Louisville and Portland Canal Company Annual Report, 1828, copy in SEN21A-D16, NARG46.
2. Louisville Focus, 16 Dec. 1828; Louisville Public Advertiser, 13 Dec. 1828, 4 Feb. 1829, 5 and 29 June, 16 July 1830.
3. U. S. Congress, Register of Debates, 20th Cong., 2d Sess., 1830, p. 47; Louisville Public Advertiser, 14 Feb. 1829.
4. William Perrine, Abstract of Claim, Perrine Case, SEN33A-H22, NARG 46; Deposition of John Holborn, n.d., *ibid*.
5. Crnkovich, "Tarascon, Junr., James Berthoud & Co. and the Development of Shippingport, Kentucky," pp. 51-63; Louisville Public Advertiser, 8 July 1835; see also canal officers listed in Louisville and Portland Canal Company Annual Reports, 1829-1853.
6. Increase Lapham to Darius Lapham, 4 July 1829, Wisconsin State Historical Society, Madison, WS.
7. Deposition of Increase Lapham, 1830, Lapham Papers, Wisconsin State Historical Society, Madison, WS.
8. *Ibid.*; Thomas and Conner, "The Falls of the Ohio River and Its Environs: The Journals of Increase Allen Lapham from 1827-1830," pp. 9, 31, 221; Louisville and Portland Canal Annual Report, 1829, in U. S. Congress, Senate, Fifth Annual Report of the Louisville and Portland Canal Company, Sen. Doc. No. 36, 21st Cong., 1st Sess., 1830.
9. Thomas and Conner, "The Falls of the Ohio River and Its Environs: The Journals of Increase Allen Lapham from 1827-1830," pp. 24-25, 220, 382-85, 395.
10. *Ibid.*, p. 389; Francis McHarry et al. v. Louisville and Portland Canal Company, Case 12094, 1856,

Jefferson County Chancery Court, Kentucky State Library and Archives, Frankfort, KY.

11. Thomas and Conner, "The Falls of the Ohio River and Its Environs: The Journals of Increase Allen Lapham from 1827-1830," pp. 383-91.
12. *Ibid.*, p. 384; Louisville Public Advertiser, 27 May 1829; Johnson and Parrish, The Kentucky River Navigation: The Commonwealth's Waterway, pp. 39, 56-59. Modern lockgates miter in a fashion similar to those built at Louisville in 1829.
13. Louisville and Portland Canal Company Annual Report, 1833, in Kentucky Senate Journal, 1833-1834, pp. 137-44; Thomas and Conner, "The Falls of the Ohio River and Its Environs: The Journals of Increase Allen Lapham from 1827-1830," p. 394.
14. Louisville and Portland Canal Annual Report, 1829, in U. S. Congress, Senate, Fifth Annual Report of the Louisville and Portland Canal Company, Sen. Doc. No. 36, 21st Cong., 1st Sess., 1830.
15. Thomas and Conner, "The Falls of the Ohio River and Its Environs: The Journals of Increase Allen Lapham from 1827-1830," p. 395; "Early Days in Ohio: From Letters and Diaries of Dr. I. A. Lapham," Ohio Archaeological and Historical Society Publications 18(1909):43-53; Robert P. Nurre, The Antiquities of Wisconsin, as Surveyed and Described [by I. A. Lapham], (Madison, WS: University of Wisconsin Press, 2001); see also website www.wisc.edu/wisconsinpress.
16. James McGilly Cuddy to U. S. Congress, 8 Jan. 1830, SEN21A-D16, NARG46; U. S. Congress, Register of Debates, 21st Cong., 1st Sess., 1830, p. 1148; Louisville and Portland Canal Annual Report, 1829, in U. S. Congress, Senate, Fifth Annual Report of the Louisville and Portland Canal Company, Sen. Doc. No. 36, 21st Cong., 1st Sess., 1830.
17. Louisville and Portland Canal Annual Report, 1829, in U. S. Congress, Senate, Fifth Annual Report of the Louisville and Portland Canal Company, Sen. Doc. No. 36, 21st Cong., 1st Sess., 1830; Carleton Jackson, "The Internal Improvement Vetoes of Andrew Jackson," Tennessee History Quarterly 25(Fall 1966):261-79.
18. James D. Richardson, ed., A Compilation of the Messages and Papers of the Presidents, 1789-1897 (Washington, DC: Government Printing Office, 1896), II:510.
19. John R. Henry, A Few Statements Showing the Utility and Importance of the Louisville & Portland Canal (Philadelphia, PA: Charles Alexander, 1830), *passim*, from original copy at Historical Society of Pennsylvania, Philadelphia, PA
20. Thomas Hulme's journal of his 1818 visit to Louisville and Shippingport, together with Hulme's

- autobiography, was printed in William Cobbett, *A Year's Residence in the United States of America* (Carbondale, IL: Southern Illinois University Press, 1964), pp. 245-83; see also Thomas Hulme to a Member of Congress, in *Niles Register* 38(3July 1830):341-44.
21. Louisville and Portland Canal Company Annual Report, 1830, in *Kentucky House Journal, 1830-1831*, pp. 254-58; *Louisville Public Advertiser*, 17 Jan. 1831. In 1840 Thomas Hulme owned 849, Peter had 43, and John had 30 shares, and they also received cash payments for part of the loan.
22. *Ephraim Baldwin v. John B. Ives*, Case 2146, 1831, Jefferson County Circuit Court, Kentucky State Library and Archives, Frankfort, KY; Thomas and Conner, "The Falls of the Ohio River and Its Environs: The Journals of Increase Allen Lapham from 1827-1830," pp. 329, 340, 394.
23. "Louisville and Portland Canal," *Family Magazine*, 4(1839):294-95; Ben Casseday, *The History of Louisville* (Louisville, KY: Hull and Brother, 1852):168; Thomas and Conner, "The Falls of the Ohio River and Its Environs: The Journals of Increase Allen Lapham from 1827-1830," p. 207. Cultural origins of the iron and brick were not determined, and nothing is known of the disposition of these materials.
24. Ford, *History of the Ohio Falls Cities*, I:50; Louisville and Portland Canal Annual Report, 1831, in *Kentucky Senate Journal, 1832-33*, pp. 247-53.
25. Collins-Allen-Perrine to Louisville and Portland Canal Company, 21 July 1829, Perrine Case, SEN33A-H22, NARG46.
26. "A Pen Picture of Life in Louisville," *Courier-Journal*, 30 Oct. 1898.
27. William Perrine, Abstract of Claim, 1830, Perrine Case, SEN33A-H22, RG 46.
28. "A Pen Picture of Life in Louisville," *Courier-Journal*, 30 Oct. 1898; Thomas and Conner, "The Falls of the Ohio River and Its Environs: The Journals of Increase Allen Lapham from 1827-1830," p. 399.
29. "A Pen Picture of Life in Louisville," *Courier-Journal*, 30 Oct. 1898; Thomas and Conner, "The Falls of the Ohio River and Its Environs: The Journals of Increase Allen Lapham from 1827-1830," pp. 397-98.
30. *Louisville Journal*, 11 and 21 Dec. 1830.
31. Thomas D. Clark, "The Lexington and Ohio Railroad," *Register of the Kentucky Historical Society* 31(Jan. 1933):9-28. Review of the canal company's annual reports from 1830 to 1853 reveals no policy statements on railroad competition. It should also be noted that James Guthrie sold his few shares in the canal company before 1840; when he became canal company president in 1863, he bought or was given one share to qualify for the presidency.
32. Louisville and Portland Canal Company Annual Report, 1830, in *Kentucky House Journal, 1830-1831*, pp. 254-58; William E. Perrine v. Louisville and Portland Canal Company, Case 2688, 1830, Jefferson County Circuit Court, Kentucky State Library and Archives, Frankfort, KY; *Louisville Public Advertiser*, 24 Dec. 1832; *Biographical Directory of the American Congress, 1774-1971*, p. 507. The news report of Allen's death does not discuss its cause, but Louisville tradition states that one of the contractors committed suicide, probably meaning Allen.
33. Perrine Case, SEN33A-H22, NARG 46; U. S., Congress, Senate, Committee on Roads and Canals, Report on Petition of Mary W. Perrine, Sen. Comm. Report No. 506, 33rd Cong, 2 Sess., 1855.
34. Louisville and Portland Canal Company Annual Report, 1830, in *Kentucky House Journal, 1830-1831*, pp. 254-58; *Louisville Public Advertiser*, 17 Jan. 1831; John Rowan v. Louisville and Portland Canal Company, 1836, in James G. Dana, *Reports of Select Cases Decided in the Court of Appeals of Kentucky* (Frankfort, KY, 1837):4:606-10.
35. *Louisville Public Advertiser*, 24 Dec. 1830; Works Projects Administration, *Ship Registers and Enrollments of New Orleans, Louisiana* (6 Vols. University, LA: Louisiana State University, 1941-42), II:30; *Louisville Public Advertiser*, 1 and 29 March 1831. In March 1831, the *Uncas* had 36 cabin and 40 deck passengers in addition to its cargo.
36. *Courier-Journal*, 9 Mar. 1872. The *Uncas*, with only 59 tons registered capacity, later was sold south and operated until 1835; see, William M. Lytle, Forrest R. Holdcamper, C. Bradford Mitchell, and Kenneth R. Hall, *Merchant Steam Vessels of the United States, 1790-1868* (Staten Island, NY: Steamship Historical Society of America, 1975), p. 42 (under name Columbus).
37. *Louisville Public Advertiser*, 30 Dec. 1830.
38. Louisville and Portland Canal Company Annual Report, 1830, in *Kentucky House Journal, 1830-1831*, pp. 254-58; *Louisville Public Advertiser*, 17 Jan. 1831.
39. *Louisville Public Advertiser*, 4-5 Jan. 1831.
40. Deposition of Captain David Jenkins, in John Muir, George Gwathmey, Asher Phillips v. Louisville and Portland Canal Company, Case 20216, 1831, Jefferson County Circuit Court, Kentucky State Library and Archives, Frankfort, KY; Pirtle, "Early History of Louisville and Portland Canal," p. 6-7.
41. Deposition of John Henry, 29 Aug. 1833, in John Muir, George Gwathmey, Asher Phillips v. Louisville and Portland Canal Company, Case 20216, 1831, Jefferson County Circuit Court, Kentucky State Library and Archives, Frankfort, KY; Muir et al. v. Louisville and Portland Canal Company, 1839, in James G. Dana,

- Reports of Select Cases Pleaded in the Court of Appeals of Kentucky (Frankfort, KY, 1839), 8:161-62.
42. Louisville Public Advertiser, 31 Jan., 7 Feb., 21 May 1831.
43. Louisville and Portland Canal Annual Report, 1831, in Kentucky Senate Journal, 1832-33, pp. 247-53.
44. Simeon Goodwin to Pres. Andrew Jackson, 6 June 1831, File G434, NARG77.
45. James Ronaldson to Secretary Of War Lewis Cass, 14 May 1832, Entry 18, Box 74, NARG77.
46. Letter from James Ronaldson to acting Secretary of War William Randolph, 8 July 1831, in *ibid.*; see presidential endorsement on Simeon Goodwin to Pres. Andrew Jackson, 6 June 1831, File G434, NARG77.
47. Louisville and Portland Canal Annual Report, 1831, in Kentucky Senate Journal, 1832-33, pp. 247-53; Ford, *History of the Ohio Falls Cities*, I:50.
48. Louisville Public Advertiser, 11 Oct. and 9 Nov. 1831; Alan L. Bates, Martin C. Striegel, and Victoria L. Nugent, "Falls Cities Ferries: A Note," *Indiana Magazine of History* 95(September 1999):255-83.
49. Thomas and Conner, "The Falls of the Ohio River and Its Environs: The Journals of Increase Allen Lapham from 1827-1830," p. 383.
50. James Marshall to Richard Henry Lee, 20 Mar. 1852, Box 1, Entry 445, Records of Treasury Department, Record Group 56, National Archives, Washington, DC (cited hereafter as NARG56); Trescott, "The Louisville and Portland Canal Company, 1825-1874," pp. 694-95.

5: INITIAL CANAL OPERATIONS

1. Louisville Public Advertiser, 15-28 Feb. 1832; Louisville and Portland Canal Company Annual Report, 1832, in Kentucky Senate Journal, 1832-33, pp. 247-53.
2. Louisville and Portland Canal Company Annual Report, 1832, in Kentucky Senate Journal, 1832-33, pp. 247-53.
3. Crnkovich, "Tarascon, Junr., James Berthoud & Co. and the Development of Shippingport, Kentucky," pp. 27-30; "John D. Colmesnil," in M. Joblin, *Louisville Past and Present: Its Industrial History* (Louisville, KY: John P. Morton Company, 1875), 216-20.
4. Thomas and Conner, "The Falls of the Ohio River and Its Environs: The Journals of Increase Allen Lapham from 1827-1830," pp. 383-84; Hugh Hays, "The Canal Ruined It: Rise and Fall of Shippingport," 6 June 1887, in Manuscript Division, Kentucky Library, Western Kentucky University, Bowling Green, KY; Courier-Journal, 12 Oct., 1873, 7 May 1876. Jim Porter died 25 Apr. 1859.

5. "Romance of a Gambler Turned Preacher," Louisville Courier-Journal, 10 Oct. 1915.
6. Louisville Public Advertiser, 26 Oct. and 7 Nov. 1832; Louisville and Portland Canal Company Annual Report, 1832, in Kentucky Senate Journal, 1832-33, pp. 247-53.
7. Louisville and Portland Canal Company Annual Report, 1832, in Kentucky Senate Journal, 1832-33, pp. 247-53; Deposition of John Henry, 29 Aug. 1833, in John Muir, George Gwathmey, Asher Phillips v. Louisville and Portland Canal Company, Case 20216, 1831, Jefferson County Circuit Court, Kentucky State Library and Archives, Frankfort, KY; Leland R. Johnson, "Muscle Shoals Canal, Tennessee River," *Military Engineer* 63(July 1971):260-65.
8. Louisville and Portland Canal Company Annual Report, 1832, in Kentucky Senate Journal, 1832-33, pp. 247-53; Pirtle, "Early History of Louisville and Portland Canal," pp. 6-7.
9. U.S. Congress, House, Louisville and Portland Canal, H. Exec. Doc. No. 11, 23d Cong., 1st Sess., 1833, prints Pittsburgh's objections; and U. S. Congress, Senate, Memorial of Sundry Inhabitants of St. Louis, Missouri, Sen. Doc. No. 5, 22d Cong., 2d Sess., 1832, prints the St. Louis protest; Thomas Hulme and John Shackford to Congress, 4 May 1832, SEN33AH22, NARG46.
10. Louisville and Portland Canal Stockholders to Congress, Dec. 1832, in SEN22A-618, NARG46. Other petitions in this file from St. Louis and Cincinnati urge the federal government to buy out the stockholders, but Cincinnati also recommended that Congress appropriate a half million dollars to build a canal at the Falls on the Indiana bank.
11. Louisville and Portland Canal Company Annual Report, 1833, in Kentucky Senate Journal, 1833-1834, pp. 137-44; Nashville, TN, Nashville Banner, 20 Jan. 1833.
12. Pirtle, "Early History of Louisville and Portland Canal," p. 6-7; Lucian Minor, *A Journey to the West in 1836*, Proceedings of the Massachusetts Historical Society (2d Series, 1891-92): 7:263-64.
13. Louisville and Portland Canal Company Annual Report, 1833, in Kentucky Senate Journal, 1833-1834, pp. 137-44.
14. Louisville and Portland Canal Company Annual Report, 1833, in Kentucky Senate Journal, 1833-1834, pp. 137-44.
15. *Ibid.*
16. James Marshall to Richard Henry Lee, 20 March 1852, Box 1, Entry 445, NARG56.
17. Louisville and Portland Canal Company Annual Report, 1833, in Kentucky Senate Journal, 1833-1834,

- pp. 137-44; Louisville and Portland Canal Company v. City of Louisville, 1838, Case 27351, Jefferson County Circuit Court, Kentucky State Library and Archives, Frankfort, KY; Louisville Journal, 13 Aug. 1863. No biography of James Marshall has been located; biographical information was extracted from the Louisville City Directories, 1832-1861.
18. Louisville and Portland Canal Company v. City of Louisville, 1838, Case 27351, Jefferson County Circuit Court, Kentucky State Library and Archives, Frankfort, KY; Louisville and Portland Canal Company v. Commonwealth, 1845, Case 43, in Ben Monroe, Reports of Cases in the Court of Appeals of Kentucky (Frankfort, KY, 1847): 7:160-62. Thomas F. Marshall presented the canal company's petition to the Kentucky General Assembly asking passage of a law exempting the canal from taxation by any city or corporation, and the assembly passed it; see Kentucky House Journal, 1836-1837, p. 58.
19. Louisville Journal, 24 May 1847; Louisville and Portland Canal Company Annual Report, 1834, in Kentucky Senate Journal, 1834-1835, pp. 137-42.
20. William Dzombak, "Louisville-Portland Canal Described, 1837," American Canals 68(February 1989):7; William R. Smith, Journal of Gen. William R. Smith: Incidents of a Journey from Pennsylvania to Wisconsin Territory in 1837 (Chicago, IL: Wright Howes, 1927), p. 36.
21. Louisville and Portland Canal Company Annual Report, 1835, in Kentucky Senate Journal, 1835-36, pp. 102-08; Louisville and Portland Canal Company Annual Report, 1836, in Kentucky House Journal, 1836-1837, pp. 206-24.
22. Trescott, "The Louisville and Portland Canal Company, 1825-1874," pp. 694-95; Charles K. Palmer, "Improvement of Navigation on the Ohio River," 1938 draft, Historical Files, Lakes and Rivers Division, U. S. Army Corps of Engineers, Cincinnati, OH.
23. U.S. Congress, House, Chute—Great Falls of Ohio, H. Doc. No. 488, 23d Cong., 1st Sess., 1834, passim.
24. Louisville Public Advertiser, 16 Jan., 8 and 11 May 1835; Kentucky Senate Journal, 1834-1835, pp. 50, 61; Senator William Hendricks, Committee on Roads and Canals, Report on Memorial of Louisville and Portland Canal Company, 3 Feb. 1836, SEN24A-D17, NARG46.
25. Louisville Public Advertiser, 10-12 Feb. 1836, 6 Jan., 4 Feb., and 7 Nov. 1837.
26. *Ibid.*, 20 Apr. 1836; Biographical Directory of the American Congress, 1774-1971, p. 1026.
27. Louisville Public Advertiser, 8, 25, 30 Apr., 14 May, and 22 June 1835; Pirtle, "Early History of Louisville and Portland Canal," pp. 6-7. Although the locks were 190 feet long, the usable length for boats was 185 feet because the lockgates needed space to open and close inside the chamber.
28. Kleber, ed., Encyclopedia of Louisville, pp. 362-63, 434-35; Louisville city council minutes, 16 May, 1836, in Francis McHarry et al. v. Louisville and Portland Canal Company, Case 12094, 1856, Jefferson County Chancery Court, Kentucky State Library and Archives, Frankfort, KY.
29. Louisville Public Advertiser, 26 June and 12 Dec. 1835; Louisville and Portland Canal Company v. Athiel Town, Case 27368, 1838, Jefferson County Chancery Court Records, Kentucky State Library and Archives, Frankfort, KY; Carl E. Kramer, "Bridging the Ohio," Louisville (August 1979), pp. 46-62.
30. Charles W. Short to William Short, 3 July 1839, Manuscript Division, Filson Club, Louisville, KY.
31. U.S., Congress, House, Message from the President to the Two Houses of Congress, H. Exec. Doc. No. 2, 25th Cong., 3d Sess., 1838, pp. 317-21; U.S., Congress, House, Survey of the Ohio River, H. Doc. No. 50, 27th Cong., 3d Sess., 1843, pp. 22-23.
32. U.S., Congress, House, Survey of the Ohio River, H. Doc. No. 50, 27th Cong., 3d Sess., 1843, pp. 22-23.
33. Louisville and Portland Annual Report, 1840, in Entry 445, NARG56; Louisville and Portland Annual Report, 1841, in Kentucky Senate Journal, 1841-1842, pp. 101-03; Joseph H. Harrison, "Martin Van Buren and His Southern Supporters," Journal of Southern History 22(Nov. 1956):438-58; Johnson, Headwaters District, pp. 74-78.
34. U. S. Congress, Senate. The Report of Captain T. J. Cram on the Best Mode of Improving the Navigation of the Ohio at the Falls at Louisville, Sen. Doc. No. 243, 28th Cong., 1st Sess., 1844, p. 32; Louisville Journal, 19 Feb. 1852 and 26 Feb. 1853; Louisville Courier, 3 Jan. 1852; Louisville Democrat, 12 Mar. 1853.
35. Judy Munro-Leighton, Natalie Andrews, and Bill Munro-Leighton, Changes at the Falls: Witnesses and Workers, Louisville and Portland, 1830-1860 (Portland, KY: Portland Museum, 1982), pp. 15-17; Louisville Journal, 11 Mar. 1858 and 31 Aug. 1859.
36. Eliza Steele, A Summer Journey (New York: John S. Taylor, 1841), pp. 225-26.
37. Louisville Journal, 7 July 1841, 27 May 1842, 7 Feb. 1844, 10 Feb. 1847, 28 Sept. 1849.
38. U. S. Congress, Senate, Report of the Secretary of Treasury in Relation to the Louisville and Portland Canal, Sen. Report No. 155, 26th Cong., 1st Sess., 1840, passim; Francis McHarry et al. v. Louisville and Portland Canal Company, Case 12094, 1856, Jefferson County Chancery Court, Kentucky State Library and Archives, Frankfort, KY.
39. Louisville Journal, 27 Jan. 1840.

40. U.S. Congress, Senate, Report of the Secretary of Treasury in Relation to the Louisville and Portland Canal, Sen. Report No. 155, 26th Cong., 1st Sess., 1840, p. 40.

41. James Marshall to Richard Henry Lee, 20 Mar. 1852, Entry 445, NARG56; Laws of Kentucky, 21 Feb. 1842, 22 Feb. 1844, 10 Feb. 1845; U. S., Congress, Senate, Committee on Roads and Canals, Enlarging and Improving the Louisville and Portland Canal, Sen. Committee Report No. 371, 34th Cong., 3d Sess., 1875, p. 1.

42. William Shackford, Report of 4 July 1842 meeting to stockholders, Entry 445, NARG56; Louisville Journal, 4 July and 29 Aug. 1842; Louisville and Portland Canal Annual Report, 1843, in Kentucky Senate Journal, 1843-1844, pp. 63-64.

6: CANAL CONUNDRUM

1. U.S., Congress, Senate, Message from the President to the Two Houses of Congress, Sen. Doc. No. 1, 28th Cong., 1st Sess., 1843, p. 196; U.S., Congress, House, Ohio River—Falls at Louisville, H. Exec. Doc. No. 95, 32d Cong., 1st Sess., 1852, passim; John W. Larson, *Those Army Engineers: A History of the Chicago District, U. S. Army Corps of Engineers (Chicago, IL: U. S. Army Engineer District, 1979)*, pp. 38-58. Major Long's Office of Western River Improvements in Louisville was located on Magazine street between Seventh and Eighth streets (within sight of the Corps of Engineers' office in 2002).

2. U.S., Congress, Senate, The Report of Captain T. J. Cram on the Best Mode of Improving the Navigation of the Ohio River at the Falls at Louisville, Sen. Rept. No. 243, 28th Cong., 1st Sess., 1844, p. 8; Louisville Journal, 13 Jan. 1842.

3. U.S., Congress, Senate, The Report of Captain T. J. Cram on the Best Mode of Improving the Navigation of the Ohio River at the Falls at Louisville, Sen. Rept. No. 243, 28th Cong., 1st Sess., 1844, pp. 35-42.

4. *Ibid.*, p. 32.

5. *Ibid.*

6. *Ibid.*

7. *Ibid.*, pp. 1-4; Biographical Directory of the American Congress, 1774-1971, p. 588; James Marshall to George Bibb, 8 Jan. 1845, Entry 445, NAG56.

8. U.S., Congress, Senate, The Report of Captain T. J. Cram on the Best Mode of Improving the Navigation of the Ohio River at the Falls at Louisville, Sen. Rept. No. 243, 28th Cong., 1st Sess., 1844, p. 32; U. S. Congress, House, Louisville and Portland Canal Company, H. Doc. No. 66, 28th Cong., 2d Sess., 1845, pp. 1-4; Louisville Journal, 16 May 1844.

9. U.S., Congress, House, Falls of the Ohio, H. Rept. No. 661, 29th Cong., 1st Sess., 1846, passim; Walter N. Haldeman, *Haldeman's Picture of Louisville, Directory and Business Advertiser for 1844-1845* (Louisville: W. N. Haldeman, 1844), p. 63; Johnson and Parrish, *Kentucky River Development*, pp. 55-58.

10. U.S., Congress, Senate, Committee on Roads and Canals, Petition of a Number of Captains of Steamboats and Others Interested in the Navigation of the Western Rivers, Sen. Rept. No. 25, 28th Cong., 2d Sess., 1845; Louisville Journal, 5-6 Feb., 6, 8, and 10 Mar. 1845, 14 and 18 Dec. 1846; Albjerg, "Internal Improvements without a Policy," p. 176; Hunter, *Steamboats on the Western Rivers*, p. 191. Louisville Journal, 6 Dec. 1844, reported Guthrie was under consideration for appointment to Polk's cabinet.

11. Louisville Journal, 8 Apr. and 30 June 1845, 9-10 Dec. 1846; on Dickins's visit, see Ford, *History of the Ohio Falls Counties*, 1:292-93.

12. Ford, *History of the Ohio Falls Counties*, 1:300; Louisville Journal, 17 Dec. 1846 and 8-9 Dec. 1847. Smith installed his first hoisting engine on the *Marshall Ney* at the head of the Louisville canal.

13. Louisville Journal, 10-12 Mar., 20-22 Oct. 1845, 1-8 Mar., 8 and 30 Dec. 1847, 10 Jan. and 28 Mar. 1848; Louisville Courier, 29 Mar. 1851.

14. Louisville Journal, 20 May 1843, 13 Dec. 1848, 16-20 Jan. 1849, 19 Feb. 1852 and 26 Feb. 1853; Louisville Courier, 3 Jan. 1852; Louisville Democrat, 12 Mar. 1853.

15. Louisville Journal, 8 Aug. and 24-28 Oct. 1844, 16 Mar. 1848; Ford, *History of the Ohio Falls Counties*, 1:294.

16. James St. Clair Morton, *Memoir of the Life and Services of Capt. and Brevet Major John Sanders* (Pittsburgh, PA: W. S. Haven, 1861), pp. 28-29.

17. Stephen H. Long to J. J. Abert, 26 May 1846, Vol. 1, Entry 338, NARG77.

18. Wood, Stephen H. Long, pp. 211-17; Baird's *History of Clark County, Indiana*, p. 331. A list of steamboats used by the Army during the Mexican War is in the U. S., Congress, Senate, Report of the Secretary of War Showing the Contracts Made under the Authority of that Department during the year 1848, Sen. Exec. Doc. No. 17, 30th Cong., 2d Sess., 1849, pp. 23-96.

19. Louisville and Portland Canal Annual Report, 1846, Entry 440, NARG56; Louisville Journal, 25 Dec. 1846.

20. Louisville Journal, 15-17 Dec. 1847.

21. Louisville Journal, 18 Dec. 1847.

22. Baird's *History of Clark County, Indiana*, p. 433; George Conclin, *Conclin's New River Guide* (Cincinnati, OH: J. A. and U. P. James, 1851), p. 48.

23. Louisville Journal, 17, 28, and 30 Dec. 1847; Louisville and Portland Canal Annual Report, 1847, in Kentucky House Journal, 1847-1848, pp. 69-71; Louisville and Portland Canal Annual Report, 1848, in Kentucky House Journal, 1848-1849, pp. 107-08.
24. Louisville and Portland Canal Annual Report, 1848, in Kentucky House Journal, 1848-1849, pp. 107-08; Louisville and Portland Canal Annual Report, 1849, in Kentucky Senate Journal, 1849-1850, pp. 95-97; Leland R. Johnson, *The Headwaters District: A History of the Pittsburgh District* (Pittsburgh, PA: U.S. Army Engineer District, 1979), pp. 75-78, 96-97.
25. Louisville and Portland Canal Annual Report, 1849, in Kentucky Senate Journal, 1849-1850, pp. 95-97; Louisville Journal, 24 Sept. 1849.
26. Louisville Journal, 9 and 26 Mar. 1841.
27. Louisville Journal, 31 May 1850. The buildings were erected by the partnership of Hulme, Cochran, Glover, and Petit.
28. Louisville Journal, 12 Jan. 1847, 2 May 1848, 30 Jan., 27 Apr., 2 June 1849.
29. Louisville Journal, 3 Feb. 1847, 1 June 1849; Louisville Courier, 3 June 1851.
30. Louisville Courier, 30 May 1851; Louisville Journal, 16 and 23 July 1851.
31. Acts of Kentucky, 2 Mar. 1844 and 10 Feb. 1846; Louisville Journal, 16 Oct. and 15 Nov. 1849, 6 Jan. 1850.
32. Louisville Journal, 8 Apr. 1854, 14 May 1855, 31 Aug. 1859.
33. Louisville Journal, 8 Apr. 1854, 11 Mar. 1858, and 31 Aug. 1859; Louisville Courier, 15 Oct. 1858.
34. U.S., Congress, House, Falls of the Ohio, H. Rept. No. 661, 29th Cong., 1st Sess., 1846, passim; Louisville Journal, 21 April 1868, listing famous antebellum steamboats, mentioned the *Eclipse*, *Shotwell*, *Diana*, *Robert J. Ward* running between Louisville and New Orleans and the *Alvin Adams*, *Crystal Palace*, *Moses McLellan*, *Fashion*, *Southerner* and *Northerner* operating from Louisville to St. Louis.
35. Frank Davis, "Something about the Old Coal Boats of the Ohio," *National Waterways* 7(Apr. 1930):22, 53; Louisville Journal, 13 Dec. 1858; Courier-Journal, 9 Aug. 1873.
36. Baird's History of Clark County, Indiana, pp. 323-34; Louisville Courier, 10 Jan. 1852
37. Louisville Journal, 11 May 1855 and 14 Apr. 1856. The two deceased lockhands were Matthew Brady, a fifteen-year canal employee of Louisville, and Michael McKegney of Shippingport.
38. Louisville Journal, 24-25 Jan. 1854.
39. United States Marine Hospital, National Historic Landmark Nomination, Historical Files, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.
40. Ibid.; Courier-Journal, 27 May 1870, 17 Feb. 1872, 12 Jan. 1875, 4 Jan. 1876.
41. Frederick Way, Jr., *Way's Steam Towboat Directory* (Athens, OH: Ohio University Press, 1990), pp. xii-xiii, 118; Louisville Courier, 5 May 1851; Louisville Journal, 23 July 1851, 24 Sept. and 27 Oct. 1853, 7 Apr. 1859. The towboat *Sea Gull* with eight coal barges in tow arrived at Louisville from Pittsburgh in December 1852; see Louisville Journal, 4 Dec. 1852.
42. Louisville Journal, 20 June 1849; Louisville Courier, 4 Feb. 1851.
43. Louisville Courier, 1 Jan. 1851.
44. Louisville Courier, 8 and 17-18 Feb., 13 Nov. 1851. Elwood Fisher, publisher of a Washington, DC, newspaper, was named as the principal speculator on the Indiana canal site.
45. Louisville Journal, 16 and 28 Jan., 17-18, 21 Feb. 1852; Louisville Courier, 18 May 1851 and 17 Jan. 1852.
46. Louisville Courier, 5 Jan. 1852.
47. Louisville Journal, 7 Mar. 1844, 18 Dec. 1845, 20 Apr. 1849; Kentucky House Journal, 1841-1842, pp. 413-14, 566-68; Louisville Journal, 26 Feb. 1842; Acts of Kentucky, 25 Feb. 1842. Thomas Hulme, Jr., was United States Consul to the Sedan.
48. Biographical Encyclopedia of Pennsylvania (Philadelphia, PA: Galaxy Publishing Co., 1874), pp. 369-70; Louisville Journal, 8 June 1852.
49. Louisville Journal, 24 Sept. 1849; Louisville Courier, 29 Nov. 1851; John Hulme to James Guthrie, 2 July 1855, Entry 445, NARG56.
50. Louisville Courier, 29 Nov. 1851 and 5 Jan. 1852; Louisville Times, 22 and 27 May 1893.
51. Louisville Journal, 3 Oct. 1849 and 3 July 1852; Louisville Courier, 5-7 Apr. 1851; Kleber, ed., *Encyclopedia of Louisville*, pp. 362-63.

7: GUTHRIE'S PROJECT

1. Johnston, *Memorial History of Louisville*, pp. 371-75; Ford, *History of the Ohio Falls Counties*, 1:489-91; Louisville Journal, 10 Oct., 7 Nov. 1853; Larry Gara, *The Presidency of Franklin Pierce* (Lawrence, KS: University Press of Kansas, 1991), pp. 60-61.
2. Gara, *The Presidency of Franklin Pierce*, p. 60-61; Johnston, *Memorial History of Louisville*, pp. 371-75; Roy F. Nichols, *Franklin Pierce Young Hickory of the Granite Hills* (Philadelphia, PA: University of Pennsylvania Press, 1958), pp. 247, 271, 294, 541; Louisville Journal, 26 Apr. 1854; Joblin, *Louisville Past*

- and Present: Its Industrial History, pp. 216-20. William Davis Gallagher (1808-1894) resided at Pewee Valley; see Kleber, ed., *Encyclopedia of Louisville*, p. 699.
3. John Hulme to James Guthrie, 25 Nov. 1853, Entry 445, NARG56; James Guthrie to Jonas H. Rohrer, 25 Mar. 1854, and Rhorer to Guthrie, 8 Apr. 1854, in *ibid.*
 4. *Louisville Journal*, 12 July 1854; Nichols, Franklin Pierce, pp. 354-55, 374-75.
 5. *Louisville Journal*, 28 Aug. 1852; U. S., Congress, Senate, Message from the President of the United States to the Two Houses of Congress, Sen. Exec. Doc. No. 11, 35th Cong., 1st Sess., 1858, pp. 315-19; George Graham, Review of the Report of the Board of Engineers on the Improvement of the Falls of the Ohio (Washington, DC: John T. and Lem Powers, 1854), *passim*; Trescott, "The Louisville and Portland Canal," pp. 702-04.
 6. *Louisville Journal*, 5 Feb., 23 Mar., 8 Apr., 22 July, 7 Aug. 1850.
 7. *Louisville Journal*, 22 and 29 Oct., 23 Nov. 1850, 9, 12, 26 Sept. 1851, 23 June, 1 and 19 July 1852, 25 Mar. 1854; *Louisville Courier*, 22 Feb., 18 Mar., 5 and 26 Apr., 12 May, 4 Nov. 1851.
 8. *Louisville Journal*, 18 Feb. 1853.
 9. *Louisville Journal*, 12 Mar. 1853.
 10. *Louisville Journal*, 31 Aug. and 2 Sept. 1850; *Louisville Courier*, 30 Apr., 14-16 June, 21-23 Oct. 1851, 20-23 June 1853. Rogers and Sherlock Company of Cincinnati bought the West Louisville property.
 11. *Louisville Journal*, 9 Aug. 1850, 22 Mar. and 28 Sept. 1852, 10, 19, 23 May and 26 June 1856.
 12. *Louisville Journal*, 30 Jan. 1858.
 13. *Louisville Courier*, 19 Feb., 17 Mar., 4-7 Apr. 1851; *Louisville Journal*, 16 Sept. 1854, 13 June 1856.
 14. *Louisville Journal*, 18 Sept, 28 Dec. 1852, 11-12 Jan. 1853; Jacob Abbott, "Some Account of Francis's Life-Boats and Life-Cars," *Harper's New Monthly Magazine* 3(July 1851):161-71.
 15. *Louisville Journal*, 18 May 1852, 14 July, 21 Dec. 1854, 19-24 Nov. 1855.
 16. *Louisville Journal*, 19-21 Nov., 7 Dec. 1853, 14 July 1854, 29 June 1855, and 19 Nov. 1856.
 17. *Louisville Journal*, 16 July 1852; Memorial of the Ohio Falls Marine Railroad Company in SEN33A-H22, NARG46.
 18. John J. Weisert, "A Tunnel for the Southern Trade?" *Indiana Magazine of History* 51(Dec. 1955):317-22. *Louisville Journal*, 23 Oct., 17 Nov., 2 Dec. 1854, 6 Mar. 1855.
 19. *Louisville Journal*, 23 Feb. 1855; *Courier-Journal*, 26 Jan. 1869.
 20. James Marshall to James Guthrie, 18 Aug. 1854, Entry 445, NARG56.
 21. *Ibid.*
 22. James Marshall to James Guthrie, 31 Jan. 1855, *ibid.*
 23. John W. Leathers to Jefferson Davis, 19 July 1854, James Guthrie Papers, Manuscript Division, Filson Club, Louisville, KY; John Hulme to James Guthrie, 2 July 1855, Entry 445, NARG56; James Speed et al. to President Franklin Pierce, *ibid.*
 24. John Hulme to James Guthrie, 10 Feb. 1855, Entry 445, NARG56; James Guthrie to Franklin Pierce, 8 Feb. 1855, *ibid.*
 25. James Marshall to James Guthrie, 12 Apr. 1855, *ibid.*
 26. James Guthrie to James Marshall, 20 Apr. 1855 with endorsement by President Pierce dated 21 Apr. 1855, *ibid.*; *Louisville Journal*, 30 April 1855.
 27. James Marshall to James Guthrie, 2 May 1856, Entry 445, NARG56; Jefferson Davis to James Guthrie, 20 June 1856, *ibid.*; Edward Watts to James Guthrie, 12 July 1856, *ibid.*; Owners and Officers of Steamboats, Memorial to the Senate and House of Representatives, 28 June 1856, SEN34A-H23, NARG46; U. S., Congress, House, Louisville and Portland Canal, H. Rept. No. 327, 34th Cong., 1st Sess., 1856, pp. 1-3; *Louisville Journal*, 13 July 1856.
 28. Stephen Long to James Guthrie, 8 July, 16 Sept., 14 Oct. 1856, Entry 445, NARG56; U. S., Congress, House, Louisville and Portland Canal, H. Rept. No. 327, 34th Cong., 1st Sess., 1856, pp. 1-3; *Louisville Journal*, 13 July 1856; James Guthrie to James Marshall, 17 Aug. 1856, Entry 445, NARG56; James Marshall to James Guthrie, 30 Sept. 1856, *ibid.* The company paid Colonel Long \$490 for his surveys and plans.
 29. James Marshall to James Guthrie, 7 Aug. 1856, Entry 445, NARG56; *Louisville Journal*, 18-21, 31 July, 2 Aug. 1856.
 30. *Louisville Journal*, 6 Aug. and 19 Sept. 1856; James Marshall to James Guthrie, 7 Aug. 1856, Entry 445, NARG56; Francis McHarry et al. v. Louisville and Portland Canal Company, Case 12094, 1856, Jefferson County Chancery Court, Kentucky State Library and Archives, Frankfort, KY. S. S. Nicholas and Charles Ripley served as attorneys for McHarry and Shippingport residents James D. Porter, Joseph Noble, James Napier, Harvey Norell, James Sanders, William Sanders, Russell Hinman, William Devine, John Davis, William McKeever, Mary Carnes, and Sarah Phipps.
 31. See depositions in Francis McHarry et al. v. Louisville and Portland Canal Company, Case 12094, 1856, Jefferson County Chancery Court, Kentucky State Library and Archives, Frankfort, KY; Dan Walsh, Jr.,

"Dan and Ike Batman, Pioneer Draymen," *Courier-Journal*, 2 July 1916.

32. See depositions in Francis McHarry et al. v. Louisville and Portland Canal Company, Case 12094, 1856, Jefferson County Chancery Court, Kentucky State Library and Archives, Frankfort, KY.

33. *Ibid.*; *Louisville Courier*, 19 June 1852, reported the *Hungarian* accident; for similar accidents see *Louisville Courier*, 11 Mar. 1851 and *Louisville Journal*, 24 Mar. 1852.

34. Francis McHarry et al. v. Louisville and Portland Canal Company, Case 12094, 1856, Jefferson County Chancery Court, Kentucky State Library and Archives, Frankfort, KY, encloses Watt's cost estimates (see also depositions of Elijah Stuart, 4 Sept. 1856, and Enoch Lockhart, 10 Sept. 1856); James Marshall to James Guthrie, 7 Aug. 1856, Entry 445, NARG56.

35. *Louisville Courier*, 24 Sept. 1856; *Louisville Journal*, 24 Sept., 6 Oct., and 5 Nov. 1856.

36. James Marshall to James Guthrie, 4 Oct. 1856, Entry 445, NARG56; *Louisville Journal*, 29-30 Sept., 1-4 Oct. 1856.

37. *Louisville Journal*, 6, 21-22 Oct., 1-4 Nov. 1856, 5 Feb. 1861; U.S., Cong., House, Louisville and Portland Canal, H. Exec. Doc. No. 33, 34th Cong., 3d Sess, 1857, pp. 1-2.

38. *Louisville Journal*, 16-18 Feb. 1857; *Courier-Journal*, 4-7 and 20 Oct. 1875; New Albany, IN, *Ledger-Tribune*, 19 May 1996; Charles E. Parrish, "Looking Back," *Falls City Engineer* (Mar. 1988):5. The tomb is on the Indiana bank at Beeler Landing, River Mile 619.3.

39. David Dryden v. Commonwealth of Kentucky, 1854, reported in 16 B. Monroe 598 (55 KY 598); *Louisville Journal*, 9 Oct. 1856.

40. U.S. Cong., Senate, Message from the President to the Two Houses of Congress, Sen. Exec. Doc. No. 11, 35th Cong., 1st Sess., 1858, pp. 303-15; *Louisville Journal*, 13 June, 24 July, 9 Oct. 1856.

41. U.S. Cong., Senate, Message from the President to the Two Houses of Congress, Sen. Exec. Doc. No. 11, 35th Cong., 1st Sess., 1858, pp. 303-15; *Louisville Journal*, 9, 27-29 Oct. 1856.

42. *Louisville Journal*, 18 and 30 May 1857, 4, 7-8 Oct. 1858.

43. *Louisville Journal*, 10, 20, 27 Nov., 12 Dec. 1856; 26 Feb., 26 Mar., 16 Apr. 1857, 25-27 Mar. 1866. *Louisville Journal*, 25 Mar. 1858, reported the aerial telegraph wire from Louisville to Jeffersonville, frequently broken by passing boats, was replaced with an insulated cable buried in the river bottom.

44. U. S. Cong., Senate, Message from the President to the Two Houses of Congress, Sen. Exec. Doc. No. 11, 35th Cong., 1st Sess., 1858, pp. 290-98; Letters and

Reports Sent by the Office of Improvement of the Western Rivers, Entry 338, NARG77, contains Abert's correspondence. He is quoted from his fiscal year report of 30 June 1859.

45. *Louisville Journal*, 5 Nov. 1856; James Marshall to James Guthrie, 23 Dec. 1856, Entry 445, NARG56; U. S., Cong., House, Louisville and Portland Canal, H. Exec. Doc. No. 33, 34th Cong., 3d Sess, 1857, passim.

46. James Marshall to James Guthrie, 23 Dec. 1856, Entry 45, NARG56; U. S., Congress, Senate, Committee on Roads and Canals, Enlarging and Improving the Louisville and Portland Canal, Sen. Comm. Report No. 371, 34th Cong., 3d Sess., 1875, passim; *Louisville Journal*, 6 Mar. 1857.

47. Ford, *History of the Ohio Falls Counties*, 1:490-91; Dugan, "James Guthrie: His Interests in Internal Improvements in Kentucky from 1820 to 1869," pp. 33, 62-72; *Louisville Journal*, 30 May 1860. For early history of the railroad, see Thomas D. Clark, *The Beginning of the L&N* (Louisville, KY: Standard Printing, 1933).

8: SCOWDEN LOCKS AT WAR

1. Maurice Joblin, *Cincinnati Past and Present* (Cincinnati, OH: Elm Street Printing, 1872), pp. 373-77.

2. *Ibid.*; *Louisville Journal*, 5 Mar. 1857; "Louisville Water Company Pumping Station," National Register of Historic Places Nomination, Historical Archives, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

3. Joblin, *Cincinnati Past and Present*, pp. 373-77; *Courier-Journal*, 7 Jan. 1876 (Ransom T. Scowden biography); Jonas Rhorer to John Caperton, 13 Aug. 1872, John Caperton Papers, Filson Club, Louisville, KY; *Louisville Journal*, 26 May 1859.

4. *Louisville Journal*, 8-11 Mar. 1856, 4-22 Mar. 1858, 14 Dec. 1860, 28 Jan. 1861; Patricia Buckler, "Mark Twain on the Rocks at Louisville," *Filson Club History Quarterly* 60(April 1986):257-63. Buckler points out Twain's memory did not conform to the facts.

5. *Louisville Journal*, 9 and 18 July 1857, 21-23 Nov. 1857, 1 Mar. 1858, 29 June 1858, 18 May 1859, 21 Dec. 1859, 24 Jan. 1860.

6. *Louisville Journal*, 20 Mar. 1858; *Congressional Globe*, 42d Cong., 3d Sess., 1873, appendix, p. 132, reprints the Maryland resolution of 1 Mar. 1858; ARCE, 1882, p.1886, reports that Cobb forbid the canal directors to apply toll revenues to the enlargement construction.

7. The condemnation records are Case 47504, 1858, Jefferson County Circuit Court, Common Law, Kentucky State Library and Archives, Frankfort, KY.

8. *Louisville Journal*, 15 June 1859.

9. Report of Committee on the Best Mode of Improving Navigation at the Falls of the Ohio (Cincinnati, OH: Gazette Printing, 1859), passim; Louisville Journal, 24-30 June 1859.
10. Louisville Journal, 30 June and 19 July 1859; Report of Committee on the Best Mode of Improving Navigation at the Falls of the Ohio, passim; Courier-Journal, 29 Feb. 1872; James Marshall to Howell Cobb, 21 Jan. 1860, Entry 445, NARG56, reported the company spent \$26,705 purchasing land for the branch canal and would expend another \$6,000 to acquire a few lots in Portland.
11. Courier-Journal, 29 Feb. 1872; ARCE, 1882, pp. 1885-86; Joblin, Cincinnati Past and Present, pp. 375.
12. Louisville Journal, 6 Jan. 1860, 5 June and 22 Dec. 1866, print Scowden's plans.
13. Congressional Globe, 36th Cong., 1st Sess., March 14, 1860, pp. 1173-76; Louisville Journal, 25 May 1860; ARCE, 1873, p. 539.
14. Joblin, Louisville Past and Present, pp. 340-44; Louisville Journal, 30 May, 6 June 1860, and 5 June 1866; Congressional Globe, 42d Cong., 3d Sess., 1873, appendix, p. 133; Louisville Journal, 3 Sept. 1866 (Dean Richmond obit.).
15. Louisville Journal, 18 May 1860, 17 and 21 Aug. 1860, 5 June 1866; Leland R. Johnson, *Men, Mountains and Rivers: A History of the Huntington District* (Huntington, WV: U.S. Army Engineer District, 1977), pp. 61-62; Louisville Journal, 5 Dec. 1854, 16 Apr. 1868; Louisville and Portland Canal Company v. John Gray heirs, Case 49399, 1860, Jefferson County Chancery Court, Kentucky State Library and Archives, Frankfort, KY.
16. Louisville Journal, 25 Sept., 14 Nov. 1860, 5 June 1866.
17. Louisville Journal, 17 Sept., 15 and 30 Oct. 1860, 6 June 1861, 5 June 1866.
18. Joblin, Cincinnati Past and Present, p. 375.
19. Louisville Journal, 5 and 19 Nov 1860, 9 Jan. 1861.
20. Louisville Journal, 1 Apr. 1861. Other leaders were Charles Hart, Melvin Rhorer, J. M. Huston, and George Mullikin.
21. Baird's History of Clark County, Indiana, p. 160; Louisville Journal, 3 Sept. 1861; Kleber, ed., Encyclopedia of Louisville, p. 194; Gary L. Williams, "James and Joshua Speed: Lincoln's Kentucky Friends," (Ph.D. dissertation, 1971, Duke University), pp. iii-iv; Robert E. McDowell, *City of Conflict: Louisville in the Civil War, 1861-1865* (Louisville, KY: Civil War Round Table, 1962), pp. 35-39.
22. Louisville Journal, 18-19, 23 and 26 Apr. 1861; William G. Eidson, "Louisville, Kentucky during the First Year of the Civil War," Filson Club History Quarterly 38(July 1964):232.
23. McDowell, *City of Conflict*, pp. 22-23; Louisville Journal, 2 May and 26-29 June 1861; U. S. Navy Department, *Official Records of the Union and Confederate Navies in the War of the Rebellion* (Washington, DC: Government Printing Office, 1908), Series 1, Vol. 22, pp. 289-92. Other Island Home Guard officers were Capt. John M. Huston and Sergeant William Tuell.
24. Louisville Journal, 15-16, 25-27 May, 7, 11-14 June 1861.
25. Louisville Journal, 9 July, 8 Aug. 1861; ARCE, 1873, pp. 536-37, lists canal toll receipts, 1831-1872, and list receipts for 1861 of \$42,650 and 1862 of \$69,936 compared to \$131,917 in 1860. Joblin, Cincinnati Past and Present, p. 375.
26. Louisville Journal, 6-7, 24 Sept. 1861; John E. Kleber, ed., *The Kentucky Encyclopedia* (Lexington, KY: University Press of Kentucky, 1992), pp. 192-93; Eidson, "Louisville, Kentucky during the First Year of the Civil War," p. 233.
27. Rachel Varble, "Notes on Captain Pinkney Varble," Historical Files, Filson Club, Louisville, KY; U. S. Navy Department, *Official Records of the Union and Confederate Navies in the War of the Rebellion*, Series 1, Vol. 23 (Washington, DC: Government Printing Office, 1910), pp. 125-27, 131, 143; Louisville Journal, 4 Mar. 1861.
28. Louisville Journal, 16, 21, 23, 26 Sept. 1861, 21 July 1863; Louisville Commercial, 24 Feb. 1886, mentioned Varble's thirteen trips, reporting his second busiest day was 22 Feb. 1886 when he made eleven trips with towboats and coal barges down the Falls.
29. Louisville Journal, 22-30 Nov., 2 Dec. 1861, and 26 Feb. 1862.
30. Louisville Journal, 20-24 Jan., 14 Feb., 28 Apr., 16-23 May 1862, 2 Feb. 1864.
31. Joblin, Cincinnati Past and Present, p. 375.
32. Louisville Journal, 22 Feb., 13 Sept. 1862.
33. Joblin, Cincinnati Past and Present, pp. 375-76; Kleber, ed., *The Kentucky Encyclopedia*, pp. 193-94.
34. U. S., War Department, *The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies* (70 vols. in 128; Washington, DC: Government Printing Office, 1880-1901), Series 1, Vol. 16, pp. 544-45 (cited hereafter as O.R.).
35. O.R., Series 1, Vol. 16, pp. 506, 532-33; McDowell, *City of Conflict*, pp. 80-89.
36. McDowell, *City of Conflict*, p. 542; Louisville Journal, 25-27 Sept. and 17-30 Oct. 1862; Joblin, Cincinnati Past and Present, p. 376.

37. Louisville Journal, 25-27 Sept. and 17-30 Oct. 1862; Varble, "Notes on Captain Pinkney Varble," passim; Joblin, *Cincinnati Past and Present*, p. 376. Varble removed the Portland ponton bridge on Oct. 17 and the Louisville bridge on October. 30; while in place the bridges were extensively used.
38. Louisville Journal, Oct. 24 and 28, 1862, 5 Jan. 1863; Way's Packet Directory, p. 405.
39. Louisville Journal, 8 Jan. and 31 Jan. 1863.
40. Louisville Journal, 13 and 21-23 Feb. 1863; Joblin, *Cincinnati Past and Present*, p. 376. Construction records do not name the contractors' three towboats. Newspaper accounts, however, identify the *Clifton* as one, and the *Monongahela*, which towed dredges to Vicksburg, may have been another.
41. Louisville Journal, 11 Oct. 1862, 13 Aug. 1863; Joblin, *Cincinnati Past and Present*, p. 376. Marshall died on 12 Aug. 1863; when Guthrie had become president of the University of Louisville, he made Marshall its treasurer.
42. Louisville Journal, 21, 25 Apr., 6 May, 20 June, 15 July 1863. Manufactured by the American Arms Company of New York, the repeating gun splashed a target in the river a thousand feet from the canal. Louisville officials did not permit the *Idahoe* to land its cargo at Louisville; it went on to Cincinnati.
43. O.R., Series 1, Vol. 23, pp. 347-49; Louisville Journal, 9 July 1863; Kleber, ed., *Encyclopedia of Louisville*, pp. 199, 457.
44. Louisville Journal, 9-11 July 1863; U. S. Navy Department, *Official Records of the Union and Confederate Navies in the War of the Rebellion*, Series 1, Vol. 25, pp. 239-44; McDowell, *City of Conflict*, pp. 148-51.
45. Kleber, ed., *Encyclopedia of Louisville*, pp. 197-99; Johnson, *Falls City Engineers*, pp. 110-13; Louisville Journal, 10 and 20 Aug. 1864; O.R., Series 1, Vol. 49, pp. 273-75, 642-44; Charles Messmer, "Louisville during the Civil War," *Filson Club History Quarterly* 52(Apr. 1978):206-33; McDowell, *City of Conflict*, pp. 171-76.
46. Joblin, *Cincinnati Past and Present*, pp. 376-77; Louisville Journal, 9 Sept. 1865.
47. Louisville Journal, 3, 16, 25-27 Feb. 1864.
48. Baird's *History of Clark County, Indiana*, pp. 161-63; Kleber, ed., *Encyclopedia of Louisville*, p. 199; Louisville Journal, 28 Sept. 1864, 3 Feb. 1865; Messmer, "Louisville during the Civil War," p. 226.
49. Joblin, *Cincinnati Past and Present*, pp. 376-77; Louisville Journal, 5 June 1866; *Courier-Journal*, 29 Feb. 1872.
50. James Henning to James Guthrie, 7 Apr. 1866, James Guthrie Papers, Manuscript Division, Filson Club, Louisville, KY; Louisville Journal, 22 Dec. 1866.
51. Louisville Journal, 21, 25-26 Jan. 1865.
52. Louisville Journal, 3-4, 10, 18 Mar. 1865, 9 Mar. 1866. Of the 7 monitors, 5 were built at Cincinnati: *Catawba*, *Klamath*, *Oneota*, *Tippecanoe*, *Yuma*; and 2 at Pittsburgh: *Manayunk* and *Umpqua*. Three steam rams completed at New Albany were *Avenger*, *Vindicator*, and *Tuscumbia*.
53. Louisville Journal, 5-6, 11, 16 April 1865.
54. Louisville Journal, 3, 24 May 1865; Alfred Pirtle, "River Reminiscences No. 3," Manuscript Division, Filson Club, Louisville, KY.
55. Joblin, *Cincinnati Past and Present*, pp. 376; *Courier-Journal*, 29 Feb. 1872.
56. Joblin, *Cincinnati Past and Present*, pp. 376; Louisville Journal, 5 June 1866.
57. *Courier-Journal*, 29 Feb. 1872; Louisville Journal, 5 June 1866.
58. U.S., Congress, House, River and Harbor Improvements, H. Exec. Doc. No. 56, 39th Cong., 2d Sess., 1869, pp. 317-18; Trescott, "The Louisville and Portland Canal Company, 1825-1875," pp. 704-05; John Bogart, "William Milnor Roberts," *Transactions of the American Society of Civil Engineers* 36 (Dec. 1896):531-37.

9: WEITZEL'S PROJECT

1. Louisville Journal, 9 July and 22 Dec. 1866. Cincinnati's delegates were Theodore Cook, William Glenn, and R. M. Bishop.
2. *Ibid.*, 1 and 20 Mar. 1867.
3. William Gallagher to Sec. of Treasury H. McCulloch, 5 and 24 June 1867, Entry 440, NARG56; Louisville Journal, 16 May 1867.
4. Joint Resolution of March 29, 1867, in U. S. Army Corps of Engineers, *Laws of the United States Relating to the Improvement of Rivers and Harbors* (3 vols.; Washington, DC: Government Printing Office, 1913), I:167 (cited hereafter as *Laws of the United States*); Louisville Journal, 30 Mar. and 28 June 1867.
5. ARCE, 1867, pp. 38-39; James H. England, "Godfrey Weitzel," *Professional Memoirs, Corps of Engineers* 10(Sept. 1918):747-50.
6. Louisville Journal, 6 June and 25 Nov. 1865, Godfrey Weitzel biographical file, Historical Collection, Office of History, U. S. Army Corps of Engineers, Humphreys Engineer Center, Alexandria, VA. The Virginia Campaign, 1864 and 1865 (reprint of 1883 edition. New York: Da Capo Press, 1995), relates Weitzel's role in the campaign to take Richmond. Of all Union army commanders, Weitzel may be the only officer lacking a scholarly biography.

7. Undated news clip attached to William Gallagher to Sec. Of Treasury H. McCulloch, 24 June 1867, Entry 440, NARG56; Louisville Journal, 15 July 1867.
8. Joblin, Cincinnati Past and Present, p. 377; Courier-Journal, 7 Jan. 1876 (Ransom T. Scowden biography).
9. U. S. Congress, House, Ship Canal around the Falls of the Ohio River, H. Exec. Doc. No. 181, 40th Cong., 2d Sess., 1868, pp. 1-12; Louisville Journal, 26 and 29 July 1867.
10. Louisville Journal, 27 Apr. 1864, 12-14 Jan., 9 Aug. 1865, 23 Jan, 19 Aug., 6 and 20 Nov. 1866, 6 June and 11 July 1867; Albert Fink, "Bridge Over the River Ohio at Louisville," Engineering (22 May 1868), p. 507.
11. Louisville Journal, 2 Aug. 1867.
12. Ibid., 8 and 28 Aug., 28 Sept., 23 Oct., 23 Nov., 6 Dec. 1867.
13. Ibid., 18 May, 24 Sept. 1867, 3 Jan. 1868.
14. Ibid., 10 Jan. and 2 July 1868; U. S. Congress, House, Ship Canal around the Falls of the Ohio River, H. Exec. Doc. No. 181, 40th Cong., 2d Sess., 1868, p. 12.
15. Louisville Journal, 21 April 1868. Courier-Journal, 18 Sept. 1871, prints a brief list of Louisville-owned steamboats.
16. Louisville Board of Trade, contract with Pink Varble, 16 Aug. 1867, Manuscript Division, Filson Club, Louisville, KY; Louisville Journal, 30 Mar. 1867.
17. Louisville Journal, 13 May, 1 June 1867; Courier-Journal, 28 Mar. 1869. For the *Fire King* (aka *Allena May*), see Louisville Journal, 13 May, 21, 26 June, 11 July, 26 Aug., 2-5, 25 Sept., 16 Dec. 1867. In 1867 also, the Navy experimented with petroleum fuel aboard the gunboat *Palos*.
18. Louisville Journal, 23 Oct. 1867; U. S. Congress, House, Ship Canal around the Falls of the Ohio River, H. Exec. Doc. No. 181, 40th Cong., 2d Sess., 1868, pp. 1-12; ARCE, 1873, pp. 529-30.
19. ARCE, 1868 (printed in Annual Report, Secretary of War, Serial 1368, Pt.2, dated Oct. 20, 1868), p. 532, 553.
20. Ibid., pp. 56, 538-39; ARCE, 1882, p. 1887; U. S. Congress, House, Ship Canal around the Falls of the Ohio River, H. Exec. Doc. No. 181, 40th Cong., 2d Sess., 1868, p. 12; Louisville Journal, 4 Mar. 1868.
21. ARCE, 1868, p. 56; ARCE, 1869, pp. 47-49, 277-79; ARCE, 1882, p. 1888; Laws of the United States, I:174; Courier-Journal, 9 Apr. 1869.
22. ARCE, 1882, pp. 1888-89; Courier-Journal, 4 Feb. 1869. Johnson and Parrish, Kentucky River Development, pp. 32-33, 105-19, details cribdam design and prints photographs of their construction. Weitzel initially proposed a stone-masonry dam on the Falls crest, but changed to a cribdam to reduce costs.
23. Congressional Globe, 12 Feb. 1869, pp. 1130-39, 1165-71; Louisville Journal, 18 Sept. 1868, 24 Jan. and 4-5 Feb. 1869; ARCE, 1869, pp. 47-49; Courier-Journal, 16 Apr. 1869. In ARCE, 1882, p. 1889, Weitzel explained, "In the summer of 1869 the merchants, manufacturers, and steamboat owners of this valley, seeing the slow progress of the work, owing to the small amounts allotted to it, again took hold of this matter with great earnestness and determination." Congress in 1870 appropriated \$250,000, \$450,000 in 1871, and \$300,000 in 1872, allowing completion of the canal enlargement.
24. Louisville Journal, 9 July 1868; Courier-Journal, 16 Nov. 1868. Derrickman Smith had come to Louisville from Nashville, where he worked on the Fink iron-truss bridge spanning the Cumberland.
25. Louisville Journal, 23-25 July, 9 Aug., 15 Nov. 1867, 19 Mar, 2-7 and 16-19 Apr., 29 May, 31 July, and 15 Nov. 1868; Courier-Journal, 13 Apr. 1872.
26. Louisville Journal, 21 July 1868; ARCE, 1882, p. 1891.
27. Courier-Journal, 14-15, 20 March 1869; Dugan, "James Guthrie: His Interests in Internal Improvements in Kentucky from 1820 to 1869," passim.
28. ARCE, 1882, pp. 1887-88.
29. ARCE, 1870, pp. 382-89; Cincinnati Board of Trade, Report of the Committee on River Navigation (Cincinnati, OH: Gazette Co., 1870), pp. 1-8; Louisville Board of Trade, The City of Louisville and a Glimpse of Kentucky (Louisville, KY: Courier Journal, 1887), n. p.; Courier-Journal, 13, 18-19, 26 Feb., and 14 Mar. 1870; Cincinnati Commercial, 14 June 1870. The *Richmond* carried so many passengers that Will Visscher, formerly river reporter of the Louisville Journal, published a daily newspaper aboard ship; loaded, it drew nine feet of water and the canal had only a six-foot depth.
30. Courier-Journal, 21, 25-28 July, 4, 12, 26, 31 Aug., 25 Sept., 17 Nov. 1870. The employee killed was Charles Briscoe of Louisville.
31. Courier-Journal, 21 and 27 Oct. 1870.
32. Ibid., 22 Oct., 17-19, 21, 23 Nov. 1870.
33. Ibid., 7 Dec. 1870; ARCE, 1871, pp. 457-67; ARCE, 1875, p. 781.
34. ARCE, 1871, pp. 457-67.
35. Ibid.; Courier-Journal, 21, 25 Apr., 24 June, 11, 15 Aug. 1871.
36. Ibid., 8 Sept., 21 Oct., 2 and 8 Nov. 1871.
37. Ibid. Confined to American engineers, the list omitted famed international engineers as Ferdinand De Lesseps, who completed the Suez Canal in 1869, and Sir Charles Hartley who opened the Danube River

to navigation in 1870. Hartley inspected the Louisville canal in 1874; see C. W. S. Hartley, *A Biography of Sir Charles Hartley, Civil Engineer: the Father of the Danube* (2 vols.; Lewiston, NY: Edwin Mellon Press, 1989), 1:326-27.

38. *Courier-Journal*, 22-23 Nov. 1871; ARCE, 1872, pp. 452-57.

39. Godfrey Weitzel, *Lock-Gates*. Translation of Notes Accompanying Drawings Concerning Construction of Iron Lock-Gates for Harbors of Weser River, Germany (pamphlet; Washington, DC, 1873), passim; ARCE, 1872, p. 458-49. George Stealey had been resident engineer at Kentucky River Lock and Dam No. 1 and was Louisville city engineer from 1866 to 1870.

40. ARCE, 1872, pp. 442-61; *Courier-Journal*, 10-11 Jan., 11 and 29 Feb. 1872.

41. *Courier-Journal*, 27-29 Feb., 12 Apr. 1872. Ransom T. Scowden later directed construction of a Cleveland steel mill, designed the Atlanta, Georgia, water system, and in 1876 was elected Louisville's city engineer; see *Courier-Journal*, 7 Jan. 1876.

42. *Courier-Journal*, 3 Mar. 1872.

43. *Ibid.*, 22 Mar. 1872.

44. *Ibid.*, 22 Mar. and 7 Sept. 1872.

10: THE FEDERAL CANAL

1. *Louisville Journal*, 5 June 1866; Lewis Collins and Richard H. Collins, *History of Kentucky* (2 vols. Reprint of 1874 edition. Berea, KY: Kentucke Imprints, 1976), 1:246; *Courier-Journal*, 11 June 1874; ARCE, 1875, p. 778; Gary L. Williams, "James and Joshua Speed: Lincoln's Kentucky Friends," (Ph.D. dissertation, 1971, Duke University, Durham, NC), passim; see Jonas Rohrer's letters to John Caperton, in John Caperton Papers, Manuscript Division, Filson Historical Society, Louisville, KY.

2. *Louisville Journal*, 15 Sept. and 25 Nov. 1865; Godfrey Weitzel biographical file, Historical Collection, Office of History, U. S. Army, Corps of Engineers, Humphreys Engineer Center, Alexandria, VA. In Godfrey Weitzel to Andrew Humphreys, 7 and 9 March 1870, "Letters Received, 1865-70," NARG77, he emphasized he was the only commander of a Corps of black troops during the war.

3. *Courier-Journal*, 26, 30 Jan., 4, 7, 16, 22 Feb., 22 Mar. 1872.

4. *Ibid.*, 13 Feb. 1872; ARCE, 1873, pp. 534-35.

5. *Courier-Journal*, 28 Mar. 1872; ARCE, 1873, pp. 534-35.

6. *Courier-Journal*, 30 Apr., 3-9, 28 May, 19 June, 12 Nov. 1872, 29 Oct. 1873; Collins, *History of Kentucky*, 1:246.

7. Laws of the United States, I:204-05 (Rivers and Harbors Act, 10 June 1872); *Courier-Journal*, 23 May, 18 June 1872; ARCE, 1872, pp. 444-52.

8. ARCE, 1872, pp. 444-52.

9. Jonas Rohrer to John Caperton, 10 Aug. 1872, John Caperton Papers, Manuscript Division, Filson Historical Society, Louisville, KY.

10. *Ibid.*; *Courier-Journal*, 9-13 Aug. 1872; U. S., Congress, Senate, Report of the Select Committee on Transportation Routes to the Seaboard, Sen. Rept. No. 307, 43d Cong., 1st Sess., 1874, p. 544.

11. *Courier-Journal*, 13 July, 14 Aug. 1872.

12. ARCE, 1872, pp. 444-52; *Courier-Journal*, 3 Sept., 28 Oct., 27 Nov. 1872.

13. ARCE, 1873, pp. 526-40; *Courier-Journal*, 7 Mar. 1873.

14. *Courier-Journal*, 7 Mar., 20 Oct. 1873; Laws of the United States, 1:214 (act of 3 Mar. 1873).

15. ARCE, 1874, pp. 566-69; John W. Larson, *Essayons: A History of the Detroit District, U. S. Army Corps of Engineers* (Detroit, MI: U. S. Army Engineer District, 1981), pp. 82-84.

16. *Courier-Journal*, 26-28 Mar., 4 Apr., 7 May, 16 Oct. 1873; Jonas Rohrer to John Caperton, 10 and 13 Aug., 26 Sept. 1872, 6 and 21 Aug., 6 Nov. 1874, John Caperton Papers, Manuscript Division, Filson Historical Society, Louisville, KY. Smith Speed was the brother of Joshua and James Speed.

17. *Courier-Journal*, 1-3 Oct. 1873; Leland R. Johnson, *The Davis Island Lock and Dam, 1870-1922* (Pittsburgh, PA: U.S. Army Engineer District, 1985), pp. 21-27.

18. Collins, *History of Kentucky*, 1: 246; *Courier-Journal*, 29-30 Oct. 1873; Howard B. Schonberger, *Transportation to the Seaboard: The "Communication Revolution" and American Foreign Policy, 1860-1900* (Westport, CT: Greenwood Press, 1971), analyzes the Senate committee's activities.

19. *Courier-Journal*, 5 June 1869, 23 Jan. 1874; *Murphy v. Louisville and Portland Canal Company*, Case 55, 2 May 1873, in W. P. D. Bush, *Reports of Selected Civil and Criminal Cases Decided in the Court of Appeals of Kentucky* (Louisville: John P. Morton, 1875), pp. 522-34.

20. *Courier-Journal*, 13 Mar., 2 Apr., 4 Dec. 1874; R. W. Taylor to Benjamin Bristow, 20 Nov. 1874, Entry 445, NARG56.

21. *Courier-Journal*, 21 Jan., 6 May 1874; Laws of the United States, 1:222-24 (act of 11 May 1874).

22. *Courier-Journal*, 13 May 1874; "William Shakespeare Hays," in Dumas Malone, ed., *Dictionary of American Biography* (New York: Charles Scribner's Sons, 1943), 8:464.

23. *Courier-Journal*, 3, 11, 13, 17 June 1874; ARCE, 1875, pp. 776-82.
24. *Laws of the United States*, I:214; *Courier-Journal*, 30 Apr. 1874; *Biographical Encyclopedia of Pennsylvania*, pp. 369-70.
25. *Courier-Journal*, 11 and 13 June 1874; *Way's Packet Directory*, p. 78.
26. R. W. Taylor to Benjamin Bristow, 20 Nov. 1874, Entry 445, NARG56; *Courier-Journal*, 4 Dec. 1874; Jonas Rohrer to John Caperton, 18 June 1874, John Caperton Papers, Manuscript Division, Filson Historical Society, Louisville, KY.
27. ARCE, 1875, p. 778; *Courier-Journal*, 6 Jan. 1875; *Louisville Times*, 22 and 27 May 1893; *Louisville Commercial*, 27 May 1893. In 1876 Hays, Lockhart, and Varble organized a rivermen's association to support Democrat Samuel Tilden for the presidency; see *Courier-Journal*, 9 July 1876.
28. ARCE, 1870, pp. 163-68. The Corps employed crews for snagboats, dredges, and floating plant as early as the 1820s, but these were temporary personnel, normally employed during the boating season and laid off during winters.
29. *Courier-Journal*, 4 Mar. 1874; History Office, U. S. Army Corps of Engineers, *The History of the U. S. Army Corps of Engineers* (Washington, DC: Office of the Chief of Engineers, 1998), p. 145; ARCE, 1875, pp. 774-82.
30. ARCE, 1875, pp. 774-82; ARCE, 1876, pp. 747-67.
31. *Courier-Journal*, 18 July 1874.
32. *Courier-Journal*, 25 May, 4 Dec. 1874, 3 Jan., 17 Mar., 19 Apr. 1875.
33. *Louisville Journal*, 8 Aug., 15 Oct. 1867; *Courier-Journal*, 4 June, 1869, 1 and 5 June, 4 and 20 July, 13 Aug. 1873, 19 Sept. 1874, 16 and 27 July, 12 Oct. 1875, 28 May 1876; Carolyn Brooks, "Life along the Ohio: Recreational uses of the Ohio River in Jefferson County, Kentucky" (1997 manuscript. Historical Archives, Public Affairs Office, U. S. Army Engineer District, Louisville, KY), *passim*.
34. Brooks, "Life along the Ohio: Recreational uses of the Ohio River," *passim*; *Courier-Journal*, 4 July 1870, 28 Aug. 1873, 5 Mar. 1874, 8 Aug. 1875.
35. *Courier-Journal*, 4, 11, 22 Nov. 1873, 25 Aug., 30 Sept., 10, 15 Nov. 1874, 7 Feb. 1875.
36. *Courier-Journal*, 8 Apr. 1869, 22 Nov. 1873, 25 July, 10 Nov. 1874; Testimony of Pink Varble, 25 Aug. 1888, File 4254, Box 23, Letters Received, Corps of Engineers, 1888-89, NARG77. Pink Varble became a Falls pilot in 1852, William in 1862, Richard in 1868, and Dan in 1873. John Littrell became an Indiana Falls pilot in 1875. Dan Varble was still a Falls pilot in 1912 when he died at Louisville wharf while boarding a boat to take it over the Falls.
37. *Courier-Journal*, 8 Dec. 1874.
38. *Ibid.*
39. *Courier-Journal*, 4 Dec. 1874, 7 Jan., 21 Dec. 1875; ARCE, 1876, pp. 755-65.
40. *Courier-Journal*, 3 and 7 Jan. 1875.
41. *Ibid.*, 17 Jan. 1875.

11: HEROES OF THE FALLS

1. "William Shakespeare Hays," in Dumas Malone, ed., *Dictionary of American Biography*, 8:464; "William Shakespeare Hays," in Kleber, ed., *Encyclopedia of Louisville*, pp. 378-79; George C. Grise, "Will S. Hays, His Life and Works," (MA thesis, 1947, Western Kentucky University, Bowling Green, KY), *passim*.
2. Kleber, ed., *Encyclopedia of Louisville*, pp. 378-79. See comments on Hays by his competitor Will Visscher in *Louisville Journal*, 27-28 July, 6-8 Aug. 1868; Hays became passenger agent for the U. S. Mail Line packets in June 1876; see *Courier-Journal*, 24 June 1876.
3. *Courier Journal*, 4 Feb. 1869, 29 Apr., 7 June 1870.
4. *Courier-Journal*, 28 July 1876, 1 Jan. 1880 (the drayman was John H. Mossup); Dan Walsh, Jr., "Dan and Ike Batman, Pioneer Draymen," *Courier-Journal*, 2 July 1916.
5. *Cong. Record*, 48th Cong., 1st Sess., 1884, p. 5739; *Courier-Journal*, 16 Sept. 1873 and 15-16 Feb. 1883 listed Shippingport's population at about 1,300.
6. *Courier-Journal*, 20 Oct. 1879, 1 Jan. 1880; *ibid.*, 22 Mar. 1876, prints a Cincinnati Board of Trade report on changing steamboat commerce. Cincinnati steamboats before 1865 were adapted in size to the Louisville locks and carried from 300 to 800 tons; but by 1876 they carried 500 to 2,000 tons, cheapening transportation costs because the same crew served a steamer carrying as much as two to three steamers did before 1865. Freight rates from Cincinnati to New Orleans, 30-40 cents per hundred pounds before the war, declined to 20-25 cents per hundred.
7. *Ibid.*, 26 July 1874, 21 Jan. 1875, 20 Oct. 1879, 1 Jan. 1880; *Biographical Directory of the American Congress, 1774-1971*, p. 1934.
8. ARCE, 1878, pp. 780-81.
9. ARCE, 1877, p. 610-18.
10. ARCE, 1876, pp. 755-65; ARCE, 1878, pp. 769-94; *Courier-Journal*, 28 Jan. 1876.
11. ARCE, 1877, pp. 605-24; ARCE, 1878, pp. 772, 787; ARCE, 1880, pp. 1723-35; John C. Oakes, "Works at the Falls of the Ohio, Louisville, Ky.," *Military Engineer* 6(Sept.-Oct. 1914):570.

12. ARCE, 1875, pp. 782-83; *Courier-Journal*, 8 Dec. 1874, 23 June 1875.
13. ARCE, 1878, pp. 781-82; ARCE, 1879, p. 1283-98; Godfrey Weitzel to George Davis, 14 July 1879, Godfrey Weitzel Papers, Cincinnati Historical Society, Cincinnati, OH; *Courier-Journal*, 27 Jan. and 19 Apr. 1875, 6 May 1880; ARCE, 1881, p. 1904.
14. ARCE, 1875, pp. 772-76, 784-85.
15. ARCE, 1876, pp. 747-67.
16. *Ibid.*; Cong. Record, 49th Cong., 1st Sess., 1886, p. 3592; *Laws of the United States*, 1:601-02.
17. ARCE, 1876, pp. 747-67; *Courier-Journal*, 10 and 29 Aug. 1875; ARCE, 1877, p. 616; ARCE, 1896, p. 2234.
18. *Courier-Journal*, 12, 16-17, 20 Mar. 1876; Peter Lyon, "The Fearless Frogman," *American Heritage* 11(Apr. 1960):37-39, 92-93.
19. *Courier-Journal*, 22 Mar., 12 Apr. 1876, 18 Apr. 1926.
20. *Ibid.*, 22-23 Mar. 1881, 6 Mar. 1882; Hopkins, *Steamboats at Louisville*, p. 159; Cong. Record, 48th Cong., 1st Sess., 1884, p. 5739.
21. *Courier-Journal*, 16, 26 July, 2 Aug. 1879, 29 Jan., 8 Apr. 1880, 27-28 May 1881, 18 Apr. 1926; Dennis R. Means, "A Heavy Sea Running: The Formation of the U.S. Life-Saving Service, 1846-1878," Prologue 19(Winter 1987): passim. Sumner Kimball was the first and only commander of the Life-Saving Service, 1871-1915.
22. *Courier-Journal*, 18 Apr. 1926. The Broadus became the Belle of Louisville's administrative offices.
23. *Ibid.*, 9, 16, 21 July and 2 Aug. 1876.
24. *Ibid.*, 6 May 1880, 16 Feb. 1884; see the following chapter for discussion of political dissension at the canal.
25. *Ibid.*, 20 Jan. 1876.
26. *Ibid.*, 25 May 1874, 10 Aug., 8 Sept. 1876; ARCE, 1882, pp. 1894-96.
27. ARCE, 1882, pp. 1894-96. See discussions and diagrams of beartraps in Johnson and Parrish, *Kentucky River Development*, pp. 100-01, and Johnson, *Headwaters District*, pp. 136-37.
28. ARCE, 1875, p. 772-85. Photographs of the Boule dam at the Falls and its operations are printed in Johnson, *Falls City Engineers*, pp. 228-29.
29. *Courier-Journal*, 19 Apr. 1875; ARCE, 1878, p. 783; ARCE, 1879, p. 1284; ARCE, 1880, pp. 1723-24; ARCE, 1881, p. 1902; *Courier-Journal*, 1 Nov. 1879 (biography of Capt. Lee).
30. *Courier-Journal*, 18, 20, 28 Jan., 10-12 Nov. 1876.
31. ARCE, 1877, p. 606; ARCE, 1878, pp. 769-72; ARCE, 1881, pp. 1899-02.
32. ARCE, 1881, pp. 1899-02; *Courier-Journal*, 17, 31 Oct., 1, 7-8 Nov. 1879.
33. *Courier-Journal*, 9, 11 Nov., 6, 12-15, 28 Dec. 1879.
34. ARCE, 1881, pp. 1899-02; ARCE, 1882, pp. 1881-82.
35. ARCE, 1881, pp. 1899-02.
36. ARCE, 1882, p. 1879.
37. *Courier-Journal*, 8-13 Nov. 1881.
38. *Ibid.*, 16 Jan. 1881; Pink Varble, testimony of 25 Aug. 1888, File 4254, Box 23, Letters Received, Corps of Engineers, 1888-89, NARG77.
39. Pink Varble, testimony of 25 Aug. 1888, File 4254, Box 23, Letters Received, Corps of Engineers, 1888-89, NARG77; ARCE, 1878, pp. 769-94; ARCE, 1882, 1897-98.
40. *Courier-Journal*, 14 May 1880; U.S., Congress, House, Committee on Railways and Canals, Tolls on the Louisville and Portland Canal, House Rept. No. 348, 46th Cong., 2d Sess., 1880, passim.
41. U.S., Congress, House, Committee on Railways and Canals, Tolls on the Louisville and Portland Canal, House Rept. No. 348, 46th Cong., 2d Sess., 1880, passim; *Laws of the United States*, 1:306, 323 (acts of 18 May and 14 June 1880); ARCE, 1880, pp. 1723-35.
42. ARCE, 1882, p. 1893.
43. *Courier-Journal*, 14 May, 3 July 1880. Hays was unfair in his assessment; railroads paid municipal property taxes, which steamboats did not.
44. Godfrey Weitzel to Samuel Covington, 7 Jan. 1881, Vol. 1, Godfrey Weitzel Papers, Cincinnati Historical Society, Cincinnati, OH; *Courier-Journal*, 7, 15-16 Jan. 1881.
45. *Courier-Journal*, 15-16 Jan., 17 Feb. 1881; Cong. Record, 46th Cong., 3d Sess., 1881, p. 1677.
46. *Courier-Journal*, 7 Jan., 10 Feb., 5, 29 Mar., 3 May 1876, 5 Jan. 1882.
47. *Ibid.*, 16 Jan. 1880.
48. *Ibid.*, 16 and 21 Jan. 1880; Williams, "James and Joshua Speed: Lincoln's Kentucky Friends," pp. 225-26. Like earlier historians, the author searched Corps of Engineers and Treasury Department records at the National Archives and other depositories without finding the boxes of vouchers, receipts, and books kept by Goodwin and Rhorer. He contacted descendants of Rhorer, and he extends his appreciation to Margaret A. Barclay for sharing a portrait of her ancestor and helpful research, but none of his descendants know anything of the canal records. *Courier-Journal*, 30 May 1882, prints obituary of Joshua Speed.
49. *Courier-Journal*, 3, 12, 23 Jan., 3 Feb., 1 and 22 Mar. 1881.

50. *Ibid.*, 26 Jan., 5 Feb., 7, 12, 22 Mar. 1881; Cong. Record, 46th Cong., 3d Sess., 1881, p. 1677; Laws of the United States, 1:346-47 (act of 3 March 1881).

51. *Courier-Journal*, 18 April 1881. This news report has no byline but appears to be Hays' handiwork; it printed a diagram of Sand Island and the canal exit indicating where the boat rolled over.

52. *Ibid.*

53. ARCE, 1883, p. 260; *Courier-Journal*, 28 July 1882. Weitzel died in 1884 at Philadelphia; see biographical file, Historical Collection, Office of History, U.S. Army Corps of Engineers, Humphreys Engineer Center Alexandria, VA., VA; ARCE, 1884, p. 1680, reports Portland Bar dike at Sand Island as 2,581 feet long, built of timbers, iron bolts and spike, and riprap stone.

12: MERRILL AND UNCIVIL SERVICE

1. Lytle Brown, "Federal River and Harbor Policies," *Civil Engineering* 5(Aug. 1935):462.

2. William E. Merrill biographical file, Historical Collection, Office of the Chief of Engineers, U. S. Army, Alexandria, VA; Margaret E. Merrill, "William E. Merrill," *Professional Memoirs, Corps of Engineers* 9(Nov. 1917):639-42.

3. Leland R. Johnson, *The Davis Island Lock and Dam, 1870-1922* (Pittsburgh, PA: U.S. Army Engineer District, 1985), passim; Johnson, *Falls City Engineers*, pp. 157-70.

4. Johnson, *Davis Island Lock and Dam*, pp. 53-57, reviews Merrill's lockgate design challenges and lists sources.

5. *Courier-Journal*, 7 and 18 Sept., 18-19 Oct. 1882.

6. ARCE, 1882, 1897-98; ARCE, 1883, pp. 1539-40.

7. ARCE, 1883, pp. 1539-40; Cong. Record, 48th Cong., 1st Sess., 1884, pp. 5006, 5739; "Granville Wheaton Shaw," *Transactions of the American Society of Civil Engineers* 89(1926):1692-94.

8. ARCE, 1885, pp. 1803-06; ARCE, 1886, pp. 1574-75; ARCE, 1887, pp. 1838-39; Robert R. Jones personnel file, Historical Archives, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

9. ARCE, 1883, pp. 261-62, 1527-28; ARCE, 1884, pp. 1692-97.

10. *Courier-Journal*, 22-26 Feb. 1882.

11. *Ibid.*, 12-14 Feb. 1883.

12. *Ibid.*

13. *Ibid.*, 14-17 Feb. 1883.

14. *Ibid.*

15. *Ibid.*, 14-20 Feb. 1884; the 16 Feb. issue quoted Folwell.

16. *Ibid.*

17. *Ibid.*

18. ARCE, 1884, pp. 1692-97; ARCE, 1887, pp. 1838-39.

19. John L. Vance, *The Great Flood of 1884 in the Ohio Valley* (Gallipolis, OH: author, 1884), passim; Thomas P. Roberts, "Pros and Cons on the Forest and Flood Question," *Professional Memoirs, Corps of Engineers* 5(Sept. 1913):583-84.

20. Leland R. Johnson, "Emergency Response: The Army Engineer Disaster Relief Mission." Draft, 1981, Historical Collection, Office of the Chief of Engineers, U. S. Army, Alexandria, VA), pp. 32-36; *Courier-Journal*, 19-20 Feb. 1884.

21. "Regulation of Western Rivers," *Engineering News* 11(23 Feb. 1884):92; ARCE, 1884, pp. 1689-92; Johnson, *Falls City Engineers*, p. 193.

22. ARCE, 1884, pp. 1689-92; ARCE, 1885, pp. 1796-98; ARCE, 1886, p. 1534; Johnson, *Falls City Engineers*, p. 193.

23. ARCE, 1885, pp. 1795-96; *Courier-Journal*, 24 Nov. 1884.

24. ARCE, 1885, pp. 1795-96.

25. Affidavit of Philip Gebertshan, 31 July 1886, in "Appointments to Various Positions on Louisville and Portland Canal, May 15, 1884-December 14, 1893," Historical Archives, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

26. *Courier-Journal*, 20 Nov. 1884.

27. Oliver Stratton to William Merrill, 3 June 1885, in "Appointments to Various Positions on Louisville and Portland Canal, May 15, 1884-December 14, 1893," Historical Archives, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

28. John Wilson to William Merrill, 9 June 1885, and William Merrill to John Newton, 23 July 1885, *ibid.*

29. *Louisville Democrat*, 19 Nov. 1885; *Courier-Journal*, 8 Oct. 1885.

30. William Merrill to John Newton, 29 Oct. and 23 Dec. 1885, and William Merrill to Pink Varble, 8 Jan. 1886, in "Appointments to Various Positions on Louisville and Portland Canal, May 15, 1884-December 14, 1893," Historical Archives, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

31. Simon Buckner to William Merrill, 11 Jan. 1886, William Merrill to Editor, 3 Feb. 1886, John Wilson to William Merrill, 4 Feb. 1886, and William Merrill to John Newton, 6 Feb. 1886, in *ibid.*; Johnston, *Memorial History of Louisville*, pp. 621-22 (Thomas Taylor biography); *Courier-Journal*, 5 Jan. 1882.

32. William Merrill to John MacLeod, 13 Feb. 1886, and Amos Stickney to J. P. Claybrook, 24 March 1887, in

ibid.; ARCE, 1886, pp. 1574-75; Louisville Commercial, 19 Jan. 1887.

33. Johnson, Davis Island Lock and Dam, *passim*.

34. ARCE, 1886, p. 1569; Louisville Commercial, 24 Feb. 1886.

35. ARCE, 1886, P. 1569; ARCE, 1887, pp. 1838-39; Granville Shaw's inspections and Stickney's reports on these contracts are in "Correspondence, Water Copies," bound volume in Historical Archives, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

36. ARCE, 1889, pp. 1916-17.

37. ARCE, 1884, pp. 1692-97; ARCE, 1885, pp. 1811-13; ARCE, 1887, pp. 1838-39;

38. Kleber, ed., Kentucky Encyclopedia, p. 972; Kleber, ed., Encyclopedia of Louisville, p. 464; Joseph J. Gaynor, "Kentucky and Indiana Terminal Railroad Company," *Filson Club History Quarterly* 44(Apr. 1970):164-69; Laws of the United States, 1:611(act of 30 June 1892). Foster and Creighton Company of Nashville, Tennessee, were the contractors who rebuilt the KIT bridge in 1910 to include a double-track, and partner Wilbur Creighton of this firm was the author's friend and mentor.

39. *Courier-Journal*, 22 Nov. 1876, 23 Jan. 1880, 5 Feb. 1882; ARCE, 1886, pp. 1574-75; ARCE, 1887, p. 1843-44.

40. Albert Willis to Secretary of War, 15 Oct. 1886, Amos Stickney to T. Lincoln Casey, 10 Apr. 1889, and T. Lincoln Casey to Amos Stickney, 6 May 1889, in "Appointments to Various Positions on Louisville and Portland Canal, May 15, 1884-December 14, 1893," Historical Archives, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

41. *Ibid.*; ARCE, 1889, p. 1913.

42. C. O. Bradford to Benjamin Harrison, 18 Oct. 1889, Thomas Costello to Benjamin Harrison, 10 and 18 June 1891, and anonymous to Garrett Lydecker, 25 June 1891, in "Appointments to Various Positions on Louisville and Portland Canal, May 15, 1884-December 14, 1893," Historical Archives, Public Affairs Office, U. S. Army Engineer District, Louisville, KY.

43. Robert R. Jones to Edward Maguire, 30 May 1890, Garrett Lydecker to Chief of Engineers, 29 June 1891, and L. A. Grant to Chief of Engineers, 30 Aug. 1892, in *ibid.*; Louisville Times, 9 Sept. 1892; Robert R. Jones personnel file, Historical Archives, Public Affairs Office, U. S. Army Engineer District, Louisville, KY; Robert R. Jones, *The Ohio River* (Cincinnati, OH: U. S. Army Engineer District, 1916), *passim*. *Waterways Journal* 41(18 Aug. 1928):8 and 26, prints an R. R. Jones biography.

44. Secretary of War John Dickinson to President William H. Taft, 1 Feb. 1911, File 79500, Entry 103, NARG77, reviews the political history at the canal.

45. William H. Taft to John Dickinson, 19 Jan. 1911, *ibid.*

13: BLASTED INDIAN CHUTE

1. ARCE, 1889, pp. 1917-19.

2. ARCE, 1890, pp. 2217-21; ARCE, 1891, p. 296; ARCE, 1892, p. 2021.

3. ARCE, 1890, p. 2222; ARCE, 1892, pp. 2024-25, 2029; ARCE, 1896, p. 2232. When the timbers on the lockwalls decayed, they were replaced with a new coping of Bedford stone, 24 inches wide and 18 inches high.

4. Louisville Times, 19 Jan. 1893.

5. *Courier-Journal*, 13 Mar. 1893.

6. *Ibid.*, 10 July 1892; Madison Dugan Diary, 18 July 1892 entry, Manuscript Division, Filson Historical Society, Louisville, KY.

7. *Courier-Journal*, 3 April 1892; Louisville Times, 3 April 1892.

8. *Courier-Journal*, 2 Apr. 1893.

9. *Ibid.*, 14 Aug. 1892; Louisville Times, 9 Sept. 1892, 20 Mar. 1893, 27 May 1893.

10. Louisville Times, 13 Apr. 1893, 27 May 1893.

11. *Courier-Journal*, 21 Apr. 1893. Captain Gus Jutte performed the Falls piloting for the Monongahela River Consolidated Coal Company; see *Courier-Journal*, 5 Dec. 1900.

12. *Ibid.*, 4 Mar. 1912. Louisville Times, 16 Dec. 1941, in its obituary for Captain Edward J. Houser of Jeffersonville, reported him as last of the Falls pilots, but no confirming records have been identified.

13. *New York Times*, 2-5 May and 2 July 1889, reports the Lydecker court martial.

14. ARCE, 1891, p. 2396; ARCE, 1894, p. 1938.

15. *Courier-Journal*, 24 Apr. 1891; ARCE, 1892, p. 2025.

16. ARCE, 1892, pp. 2025, 2029; ARCE, 1893, p. 2555.

17. *Courier-Journal*, 30 Aug. 1892; Portland Museum, *The Tarascon Mill: Shippingport's Great Mill Reconstructed in Words, Pictures and a Model* (Portland, KY: Portland Museum, 1981), n.p.

18. Louisville Times, 17 Aug. 1892, 24 Mar. 1893.

19. Louisville Times, 10, 18, 30-31 Jan. 1893.

20. *Courier-Journal*, 21 Apr. 1893.

21. *Courier-Journal*, 16, 22 Mar., 2 Apr. 1893. *Courier-Journal*, 18 Oct. 1876, reported that Major Charles R. Suter of the Corps in 1876 designed a power-steering

system for the snagboat *John N. Macomb*; it consisted of a shaft beneath the pilothouse with a drum at each end, over which the tiller ropes turned and could be made taut by slight movement of the pilotwheel.

22. *Courier-Journal*, 24 Nov. 1884.

23. *Louisville Times*, 11 May 1893. See the Sintz website for the history of this engine and its application by Elwood Haynes.

24. *Courier-Journal*, 26 Mar. 1899. Other steam launches included the *Ann T.*, *Fern Cliff*, *Dago*, and *Lillian*. Two naphtha launches were the *Wabash* and *Bonnie*; the *Sunshine* had a gasoline engine; and the *Grace* had an alcho-vapor engine. These carried picnic, swimming, and duck-hunting parties on the river.

25. Gordon E. Dodds, *Hiram Martin Chittenden: His Public Career* (Lexington, KY: University of Kentucky Press, 1973), and Kenneth H. Baldwin, *Enchanted Enclosure: The Army Engineers and Yellowstone National Park, A Documentary History* (Washington, DC: Office of the Chief of Engineers, 1976), review Chittenden's career and work at Yellowstone.

26. ARCE, 1889, pp. 1920-21; ARCE, 1891, p. 2394; ARCE, 1892, p. 2024.

27. ARCE, 1893, p. 2554; *Louisville Times*, 12, 20-21 Mar. and 5 Apr. 1893.

28. *Courier-Journal*, 5 April 1893; ARCE, 1894, p. 1937.

29. Hiram M. Chittenden, "American Types of Movable Dams and Their Development," *Engineering News* 33(7 Feb. 1895):84-85; Johnson and Parrish, *Kentucky River Development*, pp. 100-03; ARCE, 1896, p. 2234-35; ARCE, 1897, p. 2447; *Courier-Journal*, 23 Oct. 1899.

30. Bruce Le Roy, ed., *H. M. Chittenden: A Western Epic* (Tacoma, WA: Washington State Historical Society, 1961), pp. 7-10, 21.

31. ARCE, 1894, p. 1940; James Warren to John Wilson, 14 June 1897, File 21498, Entry 103, NARG77; *Courier-Journal*, 12, 21 Mar. 1893, 11 Sept. 1898, 23 Oct. 1899.

32. Ransom T. Scowden died on 12 Dec. 1893; see Cleveland Necrology File, Cleveland, OH, Public Library; *Courier-Journal*, 13 Dec. 1893, 17 Jan. 1895; "A Trip through the Canal," *Courier-Journal*, 28 June 1896.

33. *Courier-Journal*, 22-25 Sept. 1898.

34. Reuben G. Thwaites, *On the Storied Ohio* (Chicago, IL: A. C. McClurg & Co., 1903), pp. 219-22.

35. ARCE, 1897, pp. 364-65; Leland R. Johnson, "The Corps in the Gilded Age, 1866-1896" (Draft, 2000, Historical Collection, Office of History, U. S. Army, Corps of Engineers, Humphreys Engineer Center, Alexandria, VA), pp. 51-52. The continuing contract system was used until creation of the Bureau of Budget in the 1920s.

36. ARCE, 1896, pp. 284-86; ARCE, 1898, p. 1952; *Courier-Journal*, 29 Sept. 1898.

37. ARCE, 1900, pp. 3479-82, 3496; *Courier-Journal*, 27 Sept. 1898, 5 Oct. 1899. Equipped with a used steam engine and boiler, the *Wave Rock* was 55 feet long and 12 feet wide.

38. ARCE, 1900, pp. 3479-82; *Courier-Journal*, 18-19 Oct. 1899.

39. ARCE, 1902, pp. 1967-74; *Courier-Journal*, 5 Oct. and 24 Dec. 1899, 5 Dec. 1900; Edward H. Scheibler, "The Monongahela River Consolidated Coal & Coke Company," *S&D Reflector* 3(Sept. 1966):6-10; Edward H. Scheibler, "Decline and Fall of the Combine," *S&D Reflector* 5(Sept. 1968):6-10. Will Hays commented: "Dan Varble, a veteran, does the piloting on the Falls for the Big Combine and he does it well." See *Courier-Journal*, 6 April 1906.

40. ARCE, 1900, p. 3494; Kleber, ed., *Kentucky Encyclopedia*, p. 377; *Courier-Journal*, 9 Oct. and 2 Dec. 1899. Correspondence of Zinn with Chief of Engineers and Secretary of War concerning the Master Lock Manager is found in Files 18567, 21570, 23626, 23992, Entry 103, NARG77.

41. ARCE, 1901, pp. 2793-94.

42. Mary M. Bethel, "Coal for the Gulf of Mexico from the Pennsylvania Mines," *Courier-Journal*, 24 Dec. 1899, includes photos of coal tows in Scowden locks.

43. Johnson, *Davis Island Lock and Dam*, pp. 113-16; *Courier-Journal*, 17 Sept. 1898, 3 Dec. 1899.

14: THE THIRD PHASE

1. ARCE, 1899, pp. 2553-64; ARCE, 1900, pp. 3473-74; John C. Oakes, "Works at the Falls of the Ohio River, Louisville, KY," *Military Engineer* 6(Sept. 1914):572-75.

2. ARCE, 1899, pp. 2553-64; ARCE, 1900, pp. 3473-74; ARCE, 1901, pp. 1964-76.

3. Leland R. Johnson, *Memphis to Bristol: A Half Century of Highway Construction* (Nashville, TN: Tennessee Road Builders Association, 1978), pp. 18, 38; Johnson, *Falls City Engineers*, p. 145; ARCE, 1900, pp. 3462-81.

4. ARCE, 1900, pp. 3462-81; ARCE, 1909, p. 1869, lists the dam sections and describes their construction.

5. ARCE, 1908, pp. 616-17; ARCE, 1909, pp. 1860-68; ARCE, 1910, pp. 2014-15; ARCE, 1915, p. 1922; Oakes, "Works at the Falls of the Ohio River, Louisville, KY," pp. 572-75.

6. Oakes, "Works at the Falls of the Ohio River," pp. 572-75; ARCE, 1911, p. 2216; ARCE, 1912, pp. 2411-12. The two maneuverboats built at the canal shops were 74 by 22 feet equipped with steel derricks, bull wheels, and hoisting engines.

7. ARCE, 1912, p. 2417; Johnson, Falls City Engineers, pp. 228-29.
8. ARCE, 1903, pp. 1688-94; Edward B. Clark, William L. Sibert, The Army Engineer (Philadelphia, PA: Dorrans and Company, 1938), pp. 81-82; Leland R. Johnson, The Headwaters District: A History of the Pittsburgh District (Pittsburgh, PA: U.S. Army Engineer District, 1979), pp. 157-59; Courier-Journal, 24 Oct. 1929, prints Longworth's memoir on activities of the waterways bloc. George Spalding's account of his work at Pittsburgh with Sibert in 1903 is printed in Ohio Valley Improvement Association, Proceedings of the Thirty-Sixth Annual Convention (Cincinnati, OH: OVIA, 1931), pp. 42-43.
9. Frederick Way, Jr., Way's Steam Towboat Directory (Athens, OH: Ohio University, 1990), p. 153; Courier-Journal, 14-16 May 1905. The Lockwood Board report is U. S., Congress, House, Ohio River, H. Doc. No. 492, 60th Cong., 1st Sess., 1908.
10. Courier-Journal, 23 Nov. 1905.
11. Ibid., 10 Apr. 1906.
12. Ibid., 11 Nov. 1905.
13. Ibid., 15 July 1907. Hays orchestrated the "Fresh Air for Babies" program of summer steamboat excursions for disadvantaged children; see *ibid.*, 3 July 1892.
14. Ibid., 16, 24-26 July 1907. Sandie Custer of Portland, Kentucky, in 2002 was preparing a critique of Hays and his music. To hear his melodies, consult internet sites for William Shakespeare Hays.
15. Ibid., 27-30 June 1916, 18 Apr. 1926; Kevin J. Foster, "Mayor Andrew Broaddus Life-Saving Station: National Historic Landmark Study" (1989 draft, Historical Archives, Public Affairs Office, Louisville Engineer District, Louisville, KY), *passim*.
16. Courier-Journal, 15 Mar. 1910, 4 Mar. 1912. Another son, Graham Varble, became a river pilot and fell off the towboat *Henry Laughlin*, drowning near Memphis in 1946; see *ibid.*, 20 Sept. 1946. Louisville Times, 16 Dec. 1941, in its obituary for Captain Edward Houser of Jeffersonville described him as the last Indiana Falls pilot, who guided tows over the Falls before the construction of Dam 41 and then piloted for E. T. Slider Sand and Gravel Company boats.
17. Louisville Herald, 6 Feb. 1907, prints the story and a photograph of McFee.
18. U. S., Congress, House, Ohio River, H. Doc. No. 492, 60th Cong., 1st Sess., 1908, pp. 1-3.
19. Ibid., pp. 4, 115-16; "The Improvement of the Ohio River for a 9-Ft. Navigation. Will it Pay?" Engineering News 63(17 Feb. 1910):201-02 (quotes Pres. Taft).
20. Laws of the United States, 2:1412; ARCE, 1911, p. 2091; E. N. Johnston, "New River and Harbor Improvement Projects," Professional Memoirs, Corps of Engineers 3(Jan. 1911):30; Courier-Journal, 24 Oct. 1929, quotes Longworth.
21. ARCE, 1910, p. 722; U.S., Congress, House, Ohio River, House Doc. 492, 60th Cong., 1st Session, 1908, pp. 27-29.
22. Courier-Journal, 6 and 24 April 1906.
23. Lytle Brown to William Bixby, 27 Sept. 1910, NA1046, NARG77, Federal Records Center, Kansas City, MO; ARCE, 1911, p. 778; Louisville Post, 1 Jan. 1915.
24. William McAlpine biographical file, Office of History, U.S. Army Corps of Engineers, Humphreys Engineer Center, Alexandria, VA. Johnson and Parrish, Kentucky River Development, pp. 103, 121, 126, 128, 141.
25. Malcolm Elliott, "Vertically Framed Mitering Lock gates," Military Engineer 7 (July 1915):414-15; William A. Johnson, "Navigation Installations at Louisville," Military Engineer 24 (Nov. 1932):599; Leland R. Johnson, Men, Mountains and Rivers: A History of the Huntington District (Huntington, WV: U.S. Army Engineer District, 1977), p. 123.
26. ARCE, 1912, pp. 2413-14.
27. A. G. Butler, "Widening the Louisville & Portland Canal, Louisville, KY," The Rose Technic (Alumni bulletin, n.d., Historical Archives, Public Affairs Office, Louisville Engineer District), *passim*; Louisville Herald, 1 Mar. 1914. Henry Bickel was a member of the Louisville Board of Trade.
28. Butler, "Widening the Louisville & Portland Canal," *passim*; John C. Oakes, "Widening the Louisville and Portland Canal at Louisville, KY," Professional Memoirs, Corps of Engineers 9(May 1917):243-64.
29. Oakes, "Widening the Louisville and Portland Canal at Louisville, KY," pp. 243-64; Courier-Journal, 6 Oct. 1915.
30. John C. Oakes, "Direct Lift Bridge across Louisville and Portland Canal," Professional Memoirs, Corps of Engineers 7(Sept. 1915):647-50; Louisville Board of Trade, River Terminal Inspection Tour, July 9, 1918 (pamphlet, Historical Archives, Public Affairs Office, Louisville Engineer District, Louisville, KY), *passim*.
31. ARCE, 1914, pp. 2686, 2740; ARCE, 1915, pp. 2930-3, 2939-40. The "cube" mixer in shape actually was a rotating square cube rather than a cylinder like modern concrete mixers.
32. John C. Oakes to Ohio River Board, 23 Sept. 1912, NA2288, NARG77, Federal Records Center, Kansas City, MO; ARCE, 1916, pp. 2778-88; Louisville Board of Trade, River Terminal Inspection Tour, July 9, 1918, *passim*; Louisville Herald, 3 July 1921. McAlpine

transferred to the Upper Mississippi River project in 1930 and adopted Tainter valves for Lock 2. During the design of Pickwick Lock on Tennessee River, the reverse Tainter valve was developed.

33. Louisville Post, 16 Aug. 1917; Edward H. Scheibler, "Decline and Fall of the Combine," *S&D Reflector* 5(Sept. 1968):6-10.

34. William M. Hall, "Some Notes on the Location and Construction of Locks and Movable dams on the Ohio River," *Transactions of American Society of Civil Engineers* 86(1923):pp. 135-56; "Relation of Ohio River and Its Tributaries to Transportation in the United States: A Symposium," *Transactions of American Society of Civil Engineers* 89(1926):1136.

35. ARCE, 1918, pp. 1307, 2930, 2970-71.

36. ARCE, 1917, p. 2881-82; ARCE, 1918, p. 1292; Leland R. Johnson, *The Ohio River Division, U.S. Army Corps of Engineers: The History of a Central Command* (Cincinnati, OH: U.S. Army Engineer Division, 1994), pp. 78-79.

37. ARCE, 1917, pp. 1255-56; ARCE, 1918, pp. 1303-04.

38. ARCE, 1917, p. 2881; ARCE, 1918, pp. 1301-02, 2925-28; ARCE, 1919, p. 3007; ARCE, 1920, pp. 1341-42; William W. W. Harts to Lansing Beach, 19 Nov. 1920, Box 1082, Entry 103, NARG77.

39. Louisville Times, 24 Apr. 1921; Courier-Journal, 1 May 1921; Louisville Herald, 3 July 1921; ARCE, 1921, p. 1341.

40. Courier-Journal, 12 Dec. 1923.

15: POWER ON THE FALLS

1. U. S., Congress, Senate, Preliminary Report of the Inland Waterways Commission, Sen. Doc. No. 325, 60th Cong., 1st Sess., 1908, p. 2, quotes President Roosevelt.

2. Morris Belknap, "Water Power of the Falls of the Ohio River," *Transactions of the American Society of Civil Engineers* 2(1873):261-70; Charles K. Needham, "A Review of the Efforts to Develop Water Power at the Falls of the Ohio," *Filson Club History Quarterly* 2(Oct. 1927):1-18; ARCE, 1904, p. 2703-08; U. S., Congress, House, *Ohio River at Head of Falls*, Louisville, KY, H. Doc. 349, 58th Cong., 2d Sess., 1904, passim; George McDerby to George Gillespie, 22 Sept. 1903, NA 1053, NARG77, Federal Records Center, Kansas City, MO; Lansing Beach to John Oakes, 1 Dec. 1915, NA 1046, in *ibid.* On the progressive conservation movement, see Samuel Hays, *Conservation and the Gospel of Efficiency* (Cambridge, MA: Harvard University Press, 1959). The Ohio Falls Hydraulic Manufacturing Company employed engineers Benezette Williams of Chicago and John Birkenbine of Philadelphia.

3. Needham, "A Review of the Efforts to Develop Water Power at the Falls of the Ohio," pp. 1-18; Lytle Brown, "Power Development at the Falls of the Ohio, Louisville, Kentucky," *Professional Memoirs, Corps of Engineers* 4(May 1912):326.

4. Brown, "Power Development at the Falls of the Ohio, Louisville, Kentucky," 325-42; Johnson, *Engineers on the Twin Rivers*, pp. 163-68.

5. Brown, "Power Development at the Falls of the Ohio, Louisville, Kentucky," 325-42 (prints map of dam and powerhouse locations).

6. Courier-Journal, 27 Mar., 1-2 Apr. 1913, 13-14 Jan. 1916; Homer Dye, Jr., "Decadence of Shippingport," *Courier-Journal*, 29 Dec. 1918.

7. Lansing Beach to John Oakes, 1 Dec. 1915, NA 1046, NARG77, Federal Records Center, Kansas City, MO; Tennessee River Improvement Association, *A Visit to the Tennessee River on the Invitation of the Tennessee River Improvement Association* (Birmingham, AL: pamphlet, 1915), quotes Edison; Louisville Gas and Electric Company, *LG&E: The First 148 Years* (Louisville; LGE, 1986), pp. 4-6; Louisville Post, 5 Sept. 1925.

8. Louisville Gas and Electric Company, *LG&E: The First 148 Years*, pp. 6-7; ARCE, 1917, pp. 1255-56; ARCE, 1918, pp. 1303-04; George Hoffman to Lansing Beach, 23 July 1920, Entry 103, NARG77.

9. George Spalding to Interdepartmental Board, Federal Nitrate Plant, 29 Mar. 1917, Entry 103, NARG77; Johnson, *Engineers on the Twin Rivers*, pp. 169-86.

10. Courier-Journal, 18 Nov. 1905, 10 May and 20 June 1916. The Cincinnati and Louisville Packet Company steamboat *Hattie Brown* was touted in 1916 as "the first oil-burning craft to be entered in regular trade on the Ohio." The gasboat *Renovah* carried Louisville's trade to Madison and the Kentucky River.

11. *Ibid.*, 19 Jan., 23 Mar., 11 and 16 May, 5 Oct. 1916.

12. Louisville Times, 19 Feb. 1915; Courier-Journal, 12 Dec. 1915, 27 June 1916, 6 Nov. 1916, 16 May 1917, 9 June 1921; Louisville Herald, 10 July 1922. Louisville USCG station commanders from the Great Lakes were William Preston, 1917-1920, and Richard Herline, 1921-1922.

13. Courier-Journal, 12 Dec. 1915, 27 June 1916, 12 Nov. 1925, 1 Jan. 1926; Louisville Herald-Post, 30 June 1924. Piloted by Lt. H. V. Farris, the aircraft was a two-seater biplane out of Bowman Field that crashed on 11 Nov. 1925.

14. Courier-Journal, 3 May 1921; Johnson and Parrish, *Kentucky River Development*, p. 140; Bert Shearer, "Oliver F. Shearer and Sons: Recollections of a River Family," *S&D Reflector* 34(June 1997):6-12. Jim Van Sickle, "He Put the Diesel into Trucking," *Courier-*

Journal, 28 Oct. 1956, reports that Clessie Cummins, lightweight diesel engine manufacturer at Columbus, IN, first designed his engines for use in recreation boats, but the market for these declined and in 1930 he installed one in a Packard automobile, subsequently installing them in trucks.

15. George Hoffman, to Lansing Beach, 23 July 1920, Entry 103, NARG77.

16. Courier-Journal, 22 Mar., 30 Apr. 1921; Louisville Times, 6 June 1922. The Corps completed Lock and Dam 39 near Vevay, IN, in 1921.

17. Louisville Times, 6 Apr., 6-7 June 1922; Francis Shenehon to Lansing Beach, 21 Aug. 1923, Civil Works Miscellaneous File, 1923-1942, NARG77, Washington National Records Center, Suitland, MD; Engineering News 62(2 Sept. 1909):264, prints Shenehon's biography. For project construction at the Falls the Byllesby and Louisville Gas and Electric companies formed a separate corporation named Louisville Hydro-electric Company.

18. Courier-Journal, 28 Nov. and 5 Dec. 1922; Edward B. Clark, William L. Sibert, the Army Engineer (Philadelphia: Dorran & Co., 1938), passim.

19. Courier-Journal, 23 Jan. and 1 Mar. 1923; Louisville Times, 31 Jan. 1923; Louisville Civic Opinion, 10 Feb. 1923; G. R. Lukesh to Charles Kutz, 17 Mar. 1923, Entry 103, NARG77.

20. Louisville Herald, 20 Jan. 1923; Courier-Journal, 23 Jan. 1923; Huston Quin to Secretary of War, 7 Feb. 1923, Entry 103, NARG77.

21. Courier-Journal, 23 Jan. and 7 Aug. 1923; Louisville Post, 24 Jan. 1923; Louisville Times, 31 Jan. 1923; Louisville Civic Opinion, 10 Feb. 1923; Louisville Herald, 13 and 19 Apr. 1923; William Kelly to Lansing Beach, 17 Aug. 1923, and Francis Shenehon to Lansing Beach, 21 Aug. 1923, Civil Works Miscellaneous File, 1923-1942, NARG77, Washington National Records Center, Suitland, MD; "Private Capital May Develop Ohio River Power," Engineering News-Record 91(30 Aug. 1923):362.

22. Courier-Journal, 7 Aug. 1923; Louisville Herald, 10 and 12 July 1926. Historians have not reported any native reverence for the Big Eddy, nor does a review of modern archaeological studies confirm the reporter's speculations.

23. "Construction Plan and Plant at the Falls of the Ohio," Engineering News-Record 98(12 May 1927):762-69; William A. Johnson, "Navigation Installations at Louisville, Military Engineer 24(Nov. 1932):596; ARCE, 1929, pp. 1244-45, 1253-54.

24. Courier-Journal, 14 Aug. 1924; "Construction Plan and Plant at the Falls of the Ohio," pp. 762-69; Louisville Post, 1 Aug. and 5 Sept. 1925; Louisville Gas and Electric Company, Power Development at Ohio

River Falls (Louisville: Byllesby Engineering, 1926), passim; Byllesby Engineering Corporation, Power Development at the Falls of the Ohio River (Louisville: Byllesby Engineering, 1926), prints H. G. Roby's report.

25. Louisville Herald, 1 Jan. 1925; Louisville Post, 2 Jan. 1925; Louisville Times, 25 July 1925; Byllesby Engineering Corporation, Power Development at the Falls of the Ohio River, passim.

26. "Construction Plan and Plant at the Falls of the Ohio," pp. 762-69; Louisville Herald, 7 Sept. 1925; Byllesby Engineering Corporation, Power Development at the Falls of the Ohio River, passim; Johnson, Engineers on the Twin Rivers, pp. 163-68.

27. Louisville Herald, 7 Sept. 1925; Louisville Herald Post, 15 May 1927; ARCE, 1926, p. 1158.

28. Louisville Gas and Electric Company, Ohio Falls Hydro Station (Louisville: LGE, 1928), passim; ARCE, 1926, p. 1158; Byllesby Engineering Corporation, Power Development at the Falls of the Ohio River, prints A. G. Butler's report on construction planning.

29. ARCE, 1926, p. 1158; Byllesby Engineering Corporation, Power Development at the Falls of the Ohio River, passim; Louisville Gas and Electric Company, Ohio Falls Hydro Station, passim; Louisville Times, 17 Aug. 1927.

30. ARCE, 1927, p. 1179; Louisville Gas and Electric Company, Power Development at Ohio River Falls, passim; George Spalding to Edgar Jadwin, 11 Jan. 1928, Miscellaneous File, Civil Works, 1923-1942, NARG77, Washington National Records Center, Suitland, MD.

31. Courier-Journal, 15 Aug. 1927, 6 Aug. 1930; Louisville Civic Opinion, 13 Aug. and 12 Oct. 1927; Louisville Herald-Post, 20 June 1930.

32. Louisville Herald-Post, 20 June 1930; Way's Packet Directory, p. 52. The Courier-Journal printed its last regular river columns in November 1925; see comments by managing editor Tom Wallace on downsizing the river editor in Courier-Journal, 11 Oct. 1957.

33. Courier-Journal, 1 Jan. and 4 Mar. 1922; Johnson, Headwaters District, p. 161-62; Louisville Herald, 21 Dec. 1921, 22 May 1925.

34. Courier-Journal, 23 Apr. 1922 and 24 Dec. 1929; Louisville Civic Opinion, 7 Oct. 1922; Louisville Herald, 5 Mar. 1923; CSX Corporation, "Taking Chances," Connections (No. 3, 1995):4-11 (Patrick Calhoun, Jr., biography).

35. Louisville Herald, 25 Feb. 1924; Kleber, ed., Encyclopedia of Louisville, p. 770.

36. Courier-Journal, 25 March 1913; Louisville Post, 4 Oct. 1922; Roger Powell to Edgar Jadwin, 21 Dec. 1926, Miscellaneous File, Civil Works, 1923-1942, NARG77,

- Washington National Records Center, Suitland, MD; Johnson, Headwaters District, pp. 169-70; Edmund L. Daley, "Mastery of the Ohio River," *Military Engineer* 19(May 1927):188-93.
37. Daley, "Mastery of the Ohio River," pp. 188-93; Nicholas Longworth to Harry Taylor, 7 Feb. 1925, District Files, Civil Works, 1923-1942, NARG77, Washington National Records Center, Suitland, MD; A. G. Wakefield, "Historical Sketch of the United States Engineer Office, Louisville, KY," 28 Dec. 1931, Historical Archives, Public Affairs Office, Louisville Engineer District, Louisville, KY. Movable locks and dams on the Ohio were numbered from 1 at Pittsburgh to 53 at Grand Chain near Cairo; because Numbers 40 and 42 were eliminated, only 51 movable dams of the series were built. By the time the series was completed in 1929, however, the Pittsburgh Engineer District had replaced Locks and Dams 1 through 5 with the Dashields and Emsworth fixed dams, reducing the number of dams operating on the Ohio in 1929 to 46.
38. Charles W. Kutz, "Ohio River Canalization—Its History and Possibilities," *Engineering News-Record* 104(13 Mar. 1930):436-37; E. W. Suppiger, "Ohio River Lock and Dam No. 53," *Military Engineer* 20(Nov. 1928):512-14; Johnson, Falls City Engineers, pp. 180-89.
39. *Louisville Times*, 17 Oct. 1929; *Louisville Herald*, 23 Oct. 1929; *Courier-Journal*, 24 Oct. 1929; "River-Minded President on the Raging Ohio," *Literary Digest* 103(9 Nov. 1929):8-9. Hoover was aboard the Greenbrier, which tended navigation aids.
40. *Louisville Times*, 24 Oct. 1929; *Courier-Journal*, 24-25 and 29 Oct. 1929; "River-Minded President on the Raging Ohio," pp. 8-9.
41. *Louisville Herald*, 29 Oct. 1929; S&D Reflector 8(Dec. 1971):54-55, prints Captain Jesse Hughes' description of the voyage to Cairo.
42. Louisville Engineer District, *Combined Navigation and Hydro-Electric Developments at Falls of the Ohio* (Louisville, KY: U. S. Army Engineer District, 1936), passim; Louisville Engineer District, *Navigation Improvements at Louisville, KY* (Louisville, KY: U. S. Army Engineer District, 1938), pp. 9-10; *Courier-Journal*, 25 May 1983. See also "Ohio River Relicensing Information," at website www.lgeenergy.com.
43. ARCE, 1928, p. 1229; *Courier-Journal*, 26 Mar. 1921.
44. Charles Kutz to Edgar Jadwin, 13 Feb. 1929, Box 620, District Files, Civil Works, 1923-42, NARG77, Washington National Records Center, Suitland, MD; *Louisville Times*, 1 June 1928; ARCE, 1929, pp. 1244-45, 1253-54; ARCE, 1930, pp. 1316-17. Assistant Resident Engineer Charles Haddaway explained this redesign to the authors when the auxiliary lock was demolished on 17 July 2001.
45. William P. O'Brien, Mary Y. Rathbun, Patrick O'Bannon, and Christine Whitacre, *Gateways to Commerce; The U. S. Army Corps of Engineers' 9-Foot Channel Project on the Upper Mississippi River* (Denver, CO: National Park Service, 1992), passim.

16: NAVIGATION MODERNIZATION

1. *Louisville Post*, 24 Dec. 1930, prints a canal centennial notice from overseer Paul McGinnis and Benjamin Threlkel of the Louisville District office. McGinnis said the District in 1930 employed more than 100 workers keeping the canal and locks in operation.
2. U. S. Army Corps of Engineers, Louisville District, *McAlpine Lock and Dams Study Report Revised* (Louisville: U. S. Army Engineer District 1979), p. 4-1. The authors personally observed these type movable dam operations.
3. C. Lacey Hall to Gilbert Van B. Wilkes, 4 May 1934, NA1074, NARG77, Federal Records Center, Kansas City, MO; U. S. Army Corps of Engineers, Louisville District, *Louisville Locks and Dam Design Memorandum No. 1* (Louisville, KY: U. S. Army Engineer District, 1956), p. 25; James Lewis to W. W. Lapsley, 7 Oct. 1960, Historical Archives, Public Affairs Office, Louisville Engineer District, Louisville, KY.
4. *Courier-Journal*, 22 Aug. 1929, 17 Aug. 1930; U. S. Army Corps of Engineers, Louisville District, *Combined Navigation and Hydro-Electric Developments at Falls of the Ohio* (Louisville, KY: U. S. Army Engineer District, 1936), passim. By the 1990s the hydroelectric plant supplied about five percent of the city's electricity.
5. *Courier-Journal*, 21 Aug. 1928.
6. U. S. Army Corps of Engineers, Louisville District, *Navigation Improvements at Louisville, KY* (Louisville, KY: U. S. Army Engineer District, 1938), p. 4; Louisville District, *Combined Navigation and Hydro-Electric Developments at Falls of the Ohio*, passim; *Courier-Journal*, 27 Mar. 1932; Alan L. Bates, Martin C. Striegel, and Victoria L. Nugent, "Falls Cities Ferries: A Note," *Indiana Magazine of History* 95(September 1999):255-83. The New Albany and Portland ferry ceased operating in 1920, replaced by roadways completed in 1910 along the Kentucky and Indiana Terminal Railroad bridge.
7. *Louisville Times*, 23 July 1936.
8. *Louisville Herald-Post*, 12 July 1931.
9. *Louisville Herald-Post*, 26 July 1925, 21 Apr. 1929; *Courier-Journal*, 18 Apr. 1927.
10. *New York Times*, 9 April 1930; *Louisville Herald-Post*, 12 Apr. 1930

11. Louisville Herald-Post, 12 Aug. 1928; Courier-Journal, 25 Oct. 1935; Christian Science Monitor, 17 Mar. 1937.
12. Christian Science Monitor, 17 Mar. 1937; Gustave A. Breaux, "1937 Flood at Louisville," *Filson Club History Quarterly* 11(Apr. 1937):109-18; Paschal N. Strong, "The Great Flood of the Ohio," *Military Engineer* 29(May 1937):157-62; Johnson, *Falls City Engineers*, pp. 203-07.
13. Christian Science Monitor, 17 Mar. 1937; Oren H. Bellis, interview by the author, 26 Feb. 1973; "Superflood Devastates Lower Ohio and Now Threatens Mississippi Levee System," *Engineering News-Record* 118(4 Feb. 1937):205.
14. Courier-Journal, 23 Jan. 1937; United States Army Corps of Engineers, Louisville District, Louisville Locks and Dam Design Memorandum No.5 (Louisville, KY: U. S. Army Engineer District, 1958), passim.
15. Stanley J. Horn, "The Flood of 1937 in the Ohio Valley: Cause, Magnitude, and Possibility of Recurrence," *Civil Engineering* 7(May 1937):326-28; Courier-Journal, 2 Apr. and 4 Aug. 1940.
16. U. S., Congress, House, Committee on Flood Control, Comprehensive Flood Control Plan for Ohio, 75th Cong., 1st Sess, 1937, pp. 1-12; ARCE, 1937, p. 1067.
17. United States Army Corps of Engineers, Louisville District, Authorized Project Maps (Louisville, KY: U. S. Army Engineer District, 1955), flood-protection series; ARCE, 1942, p. 1195-96. The largest pumping station in the world handled the flow of Mill Creek at Cincinnati, OH.
18. ARCE, 1942, p. 1195-96; ARCE, 1943, p. 1126.
19. Louisville Times, 26 Dec. 1939, 3 Nov. 1941; Courier-Journal, 4 Aug. 1940, 1 Apr. and 29 May 1941, 4 Jan. 1942, 21 Sept. 1993. Louisville's four Coast Guard Reserve flotillas were commanded by Breaux Ballard of River Valley Boat Club, R. D. Williams of Louisville Boat Club, Dick Durham of Pastime Boat Club, and Foster Holt of Louisville Yacht basin. Louisville Times, 23 Jan. 1942, listed the owners lending boats as E. J. Theobald, Lee Heine, W. P. Huff, Charles Buddeke, William Gaunt, F. B. Russell, L. G. Kaye, H. R. Downes, R. F. Gimmell, S. H. Rainey, E. A. Buchart, E. R. Torstrick, Philip Ewald, and William Reed. Courier-Journal, 4 Apr. 1942, lists more.
20. Courier-Journal, 9 Aug. 1940.
21. Courier-Journal, 29 May 1941; Louisville Times, 29 Jan. 1942; Leland R. Johnson, "The Fourth Pillar of Defense: Waterways," in *Institute for Water Resources, National Waterways Roundtable Proceedings: History* (Fort Belvoir, VA: Institute for Water Resources, U. S. Army Corps of Engineers, 1980), pp. 27-39; Carl E. Kramer, *Visionaries, Adventurers, and Builders: Historical Highlights of the Falls of the Ohio* (Jeffersonville, IN: Sunnyside Press, 2000), pp. 123-30. Jeffboat bought the Howard yards from the government in 1947.
22. U. S., Congress, House, Use of Barge Transportation for the Movement of Petroleum Products, House Doc. No. 731, 77th Congress, 2d Session, 1942, passim; Leland R. Johnson, "Waterways: The Fourth Pillar of Defense," *Military Engineer* 72(November 1980):404-08.
23. Courier-Journal, 4 Mar. 1942; Louisville Times, 19 July 1940, 30 Sept. 1941; Gary Cohen, "The Keystone Kommandos," *Atlantic Monthly* 289(February 2002):46-59. Tradition among Corps personnel states a captured saboteur carried with him plans for Ohio River Lock 37 and the Sault Ste. Marie locks.
24. Louisville Times, 24 Oct. 1940; Courier-Journal, 3 Feb. and 20 Apr. 1941.
25. Johnson, *Ohio River Division*, pp. 78-79; Leland R. Johnson, "An Engineer District Mobilizes: Lessons Learned, 1941-42," *Military Engineer* 78(July 1986):366-70; Johnson, *Falls City Engineers*, pp. 213-24.
26. Johnson, *Falls City Engineers*, pp. 213-24. 569 Louisville District personnel joined the armed forces, and five—Harold Beal, Clements Diepenbrock, Daniel Hilliard, Earl Murphy, and Allen Schanz—lost their lives in the service; see Louisville District, *River Rises* (newsletter), May 1945, p. 2. The District field office at Lock 41 and the Louisville Repair Station in 1945 was managed by L. S. Ehrmen with E. F. Delozier as engineering assistant and A. T. Beattie as administrative assistant; see Louisville District, *River Rises* (newsletter), July 1945, p. 8.
27. Johnson, *Falls City Engineers*, p. 233; Johnson, *Ohio River Division*, pp. 207-08; William McAlpine, "Plans for Replacement of Lock & Dam No. 7, Ohio River," 17 Feb. 1944, Box 240, NARG77, Washington National Records Center, Suitland, MD.
28. Thomas Huckaby and William Lail, "Log, Ohio River Flood, Mar. 1945," Box 4, Stein Collection, Lakes and Rivers Division, Cincinnati, OH; U. S. Army Corps of Engineers, Ohio River Division, Report on Flood of March 1945 in Ohio River Basin (Cincinnati, OH: U. S. Army Engineer Division, 1945), pp. 1-23; C. Lacey Hall, "Corps of Engineers Plans Ohio Flood Control," *Civil Engineering* 15(June 1945): 249-52.
29. U. S. Army Corps of Engineers, Louisville District, Authorized Project Maps, flood-protection series.
30. *Ibid.* Building a floodwall around Shippingport would have blocked a critical part of the river's floodway, forcing the construction of even higher

floodwalls at Jeffersonville, New Albany, and Louisville.

31. Haywood R. Faison, "Some Economic Aspects of Waterways Projects," *Transactions of American Society of Civil Engineers* 120(1955):1486; Boyd Keenan, "An Ecopolitical System of Global Significance," in Robert L. Reid, ed., *Always a River: The Ohio River and the American Experience* (Bloomington, IN: Indiana University Press, 1991), pp.210-45; *Courier-Journal*, 11 May 1952, prints a photo of the Monongahela's passage over the Falls.

32. Edwin E. Abbott, "Design for a New Ohio River," *Civil Engineering* 32(Oct. 1962):46-49; Johnson, *Headwaters District*, pp. 247-48.

33. Abbott, "Design for a New Ohio River," pp. 46-49; *Louisville District, Authorized Project Maps*, navigation series, describes each structure and lists dimensions.

34. James W. Bruce, Dwight W. Keller, and James A. Neill, "Modern Facilities for Ohio River Navigation," *Journal of the Waterways and Harbors Division, American Society of Civil Engineers* 83(May 1957): No. 1239; Eugene P. Fortson and George B. Fenwick, "Navigation Model Studies of New Ohio River Locks," *Journal of the Waterways and Harbors Division, American Society of Civil Engineers* 86(June 1960):79-92.

35. Bruce, Keller, and Neill, "Modern Facilities for Ohio River Navigation," *passim*; "Markland" (1972 draft report, Historical Archives, Public Affairs Office, Louisville Engineer District, Louisville, KY), *passim*; John Eschrich, "The Ohio's Traffic Jam May Get a Remedy," *Courier-Journal*, 3 June 1956.

36. U. S. Army Corps of Engineers, Louisville District, *Louisville Locks and Dam Design Memorandum No. 5* (Louisville, KY: U.S. Army Engineer District, Feb. 1958), *passim*; Leland Johnson and Daniel Schaffer, *Oak Ridge National Laboratory: The First Fifty Years* (Knoxville, TN: University of Tennessee Press, 1994), p. 17; *Courier-Journal*, 5 Apr. 1933 and 7 June 1958.

37. Louisville District, *Louisville Locks and Dam Design Memorandum No. 5*, *passim*; U. S. Army Corps of Engineers, Louisville District, *Louisville Locks and Dam Design Memorandum No. 1* (Louisville, KY: U. S. Army Engineer District, 1956), p. 2.

38. Martin Moran, "The Rise and Decline of Shippingport," *Courier-Journal*, 13 Mar. 1955.

39. Alan Levy, "Shippingport on Verge of Giving Up Ghost," *Courier-Journal*, 12 Jan. 1958.

40. *Ibid.*; Jack and Sandie Custer to authors, 7 Aug. 2001; "Former River Boat Captain Dies at 86," *Louisville Times*, October 3, 1960. Owners of the town lots were William and Florence Zurlinden, Joseph and Anna Laura Schaefer, the E. S. Barmore family, the J. T.

Martin heirs, the James and Mary Lamb heirs, and the Charlotte Crowder family; some residents such as Tom Early were renters; see *Louisville District, Louisville Locks and Dam Design Memorandum No. 5*, real estate map.

41. Patti Lee Gauch, "Old-Timers Say Goodby to Shippingport," *Courier-Journal*, 7 June 1958; "Former River Boat Captain Dies at 86," *Louisville Times*, October 3, 1960. A fine history of another community evacuated to make way for a Corps project is John Baskin, *New Burlington: The Life and Death of an American Village* (New York: W. W. Norton and Company, 1977).

17: THE MCALPINE PROJECT

1. Keenan, "An Ecopolitical System of Global Significance," pp. 210-45; Abbott, "Design for a New Ohio River," pp. 46-49; *Courier-Journal*, 12 Apr. and 14 Oct. 1954; Samuel Sturgis, Jr., to Wilbur Brucker, 15 Oct. 1955, Historical Files, Lakes and Rivers Division, Cincinnati, OH.

2. Samuel Sturgis, Jr., to Wilbur Brucker, 15 Oct. 1955, Historical Files, Lakes and Rivers Division, Cincinnati, OH; Louisville District, *Louisville Locks and Dam Design Memorandum No. 1* (Louisville, KY: U. S. Army Engineer District, 1956), p. 26-28, 44.

3. Charles M. Haddaway, III, memo to authors, 10 Aug. 2001. The authors were acquainted with several of these engineers.

4. Wilbur F. Creighton, *Construction from a Contractor's View Point* (Nashville, TN: author, 1965), *passim*; Leland R. Johnson, *Memphis to Bristol: A Half Century of Highway Construction* (Nashville, TN: Tennessee Road Builders Association, 1978), p. 107.

5. Charles M. Haddaway III, memo to authors, 18 Sept. 2001; W. W. Lapsley to Emerson Itchner, 9 Mar. 1959, Box 4, Stein collection, Lakes and Rivers Division, Cincinnati, OH.

6. Louisville Engineer District, *Louisville Locks and Dam Design Memorandum No. 5*, *passim*; undated news clipping [June 1960] from *Courier-Journal*, Historical Archives, Public Affairs Office, Louisville Engineer District, Louisville, KY.

7. Louisville Engineer District, *Louisville Locks and Dam Design Memorandum No. 5*, *passim*; Samuel Sturgis, Jr., to Wilbur Brucker, 15 Oct. 1955, Historical Files, Lakes and Rivers Division, Cincinnati, OH; Louisville Engineer District, *Louisville Locks and Dam Design Memorandum No. 1*, pp. 43-44; Michael Pulitzer, "Planned in Miniature," *Courier-Journal*, 18 Jan. 1959.

8. Charles M. Haddaway III, memo to authors, 18 Sept. 2001; undated news column by Ben Reeves from

- Courier-Journal, 1959, in Historical Archives, Public Affairs Office, Louisville Engineer District, Louisville, KY.
9. Thomas P. Roberts, "Construction of Cofferdams," Engineers' Society of Western Pennsylvania Proceedings 21(1905):305-18; Carl B. Jansen, "Century of Progress Marks Many Improvements in Construction of Locks and Dams," Civil Engineering 18(Oct. 1948):628-33.
10. Interview with Arch Boyle reported in undated news column by Ben Reeves from Courier-Journal, 1959, in Historical Archives, Public Affairs Office, Louisville Engineer District, Louisville, KY.
11. Abbott, "Design for a New Ohio River," pp. 46-49; Louisville District, Louisville Locks and Dam Design Memorandum No. 1, passim.
12. Cincinnati Post, 25 June 1958; Cincinnati Enquirer, 26 June 1960; McAlpine file, Historical Archives, Public Affairs Office, Louisville Engineer District, Louisville, KY.
13. Jackson Graham to W. F. Wilson, Jr., 13 Sept. 1961, Box 4, Stein Collection, Lakes and Rivers Division, Cincinnati, OH; Abbott, "Design for a New Ohio River," pp. 46-49. The Wheeler Lock failure resulted from the collapse of a lockwall.
14. Abbott, "Design for a New Ohio River," pp. 46-49; Courier-Journal, 21 Nov. 1961; James Lewis to Jackson Graham, 5 Dec. 1961, Historical Archives, Public Affairs Office, Louisville Engineer District, Louisville, KY.
15. U. S. Army Corps of Engineers, Louisville District, McAlpine Locks and Dam Design Memorandum No. 10 (Louisville, KY: U. S. Army Engineer District, 1962), pp. 1-13; U. S. Army Corps of Engineers, Louisville District, McAlpine Interim Study Reconnaissance Report (Louisville, KY: U. S. Army Engineer District, 1984), p. 4-2.
16. Louisville District, Louisville Locks and Dam Design Memorandum No. 1, p. 27; Abbott, "Design for a New Ohio River," pp. 46-49.
17. U. S. Army Corps of Engineers, Louisville District, McAlpine Locks and Dam Design Memorandum No. 9 (Louisville, KY: U. S. Army Engineer District, 1960), p. 1; Courier-Journal, 20 Sept. 1951. Concreting this 600-foot section of Boule wickets in 1952 was done for \$69,700 by Central Contracting Company of Oshkosh, WS. After the concreting was completed, 3,860 feet of movable Boule and Chanoine wickets remained in service, more than enough to maintain pool level at elevation 420.
18. Louisville District, Louisville Locks and Dam Design Memorandum No. 1, p. 31; U. S. Army Corps of Engineers, Louisville District, McAlpine Locks and Dam Study Report Revised (Louisville, KY: U. S. Army Engineer District, 1979), p. 4-1.
19. Abbott, "Design for a New Ohio River," pp. 46-49; Louisville District, Louisville Locks and Dam Design Memorandum No. 1, p. 30.
20. U. S. Army Corps of Engineers, Louisville District, McAlpine Locks and Dam: Report on Caving Bank Conditions (Louisville, KY: U. S. Army Engineer District, 1973), p. 1-3; Louisville District, McAlpine Locks and Dam: Study Report Revised, passim.
21. Courier-Journal, 5 May 1965: Willard Roper to Walter Leber, 14 Apr. 1965, Historical Archives, Public Affairs Office, Louisville Engineer District, Louisville, KY.
22. John Rhett to William Starnes, 30 March 1971, Stein Collection, Lakes and Rivers Division, Cincinnati, OH.
23. Ibid. The District worked to remove the auxiliary lock along with the 600-foot lock in 2001 to make space for a second 1200-foot lock.
24. Thomas Nord, "Big, Slow Ohio River is a Commercial Superhighway," Courier-Journal, 16 Aug. 1999; Keenan, "An Ecopolitical System of Global Significance," pp. 210-45.
25. The authors' compilation of wrecks at the Falls indicate the majority occurred as boats attempted to pass Indian chute, but boats wrecking when entering or leaving the canal ranked second.
26. U. S. Army Corps of Engineers, Louisville District, After Action Report: Chlorine Barge Incident (Louisville, KY: U. S. Army Engineer District, 1972), passim.
27. Ibid.
28. U. S. Army Corps of Engineers, Louisville District, McAlpine Interim Study Reconnaissance Report (Louisville, KY: U. S. Army Engineer District, 1984), pp. 4/3-7; Courier-Journal, 22 Dec. 1972.
29. Louisville District, McAlpine Interim Study Reconnaissance Report, pp. 4/1-7.
30. Ibid.
31. Ibid.
32. David Ross Stevens, "Shippingport: An Island Facing Change," Courier-Journal, 24 Aug. 1975. By USGS, the reporter meant the United States Geological Survey.
33. Ibid.; Bob Hill, "The Rise of the Falls," Courier-Journal, 13 Nov. 1988.
34. Martin Pedigo, "Ice on the Ohio," Water Spectrum 9(Spring 1977):30-36. The authors observed the destruction of Big Bone Island.

18: FIFTH PHASE RENAISSANCE

1. U. S. Congress, House, McAlpine Lock and Dam, H. Doc. 102-157, 102d Cong., 1st Sess., 1991, p. 70.
2. U. S. Army Corps of Engineers, Louisville District, McAlpine Locks and Dam: Tainter Gate Operation Study (Louisville, KY: U. S. Army Engineer District, 1986), *passim*.
3. National Park Service, The Falls of the Ohio: Study of Alternatives (National Park Service Midwestern Region, 1981), pp. 43-45.
4. *Ibid.*, p. 15.
5. *Ibid.*, pp. 21-22.
6. *Ibid.*, pp. 48-75; Bob Hill, "The Rise of the Falls," *Courier-Journal*, 13 Nov. 1988. PL97-137 created the Falls of the Ohio National Wildlife Conservation Area. The Corps had developed parks before at its own projects, at Yellowstone National Park, and in 1982 at Big South Fork National Park on the Cumberland River.
7. Hill, "The Rise of the Falls," *Courier-Journal*, 13 Nov. 1988; National Park Service, The Falls of the Ohio: Study of Alternatives, pp. 7, 15, 126-30. Judge Edward Johnstone, U. S. District Court, 13 July 1987 decision in *U. S. v. Alice H. James, et. al.*, copy in Historical Archives, Public Affairs Office, U. S. Army Engineer District, Louisville, KY; Carl Platt, memorandum to Charles Parrish, 28 Aug. 2001. The Rowan heirs received a \$10,000 settlement, avoiding prolonged and costly litigation.
8. Hill, "The Rise of the Falls," *Courier-Journal*, 13 Nov. 1988; Patrick Connolly, "Prehistory Alive in Fossil Bed," *Courier-Journal*, 7 Nov. 1999; *Muncie Star*, 3 April 1988.
9. C. Ray Hall, "What Does Louisville's Riverfront Want to be When It Grows Up?" *Courier-Journal*, 10 Jan. 1988.
10. *Courier-Journal*, 18 Aug. 1987; Robin Garr, "Up a Lazy River," *Courier-Journal*, 2 July 1988.
11. Hall, "What Does Louisville's Riverfront Want to be When It Grows Up?" *Courier-Journal*, 10 Jan. 1988 and 9 Feb. 2001; Garr, "Up a Lazy River," *Courier-Journal*, 2 July 1988; see Louisville Waterfront Development Corporation website.
12. Charles E. Little, *Greenways for America* (Baltimore, MD: Johns Hopkins University Press, 1990), pp. 7-25.
13. *Courier-Journal*, 8 June 2000; *Louisville Magazine* (web edition), *City Guide*, 1997.
14. *Courier-Journal*, 21 Mar. and 1 July 2001; see Clarksville Parks and Recreation website.
15. "McAlpine Lock Construction Project Moves Forward," *Waterways Journal* 115(17 Sept. 2001):6-9.
16. W. N. Whitlock to Steve Proehb, 25 Nov. 1977, Historical Archives, Public Affairs Office, U. S. Army Engineer District, Louisville, KY; U. S. Army Corps of Engineers, Louisville District, Ohio River Main Stem Study: McAlpine Interim Navigation Feasibility Report(4 vols., Louisville, KY: U. S. Army Engineer District, 1986), II, A-1; *Courier-Journal*, 27 Mar. 2000.
17. U. S. Congress, House, McAlpine Lock and Dam, H. Doc. 102-157, 102nd Cong., 1st Sess., 1991, pp. 79-81.
18. *Ibid.* Smithland dam with its twin 1200-foot locks was completed in 1980, and Olmsted Locks and Dam was under construction in 2003. As was the case with the Ohio River canalization project of 1879-1929, some Ohio River modernization structures were rebuilt before the final lock and dam of the series was finished near the river's mouth. Model studies of the two 1200-foot locks at McAlpine revealed that both locks should not be filled concurrently to prevent surges in the canal; the filling operations should be staggered.
19. *Ibid.*, pp. 132-50; *Courier-Journal*, 22 Nov. 1989, 27 Oct. 2001.
20. U. S. Congress, House, McAlpine Lock and Dam, H. Doc. 102-157, 102nd Cong., 1st Sess., 1991, pp. xi, 132-50, 464-65, 480, 485.
21. *Ibid.*, pp. 1-2. The estimated benefit-cost ratio was 1.6 to 1 with the investment capitalized at 8 & 7/8 percent.
22. U. S. Army Corps of Engineers, Louisville District, McAlpine Report (in-house bulletin, Aug. 2000), *passim*. The 2001 resident office staff included Resident Engineer Dave Klintstiver, Assistant Resident Engineer Charles M. Haddway III, Project Engineer Jane Kiefer, Senior Construction Representative Scott Hearne; Engineering Technicians Barkley Nash, Bob Cusick, and Paul Ranney; Construction Representatives Jim Koopman, Milton Hall, Scott Batton, and Mark Wise; Management Support Specialists Marilyn Reading and Janet Lee; Engineering Coops Sara Rogers, Andy King, Aaron Evans, and Greg Griffith.
23. "McAlpine Lock Construction Project Moves Forward," *Waterways Journal* 115(17 Sept. 2001):6-9.
24. *Ibid.* See also the Louisville District's McAlpine Lock Replacement Project website (webmaster Mark Wise).
25. *Ibid.* Captain Shreve on the *Enterprise* completed the first steamboat voyage from New Orleans to Louisville in 1815, developed a steamboat yard at Portland in 1817, and made significant contributions to river steamboat design. After superintending Corps navigation projects he retired at St. Louis and died there in 1851. Lt. Gen. Robert Flowers, Chief of

Engineers, dedicated the new Shreve on 15 March 2002.

26. Louisville District, McAlpine Report (Aug. 2000), *passim*. The authors attended the June 1999 project groundbreaking.

27. Courier-Journal, 8 June 2000.

28. *Ibid.*

29. *Ibid.*; Louisville District, McAlpine Report (Spring 2001), p. 2; Douglas Pohl, interviewed by Leland Johnson, 17 July 2001.

30. Douglas Pohl interview; Louisville District, McAlpine Report (Spring 2001), p. 2. A stone obelisk to be installed in the visitor area will depict historic flood levels at the Falls; the flood of record reached elevation 460.2 MSL on 27 Jan. 1937.

31. David Klinstiver and Charles M. Haddaway III, interviewed by Charles Parrish and Leland Johnson, 17 July 2001. The authors personally monitored construction activities and the public may observe them at the McAlpine webcam site on the internet.

32. Charles Parrish, "Navigation Mission is Old, Continuing," *Engineer Update* (in-house newsletter, Washington, DC: U. S. Army Corps of Engineers, February 2001), p. 1.

33. U. S. Army Corps of Engineers, Louisville District, Proposed Cutoff Wall: Special Study (Louisville, KY: U. S. Army Engineer District, 1992), *passim*; Marcella Denton, interviewed by Leland Johnson, 18 July 2001. A leak between the lower Tainter gates and the hydroelectric plant was detected in 1980 and plugged by grouting; see U. S. Army Corps of Engineers, Louisville District, McAlpine Interim Study Reconnaissance Report (Louisville, KY: U. S. Army Engineer District, 1984), p. 4-1.

34. Haddaway interview, 17 July 2001.

EPILOGUE NOTES

1. U. S. Congress, House, McAlpine Lock and Dam, H. Doc. 102-157, 102nd Cong., 1st Sess., 1991, p. 6.

2. Shirley Toomey, interviewed by Charles Parrish and Leland Johnson, 6 Nov. 2001, Louisville, KY. Captain William Zurlinden's granddaughter, she lived at Shippingport until age 19.

3. Courier-Journal, 27 Feb. 1883, quotes Reuben Durrett, a founder of Louisville's public library and Filson Club.

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