



American Canals

The Bulletin of the American Canal Society

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Canvass White “Cements” His Legacy

The Story of the Chief Engineer of the D&R Canal

John Prieto

“It is proper that I should render a just tribute of merit to a gentleman who now stands high in his profession and whose skill and sound judgment, as a civil engineer, is not surpassed, if equalized, by any other in the United States. The gentleman who I refer to is Canvass White, Esquire...to this gentleman I could always apply counsel and advice in any great or difficult case.” So said Judge Benjamin Wright, lawyer, self-taught surveyor and chief engineer of the Erie Canal. Canvass White was an early assistant on the canal and became Wright’s protégé and would go on to become one of the greatest canal engineers in the country.

Canvass White was born in New York State in 1790 and studied mathematics, chemistry, mineralogy, and surveying. Before he completed his studies, he traveled to Russia to improve his poor health, brought on by chronic illness. White later served as a lieutenant in the U.S. Army in a volunteer regiment during the War of 1812; in the fighting to capture Fort Erie near Buffalo, he was severely injured.

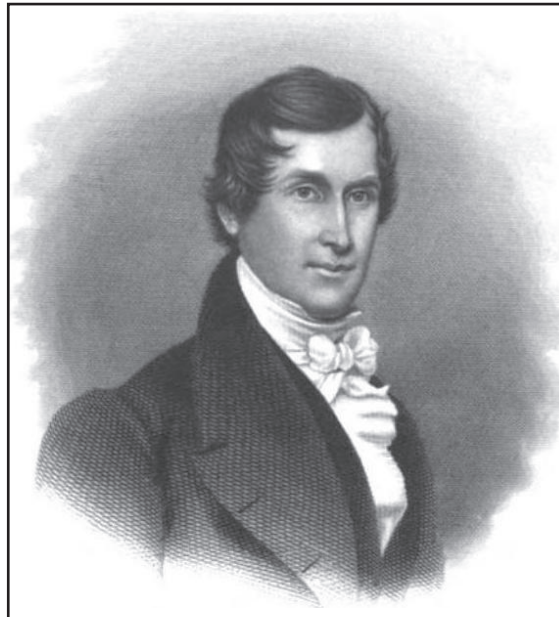
In 1816, he secured a position with Wright, working as an assistant and taking levels on the Erie Canal. At the suggestion of Wright and New York Governor DeWitt Clinton, White ventured to England to carefully study the construction and operation of its canals. He brought back with him modern surveying equipment, detailed drawings, and valuable knowledge of hydraulic cement.

As construction of the Erie Canal was underway in 1818, issues were developing with the mortaring. With his

experience from the Inland Canal in 1792, Benjamin Wright knew that common lime mortar was not the solution. With his upbringing of self-reliance and his talent for invention, Canvass White began searching for and experimenting with local materials to solve the problem.

As construction on the canal’s middle section progressed, lime rock was ordered from Madison County in New York for the masonry. In the processing stage it was discovered that the lime did not “slack” and thus

appeared much different than previous types. Experiments were thus conducted to see if it would produce hydraulic cement. There are varying accounts of exactly what happened next. One telling was that Canvass White brought in one Andrew Bartow, a local scientist, to process and mix it, which in the presence of Benjamin Wright and others proved the new cement to be waterproof. According to Bartow, his own experiments verified that hydraulic cement had indeed been discovered; Canvass White was not mentioned in his statements.



White continued experimenting and settled on a formula that was the answer to the problem. In 1820, White obtained a patent for his cement. The patent entitled him to receive four cents per bushel on the manufacture of the “waterproof cement.” Some 500,000 bushels were ultimately used

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For Canal Calendar items and news of local, state, and regional canal societies: Contact Michael Riley at mriley20@twcnny.rr.com

The objectives of the American Canal Society are to encourage the preservation, restoration, interpretation, and use of the historical navigation canals of the Americas; to save threatened canals; and to provide an exchange of canal information. Manuscripts and other correspondence consistent with these objectives are welcome.

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Canvas White, continued from page 1

during the construction of the Erie Canal. The canal commissioners, interested in the completion of the canal, had made a point of acknowledging no individual discoverer. White pursued payment for his cement from the suppliers but was rebuffed; White then sued a contractor for “infringement,” ultimately receiving some \$1,700 as judgment. When the defendant and other contractors sought relief, White agreed to sell his patent rights to the State of New York for \$10,000, much less than was originally due him. The State did not act on the offer, and after several years, White was never paid.

How was it then that the patent was in Canvass White’s name only? Years later it was found out that Bartow’s daughters had saved letters written between their father and White, detailing an agreement whereby White paid Bartow \$2,000 up front (with the patent in White’s name) with Bartow holding a 25 percent interest in future royalties. With White having no success at securing payment, the issue faded away. Bartow went on to other ventures assisting with cement work. White also moved on, to many other positions and projects.

After his work as an engineer on the Erie Canal, by the mid-1820s White’s career was far from over. In 1825 he was appointed chief engineer of the Delaware and Raritan Canal, where he organized preliminary surveys. He was then named chief engineer of the Union Canal in Pennsylvania, during which time he again became ill. He then departed to New York City to help scout sources for their water supply. Around this time he was solicited to take charge of the Schuylkill Navigation Company and was also a consulting engineer for the Delaware and Chesapeake Canal. He next built the Windsor Locks in Connecticut as chief engineer. In 1827, he was appointed chief engineer of the Lehigh Coal and Navigation Company, where he oversaw the completion of the Lehigh Canal. He also became president of the Cohoes Company, which developed water-power at Cohoes, New York. Among all these duties, White also found the time to be involved with other canal and railroad projects, such as the Camden and Amboy Railroad.

White was advised to retire to warmer climes and a month after arriving in Florida passed away in 1834. He was a pioneering canal builder and civil engineer at a time when engineering as a profession was just beginning. But his most lasting legacy may have been his ability to develop hydraulic cement and thereby launch other successful building projects for decades hence.

We thank the Hudson Valley Magazine, June 18, 2013, for this excerpt (1)

Ask any middle-schooler to name the important figures of the Industrial Revolution and, if she was paying attention in history class, she’ll rattle off names like Eli Whitney, Robert Fulton, and Elias Howe. But even her teacher probably wouldn’t include the name Canvass White. That’s a serious omission, especially in these parts. Canvass White was almost singularly responsible for the success of such 19th-century engineering feats as the Erie Canal, the U.S. Capitol, the Brooklyn Bridge, the Statue of Liberty, Grand Central Station, and, according to one historian, the modern incarnations of New York City and Boston.

What do those things have in common? None of them could have been built without natural cement, and White was to cement what Whitney was to cotton and Fulton was to boating. Along the way, he helped make Rosendale both the eponym for and the center of the natural cement world.

In a technical journal article titled “An Overview of the History and Economic Geology of the Natural Cement Industry at Rosendale, Ulster County, New York,” authors Dietrich Werner and Kurtis C. Burmeister tell how the early years of the 19th century “sparked a number of large-scale building projects, including the construction of regional canal networks. These canal projects required quantities of high-quality mortars unavailable in North America prior to the introduction of natural cement.” Unlike other binding agents of the time, cement is able to harden under water. It is made from clay-rich dolostone or limestone, and the Hudson Valley was geologically blessed with large quantities of both.

Canvass White, more than anyone, used this resource to transform the nation and the lower Hudson Valley. As author Bill Bryson writes: “The great unsung Canvass White didn’t just make New York rich, more profoundly, he helped to make America.”

Cement mixer

Canvass White (1790–1834) was born in the central New York county of Oneida. In 1817, he was an engineer working on the Erie Canal; he went to England to study canal construction, and learned about natural cement. He earned his own cement patent back home and began the first natural cement factory, in Chittenango, in 1819.

The product proved so successful that White quickly expanded operations wherever he found limestone. And the area around Rosendale proved to have the best rocks around, which were unearthed when the Delaware and

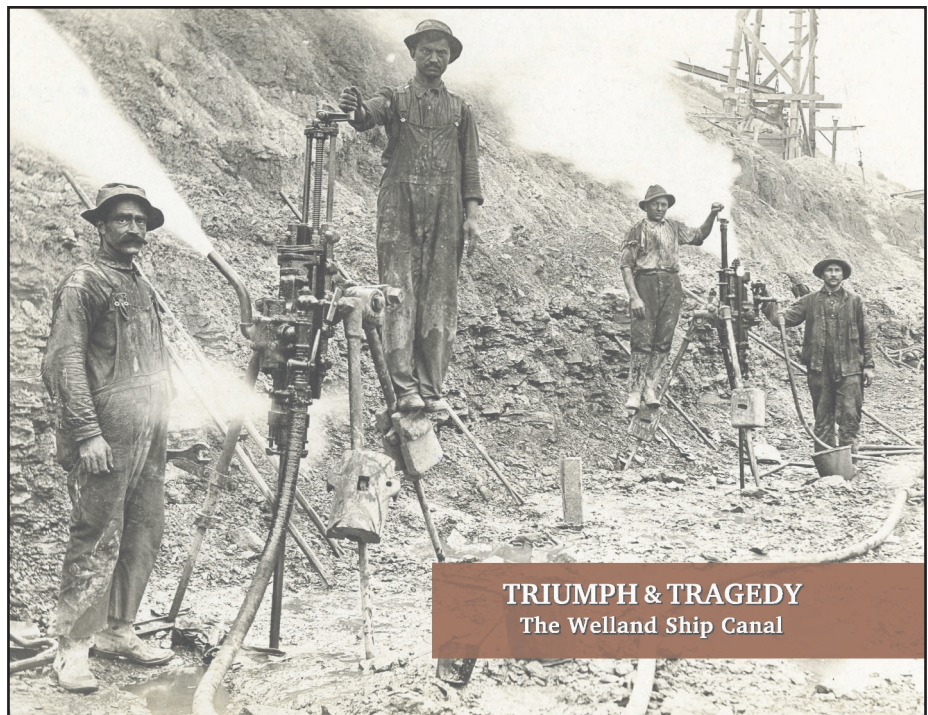
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Book Review Triumph and Tragedy: The Welland Ship Canal

Co-Editors
Arden Phair and Kathleen Powell

Canada's southern neighbor can learn much from the just-published **Triumph and Tragedy - The Welland Ship Canal**. For those New Yorkers passionate about canal history, the book is an outstanding reference with one significant caveat as explained below. The many facets of the Welland's two hundred year history, the technology and the people who made it possible, are all thoroughly documented. For those who benefit from the built environment created by countless workers, the book offers a model of recognition and appreciation of those sacrifices. It honors a promise made in 1932 to commemorate those who were killed during the three decades of construction of the fourth generation of the Welland Canal. Yet, the inspiration for the book clearly predates that promise, found in the labor and dedication of the workers themselves. It is a lasting, accessible and comprehensive memorial to those 138 lost workers.

Triumph and Tragedy follows a Canadian tradition that especially values the rights and contributions of workers. Yes, the United States also has its Labor Day as does Canada. Canada went further with its marking of April 28th as the National Day of Mourning dedicated to remembering those who have lost their lives, or suffered injury or illness on the job or due to a work-related tragedy. Sadly, a cursory recognition often gets overwhelmed by the magnitude of industrial accidents. About the same time that



work began on the fourth Welland, the Hillcrest, Alberta coal mining disaster of 1914 took the lives of 189 workers on that single day. The deaths and injuries that stretched over decades likewise get clouded by other events of the day. **Triumph and Tragedy** succeeds in putting a face and family with each of loss.

The book accomplishes this recognition by providing layered context to the lives lost. A general history of the still-continuing evolution of the Welland Canal sets the stage for a more detailed look at the technology, equipment, structures and services that built the fourth Welland Canal. More than half the book is then dedicated to the stories and portraits of the 138 people killed, arranged chronologically. Few reading the book will actually know any one of those 138 individuals. Yet, each of us actually knows everyone of them. They are the people we see everyday who make society work. Lately, we have started grouping them under the rubric of "essential workers" as they truly are. In the past, their lives at

home and at work were often deemed mundane and rarely recorded by those who left the written records. Only at tragic times do we gain entry into their personal lives. In doing so, we learn much about what it took to build these massive infrastructure projects and what the true cost was. By far the majority were recent immigrants, barely having had the chance to become a part of their new greater community. Addressed by this published memorial, they are rightly now part of our collective community and memory. Not only do we see the faces and the names on each page, but those same faces look back upon our own perceptions of what it takes to make a society.

Partly overlapping with the construction of the Fourth Welland was the very similar work to build New York State's Barge Canal system (1903-1918). New York has never formally recognized the lives lost in its building in the honorable way presented by **Triumph and Tragedy**. And, many lives were lost. We could and should follow our Canadian neighbors to define such a list. As with the Welland, the research will not be easy. Over ten times longer than the Welland, the Barge Canal crosses many communities, each with its own recollections and repositories. The construction of the Barge Canal did not have many of the geographically unified services provided during the Welland's construction whose records would assist with such an accounting.

We know of some deaths due to the prominence of the individual such as when James Casey, one of the primary contractors for Erie Barge Canal Lock 17, was fatally injured on September 14, 1910 when a skip of stone fell on him. Occasionally, the manuscript records of the State's Engineer and Surveyor have the attached blue-colored forms required at the time to report a construction death or injury to the State's Bureau of Labor Statistics. So on January 7, 1912 Remiga Casolanguida, twenty-five years old and likely a recent immigrant, was killed near Rochester when a frozen dump car unexpectedly bounced back on him, crushing him. Whether a master set of such forms is extant in some forgotten State file cabinet

is unknown. Summaries of these reports were published annually by the State's Labor Department. Though they itemize the several dozen canal-related deaths for each year and document the cause, they fail to provide a name or specific place. The litany of these recorded deaths leaves a much darker hue on the engineering marvel of the Barge Canal. Then there are instances where we suspect fatalities happened but confirming evidence remains even more elusive. With remarkably little commentary, the Lockport newspaper carried the announcement in December 1910 that the contractor for the famous Lockport Locks was "importing" 25 African-Americans to do the extremely dangerous tunnel excavation for the new hydraulic raceway. One hopes they came due to skilled experience in such work and not that their lives mattered less.

Has it all been worth this human cost? At my first glance at **Triumph and Tragedy**, I looked for an accounting in dollars and cents of the success of today's Welland Canal, how many tons of Saskatchewan wheat transited or how many cargoes of iron ore? The caveat mentioned at the start of this review is that the book does not have such a financial look-back, the Welland's cost/benefit ratio in cold hard numbers. Indeed, such an accounting has no place in such a memorial as it would imply an impossible scale to weigh the cost of the human lives lost during construction. That cost can never be adequately repaid. It must always be outstanding as a reminder of the sacrifices borne to make society work.

Reviewed by Craig Williams, President, Canal Society of New York State

How to get this book:

TRIUMPH & TRAGEDY: The Welland Ship Canal is published by the St. Catharines Museum and Welland Canals Centre. It retails for \$39.95, plus tax and shipping (where applicable). The limited-edition publication is available at the museum's gift shop located at 1932 Welland Canals Parkway, St. Catharines, ON or by calling 905 984-8880; or via email at museum@stcatharines.ca.

Pennsylvania Canal Society
Tour of the Lower Lehigh Canal
Spring Trip Review - April 16-18, 2021

Michael Riley

After a year of canceled and postponed trips due to the Covid-19 pandemic, the Pennsylvania Canal Society made the decision to go ahead with its spring trip. This included having people drive themselves to the tour stops and take all the pandemic protocols such as wearing a mask. As it turned out, most of the small group of 18 had received one of the vaccines and everyone felt fairly comfortable about gathering. Our tour host and guide was PCS president Doug Logan, who was ably aided by Gordon Perry and John Miller.

The Lehigh Canal was one of the many canals designed principally to carry coal from the anthracite fields to the eastern seaboard. In 1818, coal began to flow downstream in arks along the Delaware River to Philadelphia. In 1829 this route was improved between Mauch Chunk (today's Jim Thorpe) and Easton by the construction of locks and dams, and a combination of canal cuts and slack-water navigation. Once at Easton the coal could then head northeast toward New York City along the Morris Canal,

or south to Philadelphia along the Delaware Canal. In 1835 the company began to improve the route above Mauch Chunk by constructing the Upper Division. This section ran between Mauch Chunk and White Haven. Instead of renumbering the locks and dams along the entire system, the canal was divided by the upper and lower navigations with Mauch Chunk as the starting point. This explains why you can find two locks numbered Lock One near that village. While the upper division was relatively short lived, being destroyed by a flood in 1862, the lower division was in service until 1934. The company that operated the canal also used

switchback railroads and inclined planes to get the coal from the mines to the canals, and later the railroads. It is a fascinating history that is well documented and fortunately for us, well preserved. The entire region is part of the Delaware and Lehigh National Heritage Corridor which was established in 1988. In 2013, the region began to construct the 165-mile-long D&L Trail. This trail connects Wilkes-Barre to Bristol by using the old canal towpath, abandoned railroads and on road sections. The Heritage Corridor also assumed operations of the National Canal Museum in Easton.

Our tour covered the lower division of the Lehigh Canal between Jim Thorpe and Easton. Our tour was based at the Country Inn and Suites, which is just off the turnpike in Weissport. Those who had arrived early on Friday afternoon carpooled to Jim Thorpe for a walk along the D&L Trail to Locks 1 and 2. After parking in the lot near the train station, the group used the new pedestrian bridge that carries the D&L Trail over the river just south of the station. The



Lock 23 and the Lockhouse in Walnutport

bridge affords some great views of the historic village and the Lehigh River. Lock 1 is found just off the bridge and is in fairly poor condition. Doug explained how a dam near the lock created a slackwater pool where boats could cross the river to reach the coal loading chutes at the base of the inclined planes. The boats could also pass through upper Lock 1 to use a 1.6 mile-long-section of the upper division to Glen Onoko where there were additional loading facilities. After passing lower Lock 1, we walked along the trail about a half mile to reach Lock 2. This lock is in a fair condition and the setting in the valley cannot be beat for its natural beauty. The D&L Trail follows the canal in this section and

passes by Locks 1 through 8. The trail is the only way to access these locks and it looks like a wonderful walk or bike ride.

Our host decided to forgo the usual Friday evening pre-trip presentation. I do enjoy these presentations as they help to orient those of us who don't have much knowledge of the area or canal. He did hand out a set of directions and a turn sheet for the Saturday stops. To make my life easier, I spent the evening entering the locations into Google Maps so we could easily follow along and not be lost.

Saturday dawned cool and cloudy with a promise of sun. Due to Covid, most people used their own cars, so it wasn't so much a car pool as a car train. For the most part, Doug's directions were spot on and he was careful to discuss the twists and turns to the next stop before we set off. We then headed out to visit sites in Weissport, Parryville, Walnutport, Treichlers, Bethlehem, and Freemansburg. From

Weissport to Northampton, the D&L Trail follows the railroad and runs along the west side of the river. This is easy to understand as there were many sections of slackwater navigation where there is no old canal to follow. You would miss many of the stops we visited if you were only to follow the trail route. Some of the stops would be almost impossible to find and

understand without the expertise of local guides. One of these sites was Lock 28 in Treichlers where Doug showed us a fairly intact lock with the metal paddle gates still in place although the wooden gates had rotted away years ago.

A site of note was at Walnutport where you will find a four-mile-long section of the old canal. The D&L Trail continues along the west bank of the river passing through Slatington; however a trail spur has been built along the canal on the east side of the river. Here you will find the restored Lock 23 and its lockhouse. This is one of two intact lockhouses that remain along the canal route. Sadly the local group that oversees the house chose not to open

for us so we could see the inside. Instead we walked east to Lock 24 and to see the abutments of the large stone piers of the Poughkeepsie bridge. The trail and canal are very well kept and a credit to the local community.

The other site of great note was in Freemansburg where you will find Lock 44, the second intact lockhouse, and the Freemansburg Canal Education Center. Finding parking in this area can be a real trial when the Center is closed, but the gates were open and parking was easy. The group was broken into two groups with one going to the Education Center, which is in an old canal-side barn, and the other to the lockhouse. The site works with the National Canal Museum to supply docents as needed, and they were on hand to help us understand the site. The lockhouse is being rehabilitated and currently you cannot enter it however, the volunteers did open the door and let us look inside.

All in all, it was great to be able to get out and take a short trip to see something new after a year of lock downs. Doug and the PCS are to be given credit for deciding to offer the trip and dealing with all the additional issues that they had to overcome.

One of the best things about this canal is that you can purchase train tickets on the Lehigh Gorge Scenic Railway to ride from Jim Thorpe to

White Haven. Once at White Haven, the bikes are unloaded and you ride back along the old canal route. If someone were to offer a guided tour, that would make for a great summer or fall tour.

In 1992, David Barber walked and then published a guide to the Lehigh Canal. His explorations took place prior to the construction of the D&L Trail, so although the guide is somewhat dated and does not reflect the current conditions, his discussion of the history and the structures, along with the maps that help you find the sites, remains relevant. I have added the stops to the ACS website map and the Heritage Corridor also has maps of the trail sections and other places to visit.



Lock 44 in Freemansburg

Book Review
Holding Back the River

The Struggle Against Nature on America's Waterways
Tyler J Kelley

A revelatory work of reporting on the men and women wrestling to harness and preserve America's most vital natural resource: our rivers.

The Mississippi. The Missouri. The Ohio. America's great rivers are the very lifeblood of our country. We need them for nourishing crops, for cheap bulk transportation, for hydroelectric power, for fresh drinking water. Rivers are also part of our mythology, our collective soul; they are Mark Twain, Led Zeppelin, and the Delta Blues. But as infrastructure across the nation fails and climate change pushes rivers and seas to new heights, we've arrived at a critical moment in our battle to tame these often-destructive forces of nature.

Tyler J. Kelley spent two years traveling the heartland, getting to know the men and women whose lives and livelihoods rely on these tenuously tamed streams. The result, **Holding Back the River**, is a deeply human exploration of how our centuries-long dream of conquering and shaping this vast network of waterways squares with the reality of an indomitable natural world.

On the Illinois-Kentucky border, we encounter Luther Helland, master of the most important—and most decrepit—lock and dam in America. This old dam, at the tail end of the Ohio River, was scheduled to be replaced in 1998, but twenty years and \$3 billion later, its replacement still isn't finished. As the old dam crumbles and commerce grinds to a halt, Helland and his team must risk their lives, using steam-powered equipment and sheer brawn, to raise and lower the dam as often as ten times a year.

In Southeast Missouri, we meet Twan Robinson, who

lives in the historically Black village of Pinhook. As a super-flood rises on the Mississippi, she learns from her sister that the US Army Corps of Engineers is going to blow up the levee that stands between her home and the river. With barely enough notice to evacuate her elderly mother and pack up a few of her own belongings, Robinson escapes to safety only to begin a nightmarish years-long battle to rebuild her lost community.

Atop a floodgate in central Louisiana, we're beside

Major General Richard Kaiser, the man responsible for keeping North America's greatest river under control. Kaiser stands above the spot where the Mississippi River wants to change course, abandoning Baton Rouge and New Orleans, and following the Atchafalaya River to the sea. The daily flow of water from one river to the other is carefully regulated, but something else is happening that may be out of Kaiser and the Corps' control.

America's infrastructure is old and underfunded. While our economy, society, and climate have changed, our levees, locks, and dams have not. Yet to fix what's wrong will require more than money. It will require an act of imagination. Meticulously researched and as lively as it is informative, **Holding Back the River** brings us into the lives of the Americans who

grapple with our mighty rivers and, through their stories, suggests solutions to some of the century's greatest challenges.



**Holding Back
the River**

THE STRUGGLE AGAINST NATURE
ON AMERICA'S WATERWAYS

Tyler J. Kelley

Review

The preceeding was provided by the publishing company and it nicely outlines this very enjoyable read. The book is divided into three parts; The Lock, Alluvial Empire, and Rivers of Earth. There is a fourth short section titled, Retreat and Fortify. As the synopsis outlines, each part looks at the river through the eyes of a local person or community who has lived, worked, and had their lives impacted by, the rivers. I was very interested in part one, The Lock, and the challenges of using and maintaining Lock 53, the last lock on the Ohio River. Lock 52 and 53 were the last two of the 51 Chanione wicket-style movable dams that once created the navigation pools from the Mississippi to Pittsburgh. The US Army Corps of Engineers has been replacing the old locks and dams with 19 larger structures. Locks 52 and 53, which has been replaced by the Olmsted Lock and dam, are located near the confluence with the Mississippi, and is the busiest on the river. The operation of these locks is critical to all navigation along the river.

The author presents these challenges by way of Captain David Stansbury who operates the William Hank, and Locktender Luther Helland and his crew at lock 52. Kelley deftly explains the need for the movable dams, their construction, and workings, of the old wicket gates. Unlike the movable bridge dams along the Mohawk River, wicket dams are designed to lie flat on the river bottom when the natural depth of water was suitable for navigation. The Ohio can vary from almost dry to 50-feet-deep. When the river runs high, the tows can float right over the flattened dams. When the river depth falls below 9 feet, the wickets are raised one at a time, and slowly the navigation pool is created. Lock 52 had over 400 such wickets, and most of them had to function in order for traffic to continue. Kelley explains how Helland had to manage and almost trick the old wickets to stay in the raised position. As the book was chronicling events in 2016-2018 period, Kelley



Wicket Gates at Dam 6 on the Ohio

was capturing operations at the end of this dam's life. A YouTube video showing the operations of this dam was made in 2011.

The reason that the author was able to write this part at all was the length of time it had taken to get the new Olmsted Dam built. Construction had begun in 1995 and it still is not complete today, and Kelley touches on the issues of building a new structure over a 23-year period as those in Washington managed to both provide and remove funding. In the summer of 2018, the new Olmsted Lock and Dam was put into service even though it wasn't ready for service, but there was little choice as the last two wicket dams at Lock 52 and 53 had completely worn out and were unusable. If you don't read any further than Part One, the book is certainly worth the purchase.

The second and third parts get into the life of the rivers

and how man has tried to control them by way of dredging, levees, flood gates and diversion channels. It often places the local population against the federal government when decades-old easements are suddenly activated in times of high water, or when dams stop the flow of sediments and fill up lakes or fail to resupply old deltas. Seeing the confusion and conflict through the

eyes of the local population and even through the eyes of the employees of the US Army Corps of Engineers, all aided my understanding of the issues. Although climate change is addressed throughout the book, there is no political agenda presented. The book is 224 pages.

Michael Riley

Erie Canal Eras

Compiled by Richard Palmer

This provides a complex picture and context for the often-read comment that the Erie earned one-million-dollars even before it was completed. One can see the earning potential and why it energized canal building in the U.S., but the true picture is very mixed as always with a very expensive, massive project such as a long-distance canal.

From: Laws of the state of New York, in Relation to the Erie and Champlain Canals (Volumes 1 and 2). Albany, N.Y., 1825 (Items in parentheses are from other sources)

1817

March 18 - First report of a financial system, establishing a Canal Fund, by (made by a committee, Mr. Ford, chairman)

April 15- First law establishing a canal fund, and directing the canal to be commenced, &c.

June 17- First contract made with individuals to commence the work in making the Canal under law of April 15, 1817.

July 4- First excavation made at Rome (groundbreaking).

1818

Between July 4, 1817 and January 21st, 1818, the distance contract to be made, 58 miles, and 15 miles of it considered as complete, &c. From August 10, 1818 and Dec. 10, between two and three thousand men, with half as many horses and cattle, and a great variety of mechanical inventions unremittingly employed in constructing the canal, &c.

1819

From January 31, 1818, to the succeeding season (in 1819), 117 miles of the canal completed by October, including the lateral canal to Salina. The whole middle section of the Erie canal (Utica to Montezuma, 96 miles) completed by October, including the lateral canal at Salina, and 12 miles of the Champlain canal. In two months of good weather from January 1819, will complete the excavation. Villages are rapidly rising on the borders of the canal.

Oct. 23- The canal was opened with great ceremony, and navigated by canal commissioners from Utica to Rome.

Nov. 24.- Champlain canal in a navigable state.

Dec.- Water was admitted into the Champlain Canal,

and the canal navigable. Whole length of Erie Canal to be 363 miles, and the Champlain 61 miles, Total 414 miles.

Dec 9- First trip, Seneca Falls to Jordan.

1820

April 20 - First trip, Montezuma to Syracuse.

July 1- Toll first demanded and received. From July 1 till the ice prevent navigation in that year, \$5,244.34 for tolls were received, on the part of the Erie canal which was navigable, &c. and \$450.56 at Little Falls. Six collectors of toll at first appointed. Eastern section commenced in 1820, and 30 miles nearly completed. 93 miles (including Salina side cut) of artificial navigation completed on Erie canal. 17 miles extending from Saratoga falls, to within 10 miles of Waterford, complete on Champlain canal. Lumber, &c, on Champlain canal.

Nov. 7- Fifty-one miles of the canal between the Genesee river and Montezuma, (including 15 lock) under contract and the whole distance of 60 1/4 miles, two additional locks, can be fished by September 1, 1821. Rocks excavated at Little Falls, in 70-80 days, which it was originally supposed would take two years. Lumber &c, passed the Whitehall locals before toll was receivable.

1821

The section from the Seneca to the Genesee river (63 miles) nearly complete. Almost all the line from Tonawanda creek to the Hudson river under contract. More than 27 miles of the eastern division from Utica to Little Falls navigated, and great progress made towards completing those parts of the canal lying west of the Genesee river, and east of Little Falls. The Champlain canal rapidly advancing. From June, 1817, to Oct., 1821, was borrowed for the canals \$2,893,500, and premiums advanced the state on those loans amounted to \$91,202.50, annual interest on these canal loans, \$159,580.

June 6- Contracts received and made for opening a feeder from the Genesee River Canal. Contracts made for carrying the canal from the termination of former contracts on the east side of the Genesee river, westerly, through village of Rochester.

July 10- Contracts made for 20 miles of the canal line west of the Genesee River. During this season more than 80 miles of the western section under contract, and the whole completed or under contract between Seneca river and Tonawanda creek. More than 50 miles of the canal completed or under contract the Seneca and Genesee

rivers, and 28 miles navigated. \$23,001.63 received for toll in 1821 on middle section. Uninterrupted boat navigation from Schenectady to the Cayuga to Seneca lakes.

Nov. 12- Dam near Baker's Falls almost destroyed by a flood.

1822

Canal debt Dec. 1, was \$243,500. More than 22 miles of Erie canal navigated this year. \$64,072.33 for toll were collected this year, (costs of collection \$3,673.50).

July 2- River boats began using canal between Genesee River to Pittsford.

July 30- Boats pass the canal over the Cayuga marshes. Middle section navigable from April to October. Eastern section navigable in like manner from Utica to Little Falls. \$64,072.33 for toll collected this year, (costs for collection \$3,673.50).

Sept. 1- Great dam at Fort Edward finished, so that a continuous sheet of 900 feet of water runs over the whole length of that stupendous structure. Part of dam between Troy and Waterford, injured by a flood. In October, the canal navigable through the Irondequoit embankment. More than 280 miles of Erie canal finished, and \$153,099.47 received for tolls.

Oct. 10- From Rochester the canal completed and filled with water. The four great embankments, viz at Oak Orchard creek, Fish creek, Otter creek, nearly finished. Aqueduct over Genesee river completed- it is 802 feet long, and has 11 arches, &c.

Nov. Water let into canal between Schoharie Creek and Little Falls.

1823

Oct. 1- Whole line between Albany and Schenectady prepared for the reception of water. Two stupendous aqueducts on that part of the line, 1,892 feet long, 29 locks between Albany and Schenectady.

Oct. 6- Rochester aqueduct opened.

Oct. 8- The first boats passed from the west and the north, through the canal, into the tidewaters of the Hudson, at Albany, amidst the celebration of thousands. On the Champlain canal not more than 10 boats in the year 1821, and in the year 1823, they had increased to more than 100. \$26,966.87 collected for toll at Whitehall, Fort Anne, Fort Edward, Fort Miller, Saratoga, Waterford and the state sloop lock. Grand total of canal expenditures up the year 1823, inclusive, was \$6,916,402.47. The Erie canal is the longest in the world.

1824

Debt due at the close of the year 1824 for constructing the canals, \$7,467,770.99. Revenue from toll \$310,000. Duties on salt \$100,000. Excess of revenue above the

interest of the canal \$300,000. 10,000 boats passed this year at the junction of the Erie and Champlain canals. Steamboat introduced to Erie Canal. Boats with commodities proceed at the rate of 55 miles in 24 hours,

Dec. 15- A boat laden with merchandise arrived at Utica from Albany. It was stated that 5,000 houses were built this year in the city of New York, (much of this impulse owing to the canals, &c.) 300 bridges erected across the canal between Utica and Albany, and 80 between Utica and Little Falls. The locks at the junction of the two canals constantly engaged day and night, and yet from 60 to 70 boats constantly waiting their turn to pass. Hydrostatic locks erected for weighing boats and freight, and yet from 60 to 70 boats waiting their turn to pass. 20 tons weighed in one differed only 18 pounds in weight, and that ascribed to the friction. Tolls collected in 1824 on the Erie canal- \$294,546.62, Champlain canal- \$46,214.45. Total \$340,761.07.

Forty boats on an average per day passed the junction during the season, 24 per day, between the junction and Utica, 16 per day between Utica and Rochester - a boat can pass a lock in five minutes, and 180 can easily pass in a day through a lock, (canal being 40 feet wide on the surface, and 28 at the bottom,) Great press of business on eastern section. Canal debt this year, \$7,700,000. Toll received in 1820 was \$5,437,34, in 1821- \$23,000.00., in 1822- \$57,160.39, in 1823- \$105,037.35, in 1824- \$294,546.62. Add Champlain canal- \$46,214.45. Total- \$531,396.15.

In 1820, only 94 miles of the Erie canal were finished. In 1821 it was 94, 1822-116, 1823-160, 1824-280. (Revenue estimated after 10 years to amount to a million upwards of dollars per annum.) More than nineteen/twentieths of the toll is paid by our own citizens. Estimates of toll and population, showing that in the year 1836, our population will increase to 2,000,000 souls, the toll to \$1 million. The annual period of navigating the canals is at present about 220 days, but with the improvement of the country, cutting down forests, &c. the climate will ameliorate and increase it probably to 250, or 275 days. Where one ton of merchandise goes into the country, five tons of produce find their way on the canal to the Hudson River. More than 50,000 bushels of water proof lime used in building the canals. Estimate showing how the annual amount of tolls received may exceed \$9 million. Boats from 35 to 45 tons navigate the canals. Canals constructed with unexampled rapidity by our own citizens, and with our own resources, exclusively. Canal debt on Jan. 1, 1826, will amount to \$7,662,092.55, and

Continues on page 16

Book Review
Stairway to Empire;
Lockport, the Erie Canal and the Shaping of America.
Patrick McGreevy

Although this book was published in 2009, I had not heard about it until I was virtually attending the 2021 Canal Society of NYS Winter Symposium. Mr. McGreevy was one of the presenters on the topic of the Lockport flight, its natural history, and the ongoing restorations. Mr. McGreevy's role in the presentation was to speak about the geology and how it shaped the way the canal was constructed. His presentation was interesting enough to make me order the book from the SUNY Press website.

The title comes from the five side-by-side locks that were built to overcome the sixty-foot-high Niagara escarpment. The construction of these staircase locks allowed the canal to be built to Lake Erie (instead of Lake Ontario) and for Lake Erie waters to fill the canal. By constructing these locks and opening the canal, the route to the Midwest and West was opened and the empire of the United States was created. It is a bold statement, and tends to overlook the influence of the other canals and waterways, but there is no denying the importance of the Erie Canal.

Perhaps the most interesting takeaway from the book is Mr. McGreevy's argument that the construction of the five-mile-long deep cut was the most important feature of Lockport, and not the locks. If you are not familiar with the area, the locks allowed the canal to climb up over the escarpment, however, once the canal reached the top, a higher area known as Mountain Ridge lay between Lockport and the Tonawanda River near Pendleton. To be able to use the water of Lake Erie to supply the canal this ridge had to be cut through. This was a greater task than the building of the locks and was more important to the success of the canal. However, the Deep Cut to Empire is not as sexy a title.

Although the book presents some new ways of looking at Lockport, I found it to be tiring to read. I did enjoy the fact that the author notes that, "Although the Lockport combine was the only staircase on the original Erie, there were precedents in Europe; in addition to the French masterpieces on the Canal Du Briare and the Canal Du Midi, there were several more recent British examples." (page 99) It was refreshing to see that the author properly placed the Erie as one of many canals, and that ideas were shared between builders. Too often

Erie Canal enthusiasts feel that everything that took place along the Erie was the result of Yankee ingenuity.

While I found this refreshing, there were other passages that made me cringe. McGreevy spends a lot of time comparing the opening of the canal, or as it was called, the wedding of the waters, to an actual marriage. Or as he suggests, perhaps it was a rape? He writes, "Marriages are consummated by a penetration, but abduction and rape accomplish the same deflowering without consent. Despite the rhetoric contrasting the peaceful benefits of internal improvements with the horrors of war and conquest, constructing the Erie Canal was, in a sense, an act of violence." (page 126) Yea, I get it. In this new world of history, we need to acknowledge every good and evil of the events and actions taken by our ancestors, but this was just too much.

In a sense, I felt that the book was far too wide ranging. McGreevy tries to cover it all, from the geology that created the landscape that allowed the canal to climb over the escarpment, to the difficulties in blasting the deepcut through the bedrock, and then onto the impacts of the canal in the village and across the land. He quotes often about the societal impacts from Carol Sheriff's excellent *The Artificial River*, as well as the issues with canal workers from Peter Way's *Common Labour*. Perhaps the author was writing for an audience that might never pick up another canal book and wanted to give the most in-depth coverage he could to the subject. The book is certainly wide ranging. It is dense with facts and opinions. An example of this wide-ranging discussion was the naming of all the twenty-one Lockports that can be found in North America. Can you name them all? Do you care? In the end, I found myself flipping through the pages, something I hate to do.

Am I unhappy that I purchased this book? Certainly not. The sections about the natural geology are quite good, and I will certainly look at the deep cut with a renewed perspective. If you have not read it and can find it in your local library, it is worth the read.

Stairway to Empire; Lockport, the Erie Canal and the Shaping of America. Patrick McGreevy, SUNY Press, 2009, Paperback, 328 pages, \$33.95

Michael Riley

Hudson Canal was being dug in 1825. Those limestone deposits were vast: twenty-two-foot deep, three-miles wide, and extending thirty-two-square miles between High Falls and Kingston. The cement turned out to be so good, the term “Rosendale cement” became interchangeable with natural cement, like Kleenex for tissues.

By then, the cement business was fiercely competitive. White and his partner and brother, Hugh, knew they couldn’t compete from faraway Chittenango. The Whites relocated to Whiteport, near Rosendale, in 1836, “a time of considerable growth in the natural cement industry,” according to Werner and Burmeister’s article.

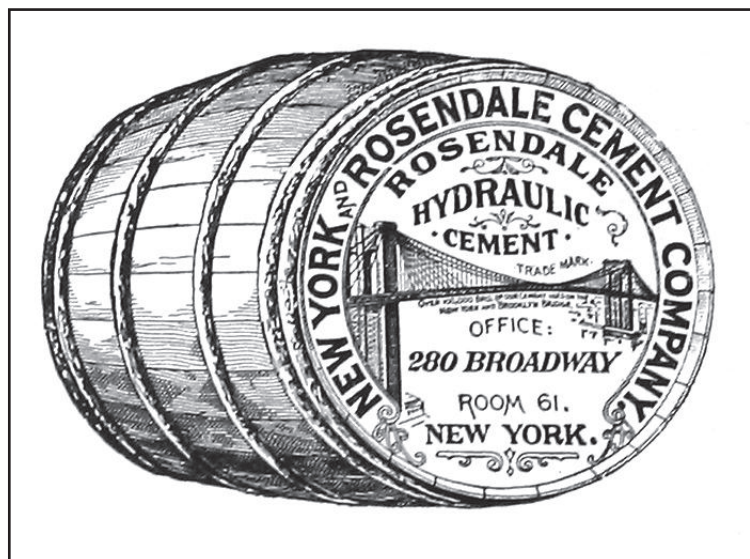
By the early 1840s, 13 companies produced 600,000 barrels of cement annually. Thanks to the Delaware and Hudson Canal, Rondout Creek, and the Hudson River, these companies were able to ship concrete and import fuel more cost-effectively than inland cement producers. Rosendale cement eventually found its way to every major port on the Atlantic Ocean

and was used in just about every significant construction project of the era. For example: From 1884 to 1886, Rosendale cement from the Widow Jane Mine was carried to Liberty Island, where it was used to build the base for the Statue of Liberty, the largest 19th-century concrete structure in the United States. Behind the granite walls of the statue’s pedestal, the foundation is comprised of massive concrete walls eight to 20 feet thick and 15 feet deep.

In the final year of the 19th century, Rosendale’s cement industry peaked, producing nearly ten-million-barrels a year. But as the new century began, builders needed even stronger cement, and a new product called Portland cement rapidly became more popular. In just a decade, from 1900 to 1910, the two products essentially exchanged market share. Natural cement production in the U.S. shrank from ten million barrels annually to one million, while Portland cement production grew from one

million barrels to more than 12 million by 1910. Natural cement held on for a while as a specialty product, but in 1970, Rosendale’s Century Cement Manufacturing Company, the last natural cement works in North America, closed.

All in all, it had been a good run. Thirty-four different cement companies filed a property deed prior to 1900 at the Ulster County Clerk’s Office, says Gayle Grunwald of the Century House Historical Society. “This did not count unincorporated family businesses,” she says, of which there were probably many. During most of the 151-year span of the natural cement industry, Rosendale produced nearly 50 percent of all the natural cement manufactured in North America.



(1) Link to the entire article: <https://hvmag.com/life-style/history/a-history-of-rosendales-natural-cement-industry/>

*Those readers with an interest in the development of hydraulic cement might wish to read an article by Bill Hullfish, titled “What was the Most Important Discovery in the Construction of the Erie Canal and Who Discovered It?” in the Fall 2019 edition of *American Canals*.*

The Davis Island Lock and Dam

Michael Riley

After reading **Holding Back the River** (see review on page 8), I did some searching through the old newspapers to see what I could find about Chanoine wicket dams. I found this article from 1878 when the first wicket dam was being constructed at Davis Island, just downstream of Pittsburgh. I also added a short bit from the **1903 Improvement of Rivers** and the **1983 Engineering Record** for context. The site was designated as a National Historic Civil Engineering Landmark in 1985.

Movable Dams

Pittsburgh Daily Post, Wed, Dec 4, 1878 Col. Merrill's Opinion and Knowledge of Them How the Davis Island Dams Will Work- Objections to It Answered

Workmen are now engaged at repairing the recent break at the coffer dam at Davis Island. The break is being rebuilt and additional filling is being placed all around. The water has not been pumped out yet, but will be as soon as it has been made tight. Work on the foundation of the lockhouse has been finished, and the masons are now engaged upon the brickwork of that structure.

In this connection our readers will no doubt find interest in an abstract of a letter written by Col. Wm. Merrill in answer to various objections urged against the movable dam experiment at Davis Island. The Colonel says:

In the first place, the special utility of a movable dam is due to the fact that it is only set up when the natural navigation of the river becomes insufficient. The natural navigation of all stages of six feet and higher is entirely unimpeded- is just as free as it is now. How then, in the name of common sense, can a traffic that is only carried on when there is six feet and more in the river, be injured by a movable dam? And yet the claim is made, not that it will somewhat injure, but that it will injure it nine million dollars worth per year?

In reply to those who say that the dam cannot be arranged so as to leave the river free at high stages, I have only to state that it can be so arranged, and that I have seen numbers of dams so arranged, that I have visited them repeatedly, have studied them in books and on the ground, have seen all their maneuvers, and that there is no matter of which I am more fully satisfied than I am of the

truth of the statement, which I have often repeated, that the only practical method of satisfactorily improving the navigation of the Ohio River is by constructing movable dams.

In deference to the prejudices of some navigators of the Ohio, the present purpose of the General Government is limited to the construction of one movable dam- that at Davis Island. It is simply impossible that this one dam can have any influence whatever on the coal trade, except the good influence of increasing the harbor room for coal barges, although possibly the owners of the few good landings, at present available, may not care to have other equally good ones brought into market. *Hinc illae lachrymae*, a quotation that I think will not be considered seditious. [ed- a search brings up, *Hinc illae lacrimae*, or Hence the tears!]

As to the deposit of sediment in Pittsburgh harbor, I have only to say that deposits can no more accumulate when the dam is built than now, for the simple reason that the river is wholly unobstructed as stages above six feet. I am glad this point was mentioned, as this freedom from sedimentary deposits is one of the chief reasons for using movable dams, such as those on the Monongahela.

The system of wing dams has been tried on the Ohio for forty years, and experience has shown that they usually do some good, but that this good is not always commensurate with the expense. The minimum depth in any river consistent with cheap water transportation is six feet, and it is impossible to secure a six-foot navigation in low water in any part of the Ohio river by any number or combination of wing dams. A constant depth of six feet, such as is maintained in all improved rivers of France, can only be maintained by dams, and the only question to be answered is whether these dams shall be fixed or movable.

I have often been asked how many movable dams there are in France and how long they have been in operation. In order to answer this question I wrote to a distinguished French engineer, Mr. Maleziou, and requested him to send me a list. It has just been received, and I am now able to state that there are at present in France 124 movable dams, of which the oldest was completed in 1841, thirty-seven years ago. In all, fifteen dams have been finished during the present year, and others are in course of construction, of which no mention is made in the list. There can be no question, therefore,

that movable dams are thoroughly approved in France and that their use is steadily increasing.

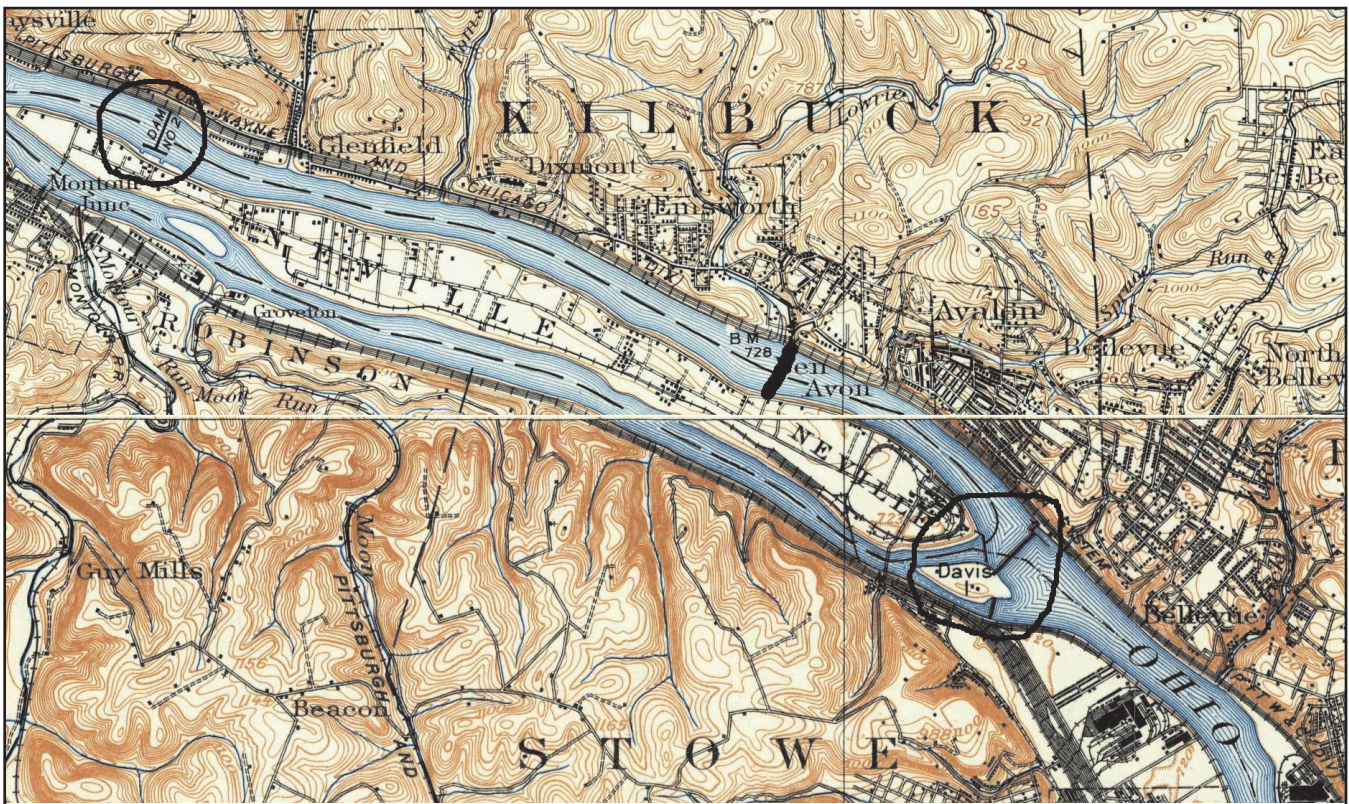
From The Improvement of Rivers, B.F. Thomas and D.A. Watt, 1903

The largest system of movable dams in America, and one which, when ultimately completed, will compose the largest system in any country, is that of the Ohio River. At present only one dam is actually in operation, that at Davis Island, a few miles below Pittsburgh, at the head of the river. This was the pioneer of movable dams in this country, having been completed more than twenty years ago in the face of strenuous opposition from the navigation interests, who believed that any structure in the river would seriously hamper traffic. One result of its construction has been that these interests have since come to see that a suitable system of slackwater is of the greatest benefit to commerce. Several other dams, Nos 2,3,4, and 5, are under construction and will be complete in a few years. Page 271

From the Historic American Engineering Record, Documentation of Lock No. 1, Davis Island Dam, 1983

As the first lock and dam on the Ohio River, the Davis Island Lock and Dam was an experimental project testing the skills of the 19th century engineers. Project design achievements included the first rolling lock gates, the largest movable dam built in the 19th century, and the widest [lock] chamber of world history.

The engineering experiment at the Davis Island project proved so successful that the system was extended the entire length of the Ohio River, with completion of 50 locks and dams similar to the David Island project by 1929.



The Davis Island lock and dam was 4.5 miles downstream from Pittsburgh. This merge of the 1906 Sewickley and 1904 Carnegie topographic maps shows the location of the lock and dam, as well as Dam 2. Both these have been circled. The 1921 Emsworth Lock and Dam, noted by the heavy line, replaced three older lock and dams, that were all numbered as #1. These were; the Davis Island lock on the Ohio, Lock 1 on the Monongahela, and Lock 1 on the Allegheny.

Canal Tidbits and News

Canal Era, continues

The ACS will be holding its Annual Board Meeting on Sunday, August 29, which is the first day of the **World Canals Conference**. We will meet between 2 and 4pm at the Ramada Plaza, and you are all invited to stop by, say hello, and even sit in. You can share your canal news with us!

If you wish to receive a digital newsletter, let us know. We will be happy to add you to the email distribution while we mail you a printed copy. The digital version is in color, for those few times when we run a color image or map. And if you know someone you feel might enjoy receiving American Canals, send us their name and address. We can mail or email them a few copies.

Where is **Terry Woods' Canal Comments**? Space prevented us from including him here, but you can find some of his columns on the ACS website. We are adding more all the time.

Have you been doing any local research and want to see your name in print? Please consider sending us your articles. We can use them in the newsletter and post them to the website. As there are no space limits on the website, long form articles with lots of details and photos are welcome. As we mail American Canals to a number of libraries, archives, canal groups, and state agencies, it is a nice way to share your findings.

We were saddened to hear the news of the passing of **Dr. Bill Hullfish**. Bill had given a presentation about the use of song in tracing canal history at the CSNYS Winter Symposium, and appeared to be in fine voice.

in ten years will be extinguished.

1825

Jan. 1 - Canals and can fund estimated at \$9,006,346.10. Canals cost, (deducting the tolls received from canal and the Western Inland Lock Navigation Canal, which are \$494,773.38) \$3,829,055.67. But add the tolls and it amounted to \$9,323,789.05. And if the sum necessary for completing the canals, and satisfying all claims for damages be added, and which is estimated at \$8,829,055, then the whole cost will be \$10,123,789. Revenue of canal fund for 11 months was \$592,497.07, of which \$289,320.58 was for canal tolls. Estimated revenue of canal fund for this year, \$717,500. Canal debt, Jan. 1, 1825, \$402,823.55. Whole amount of canal tolls received from the commencement of the canal to the year 1824, inclusive, (including \$8,738 received from WILN Canal), is \$494,733.38. Annual surplus revenue to be applied to the reduction of the canal debt, \$610,000. Total cost of aqueduct at Rochester, \$87,127.61, total cost of canal 7 miles through Cayuga marshes, including lock, \$122,759.34

Oct. 26 - Grand opening of entire canal with much celebrating.

Canalendar

Note- The best advice remains to check a group's website or social media for updates.

August 30-Sept 2, 2021: World Canals Conference 2021, C&O Canal, Hagerstown, MD. www.wcc2021.com

September 26-28, 2021: Canal Society of New York State, New York State Canal Conference, Schenectady, NY at the Mohawk Harbor Resort and Casino. <https://www.nyscanalconference.org/>

October 1-3, 2021: Pennsylvania Canal Society, Fall Trip, joint tour with the Ohio Canal Society, Pittsburgh Riverboat Tour, PaCanals.info@gmail.com

April 22-24, 2022: Pennsylvania Canal Society, Spring Trip, Upper Grand Division of the Lehigh Navigation, PaCanals.info@gmail.com

May 30 - June 3, 2022: World Canals Conference 2022, Leipzig, Germany. This is a reschedule of the 2020 event.